Cusrow Wadia Institute of Technology
Pune 411 001

CIVIL ENGINEERING DEPARTMENT

Multi Point Entry Credit System 2018

CURRICULUM

(W. E. F. June 2018)

Cusrow Wadia Institute of Technology, Pune 1.

CURRICULUM REVISION (2018)

1. Preamble:

- Cusrow Wadia Institute of Technology, Pune was granted Academic Autonomy in the year 1985 by Government of Maharashtra vide letter No. PTI 2483/119915(234)/TE-I (B) dated 27/2/1985.
- Initially the Institute adopted the Model Curriculum prepared by then TTTI, Western Region, Bhopal. Subsequently, the revisions in the curriculum were made as per the needs of the Society.
- The Institute adopted Multi Point Entry and Credit System w.e.f. June 1998.
- The earlier revision of the curriculum was carried out in the year 2014. Review of the curriculum adopted in 2014 was taken in the subsequent years. Necessary changes in the contents and detailing of the document as regards to the outcomes, implementation strategy and assessment were done by end of academic year 2017 - 18. The present outcome based curriculum will come into force w.e.f. June 2018.
- The feedback was taken from various stake holders and it was strongly felt that the rapid strides in the field of Information Technology, Computers and Construction and allied processes, a dynamic curriculum need to adopt the benefits of the fast changing expectations in the contents as well as the Teaching Learning Methodology.
- The Institute has strengthened the hardware and software which is constantly consolidated and upgraded to match the needs of the society in general and the Industries in particular.
- Students should be proficient in the use of computers and related softwares irrespective of the branch of Engineering they are studying. The students shall be made to make maximum use of software packages and use Internet to derive and update their knowledge.
- The contemporary needs of the user system and overall development of the students is the governing factor in the revision of 2018 outcome based curriculum.

2. Approach for Curriculum Revision:

- The curriculum should help the students to acquire professional skills and inculcate attitudes in order that the student will be able to discharge the role and functions effectively on the societal and employment front.
- Scientific system approach has been adopted in the revision of this outcome based curriculum.
- A curriculum revision model showing various steps undergone is presented.
- Analysis of the existing curriculum was done by taking feedback from the faculty implementing the curriculum, Alumni, Industry / Field Personnel, Courses Committee Members and the Experts in the field of Education.
- Entry behaviour of the students was assessed. Basic entry qualification for Diploma is SSC or equivalent. However, higher entry qualification like 12^{th} Science, 12^{th} MCVC, ITI etc. was also considered.
- Curriculum documents of MSBTE, other Boards and other Autonomous Institutions were studied for inclusion of new courses and analysis of contents of existing and newly inducted courses and also the implementation strategy.
- The curriculum is rationalised as per the AICTE and MSBTE norms and guidelines.

- The team members were identified for collecting feedback from stake holders and interviews with Experts for noting the suggestions about the courses and necessary modifications Interaction was carried out with expert from Industry and Academia. The faculty members were trained by specialists in Technical Education System as regards to the Curriculum Revision Process.

3. Roles to be played and functions to be performed by a diploma holder:

- A Diploma holder may be employed in the Industry as a Technician or Supervisor for Production, Installation, Repairs and Maintenance. He also may be employed in drawing, estimation or as an Assistant in IT related activities. He may be an Entrepreneur, be assigned a job of Purchase/Marketing Department. Diploma holder should have basic knowledge of the various subjects of his branch in Engineering and also the related Inter-disciplinary subjects. He should be aware of the present technologies and be able to adopt the changes in future. He shall acquire the necessary skill sets in the Engineering subjects.
- His role in the Society is that of a responsible individual and should conduct himself as regards the values and cultures. He should acquire the necessary professional, presentation and managerial Skills.

4. Outcome Based Education (OBE)

- The induction of India in the Washington Accord in 2014 with the permanent signatory status of The National Board of Accreditation (NBA) is considered a big leap forward for the higher-education system in India. It means that an Engineering graduate from India can be employed in any one of the other countries who have signed the Washington accord. For Indian Engineering Institutions to get accredited by NBA according to the pacts of the accord, it is compulsory that engineering institutions follow the Outcome Based Education (OBE) model.
- Cusrow Wadia Institute of Technology has adopted Outcome Based Education (OBE) model in revision of its curriculum effective from year 2018. Development of curriculum based on OBE model is a noteworthy step towards further improvement in quality of technical education at polytechnic level in this institute.
- Outcome based education (OBE) is student-cantered teaching learning model that focuses on measuring student's performance through outcomes. Outcomes include knowledge, skills and attitudes. Its focus remains on evaluation of outcomes of the program by stating the knowledge, skill and behaviour a diploma holder is expected to attain upon completion of every course (Course Outcomes) and after three years of diploma program (Program Outcomes). Program specific outcomes (PSO's) are statements that describe what the graduates of a specific engineering program should be able to do.
- This OBE model measures the progress of the diploma holder in three parameters, which are
    - Program Educational Objectives (PEO)
    - Program Outcomes (PO)
    - Course Outcomes (CO)
- Program Educational Objectives (PEO) are broad statements that describe the career and professional accomplishments that the program is preparing the graduates to achieve. PEO's are measured 4-5 years after graduation.
- Program outcomes are narrower statements that describe what students are expected to know and be able to do by the time he/she completes diploma education. They must reflect the seven Graduate attributes as described by NBA for polytechnic education programs. Course

outcomes are the measurable parameters which evaluates each students performance for each course that the student undertakes in every semester.

- The assessment of outcomes is divided in two parts direct assessment and indirect assessment, direct assessment includes mid and end semester examinations, tutorials, assignments, project work, orals, practical examinations, continuous lab work assessment, presentations and carries weightage of 80%. Indirect assessment involves assessment through employer feedback, alumni feedback, parents' feedback etc and carries 20 % weightage. These course outcomes are mapped to Program outcomes based on relevance. This pattern of evaluation aids in effectively measuring the Program Outcome. The Program Educational Objective is measured through Employer satisfaction survey, Alumni survey, Placement records and higher education records.

5. Analysing Job Functions and Deriving Curriculum Outcomes:

- Vision and Mission of the programme were framed.
- The role of Diploma holder as a technician on the job is analysed in the four 'Program Educational Objectives (PEO)' mapped with mission of the Department.
- The Program Outcomes (PO) suggested by NBA is incorporated with proper thought and understanding and two 'Program Specific Outcomes (PSO)' were defined after discussion with stake holders.
- Course Outcomes (CO) for each course is meticulously defined and mapped with POs and PSOs
- The courses common to several programmes and the courses relevant to particular programmes were classified under various categories.
- The overall course structure and Teaching Examination Scheme was prepared.
- The contents of various courses were finalised by considering the feedback from stake holders through interviews, and discussions.
- The course structure and the contents were validated by the Board of Studies.
- Study of the Diploma programmes offered by MSBTE, other State Boards and other Autonomous Institutions was done to widen the perspective.

6. Evolving the teaching learning process:

The following points were considered:

- No. of weeks – 16
- Average days per week- 5.5
- No. of contact hours per day – 7
- No. of hours per week for instruction and pre-decided Co-curricular activities – 38.
- Each course shall be taught for sixteen weeks.

7. Course Categories:

- Foundation (1)
- Allied (2)
- Core (3)
- Applied (4)
- Specialised (5)
- Number of courses for a programme – 37.
- Number of courses for award of class – 11

- Number of Elective courses – 3
- Number of credits to be earned for obtaining Diploma – 191.
- One credit = one hour of lecture or one hour of practical per week for a course.
- Ratio of theory to practical hours per week : approx. 53:47

8. Examination scheme:

- Theory paper – 80 marks
- Tests – 20 marks
- Term Work – 25 - 100 marks
- Practicals - 25 – 50 marks
- Viva voce - 25 – 75 marks
- Project Work - 100 + 50 marks
- Grand total – 4750 marks
- Grand total of marks for award of class – 1700.

9. Course-wise content detailing:

- For finalisation of course structure from Courses Committee, Examination Committee and Board of Studies, various processes in the Curriculum Revision Model were followed. Also the documents of MSBTE and Autonomous Polytechnics were referred.
- Contents were decided by taking into consideration, the expectations of the stake holders, specific needs of Industry, Interviews, Discussions and Experts opinions.
- Every course has a unique code e.g. R18CE4101. 'R18' means the course is from the curriculum revised in 2018. CE implies Civil Engineering Department will teach this course. '4' indicates that it is Applied Course Category in the programme structure. '1' means the course is to be taught by Civil Engineering programme. '01' is the serial number of the course in Applied Courses Category.

  The 7th character in the above 9 digit code is assigned for the programme, e.g. 1 – Civil, 2 – Mechanical, 3 – Electrical, 4 – Computer and 5 – Electronics & Telecommunication Engineering and 7 – Common courses for all programmes taught by Science Department.
- A rationale giving the importance of the course in the curriculum is vividly explained. The proficiency expected to be developed through the course is defined. The course outcomes are derived indicating the purpose to teach the course.
- The practicals, student activities, assignments & tutorials are spelt out along with assessment technique in form of Rubrics.
- The inputs for student activities are included in most of the courses so that the students will be able to learn the contents beyond syllabus.
- The curriculum document prescribes learning resources for students e.g. Reference books, Textbooks, Websites, Handbooks, Printed notes etc.
- Use of Learning Management System, Audio Visual Aids be increased for enhancing the Teaching Learning Process.

10. Curriculum implementation strategy:

- Members of the faculty shall continuously undergo Induction Training Programme, Content upgrading programme conducted by ISTE, NITTTR and other Organisations.
- The faculty members will be deputed to attend Refresher courses and Training programmes so as to help them keep abreast with latest developments and technology.

- Faculty members will be trained/updated in respect of various aspects and methods of evaluation systems, paper setting etc.
- Faculty will be trained/updated for monitoring the curriculum implementation.
- Library will be constantly modernised with additions of latest titles and books .The Library will have open access to the students. Library will be open for extended hours. The Books Bank Facility will support the demand of the students.
- The Laboratory and Field Manuals will be structured and standardised so that the students can spend more time for doing practicals, understanding the significance, discussions and result analysis rather than only writing the journals.
- The Examination rules will be revised to suit the curriculum and will have similarity as regards to principles followed by MSBTE and other Examination bodies.
- The Evaluation Systems and marking schemes will be commensurate with the input hours and importance of the topics in the course.
- 24 X 7 – 50 MBPS internet connection is available for faculty, staff and students. Also Wi-Fi connectivity provided in all classrooms and laboratories will support the modern methods of teaching.
- Uninterrupted Power Supply and captive power is made available to take over the load shedding.
- The laboratories, equipments and computers be maintained in working conditions. The models, charts and exhibits be displayed to invite attention of the students.
- Industrial visits, Field visits, Study tours shall be arranged regularly in a preplanned and structured manner so as to have focus on technical aspects.
- Guest faculty should be invited to deliver lectures on recent trends, technologies, materials and processes. These activities be planned in the beginning of the term.
- The students should imbibe various life skills, soft skills, learn stress management and adjust help and appreciate colleagues especially during group activities, study tours and visits etc.

Cusrow Wadia Institute of Technology, Pune 1.

Vision And Mission of The Institute

Vision

To be a resourceful institute that develops technically competent and socially responsible citizen for futuristic needs of industry and society.

Mission

M1: To impart technical knowledge and skills along with ethical and social values

M2: To continually enhance curricula and learning resources as per latest trends in technology.

M3: To develop the faculty and enable them to implement innovative teaching methods.

M4: To strengthen association with industry and alumni.

M5: To adopt and implement various e-governance practices for benefits of stake-holders.

Vision and Mission of the Civil Engineering Department

Vision

To mould the students to become responsive to the needs of the civil engineering field by imparting quality curriculum.

Mission

M1: To impart industry focused technical skills and adhere to social and ethical values.

M2: To update curricula as well as learning strategies in tune with latest development in Civil Engineering.

M3: To reinforce linkage with industry as well as alumni.

M4: To continuously develop faculty & infrastructure.

Cusrow Wadia Institute of Technology, Pune 1.

DIPLOMA PROGRAMME IN CIVIL ENGINEERING

Rationale

Civil Engineering is a professional engineering discipline that deals with the planning design, construction and maintenance of the physical and naturally built environment, including works such as buildings, roads, railways, dams, canals, effluent treatment plants etc. The various sub-disciplines are material science, geotechnical engineering, surveying, construction, water resource engineering, transportation engineering, environmental engineering, structural engineering and project management.

Aim of Civil Engineering fraternity is to improve the standard of life of human being by providing physical means for human activities. The existence of creation of Civil Engineer can be felt from buildings, roads, railways, dams, canals and all such structures. A Civil Engineer learns and works with nature. He integrates the knowledge of physical science, mathematics, sociology and management by providing solutions to challenges posed by the society and nature. It is one of the oldest discipline addressing basic needs of water, shelter and food. It grooms civilisation by providing basic infrastructure for the businesses, industries and organisations dealing with health, education, entertainment etc.

New challenges of sustainable development, maintain ecological balance with ever increasing demand for the physical means from the society can be mitigated by adopting clean technologies, eco friendly materials and advanced knowledge based decision system by integration with other engineering disciplines. Therefore the scope of Civil Engineering has crossed all physical, socio-political and technological boundaries. The leadership, teamwork, good human engineering with sound technical bias will be the key elements in making of a Civil Engineer.

Program Educational Objectives (PEOs)

PEO 1: Actively engage in problem solving using Civil Engineering principles as a team member or individual to address the evolving needs of the society.

PEO 2: Adapt emerging techniques & methods in their professional practice in related fields.

PEO 3: Provide ethical, social & sustainable solutions to Civil Engineering application areas.

Program Outcomes (POs)

PO1: *Basic and Discipline specific knowledge* - Apply knowledge of basic mathematics, science and engineering fundamentals and engineering specialization to solve the engineering problems.

PO2: *Problem analysis* - Identify and analyse well-defined engineering problems using codified standard methods.

PO3: *Design/development of solutions* - Design solutions for well-defined technical problems and assist with the design of systems components or processes to meet specified needs.

PO4: *Engineering Tools, Experimentation and Testing* - Apply modern engineering tools and appropriate technique to conduct standard tests and measurements.

PO5: *Engineering practices for society, sustainability and environment* - Apply appropriate technology in context of society, sustainability, environment and ethical practices.

PO6: *Project Management* - Use engineering management principles individually, as a team member or a leader to manage projects and effectively communicate about well-defined engineering activities.

PO7: *Life-long learning* - Ability to analyse individual needs and engage in updating in the context of technological changes.

Program Specific Outcomes (PSOs)

PSO1: *Construction Planning and detailing* – Plan, draft, detail out and estimate Civil Engineering works.

PSO2: *Construction Execution, Supervision and Maintenance* – Supervise, construct and maintain Civil Engineering activities.

Matrix of PEOs and Mission of the Department

--	Department Mission				Total	% Co-relation
	M1	**M2**	**M3**	**M4**		
PEO 1	3	2	1		6	33.33
PEO 2	1	3	1	2	7	38.89
PEO 3	3	1	1		5	27.78
Total	7	6	3	2	18	100
% Co-relation	38.89	33.33	16.67	11.11	100	

- All PEOs nearly equally contribute to mission of the department.
- Almost all PEOs exhibit strong co-relation to M1 as it is focussed on skills and values.
- M2 is focussed on adapting to advances in Civil Engineering field, thus PEO2 contribute highest to M2.
- As M3 and M4 principally focus on linkage of other stake-holders with the Institute hence contribution by almost all PEOs towards M3 and M4 is relatively low.
- As M4 bridges the gap between technological advances and program curriculum, PEO2 helps in achieving desired performance level over period of time for student in profession.

Courses Contributing to Program Outcomes

Sr. No.	Programme Outcome (PO)	Contributing Course
1	Basic and discipline specific knowledge	1) Basic Mathematics, 2) Engineering Mathematics, 3) Basic Science, 4) Applied Science, 5) English, 6) Business Communication, 7) Engineering Graphic Skills, 8) Engineering Mechanics, 9) Strength of Materials, 10) General Engineering (Elect. & Mech.), 11) Entrepreneurship Development, 12) Construction Materials, 13) Building Planning & Drawing, 14) Building Construction, 15) Civil Engineering Workshop and Practice, 16) Surveying-I, 17) Surveying-II, 18) Hydraulics, 19) Geotechnical Engineering, 12) Transportation Engineering, 13) Road Engineering, 14) Environmental Engineering, 15) Irrigation Engineering, 16) Quantity Surveying-I, 17) Quantity Surveying- II, 18) Construction Management, 19) Project Work, 20) Design of RCC Structures, 21) Design of Steel Structures, 22) Seminar, 23) Elective-I, 24) Elective-II, 25) Elective-III.
2	Problem analysis	1) Basic Mathematics, 2) Engineering Mathematics, 3) English 4) Engineering Graphic Skills, 5) Entrepreneurship Development, 6) Building Planning & Drawing, 7) Building Construction, 9) Civil Engineering Workshop and Practice, 10) Surveying-I, 11) Surveying-II, 12) Hydraulics, 13) Theory of structures, 14) Geotechnical Engineering, 15) Transportation Engineering, 16) Road Engineering, 17) Environmental Engineering, 18) Irrigation Engineering, 19) Quantity Surveying-I, 20) Quantity Surveying- II, 21) Construction Management, 22) Project Work, 23) Design of RCC Structures, 24) Design of Steel Structures, 25) Seminar, 26) Internship Training, 27) Elective-I, 28) Elective-II, 29) Elective-III.
3	Design/development of solutions	1) Basic Science, 2) Applied Science, 3) Office Automation & CAD, 4) Engineering Graphic Skills, 5) General Engineering (Elect. & Mech.), 6) Entrepreneurship Development, 7) Building Planning & Drawing, 8) Building Construction, 9) Hydraulics, 10) Geotechnical Engineering, 11) Transportation Engineering, 12) Road Engineering, 13) Environmental Engineering, 14) Irrigation Engineering, 15) Quantity Surveying- I, 16) Quantity Surveying- II, 17) Construction Management, 18) Project Work, 19) Design of RCC Structures, 20) Design of Steel Structures, 21) Seminar, 22) Internship Training, 23) Elective-I, 24) Elective-II, 25) Elective-III.
4	Engineering Tools, Experimentation and Testing	1) Office Automation & CAD, 2) General Engineering (Elect. & Mech.), 3) Entrepreneurship Development, 4) Building Planning & Drawing, 6) Building Construction, 7) Civil Engineering Workshop and Practice, 8) Surveying-I, 9) Surveying-II, 10) Hydraulics, 11) Concrete Technology, 12) Geotechnical Engineering, 13) Road Engineering, 14) Environmental Engineering, 15) Irrigation Engineering, 16) Quantity Surveying- II, 17) Construction Management, 18) Project Work, 19) Design of RCC Structures, 20) Design of Steel Structures, 21) Seminar, 22) Internship Training, 23) Elective-I, 24) Elective-II, 25) Elective-III.
5	Engineering practices for society, sustainability and environment	1) Basic Science, 2) Applied Science, 3) Office Automation & CAD, 4) Engineering Graphic Skills, 5) General Engineering (Elect. & Mech.), 6) Entrepreneurship Development 7) Construction Materials, 8) Building Planning & Drawing, 9) Building Construction, 10) Civil Engineering Workshop and Practice, 11) Hydraulics, 12) Concrete Technology, 13) Geotechnical Engineering, 14) Transportation Engineering, 15) Road Engineering, 16) Irrigation Engineering, 17) Quantity Surveying- I, 18) Quantity Surveying- II, 19) Construction Management, 20) Project Work, 21) Design of RCC Structures, 22) Design of Steel Structures, 23) Seminar, 24) Internship Training, 25) Elective-I, 26) Elective-II, 27) Elective-III.
6	Project Management	1) Basic Science, 2) Applied Science, 3) Business Communication, 4) Entrepreneurship Development, 5) Building Planning & Drawing, 6) Civil Engineering Workshop and Practice, 7) Surveying-I, 8) Surveying-II, 9) Concrete Technology, 10) Geotechnical Engineering, 11) Irrigation Engineering, 12) Quantity Surveying-I, 13) Quantity Surveying-II, 14) Construction Management, 15) Project Work, 16) Design of RCC Structures, 17) Design of Steel Structures, 18) Seminar, 19) Internship Training, 20) Elective-I, 23) Elective-II, 24) Elective-III.

Sr. No.	Programme Outcome (PO)	Contributing Course
7	Life-long learning	1) Basic Science, 2) Applied Science, 3) English, 4) Business Communication, 5) Office Automation & CAD, 6) Engineering Graphic Skills, 7) General Engineering (Elect. & Mech.), 8) Entrepreneurship Development, 9) Building Planning & Drawing, 10) Building Construction, 11) Civil Engineering Workshop and Practice, 12) Surveying-I, 13) Surveying-II, 14) Concrete Technology, 15) Geotechnical Engineering, 16) Road Engineering, 17) Environmental Engineering, 18) Irrigation Engineering, 19) Quantity Surveying-I, 20) Quantity Surveying-II, 21) Construction Management, 22) Project Work, 23) Design of RCC Structures, 24) Design of Steel Structures, 25) Seminar, 26) Internship Training, 27) Elective-I, 28) Elective-II 29) Elective-III

Courses Contributing to Program Specific Outcomes

Sr. No.	Programme Specific Outcome (PSO)	Contributing Course
1	Construction Planning and detailing	1) Basic Science, 2) Applied Science, 3) Engineering Graphic Skills, 4) General Engineering (Elect. & Mech.), 5) Entrepreneurship Development, 6) Building Planning & Drawing 7) Building Construction, 8) Civil Engineering Workshop and Practice, 9) Surveying-I, 10) Surveying-II, 11) Concrete Technology, 12) Geotechnical Engineering, 13) Transportation Engineering, 14) Road Engineering, 15) Environmental Engineering, 16) Irrigation Engineering, 17) Quantity Surveying-I, 18) Quantity Surveying-II, 19) Construction Management, 20) Project Work, 21) Design of RCC Structures, 22) Design of Steel Structures, 23) Seminar, 24) Internship Training, 25) Elective-I, 26) Elective-II, 27) Elective-III.
2	Construction Execution, Supervision and Maintenance	1) Basic Science, 2) Applied Science, 3) General Engineering (Elect. & Mech.), 4) Entrepreneurship Development, 5) Building Planning & Drawing, 6) Building Construction, 7) Civil Engineering Workshop and Practice, 8) Concrete Technology, 9) Geotechnical Engineering, 10) Transportation Engineering, 11) Road Engineering, 12) Irrigation Engineering, 13) Construction Management, 14) Project Work, 15) Design of RCC Structures, 16) Design of Steel Structures, 17) Seminar, 18) Internship Training, 19) Elective-I, 20) Elective-II, 21) Elective-III.

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE 1

PROGRAMME: DIPLOMA IN CIVIL ENGINEERING

SCHEME: MPECS 2018 AT A GLANCE

Summary of 2018 Scheme		No of Courses		Teaching Scheme				Examination scheme					
	Category	**Compulsory**	**Opt**	**L**	**T**	**P**	**C**	**TH**	**TT**	**PR**	**OR**	**TW**	**Total**
1	Foundation	08	00	22	02	20	44	400	100	100	25	275	900
2	Allied	04	00	08	00	10	18	160	40	00	75	125	400
3	Core	10	00	29	01	22	52	720	180	50	125	275	1350
4	Applied	12	00	30	00	26+6^	56+6^	640	160	00	400	450	1650
5	Specialised	00	03	09	00	06	15	240	60	00	75	75	450
	Total	34	03	98	03	84+6^	185+6^	2160	540	150	700	1200	4750
Grand Total		37		101		84+6^	185+6^	2700		2050			4750

^ Internship Training

Total No. of courses to complete Programme : 34 Compulsory + 3 Optional =37

Total No. of Theory Examinations : 27

Total No. of Practical/Oral Examinations : 13 Internal + 13 External

Theory Credits to Non-theory Credit ratio : 55 : 45 --- Without Internship Training Credits

53 : 47 --- With Internship Training Credits

Theory Marks to Non-Theory Marks ratio : 57 : 43

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE-1.

PROGRAMME: DIPLOMA IN CIVIL ENGINEERING, SCHEME: MPECS 2018

FOUNDATION COURSES

Sr. No.	Category	Course Code	Subject Title	Prerequisite	C/O	Teaching Scheme				Examination Scheme					
						L	T	P	C	ESE (TH)	PA (TT)	ESE		PA	Total
												PR	OR	TW	
1	Foundation (8 Courses)	R18SC1701	Basic Mathematics	--	C	4	1	-	5	80	20	-	-	-	100
2		R18SC1702	Engineering Mathematics	--	C	4	1	-	5	80	20	-	-	-	100
3		R18SC1704	Basic Science	--	C	4	-	4	8	80	20	-	-	50	150
4		R18SC1705	Applied Science	--	C	4	-	4	8	80	20	-	-	50	150
5		R18SC1707	English	--	C	2	-	2	4	80	20	-	-	25	125
6		R18SC1708	Business Communication	--	C	1	-	2	3	-	-	-	@25	25	50
7		R18CE1101	Office Automation and CAD / Office Automation (ICT)	--	C	1	-	2	3	-	-	@ 50	-	75	125
			Office Automation and CAD / CAD	--	C	1	-	2	3	-	-				
8		R18ME1203	Engineering Graphics skills	--	C	1	-	4	5	-	-	@ 50	-	50	100
					Total	**22**	**2**	**20**	**44**	**400**	**100**	**100**	**25**	**275**	**900**

@ Internal Assessment

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE-1.

PROGRAMME: DIPLOMA IN CIVIL ENGINEERING, SCHEME: MPECS 2018

ALLIED COURSES

Sr. No.	Category	Course Code	Subject Title	Prerequisite	C/O	Teaching Scheme				Examination Scheme					
						L	T	P	C	ESE (TH)	PA (TT)	ESE PR	ESE OR	PA TW	Total
9	Allied (4 Courses)	R18AM2101	Engineering Mechanics	-	C	3	-	2	5	80	20	-	-	25	125
10		R18AM2102	Strength of Materials	-	C	4	-	2	6	80	20	-	-	25	125
11		R18CE2103	General Engg. Electrical & Mechanical	-	C	-	-	4	4	-	-	-	@50	50	100
12		R18ME2208	Entrepreneurship Development	-	C	1	-	2	3	-	-	-	@25	25	50
Total						**8**	**-**	**10**	**18**	**160**	**40**	**-**	**75**	**125**	**400**

@ Internal Assessment N. B. – Term work for all the courses shall be assessed internally

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE-1.

PROGRAMME: DIPLOMA IN CIVIL ENGINEERING, SCHEME: MPECS 2018

CORE COURSES

Sr. No.	Category	Course Code	Subject Title	Prerequisite	C/O	Teaching Scheme				Examination Scheme					
						L	T	P	C	ESE (TH)	PA (TT)	ESE PR	ESE OR	PA TW	Total
13	Core (10 Courses)	R18CE3101	Construction Materials	--	C	3	-	-	3	80	20	-	-	-	100
14		R18CE3102	Building Planning & Drawing	--	C	3	-	4	7	80	20	-	25@	50	175
15		R18CE3103	Building Construction	R18CE3101	C	4	-	2	6	80	20	-	-	25	125
16		R18CE3104	Civil Engg Workshop & Practice	--	C	-	-	2	2	-	-	-	25@	25	50
17		R18CE3105	Surveying - I	--	C	3	-	4	7	80	20	25	-	50	175
18		R18CE3106	Surveying-II	R18CE3105	C	3	-	4	7	80	20	25	-	50	175
19		R18CE3107	Hydraulics		C	3	1	2	6	80	20	-	25@	25*	150
20		R18AM3108	Theory of Structures	R18AM2102	C	4	-	-	4	80	20	-	-	-	100
21		R18AM3109	Concrete Technology	--	C	3	-	2	5	80	20	-	25@	25	150
22		R18AM3110	Geo Technical Engineering	--	C	3	-	2	5	80	20	-	25@	25	150
					Total	**29**	***1***	**22**	**52**	**720**	**180**	**50**	**125**	**275**	**1350**

*Includes marks for tutorial @ Internal Assessment N. B. – Term work for all the courses shall be assessed internally

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE-1.

PROGRAMME: DIPLOMA IN CIVIL ENGINEERING , SCHEME: MPECS 2018, **APPLIED COURSES**

Sr. No.	Category	Course Code	Subject Title	Prerequisite	C/O	Teaching Scheme				Examination Scheme					
						L	T	P	C	TH	TT	PR	OR	TW	Total
23	Applied (12 Courses)	R18CE4101	Transportation Engineering	--	C	3	-	-	3	80	20	-	-	-	100
24		R18CE4102	Road Engineering	--	C	3	-	2	5	80	20	-	25	25	150
25		R18CE4103	Environmental Engineering	--	C	3	-	2	5	80	20	-	25	25	150
26		R18CE4104	Irrigation Engineering	--	C	4	-	2	6	80	20	-	25	25	150
27		R18CE4105	Quantity Surveying - I	--	C	3	-	4	7	-	-	-	50@	50	100
28		R18CE4106	Quantity Surveying - II	R18CE4105	C	3	-	*4*	*7*	80	20	-	50	50	200
29		R18CE4107	Construction Management	--	C	3	-	2	5	80	20	-	25	25	150
30		R18CE4108	Project Work	100 Credits	C	-	-	4	4	-	-	-	50	100	150
31		R18AM4109	Design of RCC Structures	R18AM3108	C	4	-	2	6	80	20	-	25	25	150
32		R18AM4110	Design of Steel Structures	R18AM3108	C	4	-	2	6	80	20	-	25	25	150
33		R18CE4111	Seminar	--	C	-	-	2	2	-	-	-	25@	25	50
34		R18CE4112	Internship Training	--	C	-	-	6^	6^	-	-	-	75	75	150
					Total	**30**	***00***	***26+6^***	***56+6^***	**640**	**160**	**-**	**400**	**450**	**1650**

^ Every student has to undergo 6 weeks Internship Training at a site or plant or office related to Civil Engineering in summer vacation after term end examination of even term of second year. Though 6 credits are allocated for Internship Training, it is only for awarding marks. As far as 'Teaching Load' or 'Time Table' preparation is considered, concerned faculty would be assigned with one batch of students (equivalent to practical batch size) for assessment and evaluation of Internship Training Report. For this purpose 1 hour (or two hours on working Saturday) teaching load would be considered. @ Internal Assessment N. B. – Term work for all the courses shall be assessed internally

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE-1.

PROGRAMME: DIPLOMA IN CIVIL ENGINEERING , SCHEME: MPECS 2018,

SPECIALISED COURSES

Sr. No.	Category	Course Code	Subject Title	Prerequisite	C/O	Teaching Scheme				Examination Scheme					
						L	T	P	C	TH	TT	PR	OR	TW	Total
35	**Specialised I**	R18CE5101	Advanced Construction Techniques	R18AM3109	**Any One (To be Offered at V Sem.)**	3	-	2	5	80	20	-	25	25	150
		R18CE5103	Advanced Surveying	R18CE3106		3	-	2	5	80	20	-	25	25	150
		R18AM5105	Pre stressed Concrete	R18AM3108		3	-	2	5	80	20	-	25	25	150
36	**Specialised II**	R18CE5108	Civil Engg Software	--	**Any One (To be Offered at VI Sem.)**	3	-	2	5	80	20	-	25	25	150
		R18CE5104	Township Planning	R18CE3102		3	-	2	5	80	20	-	25	25	150
		R18AM5106	Advanced Structural Design	R18AM3108		3	-	2	5	80	20	-	25	25	150
37	**Specialised III**	R18CE5102	Building Services	R18CE3103	**Any One (To be Offered at VI Sem.)**	3	-	2	5	80	20	-	25@	25	150
		R18CE5107	Geo Informatics	R18CE3106		3	-	2	5	80	20	-	25@	25	150
		R18AM5110	Earthquake Engineering	R18AM3108		3	-	2	5	80	20	-	25@	25	150
Total						**09**	**-**	**6**	**15**	**240**	**60**	**-**	**75**	**75**	**450**
GRAND TOTAL						**98**	**3**	**84 + 6^**	**185 + 6^**	**2160**	**540**	**150**	**700**	**1200**	**4750**

@ Internal Assessment N. B. – Term work for all the courses shall be assessed internally

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE-1.

PROGRAMME: DIPLOMA IN CIVIL ENGINEERING, SCHEME: MPECS 2018,

CLASS DECLARATION COURSES

Class Declaration Courses				Teaching Scheme				Examination scheme					Total
Sr No	Category	Code	Course Title	L	T	P	C	TH	TT	PR	OR	TW	
1	Applied	R18CE4102	Road Engineering	3	-	2	5	80	20	-	25	25	150
2	Applied	R18CE4103	Environmental Engineering (PHE)	3	-	2	5	80	20	-	25	25	150
3	Applied	R18CE4104	Irrigation Engineering	4	-	2	6	80	20	-	25	25	150
4	Applied	R18CE4106	Quantity Surveying - II	3	---	*4*	*7*	80	20	-	50	50	200
5	Applied	R18CE4107	Construction management	3	-	2	5	80	20	-	25	25	150
6	Applied	R18CE4108	Project Work	-	-	4	4	-	-	-	50	100	150
7	Applied	R18AM4109	Design of RCC Structures	4	-	2	6	80	20	-	25	25	150
8	Applied	R18AM4110	Design of Steel Structures	4	-	2	6	80	20	-	25	25	150
9	Applied	R18CE4112	Internship Training	-	-	6^	6^	-	-	-	75	75	150
10	Specialised	--	Elective 1	3	-	2	5	80	20	-	25	25	150
11	Specialised	--	Elective 2	3	-	2	5	80	20	-	25	25	150
			Total	**30**	***00***	***24+ 6^***	***54+ 6^***	**720**	**180**	**0**	**375**	**425**	**1700**

^ Every student has to undergo 6 weeks Internship Training at a site or plant or office related to Civil Engineering in summer vacation after term end examination of even term of second year. Though 6 credits are allocated for Internship Training, it is only for awarding marks. As far as 'Teaching Load' or 'Time Table' preparation is considered, concerned faculty would be assigned with one batch of students (equivalent to practical batch size) for assessment and evaluation of Internship Training Report. For this purpose 1 hour (or two hours on working Saturday) teaching load would be considered.

Total Theory Credits : 30 Total Theory Marks : 900

Total Practical Credits : 24+6^ Total Non-theory Marks : 800

Theory Credits to Practical Credit ratio = 56 : 44 ---- Without Internship Training Credits

50 : 50 ---- With Internship Training Credits

Theory marks to Non-theory marks ratio = 53 : 47

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE-1.

PROGRAMME: DIPLOMA IN CIVIL ENGINEERING, SCHEME: MPECS 2018

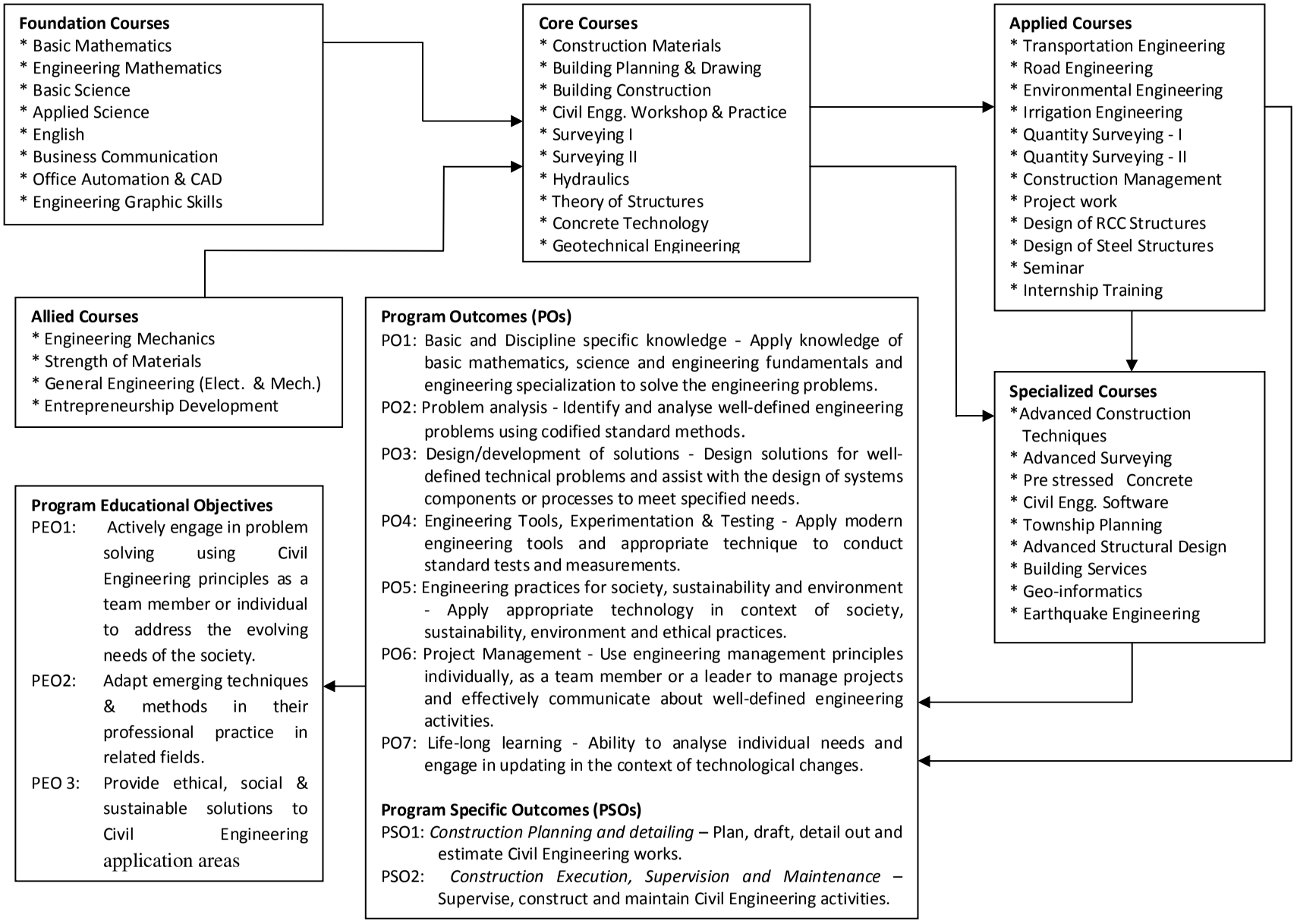
GROUPS AND COURSES UNDER SPECIALIZED CATEGORY

Group	Courses		
	Elective 1	**Electives 2**	**Elective 3**
I - Construction & Planning	Advanced Construction Techniques (R18CE5101)	Civil Engg. Software (R18CE5108)	Building Services (R18CE5102)
II – Advances in Civil Engg.	Advanced Surveying (R18CE5103)	Township Planning (R18CE5104)	Geo Informatics (R18CE5107)
III - Structural Engg.	Pre Stressed Concrete (R18AM5105)	Advanced Structural Design (R18AM5106)	Earthquake Engg. (R18AM5110)

Total optional courses offered = 09, Total optional courses to be opted by the students = 03

SUMMARY OF MPECS R18 STRUCTURE

Total Courses C + O (Credits)	**Total Marks (Credits)**	**No. of Theory Courses**	**No. of Pract. Ext + Int (Marks)**	**No. of Oral Ext + Int (Marks)**	**Project L + P (Marks)**	**No. of Class Declaration Courses Th + Pr + Or + TW (Marks)**
34 + 3 (*176* + 15)	4750 (*185+6^*)	27	2 + 2 (50 + 100)	11 + 11 (375 + 325)	0 + 4 (50 Or + 100 TW = 150)	9 + 0 + 11 + 11 (900 + 0 + 375 + 425 = 1700)



LINK DIAGRAM FOR CIVIL ENGINEERING

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE 1

PROGRAMME: DIPLOMA IN CIVIL ENGINEERING

SCHEME: MPECS 2018

Probable Semester wise Distribution of Courses Offered

Year – I, Term – Odd, Semester – I

Sr. No.	Course Code	Course	Teaching Scheme				Work Load	Examination Scheme					
			L	T	P	C		TH	TT	PR	OR	TW	Total
1	R18SC1701	Basic Mathematics (BMT)	4	1	-	5	05	80	20	-	-	-	100
2	R18SC1704	Basic Science (BSC)	4	-	4	8	16	80	20	-	-	50	150
3	R18SC1707	English (ENG)	2	-	2	4	08	80	20	-	-	25	125
4	R18ME1203	Engineering Graphics Skills (EGS)	1	-	4	5	13	-	-	@ 50	-	50	100
5	R18CE3101	Construction Materials (CSM)	3	-	-	3	03	80	20	-	-	-	100
		Totals	14	1	10	25	45	320	80	50	-	125	575

Theory Exams = 4, Practical & Oral Exam = 01 (Internal) @ Internal

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE 1

PROGRAMME: DIPLOMA IN CIVIL ENGINEERING

SCHEME: MPECS 2018

Probable Semester wise Distribution of Courses Offered

Year – I, Term – Even, Semester – II

Sr. No.	Course Code	Course	Teaching Scheme				Work Load	Examination Scheme					
			L	T	P	C		TH	TT	PR	OR	TW	Total
1	R18SC1702	Engineering Mathematics (EMT)	4	1	-	5	05	80	20	-	-	-	100
2	R18SC1705	Applied Science (AS)	4	-	4	8	16	80	20	-	-	50	150
3	R18SC1708	Business Communication (BCM)	1	-	2	3	07	-	-	-	@25	25	50
-	R18CE1101	**Office Automation** and CAD (To be registered in the III Semester) (OAC)	1	-	2	3	07	-	-	-	-	-	-
4	R18AM2101	Engineering Mechanics (EMC)	3	-	2	5	09	80	20	-	-	25	125
5	R18CE2103	General Engg. Electrical & Mechanical (GEEM)	-	-	4	4	12	-	-	-	**@**50	50	100
6	R18CE3103	Building Construction (BC)	4	-	2	6	10	80	20	-	-	25	125
		Totals	17	1	16	34	66	320	80	-	75	175	650

Theory Exams = 4, Practical & Oral Exam = 02 (Internal) @ Internal

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE 1

PROGRAMME: DIPLOMA IN CIVIL ENGINEERING

SCHEME: MPECS 2018

Probable Semester wise Distribution of Courses Offered

Year – II, Term – Odd, Semester – III

Sr. No.	Course Code	Course	Teaching Scheme				Work Load	Examination Scheme					
			L	T	P	C		TH	TT	PR	OR	TW	Total
1	R18ME2208	Entrepreneurship Development (EDP)	1	-	2	3	07	-	-	-	**@**25	25	50
2	R18CE1101	Office Automation and **CAD (OAC)**	1	-	2	3	07	-	-	@50	-	75	125
3	R18AM2102	Strength of Materials (SOM)	4	-	2	6	10	80	20	-	-	25	125
4	R18CE3102	Building Planning & Drawing (BPD)	3	-	4	7	15	80	20	-	25@	50	175
5	R18CE3105	Surveying – I (SVY-I)	3	-	4	7	15	80	20	25	-	50	175
6	R18AM3110	Geo Technical Engineering (GTE)	3	-	2	5	09	80	20	-	25@	25	150
		Totals	15	-	16	31	63	320	80	75	75	250	800

Theory Exams = 4, Practical & Oral Exam = 04 (Internal) + 1 (External) @ Internal

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE 1

PROGRAMME: DIPLOMA IN CIVIL ENGINEERING

SCHEME: MPECS 2018

Probable Semester wise Distribution of Courses Offered

Year – II, Term – Even, Semester – IV

Sr. No.	Course Code	Course	Teaching Scheme				Work Load	Examination Scheme					
			L	T	P	C		TH	TT	PR	OR	TW	Total
1	R18CE3104	Civil Engg. Workshop & Practice (CEWP)	-	-	2	2	06	-	-	-	25@	25	50
2	R18CE3106	Surveying-II (SVY-II)	3	-	4	7	15	80	20	25	-	50	175
3	R18CE3107	Hydraulics (HYD)	3	1	2	6	10	80	20	-	25@	25*	150
4	R18AM3108	Theory of Structures (TOS)	4	-	-	4	04	80	20	-	-	-	100
5	R18AM3109	Concrete Technology (CT)	3	-	2	5	09	80	20	-	25@	25	150
6	R18CE4105	Quantity Surveying – I (QS-I)	3	-	4	7	15	-	-	-	50@	50	100
7	R18CE4111	Seminar (SMN)	-	-	2	2	06	-	-	-	25@	25	50
		Totals	16	1	16	**33**	65	320	80	25	150	200	775

Theory Exams = 4, Practical & Oral Exam = 05 (Internal) + 1 (External) @ Internal

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE 1

PROGRAMME: DIPLOMA IN CIVIL ENGINEERING

SCHEME: MPECS 2018

Probable Semester wise Distribution of Courses Offered

Year – III, Term – Odd, Semester – V

Sr. No.	Course Code	Course			Teaching Scheme				Work Load	Examination Scheme					
					L	T	P	C		TH	TT	PR	OR	TW	Total
1	R18CE4101	Transportation Engineering (TRE)			3	-	-	3	03	80	20	-	-	-	100
2	R18CE4103	Environmental Engineering (EE) #			3	-	2	5	09	80	20	-	25	25	150
3	R18CE4107	Construction Management (CM) #			3	-	2	5	09	80	20	-	25	25	150
-	R18CE4108	Project Work (PW) - To be Registered in the VI semester.			-	-	2	2	06	-	-	-	-	-	-
4	R18AM4109	Design of RCC Structures (DRCC) #			4	-	2	6	10	80	20	-	25	25	150
5	R18CE4106	Quantity Surveying – II (QS – II) #			3	-	4	7	15	80	20	-	50	50	200
6	R18CE4112	Internship Training (INTR) #			-	-	6^	6^	03^	-	-	-	75	75	150
7	R18CE5101	Elective – I #	Advanced Construction Techniques (ACT)	Students have to opt for any one specialised course amongst these 3 courses as Elective I.	3	-	2	5	12	80	20	-	25	25	150
	R18CE5103		Advanced Surveying (AS)												
	R18AM5105		Pre stressed Concrete (PSC)												
Totals					19	-	14+6^	33+6^	64+3^	480	120	-	225	225	1050

Theory Exams = 6, Practical & Oral Exam = 06 (External) # Class Declaration Course

^ Though 6 credits are allocated for Internship Training, it is only for awarding marks. As far as 'Teaching Load' or 'Time Table' preparation is considered, concerned faculty would be assigned with one batch of students (equivalent to practical batch size) for assessment and evaluation of Internship Training Report. For this purpose 1 hour (or two hours on working Saturday) teaching load would be considered.

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE 1

PROGRAMME: DIPLOMA IN CIVIL ENGINEERING

SCHEME: MPECS 2018

Probable Semester wise Distribution of Courses Offered

Year – III, Term – Even, Semester –V I

Sr. No.	Course Code	Course			Teaching Scheme				Work Load	Examination Scheme					
					L	T	P	C		TH	TT	PR	OR	TW	Total
1	R18CE4102	Road Engineering (RE) #			3	-	2	5	09	80	20	-	25	25	150
2	R18CE4104	Irrigation Engineering (IRG) #			4	-	2	6	10	80	20	-	25	25	150
3	R18CE4108	Project Work (PW) #			-	-	2	2	06	-	-	-	50	100	150
4	R18AM4110	Design of Steel Structures (DSS) #			4	-	2	6	10	80	20	-	25	25	150
5	R18CE5108	Elective II #	Civil Engg Software (CES)	Students have to opt for any one specialised course amongst these 3 courses as Elective II.	3	-	2	5	12	80	20	-	25	25	150
	R18CE5104		Township Planning (TP)												
	R18AM5106		Advanced Structural Design (ASD)												
6	R18CE5102	Elective III	Building Services (BS)	Students have to opt for any one specialised course amongst these 3 courses as Elective III	3	-	2	5	12	80	20	-	25@	25	150
	R18CE5107		Geo Informatics (GI)												
	R18AM5110		Earthquake Engineering (EQE)												
Totals					17	-	12	29	59	400	100	-	175	225	900

Theory Exams = 5, Practical & Oral Exam = 05 (External) + 1 (Internal) @ Internal # Class Declaration Course

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE 1

PROGRAMME: DIPLOMA IN CIVIL ENGINEERING, SCHEME: MPECS 2018

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CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE -1

Diploma Programme	CIVIL/MECH./ELECT./COMP./E&TC.		
Course Name	Basic Mathematics	Course code	R18SC1701
Course Category	Foundation	Credits	5

COURSE TEACHING, ASSESSMENT AND EVALUATION SCHEME:

Teaching scheme		Evaluation scheme									
		Direct assessment - Weightage - 80%									
		Theory outcome		Practical outcome							Total
				TERMWORK					PRACTICAL	ORAL	
Theory Allotted Hrs	Practical Allotted Hrs	ESE marks	TTA marks	TW marks	SW marks	AS marks	TU Marks	Total	Practical Marks	OR marks	Total marks
4 + 1*	-	80	20	-	-	-	-	-	-	-	100
		Indirect assessment – Weightage - 20%									
		Mid semester students feedback							End of the course survey		

End semester examination-ESE, Two tests average-TTA, Term Work- TW, Student Activity-SW, Assignments –AS, Tutorials- TU, Oral –OR, * TU Hours

1. RATIONALE

Mathematics is an important prerequisite for the development and understanding of engineering concepts. The aim of the course is to acquire some essential competencies in Mathematics by the students of diploma in Engineering. The course will help the students to think logically and systematically. The students will develop the attitude of problem solving. Hence the course provides the ability to analyse Engineering problems using determinants, matrices, trigonometry, statistics and graphs.

2. EXPECTED PROFICIENCY

Solve broad-based technology problems using the principles of basic Mathematics.

3. COURSE OUTCOMES (COs)

Students will be able to

1. Apply the rules and formulae of trigonometry to solve engineering problem.
2. Use determinant and matrices to solve simultaneous equations for engineering problem.
3. Analyze the given data using measures of central tendency and dispersion.
4. Plot the graph of functions used in engineering field.

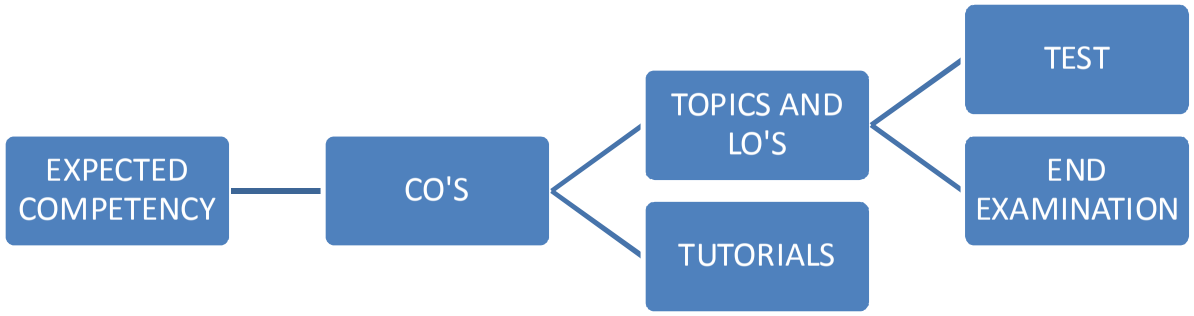
COURSE NAME	**Basic Mathematics**	COURSE CODE	**R18SC1701**

4. CO –PO MATRIX

Course Name: Basic Mathematics **Course Code:** R18SC1701	**PO 1** Basic and Discipline specific knowledge	**PO 2** Problem analysis	**PO 3** Design/ development of solutions	**PO 4** Engineering Tools, Experimentation and Testing	**PO 5** Engineering practices for society, sustainability and environment	**PO 6** Project Management	**PO 7** Life-long learning	**PSO 1** **Construction planning and detailing**	**PSO 2** **Construction execution, supervision and maintenance**
CO1.	3	2							
CO2	3	2							
CO3	3	2							
CO4	3	2							

Rating scale '**3'** for high, '2' for medium, **'1'** for low '0' for no correlation

5. COURSE MAP



COURSE NAME	Basic Mathematics	COURSE CODE	R18SC1701

6. DETAILED COURSE CONTENT

Sr. No.	Unit Outcomes (UOs)	Topics and Sub-topics	Marks	Hours	Mapped CO
1	1a. Apply the concept of Compound angle, allied angle, and multiple angles to solve the given simple engineering problem(s). 1b. Apply the concept of Sub- multiple angle to solve the given simple engineering related problem(s).	**1.1 Trigonometric ratios of an angle** Definition of positive and negative angles. Unit of measurement of an angle. Signs of trigonometric ratios of an angle in the four quadrants.(ASTC RULE) Trigonometric ratios of negative angles. **1.2** Trigonometric ratios of compound and allied angles. **1.3** Trigonometric ratios of multiple and sub-multiple angles.	12	12	CO1
2	2a. Apply concept of factorization and de-factorization formulae to solve the given simple engineering problem(s). **2b.** Investigate given simple problems utilizing inverse trigonometric ratios	**2.1** Factorization and de-factorization formulae. **2.2 Inverse Circular function** Definition of inverse circular function. Principal value of inverse circular function. Properties of inverse circular function. Simple problems based on properties.	**12** .	**10**	**CO1**
3	3a. Calculate the area of the given triangle with vertices A, B, C using determinant. 3b. Solve the system of linear equations using determinant method for given simple engineering problem. 3c. Resolve the given proper fraction into partial fractions.	**3.1 Determinant:** Definition of determinants. Problems on expansion of determinants of order 3. Solution of simultaneous equation in three unknowns (Cramer's Rule). **3.2 Partial Fractions:** Definition of fraction, proper and improper fraction. Resolve the given proper fraction into partial fraction for the cases a. Factors of denominator are linear and non-repeated b. Factors of denominator are linear but repeated c. Factors of denominator are quadratic, non-repeated and irreducible.	16	14	CO2

COURSE NAME	**Basic Mathematics**	COURSE CODE	**R18SC1701**

4	4a. Solve the system of linear equations using matrix method and determinant method for given simple engineering problem.	**Matrices:** 4.1 Definition of a Matrix. Types of Matrices. 4.2 Algebra of matrices: Addition, subtraction and multiplication of matrices. 4.3 Transpose of a matrix. Adjoint of a matrix. Inverse of a matrix by adjoint method. Solution of simultaneous equation by matrix method.	16	12	CO2
5	5a. Calculate the mean deviation of the given statistical observations of an experiment 5b. Calculate the standard deviation, variance and coefficient of variation of the given data 5c. Justify the consistency of the given simple sets of data	**Measures of Dispersion:** 5.1 Mean deviation about mean of raw, ungrouped and grouped data. 5.2 Standard deviation of raw, ungrouped and grouped data. 5.3 Variance and coefficient of variation. 5.4 Comparison of two sets.	12	8	CO3
6	6a. Find the value of the given function 6b. Plot the graph of the given simple function	6.1 **Functions and Limits:** Definition of functions and Notation. Different types of functions. Limits -Concept of limits 6.2 **Graphs:** Graph of linear function. Graph of quadratic equation. Graph of trigonometric function. Graph of exponential function.	12	8	CO4

7. PRACTICAL –ASSIGNMENTS-STUDENT ACTIVITIES-TUTORIALS (Separate table for each)

Sr. No.	Tutorial	Topic No.	Hours Allotted	Mapped CO
1	Solve problems on determinant to find area of triangle, and solution of simultaneous equation by Cramer's Rules.	3	1	CO2
2	Solve elementary problems on Algebra of matrices.	4	1	CO2
3	Solve elementary problems on Algebra of matrices.	4	1	C02
4	Solve solution of Simultaneous Equation using inversion method.	4	1	C02
5	Resolve into partial fraction using linear non repeated, repeated linear factors.	3	1	CO2
6	Resolve into partial fraction using quadratic, irreducible factors.	3	1	CO2
7	Solve problems on Compound and Allied angles	1	1	C01
8	Solve problems on multiple and sub-multiple angles	1	1	CO1
9	Practice problems on factorization and de factorization formula	2	1	CO1
10	Solve problems on trigonometry (All mixed)	1 & 2	1	CO1
11	Solve problems on inverse circular trigonometric ratios.	2	1	CO1
12	Solve problems on finding mean deviation about mean.	5	1	CO3
13	Solve problems on standard deviation.	5	1	CO3
14	Solve problems on coefficient of variation, comparison of two sets.	5	1	CO3
15	Solve problems on functions	6	1	CO4
16	Plot the graph of the given function	6	1	CO4
Total		**--**	**16**	**--**

9. SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Topic No.	Topic Title	Mapped CO % OR Emphasis	Distribution of Marks			
			Cognitive level			Total Marks
			Remember	Understand	Apply	
1	Trigonometry	CO1	2	4	6	12
2	Trigonometry	CO1	2	4	6	12
3	Algebra	CO2	4	4	8	16
4	Matrices	CO2	4	4	8	16
5	Statistics	CO3	-	6	6	12
6	Functions	CO4	2	4	6	12
Total			14	26	40	80

10. SAMPLE MODEL QUESTION BANK FOR THEORY AND TEST EXAMINATIONS

Sr. No.	Topic	Mapped CO	Cognitive Level R/U/A	Question
1	1	CO1	R	If $\tan A = \frac{1}{2}$ and $\tan B = \frac{1}{3}$ find $\tan(A+B)$
2	1	CO1	U	Prove that , $cos(60+A)sin(30+B) + sin(60+A)cos(30+B) = cos(A+B)$
3	1	CO1	A	If A & B are in second quadrant $\sin A = \frac{3}{5}$, $\cos B = \frac{-9}{41}$ then find the quadrant in which angle (A + B) lies.

11. LEARNING RESOURCES

- **BOOKS**

Sr. No.	Title of Book	Author	Publication
1.	Higher Engineering Mathematics	Grewal, B.S.	Khanna publications, New Delhi, 2015, ISBN: 8174091955
2.	Advanced Engineering Mathematics	Krezig, Ervin	Wiley Publications, New Delhi, 2014, ISBN :978-0-470-45836-5
3.	Engineering Mathematics (third edition).	Croft, Anthony	Pearson Education, New Delhi, 2014, ISBN 978-81-317-2605-1
4.	Advanced Engineering Mathematics	Das, H.K.	S. Chand & Co.; New Delhi; 2008, ISBN-9788121903455
5.	Higher Engineering Mathematics	Grewal, B.S.	Khanna publications, New Delhi, 2015, ISBN: 8174091955

- **SOFTWARE/ TOOLS/ MODELS**

Sr. No.	Name	Company	Freeware/commercial
1	Wolfram Mathematica CDF player	Wolfram	Freeware

- **WEBSITES**

Sr. No.	Address
1	www.dplot.com/ - DPlot
2	www.allmathcad.com/ - MathCAD
3	www.wolfram.com/mathematica/ - Mathematica
4	https://www.khanacademy.org/math?gclid=CNqHuabCys4CFdOJaAoddHoPig

12. COURSE CURRICULUM DEVELOPMENT MEMBERS

Sr. No.	Name and Designation	Contact No.	Email
1	Mrs A. S. Patil	7776018745	patil.anantamati@rediffmail.com
2	Mrs. .K. A. Takle	9850198337	kshipratakle123@gmail.com

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE -1

Diploma Programme	CIVIL/MECH./ELECT./COMP./E&TC.		
Course Name	Engineering Mathematics	Course code	R18SC1702
Course Category	Foundation	Credits	5

COURSE TEACHING, ASSESSMENT AND EVALUATION SCHEME:

Teaching scheme		Evaluation scheme									
		Direct assessment - Weightage - 80%									
		Theory outcome		Practical outcome							Total
				TERMWORK					PRACTICAL	ORAL	
Theory Allotted Hrs	Practical Allotted Hrs	ESE marks	TTA marks	TW marks	SW marks	AS marks	TU Marks	Total	Practical Marks	OR marks	Total marks
4 + 1*	-	80	20	-	-	-	-	-	-	-	100
		Indirect assessment – Weightage - 20%									
		Mid semester students feedback							End of the course survey		

End semester examination-ESE, Two tests average-TTA, Term Work- TW, Student Activity-SW, Assignments –AS, Tutorials- TU, Oral –OR, * TU Hours

1. RATIONALE

Mathematics is an important prerequisite for the development and understanding of engineering concepts. The subject intends to teach students basic facts, concepts and principles of Mathematics as a tool to analyze engineering problems. It also aims to teach students to apply the basic facts of Mathematics to solve engineering problem.

2. EXPECTED PROFICIENCY

Solve broad-based technology problems using the principles of Engineering Mathematics for Civil Engineering.

3. COURSE OUTCOMES (COs)

Students will be able to

1. Apply the rules and methods of derivatives to engineering field.
2. Evaluate integration of a function as anti derivative.
3. Apply appropriate methods of integration to engineering problem.
4. Apply appropriate methods of differential equation to engineering problems.
5. Utilize the concept of probability to solve related engineering problem.

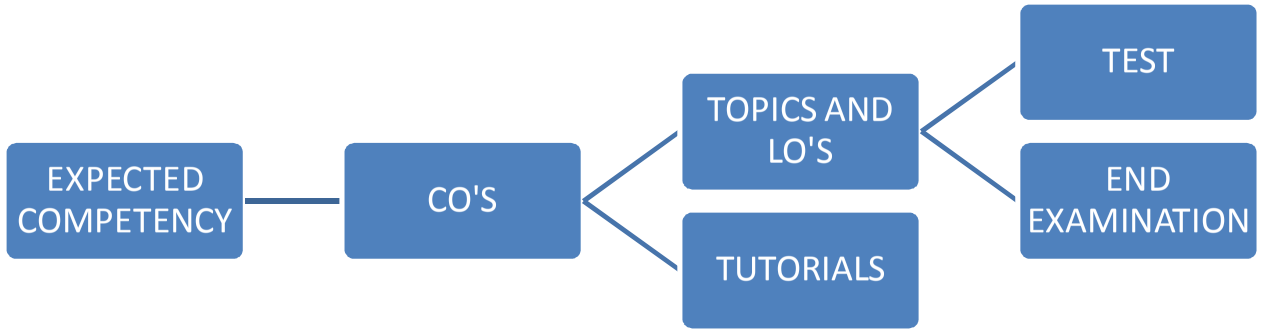
COURSE NAME	Engineering Mathematics	COURSE CODE	R18SC1702

4. CO –PO MATRIX

Course Name: Engineering Mathematics Course code: R18SC1702	PO 1 Basic and Discipline specific knowledge	PO 2 Problem analysis	PO 3 Design/ development of solutions	PO 4 Engineering Tools, Experimentation and Testing	PO 5 Engineering practices for society, sustainability and environment	PO 6 Project Management	PO 7 Life-long learning	PSO 1 Construction planning and detailing	PSO 2 Construction execution, supervision and maintenance
CO1	3	1					1		
CO2	3	1					1		
CO3	3	1					1		
CO4	3	1					1		
CO5	3	1					1		

Rating scale '**3**' for high, '2' for medium, '**1**' for low '0' for no correlation

5. COURSE MAP



COURSE NAME	**Engineering Mathematics**	COURSE CODE	**R18SC1702**

5. DETAILED COURSE CONTENTS					
Sr. No.	**Unit Outcomes (UOs)**	**Topics and Sub-topics**	**Marks**	**Hours**	**Mapped CO**
1	1a. Solve the given simple problems based on rules of differentiation.	**Derivatives:** 1.1 Concept and definition of derivative. Derivatives of standard functions. 1.2 Laws of derivatives :- Addition law. Subtraction law. Multiplication law. Division law, ratios of multiple and sub-multiple angles.	12	12	CO1
2	2a. Solve the given problems of differentiation for composite functions. 2b. Solve the given problems of Differentiation for parametric and implicit functions.	2.1 Derivatives of composite functions (Chain rule) **Methods of Derivatives:** 2.2 Derivative of parametric functions. 2.3 Derivative of implicit functions. Concept of higher order derivatives	**12**	**10**	**CO1**
3	3a. Obtain the given simple integral(s) using substitution method. 3b. Integrate given simple functions using the integration by parts.	**Integration** 3.1 Definition of integration as anti-derivative. 3.2 Integration of algebraic functions. 3.3 Integration by substitution. 3.4 Integration by parts. Integration by partial fraction	16	14	CO2

COURSE NAME	**Engineering Mathematics**	COURSE CODE	**R18SC1702**

4	4a. Apply the concept of differentiation to find slope of tangent and normal to the given curve. 4b. Apply the concept of differentiation to calculate maxima and minima of given problem. 4c. Apply the concept of definite integration to find the area under the given curve(s). 4d. Invoke the concept of definite integration to find the mean value of the function	**Application of Derivatives:** 4.1 Geometrical meaning of derivative. (slope of tangent and normal to the given curve) 4.2 Maxima and minima using derivative. **Application of Integration:** 4.3 Area under the curve. 4.4 Mean value of the function	16	12	CO3
5	5a. Find the order and degree of the differential equation. 5b. Solve the differential equation using the method of variable separable for the given engineering problem. 5c. Solve the linear differential equation for the given engineering problem.	**Differential Equation:** 5.1 Definition of differential equation. Order and degree of differential equation. 5.2 Solution of 1^{st} order and 1^{st} degree differential equation. Variable separable differential equation. Linear differential equation.	12	8	CO4
6	6a. Solve the given problem based on definition of probability. 6b. Utilize the concept of addition theorem for probability to solve related engineering problem	**Probability:** 6.1 Introduction to permutation and combination. 6.2 Definition: Event, sample space and probability. Simple examples on probability. 6.3 Addition theorem for probability.	12	8	CO5

6. PRACTICAL –ASSIGNMENTS-STUDENT ACTIVITIES-TUTORIALS (Separate table for each)

Sr. No.	Assignments	Topic No.	Hours Allotted	Mapped CO
1	Solve the given simple problems based on rules of differentiation.	1	1	CO1
2	Solve the given problems based on chain rule of differentiation	2	1	CO1
3	Solve the given problems of differentiation on parametric functions.	2	1	C01
4	Solve the given problems of differentiation on logarithmic functions.	2	1	C01
5	Solve engineering problems on differentiation.	1 &2	1	CO1
6	Solve the given simple integral(s) as anti derivative.	3	1	CO2
7	Solve the given integral(s) using substitution method.	3	1	C02
8	Solve the given integral(s) using integration by parts and by partial fraction.	3	1	CO2
9	Solve engineering problems on integration.	3	1	CO2
10	Solve problems on slope of tangent and normal at given point on the curve and on finding maxima minima of function.	4	1	CO1
11	Solve problems on finding area under the curve and Mean value of the function.	4	1	CO3
12	Solve engineering problems on application of differentiation and integration.	4	1	CO3
13	Find order and degree of given differential equation.	5	1	CO4
14	Solve differential equation based on variable separable and Linear differential equation.	5	1	CO4
15	Solve the given problem based on definition of probability.	6	1	CO5
16	Utilize the concept of addition theorem for probability to solve related engineering problem.	6	1	CO5
Total		--	**16**	--

9. SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Topic No.	Topic Title	Mapped CO % OR Emphasis	Distribution of Marks			
			Cognitive level			Total Marks
			Remember	Understand	Apply	
1	Derivatives	CO1	4	8	-	12
2	Derivatives	CO1	-	8	4	12
3	Integration	CO2	4	4	8	16
4	Application of Derivatives & Integration	CO1 & CO3	-	4	12	16
5	Differential Equation	CO4	4	-	8	12
6	Probability	CO5	2	2	8	12
Total		--	14	26	40	80

10. SAMPLE MODEL QUESTION BANK FOR THEORY AND TEST EXAMINATIONS

Sr. No	Topic	Mapped CO	Cognitive level R/U/A	Question
1	6	CO5	R	State Addition theorem of Probability
2	1	CO5	U	If P(A)=0.5, P(B)=0.3 P$(A \cap B) = 0.4$ $then\ find\ P(A' \cap B')$
3	1	CO5	A	If the probability of constructing a bridge in a year with given specifications of certain contractor is 0.35 and that of an another contactor is 0.25 then find the probability that neither of them finish their work in a year

11. LEARNING RESOURCES

- **BOOKS**

Sr. No.	Title of Book	Author	Publication
1.	Higher Engineering Mathematics	Grewal, B.S.	Khanna publications, New Delhi, 2015 ISBN: 8174091955
2.	Advanced Engineering Mathematics	Krezig, Ervin	Wiley Publications, New Delhi, 2014 ISBN :978-0-470-45836-5
3.	Engineering Mathematics (third edition).	Croft, Anthony	Pearson Education, New Delhi, 2014 ISBN 978-81-317-2605-1
4.	Advanced Engineering Mathematics	Das, H.K.	S. Chand & Co.; New Delhi; 2008, ISBN-9788121903455

- **SOFTWARE/ TOOLS/ MODELS**

Sr. No.	Name	Company	Freeware/commercial
1	Wolfram Mathematica CDF player	Wolfram	Freeware

- **WEBSITES**

Sr. No.	ADDRESS
1	www.dplot.com/ - DPlot
2	www.allmathcad.com/ - MathCAD
3	www.wolfram.com/mathematica/ - Mathematica
4	https://www.khanacademy.org/math?gclid=CNqHuabCys4CFdOJaAoddHoPig

12. COURSE CURRICULUM DEVELOPMENT MEMBERS

Sr. No.	Name and Designation	Contact No.	Email
1	Mrs A. S. Patil	7776018745	patil.anantamati@rediffmail.com
2	Mrs. .K. A. Takle	9850198337	kshipratakle123@gmail.com

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE -1

Diploma Programme	CIVIL		
Course Name	Basic Science	Course code	R18SC1704
Course Category	Foundation	Credits	8

COURSE TEACHING, ASSESSMENT AND EVALUATION SCHEME:

Teaching scheme		Evaluation scheme									
		Direct assessment - Weightage - 80%									
		Theory outcome		Practical outcome							Total
				TERMWORK					PRACTICAL	ORAL	
Theory Allotted Hrs	Practical Allotted Hrs	ESE marks	TTA marks	TW marks	SW marks	AS marks	TU Marks	Total	Practical Marks	OR marks	Total marks
4	4	80	20	50	-	-	-	50	-	-	150
		Indirect assessment – Weightage - 20%									
		Mid semester students feedback							End of the course survey		

End semester examination-ESE, Two tests average-TTA, Term Work- TW, Student Activity-SW, Assignments –AS, Tutorials- TU, Oral -OR

1. RATIONALE

Basic Sciences like Physics and Chemistry are the pillars of engineering and technology. It is very essential to learn the basic sciences to understand the fundamental concepts and principles. The course content is chosen so that it should be more relevant to fulfill the needs of industries. The study of basic principles in Electrochemistry, Corrosion, Chemical Bonding, Heat, Electricity, Magnetism and Semi-Conductors will help in understanding the technical courses where emphasis is on application of these in various fields.

2. EXPECTED PROFICIENCY

Apply principles of physics and chemistry to solve the broad based problems in engineering.

3. COURSE OUTCOMES (COs)

The theory, practical experiences and relevant soft skills associated with this course are to be taught and implemented, so that the student demonstrates the following industry oriented COs associated with the above mentioned competency:

1. Estimate errors in measurements of physical quantities measured with appropriate measuring instruments.
2. Apply principles of Electricity, Magnetism and Semi-Conductors to solve engineering problems.
3. Apply Gas laws, use basic principle of Heat and Temperature to related engineering problems.
4. Identify different types of bonds of different compounds.
5. Apply concepts of Electrochemistry and Corrosion to solve engineering problems.
6. Describe Polymers, Lubricants and Adhesives.

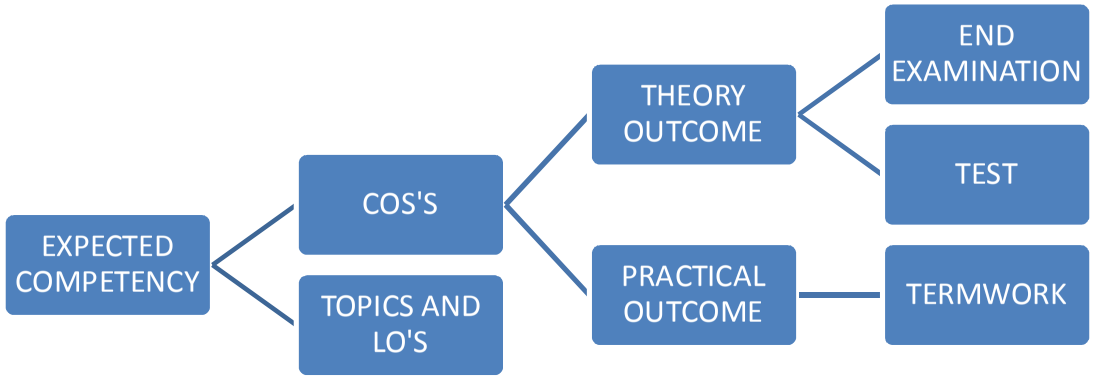
COURSE NAME	Basic Science	COURSE CODE	R18SC1704

4. CO –PO MATRIX

Course Name: Basic Science Course code: R18SC1704	PO 1 Basic and Discipline specific knowledge	PO 2 Problem analysis	PO 3 Design/ development of solutions	PO 4 Engineering Tools, Experimentation and Testing	PO 5 Engineering practices for society, sustainability and environment	PO 6 Project Management	PO 7 Life-long learning	PSO 1 Construction planning and detailing	PSO 2 Construction execution, supervision and maintenance
CO1	3			1	1	1	1		
CO2	3			1	1	1	1		
CO3	3			1	1	1	1		
CO4	3			1	1	1	1		
CO5	3			1	1	1	1		
CO6	3			1	1	1	1		

Rating scale '**3**' for high, '2' for medium, '**1**' for low '0' for no correlation

5. COURSE MAP



COURSE NAME	Basic Science	COURSE CODE	R18SC1704

6. DETAILED COURSE CONTENTS

Sr. No.	Unit Outcomes (UOs)	Topics and Sub-topics	Marks	Hours	Mapped CO
1	1a. Describe the concept of given physical quantities with relevant unit of measurement. 1b. State various systems of units and its need for the measurement of the given physical quantities. 1c. Determine the dimensions of given physical quantities. State the error in the given measurement with justification.	**1 Units and Measurements** 1.1 Physical quantity, fundamental and derived physical quantity with examples. Unit of physical quantity, fundamental units with examples and derived units with examples. 1.2 System of units (C.G.S., M.K.S., F.P.S. and S.I.) Rules and Conventions for writing units in SI system. Tables of fundamental and derived S.I. units. Multiples and sub multiples of units. Significant figures, rules for determining the significant figures. 1.3 Dimensions and dimensional formulae 1.4 Errors, types of errors (Instrumental, systematic and random error) and methods for minimization of errors, Estimation of errors (Absolute error, average absolute error, relative error and percentage error), Propagation of errors in measurement, Numerical	12	9	CO1
2	2a. Calculate electric field, potential and potential difference of the given static charge. 2b. Describe the concept of given magnetic intensity and flux with relevant units. 2c. Explain the heating effect of the electric current. 2d. Apply laws of series and parallel combination in the given electric circuits. 2e. Distinguish the given conductors, semiconductors and insulators on the basis of energy bands. Explain the I-V characteristics and applications of the	2.1 Concept of charge, Coulomb's inverse square law, Electric field, Electric lines of force and their properties, Electric field intensity, Electric potential and potential difference , Electric flux density, Electric current, Ohm's law, Specific resistance, Resistance by using colour code, Laws of series and parallel resistance, Heating effecting of electric current, Electric power, Electric energy in kWh, Electric bill, Numerical. 2.2 Magnetic field, magnetic field intensity and their units, Magnetic lines of force and their properties, magnetic flux. 2.3 Conductors, semiconductors, insulators and their energy	16	14	CO2

COURSE NAME	**Basic Science**	COURSE CODE	**R18SC1704**

Sr. No.	Unit Outcomes (UOs)	Topics and Sub-topics	Marks	Hours	Mapped CO
	given p-n junction diodes.	band diagrams. 2.4 Intrinsic or pure semiconductor, extrinsic or impurity doped semiconductors, pentavalent impurity doped N-type semiconductor and trivalent impurity doped P-type semiconductor. p-n junction diode, 2.5 Forward and reverse biasing of p-n junction diode, I-V characteristics of p-n junction, and applications of p-n junction diode.			
3	3a.Convert the given temperature in different temperature scales. 3b.Distinguish the properties of the good and bad conductors of heat. 3c.Relate the characteristics of the three gas laws. 3d.Determine the ratio of specific heats for the given gas materials. 3e.Describe the phenomena of total internal reflection for the given mediums. Describe light propagation in the given type of optical fiber.	3.1 Heat, units of heat, calorie-joule conversion, Latent heat and sensible heat. Temperature, Temperature scales, Absolute zero temperature, relations of temperatures on Celsius scale, Fahrenheit scale and Kelvin scale, Difference between heat and temperature, Numerical. 3.2 Conduction, Flow of heat along a bar, Steady state of temperature Coefficient of thermal conductivity by Searle's method. (For good conductor), Convection, Radiation, Comparison of conduction, convection and radiation.. 3.3 Applications of conduction, convection and radiation, Thermal Expansions (linear, areal, cubical), Numerical. 3.4 Principle, Construction and working of Bimetallic thermometer, Resistance thermometer and Thermocouple thermometer 3.5 Boyle's law, Charles's law and Gay–Lussac's law. General gas equation, Specific heats (C_p, C_v) of gases and their ratio, Numerical.	12	9	CO3

COURSE NAME	**Basic Science**	COURSE CODE	**R18SC1704**

Sr. No.	Unit Outcomes (UOs)	Topics and Sub-topics	Marks	Hours	Mapped CO
4	4a. Describe rules for arrangement of electrons 4b. Write electronic configuration of different elements. 4c. Distinguish the properties of given material based on the bond formation 4d.State the concepts included in the volumetric analysis.	4.1. Filling of electrons in the orbitals-Hund's rule of maximum multiplicity,Pauli exclusion principle, Aufbau's principle 4.2. Electronic configuration, octet rule & duplet rule .(Electronic configuration upto atomic number 30) 4.3. Electronic theory of valency Chemical bonds: types and characteristics , electrovalent bond(NaCl,$CaCl_2$),covalent bond(Cl_2,O_2,N_2)co-ordinate bond (SO_2,SO_3,Ozone (O_3),metallic bond(Sodium and Copper metal). 4.4. Basic Concepts of Volumetric Analysis- Titration, Titrate, Titrant,Normality , Molarity, End Point, Strength, Equivalent weight. 4.5. Types of Titrations- Acid Base Titration A) Strong acid and strong base B) Weak acid and weak base Redox Titration, Precipitation Titration , Complexometric Titration.	12	9	CO4
5	5a. Differentiate the salient features of the given electrolytic cell, electrochemical cell. 5b. Distinguish the given primary and secondary electrolytic cells 5c. Describe the process of electrolysis for the given electrolyte 5d. Describe the process of electroplating for the given material 5e. Describe the phenomenon of the given type of corrosion and its prevention 5f. Identify the different factors affecting the rate of corrosion for the given type of material. Select the protective measures to prevent the corrosion inhe given corrosive medium	5.1. Electrolyte – strong and weak , Non – Electrolyte, Electrolytic cell, Electrochemical cell, cathode ,anode , Electrode potential-oxidation and reduction , construction and working of Daniel cell ,Ionization and Dissociation 5.2. Faraday's first and second law and Numerical based on Faraday's law 5.3. Electrolysis-Definition, mechanism of electrolysis of $CuSO_4$ and NaCl using Platinum electrodes , Electroplating and electro-refining of copper 5.4. Primary cell and secondary cell- mechanism, examples and application of the types of cells. 5.5. Corrosion-Types of corrosion- Dry corrosion, Wet corrosion, Oxidation corrosion (Atmospheric corrosion due to oxygen gas), mechanism, Types of oxide film, Wet corrosion mechanism (Hydrogen evolution in acidic medium)	12	12	CO5

COURSE NAME	Basic Science	COURSE CODE	R18SC1704

Sr. No.	Unit Outcomes (UOs)	Topics and Sub-topics	Marks	Hours	Mapped CO
		Concentration cell corrosion-Oxygen absorption mechanism in neutral or alkaline medium. 5.6. Factors affecting the rate of corrosion control- Modification of environment, Use of protective coatings- coating of less active metal like Tin (Tinning), coating of more active metal like Zinc (Galvanizing)Anodic and cathodic protection.			
6	6a. Differentiate the given type of structural polymers 6b. Describe the polymerization process of the given polymer 6c. State the properties and uses of the given polymers 6d. Describe lubricants ,its function and classification 6e. State the types of lubrication. 6f. Describe the physical and chemical properties of lubricants 6g. Explain selection of lubricants for various machines 6h. State the properties and uses of adhesives Describe the application of relevant adhesives	6.1. Polymer and monomer , Classification on the basis of Molecular structure , on the basis of monomer a)homopolymer -Synthesis ,properties and application of Polyethylene, PVC, Teflon b)copolymer/heteropolymer-Nylon-6, Nylon 6,6 on the basis of thermal behaviour -Thermoplastics and thermosetting. 6.2. Types of polymerization reaction, Addition polymerization, Condensation polymerization 6.3. Definition of lubricant, function of lubricant and classification 6.4. Definition of lubrication, types of lubrication. 6.5. Physical properties-viscosity, viscosity index, oiliness, flash and fire point, volatility, cloud and pour point. 6.6. Chemical properties-acid value, saponification value, emulsification. 6.7. Properties and names of lubricants used for various machines like delicate instruments, heavy load and low speed machine, gears, cutting tools, I.C engine, steam engine 6.8. Definition, characteristics of adhesives, classification of adhesives and its uses	16	11	CO6

7. PRACTICAL –ASSIGNMENTS-STUDENT ACTIVITIES-TUTORIALS (Separate table for each)

Sr. No.	Practical (PHYSICS)	Topic No.	Hours Allotted	Mapped CO
1.	Measurement of (i) Length, Breadth and Height of a block ,(ii) Internal, External diameter and Height of a hollow cylinder, Using Vernier Callipers of different least counts.	1	4	CO1
2.	Measurement of (i) Diameter of Sphere and Wire, (ii) Thickness of a plate by using Micrometer Screw Gauge.	1	4	CO1
3.	Measurement of (i) Radii of concave and convex surfaces, (ii) Thickness of plate by using Spherometer.	1	2	CO1
4.	Measurement of Specific resistance by voltmeter ammeter method.	2	2	CO2
5.	Verification of Ohm's law	2	2	CO2
6.	Measurement of Resistance in series.	2	2	CO2
7.	Measurement of Resistance in parallel.	2	2	CO2
8.	Magnetic lines of forces of Bar Magnet.	2	2	CO2
9.	Study of PN junction diode forward and reverse bias	2	2	CO2
10.	Study the effect of temperature on the resistance of – thermistor and copper coil.	2	2	CO2
11.	Determination of co-efficient of thermal conductivity of a good conductor by Searle's method.	2	2	CO2
12.	Verification of Boyle's law.	3	2	CO3
--	Total	--	28	--

S. No.	Practical	Topic No.	Hours Allotted	Mapped CO
	Practical –assignments-student activities submission	**--**	**04**	**--**
	Total	**--**	**32**	**--**

Sr. No.	Practical (CHEMISTRY)	Topic No.	Hours Allotted	Mapped CO
1	Prepare the solutions of different Concentrations.	1	2	CO4
2	Determine the Strength of given acid solution using standard base solution.	1	2	CO4
3	Determine the neutralization point of weak acid and weak base using conductivity meter.	1	2	CO4
4	Precipitation titration of $BaCl_2$ with H_2SO_4 using conductivity meter.	1	4	CO4
5	Determine electrochemical equivalent of Cu metal using Faraday's first law.	2	2	CO5
6	Determine equivalent weight of metal using Faraday's second law.	2	2	CO5
7	Determine the electrode potential of Copper metal.	2	2	CO5
8	Determine the voltage generated from chemical reaction using Daniel Cell.	2	2	CO5
9	To determine the viscosity of oil lubricant by using Ostwald's Viscometer.	3	2	CO6
10	Determine the Acid value of given oil.	3	2	CO6

Sr. No.	Practical (CHEMISTRY)	Topic No.	Hours Allotted	Mapped CO
11	Determine the effect of temperature on viscosity for given lubricating oil using Redwood viscometer-1	3	4	CO6
12	Determination of saponification value of an oil.	3	2	CO6
--	Total	--	28	--

S. No.	Practical	Topic No.	Hours Allotted	Mapped CO
--	**Practical –assignments-student activities submission**	--	**04**	--
--	**Total**	--	**32**	--

8. EVALUATION SCHEME FOR PRACTICAL

Rubriks for laboratory manual report:

Process Related (05)	Product Related (05)	Total (10)

9. SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Topic No.	Topic Title	Mapped CO % OR Emphasis	Distribution of Marks			
			Cognitive level			Total Marks
			Remember	Understand	Apply	
	PHYSICS					
1	Units and Measurements	CO1	3	5	4	12
2	Electricity, Magnetism and Semiconductors	CO2	5	5	6	16
3	Heat , Temperature and Gas laws	CO3	3	5	4	12
	Total		11	15	14	40
	CHEMISTRY					
4	Atomic structure &Chemical Bonding	CO4	5	4	3	12
5	Electro-chemistry and Corrosion, its prevention.	CO5	3	4	5	12
6	Polymers, lubricants and adhesives	CO6	5	4	7	16
Total			13	12	15	40

10. SAMPLE MODEL QUESTION BANK FOR THEORY AND TEST EXAMINATIONS

Sr. No	Topic	Mapped CO	Cognitive level R/U/A	Question
1	1	CO1	R	deci is the prefix used to indicate submultiple
2	1	CO1	U	Submultiple 10^-2 is represented by prefix
3	1	CO1	A	State the significant figures in the following measurement of charge of electron, 1.6 X10^-19 coulomb.
4	4	CO4	R	Neutrons were discovered by?
5	4	CO5	U	The maximum number of electrons that can be accommodated by f— orbital is?
6	4	CO6	A	Calculate the equivalent weight of NaOH

11. LEARNING RESOURCES

- **BOOKS**

Sr. No.	Title of Book	Author	Publication
1	Physics Textbook XI (part1 & 2)	J.V.Naralikar,A.W.Joshi	National Council of Education Research and Training New Delhi
2	Physics Textbook XII (part1 & 2)	J.V.Naralikar,A.W.Joshi	National Council of Education Research and Training New Delhi
3	Fundamentals of Physics	D.Haliday & R. Resnick	Jhon Wiley and Sons , USA
4	Engineering Physics	R.K.Gaur, S.L.Gupta	Dhanpat Rai and Sons Publications.
5	Engineering Chemistry	Jain P.C. & Jain Monika	Dhanpat Rai Publishing Company (P) Ltd., New Delhi.
6	Engineering Chemistry	S.S.Dara	S. ChandPublication
7	Fundamental of electrochemistry	Bagotsky V S	Wiley international NJ USA

- **WEBSITES**

Sr. No.	Address
1	www.physicsclassroom.com
2	www.hyperphysics.com
3	www.physicsinfo.com http://nptel.ac.in/course.php?disciplineId=115
4	http://nptel.ac.in/course.php?disciplineId=104
5	http://hperphysics.phy-astr.gsu.edu/hbase/hph.html
6	www.physicsclassroom.com
7	www.physics.org
8	www.fearofphysics.com
9	www.sciencejoywagon.com/physicszone

Sr. No.	Address
10	www.science.howstuffworks.com
11	www.in.wikipedia.org
12	www.nptel.iitm.ac.in

12. COURSE CURRICULUM DEVELOPMENT MEMBERS

S. No.	Name and Designation	Contact No.	Email
1	Dr. D. V. Patil	9488985987	dineshvpatil@hotmail.com
2	Ms. Pooja Jalmoru	8796840143	Pooja.jalmoru@gmail.com
3	Mr. V. S. Thakare	9604046490	thakare.vasant@yahoo.com
4	Dr. D. N. Game	9028461964	Deorao.game@gmail.com
5	Mr. S. S. Kale	9403353938	ssamkale@gmail.com

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE -1

Diploma Programme	CIVIL		
Course Name	Applied Science	Course code	R18SC1705
Course Category	Foundation	Credits	8

COURSE TEACHING, ASSESSMENT AND EVALUATION SCHEME:

Teaching scheme		Evaluation scheme									
		Direct assessment - Weightage - 80%									
		Theory outcome		Practical outcome							Total
				TERMWORK					PRACTICAL	ORAL	
Theory Allotted Hrs	Practical Allotted Hrs	ESE marks	TTA marks	TW marks	SW marks	AS marks	TU Marks	Total	Practical Marks	OR marks	Total marks
4	4	80	20	40	10	-	-	50	-	-	150
		Indirect assessment – Weightage - 20%									
		Mid semester students feedback						End of the course survey			

End semester examination-ESE, Two tests average-TTA, Term Work- TW, Student Activity-SW, Assignments –AS, Tutorials- TU, Oral -OR

1. RATIONALE

Diploma engineers have to deal with various materials, methods and machines. Adequate knowledge of basic principle of Physics and Chemistry will help the students to understand the concepts better in any field of engineering. The course will develop analytical capabilities of students so that they can characterize transform and use material in engineering and apply knowledge gained in solving related engineering problems. It will develop the habit of scientific reasoning in students so that they can work with open and enquiring mind. They must learn and apply the concepts and principles of science like Metals, Alloys, Cement, Lime, Fuels, Water, Surface tension, Elasticity, Viscosity and LASERS.

2. EXPECTED PROFICIENCY

Apply principles of physics and chemistry to solve the broad based problems in engineering.

3. COURSE OUTCOMES (COs)

The theory, practical experiences and relevant soft skills associated with this course are to be taught and implemented, so that the student demonstrates the following industry oriented COs:

1. Analyze the physical properties of materials for selecting appropriate material for appropriate applications.
2. Apply Laws of motion in various applications.
3. Use equipments based on principles of LASER and Optical fibre in industrial application.
4. Select the appropriate metallurgical process and properties related to engineering application of Iron and Copper.
5. Use appropriate Water treatment process to solve water related problems.
6. Use appropriate Fuel in relevant applications.

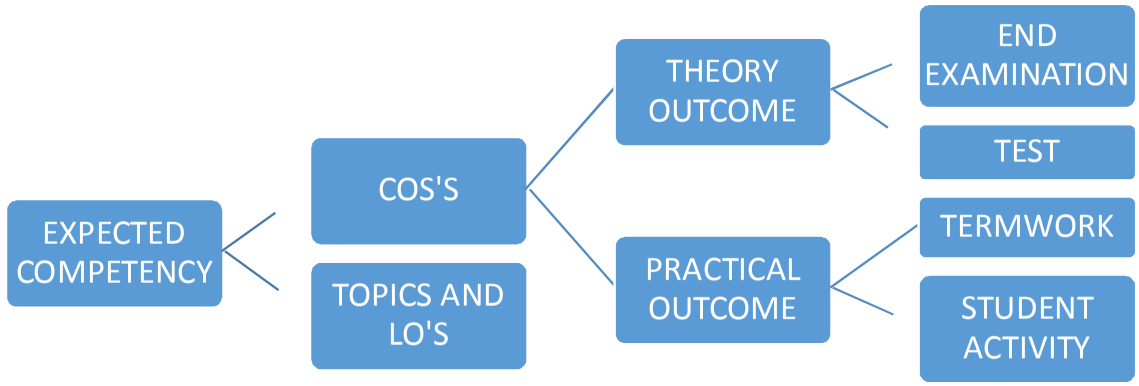
COURSE NAME	Applied Science	COURSE CODE	R18SC1705

4. CO –PO MATRIX

Course Name: Applied Science Course code: R18SC1705	PO 1 Basic and Discipline specific knowledge	PO 2 Problem analysis	PO 3 Design/ development of solutions	PO 4 Engineering Tools, Experimentation and Testing	PO 5 Engineering practices for society, sustainability and environment	PO 6 Project Management	PO 7 Life-long learning	PSO 1 Construction planning and detailing	PSO 2 Construction execution, supervision and maintenance
CO1	3			1	1	2	1		
CO2	3			1	1	2	1		
CO3	3			1	1	2	1		
CO4	3			1	1	2	1		
CO5	3			1	1	2	1		
CO6	3			1	1	2	1		

Rating scale '**3'** for high, '2' for medium, **'1'** for low '0' for no correlation

5. COURSE MAP



COURSE NAME	Applied Science	COURSE CODE	R18SC1705

6. DETAILED COURSE CONTENTS

Sr. No.	Unit Outcomes (UOs)	Topics and Sub-topics	Marks	Hours	Mapped CO
1	1a. Define elasticity, plasticity and rigidity with examples. 1b. Inter relate three types of modulii of elasticity. 1c. Explain the behavior of the wire under continuously increasing load. 1d. Describe various intermolecular forces and their nature. 1e. Explain phenomena of surface tension and capillarity. 1f. Explain pressure-depth relation of liquids and various related laws. 1g. State Newton's law of viscosity. 1h. State Stokes' law for the free fall of the body through the viscous medium..	1.1 Deforming Force and Restoring Force, Elasticity, Plasticity, Rigidity. 1.2 Stress and Strain with their types, Elastic limit and Hooke's law, types of modulii of elasticity, Stress–Strain diagram, Poisson's ratio, factors affecting elasticity, 1.3 Applications of elasticity. Numerical. 1.4 Molecular forces and their nature, cohesive forces, adhesive forces, molecular range, sphere of influence. 1.5 Definition of surface tension, factors affecting surface tension (Temperature, impurity, nature of the liquid). 1.6 Concave and convex meniscus of liquid surfaces and their explanation on the basis of molecular forces, angle of contact, 1.7 Capillary action and its explanation, applications of surface tension. Numerical 1.8 Viscosity, viscous force in fluid, velocity gradient, Newton's law of viscosity. 1.9 Free fall of spherical body through a viscous medium, terminal velocity, Stoke's law of viscosity with expression, formula for coefficient of viscosity by Stoke's law (no derivation). 1.10 Streamline and turbulent flow of liquids, critical velocity, significance of Reynolds's number, Numerical.	12	9	CO1

COURSE NAME	**Applied Science**	COURSE CODE	**R18SC1705**

Sr. No.	Unit Outcomes (UOs)	Topics and Sub-topics	Marks	Hours	Mapped CO
2	2a. Solve the given Numerical based on equations of motion, equations of motion under gravity 2b. Establish the relation between angular and linear velocity. 2c. Explain the concept of Simple Harmonic Motion (SHM), explain the related parameters and solve the given Numerical. 2d. Explain the concept of echo, reverberation and reverberation time, solve the given Numerical	2.1 Displacement, velocity, acceleration and retardation. Kinematical equations of motion, equations of motion under gravity, Numerical. 2.2 Circular motion, Uniform circular motion, Angular displacement, angular velocity, angular acceleration, three equations of angular motion, Tangential velocity and radial acceleration (No derivation), 2.3 Centripetal and Centrifugal forces, Numerical. 2.4 Periodic motion, simple harmonic motion, S.H.M. as a projection of uniform circular motion, equation of S.H.M., graphical representation of S.H.M., 2.5 concepts of oscillation, periodic time, frequency, amplitude, phase, phase difference. Numerical. 2.6 Sound waves, propagation of sound, reflection of sound waves, echo, absorption of sound, coefficient of absorption, 2.7 Reverberation, reverberation time, formula for reverberation time (No derivation), methods for controlling reverberation time, Numerical.	16	14	CO2
3	3a. Describe the construction and working of three energy level laser system. 3b. Describe the phenomena of total internal reflection for the given mediums. 3c. Describe light propagation in the given type of optical fiber.	3.1 Excitation of particle, optical pumping, types of transitions – non radiative and radiative. 3.2 Spontaneous and stimulated emission, population inversion, resonance cavity, active system, 3.3 Types of lasers, Ruby laser, Helium–Neon laser, and comparison between ruby and He–Ne lasers, Uses of lasers. 3.3 Reflection, refraction, laws of refraction, Total Internal Reflection (TIR). Principle, types, properties and applications of optical fibers.	12	9	CO3

COURSE NAME	**Applied Science**	COURSE CODE	**R18SC1705**

Sr. No.	Unit Outcomes (UOs)	Topics and Sub-topics	Marks	Hours	Mapped CO
4	4a. Describe construction and working of the given furnace 4b. Describe the extraction process of given ore with chemical reaction 4c. State purposes and describe preparation methods of making alloy. 4d. Select relevant alloy for given application stating the properties 4e. Explain the hardening and setting process of Portland cement with Hydrolysis and hydration reactions	4.1. Metallurgy: Mineral, Ore, Gangue ,Flux, Slag 4.2. Types of furnace: Muffle furnace, Blast furnace 4.3. Extraction processes of Haematite ores: Crushing, Concentration, Reduction, Refining 4.4. Properties of Iron and Copper: Hardness, Tensile Strength, Toughness, Refractoriness, Machinability Brazing, Castability 4.5. Preparation of Alloys a) Fusion method –Brass b) Compression method-Wood's metal 4.6. Ferrous alloys: composition, properties and uses of Low carbon, medium carbon ,high carbon steels 4.7. Non-Ferrous alloys : composition, properties and uses of Brass, Bronze, Duralumin , Tinman solder, Wood's metal ,Monel metal 4.8. Cement:Portland cement, Constituents,Setting and Hardening process 4.9. Lime-Classification , composition , properties and uses	12	12	CO4
5	5a. Describe the concept of Hardness 5b. Calculate the Hardness of water for the given data 5c. Describe the effects of Hard water in boilers 5d. Explain the given type of water softening process 5e. Describe the purification of municipal water for the given process 5f. Describe the Reverse Osmosis for the given type of water 5g. Describe the process of Desalination of water 5h. State the concept of pH and pOH. Numerical related with it 5i. Applications of pH in engineering	5.1. Hardness-types, EDTA method,Degree of Hardness of the water in terms of equivalent amount of $CaCO_3$, Numerical based on degree of hardness . 5.2. Effect of hard water in boilers and its prevention, Scales and Sludges 5.3. Water softening : Zeolite process,Ion exchange process (cation exchange and anion exchange) 5.4. Municipal water treatment –Screening, Sedimentation , Coagulation , Filtration and Sterilization 5.5. Waste water- Characteristics, Dissolved oxygen ,BOD and COD,Sewage treatment , recycling of waste water 5.6. De-salination of brackish water process by reverse osmosis 5.7. Definition of pH and pOH , pH scale, Numerical problems on pH and Industrial applications	16	12	CO5

COURSE NAME	**Applied Science**	COURSE CODE	**R18SC1705**

Sr. No.	Unit Outcomes (UOs)	Topics and Sub-topics	Marks	Hours	Mapped CO
6	6a. Describe properties of fuel which decide its quality 6b. Explain the proximate and ultimate analysis of coal to decide its quality 6c. Describe Fractional distillation process for refining of petroleum 6d. Describe the composition , properties and application of given Gaseous fuel 6e. Calculate the mass and volume of air required for complete combustion fuel	6.1. Fuel: Combustion reaction ,Calorific value and Ignition temperature , classification 6.2. Solid fuels: Coal , classification and composition , Proximate analysis , Ultimate analysis 6.3. Liquid Fuels: Fractional distillation of crude petroleum, Boiling range, composition, calorific value, properties and uses of petrol kerosene, diesel, biodiesel in automobile industry and IC engine. 6.4. Gaseous fuels: Composition, calorific value and ignition temperature of Biogas, LPG and CNG , combustion equation of gaseous fuels , Mass and volume of air required for complete combustion .Numerical.	12	8	CO6

7. PRACTICAL –ASSIGNMENTS-STUDENT ACTIVITIES-TUTORIALS (Separate table for each)

Sr. No.	Practical (PHYSICS)	Topic No.	Hours Allotted	Mapped CO
1	Determination of Young's modulus.	1	2	CO1
2	Verification of Hooke's law.	1	2	CO1
3	Verification of Archimedes principle.	1	2	CO1
4	Study the effect of length and mass of the bob on periodic time of a simple pendulum.	2	2	CO2
5	Determination of 'g' by simple pendulum.	2	2	CO2
6	Determination of surface tension of liquid by the capillary rise method.	1	2	CO1
7	Determination of surface tension by using capillaries different bores.	1	2	CO1
8	Determination of viscosity of water by Poiseuille's method.	1	2	CO1
9	Determination of viscosity of oil by Stoke's method.	1	2	CO1
10	Measurement of divergence of light beam by using laser.	3	2	CO3
11	Determination of velocity of sound by using resonance tube.	3	2	CO2
12	Study the phenomenon of Total Internal Reflection and determine critical angle of incidence.	3	2	CO3
--	Total	--	24	--

S. No.	Student activity	Topic No.	Hours Allotted	Mapped CO
1	Mini project	01	04	CO1 /CO2 /CO3
--	Total	--	04	--

S. No.	Practical	Topic No.	Hours Allotted	Mapped CO
--	**Practical –assignments-student activities submission**	**--**	**04**	**--**
--	**Total**	**--**	**32**	**--**

Sr. No.	Practical (CHEMISTRY)	Topic No.	Hours Allotted	Mapped CO
1	Determination of percentage purity of Iron from stainless steel alloy.	1	2	CO4
2	Estimation of Calcium in cement sample.	1	2	CO4
3	To determine amount of Nickel present in Monel metal.	1	2	CO4
4	Determine the Alkalinity of water sample.	2	2	CO5
5	Determine chloride content in the given water sample by Mohr's method.	2	2	CO5
6	Determine the Total Hardness of water sample by EDTA method.	2	2	CO5
7	Determine the Dissolved Oxygen present in the water sample by using Winkler's method.	2	2	CO5
8	Determine the pH value of given solution using pH meter.	2	2	CO5
9	Determination of Moisture content in given coal sample using Proximate analysis.	3	2	CO6
10	Determination of Ash content in given coal sample using Proximate analysis.	3	2	CO6

Sr. No.	Practical (CHEMISTRY)	Topic No.	Hours Allotted	Mapped CO
11	To determine percentage of Copper from the brass.	1	2	CO4
12	Determine the Turbidity of given water sample by Nephelometric method.	2	2	CO5
--	Total	--	24	--

S. No.	Student activity	Topic No.	Hours Allotted	Mapped CO
1	Mini project	01	04	CO4 /CO5 /CO6
--	Total	--	04	--

S. No.	Practical	Topic No.	Hours Allotted	Mapped CO
--	**Practical –assignments-student activities submission**	--	**04**	--
--	**Total**	--	**32**	--

8. EVALUATION SCHEME FOR PRACTICAL

Rubriks for laboratory manual report

Process Related (05)	Product Related (05)	Total (10)

9. SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Topic No.	Topic Title	Mapped CO % OR Emphasis	Distribution of Marks			
			Cognitive level			Total Marks
			Remember	Understand	Apply	
PHYSICS						
1	Elasticity, Surface Tension and Viscosity	CO1	3	5	4	12
2	Linear motion, Angular motion, Simple Harmonic Motion and Sound	CO2	5	5	6	16
3	Lasers and Fiber Optics	CO3	3	5	4	12
Total		--	11	15	14	40
CHEMISTRY						
4	Metals ,Alloys Cement & Lime	CO4	3	4	5	12
5	Water Treatment & analysis	CO5	4	6	6	16
6	Fuels and Combustion	CO6	3	4	5	12
Total		--	10	14	16	40

10. SAMPLE MODEL QUESTION BANK FOR THEORY AND TEST EXAMINATIONS

Sr. No	Topic	Mapped CO	Cognitive level R/U/A	Question
1	1	CO1	R	Name who first put forward the concept of stimulated emission
2	1	CO1	U	The spring is made up of steel and not of copper because
3	1	CO1	A	A metal plate moves over a layer of oil 10-3 mm thick with velocity 0.05 m/s . Calculate velocity gradient
4	4	CO4	R	The dissociation constant of water at 25^0C is-
5	4	CO5	U	Hard water is unfit for use in boilers for "steam raising" because :
6	4	CO6	A	Calculate [H+] ion concentration if the pH of the solution is 3.2

11. LEARNING RESOURCES

- **BOOKS**

Sr. No.	Title of Book	Author	Publication
1	Physics Textbook XI (Part1 &2)	J. V. Naralikar, A. W. Joshi	National Council of Education Research and Training. New Delhi
2	Physics Textbook XII (Part1 &2)	J. V. Naralikar, A. W. Joshi	National Council of Education Research and Training, New Delhi
3	Fundamentals of Physics	D. Haliday & R. Resnick	John Wiley and Sons , USA
4	Engineering Physics	R. K. Gaur, S. L. Gupta	Dhanpat Rai and Sons Publications.
5	Engineering Chemistry	Jain P. C. & Jain Monika	Dhanpat Rai Publishing Company (P) Ltd., New Delhi.
6	Engineering Chemistry	S. S. Dara	S. Chand Publication
7	Fundamental of electrochemistry	Bagotsky V. S.	Wiley international NJ, USA.

- **SOFTWARE/ TOOLS/ MODELS**

- **WEBSITES**

Sr. No.	Address
1	www.physicsclassroom.com
2	www.hyperphysics.com
3	www.physicsinfo.com http://nptel.ac.in/course.php?disciplineId=115
4	http://nptel.ac.in/course.php?disciplineId=104

Sr. No.	Address
5	http://hperphysics.phy-astr.gsu.edu/hbase/hph.html
6	www.physicsclassroom.com
7	www.physics.org
8	www.fearofphysics.com
9	www.sciencejoywagon.com/physicszone
10	www.science.howstuffworks.com
11	www.in.wikipedia.org
12	www.nptel.iitm.ac.in
13	www.youtube.com, watch v= KjoQHqzda8 (related to Chemical bonding)

12. COURSE CURRICULUM DEVELOPMENT MEMBERS

S. No.	Name and Designation	Contact No.	Email
1	Dr. D. V. Patil	9488985987	dineshvpatil@hotmail.com
2	Ms. Pooja Jalmoru	8796840143	Pooja.jalmoru@gmail.com
3	Mr. V. S. Thakare	9604046490	thakare.vasant@yahoo.com
4	Dr. D. N. Game	9028461964	Deorao.game@gmail.com
5	Mr. S. S. Kale	9403353938	ssamkale@gmail.com

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE -1

Diploma Programme	CIVIL		
Course Name	ENGLISH	Course code	R18SC1707
Course Category	FOUNDATION	Credits	04

COURSE TEACHING, ASSESSMENT AND EVALUATION SCHEME:

Teaching scheme		Evaluation scheme									
		Direct assessment - Weightage - 80%									
		Theory outcome		Practical outcome							Total
				TERMWORK					PRACTICAL	ORAL	
Theory Allotted Hrs	Practical Allotted Hrs	ESE marks	TTA marks	TW marks	SW marks	AS marks	TU Marks	Total	Practical Marks	OR marks	Total marks
2	2	80	20	20	05	-	-	25	-	-	125
		Indirect assessment – Weightage - 20%									
		Mid semester students feedback							End of the course survey		

End semester examination-ESE, Two tests average-TTA, Term Work- TW, Student Activity-SW, Assignments –AS, Tutorials- TU, Oral –OR

1. RATIONALE

Competency in English enhances the employability of an engineering professional. In today's competitive world English is important for students in their academics as well as in their prospective career. The students after passing Diploma from any discipline need to use English as a medium of communication in various formal as well as informal situations. They need to be proficient in the four skills of language i.e. listening, speaking, reading and writing. This curriculum is need based and is designed to help the students to communicate in English effectively.

2. EXPECTED PROFICIENCY

Communicate in English in spoken and written form effectively.

3. COURSE OUTCOMES (COs)

Students will be able to

1. Formulate grammatically correct sentences.
2. Use relevant words as per context.
3. Comprehend given passages and dialogues.
4. Comprehend given passages and dialogues.
5. Distinguish between various types of communication.
6. Communicate effectively by avoiding barriers in various formal and informal situations.

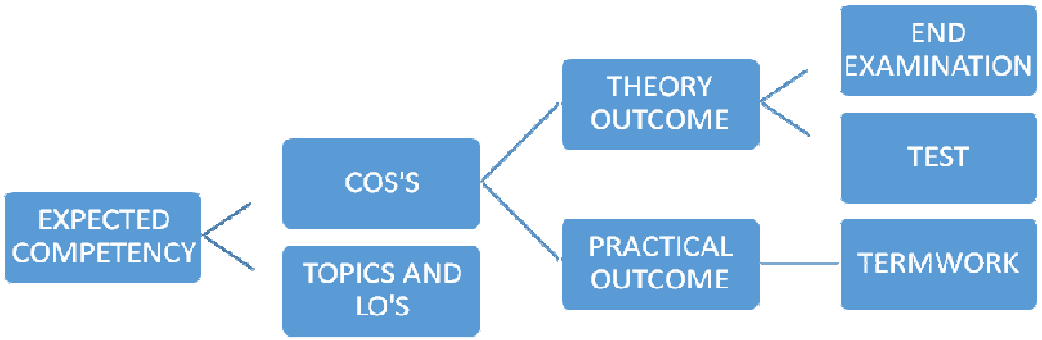
COURSE NAME	ENGLISH	COURSE CODE	R18SC1707

4. CO –PO MATRIX

Course Name: ENGLISH Course code: R18CE5103	PO 1 Basic and Discipline specific knowledge	PO 2 Problem analysis	PO 3 Design/ development of solutions	PO 4 Engineering Tools, Experimentation and Testing	PO 5 Engineering practices for society, sustainability and environment	PO 6 Project Management	PO 7 Life-long learning	PSO 1 Construction planning and detailing	PSO 2 Construction execution, supervision and maintenance
CO1	3					1	1		
CO2	3					1	1		
CO3	2					1	1		
CO4	2					1	1		
CO5	2					1	1		
CO6	3					1	1		

Rating scale '**3**' for high, '2' for medium, '**1**' for low '0' for no correlation

5. COURSE MAP



COURSE NAME	ENGLISH	COURSE CODE	R18SC1707

6. DETAILED COURSE CONTENTS

S. No.	Unit Outcomes (UOs)	Topics and Sub-topics	Marks	Hours	Mapped CO
1	1.1 List the various Parts of Speech 1.2 Define different Parts of Speech 1.3 Identify the part of speech of the given word 1.4 Use appropriate prepositions to construct meaningful sentences. 1.5 Use appropriate conjunctions to connect phrases and clauses in the given sentences. 1.6 Use correct form of tenses in given situation. 1.7 Use relevant articles in constructing sentences. 1.8 Punctuate the given sentences by using correct punctuation marks. 1.9 Change the narration for the given situation. 1.10 Change the voice of a given sentence	**Applied Grammar** 1a. Parts of Speech [Noun, Pronoun, Verb, Adverb, Adjective, Preposition, Conjunction, Interjection] 1b. Tenses 1c. Articles 1d. Punctuation 1e. Direct-indirect speech 1f. Active and Passive voice	12	08	CO1
2	2.1 Use synonyms and antonyms correctly. 2.2 Correct the spelling errors in given sentences. 2.3 Select appropriate word for the given context. 2.4 Substitute given phrase/ sentence by one meaningful word. 2.5 Apply the engineering vocabulary in the new /given context	**Vocabulary Building** 2a. Synonyms and Antonyms. 2b. Spellings 2c. Words often confused 2d. One word substitution 2e. Engineering vocabulary	16	8	CO2
3	3.1 Answer the questions on a given unseen passage/ dialogue. 3.2 Answer the questions orally on the given unseen passage with correct pronunciation	**Reading Comprehension** 3a. Comprehension based on dialogues 3b. Comprehension based on unseen passage	12	4	CO3
4	4.1 State importance of public speaking 4.2 State features of a good formal speech 4.3 State characteristics of a good vote of thanks speech 4.4 Write a vote of thanks speech for the given situation.	**Public Speaking** 4a. Importance of public speaking 4b. Characteristics of a good speech 4c. Vote of thanks	12	4	CO4

COURSE NAME	ENGLISH	COURSE CODE	R18SC1707

S. No.	Unit Outcomes (UOs)	Topics and Sub-topics	Marks	Hours	Mapped CO
	4.5 State characteristics of a good farewell speech 4.6 Write a farewell speech for the given situation. 4.7 State characteristics of a good speech for introducing a guest 4.8 Write a speech for introducing a guest in the given situation. 4.9 Deliver a speech on a given situation	4d. Farewell speech 4e. Introducing a guest			
5	5.1 Define communication 5.2 State the importance of communication in business 5.3 Enlist elements of communication 5.4 Explain the various elements of communication. 5.5 Identify the different communication elements in a given situation 5.6 Draw a neat sketch of communication cycle for a given situation 5.7 Explain encoding and decoding 5.8 List types of communication 5.9 Define verbal, non-verbal, oral, written, formal, informal communication 5.10 Identify the type of communication in a given situation 5.11 Distinguish between various types of communication 5.12 State merits and demerits of oral and written communication 5.13 Communicate effectively in a given formal and informal situation.	**Basics of Communication** 5a. Definition 5b. Need and importance of communication 5c. Communication cycle and elements 5d. Encoding and decoding 5e. Types of communication 5f. Verbal and non-verbal 5g. Oral and written 5h. Formal and informal 5i. Difference between verbal and non-verbal, oral and written, formal and informal communication 5j. Merits and demerits of oral and written communication	16	4	CO5
6	6.1 Define "barrier in communication" 6.2 List types of barriers in communication 6.3 Explain mechanical, physical, psychological, linguistic, and cultural barriers with suitable examples	**Effective Communication** 6a. Barriers in communication. • Mechanical • Physical	12	4	CO6

COURSE NAME	ENGLISH	COURSE CODE	R18SC1707

S. No.	Unit Outcomes (UOs)	Topics and Sub-topics	Marks	Hours	Mapped CO
	6.4 Identify the communication barriers in a given situation 6.5 Suggest remedies to overcome the given barriers. 6.6 List principles of effective communication 6.7 Describe the various principles of communication with suitable examples. 6.8 Apply the various principles in oral and written communication	• Psychological [Prejudice, status block, negative emotions like fear, ego, low confidence] • Linguistic • Cultural 6b. Overcoming barriers 6c. Principles of communication • Clarity • Conciseness • Correctness • Completeness • Feedback • Informality • Media selection • Flexibility			

COURSE NAME	ENGLISH	COURSE CODE	R18SC1707

7. PRACTICAL –ASSIGNMENTS-STUDENT ACTIVITIES-TUTORIALS (Separate table for each)

S. No.	Assignments	Topic No.	Hours Allotted	Mapped CO
1	Pronounce basic English words correctly.	05	02	CO5
2	Meet and greet people formally.	05	02	CO5
3	Talk about your family.	05	02	CO5
4	Give directions about places in town.	06	02	CO6
5	Describe your neighbourhood and region.	06	02	CO6
6	Answer the questions orally on the given unseen passage with correct pronunciation.	03	02	CO3
7	Deliver any one of the following speeches: Vote of thanks, Farewell speech, Introducing a guest.	04	02	CO4
8	Rewrite the given sentences using correct articles.	01	02	CO1
9	Change the narration of given sentences from direct to indirect.	01	02	CO1
10	Solve the exercise based on vocabulary.	02	02	CO2
--	Total	--	20	--

S. No.	Student activity	Topic No.	Hours Allotted	Mapped CO
1	Group reading: Read one news item from a standard English newspaper or magazine. Form a group of 4-5 students. Discuss the news from various angles (contents, grammar, and vocabulary) with your group.	01	04	CO1
2	Conduct quiz on spellings in small groups.	02	04	CO2
--	Total	--	08	--

S. No.	Practical	Topic No.	Hours Allotted	Mapped CO
--	**Practical –assignments-student activities submission**	**--**	**04**	**--**
--	**Total**	**--**	**32**	**--**

S. No.	Assignment Instructions
1	Listen to the recorded voice on the Linguaphone machine, identify and practice the pronunciation of difficult words.
2	Study the given audio/video situation and practice the conversational techniques to meet and greet people formally.
3	Study the given audio/video situation and practice the conversational techniques to talk about your family.
4	Study the given audio/video situation and practice the conversational techniques to give directions about places in town.
5	Study the given audio/video situation and practice the conversational techniques to describe your neighbourhood and region.
6	Read the passage carefully and answer the questions based on it.
7	Develop and deliver a speech on the given situation.

S. No.	Assignment Instructions
8	Rewrite the given sentences by applying the rules of definite and indefinite articles.
9	Apply the rules of narration and change the sentences from direct to indirect speech.
10	Read the given sentences and follow the instructions to change its structure.

8. EVALUATION SCHEME FOR PRACTICAL / ASSIGNMENTS/STUDENT ACTIVITIES

Rubrics for Assignments

CATEGORY	4	3	2	1
Structure	Very Well Structured	Well Constructed	Structured But Missing Links	Unstructured
Understanding Of The Subject Matter	Complete Understanding	Substantialunder standing	Some Understandi ng	Limited Understanding
Grammatical / Spelling Errors	Least Errors	90 % Free Of Errors	75 % Free Of Errors	50 % Free Of Errors
Graphics / Presentation	Neat ,Accurate And Enhance Understanding	Neat And Accurate	Some Illustrations Are Misleading And Redundant	Least Accurate And Not Neat
Timely Completion Of Activity	Maximum	Moderate	Satisfactory	Least
Overall Understanding	Maximum	Moderate	Satisfactory	Least

Rubrics for Student Activities

Category	4	3	2	1
Structure And Presentation	Very Well Structured	Well Constructed	Structured But Missing Links	Unstructured
Quantity Of Information	All Subtopics Covered In Detail	All Subtopics Are Mostly Covered	Some Of The Subtopics Are Not Covered In Detail	Some Of The Subtopics Are Not Covered
Quality Of Information	Clear Description With Supporting Details	Clear Description With Some Supporting Details	Clear Description With Lack Of Supporting Details	Irrelevent Information
Sources	Clear Documentation	Clear Documentation With Some Missing Links	Part Documentation With Missing Links	Documentation With Number Of Missing Links
Graphics / Presentation	Neat ,Accurate And Enhance Understanding	Neat And Accurate	Some Illustrations Are Misleading And Redundant	Least Accurate And Not Neat
Group Activity	Maximum Coordination And Effort	Fair Coordination And Effort	Lack Coordination And Effort	Least Participation
Timely Completion Of Activity	Maximum	Moderate	Satisfactory	Least

COURSE NAME	ENGLISH	COURSE CODE	R18SC1707

Category	4	3	2	1
Overall Understanding	Maximum	Moderate	Satisfactory	Least

9. MAJOR EQUIPMENT/ INSTRUMENTS /TOOLS REQUIRED

S. No.	Equipment Name with Specifications	Practical
1	Computers with Linguaphone Language Lab software	

9. SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Topic No.	Topic Title	Mapped CO % OR Emphasis	Distribution of Marks			
			Cognitive level			Total Marks
			Remember	Understand	Apply	
1	Applied Grammar	CO1	03	03	06	12
2	Vocabulary Building	CO2	04	04	08	16
3	Comprehension	CO3	02	08	02	12
4	Speech Writing	CO4	02	02	08	12
5	Basics of Communication	CO5	04	04	04	12
6	Effective Communication	CO6	04	04	08	16
Total		--	**19**	**25**	**36**	**80**

10. SAMPLE MODEL QUESTION BANK FOR THEORY AND TEST EXAMINATIONS

S. No	Topic	Mapped CO	Cognitive level R/U/A	Question
1	1	CO1	R	Define a noun, verb and adjective.
2	1	CO1	U	Identify the part of speech of the underlined word. Seeta is a brilliant girl.
3	1	CO1	A	Insert appropriate article in the blanks ----apple is a tasty fruit.
4	2	CO2	R	Correct the spelling of the given word appeal
5	2	CO2	U	Write synonym of the given words Beautiful, Vibrant
6	2	CO2	A	Substitute the given phrase/sentence by one meaningful word A life history of a person written by someone .
7	3	CO3	R	Define the term 'illiteracy'.
8	3	CO3	U	Describe the causes of illiteracy.
9	3	CO3	A	Suggest two measures to reduce/remove illiteracy.
10	4	CO4	R	State two features of a good formal speech
11	4	CO4	U	Describe two characteristics of a good farewell speech.
12	4	CO4	A	Draft a farewell speech for the head of the Civil

S. No	Topic	Mapped CO	Cognitive level R/U/A	Question
				department who will retire this month.
13	5	CO5	R	Define the term communication
14	5	CO5	U	Distinguish between formal and informal communication.
15	5	CO5	A	Identify the different communication elements in the given situation. A teacher who is teaching the topic of barriers in the classroom asks a question to the students. The students answer the question correctly.
16	6	CO6	R	List any two types of barriers in communication
17	6	CO6	U	Describe the mechanical barrier with two examples.
18	6	CO6	A	Suggest two remedies to overcome the mechanical barriers.

11. LEARNING RESOURCES

- **BOOKS**

S. No.	Title of Book	Author	Publication
1	Applied Grammar and Composition	M.P. Bhatia	M.I. Publications (Eighth Revised Edition), Agra.
2	Advanced English Grammar and Composition	Alok Pandey and Deepak Pandey	Sahni Publication, Delhi-7.
3	Intermediate English Grammar	Raymond Murphy	Cambridge University Press, (Second Edition), New Delhi.
4	Essential English Grammar	Raymond Murphy	Cambridge University Press, New Delhi, ISBN: 9780-0-521-67580-9
5	Effective English with CD	Kumar, E. Suresh; Sreehari, P.; Savithri, J.	Pearson Education, Noida, New Delhi, 2009 ***ISBN:*** 978-81-317-3100-0
6	English Grammar at Glance	Gnanamurali, M.	S. Chand and Co. New Delhi, 2011 ***ISBN***:9788121929042
7	Living English Structure	Allen, W.S.	Pearson Education, New Delhi, Fifth edition, 2009, ***ISBN***:108131728498,99
8	English Reading Comprehension	R. Gupta	Ramesh Publishing House, New Delhi
9	The Art of Public Speaking	Dale Carnegie	Ocean Paperbacks
10	Essential Communication Skills	Shalini Aggrarwal	Ane Books Pvt Ltd
11	A Course in Communication Skills	Dutt, Rajeevan, Prakash	Foundation Books
12	Word Power Made Easy	Norman Lewis	Pocket Books / Goyal Publishers & Distributors
13	Words Often Confused	Dr. B. R. Kishore	New Light Publishers

S. No.	Title of Book	Author	Publication
14	Perfect Your Spelling Power	Raymond Hill	Maanu Graphics Publishers

- **SOFTWARE/ TOOLS/ MODELS**

S. No.	Name	Company	Freeware/commercial
1	Linguaphone language laboratory software	Lotus Learning Ltd	Commercial

- **WEBSITES**

S. No.	Address
1	https://english.wifistudy.com/
2	https://www.britishcouncil.in/english/learn-online
3	http://learnenglish.britishcouncil.org/en/content
4	http://www.talkenglish.com/
5	www.languagelabsystem.com
6	www.wordsworthelt.com
7	www.learn4good.com
8	www.fluentzy.com
9	www.edufind.com
10	www.khake.com
11	www.learnenglish.org.uk
12	www.english4engineer.com
13	www.owl.english.purdue.edu

12. COURSE CURRICULUM DEVELOPMENT MEMBERS

S. No.	Name and Designation	Contact No.	Email
1	Prof. R.B. Dhonukshe	9822721472	rb.dhonukshe2@gmail.com
2	Mrs. R. A. Deshmukh	9373777209	rad231172@gmail.com

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE -1

Diploma Programme	CIVIL		
Course Name	Business Communication	Course code	R18SC1708
Course Category	Foundation	Credits	03

COURSE TEACHING, ASSESSMENT AND EVALUATION SCHEME:

Teaching scheme		Evaluation scheme									
		Direct assessment - Weightage - 80%									
		Theory outcome		Practical outcome							Total
				TERMWORK					PRACTICAL	ORAL	
Theory Allotted Hrs	Practical Allotted Hrs	ESE marks	TTA marks	TW marks	SW marks	AS marks	TU Marks	Total	Practical Marks	OR marks	Total marks
1	2	-	-	20	05	-	-	25	-	@25	50
		Indirect assessment – Weightage - 20%									
		Mid semester students feedback							End of the course survey		

End semester examination-ESE, Two tests average-TTA, Term Work- TW, Student Activity-SW, Assignments –AS, Tutorials- TU, Oral -OR

1. RATIONALE

Communication is life blood of any business. To be able to communicate effectively is considered one of the foremost employability skills. Fluency and correct pronunciation makes a world of difference in any business situation like meetings, conferences, seminars, presentations etc. Along with that, a business professional has to be proficient in written communication. Hence in this curriculum, speaking and writing skills are emphasized to help the students in interviews, presentations, and other oral as well as written communication situations.

2. EXPECTED PROFICIENCY

Communicate effectively and skillfully at the workplace.

3. COURSE OUTCOMES (COs)

Students will be able to

1. Give presentation using ICT.
2. Face a mock interview.
3. Write business letters for given formal situations.
4. Draft notice, circular and memorandum in given formal situations.
5. Draft reports on given formal situations

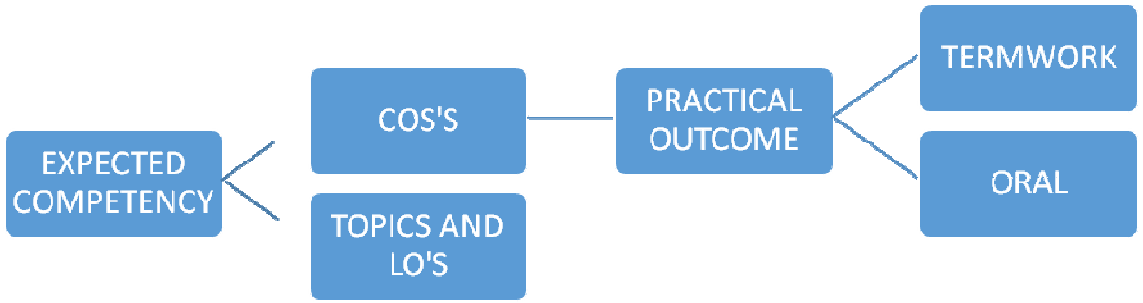
COURSE NAME	Business Communication	COURSE CODE	R18SC1708

4. CO –PO MATRIX

Course Name: Business Communication Course code: R18CE5103	PO 1 Basic and Discipline specific knowledge	PO 2 Problem analysis	PO 3 Design/ development of solutions	PO 4 Engineering Tools, Experimentation and Testing	PO 5 Engineering practices for society, sustainability and environment	PO 6 Project Management	PO 7 Life-long learning	PSO 1 Construction planning and detailing	PSO 2 Construction execution, supervision and maintenance
CO1	3					1	1		
CO2	3					1	1		
CO3	2					1	1		
CO4	2					1	1		
CO5	2					1	1		

Rating scale '**3**' for high, '**2**' for medium, '**1**' for low '**0**' for no correlation

5. COURSE MAP



COURSE NAME	**Business Communication**	COURSE CODE	**R18SC1708**

6. DETAILED COURSE CONTENTS

S. No.	Unit Outcomes (UOs)	Topics and Sub-topics	Marks	Hours	Mapped CO
1	1.1 Use different types of verbal and non–verbal communication during a presentation	**Presentation Skills** 1a. Need and importance 1b. Effective presentation – guidelines for effective presentation 1c. Use of positive Body language for effective presentation 1d. Guidelines to prepare an effective Power Point Presentation	--	02	CO1
2	2.1 Face a mock interview using appropriate communication skills	**Interview Techniques** 2a. Preparation stage: Preparing for an interview, pre-interview research. 2b. Factors affecting performance during the interview: stress, self-awareness, presence of mind. 2c. Post-interview follow-up	--	02	CO2
3	3.1 Draft formal business letters in given situations	**Business Correspondence-Part-I** 3a. Letter of Enquiry 3b. Letter of Order 3c. Letter of Complaint	--	04	CO3
4	4.1 Draft formal letters related to employment in given situations.	**Business Correspondence-Part II** 4a. Letter of Job Application 4b. Letter of Resignation 4c. Joining letter 4d. Leave application	--	04	CO3
5	5.1 Draft notice, memo, circular in given situations	**Office Drafting** 5a. Notice 5b. Circular 5c. Memo 5d. Email writing	--	02	CO4
6	6.1 Draft Visit, accident, and progress report in given situations	**Report Writing** 6a. Visit report 6b. Accident report 6c. Progress report	--	02	CO5

7. PRACTICAL –ASSIGNMENTS-STUDENT ACTIVITIES-TUTORIALS (Separate table for each)

S. No.	Assignments	Topic No.	Hours Allotted	Mapped CO
1	Face a mock Interview.	02	04	CO2
2	Talk about different jobs and types of work	01	02	CO1
3	Talk about your hobbies and enquire about those of other people.	01	02	CO1
4	Enquire about people's programmes, plans and booking facilities	01	02	CO1
5	Draft a letter of Job Application with resume	04	02	CO3
6	Draft a request letter for everyday institute activities	03	02	CO3
7	Draft a Circular/ Notice on a given situation	05	02	CO4
8	Email a Visit Report/ Accident Report to given email addresses.	06	02	CO5
9	Preparation of PPT /report on micro-project	01	04	CO1
10	Presentations on micro-project using ICT	01	04	CO1
--	Total	--	26	--

S. No.	Student activity	Topic No.	Hours Allotted	Mapped CO
1	Summarize the contents of a famous book/books. [fiction/nonfiction]	01	02	CO1
2	Write a report on various formal events in your college.	06	01	CO5
3	Identify a good business leader, study his presentations and prepare a report on it.	01	01	CO1
--	Total	--	04	--

S. No.	Practical	Topic No.	Hours Allotted	Mapped CO
--	**Practical –assignments-student activities submission**	**--**	**02**	**--**
--	**Total**	**--**	**32**	**--**

S. No.	Assignment Instructions
1	Know the Do's and Don'ts of a good interview and exhibit positive body language during the interview session.
2	Work in a group of four students and enquire about the jobs and nature of work of your parents and other family members
3	Work in a group of four students and enquire about one another's hobbies.
4	Work in a group of four students and enquire about the plans and programmes of your group members for short and long vacations.
5	Write a job application letter along with your resume
6	Draft a request letter for everyday institute activities
7	Write a circular/notice on the given situation
8	Work in a group of four students, email a given report to the given email address.
9	Compile the information that you have collected for your micro project and prepare report and PPT based on the contents.
10	Present your contents using ICT and display positive body language.

8. EVALUATION SCHEME FOR PRACTICAL / ASSIGNMENTS/STUDENT ACTIVITIES

Rubrics for Assignments

Category	4	3	2	1
Structure	Very Well Structured	Well Constructed	Structured But Missing Links	Unstructured
Understanding Of The Subject Matter	Complete Understanding	Substantial understanding	Some Understanding	Limited Understanding
Grammatical / Spelling Errors	Least Errors	90 % Free Of Errors	75 % Free Of Errors	50 % Free Of Errors
Graphics / Presentation	Neat, Accurate And Enhance Understanding	Neat And Accurate	Some Illustrations Are Misleading And Redundant	Least Accurate And Not Neat
Timely Completion Of Activity	Maximum	Moderate	Satisfactory	Least
Overall Understanding	Maximum	Moderate	Satisfactory	Least

Rubrics for Student Activities

Category	4	3	2	1
Structure And Presentation	Very Well Structured	Well Constructed	Structured But Missing Links	Unstructured
Quantity Of Information	All Subtopics Covered In Detail	All Subtopics Are Mostly Covered	Some Of The Subtopics Are Not Covered In Detail	Some Of The Subtopics Are Not Covered
Quality Of Information	Clear Description With Supporting Details	Clear Description With Some Supporting Details	Clear Description With Lack Of Supporting Details	Irrelevent Information
Sources	Clear Documentation	Clear Documentation With Some Missing Links	Part Documentation With Missing Links	Documentation With Number Of Missing Links
Graphics / Presentation	Neat ,Accurate And Enhance Understanding	Neat And Accurate	Some Illustrations Are Misleading And Redundant	Least Accurate And Not Neat
Group Activity	Maximum Coordination And Effort	Fair Coordination And Effort	Lack Coordination And Effort	Least Participation
Timely Completion Of Activity	Maximum	Moderate	Satisfactory	Least
Overall Understanding	Maximum	Moderate	Satisfactory	Least

Rubrics for Oral

Category	4	3	2	1
Delivery	Relaxed, Self confident, show natural body	Demonstrate quick recovery from minor mistake	Self conscious and monotone voice	Poorly performed

Category	4	3	2	1
	movement			
Understanding	Clear complete and concise	Mostly clear and little concise	Unclear	Incompletes and not concise
Vocabulary	Wide range of vocabulary and there is no repetition.	Quite Wide range of vocabulary and there is not lot of repetition	Some new vocabulary and few new expression	Student tends to repeat words all the time.
Presentation	Orderly and effectively	Orderly and little effectively	orderly	Not orderly
Body Language	Keep eye contact and no nervous expressions	Keep eye contact and few nervous expressions	Do not keep eye contact and few nerves expressions	Do not Keep eye contact and total nervous expressions

9. MAJOR EQUIPMENT/ INSTRUMENTS /TOOLS REQUIRED

S. No.	Equipment Name with Specifications	Practical
1	Computers with Linguaphone Language Lab software	

10. LEARNING RESOURCES

- **BOOKS**

S. No.	Title of Book	Author	Publication
1	Communication Skills	MSBTE	MSBTE, Mumbai
2	Effective Communication Skills	M Ashraf Rizvi	Tata McGraw-Hill
3	Communication Skills	Sanjay Kumar and Pushp Lata	Oxford University Press
4	Personality Development and Soft Skills	Barun K. Mitra	Oxford University Press
5	Kumar's Group Discussions and Interviews	Dr. B. R. Kishore , D. S. Paul	Vee Kumar Publications Private Limited,New Delhi-110008.
6	PowerPoint Presentations that Sell	Adam B. Cooper	McGraw Hill Professionals.
7	Business Communication	R. C. Bhatia	Ane Books India,New Delhi.
8	Developing Communication Skills	Krishna Mohan, Meera Banerji	Macmillan India Ltd., New Delhi.

- **SOFTWARE/ TOOLS/ MODELS**

S. No.	Name	Company	Freeware/commercial
1	Linguaphone language laboratory software	Lotus Learning Ltd	Commercial

- **WEBSITES**

S. No.	Address
1	British council – LearnEnglish website – http://learnenglish.britishcouncil.org/en/
2	British council – Learn English website – fun and games – http://learnenglish.britishcouncil.org/en/study-break
3	British council – LearnEnglish website – business and work – http://learnenglish.britishcouncil.org/en/business-and-work
4	http://www.talkenglish.com
5	www.wordsworthelt.com
6	www.notesdesk.com
7	http://totalcommunicator.com/
8	www.speaking-tips.com
9	www.skillstudio.co.uk
10	www.mindtools.com
11	www.storynory.com

11. COURSE CURRICULUM DEVELOPMENT MEMBERS

S. No.	Name and Designation	Contact No.	Email
1	Prof. R. B. Dhonukshe	9822721472	rb.dhonukshe2@gmail.com
2	Mrs. R. A. Deshmukh	9373777209	rad231172@gmail.com

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE -1

Diploma Programme	CIVIL		
Course Name	Office Automation	Course code	R18CE1101 (Part 1/2)
Course Category	Foundation	Credits	3

COURSE TEACHING, ASSESSMENT AND EVALUATION SCHEME:

Teaching scheme		Evaluation scheme									
		Direct assessment- Weightage 80%									
		Theory outcome		Practical outcome							Total
				TERMWORK					PRACTICAL	ORAL	
Theory Allotted hrs	Practical Allotted hrs	ESE marks	TTA marks	TW marks	SW marks	AS marks	TU Marks	Total	Practical Marks	OR marks	Total marks
1	2	-	-	-	05	20	-	25	@25	-	50
		Indirect assessment- Weightage-20%									
		End semester students feedback							End of the Program survey		

End semester examination-ESE, Two tests average-TTA, Term Work- TW, Student Activity-SW, Assignments –AS, Tutorials- TU, Oral -OR

1. RATIONALE

Office automation tools like word processing applications, spreadsheets and presentation tools along with internet communication have become necessity in performing activities related to engineering and business field. Developing skills and competency in these areas will assist students to accomplish the job with better efficiency. Similarly awareness related to cyber ethics, cyber safety and security will help students to work safely in the ever advancing digital environment.

2. EXPECTED PROFICIENCY

Use of computers in documentation, data analysis, presentation and safe internet based communication.

3. COURSE OUTCOMES (COs)

Students will be able to

a. Prepare document and report adhering to specified formatting standards using software.
b. Use of spreadsheet in solving simple engineering problems.
c. Analyze the data and graphically represent in spreadsheet software.
d. Prepare a professional presentation on specific topic with inclusion of charts, tables and multimedia.
e. Understand and apply knowledge of cyber security, safety and ethics in the digital environment

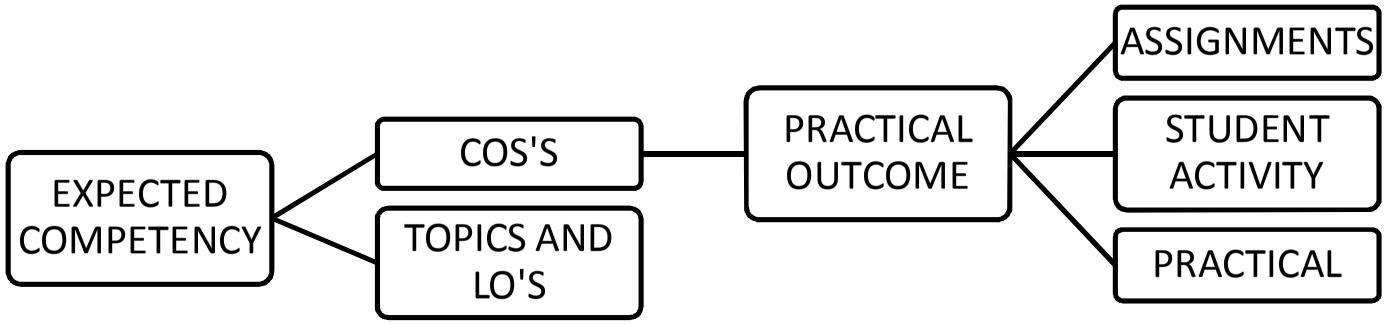
COURSE NAME	**Office Automation & CAD**	COURSE CODE	**R18CE1101**

4. CO –PO MATRIX

	PO 1 Basic and Discipline specific knowledge	**PO 2** Problem analysis	**PO 3** Design/ development of solutions	**PO 4** Engineering Tools, Experimentation and Testing	**PO 5** Engineering practices for society, sustainability and environment	**PO 6** Project Management	**PO 7** Life-long learning	PSO 1 Construction planning and detailing	PSO 2 Construction execution, supervision and maintenance
CO1				3			1		
CO2			2	3			1		
CO3				3			1		
CO4				3			1		
CO5					1		1		

Rating scale '**3'** for high, '**2**' for medium, **'1'** for low **'0'** for no correlation

5. COURSRE MAP



COURSE NAME	Office Automation & CAD	COURSE CODE	R18CE1101

6. DETAILED COURSE CONTENTS

S. No.	Unit Outcomes (UOs)	Topics and Sub-topics	Marks	Hours	Mapped CO
1	1a. Navigate through a document. 1b. Select text, undo and redo. 1c. Adjust page margins. Change page orientation, Create headers and footers, 1d. Set and change indentations, 1e. Insert a picture from a file, Resize and reposition a picture, 1f. Insert a table, convert a table to text.	**CREATING WORD DOCUMENT** **1.1 Creating a document, Editing and formatting a Document** Navigate through a document, Scroll through text, Insert and delete text in a document, Select text Undo and redo commands, Use drag and drop to move text, Copy, cut and paste, Use the clipboard, Format and align text, Line and paragraph spacing ,Add bulleted and numbered lists, Add borders and shading **1.2 Layout of a document, proofing tools and inserting elements.** Document views, Spell and grammar check, Shortcut Menus, Find and replace text, Use the Research Task pane, Adjust page margins. Change page orientation, Create headers and footers, Set and change indentations, Insert and clear tabs. Insert and delete a page break, Insert page numbers, Insert the date and time, Insert special characters (symbols), Insert a picture from a file, Resize and reposition a picture, **1.3 Working with Tables, Columned Layouts & Section Breaks** Insert a table, Convert a table to text, Navigate and select text in a table, Resize parts of a table, Align text in a table, Format a table, Insert and delete columns and rows, Borders and shading, Repeat table headings on subsequent pages, Merge table cells, Section breaks.	5	3	CO1
2	2a. Format and proof read Workbooks. 2b. Understand different types of functions, and using	**CREATING SPREADSHEET SOLUTION** **2.1 Fundamentals of spreadsheet**	10	7	CO2. CO3

COURSE NAME	Office Automation & CAD	COURSE CODE	R18CE1101

S. No.	Unit Outcomes (UOs)	Topics and Sub-topics	Marks	Hours	Mapped CO
	them to create a solution 2c. Create advanced level spreadsheet solution.	Selecting Cells, Auto Sum and Auto Fill Function, Cell Referencing and Request, Formatting Cells, Formatting Numbers, Placing Cell Alignment, Cell, Rows and Columns, Editing, Copying and Moving Cells, Page Layouts in Excel, Proofing Workbooks. **2.2 Working with spreadsheet to create solutions** Defining Names in Excel Sorting Data, Understand Charts, Chart Design Options and Tools, Chart Format Tools, Combo Charts, Functions within Excel, Understanding different types of functions, Conditional Formatting. **2.3 Creating advanced level spreadsheet solutions** Using Text to Columns, the Paste Special Function, Data Validation , Subtotals and Grouping, Consolidating Data, Scenario Analysis, Data Tables in Scenario Analysis, What-if Analysis, Formula Auditing and Error Tracing, Understanding Pivot Tables, Protecting and Sharing Worksheets, Understanding to Macros, Using Custom Lists, Tracking Changes in Excel.			
3	3 a. Develop a power point presentation 3 b. Edit a presentation 3 c. Prepare to Deliver Your Presentation.	**CREATING PRESENTATION** **3.1 Developing a PowerPoint Presentation.** Select a Presentation Type, View and Navigate a Presentation, Edit Text, Format Characters, Insert Images, Insert Shapes. **3.2 Adding and modifying Objects in Your Presentation** Edit Objects, Format Objects, Group Objects, Arrange Objects, Animate Objects, Create a Table, Format a Table, Insert a Table from Other Applications, Adding Charts to presentation. Preparing to Deliver Your Presentation. Review Presentation, Apply Transitions, Print Your Presentation.	**05**	**03**	**CO4**
4	4a. Demonstrate an understanding of current ethical and legal standards, the rights and restrictions that govern technology. 4b Practice safe strategies to protect themselves using	**CYBER-ETHICS, CYBER-SAFETY AND CYBER-SECURITY** **4.1 Cyber-Ethics** Recognize and practice responsible and appropriate use while	**05**	**03**	**CO5**

COURSE NAME	Office Automation & CAD	COURSE CODE	R18CE1101

S. No.	Unit Outcomes (UOs)	Topics and Sub-topics	Marks	Hours	Mapped CO
	internet. 4c. Understand and follow acceptable polices (college, home and community), 4d. Understand the personal and societal consequences of inappropriate use.	accessing, using, collaborating, and creating technology, technology systems, digital media and information technology. Students demonstrate an understanding of current ethical and legal standards, the rights and restrictions that govern technology, technology systems, digital media and information technology. **4.2 Cyber-Safety** Practice safe strategies to protect themselves and promote positive physical and psychological well-being when using technology, technology systems, digital media and information technology including the Internet. **4.3 Cyber-Security** Students practice secure strategies that assure personal protection and help defend network security and Understand and follow acceptable polices (college, home and community), and understand the personal and societal consequences of inappropriate use.			

7. PRACTICAL –ASSIGNMENTS-STUDENT ACTIVITIES-TUTORIALS (Separate table for each)

S. No.	Practical	Topic No.	Hours Allotted	Mapped CO
1.	Creating a document, Editing and formatting a Document	1	2	CO1
2.	Creating a report using given standards, proofing tools.	2	4	CO1
3.	Creating a technical paper adhering to given standards.	3	4	CO1
4.	Creating a Spread sheet assignment using standard formatting tools	3	2	CO2
5.	Creating a Spread sheet assignment using built-in functions.	3	4	CO2
6.	Creating a Spread sheet assignment using built-in functions and graphs.	3	4	CO3
7.	Creating advanced level spreadsheet solutions	4	4	CO3
8.	Creating a PowerPoint Presentation based on the given topic.	5	2	CO4
--	Total	--	26	--

S. No.	Student activity(any two)	Topic No.	Hours Allotted	Mapped CO
1.	Group discussion on how to cultivate and manage digital identity and reputation and awareness of the permanence of their actions in the digital world.	4	2	CO 5
2.	Student demonstration on how to engage in positive, safe, legal and ethical behavior when using technology, including social interactions online or when using networked devices.	4	2	CO 5
3.	Student demonstration of understanding and respect for the rights and obligations of using and sharing intellectual property.	4	2	CO 5
4.	Student presentation on how to maintain their personal data to maintain digital privacy, security and awareness of data-collection technology used to track their navigation online.	4	2	CO 5
--	Total	--	4	--

S. No.	Practical	Topic No.	Hours Allotted	Mapped CO
--	**Practical –assignments-student activities submission**	**--**	**2**	**--**
--	**Total**	**--**	**32**	**--**

8. EVALUATION SCHEME FOR PRACTICAL / ASSIGNMENTS/STUDENT ACTIVITIES

Topic No.	Topic Title	Mapped CO %	Distribution of Marks			
			Cognitive level			Total Marks
			Remember	Understand	Apply	
1	Word processing Assignments	CO1, 20%	--	--	5	5
2	Excel spreadsheet solutions assignments	CO2, 30% CO3, 20%	--	--	10	10
3	Power point presentation	CO4, 20%	--	--	5	5

Topic No.	Topic Title	Mapped CO %	Distribution of Marks			
			Cognitive level			Total Marks
			Remember	Understand	Apply	
4	Student activity	CO5, 10%	--	--	5	5
Total		100	**--**	**--**	**25**	**25**

Rubrics for Assignments

CATEGORY	4	3	2	1
Structure	Very Well Structured	Well Constructed	Structured But Missing Links	Unstructured
Understanding of Tool	Complete Understanding	Substantial Understanding	Some Understanding	Limited Understanding
Errors	Least Errors	90 % Free Of Errors	75 % Free Of Errors	50 % Free Of Errors
Presentation	Neat ,Accurate And Enhanced Understanding	Neat And Accurate	Some Illustrations Are Misleading And Redundant	Least Accurate And Not Neat
Timely Completion Of Sub Activities	Maximum	Moderate	Satisfactory	Least
Self Learning	Maximum	Moderate	Satisfactory	Least

Rubrics for Student Activity

CATEGORY	4	3	2	1
Structure And Presentation	Very Well Structured	Well Constructed	Structured But Missing Links	Unstructured
Quantity of Information	All Subtopics Covered	All Subtopics Are Mostly Covered	Some Of The Subtopics Are Not Covered In Detail	Some Of The Subtopics Are Not Covered
Quality of Information	Clear Description With Supporting Details	Clear Description With Some Supporting Details	Clear Description With Lack Of Supporting Details	Irrelevant Information
Sources	Clear Documentation	Clear Documentation With Some Missing Links	Part Documentation With Missing Links	Documentation With Number Of Missing Links
Graphics	Neat ,Accurate And Enhance Understanding	Neat And Accurate	Some Illustrations Are Misleading And Redundant	Least Accurate And Not Neat
Group Activity	Maximum Coordination And Effort	Fair Coordination And Effort	Lack of Coordination and Efforts	Least Participation
Timely Completion of Activity	Maximum	Moderate	Satisfactory	Least
Overall Understanding	Maximum	Moderate	Satisfactory	Least

9. MAJOR EQUIPMENT/ INSTRUMENTS /TOOLS REQUIRED

S. No.	Equipment Name with Specifications	Practical
1	Desktop computers,	All
2	L.C.D. projector	All

9. SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Topic No.	Topic Title	Mapped CO %	Distribution of Marks			
			Cognitive level			Total Marks
			Remember	Understand	Apply	
I	Word processing	20%	--	--	5	5
II	Excel spreadsheet solutions	60%	--	--	15	15
III	Power point presentation	20%	--	--	5	5
Total		100	**--**	**--**	**25**	**25**

10. MODEL QUESTION BANK FOR PRACTICAL EXAMINATIONS

S. No	Unit	Mapped CO	Cognitive level R/U/A	Question
1	1	CO1	A	Using Word Processor Application, create the cover page, index and abstract of a Project Report (use Word Art, insert Picture Image).
2	2	CO2	A	Using Spreadsheet Application, create a worksheet containing the pay details (containing Basic pay, DA, HRA, Other Allowance, Deductions- PF, PTax, Insurance, Gross and Net salary) of the employees using formulas.
3	2	CO3	A	Using spreadsheet application, forecast population based on given census data.
4	3	CO4	A	Create a power point presentation based on given data in word document.

11. LEARNING RESOURCES

- **BOOKS**

S. No.	Title of Book	Author	Publication
1	Microsoft Office 2010 for Windows: Visual Quick Start	Schwartz, Steve	Pearson Education, New Delhi India, 2012, ISBN:9788131766613
2	Microsoft Office 2010: On Demand	Johnson, Steve	Pearson Education, New Delhi, India, 2010; ISBN:9788131770641

- **SOFTWARE/ TOOLS/ MODELS**

S. No.	Name	Company	Freeware/commercial
1	MS Office	Windows	Commercial

- **WEBSITES**

S. No.	Address
1	https://support.office.com
2	http://www.iste.org/standards/for-students
3	https://www.microsoft.com/en-us/safety/default.aspx

12. COURSE CURRICULUM DEVELOPMENT MEMBERS

S. No.	Name and Designation	Contact No.	Email
1	Dr. S. V. Kanitkar	9921414902	svkwadia@yahoo.co.in

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE -1

Diploma Programme	CIVIL		
Course Name	Computer Aided Drafting (CAD)	Course code	R18CE1101 (Part 2/2)
Course Category	Foundation	Credits	3

COURSE TEACHING, ASSESSMENT AND EVALUATION SCHEME:

Teaching scheme		Evaluation scheme									
		Direct assessment- Weightage - 80%									
		Theory outcome		Practical outcome							Total
				TERMWORK				TW	PRACTICAL	ORAL	
Theory Allotted hrs	Practical Allotted hrs	ESE marks	TTA marks	TW marks	SW marks	AS marks	TU Marks	Total	Practical Marks	OR marks	Total marks
1	2	--	--	-		50	-	50	@25	-	75
		Indirect assessment- Weightage - 20%									
		End semester students feedback							End of the Program survey		

End semester examination-ESE, Two tests average-TTA, Term Work- TW, Student Activity-SW, Assignments –AS, Tutorials- TU, Oral -OR

1. RATIONALE

Using Computer aided drafting and detailing tool has become need of time due to high quality and less time of reproduction. To develop an ability to accurately draw, read and interpret the civil engineering drawings as well as produce drawing in different soft or hard format, is the key competency of this course.

2. EXPECTED PROFICIENCY

Use of computer aided drafting tool to read, interpret and create Civil Engineering drawing.

3. COURSE OUTCOMES (COs)

Students will be able to

a. Draw the given drawing of required dimensions.
b. Edit and modify the given drawing
c. Prepare a ready to plot drawing with annotation objects.
d. Draw 3D drawing of a Civil engineering object.

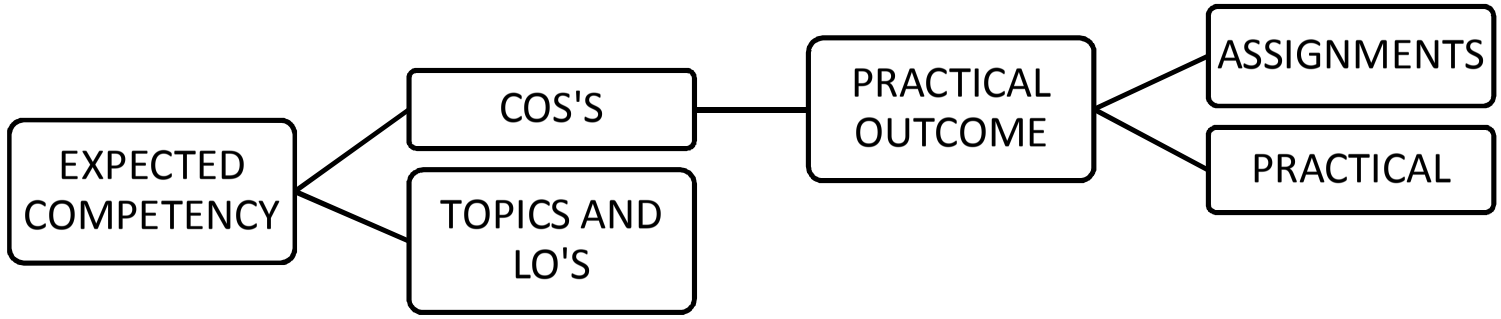
COURSE NAME	Office Automation & CAD	COURSE CODE	R18CE1101

4. CO –PO MATRIX

	PO 1 Basic and Discipline specific knowledge	PO 2 Problem analysis	PO 3 Design/ development of solutions	PO 4 Engineering Tools, Experimentation and Testing	PO 5 Engineering practices for society, sustainability and environment	PO 6 Project Management	PO 7 Life-long learning	PSO 1 Construction planning and detailing	PSO 2 Construction execution, supervision and maintenance
CO1				3			1		
CO2				3			1		
CO3				3			1		
CO4				3					

Rating scale '**3'** for high, '**2**' for medium, **'1'** for low **'0'** for no correlation

5. COURSE MAP



COURSE NAME	Office Automation & CAD	COURSE CODE	R18CE1101

6. DETAILED COURSE CONTENTS

S. No.	Unit Outcomes (UOs)	Topics and Sub-topics	Marks	Hours	Mapped CO
1	1a. Understand co- ordinate systems while drawing 1b. Use zoom and pan commands 1c. Use formatting commands to draw an object. 1d. Use draw commands to generate figures of specific shape.	**INTRODUCTION TO COMPUTER AIDED DRAFTING** 1.1 Co-ordinate system- Cartesian & Polar-Absolute, Relative mode. CAD initial settings commands - Snap, grid, ortho, osnap, limits, units, filters, itscale, mbutton pan Object Selection methods – picking, window, crossing, fence, last, previous etc. 1.2 Zoom Commands – all, previous, out, in, extent, real time, dynamic, window, pan. 1.3 Formatting commands - Layers, block, line type, line weight, color. 1.4 Draw Command - Line, arc, circle, rectangle, polygon, ellipse, spline, block, hatch Enquiry commands - distance, area.	**5**	**3**	**CO1**
2	2a. Use modify commands to alter objects. 2b. Use grips commands to edit already drawn objects.	**EDIT AND MODIFY COMMANDS** 2.1 Modify Command - Erase, oops, break, trim, copy, move, mirror, offset, fillet, chamfer, array, extend, rotate, scale, lengthen, stretch, measure, divide, explode, align. 2.2 Grips editing- Move, Copy, Stretch.	**5**	**7**	**CO2**
3	3 a. Assign dimensions to drawn objects. 3 b. Prepare notes ,schedules using text commands 3 c. Plot a drawing as well as publish.	**DIMENSIONING, TEXT AND PLOT COMMANDS** 3.1 Dimensioning commands - Dimension styles, Dimensional Tolerances and Geometrical Tolerances. 3.2 Text commands - dtext, mtext command. 3.3 Plotting a drawing - paper space, model space, creating table, plot commands.	**10**	**3**	**CO3**
4	4 a. Use 3d commands to draw object. 4 b. View object in 3d space. 4 c. Render object drawn in 3d.	**ISOMETRIC DRAWINGS** 4.1 3D Edit Commands -Pline, 3Dpoly, pedit, join splinedit commands. 4.2 View Commands - View ports, UCS, WCS commands 4.3 Shade and Enquiry commands – mass property, Shade and render command.	**5**	**3**	**CO4**

7. PRACTICAL –ASSIGNMENTS-STUDENT ACTIVITIES-TUTORIALS (Separate table for each)

S. No.	Practical	Topic No.	Hours Allotted	Mapped CO
1	Identify the components of CAD screen and apply the processes of Initial setting using format menu. Part I	1	02	CO1
2	Identify the components of CAD software	1	02	CO1
3	Calculate -Cartesian coordinates (relative and absolute) Polar coordinates of given shapes.	1	02	CO1
4	Draw the given figures according to Cartesian coordinate system.	1	02	CO1
5	Draw the given figures according to Polar coordinate system.	1	02	CO1
6	Use " Draw and modify command" to draw the given simple plan	2	02	CO2
7	Draw typical floor plan of a given framed residential building in different layers.	1-3	04	CO1, CO2, CO3
8	Develop plan of a given framed residential building with labels, schedule of openings, scale, north direction.	1-3	02	CO1, CO2, CO3
9	Draw typical floor plan of a given framed residential building in different layers along with elevation, section and title block.	1-3	04	CO1, CO2, CO3
10	Publish drawing prepared in previous practical work.	1-3	02	CO1, CO2, CO3
11	Draw isometric drawing of simple objects	4	02	CO4
12	Draw a given 3-D object.	4	04	CO4
--	Total	--	30	--

S. No.	Practical	Topic No.	Hours Allotted	Mapped CO
--	**Practical –assignments-student activities submission**	**--**	**2**	**--**
--	**Total**	**--**	**32**	**--**

8. EVALUATION SCHEME FOR PRACTICAL / ASSIGNMENTS/STUDENT ACTIVITIES

Rubrics for Assignments

Category	4	3	2	1
Understanding Of Tool	Complete Understanding	Substantial Understanding	Some Understanding	Limited Understanding
Errors	Least Errors	90 % Free of Errors	75 % Free of Errors	50 % Free of Errors
Speed	Fast	Moderate	Slow	Least
Timely Completion of Sub Activities	Maximum	Moderate	Satisfactory	Least
Self Learning	Maximum	Moderate	Satisfactory	Least

9. MAJOR EQUIPMENT/ INSTRUMENTS /TOOLS REQUIRED

S. No.	Equipment Name with Specifications	Practical
1	Desktop Computers,	All
2	L.C.D. projector	All

9. SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Topic No.	Topic Title	Mapped CO % OR Emphasis	Distribution of Marks			
			Cognitive level			Total Marks
			Remember	Understand	Apply	
1	Introduction to Computer Aided Drafting	CO1, 25%	--	--	5	5
2	Edit and Modify Commands	CO2 25%	--	--	5	5
3	Dimensioning, Text and Plot Commands	CO3, 25%	--	--	10	10
4	Isometric Drawings	CO4, 25%	--	--	5	5
Total		100%	**--**	**--**	**25**	**25**

10. MODEL QUESTION BANK FOR PRACTICAL EXAMINATIONS

S. No	Unit	Mapped co	Cognitive level R/U/A	Question
1	1	CO1 CO2, CO3	A	Draw plan as per details shown in the sketch. Create layered Plan with layers as wall, doors, windows, dimensions, text, hatch. Create blocks of windows.
2	4	C04	A	Draw a 3d view of an object given.

11. LEARNING RESOURCES

- **BOOKS**

Sr. No.	Title of Book	Author	Publication
1.	Introduction to Auto CAD 2012 for Civil Engineering Applications	Nighat Yasmin,	SDC Publication, 2011978-1-58503-642-4
2	AutoCAD 2016: A Problem-Solving Approach, Basic and Intermediate	Shyam Tickoo,	CADCIM Technologies, 22nd Edition , August 2015 10: 1942689004 ,13: 978-1942689003
3.	Auto CAD 2010 Instructor	Leach, James	Tata Mc Graw Hill, 2007 ISBN:0073375411, ISBN:9780073375410
4	Auto CAD and its Applications-Basics 2010	Shumaker, Terence M.; Madsen, David A.; Madsen, David P.	Good Heart – Willcox Publishers, 17th Edition, 2010, ISBN: 10:1590707605, ISBN: 13:9781590707609

- **SOFTWARE/ TOOLS/ MODELS**

S. No.	Name	Company	Freeware/commercial
1	Autodesk Autocad software	Autodesk	Student version

- **WEBSITES**

S. No.	ADDRESS
1	http://www.autodesk.com/education/freesoftware/autocad

12. COURSE CURRICULUM DEVELOPMENT MEMBERS

S. No.	Name and Designation	Contact No.	Email
1	Dr.S. V. Kanitkar	9921414902	svkwadia@yahoo.co.in

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE -1

Diploma Programme	CIVIL		
Course Name	Engineering Graphic Skills	Course code	R18ME1203
Course Category	Foundation	Credits	05

COURSE TEACHING, ASSESSMENT AND EVALUATION SCHEME:

Teaching scheme		Evaluation scheme									
		Direct assessment - Weightage - 80%									
		Theory outcome		Practical outcome							Total
				TERMWORK					PRACTICAL	ORAL	
Theory Allotted Hrs	Practical Allotted Hrs	ESE marks	TTA marks	TW marks	SW marks	AS marks	TU Marks	Total	Practical Marks	OR marks	Total marks
1	4	-	-	50	-	-	-	50	@50	-	100
		Indirect assessment – Weightage - 20%									
		Mid semester students feedback							End of the course survey		

End semester examination-ESE, Two tests average-TTA, Term Work- TW, Student Activity-SW, Assignments –AS, Tutorials- TU, Oral -OR

1. RATIONALE

Drawing which is known as the language of engineers is widely used means of communication among the designers, engineers, technicians & craftsmen in an industry. The translation of ideas into practice without the use of this graphic language is really beyond imagination. Thus for the effective & efficient communication among all those involved in an industrial system, it becomes necessary for a diploma engineer to acquire the appropriate skills in the use of graphic language. This preliminary course aims at building a foundation for the further courses in drawing and other allied subjects.

2. EXPECTED PROFICIENCY

Prepare engineering drawings manually using prevailing drawing instruments.

3. COURSE UTCOMES (COs)

Students will be able to

1. Use of various drawing instruments.
2. Redraw the given figures using geometrical construction.
3. Draw engineering curves with different methods.3
4. Draw orthographic and sectional views of the given object.
5. Construct an isometric view from the given views.

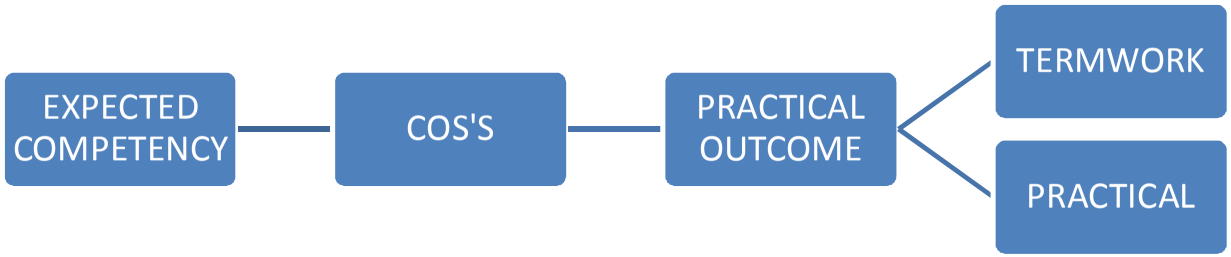
COURSE NAME	Engineering Graphics	COURSE CODE	R18ME1203

4. CO –PO MATRIX

Course Name Engineering Graphics R18ME2103	PO 1 Basic knowledge	PO 2 Discipline knowledge	PO 3 Experiments and practice	PO 4 Engineering Tools	PO 5 The engineer and society	PO 6 Environment and sustainability	PO 7 Ethics	PSO 1 Construction planning and detailing	PSO 2 Construction execution, supervision and maintenance
CO1	1	2			1		3	1	
CO2	1				1		1	1	
CO3	1				1		1	1	
CO4	1	2	2		1		3	2	
CO5	1	3	2		1		3	2	

Rating scale '**3'** for high, '2' for medium, **'1'** for low '0' for no correlation

5. COURSE MAP



COURSE NAME	Engineering Graphics	COURSE CODE	R18ME1203

6. DETAILED COURSE CONTENTS

S. No.	Unit Outcomes (UOs)	Topics and Sub-topics	Marks	Hours	Mapped CO
1	1. Explain elements of engineering graphics. 2. Draw various types of geometrical constructions in Engineering Graphics. 3. Draw various types of tangent exercises in Engineering Graphics. 4. Redraw figures by using geometrical constructions & tangent exercise.	**1.1** Use of instruments, types of lines, types of letterings, full, enlarging and reducing scales, dimensioning technique. **1.2 Geometrical constructions**: - To construct a regular polygon of given side. - To construct a regular polygon in a given circle. - To inscribe a circle in a given polygon. - To circumscribe a circle around a given polygon. - To draw circles touching each other and sides of a given polygon internally & externally **1.3 Tangent exercises** :- - To bisect a given straight line/ arc /angle. - To divide a given straight line into given number of equal parts. - To draw a normal to a given straight line/ arc from a given point within or outside it. -To draw a straight line parallel to a given straight line /arc through point/ at a given distance. -To draw an arc touching to two straight lines / two arcs (internally/ externally)/ one line & one arc. - To draw an internal/ external tangent to two given arcs apart from each other. **1.4 Redraw figures**: - To redraw the given figures (using the knowledge of Geometrical constructions & tangent exercises).	12	02	CO1, CO2

COURSE NAME	**Engineering Graphics**	COURSE CODE	**R18ME1203**

S. No.	Unit Outcomes (UOs)	Topics and Sub-topics	Marks	Hours	Mapped CO
2	1. Draw Conic curves, & know their applications. 2. Draw helix, involutes, Cycloid spiral & know their applications. 3. Draw loci of points from given data.	**2.1** To study the construction of following curves using the method mentioned against them: **Ellipse** -Directrix focus method, arcs of circle method & concentric circles method. **Parabola-** Directrix focus method, rectangle method. **Involutes**- of a polygon, circle & combination of polygon & circle. **Cycloid-** Epicycloid & hypocycloid. **Helix, Spiral**. Use of curves in engineering. **2.2 Loci of points: -** Types of mechanisms- Loci of points with given condition and examples related to it.	12	02	CO3
3	1. Draw Orthographic Projections by first & third angle 2. Draw Isometric views from given orthographic views.	**3.1** Simple exercises to draw Orthographic Projections by first & third angle methods (Wooden Models to be used). **3.2** Simple exercises on drawing isometric views from given orthographic views.	16	03	CO4 CO5,
4	1. Visualize, interpret & draw orthographic views from given pictorial view.	**4.1** Conversion of given pictorial views into orthographic projections using First angle and third angle method of projections. **4.2** Dimensioning the Views (objects including curves, slots on sloping planes).	12	03	CO4
5	1. Visualize, interpret & draw sectional views from given pictorial view.	**5.1** Conversion of given pictorial views into sectional (full sectional) orthographic projections using first angle & third angle method of projections. Dimensioning the views.	16	03	CO4
6	1. Differentiate natural scale and isometric scale. 2.Visualize, interpret & draw isometric view and isometric projection.	**6.1** Construction & use of isometric scale. Conversion of given orthographic views into isometric projections/views (objects including curves, slots on sloping planes).	12	03	CO5

7. PRACTICAL –ASSIGNMENTS-STUDENT ACTIVITIES-TUTORIALS (Separate table for each)

S. No.	Practical	Topic No.	Hours Allotted	Mapped CO
1	Geometrical construction, tangent exercises & redraw figure.	1	8	CO_1, CO_2
2	Engineering curves.	2	8	CO_3
3	Introduction to orthographic projection & isometric views	3	12	CO_4
4	Orthographic projection	4	12	CO_4
5	Sectional views	5	10	CO_4
6	Isometric Projection and Views	6	10	CO_5
--	Total	--	60	--

S. No.	Practical	Topic No.	Hours Allotted	Mapped CO
--	**Practical –assignments-student activities submission**	-	**4**	-
--	**Total**	-	**64**	-

8. EVALUATION SCHEME FOR PRACTICAL / ASSIGNMENTS/STUDENT ACTIVITIES

Rubrics for Practical:

Category	4	3	2	1
Understanding of Drawing & Tools	Complete Understanding	Substantial Understanding	Some Understanding	Limited Understanding
Errors	Least Errors	90 % Free Of Errors	75 % Free Of Errors	50 % Free Of Errors
Speed	Fast	Moderate	Slow	Least
Timely Completion of Sub Activities	Maximum	Moderate	Satisfactory	Least
Self Learning	Maximum	Moderate	Satisfactory	Least

9. MAJOR EQUIPMENT/ INSTRUMENTS /TOOLS REQUIRED

S. No.	Equipment Name with Specifications	Practical
1	Mini drafter	All
2	Solid models	3,4

10. SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Topic No.	Topic Title	Mapped CO % OR Emphasis	Distribution of Marks			
			Cognitive level			Total Marks
			Remember	Understand	Apply	
1	Geometrical construction, tangent exercises & redraw figure.	CO1, CO2	4	6	2	12
2	Engineering curves.	CO3	4	4	4	12
3	Introduction to orthographic projection & isometric views.	CO4	2	12	2	16
4	Orthographic projection	CO4	2	10	0	12
5	Sectional views	CO4	4	8	4	16
6	Isometric Projection and Views	CO5	2	6	4	12
Total		--	**18**	**46**	**16**	**80**

10. LEARNING RESOURCES

- **BOOKS**

S. No.	Title of Book	Author	Publication
1	Engineering Drawing	N.D. Bhatt	Charotar Publication, Anand.
2	Engineering Drawing	Mali and Chaudhary	Vrinda Publications,Jalgaon.
3	Engineering Drawing	Kamat & Rao	Jeevandeep Publicatons, Mumbai
4	Geometrical Engineering Drawing	N.Y. Prabhu	Pune Vidyarthi Griha, Publications, Pune.
5	Engineering Drawing	Ozarkar & Utturkar	Maharashtra Publishing House
6	Engineering Drawing	K. Venugopal	New Age International Ltd., Delhi.
7	Code of practice for general engineering drawing	SP 46-1988	Bureau of Indian Standards.(BIS)

11. COURSE CURRICULUM DEVELOPMENT MEMBERS

S. No.	Name and Designation	Contact No.	Email
1	U. N. Kamble	9422543715	uday_wadia@yahoo.com
2	R. Y. Bonde	9404730050	raju_bonde@yahoo.com

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE -1

Diploma Programme	CIVIL		
Course Name	Engineering Mechanics	Course code	R18AM2101
Course Category	Allied	Credits	5

COURSE TEACHING, ASSESSMENT AND EVALUATION SCHEME:

Teaching scheme		Evaluation scheme									
		Direct assessment- Weightage -80%									
		Theory outcome		Practical outcome							Total
				TERMWORK					PRACTICAL	ORAL	
Theory Allotted hrs	Practical Allotted hrs	ESE marks	TTA marks	TW marks	SW marks	AS marks	TU Marks	Total	Practical Marks	OR marks	Total marks
3	2	80	20	20	--	05	--	25	--	--	125
		Indirect assessment- Weightage-20%									
		Mid semester students feedback						End of the course survey			

End semester examination-ESE, Two tests average-TTA, Term Work- TW, Student Activity-SW, Assignments –AS, Tutorials- TU, Oral -OR

1. RATIONALE

This is Allied subject which will enable the students to understand the fundamentals of mechanics. The main purpose is to help the students to develop the logical, orderly processes of thinking that characterize an engineer. The relations between a force and its components, Newton's laws of motion applied to a wide variety of practical situations in the field of civil and mechanical engineering.

2. EXPECTED PROFICIENCY

Use laws and principles of applied mechanics to solve engineering problems.

3. COURSE OUTCOMES (COs)

Students will be able to

1. Identify the force systems for the given conditions by applying the basics of mechanics.
2. Apply the conditions of equilibrium to check the stability of various force system and to determine unknown forces of different engineering systems.
3. Apply the principles of friction for various conditions.
4. Locate the centroid of various components.
5. Calculate moment of inertia of various components.
6. Understand the basic concepts of kinetics, work, power and energy.
7. Describe working of simple lifting machines such as screw jack, worm and worm wheel and calculate velocity ratio and efficiency.

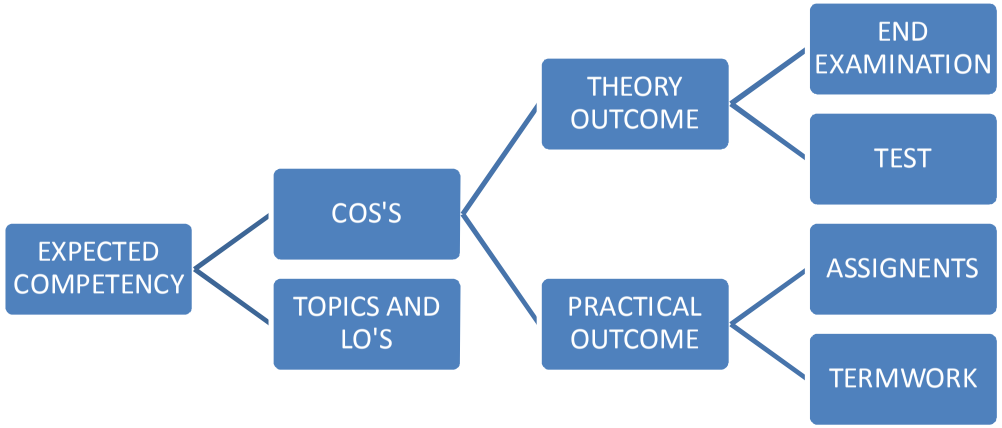
COURSE NAME	Engineering Mechanics	COURSE CODE	R18AM2101

4. CO –PO MATRIX

Course Name – Engineering Mechanics Course Code – R18AM2101	PO 1 Basic and Discipline specific knowledge:	PO 2 Problem analysis	PO 3 Design/ development of solutions	PO 4 Engineering Tools, Experimentation and Testing	PO 5 Engineering practices for society, sustainability and environment:	PO 6 Project Management	PO 7 Lifelong learning	PSO 1 Construction planning and detailing	PSO 2 Construction execution, supervision and maintenance
CO1	3								
CO2	3								
CO3	3								
CO4	3								
CO5	3								
CO6:	3								
CO7	3								

Rating scale '**3**' for high, '2' for medium, '**1**' for low '0' for no correlation

5. COURSE MAP



COURSE NAME	Engineering Mechanics	COURSE CODE	R18AM2101

6. DETAILED COURSE CONTENTS

S. No.	Unit Outcomes (UOs)	Topics and Sub-topics	Marks	Hours	Mapped CO
1	1a.Explain concepts of the given terms. 1b.Explain effects of a force on the given body. 1c.Identify the force system for the given situation. 1d.Resolve the given single force in rectangular components. 1e.Calculate the resultant of given force system analytically.	**Composition and Resolution of Forces :** 1.1 Concept of force and its unit, system of coplanar forces, concurrent and non concurrent, like and unlike Parallel forces. 1.2 Resultant and equilibrant of forces, composition of forces: triangle, parallelogram and polygon law of Forces. Resolution of forces in rectangular components.	16	08	CO1
2	2a.Draw the free body diagram for the given condition. 2b. Explain the concept of equilibrium. 2c. Identify the types of beams required for the given condition. 2d.Appreciate Friction and its engineering application. 2e.Determine force friction and coefficient of friction for the given condition. 2f.Determine unknown force in the given condition using Lami's theorem.	**Equilibrium of Forces:** 2.1Moment of a force, Equilibrium conditions, Types of Supports, Beam reactions, Varignon's theorem, concept of couple. Principle of transmissibility of a force. 2.2 **Friction :** Friction as opposing force, advantages and disadvantages of friction, Laws of friction, coefficient of friction, its value for different materials in contact, angle of friction, cone of friction, 2.3 A body resting on rough horizontal plane under applied force of different magnitude. Equilibrium of a body resting on rough inclined plane when Applied force is i) inclined to plane, ii) along the plane and iii) horizontal.	12	08	CO2 CO3
3	3a.Determine the centroid of geometrical plane figures. 3b.Calculate centroid of the composite plane lamina	**Centre of Gravity :** 3.1 Concept of center of gravity and centroid. Standard case: Rectangle, circle, semicircle and Triangle. 3.2 Determination of centroid for sections such as I, T, L and other compound sections.	16	08	CO4

COURSE NAME	**Engineering Mechanics**	COURSE CODE	**R18AM2101**

S. No.	Unit Outcomes (UOs)	Topics and Sub-topics	Marks	Hours	Mapped CO
4	4a.State Parallel axes theorem, Perpendicular axis theorem. 4b.Define radius of gyration. 4c.Compute moment of inertia of different plane laminas	**Moment of Inertia** 4.1 Definition, Parallel axes theorem, Perpendicular axis Theorem, radius of gyration. 4.2 Moment of Inertia of different shapes : rectangle, Triangle, circle, semicircle and compound sections.	12	08	CO5
5	5a.State Newton's Laws, Impulse, Momentum equation.	**Kinetics :** 5.1 Momentum, impulse, impulsive force, Newton's laws of motion, 5.2 Direct impact, D'Alembert's Principle, Law of conservation of momentum.	12	08	CO6
6	6a.Define work, power and energy, work done by torque. 6b. Compute work, Power and Energy. 6c.State work energy principle.	**Work, Power and Energy :** 6.1 Definitions of work, power and energy and their units, graphical representation of work, work done by a torque. 6.2 Definition, forms of energy – kinetic and potential, law of conservation of energy, work energy principle.	12	08	CO6

7. PRACTICAL –ASSIGNMENTS-STUDENT ACTIVITIES-TUTORIALS (Separate table for each)

S. No.	Practicals (Any 11)	Topic No.	Hours Allotted	Mapped CO
1	To verify Lami's Theorem.	1	2	CO2
2	To verify law of parallelogram of forces.	1	2	CO1
3	To verify law of triangle.	1	2	CO1
4	To verify the law of polygon of forces.	1	2	CO1
5	To verify principle of moment.	1	2	CO2
6	To find the coefficient of friction between wood and glass using a rough horizontal plane.	2	2	CO3
7	To find the coefficient of friction between wood and glass using a rough inclined plane.	2	2	CO3
8	To find mechanical advantage, velocity ratio and efficiency of worm and worm wheel.	--	2	CO7
9	To find mechanical advantage, velocity ratio and efficiency of screw jack.	--	2	CO7
10	To find the support reactions of a simple beam.	2	2	CO2
11	To find the forces in jib and tie of a jib crane.	1	2	CO1
12	Determination of centroid of plane laminas	3	2	CO4
--	Total	--	22	--

S. No.	Assignments	Topic No.	Hours Allotted	Mapped CO
1	Assignment based on basic concepts of mechanics, force systems, composition and resolution of force, equilibrium conditions, friction	1, 2	2	CO1 CO2 CO3
2	Assignment based on centroid and moment of inertia.	3, 4	2	CO4, CO5
3	Assignment based on kinetics, work, power, energy.	5, 6	2	CO6
--	Total	--	6	--

S. No.	Practical	Topic No.	Hours Allotted	Mapped CO
--	**Practical –assignments-student activities submission**	**--**	**4**	**--**
--	**Total**	**--**	**32**	**--**

Instructions:

1. Practical will be carried out in groups of students.
2. Each group will consist of about five students.
3. Each student from the group shall be given chance to handle the instrument, to understand the function of different components & use of the instrument.
4. Drawing, plotting should be considered as part of practicals.

Remarks:

1. The list of practicals/tutorials/student activities given above is suggestive. One or more such practicals/tutorials/student activities can be replaced with another or modified to attain the expected outcomes and proficiency more effectively.

2. The practicals/assignments/student activities should be so designed that students acquires outcomes in all domains - cognitive, psychomotor and affective.
3. Even though mainly outcomes in psychomotor domain are listed under practicals/assignments/student activities, it will also lead to development of outcomes in affective domain also.
4. The affective domain outcomes (social skills & attitudes) those will be developed through practicals/assignments/student activities includes – practice good housekeeping, maintain instruments & tools, demonstrate working as a team member & a leader and follow safety & et Acquisition of outcomes such as valuing, organizing and characterizing under affective domain will take place in the student gradually over three years of diploma program.
5. The skills associated with each of the practical/assignment/student activity are to be assessed using the 'Rubrics' given under 'Evaluation Scheme for Practicals/Assignments/Student Activities'.

8. EVALUATION SCHEME FOR PRACTICAL / ASSIGNMENTS/STUDENT ACTIVITIES

9. Rubrics for Practicals

Category	4	3	2	1
Experimental procedure & handling of the instruments	Follows procedure as instructed and safe & correct handling of the instruments	Little oversight towards procedure, safety & handling of the instruments	Considerable oversight towards procedure, safety and handling of the instruments	Careless about the procedure safety & handling of the instruments.
Data documentation, data analysis & results interpretation	Correct Documentation of all data, Correct calculations and Error in result worked out correctly is within the limit	Correct documentation of majority of data, Minor errors in calculations and Error in results worked out correctly is not within the limit	Incorrect documentation of majority of data, Major errors in calculations and Error in result Worked out incorrectly.	Incomplete & wrong documentation of data, Incomplete & wrong calculations and Error in result not worked out.
Timely completion of activity	Maximum	Moderate	Satisfactory	Least
Overall understanding	Maximum	Moderate	Satisfactory	Least

10. Rubrics for assignments

Category	4	3	2	1
Understanding of Analytical Concepts	Complete Understanding	Substantial understanding	Some Understanding	Limited Understanding
Mathematical Errors	Least Errors	90 % Free Of Errors	75 % Free Of Errors	50 % Free Of Errors
Graphics	Neat ,Accurate And Enhance Understanding	Neat And Accurate	Some Illustrations are Misleading and Redundant	Least Accurate And Not Neat
Timely Completion of Activity	Maximum	Moderate	Satisfactory	Least

COURSE NAME	Engineering Mechanics	COURSE CODE	R18AM2101

Category	4	3	2	1
Overall Understanding	Maximum	Moderate	Satisfactory	Least

11. MAJOR EQUIPMENT/ INSTRUMENTS /TOOLS REQUIRED

S. No.	Equipment Name with Specifications	Practical
1	Universal force table with all accessories.	1, 2, 3, 4
2	Law of moment apparatus.	6
3	Beam reaction apparatus.	11
4	Friction apparatus along with horizontal and vertical plane adjustments. Two weight box. One wooden box having wooden surface. One wooden box having glass surface.	7, 8
5	Worm and worm wheel (wall mounted unit with threaded spindle, load drum, effort wheel with necessary slotted weights, hanger and thread.	9
6	Simple screw jack(table mounted metallic body, screw with a pitch of 5mm.	10
7	Model of jib crane	4

11. SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Topic No.	Topic Title	Mapped CO % OR Emphasis	Distribution of Marks			
			Cognitive level			Total Marks
			Remember	Understand	Apply	
I	Composition and Resolution of Forces.	20	4	6	6	16
II	Equilibrium of Forces, Friction	15	2	4	6	12
III	Centre of Gravity	20	4	6	6	16
IV	Moment of Inertia	15	2	4	6	12
V	Kinetics	15	2	4	6	12
VI	Work, Power, Energy	15	2	4	6	12
Total			**16**	**28**	**36**	**80**

12. SAMPLE MODEL QUESTION BANK FOR THEORY AND TEST EXAMINATIONS

S. No	Topic	Mapped CO	Cognitive level R/U/A	Question
1	1	CO1	R	**Define:** Mechanics, Engineering Mechanics, Statics, dynamics, kinetics, Kinematics, force, coplanar and non coplanar force system, concurrent and non-concurrent force system, collinear force system, parallel and non parallel force system, resolution of a force, free body diagram, moment of a force, couple, composition of forces, resultant force, equilibrant, beam,

S. No	Topic	Mapped CO	Cognitive level R/U/A	Question
				State: characteristics of force, coplanar force system, law of moments, law of parallelogram of forces, triangle law of forces, polygon law of forces, analytical conditions of equilibrium, Lami's theorem, different types of beams,
2	1	CO1	U	**State:** Effects of a force on a rigid body, the principle of transmissibility of force, varignon' theorem of moments, types of moments according to direction of rotation, types of couple, **Sketch:** force systems, different types of beams,
3	1	CO1	A	**Problems:** To calculate resultant of the given force system, unknown force by using analytical equilibrium conditions, beam reactions.

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

14. LEARNING RESOURCES

- **BOOKS**

S. No.	Title of Book	Author	Publication
1	Engineering Mechanics	Beer and Johnston	Tata McGraw Hill
2	Engineering Mechanics	S. P. Timoshenko	Schaum Outline Series
3	Fundamentals of Applied Mechanics	Dadhe Jamdar and Walavalkar	Sarita Prakashan, Pune.
4	Elements of Applied Mechanics	S. B. Junnarkar	Charotor Book Stall, Anand.

- **WEBSITES**

S. No.	ADDRESS
1	www.nptel.ac.in
2	www.youtube.com
3	www.discoveryforengineers.com

15. COURSE CURRICULUM DEVELOPMENT MEMBERS

S. No.	Name and Designation	Contact No.	Email
1	Mrs.Vaishali D. Pawar	9403758095	vaidyavaishu@yahoo.co.in

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE -1

Diploma Programme	CIVIL		
Course Name	Strength of Materials	Course code	R18AM2102
Course Category	Allied	Credits	6

COURSE TEACHING, ASSESSMENT AND EVALUATION SCHEME:

Teaching scheme		Evaluation scheme									
		Direct assessment- Weightage - 80%									
		Theory outcome		Practical outcome							Total
				TERMWORK					PRACTICAL	ORAL	
Theory Allotted hrs	Practical Allotted hrs	ESE marks	TTA marks	TW marks	SW marks	AS marks	TU Marks	Total	Practical Marks	OR marks	Total Marks
4	2	80	20	20	-	05	--	25	-	--	125
		Indirect assessment- Weightage- 20%									
		Mid semester students feedback						End of the course survey			

End semester examination-ESE, Two tests average-TTA, Term Work- TW, Student Activity-SW, Assignments –AS, Tutorials- TU, Oral -OR

1. RATIONALE

This is allied subject which will enable the students to understand the fundamentals of solid Mechanics and deals with elementary knowledge of stresses, strains, shear forces and bending moments, it's applications in the field of civil and mechanical engineering.

2. EXPECTED PROFICIENCY

a. Analyze structural components using different methods.
b. Investigate various structural properties of materials by conducting tests under different loading conditions.

3. COURSE OUTCOMES (COs)

Students will be able to

1. Understand the basic properties of materials& determine the stress, strain and their relationship.
2. Analyze shear force diagram and bending moment diagram.
3. Determine the stresses and strains in the members subjected to shear, bending loads with stress distribution diagram.
4. Determine the stresses in members subjected to combine direct and bending loading.
5. Determine principal stresses, principal planes, maximum shear stress and their planes as well as stresses in thin cylindrical shells.
6. Determine the stresses and strains in the members subjected to torsional loads.

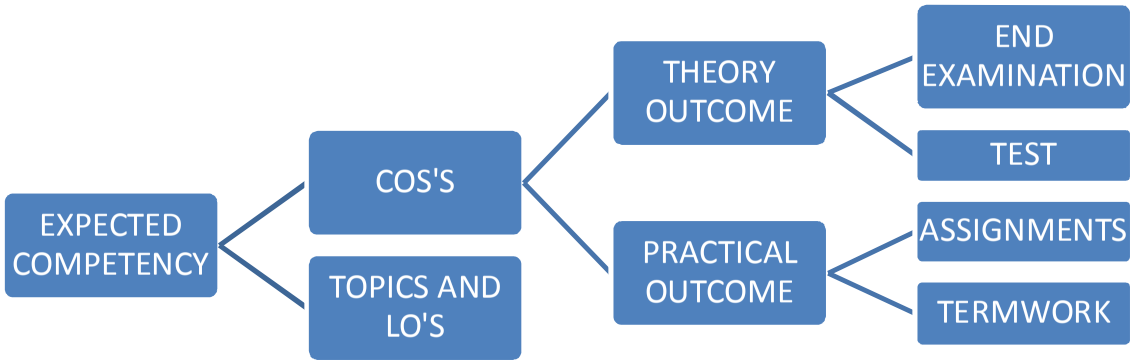
COURSE NAME	Strength of Materials	COURSE CODE	R18AM2102

4. CO –PO MATRIX

Course Name – Strength of Materials Course Code – R18 AM2102	PO1 Basic and Discipline specific knowledge	PO 2 Problem analysis	PO 3 Design/ development of solutions	PO 4 Engineering Tools, Experimentation and Testing	PO 5 Engineering practices for society, sustainability and environment	PO 6 Project Management:	PO 7 Life-long learning	PSO 1 Construction planning and detailing	PSO 2 Construction execution, supervision and maintenance
CO1	3								
CO2	3								
CO3	3								
CO4	3								
CO5	3								
CO6	3								

Rating scale '**3**' for high, '2' for medium, '**1**' for low '0' for no correlation.

5. COURSE MAP



COURSE NAME	Strength of Materials	COURSE CODE	R18AM2102

5. DETAILED COURSE CONTENTS

S. No.	Unit Outcomes (UOs)	Topics and Sub-topics	Marks	Hours	Mapped CO
1	1a. Define different properties of Material. 1b. Analyze simple, composite /compound sections and Calculate direct stress, different strains. 1c.Calculate temperature stresses in homogeneous bar only.	**Simple Stresses and Strain :** 1.1 Concept of stress and strain, direct, tensile, compressive and shear stress and strain, lateral strain, Poisson's ratio. Stresses in composite sections under direct loading only. Temperature stresses for homogeneous bar only. 1.2 Stress strain curve for mild steel and cast iron, Salient points such as limit of proportionality, elastic limit, yield point, ultimate stress and breaking stress, plastic stage, % elongation, % reduction in area, proof stress working stress, and factor of safety. 1.3 Concept of elasticity, Hook's law, Young's modulus of elasticity, modulus of rigidity and bulk modulus, relation between three elastic module and Poisson's ratio.	16	10	CO1
2	2a. Draw Shear Force & Bending Moment Diagram for Statically Determinate Beams	**Beams and bending:** 2.1 Concept of beam, Bending moment and shear force diagrams for cantilevers and simply supported beams with and without overhangs subjected to point loads, uniformly distributed loads (u.d.l.), couples, uniformly varying load (u. v. l.). 2.2 Location of point of contra flexure. Relation between bending moment, shear force and rate of loading.	12	8	CO2
3	3a. Apply Bending Theory. 3b. Calculate Bending Stress 3c. Draw stress distribution diagram.	**Bending Stresses and Shear Stresses:** 3.1 Theory of simple bending, flexural formula (No derivation), concept of bending stress, assumptions in the theory of bending, moment of resistance, section modulus, neutral axis, comparative strengths of rectangular, circular, I, T channel section 3.2 Concept of shear stresses in a beam, average shear stress, max shear stress shear stress distribution diagrams for rectangular, circular, I, T, channel sections.	12	6	CO3
4	4a. Calculate Direct & Bending Stresses of various structural components 4b. Compute Strain Energy under Different Types of Loading	**Combined bending and direct stresses :** 4.1 Axial load, eccentric load, eccentricity, direct stress, bending stress, uniaxial bending biaxial bending. Maximum and minimum total stress, no tension condition, limiting eccentricity, core of section, middle third rule, total stress	12	8	CO4

COURSE NAME	**Strength of Materials**	COURSE CODE	**R18AM2102**

S. No.	Unit Outcomes (UOs)	Topics and Sub-topics	Marks	Hours	Mapped CO
	1a.Compare stresses developed due to the axial load and eccentric load in the given situation. 1b.Evaluate resultant stresses at the base of given column and chimney under given loading conditions. 1c.Draw stress distribution diagram	variation diagrams. 4.2 Strain energy, Resilience, proof resilience and modulus of resilience. Stresses due to gradual, sudden and impact loads.			
5	5a. Calculate Normal and shear stress on a inclined plane in a element subjected to plane stress condition. 5b. Calculate Principal Stresses, Principal Planes, maximum shear stress and their Planes.	**Principal planes and principal stresses :** 5.1 Stresses on inclined planes, planes, planes of max. shear stress, definition of principal plane and principal stresses, location of principal planes, expression for normal and tangential stress, max. shear stress, Mohr's circle of stresses, condition of max. obliquity of resultant stress 5.2 Thin cylindrical shells: Longitudinal and circumferential (hoop) stresses in seamless thin walled cylindrical shells, shear stress.	16	10	CO5
6	6a.Calculate shear stresses produced in circular shafts. 6b.Calculate power transmitted by circular shafts.	**Torsion:** 6.1 Concepts of torsion, Torsional equation (No derivation) for solid circular shaft, hollow circular shaft, shear stress distribution over cross section. 6.2 Comparison between a solid and hollow shaft for same Strength and same weight, power transmitted by shafts, average torque, maximum torque and torsional rigidity.	12	6	CO6

6. PRACTICAL –ASSIGNMENTS-STUDENT ACTIVITIES-TUTORIALS (Separate table for each)

S. No.	Practical (Any 11)	Topic No.	Hours Allotted	Mapped CO
1.	Tensile test on mild steel bar (ductile material).	1	2	CO1
2.	Tensile test on tor steel bar (brittle material)	1	2	CO1
3.	Shear test on two different metals under single and double shear.	1	2	CO1
4.	Bending test on a wooden beam.	3	2	CO3
5.	Izod Impact Test.	4	2	CO1
6.	Compression Test on Metals.	1	2	CO1
7.	Torsion test on ductile material.	6	2	CO6
8.	Torsion test on brittle material.	6	2	CO6
10	Flexural Test on plywood.	3	2	CO3
11	Water Absorption Test on bricks.	--	2	--
12	Compressive Test on Bricks.	1	2	CO1
13	Hardness test on metals: Brinell's hardness test.	1	2	CO1
--	Total	--	22	--

S. No.	Assignments	Topic No.	Hours Allotted	Mapped CO
1	Problems on topic Simple stresses and strains, beams and bending.	1,2	2	CO1, CO2
2	Problems on topic shear stresses and bending stresses combined direct and bending stresses.	3,4	2	CO3, CO4
3	Problems on topic Principal planes and principal stresses, Torsion	5,6	2	CO5, CO6
--	Total	--	6	--

S. No.	Practical	Topic No.	Hours Allotted	Mapped CO
--	**Practical –assignments-student activities submission**	**--**	**4**	**--**
--	**Total**	**--**	**32**	**--**

7. EVALUATION SCHEME FOR PRACTICAL / ASSIGNMENTS/STUDENT ACTIVITIES

Rubrics for assignments

Category	4	3	2	1
Understanding Of Analytical Concepts	Complete Understanding	Substantialunderstanding	Some Understanding	Limited Understanding
Mathematical Errors	Least Errors	90 % Free Of Errors	75 % Free Of Errors	50 % Free Of Errors

Category	4	3	2	1
Graphics	Neat ,Accurate And Enhance Understanding	Neat And Accurate	Some Illustrations Are Misleading And Redundant	Least Accurate And Not Neat
Timely Completion Of Activity	Maximum	Moderate	Satisfactory	Least
Overall Understanding	Maximum	Moderate	Satisfactory	Least

8. MAJOR EQUIPMENT/ INSTRUMENTS /TOOLS REQUIRED

S. No.	Equipment Name with Specifications	Practical
1	Universal Testing machine of capacity 1000KN, Digital type with all attachments and accessories.	1,2,3,4,6,10
2	Compression testing machine of capacity 200 tons analog type with all attachments and accessories.	12
3	Izod impact testing machine.	5
4	Hot air oven with thermostatic control having temperature range 100 to 105^0 C	11
5	Accessories : Vernire caliper, meter scale, weighing balance, weights, hammer, screw driver, pliers ,punch, file	3
6	Brinell hardness testing machine	13

9. SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Topic No.	Topic Title	Mapped CO % OR Emphasis	Distribution of Marks			
			Cognitive level			Total Marks
			Remember	Understand	Apply	
I	Simple Stresses and Strain	CO1, 20	4	4	8	16
II	Beams and bending	CO2, 15	4	4	4	12
III	Bending Stresses and Shear Stresses	CO3, 15	4	4	4	12
IV	Combined bending and direct stresses	CO4, 15	4	4	4	12
V	Principal planes and principal stresses	CO5, 20	4	4	8	16
VI	Torsion	CO6, 15	4	4	4	12
Total		100	24	24	32	80

10. SAMPLE MODEL QUESTION BANK FOR THEORY AND TEST EXAMINATIONS

S. No	Topic	Mapped CO	Cognitive level R/U/A	Question
1	1	CO1	R	Define tensile and compressive stress.
2	1	CO2	U	Give relation between rate of loading, shear force, bending moment

S. No	Topic	Mapped CO	Cognitive level R/U/A	Question
3	1	CO3, CO4	A	Draw SFD and BMD for the given beam.

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

11. LEARNING RESOURCES

- **BOOKS**

S. No.	Title of Book	Author	Publication
1	Strength of Materials	R. S. Khurmi	S. Chand &Company Delhi
2	Mechanics of materials	R. C. Hibbeler	Pearson Education
3	Strength of Materials	S. S. Bhavikatti	Vikas Publishing House
4	Strength of Materials	B. K. Sarkar	Tata McGraw –Hill
5	Strength of Materials	S. Ramamurtham	Dhanpat Rai and sons
6	Strength of Materials	R. K. Bansal	Laxmi Publications

- **WEBSITES**

S. No.	Address
1	www.nptel.iitm.ac.in
2	www.nittr.com

12. COURSE CURRICULUM DEVELOPMENT MEMBERS

S. No.	Name and Designation	Contact No.	Email
1	Mrs. Vaishali D. Pawar	9403758095	vaidyavaishu@yahoo.co.in

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE -1

Diploma Programme	CIVIL		
Course Name	General Engineering (Elect. & Mech.)	Course code	R18CE2103
Course Category	Allied	Credits	4

COURSE TEACHING, ASSESSMENT AND EVALUATION SCHEME:

Teaching scheme		Evaluation scheme									
		Direct assessment- Weightage - 80%									
		Theory outcome		Practical outcome							Total
				TERMWORK					PRACTICAL	ORAL	
Theory Allotted hrs	Practical Allotted hrs	ESE marks	TTA marks	TW marks	SW marks	AS marks	TU Marks	Total	Practical Marks	OR marks	Total marks
--	2+2=4	-	-	50	-	-	-	50	-	@ 50	100
		Indirect assessment- Weightage- 20%									
		Mid semester students feedback						End of the course survey			

End semester examination-ESE, Two tests average-TTA, Term Work- TW, Student Activity-SW, Assignments –AS, Tutorials- TU, Oral –OR , @- Internal Exam

1. RATIONALE

In workshop Civil Diploma Technician is expected to know basic workshop practice like welding, cutting, fitting, drilling, tapping, plumbing, carpentry and electrical wiring etc. A site engineer requires knowing the use different machineries, tools, equipments to enhance productivity on the site. It is essential for Civil Engineers to have basic knowledge of Mechanical & Electrical Engineering so that he can interact with his counterpart more confidently.

2. EXPECTED PROFICIENCY

Use basic principles of Mechanical Engineering and Electrical Engineering to solve relevant engineering problems.

3. COURSE OUTCOMES (COs)

Students will be able to

1. Identify, select and use various tools, equipment, fastening and fixtures for plumbing, fabrication, carpentry and electrical work.
2. Infer the skills of operation & control of different tools and fabrication work.
3. Developing the knowledge about market scenario of various timber, fixtures & fastenings, and metal products.
4. Perceive earthing process, solar lighting system fixtures, and operation of stair case wiring, electrical equipment used in civil engineering systems of wirings, house wiring diagrams & components used.
5. Identify & use megger, energy meter & various domestic electrical appliances.
6. Identify safety measures in electrical installations & use.

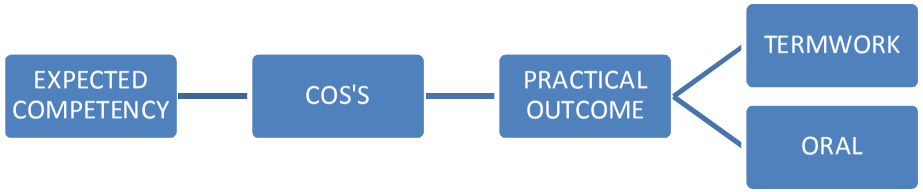
COURSE NAME	General Engineering (Elect. & Mech.)	COURSE CODE	R18CE2103

4. CO –PO MATRIX

Course Name: General Engineering Elect. & Mech. Course Code: R18 CE2103	PO 1 Basic & Discipline specific knowledge	PO 2 Problem Analysis	PO 3 Design/ development of solution	PO 4 Engineering Tools, Experiments & Testing	PO 5 Engineering Practices for society sustainability& environment	PO 6 Project Management	PO 7 Life Long Learning	PSO 1 Construction planning and detailing	PSO 2 Construction execution, supervision and maintenance
CO1	3			3	1		1		2
CO2	2			3	1		3		2
CO3	3				1		3	1	
CO4	3		1	3		2	1	1	2
CO5	3		1	2	2		1		2
CO6	3				2	1	1		1

Rating scale '**3**' for high, '2' for medium, '**1**' for low '0' for no correlation

5. COURSE MAP



6. PRACTICAL –ASSIGNMENTS-STUDENT ACTIVITIES-TUTORIALS (Separate table for each)

Mechanical Engineering Part

Sr. No.	Practical	Topic No.	Hours Allotted	Mapped CO
1	Study of various fixture and fastening in plumbing of G.I. and P.V.C.	--	2	CO1
2	Study of various tools used for plumbing work.	--	2	CO1
3	Demonstration of G.I. pipe cutting, threading and joining.	--	4	CO1
4	Study of various types of tools used for carpentry work.	--	2	CO1
5	Demonstration on various types joint in wood work.	--	4	CO1
6	Study of various tools used for fabrication work	--	2	CO2
7	Demonstration on fabrication of lap and butt joint with finishing	--	2	CO2
8	Study of pneumatic and hydraulic mechanism	--	2	CO2
9	Collection of market information regarding various timber and metal product.	--	4	CO3
10	Collection of market information regarding the various fixtures and fastening required in plumbing	--	4	CO3
--	Total	--	28	--

Sr. No.	Practical	Topic No.	Hours Allotted	Mapped CO
--	**Practical –assignments-student activities submission**	--	**04**	--
--	**Total**	--	**32**	--

Electrical Engineering Part

Sr. No.	Practical	Topic No.	Hours Allotted	Mapped CO
1	Study of house wiring diagrams & physical identification of components/ accessories.	--	2	CO5
2	Comparative study of different systems of wirings such as open C.T.S., casing capping, conduit such as cleat wiring, casing and capping wiring, CTS or TRS or PVC wiring, lead sheathed or metal sheathed wiring, conduit wirings (open & concealed)	--	4	CO5
3	Study of energy meter details & estimation of power consumption.	--	2	CO6
4	Use of megger.	--	2	CO6
5	Study of various electrical equipment used in Civil Engineering.	--	4	CO5
6	Demonstration of stair case wiring.	--	2	CO5
7	Safety measures in electrical installations & use.	--	2	CO6
8	Study of earthing process.	--	2	CO5
9	Study of various domestic electrical appliances.	--	4	CO6
10	Study of solar lighting system fixtures.	--	4	CO5
--	Total	--	28	--

Sr. No.	Practical	Topic No.	Hours Allotted	Mapped CO
--	**Practical –assignments-student activities submission**	--	**04**	--
--	**Total**	--	**32**	--

7. EVALUATION SCHEME FOR PRACTICAL / ASSIGNMENTS/STUDENT ACTIVITIES

Rubrics for Practicals

Category	4	3	2	1
Experimental procedure & handling of the instruments	Follows procedure as instructed and safe & correct handling of the instruments	Little oversight towards procedure, safety & handling of the instruments	Considerable oversight towards procedure, safety and handling of the instruments	Careless about the procedure safety & handling of the instruments.
Data documentation, data analysis & results interpretation	Correct documentation of all data, Correct calculations and Error in result worked out correctly is within the limit	Correct documentation of majority of data, Minor errors in calculations and Error in results worked out correctly is not within the limit	Incorrect documentation of majority of data, Major errors in calculations and Error in result Worked out	Incomplete & wrong documentation of data, Incomplete & wrong calculations and Error in result not worked out.

Category	4	3	2	1
			incorrectly.	
Team spirit	Contributes a fair share to work	Sometimes depends on others to complete the work	Many times depends on others to complete the work	Always depends on others to complete the work
Timely completion of activity	Maximum	Moderate	Satisfactory	Least
Overall understanding	Maximum	Moderate	Satisfactory	Least

Rubrics for Oral

Category	4	3	2	1
Delivery	Relaxed, Self confident, show natural body movement	Demonstrate quick recovery from minor mistake	Self conscious and monotone voice	Poorly performed
Understanding	Clear complete and concise	Mostly clear and little concise	Unclear	Incompletes and not concise
Vocabulary	Wide range of vocabulary and there is no repetition.	Quite Wide range of vocabulary and there is not lot of repetition	Some new vocabulary and few new expression	Student tends to repeat words all the time.
Presentation	Orderly and effectively	Orderly and little effectively	orderly	Not orderly
Body Language	Keep eye contact and no nervous expressions	Keep eye contact and few nervous expressions	Do not keep eye contact and few nerves expressions	Do not Keep eye contact and total nervous expressions

8. LEARNING RESOURCES

- **BOOKS**

Sr. No.	Title of Book	Author	Publication
1	Workshop Technology, Vol. I	S.K. Hazara and H. S. Choudhari	Media Promoters and Publishers, New Delhi
2	Electrical Estimating & Costing	Surjit Singh	Dhanpat Rai & Co. (P) Ltd. Publishers, New Delhi
3	Electrical Wiring Estimating & Costing	S. L. Uppal & G.C. Garg	Khanna Publishers, New Delhi
4	Text Book of Electrical Engineering	B. L. Theraja	S. Chand & Co. (P) Ltd. , New Delhi

9. COURSE CURRICULUM DEVELOPMENT MEMBERS

S. No.	Name and Designation	Contact No.	Email
1	Prof. Y. A. Chaudhari, Lecturer, Mechanical	9096933099	yogesh1974cwit@gmail.com
2	Prof. S. G. Nawade, Lecturer, Electrica.l	9404363495	sgnawade@rediff.com

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE -1

Diploma Programme	CIVIL		
Course Name	Entrepreneurship Development	Course code	R18ME2208
Course Category	ALLIED	Credits	03

COURSE TEACHING, ASSESSMENT AND EVALUATION SCHEME:

Teaching scheme		Evaluation scheme									
		Direct assessment- Weightage -80%									
		Theory outcome		Practical outcome							Total
				TERMWORK					PRACTICAL	ORAL	
Theory Allotted hrs	Practical Allotted hrs	ESE marks	TTA marks	TW marks	SW marks	AS marks	TU Marks	Total	Practical Marks	OR marks	Total marks
1	2	--	--	25	--	--	--	25	-	@25	50
		Indirect assessment- Weightage-20%									
		Mid semester students feedback						End of the course survey			

End semester examination-ESE, Two tests average-TTA, Term Work- TW, Student Activity-SW, Assignments –AS, Tutorials- TU, Oral -OR

1. RATIONALE

This course consists of topics related to the development of entrepreneurial skills and other details such as selection of product lines, site selection, financial aspects, personnel management, quality control and creative thinking. The course includes case studies in the related field. The course emphasizes the development of enterprising qualities among young engineers.

2. EXPECTED PROFICIENCY

Plan to establish 'Start-up Enterprises'.

3. COURSE OUTCOMES (COs)

Students will be able to

1. Identify various business opportunities.
2. Analyze selected business idea.
3. Prepare business plan for enterprise.
4. Generate awareness about enterprise management

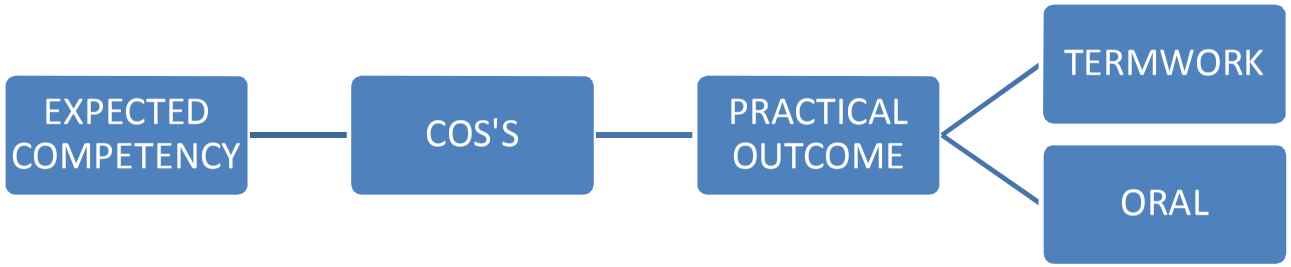
COURSE NAME	Entrepreneurship Development	COURSE CODE	R18ME2208

4. CO –PO MATRIX

Course Name - Entrepreneurship Development Course Code - R18ME2208	PO 1 Basic and Discipline Specific knowledge	PO 2 Problem Analysis	PO 3 Design or Development of Solutions	PO 4 Engineering Tools, Experimentation and Testing	PO 5 Engineering Practices for Society, sustainability and Environment	PO 6 Project Management	PO 7 Life-Long Learning	PSO 1 Construction planning and detailing	PSO 2 Construction execution, supervision and maintenance
CO1	1	1		1		2	2		1
CO2	1	2	1	1	1	2	2	1	1
CO3	1		2	1	1	2	3	2	1
CO4	1					3	2		1

Rating scale '**3**' for high, '**2**' for medium, '**1**' for low '**0**' for no correlation

5. COURSE MAP



COURSE NAME	Entrepreneurship Development	COURSE CODE	R18ME2208

6. DETAILED COURSE CONTENTS

S. No.	Unit Outcomes (UOs)	Topics and Sub-topics	Marks	Hours	Mapped CO
1	1. Explain concept of entrepreneur and entrepreneurship. 2. State characteristics and qualities of entrepreneur. 3. Difference between Entrepreneur and Entrepreneur. 4. Explain Women entrepreneurship with examples.	**1.1** Definition of entrepreneur, concept of entrepreneur and entrepreneurship, Importance of entrepreneur. Types of entrepreneur: Innovative, Imitative, Fabian, Drone and according to type of business. Difference between Entrepreneur and Entrepreneur. **1.2 Entrepreneurial Competencies: -** Characteristics of an entrepreneur, qualities of an entrepreneur, competencies of entrepreneur. **1.3 Women Entrepreneur:** Definition, characteristics of women entrepreneur. Causes of limited growth in India, remedies for limited women Entrepreneurship development.	-	03	-
2	1. Explain concept of motivation and types of motivation. 2. Explain challenges of motivations. 3. Explain theories of motivations.	**2.1 Motivation :** Definition and concept of motivation, types of motivation: affiliation, power, and achievement motivation. Need and importance of achievement motivation. Challenges of motivation. Motivating factors. Theories of motivation: a) Maslow Hierarchy theory, b) Mc Gregory X-Y theory.	-	02	-
3	1. Explain concept of Innovation and Creativity. 2. Discuss characteristics of creative people. 3. Discuss various examples of Innovation and Creativity.	**3.1 Creativity and Innovation :** Definition and concept of Innovation. Definition and concept of Creativity. Characteristics of creative people. Discussion of various examples with respect to creativity and innovation.	-	02	-
4	1. Discuss the Business Opportunities. 2. Describe classification of opportunities. 3. Explain search and generation of business	**4.1 Business Opportunity Search and Scanning:** Opportunities available in different sectors such as manufacturing, services and trading. Classification of	-	04	-

COURSE NAME	**Entrepreneurship Development**	COURSE CODE	**R18ME2208**

S. No.	Unit Outcomes (UOs)	Topics and Sub-topics	Marks	Hours	Mapped CO
	idea. Discuss Sources of Business Idea.	opportunities on the following: - Natural resource based, Demand based, Local industrial based, Service sector based, Export based, Skill based, Off-farm based. **4.2 Business Idea :** Search for business idea, sources of business idea, ways of generating ideas, Ideas processing & selection (factors affecting product idea). SWOT Analysis. **4.3 Sources of Business Idea :** Market survey & techniques, prospective consumers, development in other nation, study of project profile, government organization, trade fair and exhibitions. Checklists for information collection.			
5	1. Discuss Government and Non-Government Agencies associated with entrepreneurship. 2. State importance of funds and government fund schemes. Explain SSI and Ancillary.	**5.1 Government and Non-Government Agencies for Promotion and Development:** Importance of funds, types of funds. Various schemes of assistance of Government, Government policies and incentives. Registration with various Government agencies, definition of SSI and Ancillary.	-	02	-
6	Explain concept of Business Plan. 1. Explain project formulation and analysis. 2. State sources of capital. 3. Calculate cost of production. 4. Describe cost volume profit relationship. 5. Calculate cost of production. Discuss loan application form for appraisal.	**6.1 Business Plan Preparation :** Project identification, project formulation, feasibility analysis, Estimation of cost of production, Cost volume profit relationship at different levels, Interpretation of financial statements, Institutionalized and Non institutionalized sources of working capital, Funds flow statements, Loan application form for appraisal. Project report preparation.	-	03	-

7. PRACTICAL –ASSIGNMENTS-STUDENT ACTIVITIES-TUTORIALS (Separate table for each)

S. No.	**Practical** (Outcomes' in Psychomotor Domain)	Topic No.	Hours Allotted	Mapped CO
1	Biography of any entrepreneur	1	2	CO_4
2	Self Disclosure Exercise (Who am I?)	1	2	CO_1
3	Self rating questionnaire.	2	2	CO_1
4	Thematic Appreciation Test (TAT)	3	2	CO_2
5	Ring Toss Exercise	3	4	CO_2, CO_3
6	Tower Building Exercise	3	4	CO_2, CO_3
7	Convince and Crown	2	2	CO_2, CO_3
8	Creativity and Problem solving	3	2	CO_2
Professional Exercises				
9.	Walking through Market	4	4	CO_2
10.	Business plan preparation	5,6	2	CO_3
11.	Interview of a successful entrepreneur	1,5,6	2	CO_4
12.	Interview / Biography of a successful women entrepreneur	1	2	CO_4
Total		--	**30**	--

S. No.	Practical	Topic No.	Hours Allotted	Mapped CO
--	**Practical –assignments-student activities submission**	-	**2**	-
--	**Total**	-	**32**	-

8. EVALUATION SCHEME FOR PRACTICAL / ASSIGNMENTS/STUDENT ACTIVITIES

Rubrics for Practicals

Category	4	3	2	1
Team spirit	Contributes a fair share to work	Sometimes depends on others to complete the work	Many times depends on others to complete the work	Always depends on others to complete the work
Timely completion of activity	Maximum	Moderate	Satisfactory	Least
Overall understanding	Maximum	Moderate	Satisfactory	Least

Rubrics for Oral

Category	4	3	2	1
Delivery	Relaxed, Self confident, show natural body movement	Demonstrate quick recovery from minor mistake	Self conscious and monotone voice	Poorly performed
Understanding	Clear complete and concise	Mostly clear and little concise	Unclear	Incompletes and not concise
Vocabulary	Wide range of vocabulary and there is no repetition.	Quite Wide range of vocabulary and there is not lot of repetition	Some new vocabulary and few new expression	Student tends to repeat words all the time.
Presentation	Orderly and effectively	Orderly and little effectively	orderly	Not orderly

Body Language	Keep eye contact and no nervous expressions	Keep eye contact and few nervous expressions	Do not keep eye contact and few nerves expressions	Do not Keep eye contact and total nervous expressions

9. MAJOR EQUIPMENT/ INSTRUMENTS /TOOLS REQUIRED

S. No.	Equipment Name with Specifications	Practical
1	LCD Projector	ALL
2	Rings, Pegs, Line Marker	5
3	Work Table	5, 6
4	Wooden Blocks, Sticks	6

- **BOOKS**

S. No.	Title of Book	Author	Publication
1	Dynamics Of Entrepreneurial Development and Management.	Vasant Desai	Himalaya Publishing House, 1997, Reprint-1999.
2	Entrepreneurial Development Concept and Practices	Dilip M. Sarwate	Everest Publishing House, 1996
3	Entrepreneurial Development	Gupta Srinivasan	Sultan Chand & Sons, 1993.
4	Training of Entrepreneurship and Self Employment.	D. D. Mali	Mittal Publications, 1999.

10. COURSE CURRICULUM DEVELOPMENT MEMBERS

S. No.	Name and Designation	Contact No.	Email
1	U. N. Kamble	9422543715	uday_wadia@yahoo.com
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CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE -1

Diploma Programme	CIVIL		
Course Name	Construction Materials	Course code	R18CE3101
Course Category	Core	Credits	3

COURSE TEACHING, ASSESSMENT AND EVALUATION SCHEME:

Teaching scheme		Evaluation scheme									
		Direct assessment- Weightage - 80%									
		Theory outcome		Practical outcome							Total
				TERMWORK				TW	PRACTICAL	ORAL	
Theory Allotted hrs	Practical Allotted hrs	ESE marks	TTA marks	TW marks	SW marks	AS marks	TU Marks	Total	Practical Marks	OR marks	Total marks
3	-	80	20	-	-	-	-	-	-	-	100
		Indirect assessment- Weightage - 20%									
		Mid semester students feedback						End of the course survey			

End semester examination-ESE, Two tests average-TTA, Term Work- TW, Student Activity-SW, Assignments –AS, Tutorials- TU, Oral -OR

1. RATIONALE

The construction materials area of study gives student a comprehensive understanding of the composition, structure and engineering behavior of material used in Civil engineering application. Civil engineering technocrat deals with construction of civil structures and is often responsible for specifying, designing and manufacturing the materials with which they build their structure. Studies in construction materials are intended to make him aware of the fundamental properties of the material they use. He should be able to guide the artisans on the site regarding the use of materials and maintaining good workmanship. So that durable and sustainable structure can built in the environment and its performance withstand the adverse effect of atmosphere.

2. EXPECTED PROFICIENCY

Select appropriate building material to fulfill construction requirement.

3. COURSE OUTCOMES (COs)

Students will be able to

1. Describe the broad classification of material and state the good quality of building stone.
2. Classify different types of bricks and state the quality and uses of bricks.
3. State the properties of lime and its use also enumerate the advantages of concrete block.
4. State the properties of timber and Describe types and forms of glass and its uses in building.
5. Classify ferrous and non ferrous metals and its use also state advantages of plastic building product.
6. Classify various types of tiles, paints and varnishes with its uses.

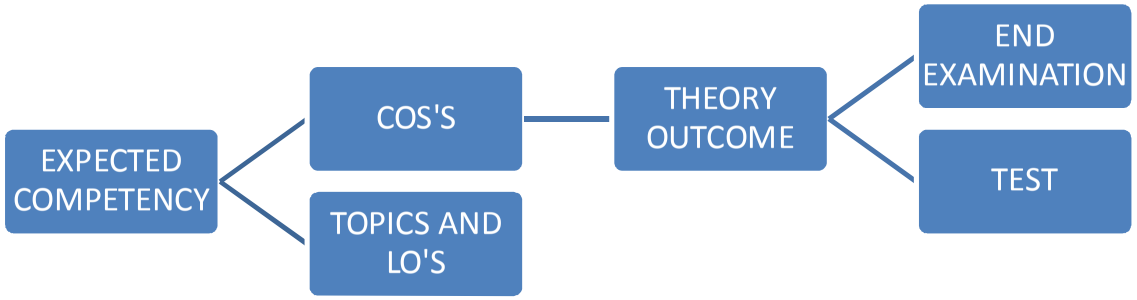
COURSE NAME	Construction Materials	COURSE CODE	R18CE3101

4. CO –PO MATRIX

Course Name: Construction Material Course Code : R18CE3101	PO 1 Basic and Discipline Specific knowledge	PO 2 Problem Analysis	PO 3 Design or Development of Solutions	PO 4 Engineering Tools, Experimentation and Testing	PO 5 Engineering Practices for Society, sustainability and Environment	PO 6 Project Management	PO 7 Life-Long Learning	PSO 1 Construction planning and detailing	PSO 2 Construction execution, supervision and maintenance
CO1	3				1				
CO2	3				1				
CO3	3				1				
CO4	3				1				
CO5	3				1				
CO6	3				1				

Rating scale '**3**' for high, '**2**' for medium, '**1**' for low '**0**' for no correlation

5. COURSE MAP



COURSE NAME	Construction Materials	COURSE CODE	R18CE3101

6. DETAILED COURSE CONTENTS

Sr. No.	Unit Outcomes (UOs)	Topics and Sub-topics	Marks	Hours	Mapped CO
1	1.1 Describe role of Civil Engineer. 1.2 Classify the given construction material. 1.3 Suggest the criteria for selection of material. 1.4 Enlist rock forming mineral and types of rock. 1.5 Select good quality of stone for given situation with justification. 1.6 List the tools required for dressing and types of stone surface finish.	**Stones** 1.1 Role of Civil Engineer in the Field of Civil Engineering, Criteria for selection of Construction Material. 1.2 Broad Classification of Material (Natural, Artificial, Special, Finishing & Recyclable). 1.3 Basic areas in civil engineering, Civil Engineering Application 1.4 List of rock forming minerals, Classification of rocks, characteristics of good building stones. **1.5** Properties & Testing of stones, Quarrying & dressing, limitation in use.	16	10	**CO1**
2	2.1 State the advantages of bricks. 2.2 Classify different types of bricks and its uses. 2.3 Describe the manufacturing process of bricks. 2.4 Enlist different ingredients of bricks and its effect on quality of brick. 2.5 State the advantages of fly ash brick. 2.6 Suggest the field and lab test conducted on brick.	**Bricks** 2.1 Introduction, sizes & forms of Bricks, Advantages of Brick . 2.2 Classification of bricks, requirement of bricks. 2.3 Quality and uses of bricks. 2.4 Constituents of brick earth, useful and harmful ingredient of bricks. 2.5 Manufacturing – preparation of brick earth, moulding, drying and burning. Comparison of clamp and kiln burning. 2.6 Testing of bricks, factors affecting quality of bricks, fly ash and fly ash bricks.	**12**	07	**CO2**
3	3.1 Enlist the various concrete block and their sizes 3.2 State the advantages and disadvantages also describe the procedure for manufacturing. 3.3 List the types of lime and its uses in given situation. 3.4 Describe the properties and uses of gypsum in given situation.	**Concrete Blocks and Lime** 3.1 Introduction, types of building blocks, sizes and uses, 3.2 Soil cement stabilized, aerated, cinder block, lintel block, paving block, hollow and solid concrete block, advantages and disadvantages. 3.3 Manufacturing process, testing of concrete block. 3.4 Lime – Introduction, manufacturing of lime, properties of lime, slaking of lime, types of lime and uses. 3.5 Gypsum – definition, constituents, uses, market forms, properties.	12	07	**CO3**
4	4.1 Classify the timber and state the properties of timber. 4.2 Explain the defects in timber and state	**Timber & Glass** 4.1 Timber – Introduction, properties of good timber, classification of timber.	16	10	**CO4**

COURSE NAME	**Construction Materials**	COURSE CODE	**R18CE3101**

Sr. No.	Unit Outcomes (UOs)	Topics and Sub-topics	Marks	Hours	Mapped CO
	precautions to be taken to minimize the defects. 4.3 Enlist the artificial wood product and its uses i given situation. 4.4 Describe types and forms of glass and its uses in given situation.	4.2 Seasoning of timber and its importance, preservation of wood, defects in timber. 4.3 Market forms of wood and artificial wood products, uses of bamboo in construction. 4.4 Glass – defination, terms used in glass, composition, types, properties, manufacturing process, forms of glass products and its uses in building construction.			
5	5.1 Classify the ferrous and non ferrous metals and its uses in given situation. 5.2 Describe the properties of steel and plastics. 5.3 State the advantages and disadvantages of plastic building products.	**Metals, Alloys (Including Steel) & Plastics** 5.1 Metals & Alloys – Introduction, types, properties, factors influencing. 5.2 Ferrous metals – Pig iron, wrought iron, cast iron and its use. Steel and uses in building construction. 5.3 Non ferrous metals – copper, aluminium, brass, gun metal – introduction, properties & uses 5.4 Plastics – Introduction, uses, properties, constituents, Classification, advantages and disadvantages, plastic building products.	12	07	**CO5**
6	6.1 Classify various types of tiles, paints and varnishes with its uses in given situation. 6.2 Sugggest the propertis of paints and varnishes. 6.3 Describe terra cotta, earthen ware, stoneware, porcelain and its uses	**Tiles, Paints & Varnishes** 6.1 Tiles – Introduction, Types (Natural & Ceramic), Cement tile. Advantages and disadvantages of tiles. 6.2 Types of flooring, roofing and paving tiles & uses. Testing of tiles, Introduction to terra cotta, earthen wares, stoneware & porcelain. 6.3 Paints – Introduction, requirements, constituents & their function, material used as constituents, charactoristics of paints. Types of paints (anti corrosion, asbestos, bituminous, aluminium, coal tar). 6.4 Varnishes – Introduction, types, characteristics, ingredients, classification, uses.	12	07	**CO6**

10. SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Topic No.	Topic Title	Mapped CO % OR Emphasis	Distribution of Marks			
			Cognitive level			Total Marks
			Remember	Understand	Apply	
I	Stones	CO1	08	06	02	16
II	Bricks	CO2	04	06	02	12
III	Concrete Blocks & Lime	CO3	04	08	00	12
IV	Timber & Glass	CO4	06	08	02	16
V	Metals, Alloys (Including Steel) & Plastics	CO5	04	08	00	12
VI	Tiles, Paints & Varnishes	CO6	04	06	02	12
Total		--	**30**	**42**	**08**	**80**

10. SAMPLE MODEL QUESTION BANK FOR THEORY AND TEST EXAMINATIONS

S. No	Topic	Mapped CO	Cognitive level R/U/A	Question
1	1	CO1	R	Enlist various materials used in building construction.
2	1	CO1	U	Discuss various factors affecting selection of material for construction of building.
3	1	CO1	A	Suggest the suitable material for construction.

11. LEARNING RESOURCES

- **BOOKS**

Sr. No.	Title of Book	Author	Publication
1	Building construction and Materials	Sushil Kumar	Standard Publication, N.Delhi.
2	Materials of Construction	Gose, D.N.	Tata McGraw, N. Delhi.
3	Material of Construction & Concrete Technology	V.R. Phadke & P.D. Dhavale	Nirali Prakashan.
4	A to Z, Bldg. Construction	Sandeep Mantri	Satya Prakashan, N. Delhi.
5	Building Material	Duggal, S.K.	New Age International Publication, New Delhi.
6	Civil Engg. Materials	TTTI	Tata McGraw Hill
7	Building Materials	Varghese, P.C.	PHI Learning, New Delhi
8	National Building Code-2006	--	Bureau of Indian Standards

- **MAGAZINES & JOURNALS**

S. No.	Title of Magazine
1	New Building Materials and Construction World
2	The Master builder
3	Inside Outside
4	Civil Engineering Construction Review
5	Construction World

- **WEBSITES**

S. No.	Address
6	https://www.youtube.com/watch?v=1fc4NVP9wXk
7	https://www.youtube.com/watch?v=m8U76Bm8kDY
8	https://www.youtube.com/watch?v=IORIZIshRIM
9	https://www.youtube.com/watch?v=Xf89KDibIFE
10	https://theconstructor.org/building/types-of-building-materials-construction
11	https://www.archdaily.com/catalog
12	www.slideshare.com

12. COURSE CURRICULUM DEVELOPMENT MEMBERS

S. No.	Name and Designation	Contact No.	Email
1	Prof. R. S. Kengale	9881293044	rskengale@rediffmail.com

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE -1

Diploma Programme	**CIVIL**		
Course Name	**Building Planning & Drawing**	**Course code**	**R18CE3102**
Course Category	**Core**	**Credits**	**7**

COURSE TEACHING, ASSESSMENT AND EVALUATION SCHEME:

Teaching scheme		**Evaluation scheme**									
		Direct assessment- Weightage - 80%									
		Theory outcome		**Practical outcome**							**Total**
				TERMWORK					**PRACTICAL**	**ORAL**	
Theory Allotted hrs	**Practical Allotted hrs**	**ESE marks**	**TTA marks**	**TW marks**	**SW marks**	**AS marks**	**TU Marks**	**Total**	**Practical Marks**	**OR marks**	**Total marks**
3	**4**	**80**	**20**	**40**	**-**	**10**	**-**	**50**	**-**	**@25**	**175**
		Indirect assessment- Weightage - 20%									
		Mid semester students feedback							**End of the course survey**		

End semester examination-ESE, Two tests average-TTA, Term Work- TW, Student Activity-SW, Assignments –AS, Tutorials- TU, Oral -OR

1. RATIONALE

Drawing is the graphical language of an engineer. Ideas conceived in the mind of technician have to be expressed in the form of drawing. The expression by drawing should be accurate, precise & brief. At a glance one can understand details of any part of the structure to be constructed or developed. For all technicians thorough understanding of principles of drawing is essential. A civil engineering technician shall be able to communicate with the superiors, subordinates, clients, contractors, consultants etc. through building drawings. This subject describes technique to read, understand interpret and prepare drawing using conventions and symbols to use it for execution and different subjects during diploma course. It also introduces the students to basic aspects such as planning, design, regulations, byelaws, standards etc. related with buildings. The knowledge of this subject is useful for building construction, estimating and costing, drafting specification and tender document, design of structure, surveying, projects etc.

2. EXPECTED PROFICIENCY

Understand concept and principles for creation of different types of civil engineering drawing as per DCR.

3. COURSE OUTCOMES (COs)

Students will be able to

1. Understand about the principles, concepts, facts & procedures in Building Drawing.
2. Apply principles and development control regulations in building planning.
3. Read, understand and interpret drawing as per given standards.
4. Prepare brief area statement also discuss general requirement of building while planning building.
5. Prepare one point and two point perspective.
6. State the role of various agencies in building industry and identify various plan passing authority.

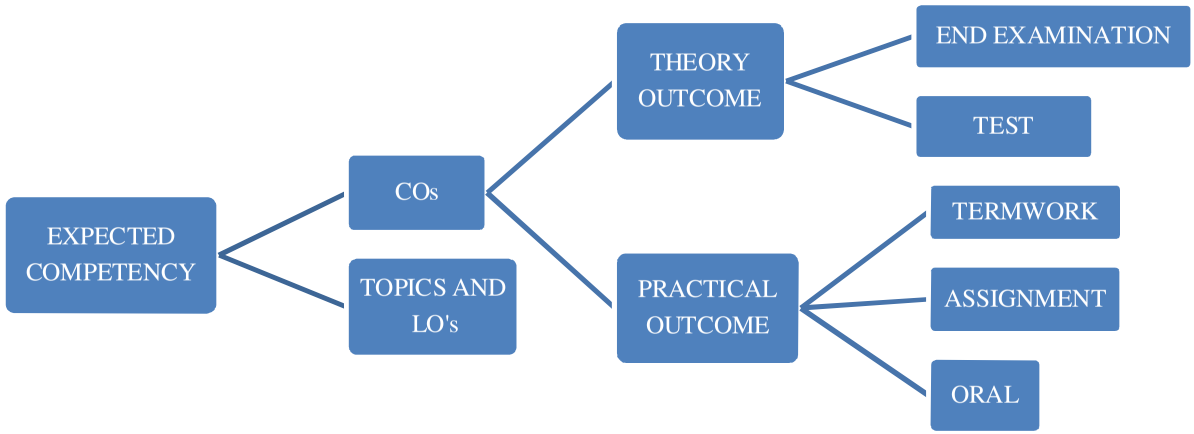
COURSE NAME	**Building Planning & Drawing**	COURSE CODE	**R18CE3102**

4. CO –PO MATRIX

Course Name: Building Planning And Drawing Course Code R18CE3102	PO 1 Basic and Discipline Specific knowledge	PO 2 Problem Analysis	PO 3 Design or Development of Solutions	PO 4 Engineering Tools, Experimentation and Testing	PO 5 Engineering Practices for Society, sustainability and Environment	PO 6 Project Management	PO 7 Life-Long Learning	PSO 1 Construction planning and detailing	PSO 2 Construction execution, supervision and maintenance
CO1	2							2	
CO2	1			2	1		1	1	1
CO3	1	1						1	1
CO4	1	2			3	1		1	1
CO5	1		2		3			1	1
CO6	1							1	

Rating scale '**3**' for high, '**2**' for medium, **'1'** for low **'0'** for no correlation

5. COURSE MAP



COURSE NAME	**Building Planning & Drawing**	COURSE CODE	**R18CE3102**

6. DETAILED COURSE CONTENTS

Sr. No.	Unit Outcomes (UOs)	Topics and Sub-topics	Marks	Hours	Mapped CO
1	1.1 Describe types of drawing and its purpose. 1.2 Explain the standards adopted while preparing drawing. 1.3 Select the appropriate scale for preparing working drawing. 1.4 State the requirement of good drawing. 1.5 Draw the conventional, symbol, signs used in drawing.	**Requirement of Building Drawing** 1.1 Definition & purposes of building drawing, Requirements of good building drawing. 1.2 Types of building drawings: preliminary; submission, working; presentation & measured. 1.3 Sizes of drawing papers & boards. General Layout of building drawing. Scales: Selection of scales for drawing and metric scales for architectural & building drawing. 1.4 Lettering & dimensioning, Numbering of building components in drawing. 1.5 Standard symbols & conventions in building drawing, Colouring the building plan. Folding of drawing sheets.	12	07	CO1
2	2.1 Describe the factors considered for selection of site for residential building. 2.2 Discuss the principles of planning and architectural compositions for planning the building. 2.3 Develop the given line plan by adopting various building bylaws. 2.4 Study of development control regulation for planning building.	**Planning of Buildings** 2.1 Selection of building site, orientation & sun diagram. 2.2 Principles of planning: Aspect & prospect, privacy, grouping, roominess, furniture requirement, circulation, flexibility, sanitation, elegance & economy. 2.3 Principles of architectural composition: Unity, mass composition, contrast, proportion & scale. 2.4 Building Bylaws: Tenement density, plot area, ground coverage, built up area, number of storey's/height and marginal distances for residential (including group housing schemes), commercial, industrial & special type of buildings, parking requirement. Introduction to DCR.	**16**	10	**CO2**
3	3.1 Collecting submission drawing and preparing questioner based on it. 3.2 Read, understand and interpret drawing as per given standards. 3.3 Prepare site plan, foundation plan by adopting various norms. 3.4 Prepare scheduled for opening and construction notes.	**Drawing and Checking Building Views** 3.1 Drawing & checking building plan, elevation, section. 3.2 Foundation plan, roof plan, site plan, location plan, area key/block plan, layout plan. 3.3 Preparing construction notes, schedules for room finishes; doors & windows and fixtures & fastenings for doors & windows.	12	07	CO3

COURSE NAME	**Building Planning & Drawing**	COURSE CODE	**R18CE3102**

4	4.1 Planning of g+1 storied residential bungalow in the form of working drawing. 4.2 Prepare brief area statement. 4.3 Discuss the general requirement of building. 4.4 Prepare the checklist for planning the job.	**Building Area Calculation** 4.1 Calculation of Plinth floor & carpet areas. Floor Area Ratio (FAR) or Floor Space Index (FSI), Volume Plot Ratio (VPR), Prepare brief area statement. Concept of TDR. 4.2 General building/space requirements & norms for various facilities in the residential building. 4.3 Planning of public buildings. 4.4 Check list for planning the job.	12	07	CO4
5	5.1 Discuss the necessity of perspective drawing and terms used. 5.2 Prepare one point and two point perspective. 5.3 Explain the procedure for getting plan sanction from competent authority. **5.4** Identify charges of scrutiny fee, hardship, premium and development charges.	**Presentation Drawing and Plan Sanctioning** 5.1 Perspective Drawing: Definition, Necessity, Principles of perspective of drawing, Term used in perspective drawing. Classifications – One point or parallel perspective, two point or angular perspective, birds eye perspective. Axonometric Drawing: Concept, procedure & uses. 5.2 Plan Sanctioning Procedure, Documents pertaining to the Records of land, Essential documents required for plan sanctioning duration of sanctioning deviation during constructions. Scrutiny of building drawing, Scrutiny form, Development charges, Scrutiny fee hardship & premium.	16	10	CO5
6	6.1 State the agencies involved in building industry its role and responsibilities. 6.2 Identify various plan passing authority. 6.3 Study various norms for green building and high rise building.	**Agencies in Building Industry** 6.1 Roll of various agencies in building industry like owner, promoter, builder, legal consultant, contractor, architect, quantity surveyor, valuer, arbitrator, structural designer, management consultant, landscape architect, specialist designer for foundation, building service consultant. 6.2 Plan sanctioning authorities like Municipal council, Municipal Corporation, MRDA, NTDA, CIDCO, MHADA, MIDC etc. 6.3 Norm & Regulations for Green / Eco-friendly Buildings in the contents of Solar heating, Rain Water harvesting, Sewage water recycling, plantation, ventilation & lighting. Norm & Regulation for high Rise Building.	12	07	CO6

7. PRACTICAL –ASSIGNMENTS-STUDENT ACTIVITIES-TUTORIALS (Separate table for each)

S. No.	Practical	Topic No.	Hours Allotted	Mapped CO
1.	Collection of copy of submission drawing of a single or multistoried, load bearing or framed bungalow, within the jurisdiction of any urban local body, prepared by professional architect or licensed engineer. Student is expected to read the drawing carefully & submit in standard format, supplied by the Department, the answers to few question related with planning of the building on that drawing.	02 03	12	CO2 CO3
2.	Plan and Develop the G+1 storied framed structure bungalow & preparing for the same, the working drawing on A1 size drawing sheet to the scale of 1:100 or 1:200. The drawing shall consist of ground floor plan, first floor plan, road side or front elevation, minimum one section passing through staircase &/or toilet block, foundation plan, site plan, details of foundation for wall &/or column, details of plinth & plinth filling, details of step block, details of lintel & chajja, details of compound wall & gate, detailed construction notes, detailed schedule of openings & brief area statement.	01 02 04	18	CO1 CO2 CO4
3.	Planning a multistoried public building such as school, bank, rural hospital, community hall, theatre etc. and preparing on A1 size graph paper to suitable scale only line plan along with schedule of openings & brief specifications/construction notes.	04	08	CO4
4.	Prepare one point or two point perspective of small building.	05	08	CO5
	Total		46	

S. No.	Assignment	Topic No.	Hours Allotted	Mapped CO
1	Collect Submission Drawing From renowned Architect and Licensed Engineer.	03	02	CO3
2	Prepare Line plan for G+1 Storied Bungalow	02	04	CO2
3	Prepare One Point Perspective of Given Small Object	05	04	CO5
4	Prepare Two Point perspective of Given Small Object	05	04	CO5
	Total		14	

Sr. No.	Practical	Topic No.	Hours Allotted	Mapped CO
--	**Practical –assignments-student activities submission**	-	**4**	-
--	**Total**	-	**64**	-

8. EVALUATION SCHEME FOR PRACTICAL / ASSIGNMENTS/STUDENT ACTIVITIES

Rubrics for Practical:

Category	4	3	2	1
Understanding of Drawing & Tools	Complete Understanding	Substantial Understanding	Some Understanding	Limited Understanding
Errors	Least Errors	90 % Free Of Errors	75 % Free Of Errors	50 % Free Of Errors
Speed	Fast	Moderate	Slow	Least
Timely Completion of Sub Activities	Maximum	Moderate	Satisfactory	Least
Self Learning	Maximum	Moderate	Satisfactory	Least

Rubrics for Assignments

Category	4	3	2	1
Structure	Very well structured	Well constructed	Structured but missing links	Unstructured
Understanding of concepts	Complete understanding	Substantialunderstanding	Some understanding	Limited understanding
Graphics	Neat ,accurate and enhance understanding	Neat and accurate	Some illustrations are misleading and redundant	Least accurate and not neat
Timely completion of activity	Maximum	Moderate	Satisfactory	Least
Overall understanding	Maximum	Moderate	Satisfactory	Least

Rubricks for Orals

Category	4	3	2	1
Delivery	Relaxed, Self confident, show natural body movement	Demonstrate quick recovery from minor mistake	Self conscious and monotone voice	Poorly performed
Understanding	Clear complete and concise	Mostly clear and little concise	Unclear	Incompletes and not concise
Vocabulary	Wide range of vocabulary and there is no repetition.	Quite Wide range of vocabulary and there is not lot of repetition	Some new vocabulary and few new expression	Student tends to repeat words all the time.
Presentation	Orderly and effectively	Orderly and little effectively	orderly	Not orderly
Body Language	Keep eye contact and no nervous expressions	Keep eye contact and few nervous expressions	Do not keep eye contact and few nerves expressions	Do not Keep eye contact and total nervous expressions

COURSE NAME	**Building Planning & Drawing**	COURSE CODE	**R18CE3102**

9. SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Topic No.	Topic Title	Mapped CO % OR Emphasis	Distribution of Marks			
			Cognitive level			Total Marks
			Remember	Understand	Apply	
1	Requirement of Building Drawing	CO1	04	04	04	12
2	Planning of Buildings	CO2	00	04	12	16
3	Drawing and Checking Building Views	CO3	--	04	08	12
4	Building Area Calculation	CO4	--	04	08	12
5	Presentation Drawing and Plan Sanctioning	CO5	--	04	12	16
6	Agencies in Building Industry	CO6	04	08	--	12
Total			**08**	**28**	**44**	**80**

10. SAMPLE MODEL QUESTION BANK FOR THEORY AND TEST EXAMINATIONS

S. No	Topic	Mapped CO	Cognitive level R/U/A	Question
1	1	CO1	R	State the requirement of good building drawing.
2	1	CO1	U	Describe the various principle of planning.
3	1	CO1	A	Apply various building by laws for planning a residential building.

11. LEARNING RESOURCES

- **BOOKS**

Sr. No.	Title of Book	Author	Publication
1	Building Drawing,	Shah, Kale & Patki,	Tata McGraw Hill Co., Delhi
2	Civil Engg. Drg. & House Planning,	B. V. Verma,	B. V. Verma, Delhi 6.
3	Civil Engg. Drawing,	M. Chakraborti,	M. Chakraborti,Kolkotta
4	Civil Engg. Drawing,	S. V. Deodhar,	Vrinda, Jalgaon.
5	Civil Engg. Drawing Work Book	--	T TT I , Bhopal.
6	Planning & Design of Buildings	Y.S. Sane	PVG, Pune.
7	Building Construction, Vol. I to IV	W. B. Mackey.	Longman,Newyork.
8	National Building Code 2005	--	Bureau of Indian Standards
9	Civil Engineering Drawing	V B Sikka	Katson Books
10	Construction Technology, Vol. I to IV	Barry,	Lockwood, London.

- **WEBSITES**

S. No.	ADDRESS
1	www.archtectview.com
2	www.greatbuildings.com
3	www.wikipedia.com
4	www.archtectview.com
5	www.greatbuildings.com
6	www.wikipedia.com

12. COURSE CURRICULUM DEVELOPMENT MEMBERS

S. No.	Name and Designation	Contact No.	Email
1	Prof. R. S. Kengale, Lecturer, Civil	9881293044	rskengale@rediffmail.com

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE -1

Diploma Programme	CIVIL		
Course Name	Building Construction	Course code	R18CE3103
Course Category	Core	Credits	6

COURSE TEACHING, ASSESSMENT AND EVALUATION SCHEME:

Teaching scheme		Evaluation scheme									
		Direct assessment- Weightage - 80%									
		Theory outcome		Practical outcome							Total
				TERMWORK				TW	PRACTICAL	ORAL	
Theory Allotted hrs	Practical Allotted hrs	ESE marks	TTA marks	TW marks	SW marks	AS marks	TU Marks	Total	Practical Marks	OR marks	Total marks
4	2	80	20	15	-	10	-	25	-	-	125
		Indirect assessment- Weightage - 20%									
		Mid semester students feedback						End of the course survey			

End semester examination-ESE, Two tests average-TTA, Term Work- TW, Student Activity-SW, Assignments –AS, Tutorials- TU, Oral -OR

1. RATIONALE

Building Construction is core subject in civil engineering. A civil engineer is identified with the construction of building. It is imperative for him to know thoroughly the different construction process with respect to facts, concepts, principles and procedures related to building construction system, so that student can effectively plan, execute building construction work with quality so that a strong and pleasing structure is added to the environment. The site engineers should be able to guide the artisans on the site. Course contents shall make the student conversant with the various procedures encompassing the construction of a building.

2. EXPECTED PROFICIENCY

Implement safe building construction practices.

3. COURSE OUTCOMES (COs)

Students will be able to

1. Identify various components of building and Set out the building on ground.
2. Demonstrate the procedure for construction of masonary.
3. Enlist different types of arches, lintels, doors and windows and its uses also prepare checklist for various items in building construction.
4. Describe the procedure for construction of floors and roof also states the different means of vertical circulation.
5. Describe the procedure for plastering and pointing.
6. State different types of paint and describe the procedure for application of paint on various surface.

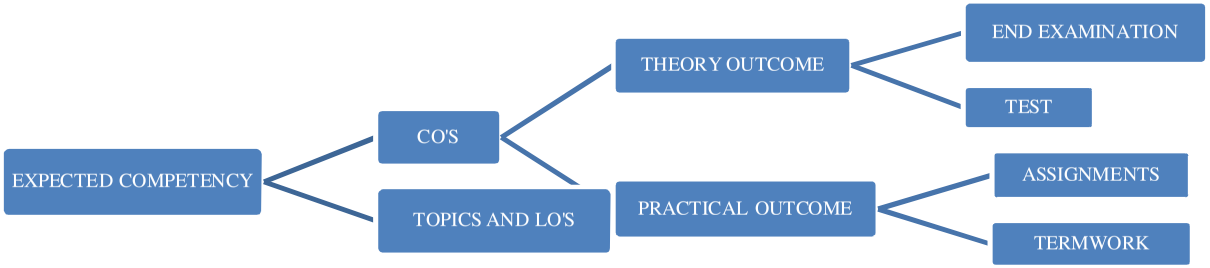
COURSE NAME	Building Construction	COURSE CODE	R18CE3103

4. CO –PO MATRIX

Course Name: Building Construction Course Code: R18CE3103	PO 1 Basic and Discipline Specific knowledge	PO 2 Problem Analysis	PO 3 Design or Development of Solutions	PO 4 Engineering Tools, Experimentation and Testing	PO 5 Engineering Practices for Society, sustainability and Environment	PO 6 Project Management	PO 7 Life-Long Learning	PSO 1 Construction planning and detailing	PSO 2 Construction execution, supervision and maintenance
CO1	3	2		1			1	1	3
CO2	0	2	3	1			1		1
CO3	1		2	3					1
CO4		2	3	1					1
CO5	1		3	2					1
CO6	1	1	3	1	2				1

Rating scale '**3**' for high, '**2**' for medium, '**1**' for low '**0**' for no correlation

5. COURSE MAP



COURSE NAME	Building Construction	COURSE CODE	R18CE3103

6. DETAILED COURSE CONTENTS

Sr. No.	Unit Outcomes (UOs)	Topics and Sub-topics	Marks	Hours	Mapped CO
1	1.1 Describe various component parts of building. 1.2 Explain the procedure for setting out of building, also justify the suitable type of foundation as per the given situation. 1.3 State the different types loads acting on structure. 1.4 Discuss the basic requirement of building. 1.5 Prepare the checklist.	**Building Components, foundation and setting out for Building.** 1.1 Definition of Building, basic requirement of building, types of structure & comparison. 1.2 Building components and their function, Loads acting on foundation, Bearing capacity- definition, types, factors affecting & ways to improve. 1.3 Foundation – definition, classification, requirement, function, necessity & their suitability. 1.4 Setting out of Load bearing & framed structure on ground. Precautions while setting out of Building. 1.5 Checklist for excavation, PCC, construction of foundation, & checklist for Line-out of Building.	16	10	CO1
2	2.1 Discuss the general points to be considered for construction masonary. 2.2 Classify the types of masonary and justify suitable type as per the given situation. 2.3 State the different terms used in masonary construction. 2.4 Define mortar. Also state the function and requirement of mortar. 2.5 Prepare the checklist.	**Masonry Construction** 2.1 Brick Masonry – Definition, Principal of Brick masonry construction, terms used in brick masonry, sizes, Bonds in brick masonry, Rules in Bonding, English, Flemish, Header, stretcher bond. Comparison of English and Flemish Bond, Various forms of Brick masonry 2.2 Stone masonry – Definition, classification, Terms used in stone masonry, General principles in the construction stone masonry, comparison of stone and Brick masonry. 2.3 Block masonry, situation where block masonry is used, reinforced brick masonry, cavity wall, composite masonry. 2.4 Mortar – definition, types, function, requirement & proportions. 2.5 Checklist for Brick masonry, stone masonry.	**12**	07	CO2
3	3.1 Define arch and lintel. State the function and types. 3.2 Describe the types of opening for the given situation with sketches.	**Arches, Lintels, Doors & Windows** 3.1 Arch – Definition, function, types, technical terms in arch work, stability of an arch. 3.2 Lintel – Definition, function, types, material used, advantages over arch.	12	07	CO3

COURSE NAME	**Building Construction**	COURSE CODE	**R18CE3103**

Sr. No.	Unit Outcomes (UOs)	Topics and Sub-topics	Marks	Hours	Mapped CO
	3.3 Sate the requirement of doors and windows. 3.4 Explain the procedure for erection of doors and windows. **3.5** Prepare the checklist.	Chajja or weather shade necessity and types. 3.3 Doors - Door frame components, types of doors, Technical terms used in doors and windows, function, material used, size & Location of doors, procedure for fixing of door frame, technical designation of door, fastening & fixtures required & their standard position on shutter. 3.4 Window - Component and types of window, function, material, sizes & location of window, procedure for fixing of window, Designation of Window, fastening & fixtures required. 3.5 Checklist – for door frame & shutter fixing, for MS Window, window frame, Aluminium Window fixing.			
4	4.1 State the types of floors and floor finishes. 4.2 Enlist the types of truss, roof and roofing material also justify the suitability for given situation. 4.3 Describe the means of vertical circulation. 4.4 Explain the procedure for laying of flooring tiles and fixing roof covering on roof. **4.5** Prepare the checklist.	**Floors, Roofs And Stairs** 4.1 Floors – Concept, Requirement, construction details of concrete, tiles and stone flooring 4.2 Floor finishes – types and its suitability, industrial flooring, tools required, Process of flooring, finishing & polishing. Procedure for fixing tiles in W.C. & Bathroom. 4.3 Roof - Necessity, types, requirement, component, Roof trusses, roof structure for supporting roofing material. Roofing material, Laying, fixing details of tiled & sheet roofing. 4.4 Stairs and vertical circulation - Means of vertical communication, types of staircase, component & terms used in stair, Constructional details of R.C.C. stair, functional design, introduction to lift & escalators. 4.5 Checklist – for flooring.	16	10	CO4
5	5.1 Enlist different types of tools used for plastering and pointing. 5.2 Describe the procedure of painting and pointing. 5.3 State common defects in plaster and its remedial measures. 5.4 Suggest special decorative plaster. 5.5 Prepare the checklist.	**Plastering & Pointing** 5.1 Plastering - Necessity, Types, material required, terms used in plastering, tools required. Procedure for internal & external plastering. 5.2 Special decorative plaster like Heritage plaster, towel plaster, wall paper etc. 5.3 Common defects of plaster – causes and remedial measures. 5.4 Pointing – Definition, necessity, Types of pointing, function, preparation of surface & application.	12	07	CO5

COURSE NAME	**Building Construction**	COURSE CODE	**R18CE3103**

Sr. No.	Unit Outcomes (UOs)	Topics and Sub-topics	Marks	Hours	Mapped CO
		5.5 Checklist for – internal plastering, external plastering & pointing.			
6	6.1 Enlist different types of paint also describe various ingredints in paints. 6.2 State the necessity of painting and wall cladding. 6.3 Describe the procedure for application of paint on various surface. 6.4 Prepare the checklist.	**Painting and Wall cladding** 6.1 Painting - Types, objects of painting, tools required for painting, terms used, Ingredient of paint. 6.2 Preparation of paint. Application of paints on different surfaces, white washing, colour washing, distempering, precautions to be taken before applying paints. 6.3 Defects in painting. 6.4 Wall cladding – material and method, wall papering and glazing work. 6.5 Checklist – internal & external painting.	12	07	CO6

7. PRACTICAL –ASSIGNMENTS-STUDENT ACTIVITIES-TUTORIALS (Separate table for each)

S. No.	Practical	Topic No.	Hours Allotted	Mapped CO
1	Draw Section through a wall showing - foundation, plinth masonry, damp proof course, plinth filling, step block at entrance or at rear, a door, a window, lintels, a chhajja, a balcony, a parapet etc.	01	02	CO1
2	Draw Plan and section showing stepped footing for wall and sloped footing for a column.((dimensioned)	01	02	CO1
3	Draw sketch showing under reamed pile and plan and section showing grillage foundation.	01	02	CO1
4	Draw different forms of brick portion. Isometric view showing one brick thick English bond and terms related with brick masonry.	02	02	CO2
5	Draw neat sketch showing Plan & sectional elevation of different types of stone masonry.	02	02	CO2
6	Draw Elevation, sectional Plan and sectional side view of a fully glazed steel window fabricated from Z & T Sections or Aluminum sliding window.	02	03	CO3
7	Draw Elevation, sectional Plan and sectional Side view of partly paneled, partly glazed timber door with ventilator.	03	02	CO3
8	Draw neat sketch showing elevation and sectional plan showing solid core and hollow core flush door.	03	02	CO3
9	Sketches showing various terms related with stair and common types of stairs.	04	02	CO4
10	Draw typical isometric view and plan of pitched roof.	04	02	CO4
11	Draw Timber king post truss (4m span) & Steel queen post truss (9m span).	04	02	CO4
--	**Total**	**--**	**22**	--

S. No.	Assignments	Topic No.	Hours Allotted	Mapped CO
1	Reports on minimum one ongoing construction site visits.	01-06	04	CO1-CO6
2	Line out for framed or load bearing structure building.	01	02	CO1
3	Prepare check list for supervision of minimum 10 item related to building constructions	01-06	02	CO1-CO6
--	**Total**	**--**	**8**	--

S. No.	Practical	Topic No.	Hours Allotted	Mapped CO
--	**Practical –assignments-student activities submission**	**--**	**2**	**--**
--	**Total**	**--**	**32**	**--**

8. EVALUATION SCHEME FOR PRACTICAL / ASSIGNMENTS/STUDENT ACTIVITIES

Rubrics for Preparation of Term Work

Category	4	3	2	1
Behavior	Never display disruptive behavior	Rarely display	occasionally	almost
Writing	Well written organized clear and easy	Adequately	Fairley	Poorly
Understanding	Clear complete and concise	Mostly clear and little concise	Unclear	Incompletes and not concise
Effort	Always on task	Mostly	Sometime	Rarely
Presentation	Orderly and effectively	Orderly and little effectively	orderly	Not orderly

Rubrics for Assignments

Category	4	3	2	1
Structure	Very Well Structured	Well Constructed	Structured But Missing Links	Unstructured
Understanding Of Concepts	Complete Understanding	Substantialunderstanding	Some Understanding	Limited Understanding
Graphics	Neat ,Accurate And Enhance Understanding	Neat And Accurate	Some Illustrations Are Misleading And Redundant	Least Accurate And Not Neat
Timely Completion Of Activity	Maximum	Moderate	Satisfactory	Least
Overall Understanding	Maximum	Moderate	Satisfactory	Least

9. SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Topic No.	Topic Title	Mapped CO % OR Emphasis	Distribution of Marks			
			Cognitive level			Total Marks
			Remember	Understand	Apply	
1	Building Components, foundation and setting out for Building.	CO1- 100	04	08	04	16
2	Masonry Construction	CO2-100	04	04	04	12
3	Arches, Lintels, Doors & Windows	CO3-100	04	08	00	12
4	Floors, Roofs And Stairs	CO4-100	04	08	00	16
5	Plastering & Pointing	CO5-100	04	08	00	12
6	Painting and Wall cladding	CO6-100	02	06	04	12
Total			**22**	**42**	**12**	**80**

10. SAMPLE MODEL QUESTION BANK FOR THEORY AND TEST EXAMINATIONS

S. No	Topic	Mapped CO	Cognitive level R/U/A	Question
1	1	CO1	R	Enlist different component parts of the building.
2	1	CO1	U	State the function of foundation
3	1	CO1	A	Suggest the suitable type of foundation

11. MODEL QUESTION BANK FOR PRACTICAL EXAMINATIONS

S. No	Unit	Mapped CO	Cognitive level R/U/A	Question
1	1	CO1	R	List the tools and equipment required for setting out
2	1	CO1	U	Describe the procedure for setting out of building on ground
3	1	CO1	A	Explain how center of column transferred on ground

12. LEARNING RESOURCES

- **BOOKS**

Sr. No.	Title of Book	Author	Publication
1	Building construction and Materials	Sushil Kumar	Standard Publication, N.Delhi.
2	A to Z practical Building Construction & its Managemnt	Mantri Institute's (Sandeep Mantri)	Satya Prakashn, New Delhi.
3	Building Construction & Construction Materials	G.S.Birdie & T.D. Arora	Dhanpat Rai & Sons, Delhi-6.
4	Building Construction & Tech.	Arora & Bindra	Dhanpat Rai & Sons, Delhi.
5	Building Construction & Material	Sushil Kumar	Standard Publication, Delhi-6.
6	Construction Technology, Vol. 1	R. Chudley	Longman (ELBS).
7	Building Construction	S.C. Rangwala	Chartar Book Stall, Anand.
8	Bulidng Construction Vol.1 to IV	W.B. Mackay	Loangman (ELBS).

- **MAGAZINES AND JOURNALS**

S. No.	Title of Magazine/Journal
1	New Building Materials and Construction World
2	The Master Builder
3	Civil Engineering Construction Review
4	Sourcing Hardware For a Complete Building Products Business

S. No.	Title of Magazine/Journal
5	Construction World

- **WEBSITES**

S. No.	ADDRESS
1	http://nptel.ac.in/syllabus/105102088/
2	http://www.theconstructioncivil.org/type-of-brick-bonds
3	http://theconstructor.org/building/type-of-partition-walls/3754
4	https://www.osha.gov/Publications/OSHA3252/3252.html
5	http://www.engineerwing.com/2012/10/tremix-flooring.html
6	http://nptel.ac.in/courses/Webcourse.../Composite%20Materials/.../LNm1.pdf
7	https://en.wikipedia.org/wiki/Fibre-reinforced_plastic.
8	https://cdn.intechopen.com/pdfs-wm/41941.pdf
9	http://home.iitk.ac.in/~mohite/Composite_introduction.pdf
10	http://www.vdfflooring.in/faqs.html
11	http://theconstructor.org/building/buildings/eco-friendly-building-materials/720
12	http://nptel.ac.in/courses/105103093/21

13. COURSE CURRICULUM DEVELOPMENT MEMBERS

S. No.	Name and Designation	Contact No.	Email
1	Prof. R. S. Kengale	9881293044	rskengale@rediffmail.com

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE -1

Diploma Programme	CIVIL		
Course Name	Civil Engineering Workshop and Practice	Course code	R18CE3104
Course Category	Core	Credits	02

COURSE TEACHING, ASSESSMENT AND EVALUATION SCHEME:

Teaching scheme		Evaluation scheme									
		Direct assessment- Weightage - 80 %									
		Theory outcome		Practical outcome							Total
				TERMWORK					PRACTICAL	ORAL	
Theory Allotted hrs	Practical Allotted hrs	ESE marks	TTA marks	TW marks	SW marks	AS marks	TU Marks	Total	Practical Marks	OR marks	Total marks
-	2	-	-	25	--	--	-	25	-	@25	50
		Indirect assessment- Weightage - 20%									
		Mid semester students feedback						End of the course survey			

End Semester Examination - ESE, Two Tests Average - TTA, Term Work - TW, Student Activity - SW, Assignments – AS, Tutorials- TU, Oral - OR

1. RATIONALE

Civil diploma technician is expected to have basic skills in Carpentry, Masonry, Welding, Fitting, Drilling, Tapping, plumbing works etc. Therefore, students should be given basic practices of these skills with the safety aspects required for the same. The course of Civil Engineering Workshop Practices would facilitate the development of basic skills a Diploma holder is expected to posses. He/she should be able to supervise construction activities like brick masonry, woodwork, concerting, welding, finishing etc. including quality control and maintenances of safety to self, coworkers and the constructed components of the building. The students are advised to practice each of the experiences with an understanding of necessary technical aspects and safety precautions needed to be observed.

2. EXPECTED PROFICIENCY

Perform basic task and follow safety norms for handling materials, tools and equipments required for each construction activity

3. COURSE OUTCOMES (COs)

Students will be able to

1. Identify various component parts of the structure.
2. Perform various basic activities related to building construction.
3. Identify various tools and equipment required to perform the task.
4. Hands-on tools and equipment with safety norms.
5. Study technical aspects and safety precautions.

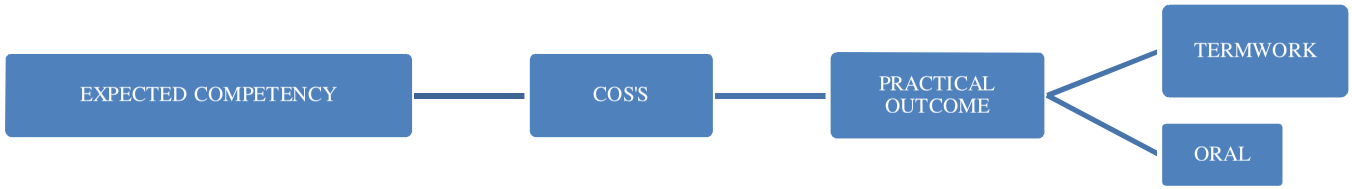
COURSE NAME	Civil Engineering Workshop & Practice	COURSE CODE	R18CE3104

4. CO –PO MATRIX

Course Name: Civil Engineering workshop & Practice Course Code: R18CE3104	PO 1 Basic and Discipline Specific knowledge	PO 2 Problem Analysis	PO 3 Design or Development of Solutions	PO 4 Engineering Tools, Experimentation and Testing	PO 5 Engineering Practices for Society, sustainability and Environment	PO 6 Project Management	PO 7 Life-Long Learning	PSO 1 Construction planning and detailing	PSO 2 Construction execution, supervision and maintenance
CO1	1	1							
CO2	1			2		3	1		2
CO3	1			3			1		1
CO4	1			1			2		1
CO5	1				3	1			1
CO6	1	1							

Rating scale '**3**' for high, '**2**' for medium, '**1**' for low '**0**' for no correlation

5. COURSE MAP



6. PRACTICAL –ASSIGNMENTS-STUDENT ACTIVITIES- (Separate table for each)

S. No.	Practical	Hours Allotted	Mapped CO
1	Dry bonding –Box Pillar, English Bond and Flemish Bond	04	CO1,CO2
2	Checking line, level and plumb with various tools.	04	CO1,CO2
3	Preparing Concrete (M10 or M15), cement mortar, paint.	04	CO2
4	Study of different hand tools and equipment used on site for performing various task.	02	CO3,CO4
5	Performing reinforcement cutting, bending and fitting for various framed components.	04	CO4
6	Demonstration of tiling/plastering/pointing/painting.	04	CO2
7	Study of various house water supply and drainage fixtures.	02	CO1
8	Identify recent material rates through market survey.	02	CO5
9	Collect item rate and labour rate of various construction activity through actual site visit.	02	CO2
10	Preparing site visit report on minimum five construction items.	04	CO5
--	**Total**	**32**	--

7. EVALUATION SCHEME FOR PRACTICAL / ASSIGNMENTS / STUDENT ACTIVITIES

Rubrics for Practicals

Category	4	3	2	1
Experimental procedure & handling of the instruments	Follows procedure as instructed and safe & correct handling of the instruments	Little oversight towards procedure, safety & handling of the instruments	Considerable oversight towards procedure, safety and handling of the instruments	Careless about the procedure safety & handling of the instruments.
Data documentation, data analysis & results interpretation	Correct Documentation of all data, Correct calculations and Error in result worked out correctly is within the limit	Correct documentation of majority of data, Minor errors in calculations and Error in results worked out correctly is not within the limit	Incorrect documentation of majority of data, Major errors in calculations and Error in result Worked out incorrectly.	Incomplete & wrong documentation of data, Incomplete & wrong calculations and Error in result not worked out.
Team spirit	Contributes a fair share to work	Sometimes depends on others to	Many times depends on others	Always depends on

Category	4	3	2	1
		complete the work	to complete the work	others to complete the work
Timely completion of activity	Maximum	Moderate	Satisfactory	Least
Overall understanding	Maximum	Moderate	Satisfactory	Least

Rubricks for Orals

Category	4	3	2	1
Delivery	Relaxed, Self confident, show natural body movement	Demonstrate quick recovery from minor mistake	Self conscious and monotone voice	Poorly performed
Understanding	Clear complete and concise	Mostly clear and little concise	Unclear	Incompletes and not concise
Vocabulary	Wide range of vocabulary and there is no repetition.	Quite Wide range of vocabulary and there is not lot of repetition	Some new vocabulary and few new expression	Student tends to repeat words all the time.
Presentation	Orderly and effectively	Orderly and little effectively	orderly	Not orderly
Body Language	Keep eye contact and no nervous expressions	Keep eye contact and few nervous expressions	Do not keep eye contact and few nerves expressions	Do not Keep eye contact and total nervous expressions

8. EVALUATION SCHEME FOR PRACTICAL / ASSIGNMENTS / STUDENT ACTIVITIES

- **BOOKS**

Sr. No	Title	Author	Publication
1	The Practical design of Structural Elements in Tim.	Bull, J.W	Gower Press, 1989
2	PWD - Standard Data Book for Building Work	PWD	PWD, Govt. of Maharashtra, Mumbai.
3	CP WD work manual	CPWD	CPWD , New Delhi
4	District Scheduled of Rates	PWD	PWD, Govt. of Maharashtra, Mumbai.
5	A to Z of Practical Building Construction & its Management	Sandeep Mantri	Satya Prakashan, New Delhi.

- **WEBSITES**

Sr. No.	Address
1	http://www.maharashtra.gov.in/
2	cpwd.gov.in/
3	www.mahapwd.com/
4	http://www.iamcivilengineer.com/ -building-design

9. COURSE CURRICULUM DEVELOPMENT MEMBERS

S. No.	Name and Designation	Contact No.	Email
1	Prof. R. S. Kengale	9881293044	rskengale@rediffmail.com

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE -1

Diploma Programme	CIVIL		
Course Name	Surveying - I	Course code	R18CE3105
Course Category	Core	Credits	7

COURSE TEACHING, ASSESSMENT AND EVALUATION SCHEME

Teaching scheme		Evaluation scheme									
		Direct assessment - Weightage - 80%									
		Theory outcome		Practical outcome							Total
				TERMWORK					PRACTICAL	ORAL	
Theory Allotted Hrs	Practical Allotted Hrs	ESE marks	TTA marks	TW marks	SW marks	AS marks	TU Marks	Total	Practical Marks	OR marks	Total Marks
3	4	80	20	25	25	-	-	50	25	-	175
		Indirect assessment – Weightage - 20%									
		Mid semester students feedback							End of the course survey		

End Semester Examination - ESE, Two Tests Average - TTA, Term Work - TW, Student Activity- SW, Assignments – AS, Tutorials - TU, Oral - OR

1. RATIONALE

One of the main concerns of civil engineering diploma pass out is land survey work required to be carried out for many civil engineering works either in their stage of planning or execution. Through this course it is intended to accustom the students about the principles, concepts, facts, & procedures in Surveying. With this knowledge & Skills, he will be able to select & use appropriate techniques & instruments to establish controls, locate details, measure distances & directions, reduce positions; distances; areas, maintain the survey instruments and prepare various types of survey drawings. These drawings are used in decision making in planning, designing, estimation and execution.

2. EXPECTED PROFICIENCY

Carry out surveys for civil engineering works

3. COURSE OUTCOMES (COs)

After completing this course students will be able to

1. Select the type of survey for given situation.
2. Carry out survey to locate details over a property/estate & find out its area.
3. Prepare plans by plane table surveying
4. Conduct tape and compass survey.
5. Select and use levelling instrument appropriate to the situation.
6. Determine difference in elevations between the ground points.

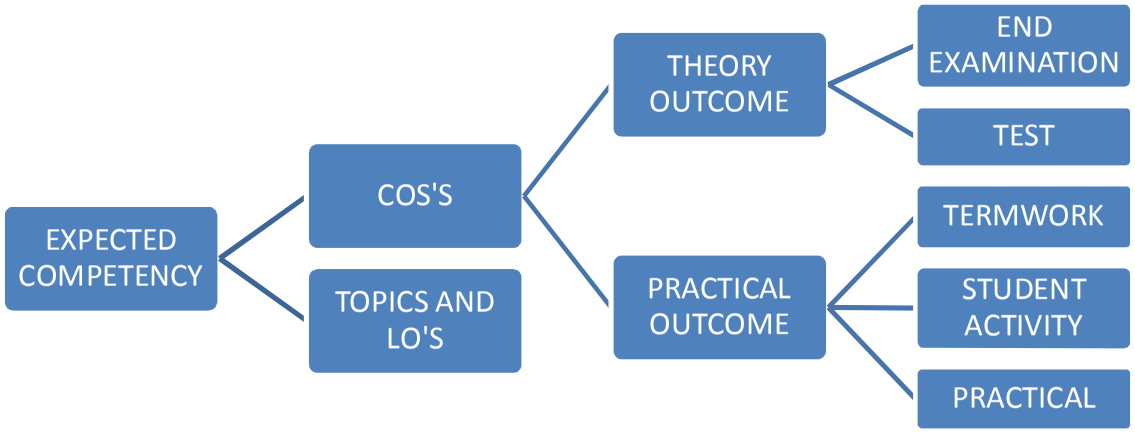
COURSE NAME	Surveying - I	COURSE CODE	R18CE3105

4. CO –PO MATRIX

Course Name: Surveying – I Course Code: R18CE3105	PO 1 Basic and Discipline Specific knowledge	PO 2 Problem Analysis	PO 3 Design or Development of Solutions	PO 4 Engineering Tools, Experimentation and Testing	PO 5 Engineering Practices for Society, sustainability and Environment	PO 6 Project Management	PO 7 Life-Long Learning	PSO 1 Construction planning and detailing	PSO 2 Construction execution, supervision and maintenance
CO1	3			2			1		
CO2	2	2		3		1			
CO3	1	1		3		1	1		
CO4	2	2		3		1	1		
CO5	3			2			1		
CO6	**1**	1		2		1	1	1	

Rating scale'**3'** for high, '**2**' for medium, **'1'** for low **'0'** for no correlation

5. COURSE MAP



COURSE NAME	Surveying - I	COURSE CODE	R18CE3105

6. DETAILED COURSE CONTENTS

Sr. No.	Unit Title Unit Outcomes (UOs)	Topics and Sub-topics	Marks	Hours	Mapped CO
1	**Introduction to Surveying & Linear Measures** 1.1 Define surveying and state objectives of surveying. 1.2 Classify the surveying on different basis. 1.3 Use appropriate survey station and line. 1.4 List uses of surveying. 1.5 Explain the principles of surveying. 1.6 Illustrate duties of a surveyor. 1.7 Select linear measures appropriate to the situation.	1.1 Definition & objectives of surveying, Map & Plan, Units for distances. Primary & secondary classification of surveying. Traversing – Concept, types & applications. 1.2 Topographical, Cadastral, City & Engineering surveys. Principles of Surveying. Duties of a surveyor. Survey stations & lines. Fixing of survey stations. Uses of surveying. 1.3 Linear Measures: Instrument for marking of stations – Pegs, arrows & ranging rods. Instruments for measurement of distances - chains (only introduction), tapes, EDM.	12	7	CO1
2	**Survey with linear measures** 2.1 Select the method of ranging. 2.2 Carry out chaining on flat & sloping ground 2.3 List and avoid/minimize mistakes/errors in survey with linear measures. 2.4 Check the survey with linear measure for accuracy to the extent of error admissible. 2.5 Calculate and apply the corrections in measurement of distances. 2.6 Suggest method of offsetting. 2.7 Compute area of field by tape and cross staff survey.	2.1 Principle of survey with linear measure. Ranging: Definition, types of ranging, optical & LASER rangers. 2.2 Chaining on flat & sloping ground. Obstacles in chaining. Errors & mistakes in chaining. Degree of accuracy in chaining. 2.3 Correcting distances, areas & volumes for incorrect linear measures. Tape surveying. 2.4 Definition & types of Offsets. Offsetting instruments - open cross staff, optical & LASER squares. Numbers of offset. Tape & cross staff survey. Units for areas.	16	10	CO2
3	**Plane table Survey** 3.1 State the use of accessories with a plane table. 3.2 Carry out temporary adjustments of a plane table. 3.3 Describe methods of plane tabling. 3.4 Select scale of plotting for survey drawing. 3.5 Prepare plan of property/estate using a plane table. 3.6 List the errors in plane table surveying. 3.7 Draw the conventional symbols on survey drawings.	3.1 Plane table & the outfit. Telescopic & EDM alidade. Temporary adjustments of a plane table. Orientation – concept, importance & types. 3.2 Methods of Plane table survey: radiation, intersection, traversing & resection. Plain Scales. Conventional symbols. 3.3 Merits & demerits of plane tabling. Errors & degree of accuracy. Records pertaining to land & solving a tippan.	12	7	CO3

COURSE NAME	Surveying - I	COURSE CODE	R18CE3105

Sr. No.	Unit Title Unit Outcomes (UOs)	Topics and Sub-topics	Marks	Hours	Mapped CO
4	**Compass survey** 4.1 State types of bearings and meridians. 4.2 Use prismatic compass to measure fore and back magnetic bearings of the lines. 4.3 Convert whole circle bearings in to reduced bearings and vice a versa. 4.4 Calculate traverse angles from the bearings. 4.5 Compute bearings free of error due to local attraction and declination. 4.6 List the errors, precautions and degree of accuracy in compass surveying. 4.7 Prepare a plan of an area from data collected in its compass traverse survey.	4.1 Introduction. Systems of angle measurement. Concept of direct & deflection angles and bearing. Meridian & its types. Fore & back bearing. 4.2 Systems of bearing designation. Reducing angles from whole circle bearings. Angular error of closure. Construction & use of prismatic compass. 4.3 Concept, causes, effects of local attraction. Precautions to avoid local attraction. Correcting whole circle bearings for local attraction. 4.4 Dip of needle. Concept of & referring for declination. Errors, precautions & degree of accuracy in compass surveying. Plotting of a compass traverse.	16	10	CO4
5	**Leveling I** 5.1 Define the terms used in leveling. 5.2 Explain the bench mark and its types. 5.3 Describe construction and functioning of a level. 5.4 Read a levelling staff. 5.5 Carry out temporary adjustments of a level. 5.6 List principal axes of a level and write conditions of permanent adjustments of a level. 5.7 Carry out simple and compound levelling.	5.1 Basic definitions: leveling, level line, horizontal line, vertical line, datum. Bench mark & its types. Construction & temporary adjustments of Dumpy & tilting level. 5.2 Introduction to auto level, precision level, LASER level, DIGITAL level. Leveling staves: Types, graduation & reading. 5.3 Principal axes of a level & inter relations between them. Principal methods of levelling – simple and compound.	12	7	CO5
6	**Leveling II** 6.1 Draw a page of level field book and record level survey readings in it. 6.2 Determine the elevation of ground point by collimation plane method or rise and fall method. 6.3 Differentiate fly levelling, check levelling and double check levelling. 6.4 Carry out profile levelling and cross section levelling and plot results of it.	6.1 Recording the levelling work in a field book. Methods of reducing levels. Arithmetical checks. 6.2 Other methods of leveling: Fly levelling, check levelling, double check levelling, profile & cross section levelling. 6.3 Field precautions. Levelling difficulties. Common mistakes & errors in leveling. Permissible errors of closure.	12	7	CO6

COURSE NAME	Surveying - I	COURSE CODE	R18CE3105

Sr. No.	Unit Title Unit Outcomes (UOs)	Topics and Sub-topics	Marks	Hours	Mapped CO
	6.5 Explain the field precautions in levelling. 6.6 Describe difficulties in levelling. 6.7 List the errors, mistakes and permissible errors in levelling.				

7. PRACTICAL – ASSIGNMENTS - STUDENT ACTIVITIES - TUTORIALS

Sr. No	Practical (Student should perform all of following practicals)	Unit No.	Hours Allotted	Mapped CO
1	Study of Chaining instruments: tapes (Metallic, plastic & steel), arrows & ranging rods.	1	2	CO1
2	Study of Electronic Distance meter.	1	2	CO1
3	Ranging with eye & line ranger, chaining & recording.	2	2	CO2
4	A. Offsetting by swinging tape, open cross staff & laser Square Method. B. Recording chaining offsetting data on pages of a field book along with location sketches for terminal stations of the survey line.	2	2	CO2
5	A. Tape & cross staff survey to find area of small plot B. Drawing location sketches for terminal stations of the base line drawing key plan for work area.	2	4	CO2
6	Study of outfit of a plane table & method of radiation.	3	2	CO3
7	Plane table surveying: Method of inter section.	3	2	CO3
8	Study of Prismatic compass. Finding fore & back bearings of sides of a triangular traverse & checking for local attraction.	4	2	CO4
9	Finding fore & back bearings of sides of a quadrilateral traverse & applying correction for local attraction.	4	2	CO4
10	A. Tape & compass traverse survey of small area, not requiring more than four control stations. B. Recording running measurements of the structures within the traverse along with location sketches for main traverse stations and key plan for work area. The said traverse shall be plotted on A3 size paper & if required shall be corrected for closing error by Bowditch's graphical method.	4	4	CO4
11	A. Study of internal or external focusing Dumpy level & levelling staves.	5	2	CO5
12	Simple leveling.	5	2	CO5
13	A. Study of Tilting/Auto level. B. Compound & fly leveling. C. Reduction of levels by HI method.	6	2	CO6
14	A. Study of Laser/digital level. B. Flying levels by double Check method. C. Reduction of levels by rise & fall method.	6	2	CO6
--	**Total**	**-**	**32**	**-**

Sr. No.	Student Activity	Unit No.	Hours Allotted	Mapped CO
1.	Expert's lecture on current land survey practices or records pertaining to land. Report on it shall be prepared & submitted along with term work.	1	2	CO1
2.	Mini Project I: Detailing Survey of a small property or an Institutional campus by plane table traversing with minimum four control stations.	3	6	CO3
3.	Drawing for Mini Project I: Plotting on an A1 size drawing sheet plan of small property or Institutional campus surveyed by plane table traversing under min project I above.	3	4	CO3

Sr. No.	Student Activity	Unit No.	Hours Allotted	Mapped CO
4.	Technical Visit to State Land Record Department's Museum or Planetarium. Report on it shall be prepared & submitted along with term work.	4	2	CO4
5.	Visiting a shop/office of survey instrument manufacturer/supplier or browsing on inter-net & collecting/downloading brochures for auto level or laser level or digital level & submitting it along with term work.	5	2	CO5
6.	Mini Project II: Profile levelling & Cross sectioning - Running a profile for a length of about 200m with cross sections at every 20m interval. The width of cross section shall be 20m on either side. Spot levels shall be collected at 10m intervals along profile as well along the cross sections.	6	8	CO6
7.	Drawing for Mini Project II: Plotting on an A1 size drawing sheet, the ground profile & cross sections with help of data collected on field under mini project II above.	6	6	CO6
--	**Total**	**--**	**30**	**--**

Sr. No.	Practical	Topic No.	Hours Allotted	Mapped CO
--	**Practical –assignments-student activities submission**	**-**	**2**	**-**
--	**Total**	**-**	**64**	**-**

Instructions:

1. Practical will be carried out in groups of students.
2. Each group will consist of about five students.
3. Each student from the group shall be given chance to handle the instrument, to understand the function of different components & use of the instrument.
4. Drawing, plotting should be considered as part of practicals.

Remarks:

1. The list of practicals/tutorials/student activities given above is suggestive. One or more such practicals/tutorials/student activities can be replaced with another or modified to attain the expected outcomes and proficiency more effectively.
2. The practicals/assignments/student activities should be so designed that students acquires outcomes in all domains - cognitive, psychomotor and affective.
3. Even though mainly outcomes in psychomotor domain are listed under practicals/assignments/student activities, it will also lead to development of outcomes in affective domain also.
4. The affective domain outcomes (social skills & attitudes) those will be developed through practicals/assignments/student activities includes – practice good housekeeping, maintain instruments & tools, demonstrate working as a team member & a leader and follow safety & ethical practices.
5. Acquisition of outcomes such as valuing, organizing and characterizing under affective domain will take place in the student gradually over three years of diploma program.
6. The skills associated with each of the practical/assignment/student activity are to be assessed using the 'Rubrics' given under 'Evaluation Scheme for Practicals/Assignments/Student Activities'.

8. EVALUATION SCHEME FOR PRACTICAL / ASSIGNMENTS / STUDENT ACTIVITIES

Rubrics for Practicals & Practical Examination

Category	4	3	2	1
Experimental procedure & handling of the instruments	Follows procedure as instructed and safe & correct handling of the instruments	Little oversight towards procedure, safety & handling of the instruments	Considerable oversight towards procedure, safety and handling of the instruments	Careless about the procedure safety & handling of the instruments.
Data documentation, data analysis & results interpretation	Correct Documentation of all data, Correct calculations and Error in result worked out correctly is within the limit	Correct documentation of majority of data, Minor errors in calculations and Error in results worked out correctly is not within the limit	Incorrect documentation of majority of data, Major errors in calculations and Error in result Worked out incorrectly.	Incomplete & wrong documentation of data, Incomplete & wrong calculations and Error in result not worked out.
Team spirit	Contributes a fair share to work	Sometimes depends on others to complete the work	Many times depends on others to complete the work	Always depends on others to complete the work
Timely completion of activity	Maximum	Moderate	Satisfactory	Least
Overall understanding	Maximum	Moderate	Satisfactory	Least

Rubrics for Student Activities

Category	4	3	2	1
Leadership qualities	Assume the role willingly & demonstrate ability fully	Assume the role willingly but demonstrate ability partly	Assume the role unwillingly though demonstrate ability fully	Assume the role unwillingly & demonstrate ability partly
Planning & Execution	Proper planning & execution	Proper planning but improper execution	Improper planning but proper execution	Improper planning & execution
Quality of report, graphics and presentation.	Clear description with all supporting details, relevant & neat graphics and well structure presentation.	Clear description with some supporting details, relevant but messy graphics. and structured presentation.	Clear description with no supporting details, neat but irrelevant graphics and structured presentation with missing links.	Irrelevant description, irrelevant & messy graphics and unstructured presentation.
Timely completion	Maximum	Moderate	Satisfactory	Least
Overall understanding	Maximum	Moderate	Satisfactory	Least

9. MAJOR EQUIPMENT/ INSTRUMENTS /TOOLS REQUIRED

Sr. No.	Equipment Name with Specifications	Practical
1	Metallic and plastic tapes as per IS: 1269 – Part I - 1997 and steel tapes as per IS: 1269 – Part II - 1997.	1 – 7 & 10
2	Ranging rods as per IS: 228 - 1963	1 & 2 - 10
3	Electronic Distance Meter as per IS: 12888 – 1989 or as per ISO 16331 – 1 or equivalent	2
4	Line Ranger	3
5	Optical square as per IS: 7009 -1973	4
6	Open Cross Staff	4
7	Plane table as per IS 2539 – 1963 along with all essential accessories such as Spirit level (IS: 5706 – 1993), U fork, Trough compass (IS:1764 – 1961), alidade etc. complete.	6 & 7
8	Prismatic Compass as per IS: 1957 – 1961.	8, 9 & 10
9	Tertiary (Dumpy) Level as per IS: 9607 – 1989.	11 & 12
10	Secondary (Tilting Level) as per IS: 4590 - 1980	13
11	Auto Level	13
12	Laser Level as per ISO:11145 – 1994.	14
13	Digital Level	14
14	Levelling staves as per IS: 1779 -1961 (Folding Type) or IS: 11961 – 1986 (Telescopic Type).	11 to 14

10. SPECIFICATION TABLE FORQUESTION PAPER DESIGN

Unit No.	Unit Title	Mapped CO% OR Emphasis	Distribution of Marks			
			Cognitive level			Total Marks
			Remember	Understand	Apply	
I	Introduction to Surveying & Linear Measures	CO1	4	4	4	12
II	Survey with linear measures	CO2	4	4	8	16
III	Plane table survey	CO3	4	4	4	12
IV	Compass survey	CO4	4	4	8	16
V	Leveling I	CO5	4	4	4	12
VI	Leveling II	CO6	4	4	4	12
Total			**24**	**24**	**32**	**80**

Note: *This specification table shall be used as general guide lines to assist students for learning and to assist teachers for teaching and assessment. The actual distribution of marks in the question paper may vary from the above table.*

11. SAMPLE MODEL QUESTION BANK FOR THEORY AND TEST EXAMINATIONS

Sr. No.	Unit	Mapped CO	Cognitive level R/U/A	Question
1	3	CO3	R	List the accessories required in plane table surveying and state use of each of them.
2	3	CO3	U	Explain in brief the temporary adjustments of a plane table.

Sr. No.	Unit	Mapped CO	Cognitive level R/U/A	Question
3	3	CO3	A	A plane table is to be set up at a station O from which two control station A & B are visible. The plotted positions of A & B on drawing are 'a' and 'b' Describe how you would plot position of O.

12. MODEL QUESTION BANK FOR PRACTICAL EXAMINATIONS

Sr. No	Unit	Mapped CO	Cognitive level R/U/A	Question
1	3	CO3	A	Use plane table at station E. Without shifting the table or paper determine the horizontal distance between the ranging rods HA and HB. You can measure the distance to the said ranging rods from your table station but don't measure the asked distance directly.
2	4	CO4	A	Use Prismatic Compass at station P. Measure the bearing of the lines PA and PB. Calculate, either a) Interiorly included angle between them or b) Reduced bearings of them or c) True bearings of them, if declination is 57'' W ----- (Only one)
3	6	CO6	A	Identify leveling instrument at station H. Take staff readings at stations K and M find out – a) Difference in elevations between the said staff stations or b) RL of station M, if RL of station K is 560.000m or c) Rise or fall from K to station M ----- (Only one).

13. LEARNING RESOURCES

- **BOOKS**

Sr. No.	Title of Book	Author	Publication
1	Surveying &Levelling, Vol. I	Kanetkar & Kulkarni	PVG, Pune. ISBN 978 81 858-2511-3
2	Surveying, Vol .I.	Dr. B. C. Punmia, Ashok Jain, Arun Jain.	Laxmi Publications, Delhi ISBN 8-17-008853-4
3	Text book of Surveying	Hussain &Nagraj,S.	S. Chand & Co., Delhi. ISBN 81-219-0021-2
4	Text book of Surveying,	C. L. Kochher,	DhanpatRai.Publishing Co., Delhi ISBN: 9789352165209
5	Surveying, Vol. I	Dr. K. R. Arora	Standard Book house, Delhi. ISBN : 978-81-89401-23-8
6	Fundamentals of Surveying	S. K. Roy	Prentice Hall of India, Delhi. ISBN: 81-203-1260-0
7	Surveying,	Narinder Singh,	The Tata McGraw Hill Co., Delhi. ISBN, 0074519131, 9780074519134
8	Surveying, Vol. I	S. K. Duggal	The Tata McGraw Hill Co., Delhi. ISBN 978-00-701-5137-6
9	Surveying &Levelling	N. N. Basak	The Tata McGraw Hill Co., Delhi. ISBN 0-07-460399-X

Sr. No.	Title of Book	Author	Publication
10	Elementary Surveying	R. C. Brinker & P. R.Wolf.	Longman Higher Education ISBN: 9780060410131, 0060410132
11	Surveying	A. Bannister, S. Raymond & R. Baker	Pearson Education, Delhi. ISBN 81-317-0066-6
12	Plane Surveying	Alka De	S. Chand & Co., Delhi. ISBN 81-219-1780-8
13	Surveying	Shelar, Mali, Patil	Nirali Prakashan, Pune ISBN 978-93-83073-94-8

- **INDIAN STANDARDS**

Sr. No.	Number & Title
1	IS 1492 : 1970 Metric surveying Chains
2	IS 1842: 1961 Surveying Chain Pins Arrows
3	IS 12874: 1989 Optical & mathematical instruments – Telescopic Alidade
4	IS 9613: 1980 Primary Level (Precision level for 1st order levelling)
5	IS 15483 (Part I):2004 Invar Levelling Staff
6	IS 8330: 2004 Tripods for surveying instruments – Fixed leg type
7	IS 15483 (Part II):2004 Tripods - Telescopic
8	IS 9849: 1991 Optics & optical instruments – Geodetic instruments - Vocabulary
9	IS 1481: 1970 Specification for Metric Steel Scales for Engineers
10	IS 10713: 1983/ISO 5455 : 1979 Scales for use in technical drawings
11	IS 1071 : 1983/ISO 128 : 1982 General principles of presentation on technical drawings

- **WEBSITES**

Sr. No.	ADDRESS
1	www.wikipedia.com
2	www.surveying.otago
3	www.amerisurv.com
4	www.thecivilegineer.net
5	www.surveyofindia.gov.in
6	www.mahabhulekh.maharashtra.gov.in

14. COURSE CURRICULUM DEVELOPMENT MEMBERS

Sr. No.	Name and Designation	Contact No.	Email
1	Prof. A. S. Shelar	9423558189	ani_shel@yahoo.com

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE -1

Diploma Programme	CIVIL		
Course Name	Surveying-II	Course Code	R18CE3106
Course Category	Core	Credits	7

COURSE TEACHING, ASSESSMENT AND EVALUATION SCHEME:

Teaching scheme		Evaluation scheme									
		Direct assessment - Weightage - 80%									
		Theory outcome		Practical outcome							Total
				TERMWORK					PRACTICAL	ORAL	
Theory Allotted Hrs	Practical Allotted Hrs	ESE marks	TTA marks	TW marks	SW marks	AS marks	TU Marks	Total	Practical Marks	OR marks	Total marks
3	4	80	20	25	25	-	-	50	25	-	175
		Indirect assessment – Weightage - 20%									
		Mid semester students feedback							End of the course survey		

End Semester Examination - ESE, Two Tests Average - TTA, Term Work - TW, Student Activity - SW, Assignments – AS, Tutorials- TU, Oral - OR

1. RATIONALE

Through this course in addition to the knowledge derived under course Surveying - I (R18CE3105), student will derive knowledge about some intermediate and modern methods of land surveying popularly used in practice. They will made aware of and rapid and precise digital surveying instruments such as electronic total station and planimeter and techniques such as Space Based Positioning Systems (SBPS), Remote Sensing (RS) and Geo graphic Information System (GIS) . Students will also be introduced to topographical maps prepared by Survey of India which are invariably required in planning & execution of civil engineering projects.

2. EXPECTED PROFICIENCY

Carry out Surveys for Civil Engineering works.

3. COURSE OUTCOMES (COs)

After completing this course students will be able to

1. Carry out contouring and read & interpret the toposheets.
2. Handle theodolites and use it as a tacheometer.
3. Establish control station and locate details with a theodolite.
4. Survey land with a total station.
5. Set out the curves.
6. Calculate area, volume and use modern survey techniques.

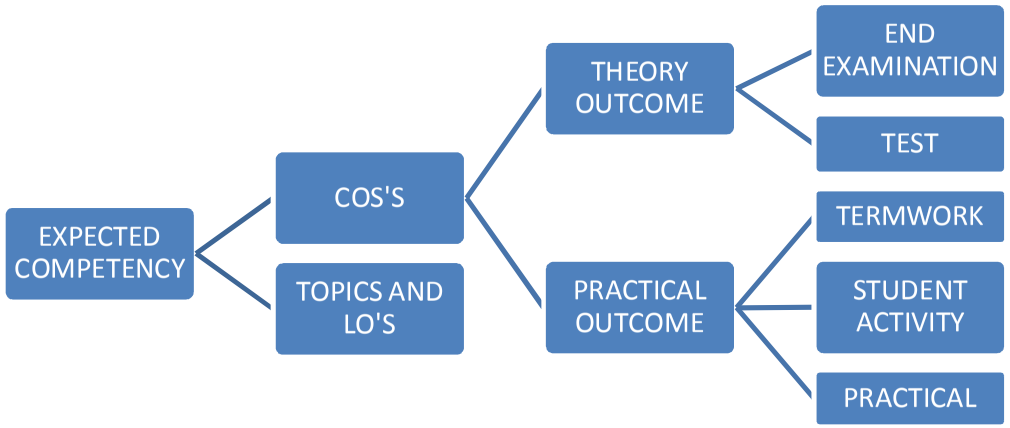
COURSE NAME	Surveying- II	COURSE CODE	R18CE3106

4. CO –PO MATRIX

Course Name: Surveying-II Course Code: R18CE3106	PO 1 Basic and Discipline Specific knowledge	PO 2 Problem Analysis	PO 3 Design or Development of Solutions	PO 4 Engineering Tools, Experimentation and Testing	PO 5 Engineering Practices for Society, sustainability and Environment	PO 6 Project Management	PO 7 Life-Long Learning	PSO 1 Construction planning and detailing	PSO 2 Construction execution, supervision and maintenance
CO1	3	1		2			1		
CO2	1	1		3		1			
CO3	2	1		3		1	1		
CO4	1			3		1	1		
CO5	2	1		1		1			
CO6	3	1		2		1	1	1	

Rating scale‘**3’** for high, ‘**2**’ for medium, **‘1’** for low **‘0’** for no correlation

5. COURSE MAP



COURSE NAME	Surveying- II	COURSE CODE	R18CE3106

6. DETAILED COURSE CONTENTS

Sr. No.	Unit Title Unit Outcomes (UOs)	Topics and Sub-topics	Marks	Hours	Mapped CO
1	**Contouring &Toposheets** 1a. Select contour interval for given work. 1b. State the of characteristics contour lines. 1c. Carry out contour survey for given terrain. 1d. Prepare contoured plans/maps. 1e. Describe layout of a toposheet. 1f. Use the information available on a toposheet. 1g. Draw sheet index for a toposheet	1.1 Definitions: contour, contour interval & horizontal equivalent. Factors deciding contour interval. Contour intervals for various works. Characteristics of contour lines. 1.2 Plotting of direct contours. Indirect methods of contouring. Interpolation of contours. 1.3 Grade contour. Locating grade contour on map & ground. Uses of contoured maps. 1.4 Toposheets: Introduction, Layout, Information available on it & Applications. Sheet numbering & index to sheet.	16	10	CO1
2	**Theodolite Surveying I** 2a. Suggest a type of a theodolite suitable to the work. 2b. State functions of components & screws of a theodolite. 2c. Explain interrelation between principal axes of a theodolite. 2d. Define technical terms related with a theodolite. 2e. Carry out temporary adjustment for a theodolite. 2f. Measure angles and bearings with a theodolite. 2g. Conduct a tacheometric survey.	2.1 Introduction to, uses & types of theodolites (including micro optic & electronic digital). Transit vernier theodolite: components, temporary adjustments, principal axes & their inter relation. 2.2 Technical terms: face left & right, swinging, plunging, & transiting. Measuring with theodolites – Magnetic bearing by loose needle method and horizontal & vertical angles. 2.3 Fixed Stadia tacheometry with vertical staff – Principle, instruments, procedure and use.	12	7	CO2
3	**Theodolite surveying II** 3a. Use theodolite for prolonging a line, lining in & setting out perpendicular. 3b. Conduct a theodolite traverse survey to establish control stations & to locate details over an area. 3c. Check the angular & linear measurements in theodolite traversing for error. 3d. Select a rule to correct consecutive co-ordinates. 3e. Carry out balancing of a theodolite traverse by Gale's method.	3.1 Other uses of theodolite: prolonging a line, lining in & setting out perpendicular. 3.2 Theodolite traversing: fieldwork, checks on measurements & balancing the traverse. Gales traverse table. 3.3 Plotting of traverse with independent coordinates. Errors & precisions in theodolite survey.	12	7	CO3

COURSE NAME	Surveying- II	COURSE CODE	R18CE3106

Sr. No.	Unit Title Unit Outcomes (UOs)	Topics and Sub-topics	Marks	Hours	Mapped CO
	3f. State sources of errors & limits of precision in theodolite survey. 3G. Prepare a plan of an area from data collected in its theodolite traverse survey.				
4	**Total Station Surveying** 4a. Identify type of a total station. 4b. State features of a total station. 4c. Determine constant for a prism reflector. 4d. Use total station for measurement of angles. 4e. Use total station for measurement of distances. 4f. Conduct traverse survey with a total station. 4G. Carry out exchange of data in between a total station & a computer.	4.1 Definition, necessity, construction, classification, merits, demerits and features of an Electronic Total Station (ETS). 4.2 The prism reflector, its constant & its determination. Common programs available onboard of an ETS. Uses of an ETS. Temporary adjustments of an ETS. 4.3 Measuring distances & angles with an ETS. Traverse survey with an ETS. The transfer and the post processing softwares.	12	7	CO4
5	**Curve ranging** 5a. Suggest type of horizontal curve for an alignment of a route. 5b. Differentiate principal points, lines & angles of a circular curve. 5c. Calculate elements of a circular curve. 5d. Determine radius from a degree or vice versa. 5e. Define peg interval, unit chord & sub-chord. 5f. Set out a horizontal curve by method of offset from long chord and method deflection angle. 5G. Distinguish between summit & valley curve.	5.1 Definition & Necessity of curves. Types of horizontal curves. Principal points, lines & angles of a circular curve. Elements of a simple circular curve. 5.2 Nomenclature for circular curve. Relation between radius & degree of a curve. Chainages of tangent point. Peg interval. Concept of unit chord & sub-chord. Length of sub-chord & number of unit chords. 5.3 Setting out simple circular curves: By method of offset from long chord & Rankine's method of deflection angles. Vertical curves: concept and types.	12	7	CO5
6	**Area & Volume Measurement and Advanced Survey Techniques** 6a. Determine area of a figure with a planimeter. 6b. Calculate volumes by trapezoidal & prismoidal formulae. 6C. State the principle of SBPS & RS. 6d. Determine the position of a survey station with SBPS.	6.1 Mechanical & electronic digital Planimeters – Principle, construction & use. 6.2 Computation of volume by Trapezoidal and Prismoidal formulae. Prismoidal correction. 6.3 Space Based Positioning System (SBPS): Introduction, principle, segments & receivers. SBPS in action. Absolute & relative positioning. SBPS Co-ordinates & heights. Errors in	16	10	CO6

COURSE NAME	**Surveying- II**	COURSE CODE	**R18CE3106**

Sr. No.	**Unit Title** **Unit Outcomes (UOs)**	**Topics and Sub-topics**	**Marks**	**Hours**	**Mapped CO**
	6e. Describe the process of visual interpretation of a RS image. 6f. Explain the components & functions of GIS. 6G. List uses of RS, SBPS & GIS in surveying.	SBPS. Accuracy, advantages & uses of SBPS. 6.4 Remote sensing (RS): Introduction, definition, principle & necessity. Active & passive RS. Components of a RS system. RS data products. Image interpretation. Advantages, limitations & applications of RS. Introduction to GIS.			

7. PRACTICAL – ASSIGNMENTS - STUDENT ACTIVITIES - TUTORIALS

Sr. No.	Practical	Unit No.	Hours Allotted	Mapped CO
1.	Direct contouring using plane table & telescopic alidade.	1	2	CO1
2.	A. Study of vernier transit theodolite, its principal axes and important terms such as face left, face right, transiting, swinging & plunging. B. Temporary adjustments of vernier transit theodolite. C. Determining least count & learning to read the vernier.	2	4	CO2
3.	Measurement of horizontal angle with a theodolite by method of repetition.	2	2	CO2
4.	Measurement of vertical angles using a theodolite.	2	2	CO2
5.	Measurement of horizontal & vertical distances & calculations of R. L. using principle of tacheometry.	2	4	CO2
6.	Study & use of electronic digital total station.	4	2	CO4
7.	Traverse survey with electronic digital total station (For a small 3 sided traverse, locate two details from each traverse station.	4	4	CO4
8.	Down loading data collected with a total station in traverse survey & preparing plan from it using drafting software.	4	2	CO4
9.	Curve ranging by linear method of offset from long chord.	5	2	CO5
10.	Curve ranging by angular method with a micro optic or digital theodolite.	5	2	CO5
11.	Finding out area of irregular figures using mechanical & electronic digital planimeters.	6	2	CO6
12.	Reducing coordinate of the stations with a SBPS.	6	2	CO6
-	**Total**	**--**	**30**	**--**

Sr. No.	Student activity	Unit No.	Hours Allotted	Mapped CO
1.	Technical visit to Survey of India or Survey Section of CME or Professional Surveyor's office in connection with preparation &/or use toposheets. Report on it shall be prepared & submitted along with term work.	1	2	CO1
2.	Mini Project I: Detailing Survey of a small property or an Institutional campus by theodolite traversing with minimum four control stations.	3	8	CO3
3.	Drawing for Mini Project I: Plotting on an A1 size drawing sheet plan of small property or Institutional campus surveyed by theodolite traversing under project I above.	3	4	CO3
4.	Mini Project II: Contour survey of a small field about 2ha in area by method of radial lines & concentric circles. Establish three horizontal control stations, about 120m apart, over the field of survey by closed total station (or theodolite) traversing. Transfer vertical control i.e. elevation from nearby bench mark to each of the control station by a digital (or opto-mechanical) theodolite used as tacheometer. Locate at least six spot levels, by a total station (or tacheometer), at about 10m intervals along every ray out of 12 rays radiating at an angular interval of about 30° from each of the control station.	4	8	CO4
5.	Drawing for Mini Project II: The control stations & the level spots shall be plotted to their correct relative geographical	4	6	CO4

Sr. No.	Student activity	Unit No.	Hours Allotted	Mapped CO
	positions on an A1 size drawing sheet. Elevation shall be written against every level spot. Contours to be interpolated by approximate method at interval suitable to purpose of survey, topography, scale of plotting etc.			
6.	Visiting a shop/office of survey instrument manufacturer/supplier or browsing on inter-net & collecting/downloading brochures for robotic electronic total station & submitting it along with term work.	4	2	CO4
7.	Going through an article published on advanced survey techniques like SBPS or RS or GIS published in any national/international magazine journal related with construction/surveying & preparing & submitting brief extracts of it. (Such magazines/journals are also available on internet)	6	2	CO6
-	**Total**	**-**	**32**	**-**

Sr. No.	Practical	Topic No.	Hours Allotted	Mapped CO
-	**Practical –Assignments-Student Activities Submission**	**-**	**2**	**-**
-	**Total**	**-**	**64**	**-**

Instructions:

1. Practical will be carried out in groups of students.
2. Each group will consist of about five students.
3. Each student from the group shall be given chance to handle the instrument, to understand the function of different components & use of the instrument.
4. Drawing, plotting should be considered as part of practicals.

Remarks:

1. The list of practicals/tutorials/student activities given above is suggestive. One or more such practicals/tutorials/student activities can be replaced with another or modified to attain the expected outcomes and proficiency more effectively.
2. The practicals/assignments/student activities should be so designed that students acquires outcomes in all domains - cognitive, psychomotor and affective.
3. Even though mainly outcomes in psychomotor domain are listed under practicals/assignments/student activities, it will also lead to development of outcomes in affective domain also.
4. The affective domain outcomes (social skills & attitudes) those will be developed through practicals/assignments/student activities includes – practice good housekeeping, maintain instruments & tools, demonstrate working as a team member & a leader and follow safety & ethical practices.
5. Acquisition of outcomes such as valuing, organizing and characterizing under affective domain will take place in the student gradually over three years of diploma program.
6. The skills associated with each of the practical/assignment/student activity are to be assessed using the 'Rubrics' given under 'Evaluation Scheme for Practicals/Assignments/Student Activities'.

8. EVALUATION SCHEME FOR PRACTICAL / ASSIGNMENTS / STUDENT ACTIVITIES

Rubrics for Practicals

Category	4	3	2	1
Experimental procedure & handling of the instruments	Follows procedure as instructed and safe & correct handling of the instruments	Little oversight towards procedure, safety & handling of the instruments	Considerable oversight towards procedure, safety and handling of the instruments	Careless about the procedure safety & handling of the instruments.
Data documentation, data analysis & results interpretation	Correct Documentation of all data, Correct calculations and Error in result worked out correctly is within the limit	Correct documentation of majority of data, Minor errors in calculations and Error in results worked out correctly is not within the limit	Incorrect documentation of majority of data, Major errors in calculations and Error in result Worked out incorrectly.	Incomplete & wrong documentation of data, Incomplete & wrong calculations and Error in result not worked out.
Team spirit	Contributes a fair share to work	Sometimes depends on others to complete the work	Many times depends on others to complete the work	Always depends on others to complete the work
Timely completion of activity	Maximum	Moderate	Satisfactory	Least
Overall understanding	Maximum	Moderate	Satisfactory	Least

Rubrics for Student Activities

Category	4	3	2	1
Leadership qualities	Assume the role willingly & demonstrate ability fully	Assume the role willingly but demonstrate ability partly	Assume the role unwillingly though demonstrate ability fully	Assume the role unwillingly & demonstrate ability partly
Planning & Execution	Proper planning & execution	Proper planning but improper execution	Improper planning but proper execution	Improper planning & execution
Quality of report, graphics and presentation.	Clear description with all supporting details, relevant & neat graphics and well structure presentation.	Clear description with some supporting details, relevant but messy graphics. and structured presentation.	Clear description with no supporting details, neat but irrelevant graphics and structured presentation with missing links.	Irrelevant description, irrelevant & messy graphics and unstructured presentation.
Timely completion	Maximum	Moderate	Satisfactory	Least
Overall understanding	Maximum	Moderate	Satisfactory	Least

9. MAJOR EQUIPMENT/ INSTRUMENTS /TOOLS REQUIRED

Sr. No.	Equipment Name with Specifications	Practical
1	Metallic and plastic tapes as per IS: 1269 – Part I - 1997 and steel tapes as per IS: 1269 – Part II - 1997.	1, 9, 10
2	Plane table as per IS 2539 – 1963 along with all essential accessories such as Spirit level (IS: 5706 – 1993), U fork, Trough compass (IS:1764 – 1961), alidade etc. complete.	1
3	Levelling staves as per IS: 1779 -1961 (Folding Type) or IS: 11961 – 1986 (Telescopic Type).	1,5
4	Vernier Transit Theodolite as per IS 2988: 1955	2, 3, 4, 5
	Ranging rods as per IS: 228 - 1963	2, 3, 4
5	Electronic total station	6, 7, 8
6	Prism reflector for electronic total station	6, 7
7	Micro optic Theodolite	10
8	Digital Theodolite.	10
9	Mechanical planimeter as per IS 7543:1975	11
10	SBPS Receiver – SPS, Code based, Single frequency.	12

10. SPECIFICATION TABLE FORQUESTION PAPER DESIGN

Unit No.	Topic Title	Mapped CO % OR Emphasis	Distribution of Marks			
			Cognitive level			Total Marks
			Remember	Understand	Apply	
I	Contouring &Toposheets	CO1	4	4	8	16
II	Theodolite Surveying I	CO2	4	4	4	12
III	Theodolite Surveying II	CO3	4	4	4	12
IV	Total Station Surveying	CO4	4	4	4	12
V	Curve Ranging	CO5	4	4	4	12
VI	Area & Volume Measurement and Advanced Survey Techniques	CO6	4	4	8	16
Total		--	**24**	**24**	**32**	**80**

11. SAMPLE MODEL QUESTION BANK FOR THEORY AND TEST EXAMINATIONS

Sr. No.	Unit	Mapped CO	Cognitive level R/U/A	Question
1	4	CO4	R	Describe in brief construction of a total station instrument
2	4	CO4	U	Differentiate Distance Meter, Digital Theodolite & Total Station
3	4	CO4	A	Determine area of a pentagonal plot PQRST in Ha & AREs. Co-ordinates of the corner points are P(50E, 25N), Q(100E, 25N), R(115.45E, 72.55N), S(75E, 101.95N), T(34.55E, 72.55N)

12. MODEL QUESTION BANK FOR PRACTICAL EXAMINATIONS

Sr. No	Unit	Mapped CO	Cognitive level R/U/A	Question
1	1	CO1	A	Refer the plot of grid of spot levels provided herewith. Work out scale of plotting and interpolate by arithmetical method a contour of elevation 100m 101m 102m 103m 104m 105m
2	1	CO2	A	Use Theodolite at station P. Measure the angle APB. Take only one set of reading with each face. Tabulate the observations properly.
3	1	CO6	A	Use planimeter and determine area of Fig. No. 1 in Ha. Scale of plotting is 1: 10000.

13. LEARNING RESOURCES

- **BOOKS**

Sr. No.	Title of Book	Author	Publication
1.	Surveying & Levelling, Vol. I	Kanetkar & Kulkarni	PVG, Pune. ISBN 978 81 858-2511-3
2.	Surveying & Levelling, Vol. II	Kanetkar & Kulkarni	PVG, Pune. ISBN 13:97881 858-2500-7
3.	Surveying, Vol. I	Dr. B. C. Punmia, Ashok Jain, Arun Jain.	Laxmi Publications, Delhi ISBN 8-17-008853-4
4.	Surveying, Vol. II	Dr. B. C. Punmia, Ashok Jain, Arun Jain.	Laxmi Publications, Delhi ISBN-10: 8170088836; ISBN-13: 978-8170088837
5.	Text book of Surveying	Hussain & Nagraj,	Chand & Co., Delhi ISBN 81-219-0021-2
6.	Text book of Surveying,	C. L. Kochher	Dhanpat Rai Publishing Co., Delhi ISBN: 9789352165209
7.	Surveying, Vol. I	Dr. K. R. Arora	Standard Book house, Delhi. ISBN : 978-81-89401-23-8
8.	Surveying, Vol. II	Dr. K. R. Arora	Standard Book house, Delhi. ISBN:978-81-89401-24-5
9.	Fundamentals of Surveying	S. K. Roy	Prentice Hall of India, Delhi. ISBN 81-203-1260-0
10.	Surveying	Narinder Singh	The Tata McGraw Hill Co., Delhi ISBN, 0074519131, 9780074519134
11.	Surveying, Vol. I	S. K. Duggal	The Tata McGraw Hill Co., Delhi ISBN 10: 0070151377 ISBN 13: 9780070151376
12.	Surveying, Vol. II	S. K. Duggal	The Tata McGraw Hill Co., Delhi ISBN 13: 978-0-07-053471-1 ISBN 10: 0-07-053471-3
13.	Surveying & Levelling	N. N. Basak	The Tata McGraw Hill Co., Delhi ISBN 0-07-460399-X

Sr. No.	Title of Book	Author	Publication
14.	Elementary Surveying	R. C. Brinker & P. R.Wolf.	Longman Higher Education ISBN: 9780060410131, 0060410132
15	Surveying	A. Bannister, S. Raymond & R. Baker	Pearson Education, Delhi. ISBN 81-317-0066-6
16	Higher Surveying	Dr. A. M. Chandra	New Age International, Delhi. ISBN 10: 8122438121, ISBN 13: 9788122438123
17	Advanced Surveying	S. Gopi, R. Sathikumar & N. Madhu	Pearson Education, Delhi. ISBN 81-317-0067-4
18	Surveying	Shelar, Mali, Patil	Nirali Prakashan, Pune. ISBN 978-93-83073-94-8

- **SOFTWARE/ TOOLS/ MODELS**

Sr. No.	Name	Company	Freeware/commercial
1	Liscad – A software to post process data downloaded from electronic survey instrument like total station.	Leica Heerberg	Commercial.

- **WEBSITES**

Sr.No.	ADDRESS
1	www.iscmapping.com
2	www.webinfolist.com
3	www.surveyofindia.gov.in
4	www.mcnetboy.net
5	www.wikipedia.com

14. COURSE CURRICULUM DEVELOPMENT MEMBERS

Sr. No.	Name and Designation	Contact No.	Email
1	Prof. A. S. Shelar, Lecturer, Civil	9423558189	ani_shel@yahoo.com

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE -1

Diploma Programme	CIVIL		
Course Name	Hydraulics	Course code	R18CE3107
Course Category	Core	Credits	6

COURSE TEACHING, ASSESSMENT AND EVALUATION SCHEME:

Teaching scheme			Evaluation scheme									
			Direct assessment- Weightage - 80%									
			Theory outcome		Practical outcome							Total
					TERMWORK					PRACTICAL	ORAL	
Theory Allotted hrs	Practical Allotted hrs	Tutorials	ESE marks	TTA marks	TW marks	SW marks	AS marks	TU Marks	Total	Practical Marks	OR marks	Total marks
3	2	1	80	20	10	05	10	-	25	-	@25	150
			Indirect assessment- Weightage - 20%									
			End semester students feedback							End of the Program survey		

End semester examination-ESE, Two tests average-TTA, Term Work- TW, Student Activity-SW, Assignments –AS, Tutorials- TU, Oral –OR

1. RATIONALE

Understanding mechanics of water under static and dynamic condition plays a significant role in design and construction of hydraulic structures. The subject is intended to teach the students concepts, principles and procedures of Hydraulics which will enable him to apply this knowledge for planning, designing, supervising, executing and maintaining the Civil Engineering projects related to water supply & treatment, irrigation engineering ,bridge engineering.

2. EXPECTED PROFICIENCY

Apply principles of statics and dynamics of water to water retaining and distribution structures.

3. COURSE OUTCOMES (COs)

Students will be able to

a. Use hydraulic properties and fundamental laws of fluid at rest or in motion in analysis of pipe and channel flow.
b. Analyze the forces of fluid using fluid mechanics principles related to water supply and irrigation engineering.
c. Measure fluid flow properties using different flow measuring devices
d. Analyze a simple pipe required water supply network.
e. Design a simple hydraulic channel section.
f. Select hydraulic machines, hydropower plant and their components with respect to their functional attributes and use.

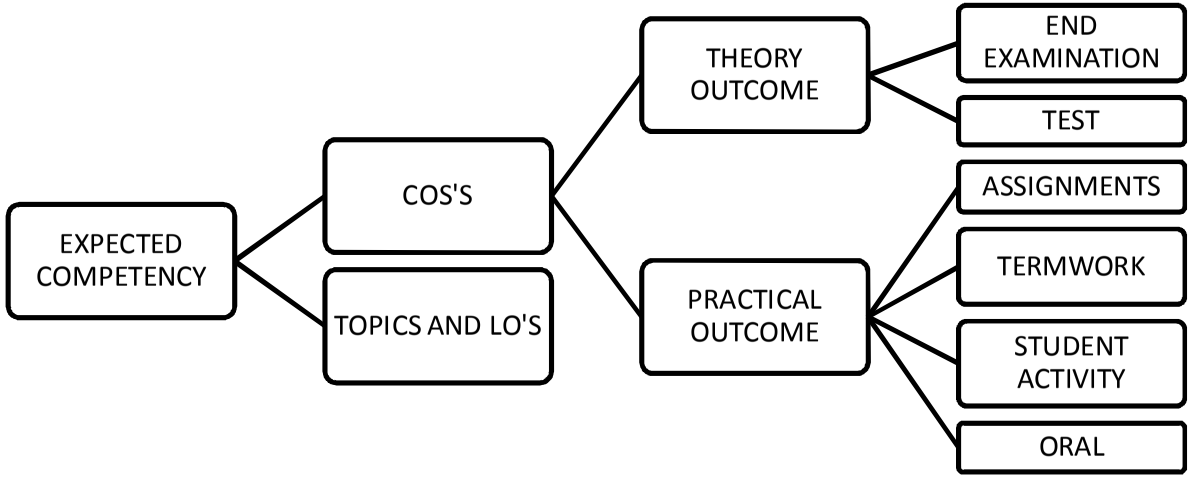
COURSE NAME	Hydraulics	COURSE CODE	R18CE3107

4. CO –PO MATRIX

Course Name: Hydraulics Course Code: R18CE3107	PO 1 Basic and Discipline specific knowledge	PO 2 Problem analysis	PO 3 Design/ development of solutions	PO 4 Engineering Tools, Experimentation and Testing	PO 5 Engineering practices for society, sustainability and environment	PO 6 Project Management	PO 7 Life-long learning	PSO 1 Construction planning and detailing	PSO 2 Construction execution, supervision and maintenance
CO1	1	3	1	**1**					
CO2	1	2	1	1					
CO3	1	2	1	1					
CO4	1	2	1	1					
CO5	1	2	1	1	1				
CO6	3	1			1				

Rating scale '**3'** for high, '2' for medium, **'1'** for low '0' for no correlation

5. COURSE MAP



COURSE NAME	Hydraulics	COURSE CODE	R18CE3107

6. DETAILED COURSE CONTENTS

S. No.	Unit Outcomes (UOs)	Topics and Sub-topics	Marks	Hours	Mapped CO
1	1a. Enumerate the importance of hydraulics in the given civil engineering application. 1b. Compute different properties of fluid from given data. 1c. Convert absolute pressure into gauge pressure for the given data and vice versa. 1d. Convert pressure head of one liquid to that of another liquid for the given data. 1e. Compute pressure at a point for the given data. 1f. Describe applications of Pascal's law in engineering applications. 1g. Compute pressure difference between two points for the given data. 1h. Develop pressure distribution diagram for a given situation. 1i. Determine total pressure and centre of pressure for given immersed vertical surface. 1j. Calculate resultant pressure and its position for given situation of liquids in a tank.	**PROPERTIES OF FLUID AND HYDROSTATICS** 1.1 Role of hydraulics in civil engineering applications, Definition of Fluid, Fluid Mechanics, Hydraulics, Hydro statics, Hydro-Dynamics-Ideal and Real Fluid. Application of Hydraulics in Civil Engineering field. 1.2 Physical properties of fluid – Density-Specific Volume, Specific Gravity-Surface Tension-Capillarity, Viscosity-Newton's law of viscosity, Simple numerical. 1.3 Terms related to pressure – Atmospheric Pressure-Gauge Pressure-Absolute Pressure-Vacuum Pressure, Concept of Pressure Head. Pascal's law of fluid pressure and its application. 1.4 Measurement of Pressure by pressure measuring devices, Pressure distribution diagram, total pressure and centre of pressure on vertical wall and gate.	16	10	CO1
2	2a. Distinguish different types of flow. 2b. Interpret the type of flow using Reynold's number 2c. Calculate velocity and discharge in the given situation using continuity equation. 2d. Apply Bernoulli's theorem to determine the given parameters for given situation.	**HYDRODYNAMICS** 2.1 Hydrokinematics: Velocity and acceleration of liquid particles, discharge, Different types of flows, equation of continuity and its simple applications 2.2 Energy and Momentum equations : Types of energies, energy equation, applications, hydraulic grade line and total energy line, Momentum equation.	**12**	**8**	**CO2**

COURSE NAME	Hydraulics	COURSE CODE	R18CE3107

S. No.	Unit Outcomes (UOs)	Topics and Sub-topics	Marks	Hours	Mapped CO
3	3 a. Describe the procedure of finding velocity and discharge in a pipe line using the given flow-measuring device. 3 b. Describe various coefficients related to flow measuring devices. 3 c. Measure the velocity of flow through open channel for the given condition using weir	**FLOW MEASUREMENT** 3.1 Pipe flow measurement - venturi meter, pitot tube, prandtl's tube. Orifice –hydraulic coefficients, current meter, floats. 3.2 Notches and Weirs -Different types of notches, computation of flow over notches, different types of weir, flow calculations.	12	6	CO3
4	4 a. Describe the given type of losses in a pipe flow. 4 b. Use appropriate equation to find out the head loss due to friction for the given data. 4 c. Compute the discharge in the given network (Parallel or series) of pipes. 4 d. Calculate equivalent length or diameter of a pipe for the given data.	**PIPE FLOW** 4.1 Characteristics, losses in pipe- major and minor losses Head loss through pipes Hagen –Poiseuille equation, Darcy – Weisbach equation. 4.2 Flow through pipes in series, pipes in parallel and Dupit's equation for equivalent pipe	12	8	CO4
5	5a. Distinguish between different types of flow in open channel. 5b. Determine discharge in the given channel using relevant formulae for the given data. 5c. Design the most economical channel section for the given conditions. 5d. Describe different flow conditions based on Froude number. 5E. Describe characteristics of a hydraulic jump.	**OPEN CHANNEL FLOW** 5.1 Characteristics of flow, uniform flow through channels, applications of Chezy, Manning formulae. 5.2 Conditions for most economical rectangular and trapezoidal channel section, Specific energy diagram, Froude's Number, specific energy, sub critical and super critical flows. Hydraulic jump.	16	10	CO5
6	6 a. Describe different components of the power station with function of each in the given situation with sketches. 6 b. Describe the working of the pump used for the given data with sketches. 6 c. Describe the working of the turbine used for the given data with sketches 6 d. Compute the power of Centrifugal pump from the given data. 6 e Select relevant type of pump or turbine for the given situation.	**HYDRAULIC MACHINES** 6.1 Power station and its components, 6.2 Terminologies related to hydraulic machines-Suction head, delivery head, static head, manometric head, efficiency and power. 6.3 Components of pumps and turbines and working in brief. 6.4 Selection and choice of pump and turbine.	12	6	CO6

COURSE NAME	Hydraulics	COURSE CODE	R18CE3107

7. PRACTICAL –ASSIGNMENTS-STUDENT ACTIVITIES-TUTORIALS (Separate table for each)

S. No.	Practical	Topic No.	Hours Allotted	Mapped CO
1	Measure pressure using pressure measuring devices.	1	2	CO1
2	Verification of Bernoulli's theorem.	2	2	CO2
3	Study of sharp edged circular orifice.	3	2	CO3
4	Calibration of Venturimeter/ Orificemeter to find out the discharge in a pipe.	3	2	CO3
5	Calibration of Triangular/ Rectangular notch to find out the discharge in a open channel.	3	2	CO3
6	Measure the velocity of flow of water in open channel using current meter/float	3	2	CO3
7	Study of loss of head due to friction in pipes.	4	2	CO4
8	Study of uniform flow formulae of open channel flow	5	2	CO5
--	**Total**	--	**16**	--

S. No.	Assignments	Topic No.	Hours Allotted	Mapped CO
1	Assignment based on prerequisite knowledge based on physics and mathematics related to hydraulics	1	2	CO1
2	Draw total energy line and hydraulic grade line for the given pipe flow condition	2, 4	2	CO2, CO4
3	Calculation of down take pipe sizing/rising main.	4	2	CO 4
4	Calculation of capacity of a centrifugal pump supplying water to overhead tank.	6	2	CO6
--	**Total**	--	**8**	--

S. No.	Student activity	Topic No.	Hours Allotted	Mapped CO
1	Preparation of report/presentation on advances in fluid properties and flow measurement	1	2	CO1
2	Video presentation on hydraulic machinery	6	2	CO6
3	Visualisation of variation in fluid properties and flow based on Wolfram Mathematica /Java Applets	2	2	CO 4
--	**Total**	--	**6**	--

S. No.	Practical	Topic No.	Hours Allotted	Mapped CO
--	**Practical –assignments-student activities submission**	--	**2**	--
--	**Total**	--	**32**	--

8. EVALUATION SCHEME FOR PRACTICAL / ASSIGNMENTS/STUDENT ACTIVITIES

Rubriks for Laboratory Manual Report/Assignments

Category	4	3	2	1
Structure	Very Well Structured	Well Constructed	Structured But Missing Links	Unstructured
Understanding of Analytical Concepts	Complete Understanding	Substantial understanding	Some Understanding	Limited Understanding
Mathematical Errors	Least Errors	90 % Free Of Errors	75 % Free Of Errors	50 % Free Of Errors
Graphics	Neat ,Accurate And Enhance Understanding	Neat And Accurate	Some Illustrations Are Misleading And Redundant	Least Accurate And Not Neat
Timely Completion of Sub Activities	Maximum	Moderate	Satisfactory	Least
Overal Understanding	Maximum	Moderate	Satisfactory	Least

Rubricks for Student Activities

Category	4	3	2	1
Structure And Presentation	Very Well Structured	Well Constructed	Structured But Missing Links	Unstructured
Quantity Of Information	All Subtopics Covered In Detail	All Subtopics Are Mostly Covered	Some Of The Subtopics Are Not Covered In Detail	Some Of The Subtopics Are Not Covered
Quality Of Information	Clear Description With Supporting Details	Clear Description With Some Supporting Details	Clear Description With Lack Of Supporting Details	Irrelevent Information
Sources	Clear Documentation	Clear Documentation With Some Missing Links	Part Documentation With Missing Links	Documentation With Number of Missing Links
Graphics	Neat ,Accurate And Enhance Understanding	Neat And Accurate	Some Illustrations Are Misleading And Redundant	Least Accurate And Not Neat
Group Activity	Maximum Coordination And Effort	Fair Coordination And Effort	Lack Coordination And Effort	Least Participation
Timely Completion Of Activity	Maximum	Moderate	Satisfactory	Least
Overal Understanding	Maximum	Moderate	Satisfactory	Least

9. MAJOR EQUIPMENT/ INSTRUMENTS /TOOLS REQUIRED

S. No.	Equipment Name with Specifications	Practical
1	Pressure measuring devices like piezzometer, differential manometer, u tube manometer, Bourdons pressure gauge	1
2	Bernoulli's apparatus, Stop watch, Hydraulic bench.	2
3	Constant head/ Variable head water tank with orifice, hydraulic bench.	3
4	Venturimeter/ Orificemeter , hydraulic bench, stop watch.	3
5	Triangular/ Rectangular notch, hydraulic bench with open channel.	3

S. No.	Equipment Name with Specifications	Practical
6	Current meter, calibration curve, hydraulic bench with open channel flow.	3
7	Apparatus for finding Friction factor of the pipe, Stop watch.	4
8	hydraulic bench with open channel, stop watch	5
9	Wolfram CDF player software	SA3

9. SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Topic No.	Topic Title	Mapped CO % OR Emphasis	Distribution of Marks			
			Cognitive level			Total Marks
			Remember	Understand	Apply	
I	Properties of Fluid and Hydrostatics	CO1, 18.75%	4	4	8	16
II	Hydrodynamics	CO2, 15.63%	4	4	4	12
III	Flow Measurement	CO3,15.63%	4	4	4	12
IV	Pipe Flow	CO4, 15.63%	4	4	4	12
V	Open Channel Flow	CO5, 18.75%	4	4	8	16
VI	Hydraulic Machines	CO6, 15.63%	4	8	-	12
Total		100%	**24**	**28**	**28**	**80**

10. SAMPLE MODEL QUESTION BANK FOR THEORY AND TEST EXAMINATIONS

S. No	Topic	Mapped CO	Cognitive level R/U/A	Question
1	1	CO1	R	Define total pressure, centre pressure.
2	1	CO1	U	Distinguish between gauge pressure and absolute pressure
3	1	CO1	A	Find the intensity of pressure on diver working, at a depth of 200m under the sea, if the specific gravity of sea water is 1.025.

11. LEARNING RESOURCES

- **BOOKS**

S. No.	Title of Book	Author	Publication
1	Hydraulics and Fluid Mechanics	Modi,P. N. and Seth S.M.	Standard book house, Delhi ISBN:13: 978-8189401269;
2	Hydraulics, Fluid Mechanics And Fluid Machines	Ramamrutham and Narayan, R.	Dhanpat Rai Publishing Company ISBN:8187433841
3	Hydraulics, Fluid Mechanics, Hydraulic machines	Khurmi,R S	S Chand ISBN: 9788121901628
4	Fluid Mechanics	Rajput, R K	S Chand, ISBN: 9788121916677
5	Fluid Mechanics and Machinery	Ojha, C S P, and Berndtsson, R	Oxford University Press ISBN: 9780195699630

COURSE NAME	Hydraulics	COURSE CODE	R18CE3107

- **SOFTWARE/ TOOLS/ MODELS**

S. No.	Name	Company	Freeware/commercial
1	Wolfram Mathematica CDF player	Wolfram	Freeware

- **WEBSITES**

S. No.	ADDRESS
1	www.nptel.iitm.ac.in
2	www.efluid.com
3	https://www.youtube.com/playlist?list=PL0EC6527BE871ABA3NSF Fluid Mechanics Series
4	http://www.caee.utexas.edu/prof/kinnas/319LAB/fr_tool.html Elementary Fluid Mechanics-Interactive Tools

12. COURSE CURRICULUM DEVELOPMENT MEMBERS

S. No.	Name and Designation	Contact No.	Email
1	Dr. S. V. Kanitkar	9921414902	svkwadia@yahoo.co.in

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE -1

Diploma Programme	CIVIL		
Course Name	Theory of structures	Course code	R18AM3109
Course Category	Core	Credits	4

COURSE TEACHING, ASSESSMENT AND EVALUATION SCHEME:

Teaching scheme		Evaluation scheme								
		Direct assessment- Weightage = 80%								
		Theory outcome		Practical outcome						Total
Theory Allotted hrs	Practical Allotted hrs	ESE marks	TTA marks	TW marks	SW marks	AS marks	TU marks	Practical Total Marks	OR marks	Total Marks
4	--	80	20	--	--	--	--	--	--	100
		Indirect assessment- Weightage - 20%								
		Mid semester students feedback				End of the course survey				

End semester examination-ESE, Two tests average-TTA, Term Work- TW, Student Activity-SW, Assignments –AS, Tutorials- TU, Oral -OR

1. RATIONALE

This is core subject which will enable the students to understand the analysis of indeterminate structures and roof trusses, also the deformation of beams.

2. EXPECTED PROFICIENCY

Analyze structural components using different methods.

3. COURSE OUTCOMES (COs)

Students will be able to

1. Evaluate forces and their nature in different members of tusses.
2. Analyze deflections and slope produced by different loading conditions.
3. Analyze fixed beams under different loading conditions.
4. Analyze continuous beams under different loading conditions by using theorem of three moments.
5. Analyze fixed and continuous beams by using moment distribution method.
6. Determine safe load short and long columns subjected to axial and eccentric loads.

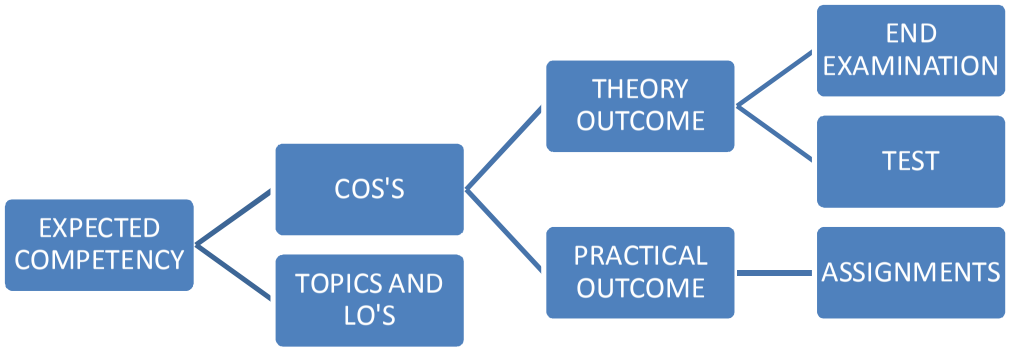
COURSE NAME	Theory of structures	COURSE CODE	R18AM3109

4. CO –PO MATRIX

Course Name: Theory of Structures Course Code: R18SAM3109	PO1 Basic and Discipline specific knowledge	PO 2 Problem analysis	PO 3 Design & development of solutions	PO4 Engineering Tools, Experimentation and Testing	PO 5 Engineering practices for society, sustainability and environment	PO Project Management	PO 7 Life-long learning	PSO 1 Construction planning and detailing	PSO 2 Construction execution, supervision and maintenance
CO1		3							
CO2		3							
CO3		3							
CO4		3							
CO5		3							
CO6		3							

Rating scale '**3**' for high, '2' for medium, '**1**' for low '0' for no correlation

5. COURSE MAP



COURSE NAME	Theory of structures	COURSE CODE	R18AM3109

6. DETAILED COURSE CONTENTS

S. No.	Unit Outcomes (UOs)	Topics and Sub-topics	Marks	Hours	Mapped CO
1	1a Calculate axial forces for the given simple truss using analytical method. 1b Calculate axial forces for the given simple truss using section of joints method.	**Trusses** 1.1 Definition of a truss, types of trusses, perfect, imperfect, redundant. Law of perfect frames. Method of joints, 1.2 Method of sections, zero force member, types of trusses used in roofs, bridges with vertical and inclined loading at nodal points	16	10	CO1
2	2a. Calculate the slope and deflection for a cantilever beam under given loading conditions by double integration method. 2b.Determine the slope and deflection for a simply supported beam under given loading conditions by double integration method. 2c. Find the slope and deflection for a cantilever beam under given loading conditions by Macaulay's method. 2d. Calculate the slope and deflection for a simply supported beam under given loading conditions by Macaulay's method.	**Slope and Deflection** 2.1 Concept of slope and deflection, stiffness of a beam, slope and deflection from differential equation of bending moment by double integration method, constants of integration and their evaluation, standard cases a cantilever with a concentrated load at free end, a cantilever carrying a u.d.l. of intensity 'w' per meter run over the entire span, a cantilever carrying a concentrated load not at the free end, a simply supported beam carrying a central concentrated load, a simply supported beam carrying an eccentric load, a simple beam carrying a u.d.l. of intensity 'w'per meter run over the entire span. 2.2 Macaulay's method Technique of taking a section while using the method, 'if required' terms, slope and deflection at different sections of a simple beam carrying concentrated loads by using Macaulay's method (solution of a cubic equation at any stage, is not expected)	12	8	CO2

COURSE NAME	Theory of structures	COURSE CODE	R18AM3109

S. No.	Unit Outcomes (UOs)	Topics and Sub-topics	Marks	Hours	Mapped CO
3	3a. Explain the effect of fixity in the given beam section. 3b. Calculate fixed end moments for beam subjected to the given point load. 3c. Determine fixed end moments for the given beam subjected to UDL over entire span by first principle. 3d. Find end moments and reactions for fixed beam under given loading condition. 3e. Draw S.F.D and B.M.D for given fixed beam for the given	**Fixed Beam** 3.1 Concept of fixity, effect of fixity, advantages and disadvantages, fixed end moments, nature of fixed end moments, and principle of superimposition. 3.2 Derivation of formulae of fixed beams subjected to concentrated loads and uniformly distributed load over entire span, application of standard formulae in finding end moments and drawing S.F. and B.M. diagrams for fixed beams. 3.3 Calculating fixed end moments from first principle for fixed beams subjected to concentrated loads and uniformly distributed load over entire span, drawing S.F. and B.M. diagrams	12	6	CO3
4	4a. Explain the effect of continuity in the given situation. 4b. Draw deflected shape of continuous beam subjected to given load and end conditions. 4c. Explain Calpeyron's theorem of three moments used for analysis of the given continuous beam. 4d. Analyze continuous beam under given loading conditions, using Clapeyrons theorem of three moments. 4e. Draw S.F.and B.M. diagram for the given continuous beam for the given data.	**Continuous Beams** 4.1 Definition, effect of continuity, nature of moment induced due to continuity, advantages and disadvantages, practical examples, concept of deflected shape Clapeyron's theorem of three moments, its application to various types of continuous beam having supports at some level, subjected to concentrated and uniformly distributed loads over entire span. 4.2 Shear force and bending moment diagrams up to three spans with or without overhangs. S.F. and B.M. diagrams for two spans with one end fixed with or without overhang.	12	8	CO4
5	5a. Explain Moment Distribution Method (M.D.M.) used for analyzing the given indeterrminate beam. 5b. Apply M.D.M. to analyse given continuous beam having same M.I.for the given condition. 5c. Apply M.D.M. to analyse given continuous beam having different M.I. for the given condition. 5d. Plot S.F. and B.M. Diagrams for continuous beam for the given data.	**Moment Distribution Method** 5.1 Introductions, sign convention, carry over factors, stiffness factors, and distribution factors. 5.2 Application of moment distribution method to various types of continuous beams subjected concentrated loads and uniformly distributed loads over the entire span, shear force and bending moment diagrams (supports rigid and at the same level) 5.3 Application of moment distribution method to non-sway	16	10	CO5

COURSE NAME	**Theory of structures**	COURSE CODE	**R18AM3109**

S. No.	Unit Outcomes (UOs)	Topics and Sub-topics	Marks	Hours	Mapped CO
	5e. Identify the type of given portal frame with justification.	symmetrical portal frames of single bay and single storey, S.F. and B.M. diagrams			
6	6a.Differentiate between short and long columns based on given criteria. 6b.Compute safe/design load of the column for given different end conditions by using Euler's. 6c.Compute safe/design load of the column for given different end conditions by using Euler's.	**Columns** 6.1 Prismatic columns, concept of a columns and struts. Modes of failure of a column, types of columns. Buckling load, crushing load, slenderness ratio and equivalent length, Euler's formula (No proof) for critical load for different end conditions, constraints for equivalent length for different condition, limitations of Euler's formula, 6.2 Rankine's formula and constants. Applications of Rankine's formula	12	6	CO6

7. SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Topic No.	Topic Title	Mapped CO % OR Emphasis	Distribution of Marks			
			Cognitive level			Total Marks
			Remember	Understand	Apply	
I	Trusses	CO1, 20	4	4	8	16
II	Slope And Deflection	CO2, 15	4	4	4	12
III	Fixed Beam	CO3, 15	4	4	4	12
IV	Continuous Beams	CO4, 20	4	4	4	12
V	Moment Distribution Method	CO5, 15	4	4	8	16
VI	Columns	CO6, 15	4	8	-	12
Total		--	**24**	**28**	**28**	**80**

8. SAMPLE MODEL QUESTION BANK FOR THEORY AND TEST EXAMINATIONS

S. No	Topic	Mapped co	Cognitive level R/U/A	Question
1	1	CO3	R	Define fixed beam
2	1	CO2	U	Write step by step procedure of double integration method.
3	1	CO4	A	Draw SFD for the given continuous beam by using theorem of three moments.

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

9. LEARNING RESOURCES

- **BOOKS**

S. No.	Title of Book	Author	Publication
1	Theory of Structures	Ramanrutham, S.	Dhanpatrai & Sons, Delhi ISBN:978-93-84378-10-3
2	Theory of Structures	Khurmi, R. S.	S. Chand and Co., New Delhi, 2006 ISBN: 978-81-21905-20-6
3	Structural Analysis Vol-1	Bhavikatti, S S	Vikas Publishing House Pvt Ltd.New Delhi; ISBN: 978-81-25927-90-7
4	Mechanics of structures, Volume-I and II	Junnarkar, S. B.	Charotar Publishing House,Anand ISBN: 978-93-80358-99-4
5	Theory of Structures	Pandit, G.S. and Gupta, S.P.	Tata McGraw Hill, New Delhi, 2006 ISBN : 978-00-74634-93-6

• SOFTWARE/ TOOLS/ MODELS

1. nptel.ac.in/courses/112107146/lects%20&%20picts/.../lecture30%20and%2031.htm
2. www.nptel.ac.in/courses/105101085/downloads/lec-32.pdf
3. www.facweb.iitkgp.ernet.in/~baidurya/CE21004/online_lecture_notes/m2l12.pdf
4. https://en.wikipedia.org/wiki/Theorem_of_three_moments
5. https://en.wikipedia.org/wiki/Moment_distribution_method
6. www.facweb.iitkgp.ernet.in/~baidurya/CE21004/online_lecture_notes/m3l19.pdf
7. www.bgstructuralengineering.com/BGSMA/ContBeams/BGSMA_CB_0201.htm
8. www.facweb.iitkgp.ernet.in/~baidurya/CE21004/online_lecture_notes/m3l19.pdf
9. www.civilprojectsonline.com › Building Construction
10. www.mathalino.com/reviewer/engineering.../method-sections-analysis-simple-trusses

• WEBSITES

S. No.	ADDRESS
1	www.nptel.iitm.ac.in
2	www.youtube.com

10. COURSE CURRICULUM DEVELOPMENT MEMBERS

S. No.	Name and Designation	Contact No.	Email
1	Mrs. V. D. Pawar	9403758095	vaidyavaishu@yahoo.co.in

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE -1

Diploma Programme	CIVIL		
Course Name	Concrete Technology	Course code	R18AM3109
Course Category	Core	Credits	5

COURSE TEACHING, ASSESSMENT AND EVALUATION SCHEME:

Teaching scheme		Evaluation scheme									
		Direct assessment- Weightage - 80%									
		Theory outcome		Practical outcome							Total
				TERMWORK					PRACTICAL	ORAL	
Theory Allotted hrs	Practical Allotted hrs	ESE marks	TTA marks	TW marks	SW marks	AS marks	TU Marks	Total	Practical Marks	OR marks	Total marks
3	2	80	20	10	15	-	-	25	-	@25	150
		Indirect assessment- Weightage- 20%									
		Mid semester students feedback						End of the course survey			

End semester examination-ESE, Two tests average-TTA, Term Work- TW, Student Activity-SW, Assignments –AS, Tutorials- TU, Oral -OR

1. RATIONALE

This is core subject, which will enable the students to understand concepts, principles and procedures about concrete and its ingredients, quality control of concrete before, during and after construction of various civil structures.

2. EXPECTED PROFICIENCY

Use proper concrete for various types of Civil works.

3. COURSE OUTCOMES (COs)

Students will be able to

1. Select the types of cement as per site condition.
2. Identify and classify the types of aggregates as per civil construction.
3. Comprehend the various theories and principals related to preparation of concrete and relate to civil engineering works.
4. Implement quality control of concrete.
5. Select admixture for concreting work under various weather conditions.
6. Observe safety measures as per set norms and guidelines specially on construction sites / equipments / plants.

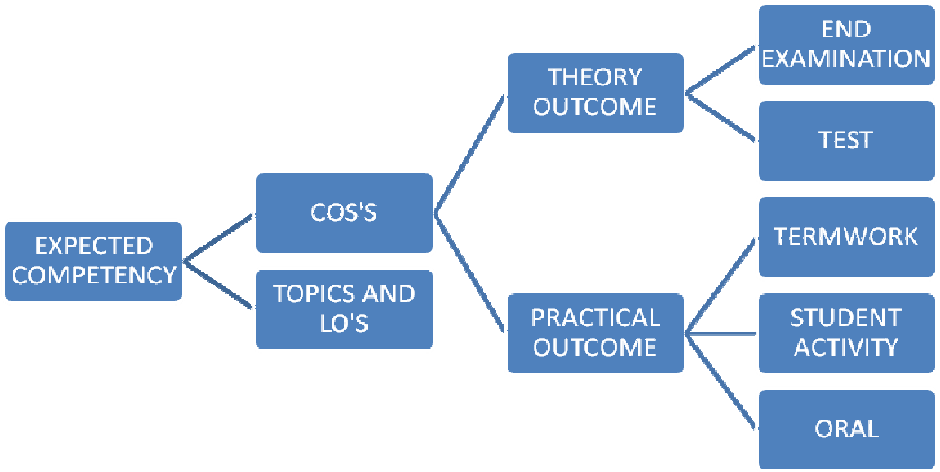
COURSE NAME	Concrete Technology	COURSE CODE	R18AM3109

4. CO –PO MATRIX

Course Name: Concrete Technology Course Code: R18AM3109	PO 4 Engineering Tools, Experimentation and Testing	PO 5 Engineering Practices for Society, Sustainability and Environment	PO 6 Project Management	PO 7 Life-long learning	PSO 1 Construction planning and detailing	PSO 2 Construction execution, supervision and maintenance
CO1	2				2	
CO2	2				2	
CO3			2		2	
CO4	3	2	2			3
CO5	2	3	1			
CO6	3	2	3	2		3

Rating scale '**3**' for high, '2' for medium, '**1**' for low '**0**' for no correlation

5. COURSE MAP



COURSE NAME	Concrete Technology	COURSE CODE	R18AM3109

6. DETAILED COURSE CONTENTS

S. No.	Unit Outcomes (UOs)	Topics and Sub-topics	Marks	Hours	Mapped CO
1	1a) Describe the manufacturing process of cement. 1b) List the types of cement along with their function. 1c) Explain the various tests on cement needed for categorization. 1d) Enlist and explain the classification and characteristic of aggregates. 1e) Discuss the grading and interpret its result from the graph. 1f) Explain the effects and ill-effects of water on concrete.	**Ingredients of Concrete** 1.1 Cement: Manufacturing of cement , types and grades of cement, field and laboratory tests on cement, sampling of cement. 1.2 Aggregate: classification characteristics and grading of aggregates, maximum size of aggregates, combination of fine and coarse aggregates. 1.3 Water : Role of water in concrete, quality of water, Duff Abram's law for water cement ratio, effect of water cement ratio on workability and strength of concrete.	16	10	CO1 CO2
2	2a) Describe the properties of concrete. 2b) Measuring the properties of concrete and interpret from the results obtained. 2c) Enlist and explain the properties of concrete in hardened state.	**Properties of Concrete** 2.1 Fresh state: Introduction, cohesion and workability. Concept of workability. Factors affecting workability. Measurement of workability by slump test, compacting factor test. Recommended degrees and corresponding values of workability, Various measures to improve workability. 2.2 Hardened state: Strength, shrinkage, Creep, Thermal expansion, Permeability, Durability, Resistance to chemical attack, Resistance to corrosion, Fire resistance.	12	7	CO3
3	3a) Describe the various steps involved in operations of concrete. 3b) State and explain methods of transportation, compaction and curing of concrete.	**Quality control of concrete** 3.1 Storing of ingredients, batching of cement and aggregates, mixing of concrete ingredients. 3.2 Transportation of concrete, various methods, placing of concrete, compaction, methods of compaction, precautions. 3.3 Curing of Concrete – Purpose, methods and period of curing. Types of Finishing of concrete.	16	10	CO4

COURSE NAME	**Concrete Technology**	COURSE CODE	**R18AM3109**

S. No.	Unit Outcomes (UOs)	Topics and Sub-topics	Marks	Hours	Mapped CO
4	4a) List the methods of Concrete Mix design as per grade of concrete. 4b) Explain and differentiate amongst the types of concrete mixed design.	**Concrete mix design** 4.1 Introduction: Basic considerations for concrete mix design., Factors influencing the choice of mix proportions. 4.2 Methods of concrete mix design for medium strength concrete – Indian Road Congress (I.R.C.) method. American Concrete Institute (A.C.I.) method, Department of Environment (D.O.E.) method, Trial and error method. 4.3 High strength concrete – Introduction, methods of mixing high strength concrete. Field adjustments.	12	7	CO3
5	5a) Explain the problems and preventive measures for the concreting under given situations. 5b) Identify the type of concrete to be used for the relevant conditions of work.	**Special concretes & Special concrete Techniques** 5.1 Introduction, hot weather concreting, Cold weather concreting, Under water concreting, Concreting in seawater, Concreting in aggressive soils and water. 5.2 Introduction: Light weight concrete, Ultra – Light weight concrete, Vacuum concrete, Ferro cement,. Gap-graded concrete, Fiber reinforced concrete. 5.3 Colcrete, Shot Crete or Guiniting, Pumping of concrete. Vacuum dewatered concrete, Jointing.	12	7	CO6
6	6a) Describe the relevance of Ready Mixed concrete . 6b) Draw the layout for RMC Plant. 6c) Identify the need of an admixture and its effect on the properties of concrete.	**Ready Mixed Concrete & Admixtures** 6.1 Ready Mixed Concrete: Introduction., RMC Plant:- Layout, Capacity, Transit Mixer, Precautions, Maintenance etc.. Ready Mix Concrete: - Batching & Mixing . Test on RMC at plant. 6.2 Admixtures: Definition, factors affecting their effectiveness, Classification:- Accelerating, Retarding, Water Reducing, Air entraining, Plasticizers, Super plasticizers, Brand names of various admixtures.	12	7	CO5

7. PRACTICAL –ASSIGNMENTS-STUDENT ACTIVITIES-TUTORIALS (Separate table for each)

S. No.	Laboratory Practical	Topic No.	Hours Allotted	Mapped CO
1	Fineness test on cement.	1	2	CO1
2	Standard consistency test on cement.	1	2	CO1
3	Initial and final test on cement.	1	2	CO1
4	Compressive strength of cement.	1	2	CO1
5	Specific gravity and water absorption of aggregates.	1	2	CO2
6	Size gradation analysis for fine and coarse aggregate.	1	2	CO2
7	Bulking of sand.	1	2	CO2
8	Effect of Water-Cement ratio on Workability & Compressive Strength of Concrete.	2 &3	2	CO3
9	Effect of Admixture on Workability & Compressive Strength of Concrete.	3 &6	2	CO3
10	Effect of Admixture on Setting Time of Cement.	1 &6	2	CO5
	Total		**20**	

S. No.	Student Activity	Topic No.	Hours Allotted	Mapped CO
A	Class visit (Any Two)			
1	Site visit to any one special concreting technique.	5	2	CO6
2	Factory visit to any one precast concrete product.	5	2	CO6
3	Plant visit to Ready Mixed Concrete or Lightweight concrete	6	2	CO4 CO6
B	Individual visits - Group of 3-4 students will visit at least 5 different types of civil construction sites and collect information related to field tests for cement, aggregates and concrete & safety norms & precautions.	1,2,3	6	CO1 CO2 CO3 CO6
	Total		**10**	

S. No.	Practical	Topic No.	Hours Allotted	Mapped CO
	Practical –assignments-student activities submission		**2**	
	Total		**32**	

8. EVALUATION SCHEME FOR PRACTICAL / ASSIGNMENTS/STUDENT ACTIVITIES

Rubriks for Laboratory Practicals

Category	4	3	2	1
Experimental procedure & handling of the instruments	Follows procedure as instructed and safe & correct handling of the instruments	Little oversight towards procedure, safety & handling of the instruments	Considerable oversight towards procedure, safety and handling of the instruments	Careless about the procedure safety & handling of the instruments.

Category	4	3	2	1
Data documentation, data analysis & results interpretation	Correct Documentation of all data, Correct calculations and Error in result worked out correctly is within the limit	Correct documentation of majority of data, Minor errors in calculations and Error in results worked out correctly is not within the limit	Incorrect documentation of majority of data, Major errors in calculations and Error in result Worked out incorrectly.	Incomplete & wrong documentation of data, Incomplete & wrong calculations and Error in result not worked out.
Team spirit	Contributes a fair share to work	Sometimes depends on others to complete the work	Many times depends on others to complete the work	Always depends on others to complete the work
Timely completion of activity	Maximum	Moderate	Satisfactory	Least
Overall understanding	Maximum	Moderate	Satisfactory	Least

Rubricks for Student Activities

Category	4	3	2	1
Structure And Presentation	Very Well Structured	Well Constructed	Structured But Missing Links	Unstructured
Quantity Of Information	All Subtopics Covered In Detail	All Subtopics Are Mostly Covered	Some Of The Subtopics Are Not Covered In Detail	Some Of The Subtopics Are Not Covered
Quality Of Information	Clear Description With Supporting Details	Clear Description With Some Supporting Details	Clear Description With Lack Of Supporting Details	Irrelevent Information
Sources	Clear Documentation	Clear Documentation With Some Missing Links	Part Documentation With Missing Links	Documentation With Number Of Missing Links
Group Activity	Maximum Coordination And Effort	Fair Coordination And Effort	Lack Coordination And Effort	Least Participation
Timely Completion Of Activity	Maximum	Moderate	Satisfactory	Least
Overall Understanding	Maximum	Moderate	Satisfactory	Least

Rubricks for Orals

Category	4	3	2	1
Delivery	Relaxed, Self confident, show natural body movement	Demonstrate quick recovery from minor mistake	Self conscious and monotone voice	Poorly performed
Understanding	Clear complete and concise	Mostly clear and little concise	Unclear	Incompletes and not concise
Vocabulary	Wide range of vocabulary and there is no repetition.	Quite Wide range of vocabulary and there is not lot of repetition	Some new vocabulary and few new expression	Student tends to repeat words all the time.
Presentation	Orderly and effectively	Orderly and little effectively	orderly	Not orderly
Body Language	Keep eye contact and no nervous expressions	Keep eye contact and few nervous expressions	Do not keep eye contact and few nerves expressions	Do not Keep eye contact and total nervous expressions

9. MAJOR EQUIPMENT/ INSTRUMENTS /TOOLS REQUIRED

S. No.	Equipment Name with Specifications	Practical
1	90 micron IS Sieve (200mm diameter) as per I.S.460-1962	1
2	Vicat Apparatus: Vicat mould (80mm dia. & 40mm high), glass base plate, Consistency plunger, Initial and Final setting time needle.	2,3,10
3	Compression Testing Machine (2000 kN) Cement Vibrating Machine (70.6 mm Cube Mould) and Vibration Table (For 150mm concrete mould)	4,8
4	Standard set of sieves ranging from 80 mm to 150 microns and mechanical sieve shaker	6
5	Pycnometer bottle	5
6	Slump cone (top dia. 100mm, bottom dia. 200mm and height 300mmm). Standard tamping rod of 16mm diameter & 600mm length with rounded end, compaction factor apparatus and flow table apparatus	8,9
7	Measuring cylinder	7
8	Weighing Balance 300kg Cap.(Platform type)	--
9	Hot Air Oven	--

9. SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Topic No.	Topic Title	Mapped CO % OR Emphasis	Distribution of Marks			
			Cognitive level			Total Marks
			Remember	Understand	Apply	
I	Ingredients of Concrete	CO1, CO2	4	8	4	16
II	Properties of Concrete	CO3	4	8	--	12
III	Quality control of concrete	CO4	4	6	6	16
IV	Concrete mix design	CO3	4	8	--	12
V	Special concretes & Special concrete Techniques	CO6	4	4	4	12
VI	Ready Mixed Concrete & Admixtures	CO5	4	4	4	12
Total			**24**	**38**	**18**	**80**

10. SAMPLE MODEL QUESTION BANK FOR THEORY AND TEST EXAMINATIONS

S. No	Topic	Mapped CO	Cognitive level R/U/A	Question
1	1	CO1	R	State various types of cement.
2	1	CO1	U	Enlist various physical tests on cement

S. No	Topic	Mapped CO	Cognitive level R/U/A	Question
3	1	CO1	A	Suggest type of cement to be used for mass construction concrete work

11. LEARNING RESOURCES

- **BOOKS**

S. No.	Title of Book	Author	Publication
1	Concrete Technology	M.S. Shetty	S. Chand and Company Ltd., New Delhi. ISBN: 978-8-121-90003-4
2	Concrete Technology	M. L. Gambhir	Tata M_cGraw-Hill Publication, New Delhi. ISBN:978-1-259-06255-1
3	Properties of Concrete	A. M. Neville	Pearson Education Pvt. Ltd., New Delhi. ISBN:978-0-273-75580-7

- **WEBSITES**

S. No.	Address
1	www.nptel.iitm.ac.in

12. COURSE CURRICULUM DEVELOPMENT MEMBERS

S. No.	Name and Designation	Contact No.	Email
1	Prof. A. Y. Devare	020-26163669	aydevare3@gmail.com

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE -1

Diploma Programme	CIVIL		
Course Name	Geotechnical Engineering	Course code	R18AM3110
Course Category	Core	Credits	5

COURSE TEACHING, ASSESSMENT AND EVALUATION SCHEME:

Teaching scheme		Evaluation scheme									
		Direct assessment- Weightage - 80%									
		Theory outcome		Practical outcome							Total
				TERMWORK					PRACTICAL	ORAL	
Theory Allotted hrs	Practical Allotted hrs	ESE marks	TTA marks	TW marks	SW marks	AS marks	TU Marks	Total	Practical Marks	OR marks	Total marks
3	2	80	20	15	10	-	-	25	-	@25	150
		Indirect assessment- Weightage-20%									
		Mid semester students feedback						End of the course survey			

End semester examination-ESE, Two tests average-TTA, Term Work- TW, Student Activity-SW, Assignments –AS, Tutorials- TU, Oral -OR

1. RATIONALE

This is core subject which will enable the students to understand the science of soil mechanics and deals with elementary knowledge of engineering of earth materials and it's applications in the field of engineering constructions.

2. EXPECTED PROFICIENCY

Apply principles of soil properties for the various civil engineering construction works.

3. COURSE OUTCOMES (COs)

Students will be able to

1. Identify and classify various types of soil suitable for types of foundation for Civil Engineering works.
2. Select appropriate processes and tools for testing of soil and soil properties.
3. Interpretation and suggest remedial measures from results of soil characteristics for Civil construction.
4. Comprehend the various theories and principals related to soil mechanics and relate to Civil Engineering components.
5. Observe safety measures as per set norms and guidelines especially on fields.

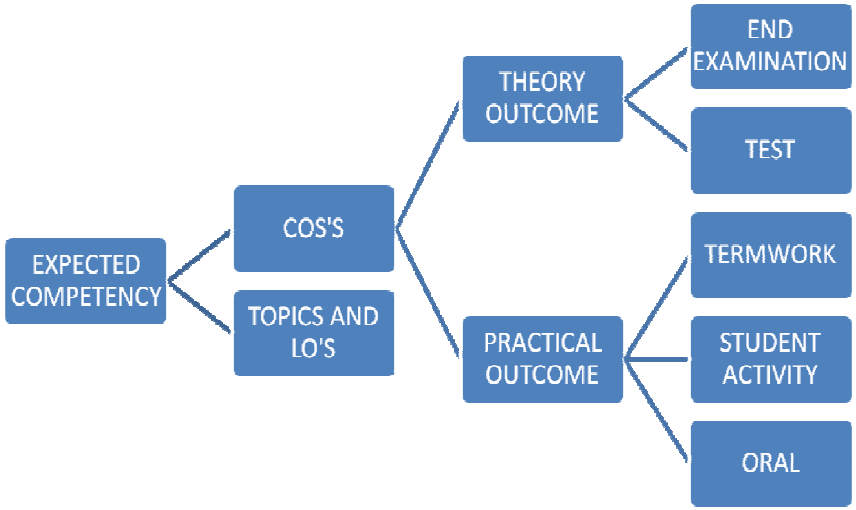
COURSE NAME	Geotechnical Engineering	COURSE CODE	R18AM3110

4. CO –PO MATRIX

Course Name: Geotechnical Engineering Course Code: R18AM3110	PO 1 Basic and Discipline knowledge	PO 2 Problem Analysis	PO 3 Design / Development of Solutions	PO 4 Engineering Tools, Experimentation and Testing	PO 5 Engineering Practices for Society, Sustainability and Environment	PO 6 Project Management	PO 7 Life-long learning	PSO 1 Construction planning and detailing	PSO 2 Construction execution, supervision and maintenance
CO1	2	2		2					
CO2	1		2	3					
CO3		2	2		2	2			
CO4	1	2		2	2	1			1
CO5				1		2	3	3	

Rating scale '**3**' for high, '**2**' for medium, '**1**' for low '**0**' for no correlation

5. CO URSE MAP



COURSE NAME	Geotechnical Engineering	COURSE CODE	R18AM3110

6. DETAILED COURSE CONTENTS

S. No.	Unit Outcomes (UOs)	Topics and Sub-topics	Marks	Hours	Mapped CO
1	1a) Enlist and define the index properties of soil. 1b) Relate various terms with index properties. 1c) Determine field density by Core cutter, Sand replacement & Water displacement method. 1d) Explain rocks, rock cycle, structural features of rocks.	**Fundamental Definitions and Their Relationship** 1.1 Meaning of soil, types of soil available in India & their behavior in short, graphical representation of soil as a three phase system, definitions of moisture content, unit weight, bulk density saturated density, submerged density, dry density, specific gravity, voids ratio, porosity, degree of saturation, percentage air voids, air content and density index. 1.2 Relationship between various terms stated above index properties, laboratory determination of moisture contain by over drying and by torsion balance method, laboratory determination of specific gravity by using Pycnometer. 1.3 Determination of field density by Core cutter, Sand replacement & Water displacement method. 1.4 Rocks – Introduction, rock cycle, Structural features of rocks(folds, faults, joints, overlaps and nappe) - definitions, parts and types.	16	10	CO1, CO2
2	2a) Explain and define liquid limit, plastic limit and shrinkage limit. 2b) Determine Atterberg's limit by laboratory method. 2c) Classify particle size using M.I.T. And I.S. method.	**Consistency of soil & Classification of Soil** 2.1 Definition, Atterberg's limits of consistency: liquid limit, plastic limit and shrinkage limit, graph of volume vs water content for different consistency limits. 2.2 Laboratory determination of Atterberg's limits. 2.3 Particle size classification M.I.T. and I.S., Particle size distribution curve & it's interpretation, U. S. Bureau of soils and U.S.P.R.A. textural classification and brief description of plasticity chart.	**12**	**7**	CO2, CO3
3	3a) Define permeability, laminar flow and turbulent flow, Darcy's law.. 3b) Suggest different methods for determination of coefficient of permeablility.	**Permeability of Soil & Compaction** 3.1 Definitions of permeability, laminar flow and turbulent flow, Darcy's law, as definitions of discharge velocity, seepage velocity and coefficient of percolation, factors affecting permeability. 3.2 Methods of determination of permeability, laboratory methods,	16	10	CO3 CO4

COURSE NAME	**Geotechnical Engineering**	COURSE CODE	**R18AM3110**

S. No.	Unit Outcomes (UOs)	Topics and Sub-topics	Marks	Hours	Mapped CO
	3c) Define compaction, consolidation. 3d) State different methods of compaction.	falling head method and constant head method. 3.3 Definition of compaction and consolidation, Proctor's compaction test : standard and modified, different methods of compaction, density and moisture content relationship, factors affecting compaction and brief description of field compaction methods.			
4	4a) Define bearing capacity, Ultimate bearing capacity, safe bearing capacity & allowable bearing pressure. 4b) Explain Terzaghi's analysis. 4c) Suggest field methods for determination of bearing Capacity.	**Bearing Capacity of Soil** 4.1 Concept of bearing capacity, Ultimate bearing capacity, safe bearing capacity & allowable bearing pressure. 4.2 Introduction to Terzaghi's analysis, assumptions made & limitations, effect of water table on bearing capacity. 4.3 Field methods for determination of bearing capacity – Plate load test & Standard Penetration Test procedures as per I.S.	12	7	CO4
5	5a) Define shear strength major, intermediate and Minor principal planes and stresses, cohesion, Frictional resistance and structural resistance. 5b) Explain Two dimensional stress analysis by Mohr's stress circle and its interpretation. 5c) Illustrate different types of shear tests.	**Shear strength of soils** 5.1 Definition of shear strength major, intermediate and minor principal planes and stresses, cohesion, frictional resistance and structural resistance, methods of improving shear strength of soil. 5.2 Two dimensional stress analysis by Mohr's stress circle and its interpretation, Mohr's circle for c – soils and c –ϕ soils, interpretation of coulomb's equations. 5.3 Different types of shear tests.	12	7	CO5
6	6a) Define earth pressure, active and passive earth pressures, terms and symbols relating to a retaining wall. 6b) describe stability conditions of retaining wall. 6c) Explain Rankine's earth pressure for Cohesive and cohesionless soils.	**Earth Pressure and Retaining Structures** 6.1 Definition of earth pressure, active and passive earth pressures, terms and symbols relating to a retaining wall, relation between movement of wall and earth pressure and movement resisting force on the sliding wedges. 6.2 Rankine's earth pressure for cohesive and cohesion less soils 6.3 Numerical problems on non-cohesive soils only.	12	7	CO3, CO5

7. PRACTICAL –ASSIGNMENTS-STUDENT ACTIVITIES (Separate table for each)

S. No.	Laboratory Practicals (Any Twelve)	Topic No.	Hours Allotted	Mapped CO
1	Determination of Moisture content by oven drying.	1	02	CO1, CO2
2	Determination of Specific gravity by Pycnometer.	1	02	CO1, CO2
3	Determination of field density by Core Cutter.	1	02	CO1, CO2
4	Determination of field density by Sand Replacement.	1	02	CO1, CO2
5	Determination of field density by Soil Clod.	1	02	CO1, CO2
6	Grain size distribution by Mechanical Sieve Analysis.	2	02	CO1, CO3
7	Determination of Liquid Limit by Casegrande's apparatus.	2	02	CO1, CO3
8	Determination of Plastic Limit	2	02	CO1, CO3
9	Determination of Shrinkage Limit.	2	02	CO1, CO3
10	Determination of Coefficient of Permeability under constant head.	3	02	CO4
11	Determination of Coefficient of Permeability under variable head.	3	02	CO4
12	Determination of O.M.C. and O.D.D. by standard proctor test.	3	02	CO4
13	Determination of Shear Parameters by direct shear test.	5	02	CO5
14	Determination of Shear Parameters by vane shear test.	5	02	CO5
15	Determination of Shear Parameters by unconfined compression test.	5	02	CO5
16	Determination of Shear Parameters by triaxial shear test.	5	02	CO5
--	**Total**	--	**24**	--

S. No.	Student activity	Topic No.	Hours Allotted	Mapped CO
1	A visit to nearby field / construction site for type of soil available, collection of soil sample for testing in the laboratory.	1, 2,3, 4 & 5	4	CO1, CO2, CO3
--	**Total**	--	**4**	--

S. No.	Practical	Topic No.	Hours Allotted	Mapped CO
--	**Practical –assignments-student activities submission**	--	**4**	--
--	**Total**	--	**32**	--

8. EVALUATION SCHEME FOR PRACTICAL / ASSIGNMENTS/STUDENT ACTIVITIES

Rubriks for Laboratory Practicals

Category	4	3	2	1
Experimental procedure & handling of the instruments	Follows procedure as instructed and safe & correct handling of the instruments	Little oversight towards procedure, safety & handling of the instruments	Considerable oversight towards procedure, safety and handling of the instruments	Careless about the procedure safety & handling of the instruments.
Data documentation, data analysis & results interpretation	Correct Documentation of all data, Correct calculations and Error in result worked out correctly is within the limit	Correct documentation of majority of data, Minor errors in calculations and Error in results worked out correctly is not within the limit	Incorrect documentation of majority of data, Major errors in calculations and Error in result Worked out incorrectly.	Incomplete & wrong documentation of data, Incomplete & wrong calculations and Error in result not worked out.
Team spirit	Contributes a fair share to work	Sometimes depends on others to complete the work	Many times depends on others to complete the work	Always depends on others to complete the work
Timely completion of activity	Maximum	Moderate	Satisfactory	Least
Overall understanding	Maximum	Moderate	Satisfactory	Least

Rubricks for Student Activities

Category	4	3	2	1
Structure And Presentation	Very Well Structured	Well Constructed	Structured But Missing Links	Unstructured
Quantity Of Information	All Subtopics Covered In Detail	All Subtopics Are Mostly Covered	Some Of The Subtopics Are Not Covered In Detail	Some Of The Subtopics Are Not Covered
Quality Of Information	Clear Description With Supporting Details	Clear Description With Some Supporting Details	Clear Description With Lack Of Supporting Details	Irrelevent Information
Sources	Clear Documentation	Clear Documentation With Some Missing Links	Part Documentation With Missing Links	Documentation With Number Of Missing Links
Group Activity	Maximum Coordination And Effort	Fair Coordination And Effort	Lack Coordination And Effort	Least Participation
Timely Completion Of Activity	Maximum	Moderate	Satisfactory	Least
Overall Understanding	Maximum	Moderate	Satisfactory	Least

Rubricks for Orals

Category	4	3	2	1
Delivery	Relaxed, Self confident, show natural body movement	Demonstrate quick recovery from minor mistake	Self conscious and monotone voice	Poorly performed
Understanding	Clear complete and concise	Mostly clear and little concise	Unclear	Incompletes and not concise
Vocabulary	Wide range of vocabulary and there is no repetition.	Quite Wide range of vocabulary and there is not lot of repetition	Some new vocabulary and few new expression	Student tends to repeat words all the time.
Presentation	Orderly and effectively	Orderly and little effectively	orderly	Not orderly
Body Language	Keep eye contact and no nervous expressions	Keep eye contact and few nervous expressions	Do not keep eye contact and few nerves expressions	Do not Keep eye contact and total nervous expressions

9. MAJOR EQUIPMENT/ INSTRUMENTS /TOOLS REQUIRED

Sr. No.	Equipment Name with Specifications	Practical
1	Pycnometer of about 900 ml capacity, with a conical brass cap at its top.	2
2	Cylindrical core cutter of steel, 127.4 mm long & 100 mm internal diameter, with a wall thickness of 3 mm, beveled at one end. Steel dolly, 25 mm high & 100 mm internal diameter, with wall thickness 7.5 mm	3
3	Sand pouring cylinder about 3 liter capacity, mounted above a pouring cone and separated by a shutter cover plate and a shutter, cylindrical calibrating container, 100 mm internal diameter & 150 mm internal depth.	5
4	Casegrande liquid limit device consisting of cup, handle, adjusting screws, counter alongwith A.S.T.M & B.S grooving tool	7
5	Circular shrinkage dish (porcelain/stainless steel/brass) with flat bottom about 45 mm in diameter & 15 mm high, Porcelain evaporating dish (about 120 mm (large) & one 60 mm (small) in diameter), glass plate with three prongs, plain glass plate	8, 9
6	Cylindrical mould (capacity 1000cc, internal diameter 100 mm, effective height 127.3 mm), Rammer for light compaction (face diameter 50 mm, mass of 2.6 kg, free drop 310 mm)	12
7	Jodhpur permeameter consisting of porous stones, filter paper etc. & accessories.	10, 11
8	Shear box, 60mm square and 60mm deep, grid plates , porous stones, base plate with cross grooves on its top face , loading pad with a steel ball on its top, loading frame, proving ring with dial gauge accurate to 0.002 mm, micrometer dial gauge accurate to 0.01 mm.	13
9	Vane shear tester consists of measuring apparatus for torque, worm gear and worm wheel arrangement.	14
10	Compression device consists of loading frame, Strain measuring dial gauge with 0.01 mm graduations, Proving ring with dial gauge accurate to 0.002 mm.	15
11	Set of Sieves and Sieve Shaker (Motorised)	6
12	Measuring cylinder	4
13	Hot Air Oven.	1
14	Soil Extractor Frame.	
15	Digital Weighing Balance.	

COURSE NAME	Geotechnical Engineering	COURSE CODE	R18AM3110

9. SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Topic No.	Topic Title	Mapped CO % OR Emphasis	Distribution of Marks			
			Cognitive level			Total Marks
			Remember	Understand	Apply	
I	Fundamental Definitions and Their Relationship	CO1, CO2	4	8	4	16
II	Consistency of soil & Classification of Soil	CO2, CO3	4	8	--	12
III	Permeability of Soil & Compaction	CO3, CO4	4	6	6	16
IV	Bearing Capacity of Soil	CO4	4	8	--	12
V	Shear strength of soils	CO5	4	4	4	12
VI	Earth Pressure and Retaining Structures	CO3, CO5	4	4	4	12
Total			**24**	**38**	**18**	**80**

10. SAMPLE MODEL QUESTION BANK FOR THEORY AND TEST EXAMINATIONS

S. No	Topic	Mapped CO	Cognitive level R/U/A	Question
1	1	CO1	R	Define moisture content.
2	1	CO1	U	Explain specific gravity and voids ratio.
3	1	CO1	A	Determine field density by Core cutter method.

11. LEARNING RESOURCES

- **BOOKS**

Sr. No.	Title of Book	Author	Publication
1	Geotechnical Engineering	B. J. Kasmalkar	Pune Vidyarthi Griha Prakashan Pune
2	Soil Mechanics and Foundation Engineering	Punmiya B. C.	Standard Book House, Delhi.
3	Fundamental of Soil Mechanics	Taylor	Asia Pub. House, Bombay.
4	Physical & Engineering Geology	S. K. Garg	Khanna Publishers, New Delhi.

- **WEBSITES**

S. No.	Address
1	www.totalgeotechnical.com
2	www.nptel.iitm.ac.in

12. COURSE CURRICULUM DEVELOPMENT MEMBERS

S. No.	Name and Designation	Contact No.	Email
1	A. Y. Devare, Lecturer, Civil	02026163669	aydevare3@gmail.com

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE -1

Diploma Programme		CIVIL	
Course Name	Transportation Engineering	Course Code	R18CE4101
Course Category	Applied	Credits	3

COURSE TEACHING, ASSESSMENT AND EVALUATION SCHEME:

Teaching scheme		Evaluation scheme									
		Direct assessment - Weightage - 80%									
		Theory outcome		Practical outcome							Total
				TERMWORK					PRACTICAL	ORAL	
Theory Allotted Hrs	Practical Allotted Hrs	ESE marks	TTA marks	TW marks	SW marks	AS marks	TU Marks	Total	Practical Marks	OR marks	Total marks
3	-	80	20	-	-	-	-	-	-	-	100
		Indirect assessment – Weightage - 20%									
		Mid semester students feedback							End of the course survey		

End Semester Examination - ESE, Two tests average - TTA, Term Work - TW, Student Activity - SW, Assignments – AS, Tutorials - TU, Oral - OR

1. RATIONALE

Transportation plays an important role in development of the country. The major share of the budget is allotted to development of transportation. Progress and integration of country is measured by the development of communication system, which has direct relation to prosperity of a nation. The civil engineer diploma holder must possess knowledge and skills in construction and maintenance of railways, bridges & tunnels. Indian Railway is a huge organization and employs more than one million of technical & nontechnical people. Railways have its own recruitment board. Same way lot of business & employment potential is available in the field of bridge & tunnel engineering. Civil engineer can execute lot of works of railways, bridges & tunnels as a contractor also.

2. EXPECTED PROFICIENCY

Undertake construction and maintenance activities for railways, bridges and tunnels.

3. COURSE OUTCOMES (COs)

After completing this course students will be able to

a. Identify the components of a railway track
b. Explain the geometric standards for railways.
c. Carry out Construction and maintenance of railway track
d. Summarize considerations in bridge design.
e. Describe construction and maintenance procedures for bridges.
f. Suggest appropriate method of construction and maintenance of tunnels

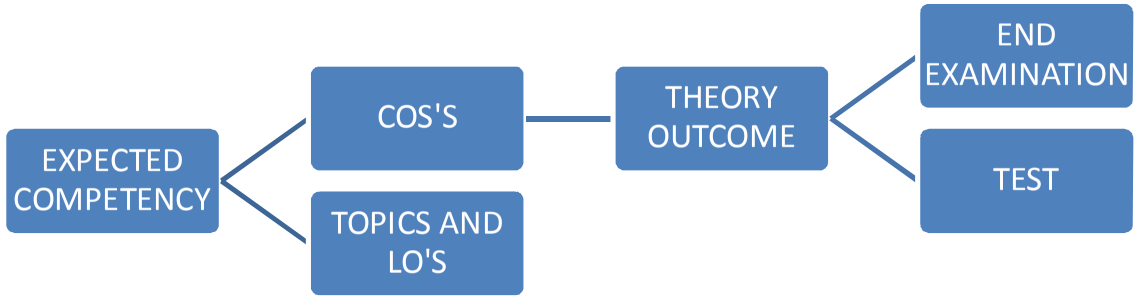
COURSE NAME	Transportation Engineering	COURSE CODE	R18CE4101

4. CO – PO MATRIX

Course Name: Transportation Engineering R18CE4101	PO 1 Basic and Discipline Specific knowledge	PO 2 Problem Analysis	PO 3 Design/ Development of Solutions	PO 4 Engineering Tools, Experimentation and Testing	PO 5 Engineering Practices for Society, sustainability and Environment	PO 6 Project Management	PO 7 Life-Long Learning	PSO 1 Construction planning and detailing	PSO 2 Construction execution, supervision and maintenance
CO1	3								
CO2	3	1	2						
CO3	3				1			1	1
CO4	3	1	1						
CO5	3				1			1	1
CO6	3				1			1	1

Rating scale '**3**' for high, '**2**' for medium, '**1**' for low '**0**' for no correlation

5. COURSE MAP



COURSE NAME	Transportation Engineering	COURSE CODE	R18CE4101

6. DETAILED COURSE CONTENTS

Unit No.	Unit Title and Unit Outcomes (UOs)	Topics and Sub-topics	Marks	Hours	Mapped CO
1	**Railways and Components of Permanent Way** 1a. Knowing the importance of railways 1b. Knowing the gauges and its importance 1c. Suggest the type of rail track joint for the given situation 1d. Suggest the proper type of track component for given railway section	1.1 Importance of railway. Indian Railways. Gauges – Types, Suitability, factors affecting adoption. Surveys for Railway Projects. Requirements of a permanent way. Tilting of rails & coning of wheels. 1.2 Components of Permanent Way I: Rails – Definition, functions, types. Rail joints & welding of rails. Sleepers – Definition, functions, types – PSC & Steel Channel. Spacing & density of sleepers. 1.3 Components of Permanent Way II: Fixtures & fastenings – fish plates & fish bolts, Elastic Rail Clip (ECR) & rubber pads. Definition & functions of ballast. Crushed stone ballast & acceptance criteria for it.	16	10	CO1
2	**Track Geometrics and Branching of Track** 2a. Explain the factors affecting the alignment of the railway for given terrain. 2b. Suggest the magnitude of elements of the track geometrics for given terrain. 2c. Suggest the type and arrangement of points and crossings for given situation.	2.1 Track Alignment. Cross Sectional Elements of Track Geometrics: Gauge, width & depth of ballast, formation width, side slopes, side drains, right of way. 2.2 Longitudinal Elements of Track Geometrics: Gradients & grade compensation at curves, Curves, Super-elevation, Cant deficiency & negative cant, Widening of gauges at curves. 2.3 Branching of Tracks: Definition, functions, component & types of Points, Switches, Crossings and Turnouts.	12	7	CO2
3	**Stations, Yards, Track - Construction and Maintenance.** 3a. To know railway stations and yards. 3b. Describe the process of rail track construction. 3c. Describe the process f rail track maintenance. 3d. Describe the function of tools and plants required for track maintenance.	3.1 Stations & Yards: Definition of Station, Types of stations – Way side stations, junctions & terminals. Definition of yards, Types of yards – Marshalling, shunting & loco. 3.2 Track Construction: Different operations involved in track construction. Tram line, American, Telescopic & PQRS methods of track laying 3.3 Track Maintenance – Definition, Necessity, advantages, classification, organization, tools & plants.	12	7	CO3

COURSE NAME	**Transportation Engineering**	COURSE CODE	**R18CE4101**

Unit No.	Unit Title and Unit Outcomes (UOs)	Topics and Sub-topics	Marks	Hours	Mapped CO
4	**Bridge Engineering – I** 4a. Propose the relevant type of bridge for given situation 4b. To know considerations in bridge design. 4c. To choose the item of bridge substructure relevant to site condition.	4.1 Definition of bridge. Classification of bridges. Site selection for a bridge. IRC & IS references for bridge design & construction. 4.2 Considerations in bridge design – Design discharge, Waterway, Economical span, Afflux & Vertical clearance, Scour depth, Depth of foundation, Width of carriage way and Horizontal clearance 4.3 Bridge substructure – Foundation, Pier, Pier cap, Girder pedestals, Bearings, Abutments & wing walls.	12	7	CO4
5	**Bridges Engineering - II** 5a. To choose the item of bridge superstructure relevant to site condition. 5b. Compare the structures of different types of culvers ad causeways. 5c. Describe the maintenance procedure for given type of bridge.	5.1 Bridge super structure – Decked, Through, Arched, Girdered, Trussed, Suspended, Cable stayed & Mobile or Moving. Approaches to bridge. 5.2 Culverts & Causeways: Definition of culvert & causeways. Types of culverts – RCC slab, pipe & box. Types of causeways – Bed level, Vented & High level. 5.3 Maintenance of Bridges: Routine, reactive and planned preventive maintenance. Maintenance of masonry, concrete & steel bridges. Inspection for maintenance of bridges.	12	7	CO5
6	**Tunnel Engineering** 6a. Describe the criteria for selection of the tunnel and shaft for given situation. 6b. Choose the method of constructing the tunnel in the given situation. 6c. Suggest the method for ventilation and drainage of given tunnel. 6D. Describe the procedure for maintenance of tunnels in the given situation.	6.1 Definition, necessity, advantages & disadvantages of tunnels. Classification of tunnels. Shape & size of tunnels. Shaft & its types. Setting out tunnel centre line. 6.2 Methods of tunneling in rocks – Full face, heading & benching and drift. Methods of tunneling in soft strata – Fore poling, Needle beam, Liner plate & shield. Tunnel boring machine. 6.3 Lining of tunnels – Objectives, Cast in situ & precast concrete lining. Rock bolting. Ventilation, drainage & maintenance of tunnels.	16	10	CO6

9. SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No.	Unit Title	Mapped CO % OR Emphasis	Distribution of Marks			
			Cognitive level			Total Marks
			Remember	Understand	Apply	
1	Railways and Components of Permanent Way	CO1	4	4	8	16
2	Track Geometrics and Branching of Track	CO2	4	4	4	12
3	Stations, Yards, Track - Construction and Maintenance	CO3	4	4	4	12
4	Bridge Engineering – I	CO4	4	4	4	12
5	Bridge Engineering – II	CO5	4	4	4	12
6	Tunnel Engineering	CO6	4	4	8	16
Total			**24**	**24**	**32**	**80**

Note: This specification table shall be used as general guide lines to assist students for learning and to assist teachers for teaching and assessment. The actual distribution of marks in the question paper may vary from the above table.

10. SAMPLE MODEL QUESTION BANK FOR THEORY AND TEST EXAMINATIONS

Sr. No	Unit	Mapped CO	Cognitive level R/U/A	Question
1	2	CO2	R	List any eight requirements of good track alignment.
2	2	CO2	U	Explain equilibrium, maximum & permissible super elevation.
3	2	CO2	A	Draw labeled sketch of a left hand turnout.

11. LEARNING RESOURCES

- **BOOKS**

Sr. No.	Title of Book	Author	Publication
1.	Transportation Engineering	A. Kamala.	Tata McGraw-Hill Publishing, New Delhi . ISBN: 0074517333
2.	Indian Rail Track (Design, Construction & aintenance)	M. M. Agarwal	Prabha & Co. Delhi. ISBN: -81-900613-1-3
3.	Railway Engineering	Satish Chandra & M. M. Agarwal	Oxford University Press, New Delhi. ISBN 9780198083535
4.	A Text Book of Railway Engineering	S. C. Saxena & S. P. Arora	Dhanpat Rai Publications, Delhi ISBN. 978-81-89928-83-4
5.	Roads, Railways, Bridges & Tunnel Engineering	T. D. Ahuja & S. P. Birdi	Standard Book House, Delhi. ISBN 978-8189401337
7.	Bridges in Maharashtra	P.W.D. of Maharashtra.	Maharashtra Govt.
8.	Bridge Engineering	S.P. Bindra.	Dhanpat Rai Publications, Delhi.

Sr. No.	Title of Book	Author	Publication
			ISBN-10: 8189928848 ISBN-13: 978-8189928841
9.	Bridge Engineering	Ponnuswamy S.	Mc-Graw Hill Education, New Delhi ISBN 9780-070656956
10.	Tunnel Engineering	S. C. Saxena	Dhanpat Rai Publications, Delhi. ISBN-10: 938318230X ISBN-13: 978-9383182305

- **WEBSITES**

Sr. No.	Address
1	www.asce.org (Site of American Society of Civil Engineers)
2	www.bridgesite.com
3	www.wikipedia.com
4	www.theconstructiontimes.com
5	www.mahapwd.org
6	nptel.ac.in/courses.php
7	www.youtube.com

- **MAGAZINES/PERIODICALS**

Sr. No.	Title
1	Building Materials & Construction World
2	Civil Engineering Construction Review

- **INDIAN STANDARDS**

Sr. No.	Number & Title
1	IS 10753:1983 Code of practice for preservation of wooden sleepers for railway track by pressure treatment
2	IS 10394:1982 Specification for wooden sleepers for railway track
3	IS 5317:2002 Specification for pitch-mastic for bridge decking and roads
4	IS 4756:1978 Safety code for tunneling work (first revision)
5	IS 1200(Part 25):1971 Method of measurement of building and civil engineering works: Tunneling
6	IS 15026:2002 Guidelines for tunneling methods in rock masses

12. COURSE CURRICULUM DEVELOPMENT MEMBERS

Sr. No.	Name and Designation	Contact No.	Email
1	A. S. Shelar	9423558189	ani_shel@yahoo.com

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE -1

Diploma Programme	CIVIL		
Course Name	Road Engineering	Course code	R18CE4102
Course Category	Applied	Credits	5

COURSE TEACHING, ASSESSMENT AND EVALUATION SCHEME:

Teaching scheme		Evaluation scheme									
		Direct assessment - Weightage - 80%									
		Theory outcome		Practical outcome							Total
				TERMWORK					PRACTICAL	ORAL	
Theory Allotted Hrs	Practical Allotted Hrs	ESE marks	TTA marks	TW marks	SW marks	AS marks	TU Marks	Total	Practical Marks	OR marks	Total marks
3	2	80	20	15	6	4	-	25	-	25	150
		Indirect assessment – Weightage - 20%									
		Mid semester students feedback							End of the course survey		

End Semester Examination-ESE, Two tests average-TTA, Term Work- TW, Student Activity-SW, Assignments –AS, Tutorials- TU, Oral -OR

1. RATIONALE

Road is important, largest & basic mode of transport not only in India but all over the world. It is a mode of transportation which can give service directly to the users end. The development of nation can be measured in terms of length of road network in it. There is lot of scope for a civil engineer in construction & maintenance of the roads. Students holding Diploma in Civil Engineering have considerable opportunities in the field of roads. They could work as a technician in state B & C Department, in MSRDC, in CPWD, in MES in NHAI and also in private sector involved in infrastructure projects. Also he could take the road construction/maintenance works on contract basis immediately after completing his diploma by registering with concerned authority in appropriate class.

2. EXPECTED PROFICIENCY

Undertake construction and maintenance of roads.

3. COURSE OUTCOMES (COs)

After completing this course students will be able to

1. Identify the type of a road.
2. Implement geometric design of a road.
3. Recommend a traffic control device.
4. Test the road construction materials.
5. Plan, organize and supervise road construction activities.
6. Select repair and maintenance technique for a road.

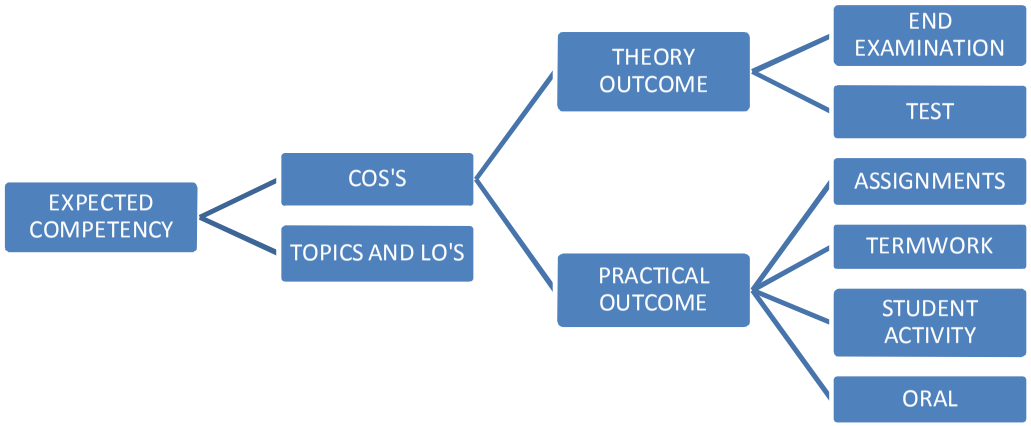
COURSE NAME	Road Engineering	COURSE CODE	R18CE4102

4. CO –PO MATRIX

Course Name: Road Engineering Course Code: R18CE4102	PO 1 Basic and Discipline Specific knowledge	PO 2 Problem Analysis	PO 3 Design or Development of Solutions	PO 4 Engineering Tools, Experimentation and Testing	PO 5 Engineering Practices for Society, sustainability and Environment	PO 6 Project Management	PO 7 Life-Long Learning	PSO 1 Construction planning and detailing	PSO 2 Construction execution, supervision and maintenance
CO1	3						1		
CO2	3	1	1						
CO3	3	1			1				
CO4	1			3	1				
CO5	2				1		`1	1	2
CO6	2				1		1	1	2

Rating scale '**3**' for high, '**2**' for medium, '**1**' for low '**0**' for no correlation

5. COURSE MAP



COURSE NAME	Road Engineering	COURSE CODE	R18CE4102

6. DETAILED COURSE CONTENTS

Sr. No.	Unit Title and Unit Outcomes (UOs)	Topics and Sub-topics	Marks	Hours	Mapped CO
1	**Development, Planning, Classification & Alignment of Roads** 1.1 State importance of road network in development of a region. 1.2 Distinguish road development plans. 1.3 Classify roads as per IRC provisions. 1.4 Describe survey for road project. 1.5 List factors affecting alignment for given type of road.	1.1 Definition & Importance of roads. Scope for road engineering. Road development in India – Jaykar Committee Report, Central Road Fund, Indian Road Congress (IRC), Central Road Research Institute (CRRI). 1.2 Road Planning – Principles, Factors considered, Procedure. Road Planning in India – Nagpur plan, Bombay plan, Lucknow plan. Current scenario of road development in India. Prime Minister Gram Sadak Yojana (PMGSY). 1.3 IRC classification of non urban & urban roads. Survey for Road Project. Road alignment & factors governing it.	12	7	CO1
2	**Road Geometrics** 2.1 Explain the terms related to road geometrics. 2.2 Select type & magnitude of camber for given section of a road 2.3 Describe road curve appropriate to given situation. 2.4 Calculate sight distances, radius of curve, super-elevation and widening & grade compensation at curves 2.5 Suggest type & magnitude of gradient for given section of road. 2.6 Sketch the cross section for a road in given situation.	2.1 Concept of road geometrics. Terrain classification. Design speed. Components of cross section of a road & their functions. 2.2 Cross sectional Elements of road Geometrics – Right of way, Building & control line, Road way width, Width of carriage way, Shoulders, Camber. 2.3 Longitudinal Elements of Track Geometrics – Sight Distances – Definitions, types & IRC recommendations. Types of horizontal curves & factors governing its provision. Widening of roads at horizontal curves. 2.4 Types of vertical curves & factors governing its alignment. Super elevation – Concept, Advantages, Magnitude, Limiting values, Methods of Attaining. Types of gradients & Grade compensation at curves.	16	10	CO2
3	**Traffic Engineering & Road Pavement** 3.1 Carry out traffic volume study. 3.2 Suggest method of parking on given section road.	3.1 Traffic engineering: Introduction. Six sections of traffic engineering, Traffic Characteristics – Road user's & vehicular. Traffic Studies – Objects & items of traffic	12	7	CO3

COURSE NAME	Road Engineering	COURSE CODE	R18CE4102

Sr. No.	Unit Title and Unit Outcomes (UOs)	Topics and Sub-topics	Marks	Hours	Mapped CO
	3.3 Identify traffic road signs. 3.4 Describe different types of road intersections. 3.5 Differentiate between flexible & rigid pavements. 3.6 Explain functions of components of a pavement.	studies. Traffic volume study & parking studies. 3.2 Traffic control devices – Signs, Signals, Markings, Islands & Intersections. 3.3 Road Pavement: Definition. Classification - As per behavior (Flexible & Rigid), As per material of construction. Layers in pavement – location, function, & requirement.			
4	**Road Construction Materials** 4.1 List desirable properties of sub-grade soil 4.2 Suggest a stabilization method suitable to given soil. 4.3 Determine the properties of given aggregate mass. 4.4 Select the aggregates suitable to site condition. 4.5 Identify given bituminous binder. 4.6 Test given bituminous binder.	4.1 Sub-grade Soil: Desirable properties, California Bearing Ratio (CBR) & soil stabilization. 4.2 Aggregates: Introduction to & desirable properties of road aggregate. Laboratory & Field tests for road aggregates. 4.3 Bituminous Binders: Definition. Salient features. Requirements. Types – Asphalt, Tar, Cutback & emulsion. 4.4 Tests on bituminous materials – Consistency tests, composition test & other tests.	16	10	CO4
5	**Construction of Roads** 5.1 State merits and limitations of earth, WBM, bituminous & concrete roads. 5.2 Describe the construction method for Earth & WBM roads. 5.3 Select method of construction of bituminous road appropriate to given situation. 5.4 Suggest machinery/plant construction of bituminous road under given condition. 5.5 Differentiate alternate bay method from continuous bay method. 5.6 Suggest the type of joint on concrete road under given situation.	5.1 Earth & WBM Roads: Terms related with earthwork in road. Construction, merits, demerits & limitations of earth roads. Features, materials, construction, merits & demerits of WBM Roads. 5.2 Bituminous Roads: Interfacing coats. Bituminous construction in use – Surface dressing, macadam, concrete, sheet & mastic asphalt. Machinery/plant in construction of bituminous rods. 5.3 Cement Concrete Roads: Introduction. Alternate & continuous bay methods. Stages in construction. Joints – Need, types and filler & sealer compounds. Machinery in construction.	12	7	CO5
6	**Hill Roads, Road Drainage & Road Maintenance** 6.1 Suggest the protective works on hill road. 6.2 Describe methods to prevent landslides. 6.3 State necessity of road drainage.	6.1 Hill Roads: Necessity of study, Alignment, Resisting length, Curves, Stages in construction, Trace cut, Protective works. Landslides – Types, causes & preventive measures. 6.2 Road Drainage: Importance & significance, Good drainage	12	7	CO6

COURSE NAME	**Road Engineering**	COURSE CODE	**R18CE4102**

Sr. No.	Unit Title and Unit Outcomes (UOs)	Topics and Sub-topics	Marks	Hours	Mapped CO
	6.4 Recommend method of road drainage adequate to given situation. 6.5 Identify the cause for deterioration of a road. 6.6 Carry out repair a road undergone particular form of failure.	system. Surface & subsurface drainage systems. Cross drainage. 6.3 Road Maintenance: Introduction & necessity. Causes & forms of failures in layers of a pavement. Routine, Periodic & Special maintenance. Inspection for maintenance. Maintenance of earth, WBM, bituminous & concrete roads.			

7. PRACTICAL – ASSIGNMENTS - STUDENT ACTIVITIES - TUTORIALS

Sr. No.	Practical (Student should perform all of following practicals)	Unit No.	Hours Allotted	Mapped CO
1	Specific gravity and water absorption test on aggregates.	4	4	CO4
2	Flakiness index and elongation index of the aggregates.	4	2	CO4
3	Crushing or Impact or Abrasion test on aggregates.	4	2	CO4
4	Softening point or penetration or ductility test on bitumen.	4	4	CO4
5	Viscosity test on cutback.	4	2	CO4
6	Stripping value of an aggregate.	4	2	CO4
7	Determination of bitumen content in bituminous mix.	4	2	CO4
--	Total	--	18	--

Sr. No.	Assignments	Unit No.	Hours Allotted	Mapped CO
1.	Carrying out geometric design of a road.	2	2	CO2
2.	Traffic volume study & analyzing data collected for it for an important road intersection in your city.	3	4	CO3
-	Total	-	6	-

Sr. No.	Student activity	Unit No.	Hours Allotted	Mapped CO
1	Going through an article on transportation planning & development in India in a national or international highway or construction engineering magazine or journal and preparing and submitting brief extract of it.	1	2	CO1
2	Arranging and attending a technical Visit to site/plant related with road construction or maintenance and preparing & submitting report of it.	5	2	CO5
3	Visiting a shop/office of road maintenance machinery manufacturer/supplier collecting information & brochures for different road maintenance machines & submitting it along with term work. OR Going through an article in a national/international highway or construction engineering periodical on innovative road maintenance materials/practices and preparing slide show of it and presenting it in front of other students in batch .	5	2	CO6
-	Total	-	6	-

Sr. No.	Practical	Unit No.	Hours Allotted	Mapped CO
-	**Practicals, Assignments, Student Activities Submission**	-	**2**	-
-	**Total**	-	**32**	-

Remarks:

1. The list of practicals/tutorials/student activities given above is suggestive. One or more such practicals/tutorials/student activities can be replaced with another or modified to attain the expected outcomes and proficiency more effectively.

2. The practicals/tutorials/student activities should be so designed that students acquires outcomes in all domains - cognitive, psychomotor and affective.
3. Even though mainly outcomes in psychomotor domain are listed under practicals/tutorials/student activities, it will also lead to development of outcomes in affective domain also.
4. The affective domain outcomes (social skills & attitudes) those will be developed through practicals/tutorials/student activities includes – practice good housekeeping, maintain instruments & tools, demonstrate working as a team member & a leader and follow safety & ethical practices.
5. Acquisition of outcomes such as valuing, organizing and characterizing under affective domain will take place in the student gradually over three years of diploma program.
6. The skills associated with each of the practical/tutorial/student activity are to be assessed using the 'Rubrics' given under 'Evaluation Scheme for Practicals/Assignments/Student Activities'.

8. EVALUATION SCHEME FOR PRACTICAL / ASSIGNMENTS/STUDENT ACTIVITIES

Rubrics for Practicals

Category	4	3	2	1
Experimental procedure & handling of the instruments	Follows procedure as instructed and safe & correct handling of the instruments	Little oversight towards procedure, safety & handling of the instruments	Considerable oversight towards procedure, safety and handling of the instruments	Careless about the procedure safety & handling of the instruments.
Data documentation, data analysis & results interpretation	Correct Documentation of all data, Correct calculations and Error in result worked out correctly is within the limit	Correct documentation of majority of data, Minor errors in calculations and Error in results worked out correctly is not within the limit	Incorrect documentation of majority of data, Major errors in calculations and Error in result Worked out incorrectly.	Incomplete & wrong documentation of data, Incomplete & wrong calculations and Error in result not worked out.
Team spirit	Contributes a fair share to work	Sometimes depends on others to complete the work	Many times depends on others to complete the work	Always depends on others to complete the work
Timely completion of activity	Maximum	Moderate	Satisfactory	Least
Overall understanding	Maximum	Moderate	Satisfactory	Least

Rubrics for Assignments

Category	4	3	2	1
Quantity & Source of information	All subtopics covered in detail & clear documentation of sources of information	All subtopics are mostly covered and clear documentation of sources of information with some missing links	Some of the subtopics are not covered in detail and part documentation of sources of information with some missing links	Some of the subtopics are not covered at all and part documentation of sources of information with too many missing links

Category	4	3	2	1
Quality of information, graphics and presentation.	Clear description with all supporting details, relevant & neat graphics and well structure presentation.	Clear description with some supporting details, relevant but messy graphics. and structured presentation.	Clear description with no supporting details, neat but irrelevant graphics and structured presentation with missing links.	Irrelevant description, irrelevant & messy graphics and unstructured presentation.
Understanding of concepts and mistakes	Complete understanding and no mistakes	Substantial understanding and 90 % Free of mistakes	Some understanding and 75 % free of mistakes	Limited understanding and 50 % free of mistakes
Timely completion of activity	Maximum	Moderate	Satisfactory	Least
Overall understanding	Maximum	Moderate	Satisfactory	Least

Rubrics for Student Activities

Category	4	3	2	1
Leadership qualities	Assume the role willingly & demonstrate ability fully	Assume the role willingly but demonstrate ability partly	Assume the role unwillingly though demonstrate ability fully	Assume the role unwillingly & demonstrate ability partly
Planning & Execution	Proper planning & execution	Proper planning but improper execution	Improper planning but proper execution	Improper planning & execution
Quality of report, graphics and presentation.	Clear description with all supporting details, relevant & neat graphics and well structure presentation.	Clear description with some supporting details, relevant but messy graphics. and structured presentation.	Clear description with no supporting details, neat but irrelevant graphics and structured presentation with missing links.	Irrelevant description, irrelevant & messy graphics and unstructured presentation.
Timely completion	Maximum	Moderate	Satisfactory	Least
Overall understanding	Maximum	Moderate	Satisfactory	Least

Rubricks for Orals

Category	4	3	2	1
Knowledge of Course content	Accurately states the main points and details in answer to the question.	Adequately states the main points and details in answer to the question.	States most of the main points but miss out details in answer to the question.	States few main points and details in answer to the question.
Delivery	Effectively and creatively delivers the information while staying on topic and considering the audience	Adequately delivers the information while staying on the topic and considering the audience.	Delivers the information but does not stay on topic. Little consideration on audience.	Little or no attempt is made to deliver the information and stay on topic.
Vocabulary	Wide range of vocabulary and there is no repetition.	Quite Wide range of vocabulary and there is not lot of repetition	Some new vocabulary and few new expression	Student tends to repeat words all the time.
Body Language and eye contact	Good straight posture and eye contact.	Most of the times straight posture and moderate eye contact	Occasionally straight posture and little eye contact	Plump posture and very little eye contact

9. MAJOR EQUIPMENT / INSTRUMENTS / TOOLS REQUIRED

Sr. No.	Equipment Name with Specifications	Practical
1	Density basket as per IS 2386 (Part III) - 1963	1
2	Thickness gauge & elongation gauge as per IS 2386 (Part I) - 1963.	2
3	Aggregate crushing mould as per IS: 2386 (Part IV) - 1963	3
4	Aggregate impact testing machine as per IS 2386 (Part IV) - 1963	3
5	Los Angeles Abrasion Test Machine as per IS 2386 (Part IV) - 1963	3
6	Ring and ball apparatus for softening point test as per IS 1205 - 1978	4
7	Standard bitumen Penetrometer as per IS 1203 - 1978	4
8	Ductility Testing Machine as per IS 1208 - 1978	5
9	Tar viscometer as per IS 1206 (Part I) – 1978	6
10	Thermostatically controlled water bath as per IS 6241 – 1971	7
11	Bitumen centrifugal extractor as per IRC: SP 11 –1988 (Appendix - 5)	8

9. SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Topic No.	Topic Title	Mapped CO % OR Emphasis	Distribution of Marks			
			Cognitive level			Total Marks
			Remember	Understand	Apply	
1	Development, Planning, Classification & Alignment of Roads	CO1	4	4	4	12
2	Road Geometrics	CO2	4	4	8	16
3	Traffic Engineering & Road Pavement	CO3	4	4	4	12
4	Road Construction Materials	CO4	4	4	8	16
5	Construction of Roads	CO5	4	4	4	12
6	Hill Roads, Road Drainage & Road Maintenance	CO6	4	4	4	12
Total		--	**24**	**28**	**32**	**80**

Note: This specification table shall be used as general guide lines to assist students for learning and to assist teachers for teaching and assessment. The actual distribution of marks in the question paper may vary from the above table.

10. SAMPLE MODEL QUESTION BANK FOR THEORY AND TEST EXAMINATIONS

Sr. No.	Topic	Mapped CO	Cognitive level R/U/A	Question
1	1	CO1	R	State the points highlighting importance of roadways.
2	1	CO1	U	Write a brief note on Current scenario of road development in India.

Sr. No.	Topic	Mapped CO	Cognitive level R/U/A	Question
3	1	CO1	A	Classify the nonurban roads as per Nagpur plan and explain each class of road in it.

11. LEARNING RESOURCES

- **BOOKS**

Sr. No.	Title of Book	Author	Publication
1	Transportation Engineering	A. Kamala.	Tata McGraw-Hill Publishing Company Ltd, New Delhi 2.
2	Transportation & Highway Engg.	G. V. Rao.	Tata McGraw-Hill Publishing Company Ltd, New Delhi 2.
3	A Text Book of Transportation Engineering	N. L. Arora	New India Publishing House, Delhi
4	Highway Engineering	T. D. Ahuja	Standard Book House, Delhi 6
5	Principes, Practice & Design of Highway Engineering	S. K. Sharma.	S. Chand & Co., Delhi 55
6	Principles of Highway Engineerng	R.K Khitoliya	Dhanpat Rai Publications, Delhi 2
7	Highway Engineering.	Khanna & Justo	Nemchand & Bros. Roorkee
8	Transportation Engineering & Planning	Papacostas & Prevedouros	Pearson Education, Delhi
9	Principles & Practices of Highway Engineering	Dr. Kadiyali & Dr. Lal	Khanna Publishers, Delhi.
10	Principles of Transportation Engineering	P. Chakraborty & A. Das	Prentice Hall of India, Delhi.
11	Traffic Engineering & Transport Planning	L. R. Kadiyali	Khanna Publishers, Delhi.
12	Laboratory Manual in Highway Engineering	Duggal & Puri	New Age International, Delhi.
13	Highway Material Testing (Laboratory Manual)	Khanna & Justo	New Chand & Bros. Roorkee.

- **WEBSITES**

Sr. No.	Address
1	www.irc.org.in (Site of Indian Road Congress)
2	www.mahapwd.com (Site of Maharashtra State PWD)
3	www.crridom.gov.in (Site of Central Road Research Institute)
4	www.asce.org (Site of American Society of Civil Engineers)
5	www.bridgesite.com
6	www.wikipedia.com
7	www.theconstructiontimes.com

- **MAGAZINES/PERIODICALS**

Sr. No.	Title
1	New Building Material & Construction World (Monthly)
2	Civil Engineering Construction Review (Monthly)
3	Indian Concrete Journal (Monthly)
4	Indian Geotechnical Journal (Quarterly)

- **IRC & IS Codes**

Sr. No.	Number and Title
1	IRC: 14 - Recommended practice for 2cm thick bitumen and tar carpets.
2	IRC: SP: 19 -Manual for Survey, Investigation and Preparation of Road Projects
3	IRC: 20 - Recommended practice for bituminous penetration macadam (full grout).
4	IRC: 29 - 1968 Tentative specifications for 4cm asphaltic concrete surface course.
5	IRC: 73 - Geometric Design Standards for Rural (Non-Urban) Highways
6	IRC: 86 - Geometric Design Standards for Urban Roads in Plains
7	IRC: 38 - Design Tables for Horizontal Curves for Highways
8	IRC SP: 23 - Vertical Curves for Highways
9	IRC: SP: 42 - Guidelines on Road Drainage
10	IRC: SP: 50 - Guidelines on Urban Drainage
11	IRC: 1983 - Guidelines for the various maintenance operations required for road and duties & responsibilities of the staff concerned.
12	IS: 73 – 1961 - Indian Standard Specifications for Paving Bitumen.
13	IS: 2720 – Part XXXI -1969 – California Bearing Ratio Test.
14	IS: 5317 -1969 – Mastic Asphalt

12. COURSE CURRICULUM DEVELOPMENT MEMBERS

S. No.	Name and Designation	Contact No.	Email
1	Prof. A. S. Shelar	9423558189	ani_shel@yahoo.com
2	Prof. D. A. Rajput.	9960729657	rajputdeepaksingh81@yahoo.co.in

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE -1

Diploma Programme	CIVIL		
Course Name	Environmental Engineering	Course code	R18CE4103
Course Category	Applied	Credits	5

COURSE TEACHING, ASSESSMENT AND EVALUATION SCHEME:

Teaching scheme		Evaluation scheme									
		Direct assessment- Weightage - 80%									
		Theory outcome		Practical outcome							Total
				TERMWORK					PRACTICAL	ORAL	
Theory Allotted hrs	Practical Allotted hrs	ESE marks	TTA marks	TW marks	SW marks	AS marks	TU Marks	Total	Practical Marks	OR marks	Total marks
3	2	80	20	5	10	10	-	25	-	25	150
		Indirect assessment- Weightage - 20%									
		End semester students feedback						End of the Program survey			

End semester examination-ESE, Two tests average-TTA, Term Work- TW, Student Activity-SW, Assignments –AS, Tutorials- TU, Oral -OR

1. RATIONALE

With growing need of water for irrigation, industry, drinking water, hydropower, pollution free water has assumed greater importance. Similarly waste in form of solid and liquid if not treated and disposed of in a scientific and hygienic manner ,may lead to health hazards, The job of civil engineer is to conduct survey, collect data, prepare drawings, and supervise construction of water and waste water treatment plants .This subject is intended to teach the students concepts, principles and procedures of Public health Engineering which will enable him to apply this knowledge for construction, supervision, execution of environmental Engineering projects. Thus the course will be useful in maintaining desired standards water and waste quality.

2. EXPECTED PROFICIENCY

Execute, supervise and maintain project related to water treatment, distribution, waste water treatment and disposal.

3. COURSE OUTCOMES (COs)

Students will be able to

a) Estimate the quantity of drinking water and domestic wastewater generated.
b) Analyze characteristics of water and wastewater.
c) Explain function of different unit processes required for water supply scheme.
d) Explain various water distribution systems and waste water disposal systems with their pros and cons.
e) Explain function of different unit processes required for waste-water treatment.
f) Suggest layouts and components for water supply and drainage for a building.

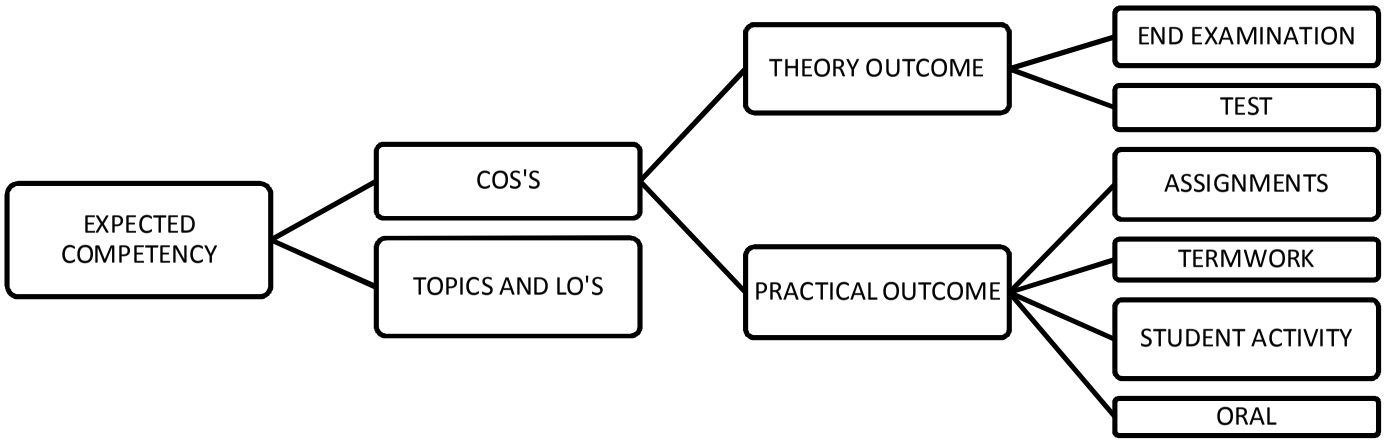
COURSE NAME	Environmental Engineering	COURSE CODE	R18CE4103

4. CO –PO MATRIX

Course Name : Environmental Engineering Course Code: R18 CE4103	PO 1 Basic and Discipline specific knowledge	PO 2 Problem analysis	PO 3 Design/ development of solutions	PO 4 Engineering Tools, Experimentation and Testing	PO 5 Engineering practices for society, sustainability and environment	PO 6 Project Management	PO 7 Life-long learning	PSO 1 Construction planning and detailing	PSO 2 Construction execution, supervision and maintenance
CO1	3	2	1	1					
CO2	3			2				1	
CO3	3	2	1						
CO4	3	2	1				1		
CO5	3	2	1					1	
CO6	3	2						1	

Rating scale '**3'** for high, '2' for medium, **'1'** for low '0' for no correlation

5. COURSE MAP



COURSE NAME	Environmental Engineering	COURSE CODE	R18CE4103

6. DETAILED COURSE CONTENTS

S. No.	Unit Outcomes (UOs)	Topics and Sub-topics	Marks	Hours	Mapped CO
1	1a. Describe various surface and sub surface sources of water in a given situation. 1b. Explain various types of intake structures for the given source of water. 1c. Draw flow diagram of water supply scheme in the given situation. 1d. Explain different method of forecasting population in the given situation. 1e. Undertake physical, chemical and biological tests for the given sample of water.	**QUANTITY AND QUALITY OF WATER SOURCES OF WATER:** 1. Surface and Subsurface sources of water, Intake Structures, Definition and types, Factors governing the location of an intake structure, Types of intakes. 2. **Quantity of water:** Flow diagram of water supply scheme, function of units, Demands of water, Factors affecting rate of demand, Variations of water demands, Forecasting of population, Methods of forecasting of population, Design period. 3. **Quality of water:** Need for analysis of water, Characteristics of water- Physical, Chemical and Biological, Testing of water Bacteriological tests, E coli, MPN, Sampling of water, Water quality standards as per norms.	16	10	CO1
2	2a. Describe different conventional water treatment processes according to water quality. 2b. Test the given water sample to determine the optimum dose of coagulant. 2c. Describe the process of filtration of water in the given situation. 2d. Differentiate between slow sand filter and rapid sand filter in the given situation. 2e. Explain different methods of disinfection for the given water sample. 2f. Explain advanced treatment methods for the water in the given situation.	**WATER TREATMENT** 1 **Conventional water treatment:** Screening- Types of screens, Aeration- objects and methods of aeration, Plain sedimentation, Sedimentation with coagulation, principles of coagulation, types of coagulants , process of coagulation, types of sedimentation tanks, Clariflocculator, Filtration- theory of filtration, classification of filters: slow sand filter, rapid sand filter, pressure filter, construction and working of slow sand filter and rapid sand filter. Disinfection: Objects, methods of disinfection, Chlorination- Application of chlorine, forms of chlorination, types of chlorination practices, residual chlorine and its importance. 2 **Miscellaneous water Treatments**: Water softening, tube settlers, electrolysis, Reverse Osmosis.	**12**	**8**	**CO2**

COURSE NAME	**Environmental Engineering**	COURSE CODE	**R18CE4103**

S. No.	Unit Outcomes (UOs)	Topics and Sub-topics	Marks	Hours	Mapped CO
3	3a Explain the conveyance system of water for the given area. 3b Select the type of valve for the given pipeline of water supply. 3c Explain the methods of distribution of water in the given situation 3d Draw the layout of water distribution system in the given situation. 3e Estimate storage capacity of reservoir using mass curve technique.	**DISTRIBUTION OF WATER** 1 **Conveyance:** Types of Pipes used for conveyance of water, choice of pipe material, Types of joints & Types of valves-their use, location and function on a pipeline. 2 **Distribution of water:** Methods of distribution of water-Gravity, pumping, and combined system, Service reservoirs - functions and types ,Layouts of distribution of water-Dead end system, grid iron system, circular system, radial system ; their suitability, advantages and disadvantages. 3 Estimation of storage capacity of reservoir using mass curve technique.	12	6	CO3
4	4 a. Define terms related to sewerage works. 4 b. Differentiate between systems of sewerage. 4 c. Compute the discharge for a sewer line 4 d. Design a sewer for given discharge conditions.	**SEWERAGE WORKS** 1. **Definition of terms**:-Sewage, sullage, refuse, garbage sewer & sewerage. Methods of sewage disposal – Conservancy & water carriage system. 2. **Systems of sewerage:-**Separate, combined & partially separate systems. Quantity of sewage - Types of flow in sewer, variation in sewage flow. Laying, Testing and maintenance of sewers, Manholes and Drop Manhole-component parts, location, spacing, construction details, Sewer Inlets, Street Inlets. 3. **Design of sewers:-**Peak flow & self cleansing velocity, gradient of sewer, size of sewer, use of tables & monograms in design of sewer, shapes for cross- section of sewer. Maintenance of sewers.	12	8	CO4
5	5a. Estimate the characteristics of given sewage sample. 5b. Examine the quality of treated sewage as per given norms. 5C. Draw flow diagram for sewage treatment plant for the given data. 5D. Select the relevant method of treatment of sewage in	**CHARACTERISTICS, TREATMENT & DISPOSAL OF SEWAGE** **5.1 Analysis of sewage** Strength of sewage. Properties of sewage. Analysis of sewage **5.2 Treatment of sewage**	16	10	CO5

COURSE NAME	**Environmental Engineering**	COURSE CODE	**R18CE4103**

S. No.	Unit Outcomes (UOs)	Topics and Sub-topics	Marks	Hours	Mapped CO
	the given situation.	Preliminary treatment- Screening; grit removal; grease removal, primary treatment – sedimentation & chemical precipitation, secondary treatment – filtration & activated sludge process. **5.3 Sludge & effluent disposal** Types of sludge, method of sludge disposal. Natural & artificial methods of disposal of effluent. Miscellaneous treatment – oxidation pond & ditch, aerated & anaerobic lagoons.			
6	6 a. Explain the term, "Building Sanitation". 6 b. Describe relevant system of plumbing in the given situation. 6 c. Draw layout plan of drainage system of a given building. 6 d. Describe the design principles used in house drainage.	**BUILDING WATER SUPPLY AND SANITATION SYSTEM.** 1 Principles governing design of building water supply system. Layout of water supply arrangement and design basics. 2 Components of house drainage, design fundamentals and layouts. Recycling of waste water	12	6	CO6

7. PRACTICAL –ASSIGNMENTS-STUDENT ACTIVITIES-TUTORIALS (Separate table for each)

S. No.	Term Work (Assignments)	Topic No.	Hours Allotted	Mapped CO
1	Preparation of chart related to characteristics of water showing details like type, permissible limits, testing equipment, effects, treatment method.	1	2	CO2
2	Excel spreadsheet solution for population forecasting methods.	1	2	CO 1
3	Excel Assignment based on calculation of storage capacity of reservoir.	3	2	CO4
4	Excel assignment based on design of sewer/storm water pipes.	4	2	CO4
5	AutoCAD detail drawings based on water treatment processes.	2	4	CO3
6	AutoCAD detail drawings based on waste water treatment processes	5	4	CO5
7	Design of water supply line for high rise building.	6	4	CO6
--	**Total**	**--**	**20**	**--**

S. No.	Student Activity	Topic No.	Hours Allotted	Mapped CO
1	Collecting information regarding norms ,for water and wastewater treatment of various statutory bodies ,information regarding new treatment processes through internet, manuals etc.	1	2	CO2
2	Video presentation on conventional or advanced water /waste treatment process.	2	2	CO3, CO5
3	Presentation on conventional or advanced water/waste water treatment process.	4	2	CO3, CO5
4	Study of software related to design of water supply distribution network design/sewer design and brief report.	3, 4	2	CO4, CO6
5	Report on visit to water treatment plant/ Waste water treatment plant.	2, 4	2	CO3, CO5
--	**Total**	**--**	**10**	**--**

S. No.	Practical	Topic No.	Hours Allotted	Mapped CO
	Practical –assignments-student activities submission		**2**	
	Total		**32**	

8. EVALUATION SCHEME FOR PRACTICAL / ASSIGNMENTS/STUDENT ACTIVITIES

Rubrics for Assignments

Category	4	3	2	1
Structure	Very Well Structured	Well Constructed	Structured But Missing Links	Unstructured
Understanding of Analytical Concepts	Complete Understanding	Substantial Understanding	Some Understanding	Limited Understanding
Mathematical Errors	Least Errors	90 % Free of Errors	75 % Free of Errors	50 % Free of Errors
Graphics	Neat ,Accurate and Enhance Understanding	Neat and Accurate	Some Illustrations are Misleading and Redundant	Least Accurate and Not Neat
Timely Completion of Activity	Maximum	Moderate	Satisfactory	Least
Overall Understanding	Maximum	Moderate	Satisfactory	Least

Rubricks for Student Activities

Category	4	3	2	1
Structure And Presentation	Very Well Structured	Well Constructed	Structured But Missing Links	Unstructured
Quantity Of Information	All Subtopics Covered In Detail	All Subtopics Are Mostly Covered	Some Of The Subtopics Are Not Covered In Detail	Some Of The Subtopics Are Not Covered
Quality Of Information	Clear Description With Supporting Details	Clear Description With Some Supporting Details	Clear Description With Lack Of Supporting Details	Irrelevent Information
Sources	Clear Documentation	Clear Documentation With Some Missing Links	Part Documentation With Missing Links	Documentation With Number Of Missing Links
Graphics	Neat ,Accurate And Enhance Understanding	Neat And Accurate	Some Illustrations Are Misleading And Redundant	Least Accurate And Not Neat
Group Activity	Maximum Coordination And Effort	Fair Coordination And Effort	Lack Coordination And Effort	Least Participation
Timely Completion Of Activity	Maximum	Moderate	Satisfactory	Least
Overall Understanding	Maximum	Moderate	Satisfactory	Least

9. MAJOR EQUIPMENT/ INSTRUMENTS /TOOLS REQUIRED

S. No.	Equipment Name with Specifications	Practical
1	MS excel software	2,3,4
2	Autocad software	5,6
3	Epanet, sewer, Autodesk storm and sanitary analysis software	SA4

9. SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Topic No.	Topic Title	Mapped CO %	Distribution of Marks			
			Cognitive level			Total Marks
			Remember	Understand	Apply	
I	Quantity and Quality of water	CO1 17.95%	08	04	04	16
II	Water treatment	CO2 15.38%	04	04	04	12
III	Distribution of water	CO3 15.38%	04	04	04	12
IV	Sewerage Works	CO4 17.95%	04	04	04	12
V	Characteristics, Treatment & Disposal of Sewage	CO5 17.95%	08	04	04	16
VI	Building water supply and sanitation system.	CO6 15.38%	04	04	04	12
Total		100%	**32**	**24**	**24**	**80**

10. SAMPLE MODEL QUESTION BANK FOR THEORY AND TEST EXAMINATIONS

S. No	Topic	Mapped CO	Cognitive Level R/U/A	Question
1	1	CO1	R	Explain any one factor considered in estimation of quantity of water
2	1	CO1	U	Explain any one method of population forecasting
3	1	CO1	A	Estimate the population for the year 2045 by Arithmetical Increase method. Refer census data given in the table.

11. LEARNING RESOURCES

- **BOOKS**

S. No.	Title of Book	Author	Publication
1	Water Supply and Sanitary Engineering	Birdie G. S. Birdie J. S.	Dhanpat Rai and Sons, 201ISBN: 81874337954,
2	Environmental Engineering Vol. I and Vol. II	S. K. Garg	Khanna Publishers, New Delhi, 2017, ISBN-10: 8174091203; ISBN-13: 978-8174091208 ...
3	Environmental Engg.	A. Kamala & D. L. Kanth Rao	Tata Mc-Graw-Hill publishing co. Ltd., Delhi.

- **SOFTWARE/ TOOLS/ MODELS**

S. No.	Name	Company	Freeware/commercial
1	EPAnet software	USEPA	Freeware
2	SEWER	World Bank	Freeware
3	Autodesk SSA	Autodesk	Commercial

- **WEBSITES**

S. No.	ADDRESS
1	www.nptel.iitm.ac.in
2	www.cpheeo.nic.in
3	www.mpcb.gov.in.
4	www.cpcb.nic.in
5	https://mjp.maharashtra.gov.in/
6	www.IS 10500(2012): Drinking Water

12. COURSE CURRICULUM DEVELOPMENT MEMBERS

S. No.	Name and Designation	Contact No.	Email
1	Dr. S. V. Kanitkar	9921414902	svkwadia@yahoo.co.in

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE -1

Diploma Programme	CIVIL		
Course Name	Irrigation Engineering	Course code	R18CE34104
Course Category	Applied	Credits	6

COURSE TEACHING, ASSESSMENT AND EVALUATION SCHEME:

Teaching scheme		Evaluation scheme									
		Direct assessment- Weightage = 80%									
		Theory outcome		Practical outcome							Total
				TERMWORK					PRACT	OR	
Theory Allotted hrs	Practical Allotted hrs	ESE marks	TTA marks	TW marks	SW marks	AS marks	TU marks	Total Marks	Practical Marks	OR marks	Total marks
4	2	80	20	15	05	05	--	25	-	25	150
		Indirect assessment- Weightage - 20%									
		Mid semester students feedback				End of the course survey					

End semester examination-ESE, Two tests average-TTA, Term Work- TW, Student Activity-SW, Assignments –AS, Tutorials- TU, Oral -OR

1. RATIONALE

In India basic source of agriculture water is precipitation. As magnitude as well as frequency of the rainfall varies throughout the tropical country, natural rainfall cannot suffice entire water requirement of the crops all over the year. Most of the water during rain is wasted through percolation, runoff etc. If food production is intended throughout the year, dependable supply of water is needed, for which irrigation structures like dams, weirs, bandhara, canals are necessary. Diploma civil engineer when works as supervisor for construction and maintenance of these irrigation structures, he needs to know functioning of these structures. Knowledge of journey of drop of water in water cycle to the field till roots of crop, through dam and canal will lead to optimum use of irrigation water.

2. EXPECTED PROFICIENCY

Supervise functioning of irrigation structures.

3. COURSE OUTCOMES (COs)

Students will be able to

1. Estimate catchment area/ command area of a small irrigation scheme & compute average annual rainfall for the catchment
2. Suggest suitable irrigation method for given agricultural land and situation.
3. Illustrate minor irrigation structures and its functioning.
4. Illustrate dam structures and its functioning.
5. Fix control levels of reservoir basin for given data and illustrate diversion head works.
6. Illustrate canal structures and its functioning.

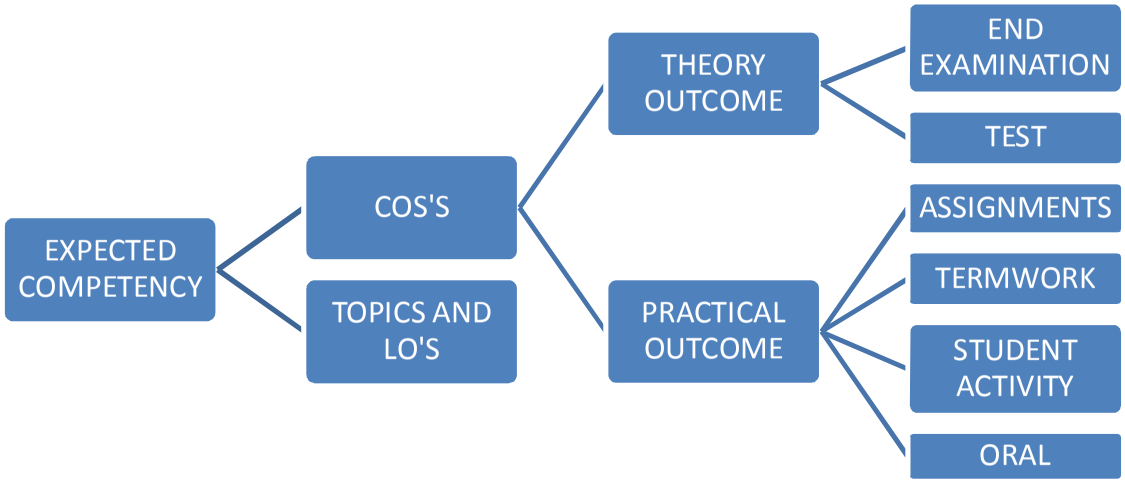
COURSE NAME	Irrigation Engineering	COURSE CODE	R18CE4104

4. CO –PO MATRIX

Course Name: Irrigation Engineering Course Code: R18CE4104	PO 1 Basic and Discipline specific knowledge:	PO 2 Problem analysis:	PO 3 Design/ development of solutions:	PO 4 Engineering Tools, Experimentation and Testing:	PO 5 Engineering practices for society, sustainability and environment:	PO 6 Project Management:	PO 7 Life-long learning:	PSO 1 Construction planning and detailing	PSO 2 Construction execution, supervision and maintenance
CO1	2	1	1	2	3		1	1	1
CO2	2		2		1	1	1	2	
CO3	1	1	1	1	2			1	2
CO4	2	1		1	1		1	1	1
CO5	1	1			2				1
CO6	1			1	2			1	1

Rating scale '**3**' for high, '**2**' for medium, **'1'** for low **'0'** for no correlation

5. COURSE MAP



COURSE NAME	Irrigation Engineering	COURSE CODE	R18CE4104

6. DETAILED COURSE CONTENTS

S. No.	Unit Outcomes (UOs)	Topics and Sub-Topics	Marks	Hours	Mapped CO
1	1.1 State importance, advantages and ill effects of irrigation. 1.2 Describe National Water Policy in brief. 1.3 Enlist types of irrigation projects and data required for irrigation project. 1.4 Describe rainfall cycle. 1.5 Describe construction and working of automatic and non automatic rain gauges. 1.6 Compute average rainfall over given catchment by Arithmetic mean method, Thissen's Polygon method and Isohyets' method. 1.7 Estimate runoff over given catchment. 1.8 Estimate Maximum Flood Discharge 1.9 Estimate Yield and dependable yield.	**Introduction to irrigation and Hydrology** 1a. Importance of irrigation. Advantages and ill effects of irrigation. 1b. National Water Policy. Types of irrigation projects. Data collected for irrigation projects. 1c. Hydrological Cycle. Types of precipitation. Factors affecting rainfall. Rainfall-runoff cycle. Factors affecting runoff. Estimate runoff by various methods. 1d. Measurement of Precipitation by Non automatic and automatic rain gauges. 1e. Computation of average rainfall over the catchment. 1f. Maximum Flood Discharge- its importance and estimation by various methods. Yield and dependable yield from a catchment.	16	10	CO1
2	2.1 Describe various crops and crop seasons in Maharashtra. 2.2 Explain concept of command area and catchment area. 2.3 Derive relation between duty, delta and base period. 2.4 Solve simple problems on water requirement of crops. 2.5 Explain necessity and methods of assessment of irrigation water. 2.6 Explain conventional and modern methods of irrigation.	**Application of water to the fields** 2.a Different crop seasons in Maharashtra. 2.b Command area and catchment area. Duty, Delta, base period. 2.c Simple problems on water requirement of crops. Assessment of irrigation water 2.d Conventional and modern methods of irrigation. Its advantages, disadvantages. Factors for selection of irrigation method.	12	8	CO2
3	3.1 Explain construction and working of bandhara. 3.2 Calculate capacity of bandhara for given constraints. 3.3 Explain construction and working of percolation tanks 3.4 Explain construction and working of lift irrigation scheme.	**Minor Irrigation Works** 3.a Bandhara, construction and working. Advantages and disadvantages of bandhara irrigation 3.b Solid and open bandhara. Capacity of Bandhara 3.c Percolation Tanks – Need, selection of site, construction	12	6	CO3

COURSE NAME	**Irrigation Engineering**	COURSE CODE	**R18CE4104**

S. No.	Unit Outcomes (UOs)	Topics and Sub-Topics	Marks	Hours	Mapped CO
		and working 3.d Lift Irrigation Scheme – Layout. Components and functioning			
4	4.1 State factors for selecting dam site. 4.2 Classify dams by various criterions 4.3 Sketch typical earthen dam and label its parts thereof. Sate function of each. 4.4 Enlist types of failure of earthen dams. Suggest preventive and remedial measures to it. 4.5 Differentiate between theoretical and practical profile of gravity dam. 4.6 Draw typical cross section and show forces acting on gravity dam 4.7 Define spillway and state functions of spillway. 4.8 Explain types of spillway and spillway gates 4.9 Explain major and minor energy dissipation structures.	**Dams and spillways** 4.a Classification of dams. Selection of site for a dam, Fixing alignment of dam. 4.b Earthen dams – Types of earthen dams. Component parts and functions. Typical cross section of earthen dam. Types of failure of earthen dam, preventive and remedial measures. 4.c Gravity dams - Theoretical and practical profile, typical cross section, Forces acting on dam, drainage gallery, joint in gravity dam, high dam and low dam. 4.d Spillways-Definition, function, location and components. Types of spillways. 4.e Spillway gates – Automatic and non automatic gates 4.f Energy dissipation structures – major and minor energy dissipation structures	16	10	CO4
5	5.1 State factors affecting selection of site for reservoir. 5.2 State factors affecting silting and preventive and curative measures thereof. 5.3 Calculate control levels of reservoir as per given data. 5.4 State causes, effects, preventive and curative measures of water logging. 5.5 Explain construction and working of diversion weirs and barrages. 5.6 Explain construction and working of diversion head works	**Reservoir and diversion head works** 5.a Selection of site for reservoir. Silting of reservoir. Factors affecting silting. Preventive and curative measures. 5.b Fixing control levels of reservoir. 5.c Water logging – Causes, effects, preventive and curative measures. 5.d Diversion weirs and barrages and diversion head work-Layout, components and working.	12	7	CO5
6	6.1 State classification of canal as per different criteria. 6.2 Sketch cross sections of canal in cutting, banking and partly cutting, partly banking.	**Canal structures and CD works** 6.a Classification of canal. Alignment of canal. Cross section of canal in embankment, in cutting and partly cutting	12	7	CO6

COURSE NAME	**Irrigation Engineering**	COURSE CODE	**R18CE4104**

S. No.	Unit Outcomes (UOs)	Topics and Sub-Topics	Marks	Hours	Mapped CO
	6.3 Design elements of most economical canal section. 6.4 Explain principle and working of cross drainage works. 6.5 Explain principle and working of Head regulator, Cross regulator, Escape, Falls and Outlets.	/Partly banking. 6.b Hydraulic and functional design of canal. Lining to canal. 6.c Cross drainage works - aqueduct, super passage, siphon, level crossing, inlet-outlet. 6.d Canal Regulation works - Head regulator, Cross regulator, Escape, Falls and Outlets.			

7. PRACTICAL –ASSIGNMENTS-STUDENT ACTIVITIES-TUTORIALS (Separate table for each)

S. No.	Practical	Topic No.	Hours Allotted	Mapped CO
1	Collect data from irrigation atlas for rivers, basins, major and minor irrigation projects in India and Maharashtra.	1	2	CO1
2	Demarcating Catchment area for small irrigation project from topo- sheet.	1	2	CO1
3	Computing average annual rainfall, Yield and MFD for given problem.	1	2	CO1
4	Report on any article published in journal /magazine regarding international practices in irrigation.	2	2	CO2
5	Study and illustrate any Minor Irrigation Schemes executed in Maharashtra.	3	2	CO3
6	Visit to any major/minor irrigation project site, study irrigation structures and write report based on visit.	4	2	CO4
7	Sketching of layout of diversion head works and its components	5	2	CO5
8	Designing of a canal section for given conditions.	6	2	CO6
--	**Total**	**--**	**16**	**--**

S. No.	Assignments	Topic No.	Hours Allotted	Mapped CO
1	Assignment based on duty, delta, base period etc	1	2	CO2
2	Sketching and illustrating Masonry / Earthen Dam section.	4	2	CO4
3	Fixing control levels for a Reservoir, based on given data.	5	2	CO 5
4	Sketching and explaining canal structures	6	2	CO6
--	**Total**	**--**	**8**	**--**

S. No.	Student activity	Topic No.	Hours Allotted	Mapped CO
1	Preparing a presentation on different methods of irrigation and its use in different parts of world with specific reference to India.	2	2	CO2
2	Power point Presentation on given topic from irrigation engineering	-	4	CO1 to CO6
--	**Total**	**--**	**6**	**--**

S. No.	Practical	Topic No.	Hours Allotted	Mapped CO
--	**Practical –assignments-student activities submission**	**--**	**2**	**--**
--	**Total**	**--**	**32**	**--**

8. EVALUATION SCHEME FOR PRACTICAL / ASSIGNMENTS/STUDENT ACTIVITIES

Rubrics for Practical and Assignments

Category	4	3	2	1
Take initiative in finding solution for given problem.	Creative thinking. Take part in discussion and develop the solution to the problem with teacher and fellow students	With small hint interested in developing the solutions on their own.	Forced participation in discussion and development of solution.	Very little Participation in development of solution.
Data documentation, data analysis & results interpretation	Correct calculations and minor error in result.	Small errors in calculations	Major errors in calculations and Error in result	Incomplete & wrong calculations and Error in result.
Presentation of solution	Neat and clean presentation of solution in form of graphs, diagrams drawn to proper scale	To large extent nNeat and clean presentation of solution in form of graphs, diagrams drawn to proper scale	Improper scale, not so clean, neat presentation.	Clumsy graphs, sketches and diagrams
Team spirit	Contributes a fair share to work	Sometimes depends on others to complete the work	Many times depends on others to complete the work	Always depends on others to complete the work
Timely completion of activity	Maximum	Moderate	Satisfactory	Least
Overall understanding	Maximum	Moderate	Satisfactory	Least

Rubricks for Student Activities

Category	4	3	2	1
Leadership qualities	Assume the role willingly & demonstrate ability fully	Assume the role willingly but demonstrate ability partly	Assume the role unwillingly though demonstrate ability fully	Assume the role unwillingly & demonstrate ability partly
Planning & Execution	Proper planning & execution	Proper planning but improper execution	Improper planning but proper execution	Improper planning & execution
Quality of report, graphics and presentation.	Clear description with all supporting details, relevant & neat graphics and well structure presentation.	Clear description with some supporting details, relevant but messy graphics. and structured presentation.	Clear description with no supporting details, neat but irrelevant graphics and structured presentation with missing links.	Irrelevant description, irrelevant & messy graphics and unstructured presentation.
Timely completion	Maximum	Moderate	Satisfactory	Least
Overall understanding	Maximum	Moderate	Satisfactory	Least

Rubricks for Orals

Category	4	3	2	1
Knowledge of Course content	Accurately states the main points and details in answer to the question raised by examiner with focus on the substance.	Adequately states the main points and details in answer to the question raised by examiner with focus on the substance.	States most of the main points but miss out details in answer to the question raised by examiner with focus on the substance.	States few main points and details in answer to the question raised by examiner with focus on the substance
Delivery	Effectively and creatively delivers the information while staying on topic and considering the audience	Adequately delivers the information while staying on the topic and considering the audience.	Delivers the information but does not stay on topic. Little consideration on audience.	Little or no attempt is made to deliver the information and stay on topic.
Body Language and eye contact	Good straight posture and eye contact.	Most of the times straight posture and moderate eye contact	Occasionally straight posture and little eye contact	Plump posture and very little eye contact
Overall understanding	Maximum	Moderate	Satisfactory	Least

9. MAJOR EQUIPMENT/ INSTRUMENTS /TOOLS REQUIRED

S. No.	Equipment Name with Specifications	Practical
1	Irrigation Atlas	1
2	Topo Sheets	2
3	Models of irrigation structures	7

9. SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Topic No.	Topic Title	Mapped CO % OR Emphasis	Distribution of Marks			
			Cognitive level			Total Marks
			Remember	Understand	Apply	
I	Introduction to irrigation and Hydrology	CO1	4	4	8	16
II	Application of water to the fields	CO2	4	4	4	12
III	Minor Irrigation Works	CO3	4	4	4	12
IV	Dams and spillways	CO4	4	4	8	16
V	Reservoir and diversion head works	CO5	4	4	4	12
VI	Canal structures and CD works	CO6	4	8	-	12
Total		--	**24**	**28**	**28**	**80**

10. SAMPLE MODEL QUESTION BANK FOR THEORY AND TEST EXAMINATIONS

S. No	Topic	Mapped CO	Cognitive level R/U/A	Question
1	1	CO1	R	State advantages and ill effects of irrigation
2	1	CO1	U	Describe rainfall-runoff cycle.
3	1	CO1	A	Compute average annual rainfall for given catchment from given data.

11. LEARNING RESOURCES

- **BOOKS**

S. No.	Title of Book	Author	Publication
1	Irrigation Water Power and Water Resources Engineering	Dr. P. N. Modi	
2	Irrigation Engg.	S. K. Mujumdar	Galgotia Publications Pvt. Ltd., New Delhi. ISBN 9788175155350
3	Irrigation Engg. & Hydraulic Structures:-	Khanna	Standard Book House, New Delhi-6 ISBN 9788187401290
4	Irrigation Engg.	J. G.Dahigaonkar	Asian Books Pvt. Ltd ISBN-10: 8184120087
5	Irrigation Engg.	S. K.Sharma	S. Chand Publishing ISBN, : 9789352533770
6	Irrigation Engg.	N. N. Basak	Tata McGraw-Hill Education Pvt. Ltd., ISBN 9780074635384
7	Irrigation Water Power and Water Resources Engineering	Dr. K. R. Arora	Standard Publishers Distributors ISBN 9788180140075

- **MODELS**

S. No.	Name of Model
1	Gravity Dam
2	Fish Ladder
3	Canal Regulator
4	Head Regulator
5	Aqueduct
6	Syphon Aqueduct
7	Super passage
8	Silt Ejector
9	River Head Works
10	Gibbs Module

- **WEBSITES**

S. No.	ADDRESS
1	https://sites.google.com/site/r18ce4104/
2	www.nptel.iitm.ac.in\\
3	https://www.youtube.com
4	https://www.youtube.com/
5	http://www.slideshare.in

12. COURSE CURRICULUM DEVELOPMENT MEMBERS

S. No.	Name and Designation	Contact No.	Email
1	Prof. D. S. Bapat	9422579511	deepa.bapat@rediffmail.com
2	Prof. A. S. Shelar	9423558189	ani_shel@yahoo.com

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE -1

Diploma Programme	CIVIL		
Course Name	Quantity Surveying- I	Course code	R18CE4105
Course Category	Applied	Credits	7

COURSE TEACHING, ASSESSMENT AND EVALUATION SCHEME:

Teaching scheme		Evaluation scheme									
		Direct assessment- Weightage - 80%									
		Theory outcome		Practical outcome							Total
				TERMWORK					PRACTICAL	ORAL	
Theory Allotted hrs	Practical Allotted hrs	ESE marks	TTA marks	TW marks	SW marks	AS marks	TU Marks	Total	Practical Marks	OR marks	Total marks
3	4	-	--	50	--	--	-	50	-	@50	100
		Indirect assessment- Weightage - 20%									
		Mid semester students feedback							End of the course survey		

End semester examination-ESE, Two tests average-TTA, Term Work- TW, Student Activity-SW, Assignments –AS, Tutorials- TU, Oral –OR, @ -Internal Oral

1. RATIONALE

The success of a project is determined by the utilization of various resources optimally. In order to achieve this an estimation of quantities of materials, items Tool & Plants, machinery to be used needs to be done meticulously in details. The schedule of rates for a region assists us in preparing an estimate as well as in analysis the rates if net given in the schedule of rates. Authenticity of rates & working them out can be done by analyzing them. An understanding of specification and drafting them to suit our work is imperative for every Civil Engineer.

2. EXPECTED PROFICIENCY

Prepare the estimate of a civil engineering structure

3. COURSE OUTCOMES (COs)

Students will be able to

a. Prepare estimates for various civil engineering structures.
b. Comprehend specifications of items of works.
c. Analyse rates of items for tenders.
d. Use schedule of rates for preparing estimates.

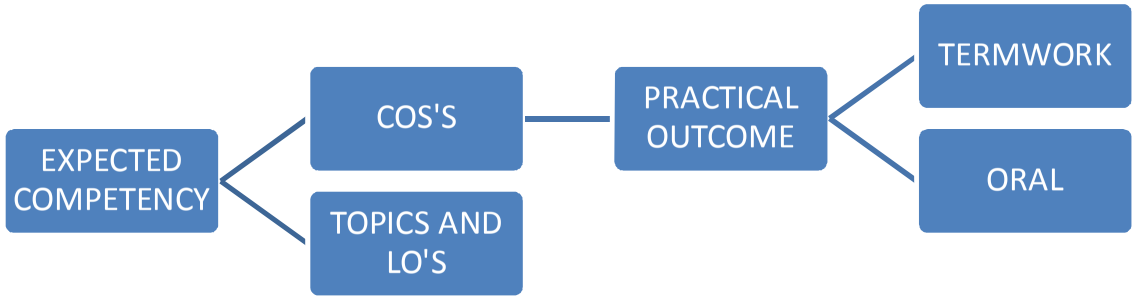
COURSE NAME	Quantity Surveying- I	COURSE CODE	R18CE4105

4. CO –PO MATRIX

Course Name: Quantity Surveying – I Course Code: R18CE4105	PO 1 Basic and Discipline specific knowledge	PO 2 Problem Analysis	PO 3 Design/ development of solution	PO 4 Engineering Tools, Experiments & Testing	PO 5 Engineering Practices for society sustainability& environment	PO 6 Project Management	PO 7 Life Long Learning	PSO 1 Construction planning and detailing	PSO 2 Construction execution, supervision and maintenance
CO1	1	3			1		1	1	
CO2	1		2		1		1	1	
CO3	1	3			1			1	
CO4	2		2			1			

Rating scale '**3**' for high, '2' for medium, '**1**' for low '0' for no correlation

5. COURSE MAP



COURSE NAME	Quantity Surveying- I	COURSE CODE	R18CE4105

6. DETAILED COURSE CONTENTS

S. No.	Unit Outcomes (UOs)	Topics and Sub-topics	Marks	Hours	Mapped CO
1	1.1 Define purpose of estimate & types of estimate. 1.2 Describe overhead charges, Contingencies, Work charge establishment. 1.3 List method's of preparing approximate estimate. 1.4 Select units of modes of measurement, payment, area and volume for different figure and shapes. 1.5 Prepare measurement sheet, abstract sheet and rate analysis sheets. 1.6 Study specification's purpose, types, importance, legal aspect.	**Introduction** 1.1 Purpose of estimates. Types of estimates. Factors effecting estimate. Overhead charges, Contingencies., Work charged establishment. 1.2 Methods of preparing approximate estimates. 1.3 Considerations underlying the selection of units and modes of measurement, unit for payment Area & volume for different figures and shapes, Conversion of units, body measurements. Vehicles' measurements, volume, materials carrying capacity. 1.4 Various tabular forms used in estimating. Measurement sheets, Abstract sheets, Rate Analysis sheets. 1.5 Specifications – Definition, Purpose, Types, Importance, Legal aspects. Drafting of specifications for non standard items eg. Kitchen otta. ACP cladding.	--	9	CO1 CO2
2	2.1 Illustrate component of cost of items of work and task work. 2.2 Calculate calculation of dry materials. 2.3 Determine labour requirement for major items of work like brick masonry, stone masonry, cement, concrete, R.C.C. flooring, plastering, white washing, distempering, painting etc. 2.4 Draw sketch of kitchen otta and analyses the rate. 2.5 Describe taxation, insurance, ESIC, PF, CAR, BST, Excise, VAT, Service tax, Octroi. **2.6** Construct an Excel program for analyses of rates.	**Analysis of Rates** 2.1 Components of cost of items of work, task work. 2.2 Calculation of dry materials. 2.3 Labour requirement for major items of work like bricks masonry, stone masonry. Cement concrete. R.C.C. flooring, plastering, white washing, distempering, painting etc. Draw Kitchen otta and analyses the rate. 2.4 Taxation, insurance, ESIC, PF, CAR, SCT, BST, Excise, VAT, Service Tax, Octroi. 2.5 Prepare an Excel program for Analyses of rates.	**--**	8	CO3
3	3.1 Suggest best method for calculation of earthwork for road, canal, dam, embankment & cutting. 3.2 Understand concept of lead & lift , stages, royalty. 3.3 Evaluate balancing of the earthwork.	**Calculation of Earth Work** 3.1 Road, Canal, Dam, Embankment, & Cutting 3.2 Lead & Lift, stages, Royalty 3.3 Balancing of the earthwork. Borrow pits & Spoil banks, Mass	--	8	CO1

COURSE NAME	Quantity Surveying- I	COURSE CODE	R18CE4105

S. No.	Unit Outcomes (UOs)	Topics and Sub-topics	Marks	Hours	Mapped CO
	3.4 Understand mass curve through rates. 3.5 Estimate of water bound macadam road, bituminous roads and concrete roads.	Curves, through rates 3.4 Estimate of Water Bound Macadam road, Bituminous roads, and Concrete roads.			
4	4.1 Write information available in schedule of rates. 4.2 Describe reference to schedule of rates – rates of materials, rates for transportation. 4.3 Illustrate loading, lead, lift, unloading, stacking, it effect on overall rate of materials.	**Use of Schedule of Rates** 4.1 Information available in schedule of rates. Reference to schedule of rates – Rates of materials. Rates for transportation, analysis of transportation, choice between truck, tempo, cart etc. 4.2 Loading, lead, lift, unloading, stacking, its effect on overall rate of materials. 4.3 Calculation of rates considering extra lead & lift of materials**.**	--	7	CO4
5	5.1 Identify methods of detailed estimate. 5.2 Prepare list of items of works for detailed estimate. 5.3 Suggest different methods of water proofing. 5.4 Prepare Excel program for detailed estimate. 5.5 List various building component.	**Detailed Estimate** 5.1 Standard modes of measurement. I.S. 1200. Sequencing of items, Overheads, WCE, Contingencies. 5.2 Building with ordinary foundation, R.C.C., slab, different methods of water proofing. 5.3 Simple building with hipped / gabled roof (with different roof materials, Intersection of different spans, valleys). King Post Truss roof, Paneled Doors and Windows. 5.4 Use of Excel programme for detailed estimate.	--	8	CO1
6	6.1 Define cross drainage works. 6.2 Calculate estimate of culvert, R.C.C. slab, hume pipes. 6.3 Describe specification for framed structure. 6.4 List of material required for framed structure. 6.5 Determine estimate of swimming pool, tremix pavements.	**Miscellaneous** 6.1 Cross Drainage works, Estimate of a Culvert – R.C.C. slab, Hume pipe. 6.2 Specifications for a framed structure, materials required. 6.3 Estimate of swimming pools, Tremix pavements.	--	8	CO1

7. PRACTICAL –ASSIGNMENTS-STUDENT ACTIVITIES-TUTORIALS (Separate table for each)

Sr. No.	Practical	Topic No.	Hours Allotted	Mapped CO
1	Ergonomics (Sketches of body measurements & positions).	1	2	CO1
2	Sequence of items of construction of load bearing and framed structure. (Own class room also).	1	2	CO2
3	Formulae for areas and volumes.	2	2	CO1
4	Conversions of units – linear, area, volumetric.	2	2	CO1
5	Units of measurements.	2	2	CO1
6	Analysis of Rates of ten important items of building construction one item to be done by actual site observation.	2	8	CO3
7	Estimate of Earthwork & Bituminous surfacing.	3	8	CO1
8	Detailed Estimate of a G+1 structure**.**	5	14	CO1
9	Estimate of R.C.C. slab culvert.	6	08	CO1
10	Specifications of ten important items of construction. One item specs should be drafted.	6	6	CO4
11	Excel program for Rate analysis. Preparing an indent for requirement of items.	5	4	CO3
--	**Total**	**--**	**60**	**--**

S. No.	Practical	Topic No.	Hours Allotted	Mapped CO
--	**Practical –assignments-student activities submission**	**--**	**4**	**--**
--	**Total**	**--**	**64**	**--**

8. EVALUATION SCHEME FOR PRACTICAL / ASSIGNMENTS/STUDENT ACTIVITIES

Rubrics for assignments

Category	4	3	2	1
Structure	Very Well Structured	Well Constructed	Structured But Missing Links	Unstructured
Understanding Of Analytical Concepts	Complete Understanding	Substantial understanding	Some Understanding	Limited Understanding
Mathematical Errors	Least Errors	90 % Free Of Errors	75 % Free Of Errors	50 % Free Of Errors
Graphics	Neat ,Accurate And Enhance Understanding	Neat And Accurate	Some Illustrations Are Misleading And Redundant	Least Accurate And Not Neat
Timely Completion Of Activity	Maximum	Moderate	Satisfactory	Least
Overall Understanding	Maximum	Moderate	Satisfactory	Least

Rubricks for Orals

Category	4	3	2	1
Knowledge of Course content	Accurately states the main points and details in answer to the question raised by examiner with focus on the substance.	Adequately states the main points and details in answer to the question raised by examiner with focus on the substance.	States most of the main points but miss out details in answer to the question raised by examiner with focus on the substance.	States few main points and details in answer to the question raised by examiner with focus on the substance
Delivery	Effectively and creatively delivers the information while staying on topic and considering the audience	Adequately delivers the information while staying on the topic and considering the audience.	Delivers the information but does not stay on topic. Little consideration on audience.	Little or no attempt is made to deliver the information and stay on topic.
Body Language and eye contact	Good straight posture and eye contact.	Most of the times straight posture and moderate eye contact	Occasionally straight posture and little eye contact	Plump posture and very little eye contact
Overall understanding	Maximum	Moderate	Satisfactory	Least

9. LEARNING RESOURCES

- **BOOKS**

Sr. No.	Title of Book	Author	Publication
1	Quantity Surveying and Costing	M. Chakraborthi	Self published
2	Quantity Surveying and Costing	G. S. Birdie	Dhanpat Rai, Delhi
3	Quantity Surveying and Costing	J. M. Muley	Vrinda, Jalgaon
4	Quantity Surveying and Costing	G. B. Deshpande	Nirali, Pune
5	Quantity Surveying and Costing Vol. 1&2	J. C. Malhotra	Khanna, Delhi
6	Quantity Surveying and Valuation	N. A. Shah	Khanna, Delhi
7	Estimating and Costing in Civil Engg.	B. N. Dutta.	Self published

- **SOFTWARE/ TOOLS/ MODELS**

S. No.	Name	Company	Freeware/commercial
1	MS Excel	Microsoft	Commercial

- **WEBSITES**

S. No.	Address
1	mahapwd.com

10. COURSE CURRICULUM DEVELOPMENT MEMBERS

S. No.	Name and Designation	Contact No.	Email
1	Prof. D. A. Rajput.	9960729657	rajputdeepaksingh81@yahoo.co.in

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE -1

Diploma Programme	CIVIL		
Course Name	Quantity Surveying- II	Course code	R18CE4106
Course Category	Applied	Credits	7

COURSE TEACHING, ASSESSMENT AND EVALUATION SCHEME:

Teaching scheme		Evaluation scheme									
		Direct assessment- Weightage - 80%									
		Theory outcome		Practical outcome							Total
				TERMWORK					PRACTICAL	ORAL	
Theory Allotted hrs	Practical Allotted hrs	ESE marks	TTA marks	TW marks	SW marks	AS marks	TU Marks	Total	Practical Marks	OR marks	Total marks
3	4	80	20	50	--	--	-	50	-	50	200
		Indirect assessment- Weightage - 20%									
		Mid semester students feedback						End of the course survey			

End semester examination-ESE, Two tests average-TTA, Term Work- TW, Student Activity-SW, Assignments –AS, Tutorials- TU, Oral -OR

1. RATIONALE

Estimation of quantities and costing of civil structures are part of daily routine jobs required to be performed on sites. This subject requires thorough understanding of drawings, construction processes and market prices of materials and labour. In any transaction of buying, selling or renting a property, valuation should be done first. Various methods are in vogue & a student should be aware of these. Concrete, reinforcement steel, Water supply & sanitary works contribute a major percentage to the construction cost. Hence a student has to estimate these in details.

2. EXPECTED PROFICIENCY

Prepare the estimate of a civil engineering structure.

3. COURSE OUTCOMES (COs)

Students will be able to

1. Prepare detailed estimates for civil engineering works.
2. Draft specifications of items of work.
3. Fill in the tender.
4. Determine the value of an existing structure.

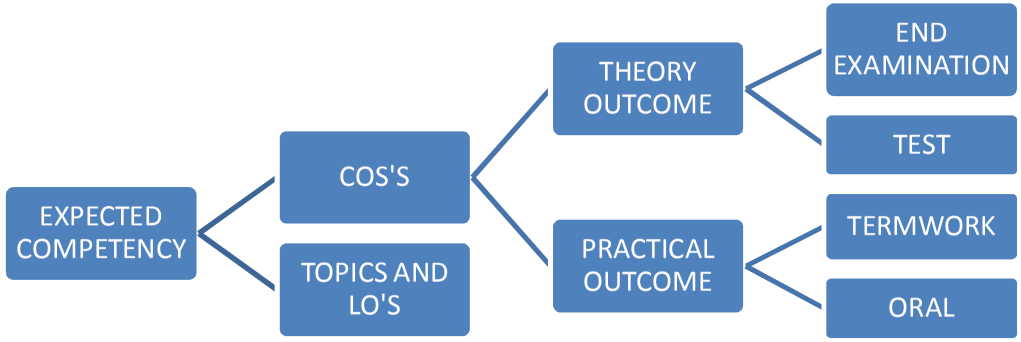
COURSE NAME	Quantity Surveying- II	COURSE CODE	R18CE4106

4. CO –PO MATRIX

Course Name: Quantity Surveying-II Course Code: R18CE4106	PO 1 Basic & Discipline specific knowledge	PO 2 Problem Analysis	PO 3 Design/ development of solution	PO 4 Engineering Tools, Experiments & Testing	PO 5 Engineering Practices for society sustainability& environment	PO 6 Project Management	PO 7 Life Long Learning	PSO 1 Construction planning and detailing	PSO 2 Construction execution, supervision and maintenance
CO1		3		1	1		1	2	
CO2	1	1	1		1	1		1	
CO3	1				3	2	1	1	
CO4	1	1	1	1	1		1	1	

Rating scale '**3**' for high, '2' for medium, '**1**' for low '0' for no correlation.

5. COURSE MAP



COURSE NAME	Quantity Surveying- II	COURSE CODE	R18CE4106

6. DETAILED COURSE CONTENTS

S. No.	Unit Outcomes (UOs)	Topics and Sub-topics	Marks	Hours	Mapped CO
1	1.1 Differentiate between cost, price & value. 1.2 State different method of depreciation. 1.3 Describe different method of valuation. 1.4 Evaluate capitalized value of building. 1.5 Calculate rent of building. 1.6 State free hold property & lease hold property.	**Valuation** 1.1 Meaning and purpose of valuation. Factors affecting valuation. Type of values determination of sinking fund, obsolescence and depreciation 1.2 Capitalized value and year's purchase. Annuity, valuation of buildings, valuation of land, different methods, rent fixation, present value future value of rupee.	16	10	CO1
2	2.1 List items of work in R.C.C. construction. 2.2 Prepare bar bending schedule. 2.3 Design an estimate of R.C.C. T beam, slab, column with footing, staircase and water tank. 2.4 Calculate detailed estimate of whole R.C.C. framed building. 2.5 Determine estimate of PT slabs.	**Estimate of R.C.C. works**. 2.1 Items of work in R.C.C. construction. Bar bending Schedule, Estimate of R.C.C. T-beam, slab, estimate of column with footing, estimate of staircase. 2.2 Estimate of water tanks. 2.3 Estimate of whole R.C.C. framed building, Estimate of PT slabs.	16	10	CO1
3	3.1 Work out estimate of G.I., A.C., FRP sheet resting over steel stanchion. 3.2 Calculate estimate of plate girder. 3.3 Evaluate estimate of structural steel work sheds. 3.4 Prepare estimate of ACP cladding. 3.5 Formulate estimation of structural glazing.	**Estimate of steel structures** 3.1 Estimate of GI, AC, FRP sheets resting over steel stanchion, estimate of plate girder. 3.2 Estimate of Structural steelwork shed. 3.3 Estimate of ACP cladding. Aluminum Composite panel. 3.4 Estimate of structural glazing.	12	7	CO1
4	4.1 Prepare estimate of water supply & sanitary work for residential building. 4.2 Determine estimate of manhole, water main, septic tank, soak pit. 4.3 Estimate of rainwater harvesting.	**Water supply & drainage layout (plan) elevation, section** 4.1 Estimate of water supply and sanitary works for a residential Building. 4.2 Estimate of manhole, estimate of water mains, estimate of septic tank, soak pit. 4.3 Estimate of rainwater harvesting.	12	7	CO2

COURSE NAME	**Quantity Surveying- II**	COURSE CODE	**R18CE4106**

S. No.	Unit Outcomes (UOs)	Topics and Sub-topics	Marks	Hours	Mapped CO
5	5.1 Explain pre audit and post audit account system. 5.2 Rule of the format of M.B. state the whether roll of writing M.B. 5.3 Draft tender notice. 5.4 State various types of tender documents. 5.5 State requirement of valid contract. 5.6 State and explain various types of contract. 5.7 Explain procedure of issue of materials to the contractor.	**PWD Procedures** 5.1 Pre-audit & Post Audit account system. Types of works, administrative approval. 5.2 Measurement books, use, Do's and Don'ts for entries in M.B., Standard Measurement books. 5.3 Tenders – Notice types, identifying mistakes in tenders. Standard tender forms used by Government. Agreement, general conditions of contract, types of contracts. Arbitration. 5.4 Site order book, purpose, procedure of issue of materials to the contractor, procedure to prepare a bill, Price variation clause.	12	7	CO3
6	6.1 Draw organization structure of PWD. 6.2 Study of material procurement, survey report form no.18. store and records, indents and material at site. 6.3 State importance of maintain account register and stock register. 6.4 List charge to be handed over in case of transfer, inception of rest house. 6.5 Different modes of payment. 6.6 Study of ERP software, it's functionality, usage, adaptability limitations.	**Department procedures For Government & Private organization**. 6.1 Hierarchy of organization in PWD. 6.2 Materials procurement, Survey reports form No.18. Store and Records. Indents and Materials at Site. 6.3 Road Metal Return, Accounts of Tools and Plants. Account Register and Stock register. 6.4 Charge to be handed over in case of transfer. Inspection of Rest Houses. 6.5 Cash Book, Cash sources of receipt of money in a section, Modes of payment. T.A. D.A. rules, Imprest Account, Temporary Advance, and Hand Receipt. 6.6 Checking of suppliers bills Vouchers, R. A. bills, Recovery statement. Secured advances and reconciliation of materials. 6.7 Introduction to ERP Software, its functionality, usage, adaptability limitations.	12	7	CO4

7. PRACTICAL –ASSIGNMENTS-STUDENT ACTIVITIES-TUTORIALS (Separate table for each)

S. No.	Practical	Topic No.	Hours Allotted	Mapped CO
1	Valuation of a building.	1	6	CO1
2	Estimate of R.C.C. frame for a building.	2	14	CO1
3	Estimate of structural steel work.	3	12	CO1
4	Detailed estimate of Water supply & Sanitary works.	4	10	CO2
5	Manner of submission of tender, tender documents.	5	6	CO3
6	Conditions of Contract.	5	6	CO3
7	Prepare EXCEL programs for valuation, costing and estimates.	6	6	CO4
--	**Total**	**--**	**60**	**--**

Sr. No.	Practical	Topic No.	Hours Allotted	Mapped CO
--	**Practical –assignments-student activities submission**	--	**4**	--
--	**Total**	--	**64**	--

8. EVALUATION SCHEME FOR PRACTICAL / ASSIGNMENTS/STUDENT ACTIVITIES

Rubrics for Assignments

Category	4	3	2	1
Structure	Very Well Structured	Well Constructed	Structured But Missing Links	Unstructured
Understanding of Analytical Concepts	Complete Understanding	Substantial understanding	Some Understanding	Limited Understanding
Mathematical Errors	Least Errors	90 % Free Of Errors	75 % Free Of Errors	50 % Free Of Errors
Graphics	Neat, Accurate and Enhance Understanding	Neat And Accurate	Some Illustrations are Misleading and Redundant	Least Accurate And Not Neat
Timely Completion of Activity	Maximum	Moderate	Satisfactory	Least
Overall Understanding	Maximum	Moderate	Satisfactory	Least

Rubricks for Orals

Category	4	3	2	1
Knowledge of Course content	Accurately states the main points and details in answer to the question raised by examiner with focus on the substance.	Adequately states the main points and details in answer to the question raised by examiner with focus on the substance.	States most of the main points but miss out details in answer to the question raised by examiner with focus on the	States few main points and details in answer to the question raised by examiner with focus on the substance

Category	4	3	2	1
			substance.	
Delivery	Effectively and creatively delivers the information while staying on topic and considering the audience	Adequately delivers the information while staying on the topic and considering the audience.	Delivers the information but does not stay on topic. Little consideration on audience.	Little or no attempt is made to deliver the information and stay on topic.
Body Language and eye contact	Good straight posture and eye contact.	Most of the times straight posture and moderate eye contact	Occasionally straight posture and little eye contact	Plump posture and very little eye contact
Overall understanding	Maximum	Moderate	Satisfactory	Least

9. SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Topic No.	Topic Title	Mapped CO % OR Emphasis	Distribution of Marks			
			Cognitive level			Total Marks
			Remember	Understand	Apply	
1	Valuation	CO1	4	4	8	16
2	Estimate of R.C.C. works.	CO1	4	4	8	16
3	Estimate of steel structures	CO1	4	4	4	12
4	Water supply and drainage layout (plan) elevation, section	CO2	4	4	4	12
5	PWD Procedures	CO3	4	4	4	12
6	Department procedures For Government and Private organization.	CO4	4	4	4	12
Total		--	**24**	**24**	**32**	**80**

10. SAMPLE MODEL QUESTION BANK FOR THEORY AND TEST EXAMINATIONS

Sr. No.	Topic	Mapped CO	Cognitive level R/U/A	Question
1	1	CO1	R	State type of values determination of sinking fund.
2	1	CO1	U	Define valuation and its purpose.
3	1	CO1	A	Explain capitalized value and year's purchase.

11. LEARNING RESOURCES

- **BOOKS**

Sr. No.	Title of Book	Author	Publication
1	Text book of Estimating & Costing	G. S. Birdie	Dhanpat Rai, Delhi

Sr. No.	Title of Book	Author	Publication
2	Quantity Surveying & Costing, vol. I & II	J. C. Malhotra	Khanna, Delhi
3	Estimating, Costing, Specification & Valuation	M. Chakraborti.	M. Chakraborti.
4	Quantity Surveying & Valuation	N. A. Shah	Khana, Delhi
5	Quantity Surveying & Costing	J. R. Muley	New Vrinda, Jalagaon.
6	Construction Mgmt. & Accounts	Vazirani Chandola	Khana, Delhi.
7	Estimating & Costing in Civil Engg.	B. N. Dutta	B.N. Dutta
8	ISO 1200- Method of measurement for Building works.	BIS	BIS

- **SOFTWARE/ TOOLS/ MODELS**

S. No.	Name	Company	Freeware/commercial
1	MS Excel	Microsoft	Commercial

- **WEBSITES**

S. No.	ADDRESS
1	mahapwd.com

12. COURSE CURRICULUM DEVELOPMENT MEMBERS

S. No.	Name and Designation	Contact No.	Email
1	Prof. D. A. Rajput.	9960729657	rajputdeepaksingh81@yahoo.co.in

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE -1

Diploma Programme	CIVIL		
Course Name	Construction Management	Course code	R18CE4107
Course Category	Applied	Credits	5

COURSE TEACHING, ASSESSMENT AND EVALUATION SCHEME

Teaching scheme		Evaluation scheme									
		Direct assessment - Weightage - 80%									
		Theory outcome		Practical outcome							Total
				TERMWORK					PRACTICAL	ORAL	
Theory Allotted Hrs	Practical Allotted Hrs	ESE marks	TTA marks	TW marks	SW marks	AS marks	TU Marks	Total	Practical Marks	OR marks	Total Marks
3	2	80	20	15	05	05	--	25	-	25	150
		Indirect assessment – Weightage - 20%									
		Mid semester students feedback							End of the course survey		

End Semester Examination - ESE, Two Tests Average - TTA, Term Work - TW, Student Activity- SW, Assignments – AS, Tutorials - TU, Oral - OR

1. RATIONALE

Diploma civil engineer as a site supervisor plays very important role from initiation to closing of construction project. He gives valuable inputs in planning, supervises the construction work carefully, checks actual work with specifications and reports it to manager. He keeps close watch on execution and maintains the quality of work. The supervisor has to read the schedule and is responsible to maintain resources for scheduled work. Any ahead or behind the schedule activity will be reported to project manager and updating in the schedule is carried out. Supervisor works as link between project manager and vendors & workers. He has to be conversant with basic management techniques of all resources like men, material, machinery, money and time. The optimum use of all resources will lead to safe, successful and profitable completion of construction project in scheduled time.

2. EXPECTED PROFICIENCY

Apply basic tools and techniques of construction management while supervising construction and maintenance of civil engineering structures.

3. COURSE OUTCOMES (COs)

Students will be able to

1. Describe functions & principles of management and organization structures.
2. Describe planning processes required for construction project and create work break down structure for small project.
3. Interpret and develop bar chart, CPM network. Find critical path and project duration.
4. Describe men, material, equipment, management functions in construction industry.
5. Identify costs and finance associated with project and interprets project documents.
6. Identify construction safety hazards, create site layout and describe elements of project documentation at every stage of project.

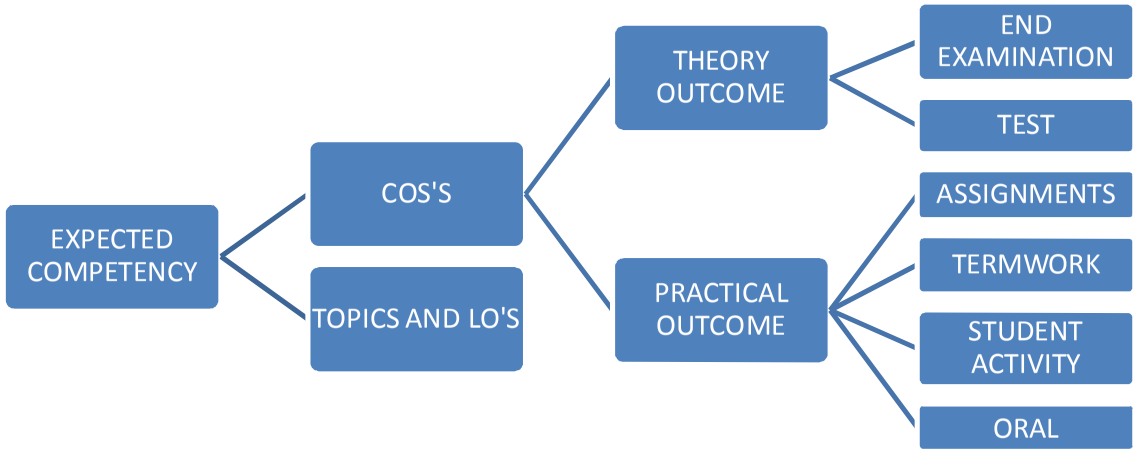
COURSE NAME	Construction Management	COURSE CODE	R18CE4107

4. CO –PO MATRIX

Course Name: Construction Management Course Code: R18CE4107	PO 1 Basic and Discipline Specific knowledge	PO 2 Problem Analysis	PO 3 Design or Development of Solutions	PO 4 Engineering Tools, Experimentation and Testing	PO 5 Engineering Practices for Society, sustainability and Environment	PO 6 Project Management	PO 7 Life-Long Learning	PSO 1 Construction planning and detailing	PSO 2 Construction execution, supervision and maintenance
CO1	3				3	1	2	2	
CO2	2	2	3	2		3	1	3	
CO3		2	2	3		3	1	2	1
CO4	2		2	2	1	2	1	2	2
CO5	2		2			3	2	3	
CO6		1	1		2	2	2	2	3

Rating scale'**3'** for high, '**2**' for medium, **'1'** for low **'0'** for no correlation

5. COURSE MAP



COURSE NAME	Construction Management	COURSE CODE	R18CE4107

6. DETAILED COURSE CONTENTS

Sr. No.	Unit Title Unit Outcomes (UOs)	Topics and Sub-topics	Marks	Hours	Mapped CO
1	**Management and Organization** 1.1 Describe and explain fourteen principles of management by Henry Fayol. 1.2 Describe and explain functions of management. 1.3 Comment on current scenario of Indian construction industry 1.4 Justify need of application of principles of organisation to construction industry. 1.5 Explain different organisation structures their advantages, drawbacks	1.1 Principles of management by Henry Fayol and Functions of management. 1.2 Current scenario of Construction sector in India and need of scientific management in construction sector. 1.3 Role of supervisor in each stage of construction project 1.4 Necessity, principles and types and structures of organization	12	7	CO1
2	**Construction Project Planning** 2.1 Describe necessity of planning in any project, types of planning. 2.2 Define project. Identify life cycle of small project. 2.3 Enlist resources required for project. 2.4 Identify stakeholders, risks and constraints in project. 2.5 Identify phases, sub phases, tasks and create work break down structure for small project. 2.6 Describe procedure to estimate work content and duration of an activity.	2.1 Necessity of planning, types of planning and planning approaches 2.2 Definition of project, project life cycle. Phases in the project. Work break down structure, 2.3 Resources of construction project, Scope of work, stakeholders, constraints, risks in projects. 2.4 Estimating work content, estimating resources of project work, estimating duration of activity.	12	7	CO2
3	**Scheduling Techniques** 3.1 Create bar chart for given small project.. 3.2 Identify milestones. 3.3 Prepare CPM network, precedence network. 3.4 Compute activity times, critical path and float. 3.5 Update the network based on actual progress. 3.6 Prepare project calendar. 3.7 Describe advantages and limitations of scheduling software.	3.1 Bar chart., Milestone chart 3.2 Activity on Arrow (CPM), 3.3 Activity on Node network (Precedence Network) and PERT 3.4 Computing Activity times, Event times, Floats, Critical activities-events, Critical Path. Project duration. 3.5 Updating and tracking of network. 3.6 Project calendar and introduction to software in planning.	16	10	CO3

COURSE NAME	**Construction Management**	COURSE CODE	**R18CE4107**

Sr. No.	Unit Title Unit Outcomes (UOs)	Topics and Sub-topics	Marks	Hours	Mapped CO
4	**Management of Men, Material and Equipments** 4.1 Describe manpower planning process for skilled and unskilled labour force. 4.2 Enlist factors influencing supply and demand of human resources. 4.3 Explain objectives and principles of manpower planning. 4.4 Create resource histogram for data given small project. 4.5 Describe functions of material manager and storekeeper. 4.6 Carry out ABC analysis for small stores inventory. 4.7 Work out economic order quantity for purchase of material. 4.8 Compare owning or hiring of equipment under given situation.	4.1 Manpower Planning process. Factors, objectives and principles 4.2 Creating resource histogram for small project. 4.3 Importance and objectives and functions of materials management 4.4 Store Management. 4.5 ABC analysis. Economic Ordered Quantity (EOQ). 4.6 Owning and Operating cost of equipment.	16	10	CO4
5	**Economic Aspects of project and Project Documentation** 5.1 Explain direct and indirect costs of project. 5.2 Find out break even sale for given product. 5.3 Choose profitable investment option by payback period method and ROI method. 5.4 Describe importance of financial statements and financial ratios. 5.5 Explain elements of reports in all stages of project.	5.1 Elements of project costs. Direct,indirectcosts. economic studies like Break even methods of analysis . 5.2 Investment appraisal by Payback period.Return on investment 5.3 Importance of financial statements and ratios in project management. 5.4 Elements of Project feasibility report, Project proposal, project status report, Project closure report.	12	7	CO5
6	**Supervision and Quality control, Safety and Site Layout** 6.1 Enlist factors affecting quality. 6.2 Emphasize role of specifications in all stages of project. 6.3 Explain role of supervisor in every stage of project. 6.4 Narrate causes and effects of accidents. 6.5 Suggest safety measures to be taken on construction site. 6.6 Describe occupational health hazard. 6.7 Enlist personal protective equipments. 6.8 Prepare construction site layout at different stages.	6.1 Factors affecting quality androle of specifications in quality control. 6.2 Role of supervisor in maintaining quality of construction project 6.3 Construction safety management 6.4 Principles, factors affecting site layout..Preparation of site layout for Civil Engg. Sites.	12	7	CO6

7. PRACTICAL –ASSIGNMENTS-STUDENT ACTIVITIES-TUTORIALS (Separate table for each)

Sr. No	Practical (Student should perform all of following practicals)	Unit No.	Hours Allotted	Mapped CO
1	Create work break down structure for small construction project.	1	2	CO2
2	Create bar chart with mile stones for small construction project.	2	2	CO 3
3	Prepare project calendar with given data.	3	2	CO 3
4	Updating and tracking of given schedule for cost and time.	3	2	CO 3
5	Develop CPM network for given logic. Find project duration & critical path.	3	2	CO 3
6	Create resource histogram for given set of data.	4	2	CO 4
7	Carry out ABC analysis for given inventory data.	4	2	CO 4
8	Prepare site layout for given construction project.	5	2	CO 6
--	**Total**	**-**	**16**	**-**

S. No.	Assignments	Topic No.	Hours Allotted	Mapped CO
1	Draw life cycle of given construction project. Describe role of diploma civil engineer / site supervisor in each phase.	2	2	CO 2
2	Write job description of civil engineer in 5 different organizations.	4	2	CO 4
3	Prepare list of project documents created at different phases of project and their elements.	4	2	CO 5
4	Solve at least five examples on economic aspects of construction project management	6	2	CO 5
--	**Total**	**-**	**8**	**-**

Sr. No.	Student activity	Unit No.	Hours Allotted	Mapped CO
1.	Search internet to find government and private organizational structures.	1	2	CO 1
2.	Prepare a power point presentation on given topic in construction management.	1 to 6	2	All
3.	Read specification for any three items of construction and prepare checklist for execution f those items	6	2	CO 6
--	**Total**	**--**	**6**	**--**

Sr. No.	Practical	Topic No.	Hours Allotted	Mapped CO
--	**Practical –assignments-student activities submission**	**-**	**2**	**-**
--	**Total**	**-**	**32**	**-**

8. EVALUATION SCHEME FOR PRACTICAL / ASSIGNMENTS / STUDENT ACTIVITIES

Rubrics for Practical

Category	4	3	2	1
Take Initiative in Developing Solution for Given Problem.	Creative Thinking. Take Part In Discussion And Develop The Solution To The Problem With Teacher And Fellow Students	With Small Hint Interested In Developing The Solutions On Their Own.	Forced Participation In Discussion And Development Of Solution.	Very Little Participation In Development Of Solution.
Data Documentation, Data Analysis & Results Interpretation	Correct Calculations And Minor Error In Result.	Small Errors In Calculations	Major Errors In Calculations And Error In Result	Incomplete & Wrong Calculations And Error In Result.
Presentation of Solution	Neat And Clean Presentation Of Solution In Form Of Graphs, Diagrams Drawn To Proper Scale	To Large Extent Nneat And Clean Presentation Of Solution In Form Of Graphs, Diagrams Drawn To Proper Scale	Improper Scale, Not So Clean, Neat Presentation.	Clumsy Graphs, Sketches And Diagrams
Team Spirit	Contributes A Fair Share To Work	Sometimes Depends On Others To Complete The Work	Many Times Depends On Others To Complete The Work	Always Depends On Others To Complete The Work
Timely Completion of Activity	Maximum	Moderate	Satisfactory	Least
Overall Understanding	Maximum	Moderate	Satisfactory	Least

Rubrics for Student Activities

Category	4	3	2	1
Leadership qualities	Assume the role willingly & demonstrate ability fully	Assume the role willingly but demonstrate ability partly	Assume the role unwillingly though demonstrate ability fully	Assume the role unwillingly & demonstrate ability partly
Planning & Execution	Proper planning & execution	Proper planning but improper execution	Improper planning but proper execution	Improper planning & execution
Quality of report, graphics and presentation.	Clear description with all supporting details, relevant & neat graphics and well structure presentation.	Clear description with some supporting details, relevant but messy graphics. and structured presentation.	Clear description with no supporting details, neat but irrelevant graphics and structured presentation with missing links.	Irrelevant description, irrelevant & messy graphics and unstructured presentation.
Timely completion	Maximum	Moderate	Satisfactory	Least
Overall understanding	Maximum	Moderate	Satisfactory	Least

Rubricks for Orals

Category	4	3	2	1
Knowledge of Course content	Accurately states the main points and details in answer to the question raised by examiner with focus on the substance.	Adequately states the main points and details in answer to the question raised by examiner with focus on the substance.	States most of the main points but miss out details in answer to the question raised by examiner with focus on the substance.	States few main points and details in answer to the question raised by examiner with focus on the substance
Delivery	Effectively and creatively delivers the information while staying on topic and considering the audience	Adequately delivers the information while staying on the topic and considering the audience.	Delivers the information but does not stay on topic. Little consideration on audience.	Little or no attempt is made to deliver the information and stay on topic.
Body Language and eye contact	Good straight posture and eye contact.	Most of the times straight posture and moderate eye contact	Occasionally straight posture and little eye contact	Plump posture and very little eye contact
Overall understanding	Maximum	Moderate	Satisfactory	Least

9. SPECIFICATION TABLE FORQUESTION PAPER DESIGN

Unit No.	Unit Title	Mapped CO % OR Emphasis	Distribution of Marks			
			Cognitive level			Total Marks
			Remember	Understand	Apply	
I	Management and Organization	CO1	4	4	4	12
II	Construction Project Planning	CO2	4	4	4	12
III	Scheduling Techniques	CO3	4	4	8	16
IV	Management of Men, Material and Equipments	CO4	4	4	8	16
V	Economic Aspects of project and Project Documentation	CO5	4	4	4	12
VI	Supervision and Quality control, Safety and Site Layout	CO6	4	4	4	12
Total			**24**	**24**	**32**	**80**

10. SAMPLE MODEL QUESTION BANK FOR THEORY AND TEST EXAMINATIONS

Sr. No.	Unit	Mapped CO	Cognitive level R/U/A	Question
1	1	CO1	R	Enlist fourteen principles by Henry Fayol
2	1	CO1	U	Explain management function 'Directing'
3	1	CO1	A	Describe role of supervisor of construction site of residential building in 'Closing' Phase.

11. MODEL QUESTION BANK FOR PRACTICAL EXAMINATIONS

Sr. No	Unit	Mapped CO	Cognitive level R/U/A	Question
1	1	CO1	R	Give any two examples each of forward and backward planning
2	1	CO1	U	Differentiate between two planning techniques PERT and CPM
3	1	CO1	A	Draw work break down structure for construction of a cycle shed in CWIT

12. LEARNING RESOURCES

- **BOOKS**

Sr. No.	Title of Book	Author	Publication
1	Civil Engineering Project Management	Chitkara	Tata McGraw – Hill, New Delhi
2	Construction Management & Planning	B. Sengupta H. Guha	Tata McGraw – Hill, New Delhi.
3	Project Planning and Control with PERT and CPM	Dr. B.C. Punmia	Laxmi Publication , New Delhi.
4	Construction Engineering and Management	S. Seetharaman	Umesh Publications, New Delhi.
5	PMBOK – Project Management Body of Knowlege	Project Management Institute	Project Management Institute

- **SOFTWARE/TOOLS/MODELS**

S. No.	Name	Company	Freeware/commercial
1	MS Excel	Microsoft	Commercial
2	Microsoft Project Management Software	Microsoft	Commercial
3	Open project	www.openproject.org	Freeware

- **WEBSITES**

Sr. No.	Address
1	https://sites.google.com/site/r18ce4107/
2	https://www.pmi.org
3	nptel.ac.in/courses/105104161

13. COURSE CURRICULUM DEVELOPMENT MEMBERS

Sr. No.	Name and Designation	Contact No.	Email
1	Prof. D. S. Bapat	9422579511	deepa.bapat@rediffmail.com
2	Prof. A. S. Shelar	9422579511	ani_shel@yahoo.com

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE -1

Diploma Programme	CIVIL		
Course Name	Project Work	Course code	R18CE4108
Course Category	Applied	Credits	4

COURSE TEACHING, ASSESSMENT AND EVALUATION SCHEME:

Teaching scheme		Evaluation scheme									
		Direct assessment- Weightage - 80%									
		Theory outcome		Practical outcome							Total
				TERMWORK					PRACTICAL	ORAL	
Theory Allotted hrs	Practical Allotted hrs	ESE marks	TTA marks	TW marks	SW marks	AS marks	TU Marks	Total	Practical Marks	OR marks	Total marks
-	4			100	-	-	-	100	-	50	150
		Indirect assessment- Weightage - 20%									
		End semester students feedback						End of the Program survey			

End semester examination-ESE, Two tests average-TTA, Term Work- TW, Student Activity-SW, Assignments –AS, Tutorials- TU, Oral -OR

1. RATIONALE

It is necessary that a student should be able to apply acquired knowledge of various civil engineering subjects for solving civil engineering problems. Project work course offers opportunity to apply creative thinking, skills and knowledge of subjects to face challenges. Aim of the course is to built-up an expertise in one core area of civil engineering field, self confidence and self learning skills in students.

2. EXPECTED PROFICIENCY

Develop technical and overall generic competencies.

3. COURSE OUTCOMES (COs)

Students will be able to

1. Define a problem, identify and collect relevant data.
2. Analyze and classify observed data.
3. Develop models for solution.
4. Identify and Evaluate solutions for given problem.
5. Document the process in appropriate format.
6. Present the findings of studies using appropriate media.

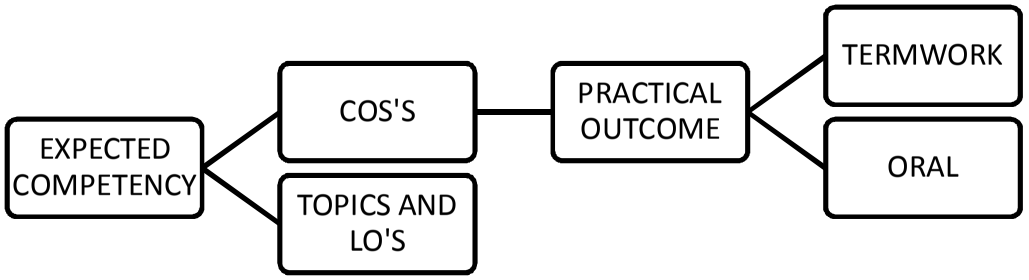
COURSE NAME	Project Work	COURSE CODE	R18CE4108

4. CO –PO MATRIX

Course Name: Project Work Course Code: R18CE4108	PO 1 Basic and Discipline specific knowledge	PO 2 Problem analysis	PO 3 Design/ development of solutions	PO 4 Engineering Tools, Experimentation and Testing	PO 5 Engineering practices for society, sustainability and environment	PO 6 Project Management	PO 7 Life-long learning	PSO 1 Construction planning and detailing	PSO 2 Construction execution, supervision and maintenance
CO1	1	3							
CO2		3							
CO3			3				1		
CO4		2	3	1		1	2	1	1
CO5					1	1	1	1	1
CO6				1					

Rating scale '**3**' for high, '**2**' for medium, '**1**' for low '**0**' for no correlation.

5. COURSE MAP



COURSE NAME	Project Work	COURSE CODE	R18CE4108

6. DETAILED COURSE CONTENTS

A batch of not less than 3 students and not more than 6 students are supposed to work on a project. Project work should have practical importance and should incorporate planning, design, experimentation, compilation of submission drawings and reports. Every individual should have his own copy and one copy of every project should be handed to the department in soft as well as hard format.

The Project may contain one or more of the following items pertaining to Civil Engineering Fields.

1. Literature and allied surveys.
2. Experimental verifications.
3. Design & fabrication of Models related to Civil engineering
4. Design Problems.
5. Industrial assignments.
6. Computerized solutions of Civil Engineering Problems.
7. Working out feasibility of a small project for execution, by actual field survey, planning, designing, final drawings etc. complete (Ready for technical sanction.)

Topics could be one out of the following or on similar lines:

1. New advents in construction technology
2. Management of a Civil Engineering project
3. Water supply or sanitary system for a township.
4. Any major irrigation structure analysis and design.
5. Analysis of any one critical problem in transportation engineering and suggesting remedial solution.
6. Green Buildings/ sustainable technology
7. Retrofitting of structures.
8. Rectification, dismantling renovating structures, preservation of structures of importance.
9. Technical appraisal of project as conducted by financial institution by working out i) Cash flow requirement, ii) Material requirement, iii) Manpower iv) Financial feasibility.
10. Study & / or development of an appropriate technology for i) Low cost housing, ii) Rural sanitation, iii) Rural water treatment
11. Making out a complete tender and rate analysis for an actual project in reply to a tender notice.
12. Environmental friendly alternative building materials for different items of construction industry.
13. Advance experimental work discovering new relationship between ranges of variables. This may require developments in the field of construction.
14. Inter disciplinary projects to accommodate latest development in the field of construction like home automation, hydro pneumatic systems, fire fighting systems, air conditioning.
15. Optimizing concrete quality by modifying content or procedures through rigorous testing and analysis.

COURSE NAME	**Project Work**	COURSE CODE	**R18CE4108**

Stages in Project Preparation :

1. Briefing session – to define project theme .Aims of projects to be clarified to the students.
2. Selection of project work.
3. Literature survey
4. Planning of work.
5. Fabrication works if necessary.
6. Experimental work – maintaining log book.
7. Analysis of experimental work data – identifying problems.
8. Presentation of Project work.
9. Seminar.
10. Participating in project exhibition /conferences/paper presentation – like ' DIPEX' (Optional)
11. Presentation in examination.

COURSE NAME	Project Work	COURSE CODE	R18CE4108

7. PRACTICAL –ASSIGNMENTS-STUDENT ACTIVITIES-TUTORIALS (Separate table for each)

S. No.	Practical	Topic No.	Hours Allotted	Mapped CO
--	Practical –assignments-student activities submission	--	64	ALL
--	Total	--	64	--

8. EVALUATION SCHEME FOR PRACTICAL / ASSIGNMENTS/STUDENT ACTIVITIES

Rubrics for Project Report and Term Work

Category	4	3	2	1
Structure	Very Well Structured	Well Constructed	Structured But Missing Links	Unstructured
Quantity of Informations	All Subtopics Covered In Detail	All Subtopics Are Mostly Covered	Some Of The Subtopics Are Not Covered In Detail	Some Of The Subtopics Are Not Covered
Quality of Informations	Clear Description With Supporting Details	Clear Description With Some Supporting Details	Clear Description With Lack Of Supporting Details	Irrelevent Information
Sources	Clear Documentation	Clear Documentation With Some Missing Links	Part Documentation With Missing Links	Documentation With Number Of Missing Links
Grammer And Spelling And Language	Least Errors	Almost No Errors	Few Errors	Many Errors
Graphics	Neat ,Accurate And Enhance Understanding	Neat And Accurate	Some Illustrations Are Misleading And Redundant	Least Accurate And Not Neat
Paragraph Construction	Through Logical Construction	Mostly Logical Construction	Unstructured	No Clear Definations
Internet Use	Optimal Utilization	Fair Utilization	Occasional	No References
Regularity	Maximum	Moderate	Satisfactory	Least
Working With Others	Coperative And Leadership Skills	Coperative	Lacks Leadership	Least Participation
Timely Completion of Sub Activities	Maximum	Moderate	Satisfactory	Least
Overal Understanding	Maximum	Moderate	Satisfactory	Least

10. COURSE CURRICULUM DEVELOPMENT MEMBERS

S. No.	Name and Designation	Contact No.	Email
1	Dr. S. V. Kanitkar	9921414902	svkwadia@yahoo.co.in

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE -1

Diploma Programme	CIVIL		
Course Name	Design of RCC Structures	Course code	R18AM4109
Course Category	Applied	Credits	6

COURSE TEACHING, ASSESSMENT AND EVALUATION SCHEME:

Teaching scheme		Evaluation scheme									
		Direct assessment - Weightage - 80%									
		Theory outcome		Practical outcome							Total
				TERMWORK					PRACTICAL	ORAL	
Theory Allotted Hrs	Practical Allotted Hrs	ESE marks	TTA marks	TW marks	SW marks	AS marks	TU Marks	Total	Practical Marks	OR marks	Total Marks
4	2	80	20	20	05		--	25	-	25	150
		Indirect assessment – Weightage - 20%									
		Mid semester students feedback						End of the course survey			

End semester examination-ESE, Two tests average-TTA, Term Work- TW, Student Activity-SW, Assignments –AS, Tutorials- TU, Oral -OR

1. RATIONALE

This is applied subject who will enable students to understand design principles and procedures for structural components like slab, beams, columns & footings. Reinforced Cement Concrete is used for almost all types of structures, e.g. residential buildings, public buildings, bridges etc. It is essential for Civil engineer to study the properties & behaviour of RCC. The diploma students should be aware of the basic concepts of RCC design & should be able to prepare, read & interpret structural drawings. The students should be familiar with the relevant IS codes & be aware of the standard requirements, while executing the construction work. Students should also be capable of designing structural components or simple structures.

2. EXPECTED PROFICIENCY

Apply principles of engineering mechanics, strength of materials and theory of structures for analysis and design of RCC structures.

3. COURSE OUTCOMES (COs)

Students will be able to

1. Use relevant IS codes for analyzing, designing and detailing of RCC structural elements.
2. Reproduce the basic knowledge in the areas of limit state method and the concept of RCC members.
3. Practice the culture of professional and ethical responsibilities by following IS:456 code provisions in the analysis, design of RC structures.
4. Identify the causes of failure in structural elements and suggest remedial measures for the benefit of community at large.
5. Demonstrate the procedural knowledge to design a system, component or process as per needs and specifications of RCC structures
6. Apply the knowledge of design of RCC structural elements using existing software and communicate the procedure adopted.

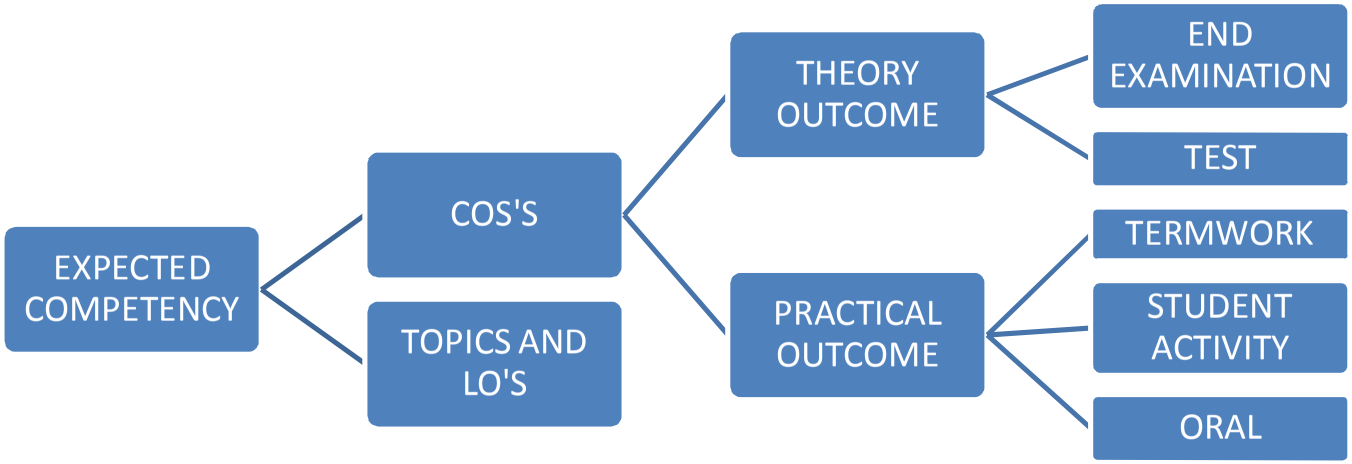
COURSE NAME	Design of RCC Structures	COURSE CODE	R18AM4109

4. CO –PO MATRIX

Course Name: Design of RCC Structures Course Code: R18AM4109	PO 1 Basic and Discipline specific knowledge	PO 2 Problem analysis	PO 3 Design/ development of solutions	PO 4 Engineering Tools, Experimentation and Testing	PO 5 Engineering practices for society, sustainability and environment	PO 6 Project Management	PO 7 Life-long learning	PSO 1 Construction planning and detailing	PSO 2 Construction execution, supervision and maintenance
CO1	2	3	2						
CO2	3	3							
CO3		3			3	2	3	1	
CO4		2	3						
CO5		3	2	2					1
CO6				3					

Rating scale '**3**' for high, '**2**' for medium, '**1**' for low '**0**' for no correlation

5. COURSE MAP



COURSE NAME	Design of RCC Structures	COURSE CODE	R18AM4109

6. DETAILED COURSE CONTENTS

S. No.	Unit Outcomes (UOs)	Topics and Sub-topics	Marks	Hours	Mapped CO
1	**Unit I: Limit State Method** 1a. Explain Limit State Method and its types. 1b. Explain design compressive and tensile strength of concrete and steel for Limit state method 1c. Analysis & Design of Singly Reinforced Rectangular beam Section in Flexure.	1.1 Necessity of steel in concrete, location of tension steel in beams, slabs and footing. 1.2 Definition of Limit State, Types of Limit States, (Limit State of Collapse – Flexure, Shear, Compression, Torsion, Limit State of Serviceability- Deflection, cracking.), Assumptions. 1.3 Characteristic strength of concrete and steel, partial safety factor for concrete and steel strength. 1.4 Characteristic load, partial safety factor for load, design or factored load. 1.5 IS 456-2000 specifications regarding spacing of reinforcement, cover, minimum & maximum reinforcement in RC members and effective span of beam or slab. 1.6 Stress and strain diagram of singly reinforced rectangular beam section. 1.7 Equations (No derivation) for balanced sections for maximum depth of N.A. (Xu_{max}), Actual depth of N.A. Xu_{lim} ,Moment of resistance (Mu_{lim}), Actual moment of resistance (Mu), 1.8 Concept of balanced section, under reinforced section, over reinforced section. 1.9 Simple numerical problems on determining design constants, moment of resistance, type of section- under and over reinforced, ultimate load carrying capacity of beam.	16	8	CO1
2	**Unit-II Limit State of Collapse: Flexure** 2a. Necessity of doubly reinforced sections 2b. Analysis & Design of Doubly Reinforced Rectangular Section. 2c. Analysis of flanged beam for Flexure.	2.1 Meaning and Condition for Doubly Reinforced beam Section, Stress- Strain diagrams for doubly reinforced beam Section, analysis & design of doubly reinforced beam Section. 2.2 Conditions for formation of flanged (T and L) beams, Width of Flange as per IS 456-2000, Introduction to cases of neutral axis in i) flange and ii) web, Numerical on Moment of Resistance for	12	8	CO2

COURSE NAME	**Design of RCC Structures**	COURSE CODE	**R18AM4109**

S. No.	Unit Outcomes (UOs)	Topics and Sub-topics	Marks	Hours	Mapped CO
		neutral axis in the flange only.			
3	**Unit-III :Limit State Of Collapse: Shear And Bond** 3a. Design Stirrups for R.C Rectangular Beam 3b. Apply shear checks as per requirements of IS. 3c. Apply checks for development length.	3.1 Necessity of shear reinforcement, Nominal shear stress, design shear strength of concrete, maximum shear stress in concrete. 3.2 Minimum shear reinforcement, forms of shear reinforcement, maximum spacing of stirrups. 3.3 Design of shear reinforcement, 3.4 Concept of bond, types of bond, Check for bond stress and Lap Length as per Is 456-2000 (Clause 26.2.5.1) 3.5 Reinforcement details for shear and bond in Simply Supported, Cantilever beams and slabs.	12	6	CO3
4	**Unit-IV :Design of Slabs** 4a. Identify type of Slab form drawing. 4b. Design & Draw detail drawings of Cantilever Slab, One Way Simply Supported Slab & Two Way Simply Supported Slab. 4c. Apply checks for shear & deflections.	4.1 Definition and classification of slabs as one-way and two-way slabs, support conditions, main and distribution steel, Limit state of serviceability for slabs: Check for deflection. 4.2 Procedure and numerical problems on design of one way simply supported slab with corners free to lift, check for shear & deflection. 4.3 Design of two-way simply supported slab with corners free to lift, check for shear & deflection. 4.4 Design of cantilever slab/chajja with uniform thickness, check for shear, deflection & development length, anchoring reinforcing bars in Tension and in Compression	16	10	CO4
5	**Unit-V: Limit State of Collapse: Compression** 5a. Calculate the ultimate load carrying capacity of the column in the given data. 5b. Design the axially loaded short column from the given data. 5c. Check the given structural drawing as per the specifications given in the IS code.	5.1 Assumption, Minimum Eccentricity, Short Column, Long Column, Reduction Factor, Effective Length of Column. 5.2 Reinforcement Requirements as per IS provisions, draw reinforcement details. 5.3 Design of axially loaded short square, rectangular or circular columns with lateral ties.	12	8	CO5
6	**Unit-VI: Design of Footing** 6a. Design isolated square/rectangular footing 6b. Draw reinforcement details of footing	6.1 Types of Footings, Design of axially loaded isolated square footing with uniform depth for square /rectangular columns. 6.2 Depth of footing, Check for one-way and two-way shear.	12	6	CO6

7. ASSIGNMENTS-STUDENT ACTIVITIES

S. No.	Term Work (Assignments)	Topic No.	Hours Allotted	Mapped CO
1	Analysis and design of singly reinforced beams	1	4	CO1
2	Analysis and design of doubly reinforced and flanged beams	2	4	CO2
3	Analysis and shear design of beams.	3	4	CO3
4	Design and drafting for one way slabs and two way slabs	4	4	CO4
5	Analysis and design of columns	5	4	CO5
6	Design of footings	6	4	CO6
--	**Total**	**--**	**24**	**--**

S. No.	Student Activity	Topic No.	Hours Allotted	Mapped CO
1	Site Visit and preparation of report based on site visit	1	4	CO1

S. No.	Practical	Topic No.	Hours Allotted	Mapped CO
--	**Assignments-student activities submission**	**--**	**4**	**--**
--	**Total**	**--**	**32**	**--**

8. EVALUATION SCHEME FOR PRACTICAL / ASSIGNMENTS/STUDENT ACTIVITIES

Rubrics for Assignments

Category	4	3	2	1
Structure	Very Well Structured	Well Constructed	Structured But Missing Links	Unstructured
Understanding of Analytical Concepts	Complete Understanding	Substantial Understanding	Some Understanding	Limited Understanding
Mathematical Errors	Least Errors	90 % Free Of Errors	75 % Free Of Errors	50 % Free Of Errors
Graphics	Neat ,Accurate And Enhance Understanding	Neat And Accurate	Some Illustrations Are Misleading And Redundant	Least Accurate And Not Neat
Timely Completion of Activity	Maximum	Moderate	Satisfactory	Least
Overall Understanding	Maximum	Moderate	Satisfactory	Least

9. SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Topic No.	Topic Title	Teaching Hours	Distribution of Marks			
			Cognitive level			Total Marks
			Remember	Understand	Apply	
I	Analysis and Design of Singly reinforced beams	8	4	4	8	16
II	Analysis and Design of Doubly & flanged beams	8	-	4	8	12
III	Analysis and Design of RCC beams subjected to shear.	8	4	-	8	12
IV	Design of one way and two	10	-	-	16	16

Topic No.	Topic Title	Teaching Hours	Distribution of Marks			
			Cognitive level			Total Marks
			Remember	Understand	Apply	
	way slabs.					
V	Analysis and Design of columns	8	4	-	8	12
VI	Design of footings	6	-	4	8	12
Total		**48**	**12**	**12**	**56**	**80**

10. SAMPLE MODEL QUESTION BANK FOR THEORY AND TEST EXAMINATIONS

S. No	Topic	Mapped CO	Cognitive level R/U/A	Question
1	1	CO1	R	Enlist functions of reinforcement in R.C. sections
2	1	CO1	U	Calculate design constants for M_{20}- Fe $_{415}$
3	1	CO1	A	Calculate moment of resistance if 4-12# are provided in a beam of size 300 mm × 500 mm deep effective.

11. LEARNING RESOURCES

- **BOOKS**

S. No.	Title of Book	Author	Publication
1	Limit State Theory and Design	Dr. S. R. Karve and Dr. V. L. Shah	Structures Structures ISBN-10: 819037172X ISBN-13: 978-8190371728
2	R.C.C. Design	Shah and Kale.	Laxmi Publications ISBN: 9789351380962, ISBN:9351380963
3	Limit State Design	P. C. Varghese	Eastern Economy Edition ISBN: 9788120320390, ISBN:8120320395
4	IS:456-2000 Plain and Reinforced Concrete	Bureau of Indian Standards	BIS

- **WEBSITES**

S. No.	ADDRESS
1	www.nptel.iitm.ac.in
2	http://www.sefindia.org/
3	www.slideshare.net/asif108/
4	www.youtube.com/watch?v=2L1DTLV8bQk
5	www.civilengineersforum.com

12. COURSE CURRICULUM DEVELOPMENT MEMBERS

S. No.	Name and Designation	Contact No.	Email
1	Dr. C. N. Thombare	9421680550	cnthombre@yahoo.co.in

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE -1

Diploma Programme	CIVIL		
Course Name	Design of Steel Structures	Course code	R18AM4110
Course Category	Applied	Credits	6

COURSE TEACHING, ASSESSMENT AND EVALUATION SCHEME:

Teaching scheme		Evaluation scheme									
		Direct assessment - Weightage - 80%									
		Theory outcome		Practical outcome							Total
				TERMWORK					PRACTICAL	ORAL	
Theory Allotted Hrs	Practical Allotted Hrs	ESE marks	TTA marks	TW marks	SW marks	AS marks	TU Marks	Total	Practical Marks	OR marks	Total Marks
4	2	80	20	20	05	--	--	25	-	25	150
		Indirect assessment – Weightage - 20%									
		Mid semester students feedback							End of the course survey		

End semester examination-ESE, Two tests average-TTA, Term Work- TW, Student Activity-SW, Assignments –AS, Tutorials- TU, Oral -OR

1. RATIONALE

This is applied subject which will enable the students to understand, design principles of bolted connections, welded connections, tension members, compression members, beams and column bases for various industrial structures. Steel is extensively used as a construction material for Civil engineering works such as high-rise buildings, industrial buildings, transmission towers, railway bridges, chimney, bunkers, silos etc. The design of steel structures involves the planning of structure for specific purpose, proportioning and selection of members to carry loads in most economic manner and erection of structure at site. This can be achieved by proper functional planning and providing adequate strength to withstand direct and induced forces, which may act on the structure during its lifetime. The knowledge of material properties and behaviours of structural member, methods of structural analysis, determining design loads and method of design by using latest IS codes, hand books and design aids is essential.

2. EXPECTED PROFICIENCY

Apply principles of engineering mechanics, strength of materials and theory of structures for analysis and design of steel structures.

3. COURSE OUTCOMES (COs)

Students will be able to

1. Use steel table and IS code to know properties of structural steel sections. Design bolted joints for tensile and compressive forces.
2. Design welded joints for tensile and compressive forces.
3. Design of Tension members using single or double angle sections or built up section with welded and bolted Connections as per IS 800-1984.
4. Design of Compression members using single or double angle sections or built up section with welded and bolted Connections as per IS 800-1984.
5. Design simple beam section.
6. Design column bases.

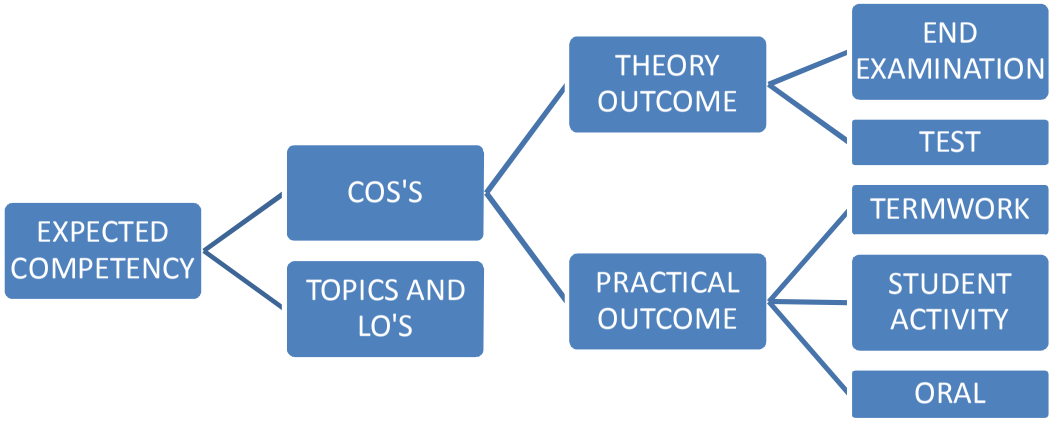
COURSE NAME	Design of Steel Structures	COURSE CODE	R18AM4110

4. CO –PO MATRIX

Course Name: Design of Steel Structures Course Code: R18AM4110	PO 1 Basic and Discipline specific knowledge	PO 2 Problem analysis	PO 3 Design/ development of solutions	PO 4 Engineering Tools, Experimentation and Testing	PO 5 Engineering practices for society, sustainability and environment	PO 6 Project Management	PO 7 Life-long learning	PSO 1 Construction planning and detailing	PSO 2 Construction execution, supervision and maintenance
CO1	2	3	2						
CO2	3	3							
CO3		3			3	2	3	1	
CO4		2	3						
CO5		3	2	2					1
CO6				3					

Rating scale '**3**' for high, '**2**' for medium, '**1**' for low '**0**' for no correlation

5. COURSE MAP



COURSE NAME	Design of Steel Structures	COURSE CODE	R18AM4110

6. DETAILED COURSE CONTENTS

S. No.	Unit Outcomes (UOs)	Topics and Sub-topics	Marks	Hours	Mapped CO
1	**Introduction to structural Steel and Analysis and Design of Bolted connections** 1a. State various grades of steel and their strength parameters 1b. List various properties of steel sections used for steel structures. 1c. Use steel table and IS code for finding different properties of steel sections. 1d. State types of steel joints and their modes of failure. 1e. Design bolted steel joints.	**General Considerations:** 1.1 Steel as a structural material, various grades of structural steel, properties, various rolled steel sections and their properties. Introduction to IS:808, IS:875(part I-III) **Bolted Connections:** 1.2 Types ,Designations, properties, permissible stresses, Failure of the bolted joint, bolt value, efficiency of the joint, strength of a joint, pitch, design of simple bolted connections (axial and moment resisting).	16	10	CO1
2	**Welded connections in Steel Structures:-** 2a. Design welded steel joints	**Welded Connections:** 2.1 Types of welds, symbols, merits and demerits of welding, permissible stresses, size of weld, throat thickness, design of butt welds, design of fillet welds, 2.2 Design of simple welded connections (axial and moment resisting).	12	8	CO2
3	**Design of Tension Members** 3a. State different types of tension members. 3b. List types of steel sections used for tension embers. 3c. Analyze and design tension member connected by bolted and welded joints.	**Tension Members :** 3.1 Types of Tension members, permissible stress, single angle and double angle used as a tie, net cross sectional area, capacity of a tension member, 3.2 Design of a tension member for the given capacity, different I.S. sections, end connections.	12	6	CO3
4	**Design of Compression Members** 4a. State different types of steel sections used for Compression members 4b. Analyze and design compression member connected by bolted or welded joints	**Compression Members:** 4.1 End conditions, effective length, slenderness ratio, permissible stress, single angle and double angle strut, capacity of a strut, limits of slenderness ratio, column, capacity of a column, different I.S. sections used for a column, 4.2 Compound sections for maximum capacity.	16	10	CO4

COURSE NAME	**Design of Steel Structures**	COURSE CODE	**R18AM4110**

S. No.	Unit Outcomes (UOs)	Topics and Sub-topics	Marks	Hours	Mapped CO
		4.3 Built-up columns, calculation of back to back or face to face distance, Introduction to lacing and battening, detailed design of battened and laced columns.			
5	**Design of Beams** 5a. List different sections used for beams. 5b. Draw loading, shear force and bending moment diagram developed in beam due to udl 5c. Analyze and design of simple beam sections subjected to udl moment diagram developed in beam due to udl	**Beam** 5.1 Type of sections, lateral stability of beams, bending stresses, 5.2 Design of the simply supported beam (with compression flange fully restrained) for bending moment, check for shear and deflection, permissible deflection, design of beam to beam framed connections only. 5.3 Design of purlins (angle section only). Introduction to Plate Girder	12	8	CO5
6	**Design of Column Bases** 6a. Draw components parts of steel foundations. 6b. Draw the sketch of slab base and gusseted base foundations 6c. Analysis and design slab base foundation.	**Column Bases** 6.1 Types of steel foundations- Slab Base foundation, Gusseted base foundation 6.2 Design of Slab base foundation for axially loaded column, design of plain concrete foundation block under the base plate 6.3 Introduction to Gusseted base Foundations: Meaning and purpose. No numerical problems on analysis and design of gusseted base foundation.	12	6	CO6

7. ASSIGNMENTS-STUDENT ACTIVITIES

S. No.	Term Work (Assignments)	Topic No.	Hours Allotted	Mapped CO
1	Analysis and design of bolted connections	1	4	CO1
2	Analysis and design of welded connections	2	4	CO2
3	Analysis and design of tension members.	3	4	CO3
4	Analysis and design of compression members	4	4	CO4
5	Analysis and design of beams	5	4	CO5
6	Design of column bases	6	4	CO6
--	**Total**	**--**	**24**	**--**

S. No.	Student activity	Topic No.	Hours Allotted	Mapped CO
1	Preparation of report based on site visit	1	4	CO1

S. No.	Practical	Topic No.	Hours Allotted	Mapped CO
--	**Assignments-student activities submission**	**--**	**4**	**--**
--	**Total**	**--**	**32**	**--**

8. EVALUATION SCHEME FOR PRACTICAL / ASSIGNMENTS/STUDENT ACTIVITIES

Rubrics for Assignments

Category	4	3	2	1
Structure	Very Well Structured	Well Constructed	Structured But Missing Links	Unstructured
Understanding of Analytical Concepts	Complete Understanding	Substantial Understanding	Some Understanding	Limited Understanding
Mathematical Errors	Least Errors	90 % Free Of Errors	75 % Free Of Errors	50 % Free Of Errors
Graphics	Neat ,Accurate And Enhance Understanding	Neat And Accurate	Some Illustrations Are Misleading And Redundant	Least Accurate And Not Neat
Timely Completion of Activity	Maximum	Moderate	Satisfactory	Least
Overall Understanding	Maximum	Moderate	Satisfactory	Least

9. SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Topic No.	Topic Title	Teaching Hours	Distribution of Marks			
			Cognitive level			Total Marks
			Remember	Understand	Apply	
I	Analysis and design of bolted connections	10	4	4	8	16
II	Analysis and design of welded connections	8	4	-	8	12
III	Analysis and design of tension members	6	-	4	8	12
IV	Analysis and design of compression members	10	-	-	16	16
V	Analysis and design of beams	8	4	-	8	12

COURSE NAME	Design of Steel Structures	COURSE CODE	R18AM4110

Topic No.	Topic Title	Teaching Hours	Distribution of Marks			
			Cognitive level			Total Marks
			Remember	Understand	Apply	
VI	Design of column bases	6	-	4	8	12
Total		**48**	**12**	**12**	**56**	**80**

10. SAMPLE MODEL QUESTION BANK FOR THEORY AND TEST EXAMINATIONS

S. No	Topic	Mapped CO	Cognitive level R/U/A	Question
1	1	CO1	R	List any four standard types of steel sections used with their applications.
2	1	CO1	U	Explain three types of failure of bolted connections.
3	1	CO1	A	Design a suitable bolted connection to connect plate 60 mm × 10 mm to 150 mm × 12 mm thick plate.

11. LEARNING RESOURCES

- **BOOKS**

S. No.	Title of Book	Author	Publication
1	Design of Steel Structures	L. S. Negi	Tata McGraw-Hill ISBN:0074623052, ISBN:9780074623053
2	Design of Steel Structures	S. Ramamruthum.	Dhanpat Rai Publishing Co ISBN-10: 8187433361 ISBN-13: 978-8187433361
3	Design of Steel Structures	P. Dayarathnam	S. Chand and Company ISBN-10: 8121923204 ISBN-13: 978-8121923200
4	IS:808-1989 Code of practice for dimensions for hot rolled steel beam, column, channel and angle sections	Bureau of Indian Standards	Bureau of Indian Standards
5	IS:800 – 1984, Code of practice for use of structural steel in general building construction.	Bureau of Indian Standards	Bureau of Indian Standards

- **WEBSITES**

S. No.	Address
1	www.nptel.iitm.ac.in
2	https://www.youtube.com/watch?v=6nguX-cEsvw
3	http://nptel.ac.in/courses/122104015/

12. COURSE CURRICULUM DEVELOPMENT MEMBERS

S. No.	Name and Designation	Contact No.	Email
1	Dr. C. N. Thombare	9421680550	cnthombre@yahoo.co.in

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE -1

Diploma Programme	CIVIL		
Course Name	Seminar	Course code	R18CE4111
Course Category	Applied	Credits	2

COURSE TEACHING, ASSESSMENT AND EVALUATION SCHEME:

Teaching scheme		Evaluation scheme									
		Direct assessment - Weightage - 80%									
		Theory outcome		Practical outcome							Total
				TERMWORK					PRACTICAL	ORAL	
Theory Allotted Hrs	Practical Allotted Hrs	ESE marks	TTA marks	TW marks	SW marks	AS marks	TU Marks	Total	Practical Marks	OR marks	Total Marks
-	2	-	-	20	5	--	-	25	-	@25	50
		Indirect assessment – Weightage - 20%									
		Mid semester students feedback							End of the course survey		

End semester examination-ESE, Two tests average-TTA, Term Work- TW, Student Activity-SW, Assignments –AS, Tutorials- TU, Oral -OR

1. RATIONALE

Students will be exposed to all kind of literature available on internet as well as in the college libraries and will thus gain an appreciation in their minds for the breadth and depth of current development going on and the process of scientific/ technical investigation being undertaken around the world. Students will consult the text books / Professors/ websites / online forums/ external experts of the subject to find / get some idea about topics of their interest.
Students will learn to write paper and prepare presentation based on that paper using computer based software. Students will present their own topic, listen to others topic, ask questions and get exposed to the content beyond curriculum.

2. EXPECTED PROFICIENCY

Study the small topic, write paper and present the same in front of teachers and fellow students.

3. COURSE OUTCOMES (COs)

Students will be able to

1. Use critical thinking skills.
2. Acquire experience in the critical assessment of the available scientific / Technical literature.
3. Practice the use of various resources to locate and extract information using offline and online tools, journals.
4. Prepare and present scientific / Technical papers and seminars in an exhaustive manner.

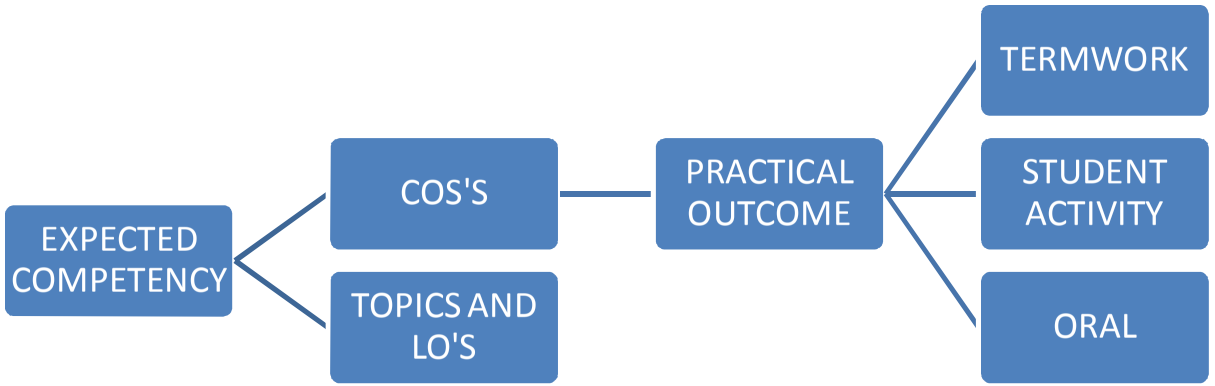
COURSE NAME	Seminar	COURSE CODE	R18CE4111

4. CO –PO MATRIX

Course Code: Seminar Course Code: R18CE4114	PO 1 Basic and Discipline specific knowledge.	PO 2 Problem analysis.	PO 3 Design/ development of solutions.	PO 4 Engineering Tools, Experimentation and Testing.	PO 5 Engineering practices for society, sustainability and environment	PO 6 Project Management	PO 7 Life-long learning	PSO 1 Construction planning and detailing	PSO 2 Construction execution, supervision and maintenance
CO1	1	2	1	1	2			2	2
CO2		1	1			1	2		
CO3			1		1		2		
CO4			1		1		2		

Rating scale '**3**' for high, '**2**' for medium, '**1**' for low '**0**' for no correlation

5. COURSE MAP



COURSE NAME	Seminar	COURSE CODE	R18CE4111

6. GUIDELINES TO ACHIEVE COURSE OUTCOMES

1 Preparation for Seminar

1a. Select small relevant topic from the broad coverage of topic given
1b. Brainstorming on the topic chosen. Generation of ideas
1c. Browsing information online / Offline (Literature survey)
1d. Collection of information.
1e. Discussion amongst group and individual discussion with teacher.
1f. Selecting information and case study.
1g. Validating the information from teacher
1h. Writing and submitting synopsis of paper on given topic.

2 Presentation of Seminar

2.a Discussion and preparation of template for paper and presentation
2.b Submitting draft copy of paper
2.c Suggestions and editing by teacher
2.d Finalizing and submitting paper
2.e Preparation of presentation based on paper.
2.f Rehearsal
2.g Seminar presentation

7. PRACTICAL –ASSIGNMENTS-STUDENT ACTIVITIES-TUTORIALS (Separate table for each)

S. No.	Term Work (Practical)	Topic No.	Hours Allotted	Mapped CO
1	Identify topics at broad level for group discussion and brain storming	1	2	CO1
2	Forming of groups and brain storming on topic of interest	1	2	CO1
3	Generate ideas and select small topic.	1	2	CO1
4	Verify the ideas by literature survey and browsing online information.	1	4	CO2
5	Search by literature survey and browsing online information case study for similar ideas and checking for any reference in past.	1	4	CO2
6	Segregating and arranging the gathered information.	2	2	CO3
7	Write synopsis of paper.	2	2	CO3
8	Prepare draft copy of paper	2	2	CO4
9	Creating presentation for seminar	2	4	CO4
--	**Total**	**--**	**24**	**--**

S. No.	Student activity	Topic No.	Hours Allotted	Mapped CO
1	Visiting library for books and journals	1	2	CO1
2	Rehearsal/Mock presentation	2	2	CO2
--	**Total**	**--**	**4**	--

COURSE NAME	Seminar	COURSE CODE	R18CE4111

S. No.	Practical	Topic No.	Hours Allotted	Mapped CO
--	**Presentation of paper**	--	**4**	--
--	**Total**	--	**32**	--

8. EVALUATION SCHEME FOR PRACTICAL / ASSIGNMENTS/STUDENT ACTIVITIES

Rubrics for Practical

Category	4	3	2	1
Quantity & Source Of Information	All Subtopics Covered In Detail & Clear Documentation Of Sources Of Information	All Subtopics Are Mostly Covered And Clear Documentation Of Sources Of Information With Some Missing Links	Some Of The Subtopics Are Not Covered In Detail And Part Documentation Of Sources Of Information With Some Missing Links	Some Of The Subtopics Are Not Covered At All And Part Documentation Of Sources Of Information With Too Many Missing Links
Quality Of Information, Graphics And Presentation.	Clear Description With All Supporting Details, Relevant & Neat Graphics And Well Structure Presentation.	Clear Description With Some Supporting Details, Relevant But Messy Graphics. And Structured Presentation.	Clear Description With No Supporting Details, Neat But Irrelevant Graphics And Structured Presentation With Missing Links.	Irrelevant Description, Irrelevant & Messy Graphics And Unstructured Presentation.
Understanding Of Concepts And Mistakes	Complete Understanding And No Mistakes	Substantial Understanding And 90 % Free Of Mistakes	Some Understanding And 75 % Free Of Mistakes	Limited Understanding And 50 % Free Of Mistakes
Timely Completion Of Activity	Maximum	Moderate	Satisfactory	Least
Overall Understanding	Maximum	Moderate	Satisfactory	Least

Rubricks for Student Activities

Category	4	3	2	1
Leadership Qualities	Assume The Role Willingly & Demonstrate Ability Fully	Assume The Role Willingly But Demonstrate Ability Partly	Assume The Role Unwillingly Though Demonstrate Ability Fully	Assume The Role Unwillingly & Demonstrate Ability Partly
Planning & Execution	Proper Planning & Execution	Proper Planning But Improper Execution	Improper Planning But Proper Execution	Improper Planning & Execution
Quality Of Report, Graphics And Presentation.	Clear Description With All Supporting Details, Relevant & Neat Graphics And Well Structure Presentation.	Clear Description With Some Supporting Details, Relevant But Messy Graphics. And Structured Presentation.	Clear Description With No Supporting Details, Neat But Irrelevant Graphics And Structured Presentation With Missing Links.	Irrelevant Description, Irrelevant & Messy Graphics And Unstructured Presentation.
Timely Completion	Maximum	Moderate	Satisfactory	Least
Overall Understanding	Maximum	Moderate	Satisfactory	Least

COURSE NAME	Seminar	COURSE CODE	R18CE4111

Rubricks for Orals

Category	4	3	2	1
Knowledge of Course content	Accurately states the main points and details in answer to the question raised by examiner with focus on the substance.	Adequately states the main points and details in answer to the question raised by examiner with focus on the substance.	States most of the main points but miss out details in answer to the question raised by examiner with focus on the substance.	States few main points and details in answer to the question raised by examiner with focus on the substance
Delivery	Effectively and creatively delivers the information while staying on topic and considering the audience	Adequately delivers the information while staying on the topic and considering the audience.	Delivers the information but does not stay on topic. Little consideration on audience.	Little or no attempt is made to deliver the information and stay on topic.
Body Language and eye contact	Good straight posture and eye contact.	Most of the times straight posture and moderate eye contact	Occasionally straight posture and little eye contact	Plump posture and very little eye contact
Overall understanding	Maximum	Moderate	Satisfactory	Least

9. MODEL QUESTION BANK FOR ORAL EXAMINATIONS

S. No	Unit	Mapped CO	Cognitive level R/U/A	Question
1	1	CO1	R	State the websites you referred for references.
2	1	CO1	U	Describe any information you thought was important for further research but out of scope for this seminar
3	1	CO1	A	Differentiate between online and offline sources of information.

10. LEARNING RESOURCES

- **BOOKS**

S. No.	Title of Book	Author	Publication
1	Research Methodology : Methods And Techniques	C.R. Kothari and Gaurav Garg	University Bookstore ISBN: 9788122436235
2	Research Methodology	Gupta A K	Vayu Education Of India ISBN: 9788190804035
3	The Presentation Book	Emma Ledden	Pearson India ISBN: 9781292002583

- **SOFTWARES**

- MS Word
- MS Power point

- **WEBSITES**

S. No.	Address
1	www.google.com
2	www.nptel.iitm.ac.in
3	https://www.youtube.com
4	http://www.slideshare.in

11. COURSE CURRICULUM DEVELOPMENT MEMBERS

S. No.	Name and Designation	Contact No.	Email
1	Prof. D. S. Bapat	9422579511	deepa.bapat@rediffmail.com
2	Prof. A. S. Shelar	9423558189	ani_shel@yahoo.com

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE -1

Diploma Programme	CIVIL		
Course Name	Internship Training	Course code	R18CE4112
Course Category	Applied	Credits	6^

COURSE TEACHING, ASSESSMENT AND EVALUATION SCHEME:

Teaching scheme		Evaluation scheme									
		Direct assessment - Weightage - 80%									
		Theory outcome		Practical outcome							Total
				TERMWORK					PRACTICAL	ORAL	
Theory Allotted Hrs	Practical Allotted Hrs	ESE marks	TTA marks	TW marks	SW marks	AS marks	TU Marks	Total	Practical Marks	OR marks	Total Marks
-	6^	-	-	--	60	15	-	75	-	75	150
		Indirect assessment – Weightage - 20%									
		Mid semester students feedback							End of the course survey		

End semester examination-ESE, Two tests average-TTA, Term Work- TW, Student Activity-SW, Assignments –AS, Tutorials- TU, Oral –OR

^ Every student has to undergo 6 weeks Internship Training at a site or plant or office related to Civil Engineering in summer vacation after term end examination of even term of second year. Though 6 credits are allocated for Internship Training, it is only for awarding marks. As far as 'Teaching Load' or 'Time Table' preparation is considered, concerned faculty would be assigned with one batch of students (equivalent to practical batch size) for assessment and evaluation of Internship Training Report. For this purpose 1 hour (or two hours on working Saturday) teaching load would be considered.

1. RATIONALE

Industrial training, where a student undertakes a period of training with an organization usually during a semester break, plays an important role in preparing the student for a professional career. From the hands-on training, the student learns about the skill sets required, demands of the industry and also work ethics. At the same time it gives the student an opportunity to put into practice what he or she has learned at the institute.

The industry exposure enhances the student's work life through added enthusiasm and commitment; provides a lifelong learning experience; is an opportunity to engage with the profession to which they aspire in a realistic work environment; appreciate and understand the practical application of their academic program; work with professional mentors and to begin to build networks within their profession.

2. EXPECTED PROFICIENCY

Work responsibly as a diploma engineer trainee in simulated work environment.

3. COURSE OUTCOMES (COs)

Students will be able to

1. Prepare oneself for formal employment.
2. Gain valuable work experience and develop and refine skills acquired during education.
3. Explore career path and networking with professionals in the field and teachers.

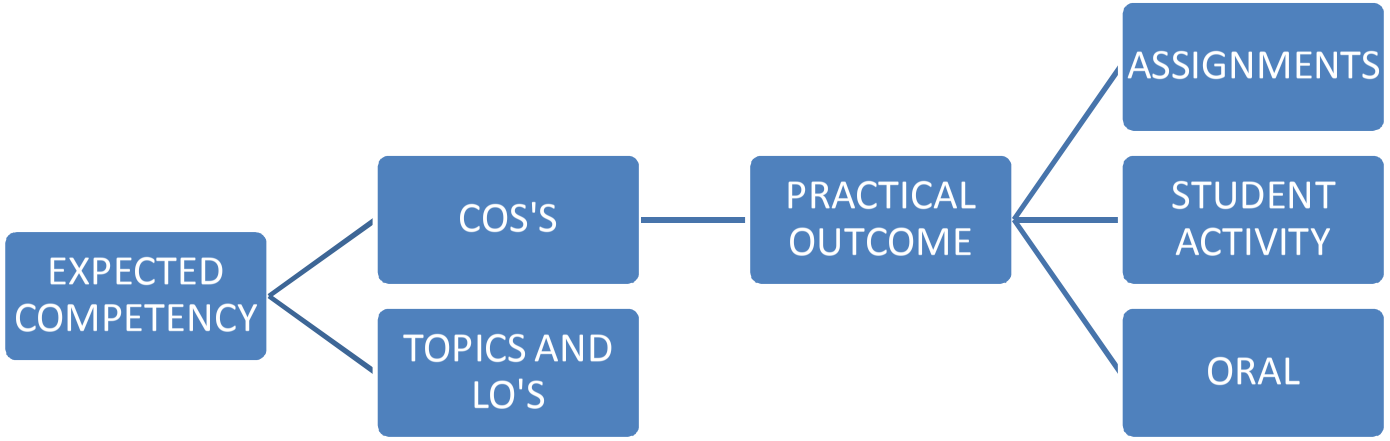
COURSE NAME	Internship Training	COURSE CODE	R18CE4112

4. CO –PO MATRIX

Course Name: Internship Training Course Code: R18CE4112	PO 1 Basic and Discipline specific knowledge:	PO 2 Problem analysis	PO 3 Design/ development of solutions:	PO 4 Engineering Tools, Experimentation and Testing:	PO 5 Engineering practices for society, sustainability and environment:	PO 6 Project Management:	PO 7 Life-long learning	PSO 1 Construction planning and detailing	PSO 2 Construction execution, supervision and maintenance
CO1		2			2		2	1	1
CO2		2	2	3	2	2	3	2	2
CO3		2	1				2		

Rating scale '**3**' for high, '**2**' for medium, '**1**' for low '**0**' for no correlation

5. COURSE MAP



6. GUIDELINES TO ACHIEVE COURSE OUTCOMES

1. Before Attending Internship training (CO1)

1a. Preparation of resume
1b. Industry search
1c. Preparing application letter and correspondence with industry.
1d. Submitting application letter, resume and appearing for interview.
1e. Receiving internship selection/offer letter and reporting about it to department.
1f. Submission of undertaking and parent's endorsement letter to department.

2. During Internship Program (CO2)

2a. Submitting joining letter to company and its copy to department.
2b. Maintaining daily report of tasks performed and lessons learnt in the company.
2c. Keeping self attendance endorsed by supervisor / mentor.
2d. Collecting mentor' feedback and getting issued certificate of internship.

3. After Attending Internship training (CO3)

3.a Submitting report of tasks performed and lessons learnt on each of the day of internship training to the department.

3.b Sharing of experience during internship through power point presentation with other students with due regards to career path and networking with professionals.

7. PRACTICAL –ASSIGNMENTS-STUDENT ACTIVITIES-TUTORIALS (Separate table for each)

S. No.	Assignments	Topic No.	Hours Allotted	Mapped CO
1	Presentation on process undergone for identifying the company/organization for internship.	1	2	CO1
2	Presenting resume, application letter, joining letter & other such documents prepared for internship training.	1	2	CO1
--	**Total**	**--**	**4**	**--**

S. No.	Student activity	Topic No.	Hours Allotted	Mapped CO
1	Submission & assessment of report of tasks performed and lessons learnt on each of the day of internship training to the department.	2	5	CO2
2	Sharing with other students through power point presentation the experiences during internship with due regards to career path and networking with professionals.	3	5	CO3
--	**Total**	**--**	**10**	**--**

S. No.	Practical	Topic No.	Hours Allotted	Mapped CO
--	**Assignments, Student Activities Submission**	**--**	**2**	**--**
--	**Total**	**--**	**16**	**--**

8. EVALUATION SCHEME FOR PRACTICAL / ASSIGNMENTS/STUDENT ACTIVITIES

Rubrics for Assignments

Category	4	3	2	1
Quantity & Source of Information	Documentation of Sources of Information (Online And Offline)	Documentation of Sources of Information With Some Missing Links	Incomplete Documentation of Sources Of Information With Some Missing Links	No Documentation of Sources of Information With Too Many Missing Links
Quality of Document Created	Clear Description And Well Structured Document	Clear Description With Some Supporting Details, Relevant But Messy Graphics. And Structured Presentation.	Clear Description With No Supporting Details, Neat But Irrelevant Graphics And Structured Presentation With Missing Links.	Irrelevant Description, Irrelevant & Messy Graphics And Unstructured Presentation.
Understanding of Concepts And Mistakes	Complete Understanding And No Mistakes	Substantial Understanding And 90 % Free of Mistakes	Some Understanding And 75 % Free of Mistakes	Limited Understanding And 50 % Free of Mistakes
Timely Completion of Activity	Maximum	Moderate	Satisfactory	Least
Overall Understanding	Maximum	Moderate	Satisfactory	Least

Rubricks for Student Activities

Category	4	3	2	1
Quality of report, graphics and presentation.	Clear description with all supporting details, relevant & neat graphics and well structure presentation.	Clear description with some supporting details, relevant but messy graphics. and structured presentation.	Clear description with no supporting details, neat but irrelevant graphics and structured presentation with missing links.	Irrelevant description, irrelevant & messy graphics and unstructured presentation.
Timely completion	Maximum	Moderate	Satisfactory	Least
Overall understanding	Maximum	Moderate	Satisfactory	Least

Rubricks for Orals

Category	4	3	2	1
Knowledge of Work / Tasks Carried Out At Site	Accurately States The Main Points And Details In Answer To The Question Raised By Examiner With Focus On The Substance.	Adequately States The Main Points And Details In Answer To The Question Raised By Examiner With Focus On The Substance.	States Most Of The Main Points But Miss Out Details In Answer To The Question Raised By Examiner With Focus On The Substance.	States Few Main Points And Details In Answer To The Question Raised By Examiner With Focus On The Substance
Delivery	Effectively And Creatively Delivers The Information While Staying On Topic And Considering The Audience	Adequately Delivers The Information While Staying On The Topic And Considering The Audience.	Delivers The Information But Does Not Stay On Topic. Little Consideration On Audience.	Little Or No Attempt Is Made To Deliver The Information And Stay On Topic.

Category	4	3	2	1
Body Language And Eye Contact	Good Straight Posture And Eye Contact.	Most Of The Times Straight Posture And Moderate Eye Contact	Occasionally Straight Posture And Little Eye Contact	Plump Posture And Very Little Eye Contact
Overall Understanding	Maximum	Moderate	Satisfactory	Least

10. LEARNING RESOURCES

- **BOOKS**

S. No.	Title of Book	Author	Publication
1	Research Methodology : Methods And Techniques	C.R. Kothari and Gaurav Garg	University Bookstore ISBN 9788122436235
2	Research Methodology	Gupta A K	Vayu Education Of India ISBN: 9788190804035
3	The Presentation Book	Emma Ledden	Pearson India ISBN: 9781292002583

- **SOFTWARES**

S. No.	Name
1	MS Word
2	MS Power point

- **WEBSITES**

S. No.	Address
1	www.google.com
2	www.nptel.iitm.ac.in
3	https://www.youtube.com
4	http://www.slideshare.in

11. COURSE CURRICULUM DEVELOPMENT MEMBERS

S. No.	Name and Designation	Contact No.	Email
1	Prof. D. S. Bapat	9422579511	deepa.bapat@rediffmail.com
2	Prof. A. S. Shelar	9423558189	ani_shel@yahoo.com

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE -1

Diploma Programme	CIVIL		
Course Name	Advanced Construction Techniques	Course code	R18CE5101
Course Category	Specialized I	Credits	5

COURSE TEACHING, ASSESSMENT AND EVALUATION SCHEME:

Teaching scheme		Evaluation scheme									
		Direct assessment- Weightage - 80%									
		Theory outcome		Practical outcome							Total
				TERMWORK					PRACTICAL	ORAL	
Theory Allotted hrs	Practical Allotted hrs	ESE marks	TTA marks	TW marks	SW marks	AS marks	TU Marks	Total	Practical Marks	OR marks	Total marks
3	2	80	20	05	10	10	-	25	-	25	150
		Indirect assessment- Weightage - 20%									
		Mid semester students feedback						End of the course survey			

End semester examination-ESE, Two tests average-TTA, Term Work- TW, Student Activity-SW, Assignments –AS, Tutorials- TU, Oral -OR

1. RATIONALE

The subject stresses on various construction processes like earth, road, and underwater construction .The subject will help students to supervise various construction processes and execute different construction projects**.**

2. EXPECTED PROFICIENCY

Use proper techniques for various types of civil works.

3. COURSE OUTCOMES (COs)

Students will be able to

1. Understand different compaction process and soil stabilization.
2. Identify and select appropriate construction equipment or plant depending on project types while executing the project.
3. Know special types of formworks.
4. Know the technical details for deep foundation construction, execute multi-storey construction & safety measures.
5. Select appropriate material/ methods for different construction activities.
6. Acquaint with various specialized construction processes.

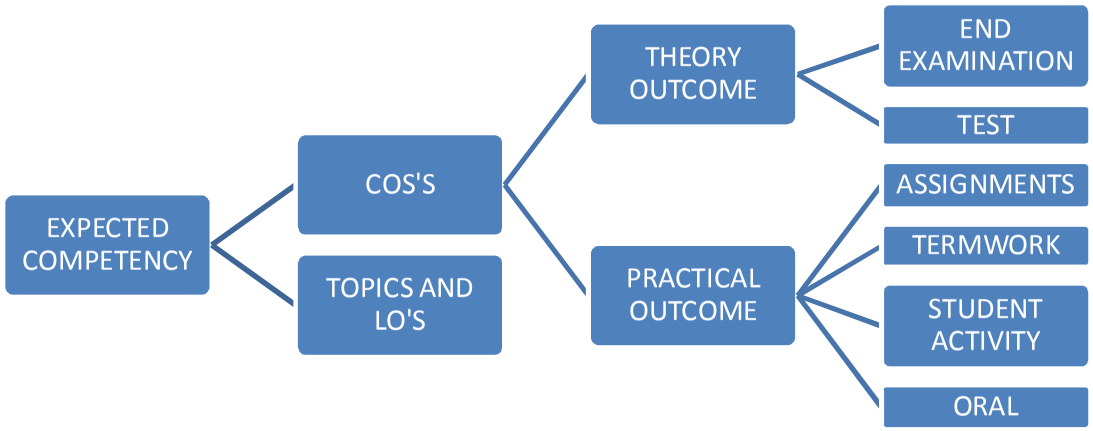
COURSE NAME	Advanced Construction Techniques	COURSE CODE	R18CE5101

4. CO –PO MATRIX

Course Name- Advanced Construction Techniques Course Code-R18CE5101	PO 1 Basic and Discipline Specific knowledge	PO 2 Problem Analysis	PO 3 Design or Development of Solutions	PO 4 Engineering Tools, Experimentation and Testing	PO 5 Engineering Practices for Society, sustainability and Environment	PO 6 Project Management	PO 7 Life-Long Learning	PSO 1 Construction planning and detailing	PSO 2 Construction execution, supervision and maintenance
CO1	1		2	3				1	
CO2	1	3		2				1	
CO3	1	3			2				
CO4	3					1			1
CO5	3								
CO6	1			3					

Rating scale '**3**' for high, '**2**' for medium, **'1'** for low **'0'** for no correlation

5. COURSE MAP



COURSE NAME	Advanced Construction Techniques	COURSE CODE	R18CE5101

6. DETAILED COURSE CONTENTS

Sr. No.	Unit Outcomes (UOs)	Topics and Sub-topics	Marks	Hours	Mapped CO
1	1.1 Define principle of compaction. 1.2 Explain soil stabilization. 1.3 Write Geo-synthetic techniques laying in retaining wall, road works.	**Soil compaction and stabilization techniques** 1.1 Principle used in compaction, types of equipments used for soil compaction, methods. 1.2 Soil stabilization – concept, methods. 1.3 Geo-synthetics techniques laying in retaining walls, roads works	16	10	CO1
2	2.1 Illustrate soil survey and investigation prior to construction in earth. 2.2 Study of earthwork equipments. 2.3 State use of truck, tractor & dumper. 2.4 Enlist factors affecting selection of equipment, work cycle, output, estimation for operation.	**Construction in Earth and Earthwork Equipment** 2.1 Introduction to soil survey and investigations prior to construction in earth, Construction of embankment as a water retaining structure. 2.2 Power shovels, Back Hoe, Drag-line, JCB excavator, loaders, Dozer, Scrapper. 2.3 Use of Trucks, tractor and Dumpers. 2.4 Factors affecting selection of equipment, work cycle, output, estimation for operation.	12	7	CO2
3	3.1 Explain types of formwork system. 3.2 Evaluate estimation of conventional formwork. 3.3 Define scaffolding, shoring and underpinning.	**Temporary structures** 3.1 Conventional formwork system, steed form work, Aluminum form Work, specialized formwork system. 3.2 Estimation of conventional formwork**.** Scaffolding, shoring, underpinning.	12	7	CO3
4	4.1 Study of pile foundation. 4.2 Explain caisson foundation. 4.3 Define well foundation. 4.4 Describe high rise structure and their construction. 4.5 Illustrate vertical material movement and construction difficulties. 4.6 State labour and fire safety norms.	**Deep Foundation and High Rise Structures** 4.1 Pile Foundations: - Construction of bored cast in situ concrete piles. 4.2 Caisson foundations – Uses. Types – Construction procedure of Caissons. 4.3 Well foundations – Component and functions. Construction Procedure of well sinking. 4.4 High rise structures and their construction. 4.5 Vertical Material movement and construction difficulties.	16	10	CO4

COURSE NAME	**Advanced Construction Techniques**	COURSE CODE	**R18CE5101**

Sr. No.	Unit Outcomes (UOs)	Topics and Sub-topics	Marks	Hours	Mapped CO
		4.6 Labour safety norms and fire safety norms.			
5	5.1 List cladding materials and specifications. 5.2 Describe framing details and method of construction.	**Structural cladding and allied process** 5.1 Cladding Materials & Specifications. 5.2 Framing Detailing, Method of construction.	12	10	CO5
6	6.1 State dredging techniques, use of barges, dewatering systems, underwater concreting, and diaphragm wall techniques. 6.2 Explain girder launching techniques for bridges. 6.3 Illustrate trenchless techniques, micro tunneling, use of tunnel boring machine in tunneling.	**Specialized Construction Processes** 6.1 Dredging Techniques, use of barges, dewatering systems, Underwater concreting, diaphragm wall techniques. 6.2 Girder launching techniques for Bridges. 6.3 Trenchless techniques, micro tunneling, use of tunnel boring machine in tunneling.	12	7	CO6

7. PRACTICAL –ASSIGNMENTS-STUDENT ACTIVITIES-TUTORIALS (Separate table for each)

S. No.	Practical	Topic No.	Hours Allotted	Mapped CO
1	Prepare a chart showing equipments with reference to capacity, suitability based on type of soil, Technical specifications.	1	2	CO1
2	Study of various types of joints in cement concrete road, filler and sealer compounds	1	2	CO1
3	Study of earth moving equipment w.r.t working, output, common manufacturer, cost, Useful life, area of use.	2	2	CO2
4	Study of Conventional formwork system, steed form work, Aluminum form Work, specialized formwork system.	3	2	CO3
5	Study of Deep foundation & their construction process.	4	2	CO4
6	Study of Girder Launching Techniques.	6	2	CO6
7	Study of pre-stressing techniques.	6	2	CO6
--	**Total**	--	**14**	--

S. No.	Student activity	Topic No.	Hours Allotted	Mapped CO
1	Technical visit	6	4	CO6
2	Video recording of operation of construction equipment.	2	2	CO2
3	Individual site visits.	1, 2, 5	4	CO1, CO2, CO5
4	Collects case studies of failures of building construction from internet, literatures /magazines.	3, 4	2	CO3, CO4
5	Visiting the construction site for high rise building /structure and preparing report on it.	4	4	CO4
--	**Total**	--	**16**	--

S. No.	Practical	Topic No.	Hours Allotted	Mapped CO
--	**Practical - student activities submission**	--	**2**	--
--	**Total**	--	**32**	--

8. EVALUATION SCHEME FOR PRACTICAL / ASSIGNMENTS/STUDENT ACTIVITIES

Rubrics for assignments

Category	4	3	2	1
Structure	Very Well Structured	Well Constructed	Structured but Missing Links	Unstructured
Understanding	Complete Understanding	Substantial understanding	Some Understanding	Limited Understanding
Mathematical Errors	Least Errors	90 % Free of Errors	75 % Free of Errors	50 % Free of Errors
Graphics	Neat, Accurate and Enhance understanding	Neat and Accurate	Some Illustrations are Misleading & Redundant	Least Accurate and Not Neat
Timely Completion of Activity	Maximum	Moderate	Satisfactory	Least
Overall Understanding	Maximum	Moderate	Satisfactory	Least

Rubricks for student activities

Category	4	3	2	1
Structure And Presentation	Very Well Structured	Well Constructed	Structured But Missing Links	Unstructured
Quantity of Information	All Subtopics Covered In Detail	All Subtopics are Mostly Covered	Some of The Subtopics are Not Covered In Detail	Some of The Subtopics are Not Covered
Quality of Information	Clear Description With Supporting Details	Clear Description With Some Supporting Details	Clear Description With Lack Of Supporting Details	Irrelevant Information
Sources	Clear Documentation	Clear Documentation With Some Missing Links	Part Documentation With Missing Links	Documentation With Number of Missing Links
Graphics	Neat ,Accurate and Enhance Understanding	Neat and Accurate	Some Illustrations Are Misleading and Redundant	Least Accurate and Not Neat
Group Activity	Maximum Coordination and Effort	Fair Coordination And Effort	Lack Coordination and Effort	Least Participation
Timely Completion of Activity	Maximum	Moderate	Satisfactory	Least
Overall Understanding	Maximum	Moderate	Satisfactory	Least

9. SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Topic No.	Topic Title	Mapped CO % OR Emphasis	Distribution of Marks			
			Cognitive level			Total Marks
			Remember	Understand	Apply	
I	Soil compaction and stabilization techniques	CO1	4	8	4	16
II	Construction in Earth and Earthwork Equipment	CO2	4	4	4	12
III	Temporary structures	CO3	4	4	4	12
IV	Deep Foundation and High Rise Structures	CO4	4	4	8	16
V	Structural cladding and allied process	CO5	4	4	4	12
VI	Specialized Construction Processes	CO6	4	4	4	12
Total		--	**24**	**28**	**28**	**80**

10. SAMPLE MODEL QUESTION BANK FOR THEORY AND TEST EXAMINATIONS

S. No	Topic	Mapped CO	Cognitive level R/U/A	Question
1	1	CO1	R	Write principle of compaction.
2	1	CO1	U	Explain methods of soil stabilization.
3	1	CO1	A	Write Geo-synthetic techniques laying in road works.

11. LEARNING RESOURCES

- **BOOKS**

Sr. No.	Title of Book	Author	Publication
1	Building Constructions	Dr. B. C. Punamia	Laxmi Publication, Delhi –2
2	Heavy Constructions	Vizirani Chandolia	Khanna , Delhi –6
3	Transportation Engineering	A. Kamala	Tata McGraw-Hill , Delhi -2
4	Irrigation Engineering	Dahigaonkar	Central Techno, Nagpur
5	Construction equipment planning and application	Dr. Mahesh Varma	Khanna Publication, Delhi –6
6	Construction planning, methods and applications	Peurifoy	Tata –McGraw Hill
7	A to Z by Mantri Publication	Sandeep Mantri	Satya Prakashan, New Delhi

- **WEBSITES**

S. No.	Address
1	www.icivilengineer.com
2	www.wikipedia.com

12. COURSE CURRICULUM DEVELOPMENT MEMBERS

S. No.	Name and Designation	Contact No.	Email
1	Prof. P. P. Barage	9404117399	Pradeep.barage16@gmail.com
2.	Dr. S. V. Kanitkar	992144902	svkwadia@yahoo.co.in

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE -1

Diploma Programme	CIVIL		
Course Name	Advanced Surveying	Course code	R18CE5103
Course Category	Specialized I	Credits	5

COURSE TEACHING, ASSESSMENT AND EVALUATION SCHEME:

Teaching scheme		Evaluation scheme									
		Direct assessment - Weightage - 80%									
		Theory outcome		Practical outcome							Total
				TERMWORK					PRACTICAL	ORAL	
Theory Allotted Hrs	Practical Allotted Hrs	ESE marks	TTA marks	TW marks	SW marks	AS marks	TU Marks	Total	Practical Marks	OR marks	Total marks
3	2	80	20	16	3	6	-	25	-	25	150
		Indirect assessment – Weightage - 20%									
		Mid semester students feedback							End of the course survey		

End semester examination - ESE, Two Tests Average - TTA, Term Work - TW, Student Activity - SW, Assignments –AS, Tutorials - TU, Oral - OR

1. RATIONALE

The students have already learnt basic surveying through core courses. However, due to the rapid modernisation& development, diploma technicians should also know advanced survey instruments & techniques. The knowledge of advanced surveying will help them to collect more precise data within reasonable time & cost. Through this specialized subject students will be introduced to testing & adjusting procedures for the survey instruments they have already handled, construction surveying, advanced curve ranging & photogrammetry.

2. EXPECTED PROFICIENCY

Carry out Surveys for Civil Engineering works.

3. COURSE OUTCOMES (COs)

Students will be able to

1. Test and adjust levels and theodolites.
2. Cary out survey for water body & plot it.
3. Implement lining out for buildings, pipelines, highways, etc.
4. Differentiate compound, reverse and transition curves.
5. Compile from aerial photographs data required for preparation of plans or maps..
6. Compute the most probable value of survey observations.

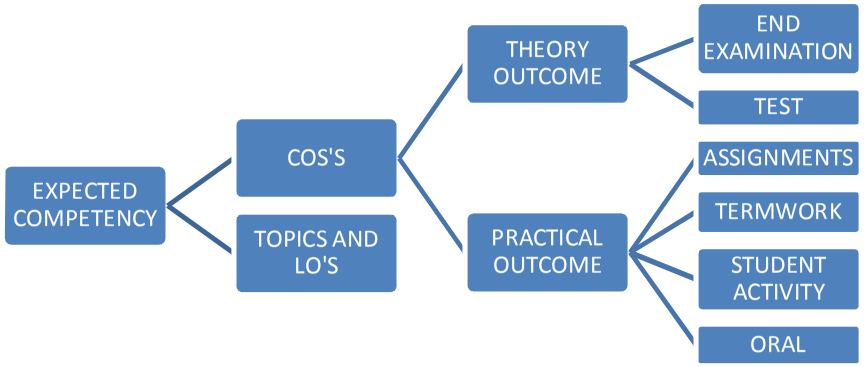
COURSE NAME	Advanced Surveying	COURSE CODE	R18CE5103

4. CO – PO MATRIX

Course Name: Advanced Surveying Course code: R18CE5103	PO 1 Basic and Discipline Specific knowledge	PO 2 Problem Analysis	PO 3 Design or Development of Solutions	PO 4 Engineering Tools, Experimentation and Testing	PO 5 Engineering Practices for Society, sustainability and Environment	PO 6 Project Management	PO 7 Life-Long Learning	PSO 1 Construction planning and detailing	PSO 2 Construction execution, supervision and maintenance
CO1	2	1		3			1		
CO2	3	1		2		1			
CO3	2			2		1	1	1	
CO4	3	1		2		1			
CO5	3	1		3		1			
CO6	3	3							

Rating scale'**3'** for high, '**2**' for medium, **'1'** for low **'0'** for no correlation

5. COURSE MAP



COURSE NAME	Advanced Surveying	COURSE CODE	R18CE5103

6. DETAILED COURSE CONTENTS

Unit No.	Unit Title and Unit Outcomes (UOs)	Topics and Sub-topics	Marks	Hours	Mapped CO
1	**Testing & Adjusting Surveying Instruments** 1a. Explain the need of test and adjustment of survey instruments. 1b. Define fundamental axes for a level and a theodolite 1c. State conditions of permanent adjustment for a level & a theodolite 1d. Carry out permanent adjustments for a level & a theodolite 1e. State the errors in total station surveying	1.1 Concept & necessity of permanent adjustment of the survey instruments. Permanent adjustments of a level. 1.2 Permanent adjustment of vernier transit theodolite. 1.3 Errors in total station surveying adjusting for it.	12	07	CO1
2	**Hydrographic Surveying** 2a. State concept and necessity hydrographic surveying 2b. Differentiate horizontal & vertical controls. 2c. Describe the process of establishing the MSL. 2d. Select and use instruments required for hydrographic surveying. 2e. Locate, reduce and plot the soundings.	2.1 Definition & need of hydrographic survey. Concept & necessity of control points. Shore line survey. 2.2 Sounding. Sounding equipments. Signals & buoys. Nautical sextant. Personnel for sounding. 2.3 Range lines. Methods of locating soundings. Reduction of soundings. Plotting of soundings. 2.4 Tidal gauging & establishment of mean sea level. Nautical charts.	16	10	CO2
3	**Construction Surveys** 3a. List requirements of good controls for construction survey. 3b. Select and use construction survey instrument appropriate to the site condition and work. 3c. Implement process of setting for a building, drainage line and highway 3d. Use offset stakes, slope stakes, grade stakes, sight rails, boning rods and pipe line lasers. 3E. Check errors and mistakes in construction survey.	3.1 Introduction to & objectives of construction survey. Requirements of good controls. Equipment's for construction survey. 3.2 Setting out for a building: Use of sight rails & reference pillars, conventional & total station method. Staking out a drainage line: Use of offset stakes, sight rails & boning rods, pipe line lasers. Developing a working profile. 3.3 Staking out a highway: Slope intercept & slope stakes. Formation or grade stakes. Blue tops. Errors & mistakes in construction surveys.	12	7	CO3
4	**Advanced Curve Ranging** 4a. Calculate data required to set out simple circular	4.1. Simple circular curves - Methods of successive bisection of arcs, by offsets from tangents & by offsets from chord	12	7	CO4

COURSE NAME	**Advanced Surveying**	COURSE CODE	**R18CE5103**

Unit No.	Unit Title and Unit Outcomes (UOs)	Topics and Sub-topics	Marks	Hours	Mapped CO
	curve. 4b. Describe process to set out a compound or reverse curve. 4c. State functions, advantages, requirements and forms of transition curve. 4d. Suggest a process to overcome an obstacle in ranging out a horizontal curve. 4e. Compute length and chainages & elevations of key points for a vertical curve.	produced. Obstacles in ranging out horizontal curves. 4.2. Compound & Reverse Curves: Definition, location, necessity, working out chainages of key points & procedure to set out. Transition Curves: Definition, objectives, functions, advantages, requirements & forms. 4.3. Vertical curve: Necessity of using parabolic arc, concept of tangent correction, Length of vertical curve and chainages & elevations of key points.			
5	**Photogrammetry** 5a. Define and classify photogrammetry 5b. List Equipments required photogrammetry. 5c. Determine co-ordinates of ground points from photograph/s. 5d. Explain vertical exaggeration, ground controls and photo mosaic. 5E. Describe process of plotting map from aerial photograph.	5.1 Definition, classification, & uses of photogrammetry. Equipments required in aerial photogrammetry. Types of aerial photographs. 5.2 Scale of aerial photograph. Ground coordinates from single vertical photograph. Relief displacement. Ground Controls. 5.3 Stereoscopy & parallax. Vertical exaggeration. Co-ordinates & elevations by stereoscopic parallax. 5.4 Mosaics. Aerial photo versus map. Plotting maps from aerial photos by graphical & stereoscopic methods.	16	10	CO5
6	**Errors & Adjustment of Survey Observations** 6a. Define different types of errors, observations, values and precision indices. 6b. State laws of accidental errors and laws of weights. 6c. Explain principle of least square. 6d. Work out most probable values of direct observations. 6E. Carry out distribution of error in field measurements.	6.1 Gross, systematic & random errors. Laws of accidental errors & Gaussian distribution. Definitions – Direct & indirect observations; Observed, true & most probable values; True, residual & most probable errors. 6.2 Precision indices - Variance & Standard deviation/error. Probable error of the single observation. Concept, allocation & laws of weight. Principle of least square. 6.3 Most probable values of direct observations. Error distribution in field measurements. Angle adjustment. Station adjustment. Figure adjustment for a plane triangle.	12	7	CO6

7. PRACTICAL – ASSIGNMENTS - STUDENT ACTIVITIES -TUTORIALS

Sr. No.	Practical (Student should perform all of following practicals)	Unit No.	Hours Allotted	Mapped CO
1.	Testing & adjustment of a dumpy level for collimation error	1	2	CO1
2.	Testing & adjustment of a vernier theodolite for vertical index error.	1	2	CO1
3.	Use of Nautical Sextant in measurement of horizontal angles.	2	2	CO2
4.	To plot cross section of a river at given site (Project).	2	6	CO2
5.	Setting out a building with electronic total station instrument.	3	2	CO3
6.	Setting out for a simple circular curve by method offsets from chords produced.	4	2	CO4
7.	Study of mirror stereoscope, parallax bar & aerial photograph.	5	2	CO5
8.	Finding Air Base distance for given stereo pair of aerial photos by using Mirror Stereoscope.	5	2	CO5
9.	Use of parallax bar for measuring parallax of two points & finding out difference of elevations between them.	5	2	CO5
-	Total	-	22	-

Sr. No.	Assignments	Unit No.	Hours Allotted	Mapped CO
1.	Solution of a three point problem by graphical method of intersecting circles.	2	1	CO2
2.	Calculate chainages of key points to set out a compound or a reverse curve	4	1	CO4
3.	Calculating most probable value and probable error for a length of a line from its equally reliable direct measurements.	6	1	CO6
4.	Adjusting for a triangle angular observations of unequal weights.	6	1	CO6
-	Total	-	4	-

Sr. No.	Student Activity	Unit No.	Hours Allotted	Mapped CO
1.	Visit to CME's surveying lab or survey professional's office or a survey site.	1	2	CO1
2.	Collecting information about construction & use of pipe line lasers & other such products used in construction surveys from internet or magazine or journal.	3	2	CO3
-	Total	-	4	-

Sr. No.	Practical	Unit No.	Hours Allotted	Mapped CO
-	**Practical – assignments-student activities submission**	-	**2**	-
-	**Total**	-	**32**	-

Instructions:

1. Practical will be carried out in groups of students.
2. Each group will consist of about five students.
3. Each student from the group shall be given chance to handle the instrument, to understand the function of different components & use of the instrument.
4. Drawing, plotting should be considered as part of practicals.

Remarks:

5. The list of practicals/tutorials/student activities given above is suggestive. One or more such practicals/tutorials/student activities can be replaced with another or modified to attain the expected outcomes and proficiency more effectively.
6. The practicals/assignments/student activities should be so designed that students acquires outcomes in all domains - cognitive, psychomotor and affective.
7. Even though mainly outcomes in psychomotor domain are listed under practicals/assignments/student activities, it will also lead to development of outcomes in affective domain also.
8. The affective domain outcomes (social skills & attitudes) those will be developed through practicals/assignments/student activities includes – practice good housekeeping, maintain instruments & tools, demonstrate working as a team member & a leader and follow safety & ethical practices.
9. Acquisition of outcomes such as valuing, organizing and characterizing under affective domain will take place in the student gradually over three years of diploma program.
10. The skills associated with each of the practical/assignment/student activity are to be assessed using the 'Rubrics' given under 'Evaluation Scheme for Practicals/Assignments/Student Activities'.

8. EVALUATION SCHEME FOR PRACTICAL / ASSIGNMENTS/STUDENT ACTIVITIES

Rubrics for Practicals

Category	4	3	2	1
Experimental procedure & handling of the instruments	Follows procedure as instructed and safe & correct handling of the instruments	Little oversight towards procedure, safety & handling of the instruments	Considerable oversight towards procedure, safety and handling of the instruments	Careless about the procedure safety & handling of the instruments.
Data documentation, data analysis & results interpretation	Correct Documentation of all data, Correct calculations and Error in result worked out correctly is within the limit	Correct documentation of majority of data, Minor errors in calculations and Error in results worked out correctly is not within the limit	Incorrect documentation of majority of data, Major errors in calculations and Error in result Worked out incorrectly.	Incomplete & wrong documentation of data, Incomplete & wrong calculations and Error in result not worked out.
Team spirit	Contributes a fair share to work	Sometimes depends on others to complete the work	Many times depends on others to complete the work	Always depends on others to complete the work
Timely completion of activity	Maximum	Moderate	Satisfactory	Least
Overall understanding	Maximum	Moderate	Satisfactory	Least

Rubrics for Assignments

Category	4	3	2	1
Quantity & Source of information	All subtopics covered in detail & clear documentation of sources of information	All subtopics are mostly covered and clear documentation of sources of information with some missing links	Some of the subtopics are not covered in detail and part documentation of sources of information with some missing links	Some of the subtopics are not covered at all and part documentation of sources of information with too many missing links
Quality of information, graphics and presentation.	Clear description with all supporting details, relevant & neat graphics and well structure presentation.	Clear description with some supporting details, relevant but messy graphics. and structured presentation.	Clear description with no supporting details, neat but irrelevant graphics and structured presentation with missing links.	Irrelevant description, irrelevant & messy graphics and unstructured presentation.
Understanding of concepts and mistakes	Complete understanding and no mistakes	Substantial understanding and 90 % Free of mistakes	Some understanding and 75 % free of mistakes	Limited understanding and 50 % free of mistakes
Timely completion of activity	Maximum	Moderate	Satisfactory	Least
Overall understanding	Maximum	Moderate	Satisfactory	Least

Rubrics for Student Activities

Category	4	3	2	1
Leadership qualities	Assume the role willingly & demonstrate ability fully	Assume the role willingly but demonstrate ability partly	Assume the role unwillingly though demonstrate ability fully	Assume the role unwillingly & demonstrate ability partly
Planning & Execution	Proper planning & execution	Proper planning but improper execution	Improper planning but proper execution	Improper planning & execution
Quality of report, graphics and presentation.	Clear description with all supporting details, relevant & neat graphics and well structure presentation.	Clear description with some supporting details, relevant but messy graphics. and structured presentation.	Clear description with no supporting details, neat but irrelevant graphics and structured presentation with missing links.	Irrelevant description, irrelevant & messy graphics and unstructured presentation.
Timely completion	Maximum	Moderate	Satisfactory	Least
Overall understanding	Maximum	Moderate	Satisfactory	Least

Rubrics for Oral

Category	4	3	2	1
Knowledge of Course content	Accurately states the main points and details in answer to the question.	Adequately states the main points and details in answer to the question.	States most of the main points but miss out details in answer to the question.	States few main points and details in answer to the question.

Category	4	3	2	1
Delivery	Effectively and creatively delivers the information while staying on topic and considering the audience	Adequately delivers the information while staying on the topic and considering the audience.	Delivers the information but does not stay on topic. Little consideration on audience.	Little or no attempt is made to deliver the information and stay on topic.
Vocabulary	Wide range of vocabulary and there is no repetition.	Quite Wide range of vocabulary and there is not lot of repetition	Some new vocabulary and few new expression	Student tends to repeat words all the time.
Body Language and eye contact	Good straight posture and eye contact.	Most of the times straight posture and moderate eye contact	Occasionally straight posture and little eye contact	Plump posture and very little eye contact

9. MAJOR EQUIPMENT/ INSTRUMENTS /TOOLS REQUIRED

Sr. No.	Equipment Name with Specifications	Practical
1	Metallic or plastic tapes as per IS: 1269 – Part I - 1997 and steel tapes as per IS: 1269 – Part II - 1997.	1 & 4, 6
2	Levelling staves as per IS: 1779 -1961 (Folding Type) or IS: 11961 – 1986 (Telescopic Type).	1, 2 & 4
3	Ranging rods as per IS: 228 - 1963	4 & 6
4	Tertiary (Dumpy) Level as per IS: 9607 – 1989.	1
5	Vernier theodolite as per IS 2988: 1955	2 & 6
6	Sounding (Nautical) Sextant as per IS 5146: 1969	3 & 4
7	Prismatic Compass as per IS: 1957 – 1961.	4
8	Electronic Total Station (ETS) Instrument	5
9	Parallax bar as per IS 11445:1985	7 & 9
10	Metric Steel Scales for Engineers as per IS 1481: 1970	8
11	Mirror stereoscope as per IS 8691:1986	7 & 9

9. SPECIFICATION TABLE FORQUESTION PAPER DESIGN

Unit No.	Unit Title	Mapped CO % OR Emphasis	Distribution of Marks			
			Cognitive level			Total Marks
			Remember	Understand	Apply	
I	Testing & Adjusting Surveying Instruments	CO1	4	4	4	12
II	Hydrographic Surveying	CO2	4	4	8	16
III	Construction Surveys	CO3	4	4	4	12
IV	Advanced Curve Ranging	CO4	4	4	4	12
V	Photogrammetry	CO5	4	4	8	16
VI	Errors & Adjustment of Survey Observations	CO6	4	4	4	12
Total			**24**	**24**	**32**	**80**

COURSE NAME	Advanced Surveying	COURSE CODE	R18CE5103

Note: This specification table shall be used as general guide lines to assist students for learning and to assist teachers for teaching and assessment. The actual distribution of marks in the question paper may vary from the above table.

10. SAMPLE MODEL QUESTION BANK FOR THEORY AND TEST EXAMINATIONS

Sr. No	Unit	Mapped CO	Cognitive level R/U/A	Question
1	5	CO5	R	Define the terms: i) Principal point ii) Average scale of a vertical photo iii) End lap iv) Side lap
2	5	CO5	U	Draw neat and labeled sketch of mirror stereoscope.
3	5	CO5	A	The focal length of camera lense is 15cm, height of flight is 1500m above datum, and average elevation of terrain photographed is 500m above same datum. Calculate scale of photography.

11. LEARNING RESOURCES

- **BOOKS**

Sr. No.	Title of Book	Author	Publication
1.	Surveying & Levelling,Vol. I	Kanetkar & Kulkarni	PVG, Pune. ISBN 978 81 858-2511-3
2.	Surveying & Levelling, Vol. II,	Kanetkar & Kulkarni	PVG, Pune. ISBN 13:97881 858-2500-7
3.	Surveying, Vol . I,	Dr. B. C. Punmia, Ashok Jain, Arun Jain.	Laxmi Publications, Delhi ISBN 8-17-008853-4
4.	Surveying, Vol . II	Dr. B. C. Punmia, Ashok Jain, Arun Jain.	Laxmi Publications, Delhi ISBN-10: 8170088836; ISBN-13: 978-8170088837
5.	Surveying, Vol . III	Dr. B. C. Punmia, Ashok Jain, Arun Jain	Laxmi Publications, Delhi ISBN 10: 8170088259 ISBN 13: 9788170088257
6.	Text book of Surveying	Hussain & Nagraj,	Chand & Co., Delhi ISBN 81-219-0021-2
7.	Text book of Surveying,	C. L. Kochher	Dhanpat Rai Publishing Co., Delhi ISBN: 9789352165209
8.	Surveying, Vol. I	Dr. K. R. Arora	Standard Book house, Delhi. ISBN : 978-81-89401-23-8
9.	Surveying, Vol. II	Dr. K. R. Arora	Standard Book house, Delhi. ISBN:978-81-89401-24-5
10.	Fundamentals of Surveying	S. K. Roy	Prentice Hall of India, Delhi. ISBN 81-203-1260-0
11.	Surveying,	Narinder Singh	The Tata McGraw Hill Co., Delhi ISBN, 0074519131, 9780074519134
12.	Surveying, Vol. I	S. K. Duggal	The Tata McGraw Hill Co., Delhi ISBN 10: 0070151377 ISBN 13: 9780070151376
13.	Surveying, Vol. II	S. K. Duggal	The Tata McGraw Hill Co., Delhi ISBN 13: 978-0-07-053471-1 ISBN 10: 0-07-053471-3

Sr. No.	Title of Book	Author	Publication
14.	Surveying & Levelling	N. N. Basak	The Tata McGraw Hill Co., Delhi ISBN 0-07-460399-X
15.	Elementary Surveying	R. C. Brinker & P. R.Wolf.	Longman Higher Education ISBN: 9780060410131, 0060410132
16.	Surveying	A. Bannister, S. Raymond & R. Baker	Pearson Education, Delhi. ISBN 81-317-0066-6
17.	Higher Surveying	Dr. A. M. Chandra	New Age International, Delhi. ISBN 10: 8122438121, ISBN 13: 9788122438123
18.	Advanced Surveying	S. Gopi, R. Sathikumar & N. Madhu	Pearson Education, Delhi. ISBN 81-317-0067-4
19.	Advanced Surveying	Shelar, Jadhav, Patil	Nirali Prakashan, Pune. 978-93-5164-351-7

- **INDIAN STANDARDS**

Sr. No.	Number & Title
1	IS 9849: 1991 Optics & optical instruments – Geodetic instruments - Vocabulary
2	IS 10713: 1983/ISO 5455 : 1979 Scales for use in technical drawings
3	IS 1071 : 1983/ISO 128 : 1982 General principles of presentation on technical drawings

- **WEBSITES**

S. No.	ADDRESS
1	www.surveyinstrument.com
2	www.hydrobharat.com
3	nauticalcharts.noaa.gov
4	www.123photogrammetry.com
5	www.surveyofindia.gov.in
6	www.wikipedia.com

12. COURSE CURRICULUM DEVELOPMENT MEMBERS

S. No.	Name and Designation	Contact No.	Email
1	Prof. A. S. Shelar	9423558189	ani_shel@yahoo.com

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE -1

Diploma Programme	CIVIL		
Course Name	Prestressed Concrete	Course code	R18AM5105
Course Category	Specialized I	Credits	5

COURSE TEACHING, ASSESSMENT AND EVALUATION SCHEME:

Teaching scheme		Evaluation scheme									
		Direct assessment- Weightage = 80%									
		Theory outcome		Practical outcome					Practical	Oral	Total
Theory Allotted hrs	Practical Allotted hrs	ESE marks	TTA marks	TW marks	SW Marks	AS marks	TU marks	Total Marks	PR marks	OR marks	Total marks
3	2	80	20	20	05	--	--	25	-	25	150
		Indirect assessment- Weightage - 20%									
		Mid semester students feedback					End of the course survey				

End semester examination-ESE, Two tests average-TTA, Term Work- TW, Student Activity-SW, Assignments –AS, Tutorials- TU, Oral -OR

1. RATIONALE

This is specialised subject who will enable students to understand design principles and procedures for prestressed concrete members. Precast and Pre-stressed Concrete construction technology is widely used across the globe for its inherent advantages. It has been adopted in India from past many years, but was mostly limited to civil structures such as tunnels, bridges, flyovers and underpasses. Today, with critical housing shortages, rising labor and input costs and an increased emphasis on quality and timely delivery, more and more developers are opting for innovative construction practices like precast and pre-stressed concrete. Hence it is essential to make upcoming engineering community aware about this. This course is designed to provide basic knowledge of precast and pre-stressed elements, their design aspects, pre-stressing techniques, methods and basic design principles.

2. EXPECTED PROFICIENCY

The aim of this course is to help the student to attain the following industry identified competency through effectively execute construction work involving precast and pre-stressed concrete.

3. COURSE OUTCOMES (COs)

Students will be able to

1. Use the relevant components for the prestressed concrete structure.
2. Justify the relevance of prestressed element in a given situation.
3. Select the relevant methods / systems for given prestressed concrete work.
4. Evaluate losses in a given pre-stressed concrete construction.
5. Propose a suitable cable profile and end block reinforcement for the given prestressed concrete member.
6. Select the relevant precast concrete element for a given type of construction

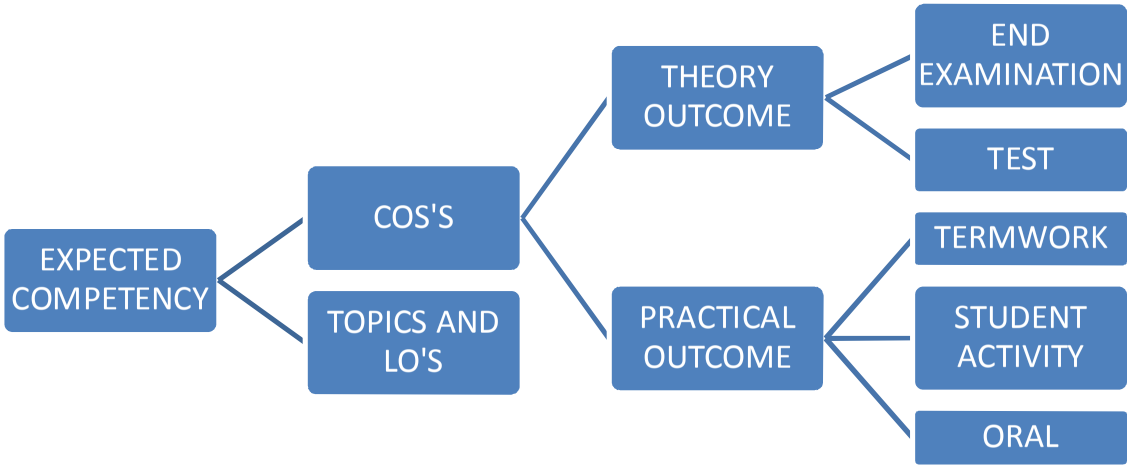
COURSE NAME	Prestressed Concrete	COURSE CODE	R18AM5105

4. CO –PO MATRIX

Course Name: Prestressed Concrete Course Code: R18AM5105	PO 1 Basic and Discipline specific knowledge	PO 2 Problem analysis	PO 3 Design/ development of solutions	PO 4 Engineering Tools, Experimentation and Testing	PO 5 Engineering practices for society, sustainability and environment	PO 6 Project Management	PO 7 Life-long learning	PSO 1 Construction planning and detailing	PSO 2 Construction execution, supervision and maintenance
CO1	2	3	2						
CO2	3	3							
CO3		3			3	2	3	1	
CO4		2	3						
CO5		3	2	2					1
CO6				3					

Rating scale '**3**' for high, '**2**' for medium, '**1**' for low '**0**' for no correlation

5. COURSE MAP



COURSE NAME	**Prestressed Concrete**	COURSE CODE	**R18AM5105**

6. DETAILED COURSE CONTENTS

S. No.	Unit Outcomes (UOs)	Topics and Sub-topics	Marks	Hours	Mapped CO
1	**Unit I: Introduction to Prestressed Concrete** 1a. Explain the principle of pre-stressing an element. 1b. Describe the applications of pre-stressed concrete elements. 1c. Distinguish the PSC with other construction materials in given situation. 1d. Justify the need of high strength material for PSC 1e. Select relevant type of pre-stressing steel for given member	1.1 Principle of pre-stressed concrete and basic terminology. 1.2 Applications of pre-stressed concrete 1.3 Advantages and disadvantages of pre-stressed concrete 1.4 Materials used and their properties, Necessity of high-grade materials 1.5 Types of Pre-stressing steel -Wire, Cable, tendon, Merits-demerits and applications.	12	8	CO1
2	**Unit-II Analysis of Prestressed Concrete Members** 2a. Select the relevant method of pre-stressing for given structural element, Illustrate the merits and demerits for given method/system 2b. Explain Hoyer system of pre-tensioning with diagram. 2c. Explain system of post- tensioning with diagram.	2.1 Methods of pre-stressing – Internal and External pre-stressing, Pre and Post tensioning- applications, merits and demerits 2.2 Systems for pre tensioning – process, applications, merits and demerits - Hoyer system 2.3 Systems for post-tensioning - process, applications, merits and demerits - Freyssinet system, Magnel Blaton system, Gifford Udall system.	16	10	CO2
3	**Unit-III :Design of Pre-stressed rectangular beam section** 3a. Explain the assumptions made in the analysis of pre-stressed concrete beams 3b. Outline the cable profiles in the given situation. 3c. Depict/Predict effect of cable profile on fibre stresses 3d. Calculate maximum stresses induced in given	3.1 Basic assumptions in analysis of pre-stressed concrete beams. 3.2 Cable Profile in simply supported rectangular beam section – concentric, eccentric straight and parabolic, 3.3 Effect of cable profile on maximum stresses at mid span and at support. 3.4 Numerical problems on determination of maximum stresses at mid spans with linear (concentric and eccentric) cable profiles only. 3.5 Simple steps involved in Design of simply supported	12	6	CO3

COURSE NAME	**Prestressed Concrete**	COURSE CODE	**R18AM5105**

S. No.	Unit Outcomes (UOs)	Topics and Sub-topics	Marks	Hours	Mapped CO
	beam 3e. Describe the steps adopted in the design of pre-stressed beam element.	rectangular beam section.			
4	**Unit-IV : Losses of pre-stress** 4a. Identify the reasons for loss of pre-stress 4b. Describe the elements/situation that results in loss of pre-stress. 4c. Calculate the loss of pre-stress during anchoring in the given situation. 4d. Calculate the loss of pre-stress occurring in the given situation. 4e. Compile the IS recommendations for percentage loss in the given pre-stressing	4.1 Pre-stressing force in Cable, Meaning of Loss of Pre-stress 4.2 Loss of pre-stress during the tensioning process - loss due to friction, length effect, wobbling effect and curvature effect. (Simple Numerical problems to determine loss of pre-stress) 4.3 Loss of pre-stress at the anchoring stage, 4.4 Loss of pre-stress occurring subsequently: losses due to shrinkage of concrete, creep of concrete, elastic shortening, and creep in steel. (Simple Numerical problems to determine loss of pre-stress) 4.5 IS recommendations for % loss in case of Pre and Post tensioning,	16	10	CO4
5	**Unit-V: Prestressed concrete precast units** 5a. Explain the concepts of precast concrete 5b. Select the material of relevant specifications for the given precast elements. 5c. Describe the design considerations and IS provisions for given precast element.	5.1 Advantages of prestressed concrete poles, different shapes, cross sections of poles, design considerations 5.2 Advantages of prestressed concrete piles, Types and cross-sections of piles, design considerations. 5.3 Types of prestressed concrete sleepers, different loads to be considered, design consideration of sleepers (IS).	12	8	CO5
6	**Unit-VI: Anchorage Zone Stresses in Post-tensioned Members** 6a. Explain the concepts of Anchorage Zone 6b. Describe the reinforcement details of end block	6.1 Cable profile computations. Anchorage zone in post tensioned members. Stress distribution in end block. Anchorage zone reinforcement. 6.2 Analysis by Magnel's / IS method. Use of mild steel reinforcement in Prestressed Concrete.	12	6	CO6

COURSE NAME	Prestressed Concrete	COURSE CODE	R18AM5105

7. ASSIGNMENTS-STUDENT ACTIVITIES

S. No.	Term Work (Assignments)	Topic No.	Hours Allotted	Mapped CO
1	Assignment on Pretensioning and Post-tensioning Systems.	1	4	CO1
2	Assignment on Analysis of Pre-tensioned and Post-tensioned Members.	2	4	CO2
3	Assignment on Design of Pre-tensioned and Post-tensioned Members.	3	4	CO3
4	Assignment on Losses in Pre-tensioned and Post-tensioned Members.	4	4	CO4
5	Assignment on Pre-stressed concrete precast units	5	4	CO5
6	Assignment on Anchorage Zone Stresses in Post-tensioned Members.	6	4	CO6
--	**Total**	--	**24**	--

S. No.	Student activity	Topic No.	Hours Allotted	Mapped CO
1	Preparation of report based on site visit	1	4	CO1

S. No.	Practical	Topic No.	Hours Allotted	Mapped CO
--	**Assignments-student activities submission**	--	**4**	--
--	**Total**	--	**32**	--

8. EVALUATION SCHEME FOR PRACTICAL / ASSIGNMENTS/STUDENT ACTIVITIES

Rubrics for Assignments

Category	4	3	2	1
Structure	Very Well Structured	Well Constructed	Structured But Missing Links	Unstructured
Understanding Of Analytical Concepts	Complete Understanding	Substantial Understanding	Some Understanding	Limited Understanding
Mathematical Errors	Least Errors	90 % Free Of Errors	75 % Free Of Errors	50 % Free Of Errors
Graphics	Neat ,Accurate And Enhance Understanding	Neat And Accurate	Some Illustrations Are Misleading And Redundant	Least Accurate And Not Neat
Timely Completion Of Activity	Maximum	Moderate	Satisfactory	Least
Overall Understanding	Maximum	Moderate	Satisfactory	Least

9. SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Topic No.	Topic Title	Mapped CO % OR Emphasis	Distribution of Marks			
			Cognitive level			Total Marks
			Remember	Understand	Apply	
I	Introduction to Prestressed Concrete	CO1	6	6	-	12
II	Analysis of Prestressed Concrete Members	CO2	-	-	16	16
III	Design of Pre-stressed rectangular beam section	CO3	-	-	12	12
IV	Losses of pre-stress	CO4	4	-	12	16
V	Prestressed concrete precast units	CO5	6	6	-	12
VI	Anchorage Zone Stresses in Post-tensioned Members	CO6	6	6	-	12
Total			**22**	**18**	**40**	**80**

10. SAMPLE MODEL QUESTION BANK FOR THEORY AND TEST EXAMINATIONS

S. No	Topic	Mapped CO	Cognitive level R/U/A	Question
1	1	CO1	R	Enlist advantages and disadvantages of prestressed concrete
2	1	CO1	U	Explain load balancing concept.
3	1	CO1	A	Calculate resultant stresses at mid span section of a rectangular PSC beam 250mm and 500mm deep simply supported over a span of 10m. It is prestressed by a straight cable carrying an effective prestressing force of 800kN at an eccentricity of 90mm.

11. LEARNING RESOURCES

- **BOOKS**

S. No.	Title of Book	Author	Publication
1	Prestressed Concrete Structures	N. Krishna Raju	Tata McGraw Hill ISBN 13: 9781259003363
2	Design of Prestressed Concrete Structures	T. Y. Lin, Ned H Burns	John Wiley and Sons, New York, ISBN- 8: 0471018988
3	Pre-stressed Concrete Structures	Pravin Nagarajan	Pearson Education India ISBN-9:789332517615
4	Prestressed Concrete	S. Ramamrutham	Dhanpat Rai Publications
5	IS:1343-1980 Code of Practice for Prestressed Concrete	Bureau of Indian Standards	BIS

- **WEBSITES**

S. No.	Address
1	www.nptel.iitm.ac.in
2	Website of Precast Concrete Engineers Society (PSEI)
3	www.youtube.com for videos regarding precast and prestressing procedures.

12. COURSE CURRICULUM DEVELOPMENT MEMBERS

S. No.	Name and Designation	Contact No.	Email
1	Dr. C. N. Thombare	9421680550	cnthombre@yahoo.co.in

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE -1

Diploma Programme	CIVIL		
Course Name	Civil Engg Software	Course code	R18CE5108
Course Category	Specialised II	Credits	5

COURSE TEACHING, ASSESSMENT AND EVALUATION SCHEME:

Teaching scheme		Evaluation scheme									
		Direct assessment- Weightage - 80%									
		Theory outcome		Practical outcome							Total
				TERMWORK				TW	PRACTICAL	ORAL	
Theory Allotted hrs	Practical Allotted hrs	ESE marks	TTA marks	TW marks	SW marks	AS marks	TU Marks	Total	Practical Marks	OR marks	Total marks
3	2	80	20		-	25	-	25	-	25	150
		Indirect assessment- Weightage - 20%									
		End semester students feedback						End of the Program survey			

End semester examination-ESE, Two tests average-TTA, Term Work- TW, Student Activity-SW, Assignments –AS, Tutorials- TU, Oral -OR

1. RATIONALE

Software is used to enhance productivity in planning, designing, decision making and monitoring of civil engineering works. Mastering software used in civil engineering industry is a value addition for job potential. The basic knowledge of technology and skills of using software in relevant area is a desirable combination for any technocrat.

2. EXPECTED PROFICIENCY

Solve Civil Engineering problem using software and analyze the results.

3. COURSE OUTCOMES (COs)

Students will be able to

1. Understand basic principals related with the subject of application software.
2. Translate engineering aspects into equivalent software terminologies in terms of flowchart, system chart, logic diagram, data flow diagram etc.
3. Develop ability to effectively use the software.
4. Work out some practical case studies with the help of software.
5. Demonstrate understanding of use of software for practical civil engineering situations.

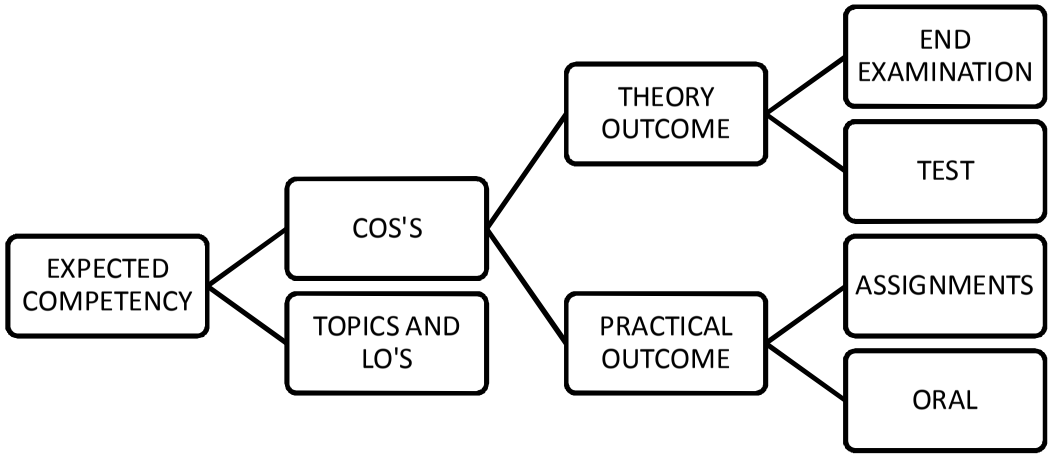
COURSE NAME	Civil Engg. Software (CES)	COURSE CODE	R18CE5108

4. CO –PO MATRIX

Course Name: Civil Engineering Software Course Code: R18CE5108	PO 1 Basic and Discipline specific knowledge	PO 2 Problem analysis	PO 3 Design/ development of solutions	PO 4 Engineering Tools, Experimentation and Testing	PO 5 Engineering practices for society, sustainability and environment	PO 6 Project Management	PO 7 Life-long learning	PSO 1 Construction planning and detailing	PSO 2 Construction execution, supervision and maintenance
CO1		2	1	3		1	1	1	1
CO2	2	3	1						
CO3				3	1		2		
CO4		2	3	1	1	1	1	1	1
CO5				3	1	2	1		

Rating scale '**3**' for high, '**2**' for medium, '**1**' for low '**0**' for no correlation

5. COURSE MAP



COURSE NAME	Civil Engg. Software (CES)	COURSE CODE	R18CE5108

6. DETAILED COURSE CONTENTS

S. No.	Unit Outcomes (UOs)	Topics and Sub-topics	Marks	Hours	Mapped CO
1	1a. Document problem. 1b. Define objectives and problem statement.	**PROBLEM DEFINITION** Interaction with user to know the problem, identifying objectives, variables, parameters, constraints, environment for exact problem identification, Assumptions, problem statement.	10	6	CO1
2	2a. Draw flow-chart for solving defined problem 2b. Describe step by step procedure of solving defined problem using the software.	**TRANSLATING GIVEN PROBLEM IN SOFTWARE BASED TERMINOLOGIES** Use of system flow charts, data- flow chart, program flow chart etc. and convert into model suitable for solution with the software under consideration	**10**	6	CO2
3	3 a. Document terminologies and methods related to the software.	**UNDERSTANDING BASIC TERMINOLOGY** Features related with software.	10	6	CO2
4	4a. Solve defined problem using the software using predefined methodology	**WORKING OF BASIC FEATURES AND OPERATIONS OF SOFTWARE**. Few exercises for understanding of tool.	20	12	CO3
5	5a. Collect data related to actual problem and solve using methodology described.	**CASE STUDY** Some practical civil engineering problem will be coded and implemented using software.	15	8	CO4
6	6 a. Document and present results and conclusions based on solutions generated. .	**DOCUMENTATION AND PRESENTATION** Documentation for maintaining modifying and operational instructions for using software for the case study. Presentation of case study in form of demonstration for a group of student.	15	8	CO5

7. PRACTICAL –ASSIGNMENTS-STUDENT ACTIVITIES-TUTORIALS (Separate table for each)

S. No.	ASSIGNMENTS	Topic No.	Hours Allotted	Mapped CO
1	Document problem statement, objectives and assumptions	1	6	CO1
2	Document procedure of using software to solve the defined problem.	2	4	CO2
3	Document terminologies related to software and related methods	3	4	CO3
4	Solve predefined problems related to defined problem and document results.	4	6	CO3
5	Collect data related to actual problem and solve using methodology described.	5	4	CO4
6	Document and present results and conclusions based on solutions generated.	6	6	CO5
--	**Total**	--	**30**	--

S. No.	Practical	Topic No.	Hours Allotted	Mapped CO
--	**Practical –assignments-student activities submission**	--	**2**	--
--	**Total**	--	**32**	--

8. EVALUATION SCHEME FOR PRACTICAL / ASSIGNMENTS/STUDENT ACTIVITIES

Rubrics for Assignments

Category	4	3	2	1
Understanding Of Tool	Complete Understanding	Substantial Understanding	Some Understanding	Limited Understanding
Errors	Least Errors	90 % Free Of Errors	75 % Free Of Errors	50 % Free Of Errors
Speed	Fast	Moderate	Slow	Least
Timely Completion Of Sub Activities	Maximum	Moderate	Satisfactory	Least
Self Learning	Maximum	Moderate	Satisfactory	Least

9. MAJOR EQUIPMENT/ INSTRUMENTS /TOOLS REQUIRED

S. No.	Equipment Name with Specifications	Practical
1	Software freeware/commercial	ALL
2	Desktop PC's	ALL

9. SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Topic No.	Topic Title	Mapped CO % OR Emphasis	Distribution of Marks			
			Cognitive level			Total Marks
			Remember	Understand	Apply	
--	**All topics**	100	--	20	60	80
Total		**100**	**--**	**20**	**60**	**80**

10. SAMPLE MODEL QUESTION BANK FOR THEORY AND TEST EXAMINATIONS

S. No	Topic	Mapped CO	Cognitive level R/U/A	Question
1	1	All CO's	U/A	Examination will be carried out on software (Hands on) and will depend upon software used.

11. MODEL QUESTION BANK FOR PRACTICAL EXAMINATIONS

12. LEARNING RESOURCES (will be based on problem definition and software selected)

- **BOOKS**
- **SOFTWARE/ TOOLS/ MODELS**
- **WEBSITES**

13. COURSE CURRICULUM DEVELOPMENT MEMBERS

S. No.	Name and Designation	Contact No.	Email
1	Dr. S. V. Kanitkar	9921414902	svkwadia@yahoo.co.in

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE -1

Diploma Programme	CIVIL		
Course Name	Township Planning	Course code	R18CE5104
Course Category	Specialised II	Credits	5

COURSE TEACHING, ASSESSMENT AND EVALUATION SCHEME:

Teaching scheme		Evaluation scheme									
		Direct assessment- Weightage - 80%									
		Theory outcome		Practical outcome							Total
				TERMWORK					Practical	Oral	
Theory Allotted hrs	Practical Allotted hrs	ESE marks	TTA marks	TW marks	SW marks	AS marks	TU Marks	Total	Practical Marks	OR marks	Total marks
3	2	80	20	20	05	--	-	25	-	25	150
		Indirect assessment- Weightage - 20%									
		Mid semester students feedback							End of the course survey		

End semester examination-ESE, Two tests average-TTA, Term Work- TW, Student Activity-SW, Assignments –AS, Tutorials- TU, Oral -OR

1. RATIONALE

A student should know elements in a township their planning & execution. The Government has allowed construction on mass scale on own agricultural lands to the extent of 100 acres or more to form self sufficient townships. But these townships have to manage their own utility service systems. A student should be made aware of these facts and should be taught the factors leading to site selection. He should know the government procedures regarding land purchase, plan sanctioning etc. He should be able to execute a township scheme and maintain the various services in order. He should be able to liaise with the Govt. Officials.

2. EXPECTED PROFICIENCY

Carry out surveys for Civil Engineering Works.

3. COURSE OUTCOMES (COs)

Students will be able to

1. Prepare subdivision of land by adopting development control regulation.
2. Explain Role of FDI and approval of township from competent authority.
3. Explain various land uses and regulation of project through ventures.
4. State different agencies in housing & investment in housing sector.
5. State various planning acts for acquisition of land.
6. Classify various zones and types of survey for planning.

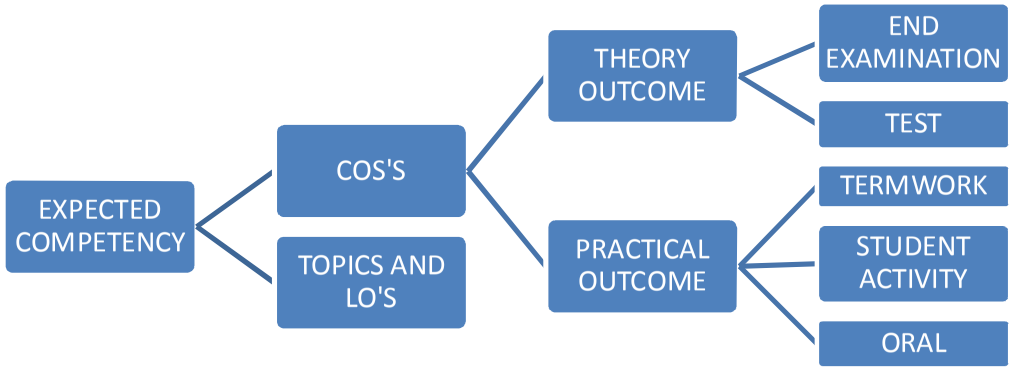
COURSE NAME	Township Planning	COURSE CODE	R18CE5104

4. CO – PO MATRIX

Course Name : Township Planning Course Code: R18CE5104	PO 1 Basic and Discipline Specific Knowledge	PO 2 Problem Analysis	PO 3 Design/Development of solutions	PO 4 Engineering Tools, Experimentation and Testing	PO 5 Engineering practices for society, sustainability and environment	PO 6 Project Management	PO 7 Life-long learning	PSO 1 Plan, Draft, Detail out and Estimate Civil Engineering works	PSO 2 Supervise Construct and maintain Civil Engineering Activities
CO1		2	1		3	1		2	
CO2	1			1		2		1	
CO3	2			1		2			
CO4	3			2				1	
CO5	3								
CO6	2	1			1				

Rating scale '**3**' for high, '**2**' for medium, **'1'** for low **'0'** for no correlation

5. COURSE MAP



COURSE NAME	Township Planning	COURSE CODE	R18CE5104

6. DETAILED COURSE CONTENTS

Sr. No.	Unit Outcomes (UOs)	Topics and Sub-topics	Marks	Hours	Mapped CO
1	1.1 Differentiate between Town Planning & Township Planning. 1.2 Study of hierarchy in planning. 2.1 List authority for seeking sanction or approval. 1.3 Describe amenities in the township, 1.4 State DC rules applicable to township. 1.5 Define subdivision of land. 1.6 Explain effect of township on services provided by the local body.	**Introduction** 1.1 Difference between Town Planning and Township Planning. Extent of township. Hierarchy in Planning. Area of influence. Horizontal and vertical growth. 1.2 Amenities in the township and design of amenities. 1.3 Competent Authority for seeking sanction or approval. 1.4 DC rules and relaxation in DC rules for townships. 1.5 Subdivision of land. 1.6 Effect of township on services provided by the local body. Authority to be set up for administration of township.	16	10	CO1
2	2.2 Calculate expenditure to be incurred for the project teams to be formed for rising, finance purchase, liaisoning execution. 2.3 Explain FDI in township. 2.4 Determine time needed for completion, phasing out of the construction activity. **2.5** State various agencies to be appointed for planning and execution of the project.	**Financing & Executing the Township Projects** 2.1 Expenditure to be incurred for the township project. Teams for raising finance, purchase, liaisoning, execution, selling.. 2.2 Flow of funds and FDI in Township projects. 2.3 Phasing out of the construction activities and completion time for township projects. 2.4 Agencies for planning and execution of a township project - Architect, Landscape architect, RCC Consultant & Contractor, Water & Electrical consultant, Security, Estate managers.	12	7	CO2
3	3.1 State various land uses & their colour codes. 3.2 Explain execution on own by builder or company, joint venture basis, fixing of rate done for joint venture. 3.3 Procedure of selection of site and purchase of land. 3.4 Study of land owners as share holders. 3.5 List documentation needed for purchase of land.	**Land & Land use** 3.1 Various land uses & their colour codes. 3.2 Execution on own by builder or company. Execution on joint venture basis. Fixing of rate done for joint venture 3.3 Pooling of land - Purchase of land and land owners as share holders. 3.4 Selection of site for township. Documentation needed for purchase of land.	12	7	CO3

COURSE NAME	**Township Planning**	COURSE CODE	**R18CE5104**

Sr. No.	Unit Outcomes (UOs)	Topics and Sub-topics	Marks	Hours	Mapped CO
4	4.1 Study of different agencies for housing. 4.2 Explain different investment in housing sector.	**Housing** 4.1 Importance and demand of housing. Classification, requirements and design aspects of residential buildings. 4.2 Agencies in housing. HUDCO, CIDCO, MHADA, NBFC, HDFC, LIC housing finance. 4.3 Problems in housing sector in India. 4.4 Investment in housing sector.	12	7	CO4
5	5.1 State Maharashtra regional & town planning act. 5.2 Describe repeal of urban land ceiling and regulation act. 5.3 Define land acquisition act. 5.4 Explain Maharashtra Land Revenue Code. 5.5 State Environmental Impact Assessment of township projects.	**Laws & Codes for Planning** 5.1 Need, aspects, advantages & limitations of laws & codes in township planning. 5.2 Maharashtra Regional & town Planning Act. 5.3 Repeal of Urban land ceiling and Regulation Act. 5.4 Land Acquisition Act. 5.5 Maharashtra land Revenue Code. 5.6 Environmental Impact Assessment of Township Projects.	16	10	CO5
6	6.1 Explain zoning. 6.2 State principles, advantages, aspect, and economy. 6.3 Define powers, maps, transition zone. 6.4 Classify various types of surveys.	**Zoning & Civic Surveys** 6.1 Concept, objectives, importance, principles, aspects and advantages of zoning. 6.2 Transition Zone, Zoning powers and Maps for zoning. Economy of zoning. 6.3 Civic Surveys – Concept & necessity of civic surveys. Data and methods of data collection in civic surveys. 6.4 Drawings and reports to be prepared from civic surveys.	12	7	CO6

7. PRACTICAL –ASSIGNMENTS-STUDENT ACTIVITIES-TUTORIALS (Separate table for each)

Sr. No.	Practical (Assignments)	Topic No.	Hours Allotted	Mapped CO
1	Subdivision of land taking in to account the prevailing DC rules.	1	6	CO1
2	Listing of roles of various agencies involved in planning & execution of various agencies in township planning.	2	2	CO2
3	Preparing an information brochure, professional type, of the above subdivision with due regards to colour codes.	3	4	CO3
4	Detailed study of profile of a housing agency.	4	2	CO4
5	Study of case for land acquisition for township or Listing salient feature of MRTP act	2	2	CO5
6	Neighborhood planning conforming to the present zoning and other norms.	5	6	CO6
--	Total	--	22	--

Sr. No.	Student activity	Topic No.	Hours Allotted	Mapped CO
1	Planning and arranging a technical visit to a township scheme and preparing & submitting a report on it.	1	4	CO1
2	Planning and arranging expert's lecture on a law/code applicable to township planning and preparing and submitting a report on it.	5	2	CO5
--	Total	--	6	--

Sr. No.	Practical	Topic No.	Hours Allotted	Mapped CO
--	**Practical –assignments-student activities submission**	--	**4**	--
--	**Total**	--	**32**	--

8. EVALUATION SCHEME FOR PRACTICAL / ASSIGNMENTS/STUDENT ACTIVITIES

Rubrics for Assignments

Category	4	3	2	1
Structure And Presentation	Very Well Structured	Well Constructed	Structured But Missing Links	Unstructured
Quantity of Information	All Subtopics Covered In Detail	All Subtopics Are Mostly Covered	Some of The Subtopics Are Not Covered In Detail	Some of The Subtopics Are Not Covered
Quality of Information	Clear Description With Supporting Details	Clear Description With Some Supporting Details	Clear Description With Lack of Supporting Details	Irrelevant Information
Sources	Clear Documentation	Clear Documentation With Some Missing Links	Part Documentation With Missing Links	Documentation With Number of Missing Links

Category	4	3	2	1
Graphics	Neat ,Accurate And Enhance Understanding	Neat And Accurate	Some Illustrations Are Misleading And Redundant	Least Accurate And Not Neat
Group Activity	Maximum Coordination And Effort	Fair Coordination And Effort	Lack Coordination And Effort	Least Participation
Timely Completion of Activity	Maximum	Moderate	Satisfactory	Least
Overall Understanding	Maximum	Moderate	Satisfactory	Least

Rubrics for Student Activities

Category	4	3	2	1
Leadership qualities	Assume the role willingly & demonstrate ability fully	Assume the role willingly but demonstrate ability partly	Assume the role unwillingly though demonstrate ability fully	Assume the role unwillingly & demonstrate ability partly
Planning & Execution	Proper planning & execution	Proper planning but improper execution	Improper planning but proper execution	Improper planning & execution
Quality of report, graphics and presentation.	Clear description with all supporting details, relevant & neat graphics and well structure presentation.	Clear description with some supporting details, relevant but messy graphics. and structured presentation.	Clear description with no supporting details, neat but irrelevant graphics and structured presentation with missing links.	Irrelevant description, irrelevant & messy graphics and unstructured presentation.
Timely completion	Maximum	Moderate	Satisfactory	Least
Overall understanding	Maximum	Moderate	Satisfactory	Least

9. MAJOR EQUIPMENT/ INSTRUMENTS /TOOLS REQUIRED

Sr. No.	Equipment Name with Specifications	Practical
1	Different Drawing Tools	1, 2, 5
2	Desktop Computers	1, 2, 5
3	LCD Projector	1, 2, 5

10. SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Topic No.	Topic Title	Mapped CO % OR Emphasis	Distribution of Marks			
			Cognitive level			Total Marks
			Remember	Understand	Apply	
I	Introduction	CO1	4	4	8	16
II	Financing & Executing Township Projects	CO2	4	4	4	12
III	Land & Land use	CO3	4	4	4	12
IV	Housing	CO4	4	4	4	12

COURSE NAME	Township Planning	COURSE CODE	R18CE5104

Topic No.	Topic Title	Mapped CO % OR Emphasis	Distribution of Marks			
			Cognitive level			Total Marks
			Remember	Understand	Apply	
V	Laws & Codes for Planning	CO5	4	4	8	16
VI	Zoning & Civic Surveys	CO6	4	4	4	16
Total		--	**24**	**24**	**32**	**80**

11. SAMPLE MODEL QUESTION BANK FOR THEORY AND TEST EXAMINATIONS

Sr. No	Topic	Mapped CO	Cognitive level R/U/A	Question
1	1	CO1	R	Differentiate between Town Planning and Township Planning.
2	1	CO1	U	Explain principles of land subdivision.
3	1	CO1	A	Write various amenities in the township.

12. LEARNING RESOURCES

- **BOOKS**

Sr. No.	Title of Book	Author	Publication
1	Town Planning	G. K. Hiraskar	Dhanpat Rai, Delhi.
2	Town Planning	S. C. Rangwala	Charotor Publishing House, Anand.
3	Text book of town planning	A. Bandopadhyay	Books and Allied, Calcutta
4	The Urban Pattern	Arther Gallion	CBS, Delhi.
5	Town Planning Act 1966	--	Govt. of Maharashtra Publication
6	Maharashtra Land Revenue Code	--	Govt. of Maharashtra Publication
7	Urban Land ceiling & regulation Act.	--	Govt. of India Publication

- **SOFTWARE/ TOOLS/ MODELS**

Sr. No.	Name	Company	Freeware/commercial
1	Autodesk Autocad software	Autodesk	Student version

- **WEBSITES**

Sr. No.	Address
1	Website of Town Planning Department Maharashtra State, https://urban.maharashtra.gov.in

Sr. No.	Address
2	Website of Pune Municipal Corporation https://pmc.gov.in/en/Department of Town Planning
3	Website of Pimpari Chinchvad Municipal Corporation https://www.pcmcindia.gov.in/townplanning.php
4	Website of Pimpari Chinchvad New Town Development Authority https://www.pcntda.org.in/

13. COURSE CURRICULUM DEVELOPMENT MEMBERS

Sr. No.	Name and Designation	Contact No.	Email
1	Prof. D. A. Rajput.	9960729657	rajputdeepaksingh81@yahoo.co.in
2	Prof. A. S. Shelar	9423558189	ani_shel@yahoo.com

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE -1

Diploma Programme	CIVIL		
Course Name	Advanced Structural Design	Course code	R18AM5106
Course Category	Specialized II	Credits	5

COURSE TEACHING, ASSESSMENT AND EVALUATION SCHEME:

Teaching scheme		Evaluation scheme									
		Direct assessment- Weightage = 80%									
		Theory outcome		Practical outcome							Total
				TERMWORK					Practical	Oral	
Theory Allotted hrs	Practical Allotted hrs	ESE marks	TTA marks	TW marks	SW Marks	AS marks	TU marks	TW Total	Practical Marks	OR marks	Total marks
3	2	80	20	20	05	--	--	25	-	25	150
		Indirect assessment- Weightage - 20%									
		Mid semester students feedback				End of the course survey					

End semester examination-ESE, Two tests average-TTA, Term Work- TW, Student Activity-SW, Assignments –AS, Tutorials- TU, Oral -OR

1. RATIONALE

This is specialized subject who will enable students to understand design principles and procedures for structural components like continuous slabs and beams, columns & footings subjected to moments, water tanks, etc. A Civil Engineering technocrat needs to understand the behaviour of various structural components for developing insight for the design concept. Advanced Structural Design is the specialized subject for the Civil Engineering which comprises of knowhow of Analysis and Design concept of Reinforced Concrete structures. In the design of RCC structures Limit State Method is to be used as per IS: 456-2000 for analysis and design and IS: 875-1987 is to be used for Loading Standards, IS: 3370 is used for water retaining structures.

2. EXPECTED PROFICIENCY

The aim of this course is to help the student to attain the industry identified competency through the concepts of RCC design of various structural components.

3. COURSE OUTCOMES (COs)

Students will be able to

1. Design of a continuous one way and two way slabs.
2. Analyze & Design of a compression members subjected with moments.
3. Design of a RCC dog legged and cantilever staircase.
4. Design of a RCC cantilever retaining wall.
5. Design of circular water tanks with flexible and rigid base.
6. Design of RCC column footing subjected with axial compression and moments.

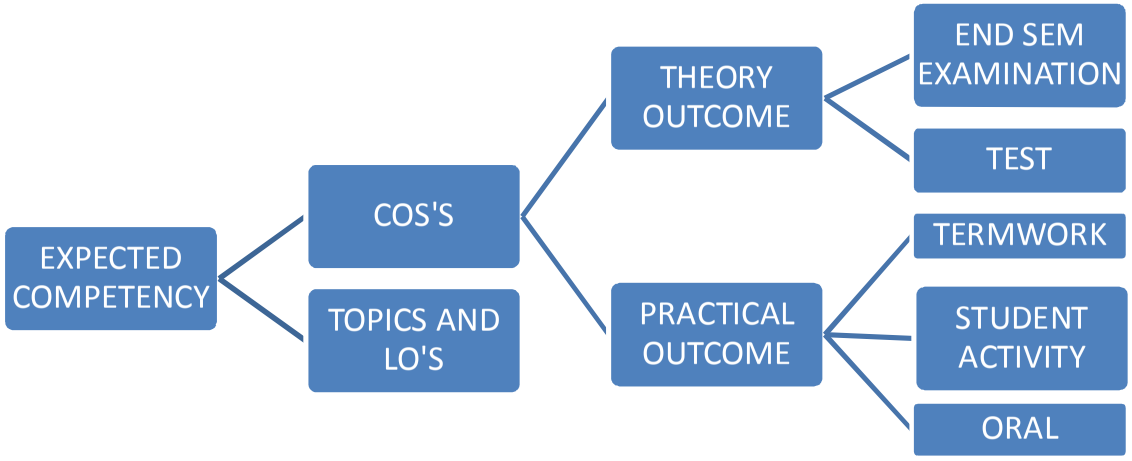
COURSE NAME	Advanced Structural Design	COURSE CODE	R18AM5106

4. CO –PO MATRIX

Course Name: Advanced Structural Design Course Code: R18AM5106	PO 1 Basic and Discipline specific knowledge	PO 2 Problem analysis	PO 3 Design/ development of solutions	PO 4 Engineering Tools, Experimentation and Testing	PO 5 Engineering practices for society, sustainability and environment	PO 6 Project Management	PO 7 Life-long learning	PSO 1 Construction planning and detailing	PSO 2 Construction execution, supervision and maintenance
CO1	2	3	2						
CO2	3	3							
CO3		3			3	2	3	1	
CO4		2	3						
CO5		3	2	2					1
CO6				3					

Rating scale '**3**' for high, '**2**' for medium, '**1**' for low '**0**' for no correlation

5. COURSE MAP



COURSE NAME	Advanced Structural Design	COURSE CODE	R18AM5106

6. DETAILED COURSE CONTENTS

S.No.	Unit Outcomes (UOs)	Topics and Sub-topics	Marks	Hours	Mapped CO
1	**Unit I: Design of Retaining Walls** 1a. Explain retaining wall and its types. 1b.Explain various stability checks 1c. Analysis & Design of retaining wall subjected to levelled earth backfill.	1.1 Necessity of retaining walls, different types of walls and loading conditions. 1.2 Active earth pressure, depth of foundation, base pressure, IS 456-2000 specifications for stability requirements. 1.3 Numerical problems on design of cantilever type retaining wall (Levelled earth backfill only). Checks for Stability, Design of stem, Design of toe slab, Design of heel slab. Reinforcement detailing	16	10	CO1
2	**Unit-II Design of compression members subjected with moments.** 2a.Calculate the ultimate load carrying capacity of the column in the given loading condition. 2b.Design short column for the given axial load and moment.	2.1 Introduction to Pu-Mu Interaction Diagrams, Concentric axial load (Puz), design of columns using charts, 2.2 Design of columns subjected to axial compression and uni-axial bending, columns subjected to axial compression and biaxial bending (only introduction).	12	6	CO2
3	**Unit-III : Design of RCC Staircase** 3a. Calculate various loads on the waist slab of a dog legged staircase. 3b. Design of waist slab of a dog legged staircase for given rise, tread, width, and number of steps with supporting beams at the ends of flight, parallel to steps. 3c. Draw reinforcement detailing diagram of typical flight of a dog legged staircase	3.1 Various clauses in IS456-2000 regarding effective span and load calculation for typical flight of a dog legged staircase. 3.2 Load calculation for a typical flight of a dog legged staircase with load distribution on landing slab as per IS 456-2000. 3.3 Design of waist slab of a dog legged staircase for given rise, tread, width, and number of steps, with supporting beams at the ends of flight, parallel to steps. 3.4 Reinforcement detailing of typical flight of dog legged and cantilever staircase	12	8	CO3
4	**Unit-IV :Design of Continuous Slabs** 4a. Identify type of slab from drawing. 4b. Design & drawings of reinforcement details of one-way continuous slab and two-way continuous slab.	4.1 Definition and classification of slabs as one-way and two-way continuous slabs, support conditions, main and distribution steel. 4.2 Numerical problems on design of one-way continuous slab with corners held down (restrained). 4.3 Numerical problems on design of two-way continuous	16	10	CO4

COURSE NAME	**Advanced Structural Design**	COURSE CODE	**R18AM5106**

S.No.	Unit Outcomes (UOs)	Topics and Sub-topics	Marks	Hours	Mapped CO
	4c. Apply checks for shear and deflection.	slab with corners held down (restrained).			
5	**Unit-V: Design of circular water tanks with flexible and rigid base.** 5a. Design circular water tank with flexible base. 5b. Design circular water tank with rigid base. 5c. Draw reinforcement details of water tank.	5.1 Classification, permissible stresses in concrete and steel, joints in tanks, base slab of tank. 5.2 Design of circular tank resting on ground with flexible joint between the walls and the base , 5.3 Design of circular tank resting on ground with fixed joint between the walls and the base, Reinforcement detailing	12	6	CO5
6	**Unit-VI: Design of footing subjected with axial compression and moments** 6a. Design isolated square footing subjected to axial load and moment. 6b. Draw reinforcement details of footing.	6.1 Types of Footings, Locating centre of gravity of footing, proportioning base 6.2 Design of footing subjected to axial load and moment, check for one-way shear, check for two- way shear, Introduction about combined footing (No detailed design)	12	8	CO6

7. ASSIGNMENTS-STUDENT ACTIVITIES

S. No.	Assignments	Topic No.	Hours Allotted	Mapped CO
1	Design of a RCC cantilever retaining wall.	1	4	CO1
2	Analyze & Design of a compression members subjected with moments.	2	4	CO2
3	Design of a RCC dog legged and cantilever staircase	3	4	CO3
4	Design of a continuous one way and two way slabs	4	4	CO4
5	Design of circular water tanks with flexible and rigid base.	5	4	CO5
6	Design of RCC column footing subjected with axial compression and moments	6	4	CO6
--	**Total**	**--**	**24**	**--**

S. No.	Student activity	Topic No.	Hours Allotted	Mapped CO
1	Preparation of report based on site visit	1	4	CO1

S. No.	Practical	Topic No.	Hours Allotted	Mapped CO
--	**Assignments-student activities submission**	**--**	**4**	**--**
--	**Total**	**--**	**32**	**--**

8. EVALUATION SCHEME FOR PRACTICAL / ASSIGNMENTS/STUDENT ACTIVITIES

Rubrics for Assignments

Category	4	3	2	1
Structure	Very Well Structured	Well Constructed	Structured But Missing Links	Unstructured
Understanding Of Analytical Concepts	Complete Understanding	Substantial Understanding	Some Understanding	Limited Understanding
Mathematical Errors	Least Errors	90 % Free Of Errors	75 % Free Of Errors	50 % Free Of Errors
Graphics	Neat ,Accurate And Enhance Understanding	Neat And Accurate	Some Illustrations Are Misleading And Redundant	Least Accurate And Not Neat
Timely Completion Of Activity	Maximum	Moderate	Satisfactory	Least
Overall Understanding	Maximum	Moderate	Satisfactory	Least

9. SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Topic No.	Topic Title	Mapped CO % OR Emphasis	Distribution of Marks			
			Cognitive level			Total Marks
			Remember	Understand	Apply	
I	Design of a RCC cantilever retaining wall.	CO1	-	4	12	16
II	Analyze & Design of columns subjected with moments.	CO2	6	-	6	12
III	Design of a RCC dog legged and cantilever staircase	CO3	-	4	8	12
IV	Design of continuous one way and two way slabs.	CO4	4	-	12	16
V	Design of circular water tanks with flexible and rigid base.	CO5	-	-	12	12
VI	Design of RCC column footing subjected with axial compression and moments	CO6	-	4	8	12
Total			**10**	**12**	**58**	**80**

10. SAMPLE MODEL QUESTION BANK FOR THEORY AND TEST EXAMINATIONS

S. No	Topic	Mapped CO	Cognitive level R/U/A	Question
1	1	CO6	R	Describe various types of combined footings.
2	1	CO6	U	Explain design steps for the footing when it is subjected to axial load and moment.
3	1	CO6	A	A RCC column 400mm X 400mm carries an axial load of 1000 KN and moment 110KNm @ major axis. Calculate the size of footing.

11. LEARNING RESOURCES

- **BOOKS**

S. No.	Title of Book	Author	Publication
1	Limit State Theory and Design	Dr. S. R. Karve & Dr. V. L. Shah	Structures ISBN-10: 819037172X ISBN-13: 978-8190371728
2	R.C.C. Design	M. G. Shah and C. M. Kale.	Laxmi Publications ISBN: 9789351380962, ISBN :9351380963
3	Limit State Design	P. C. Varghese	Eastern Economy Edition ISBN: 9788120320390, ISBN: 8120320395
5	IS:456-2000 Plain and Reinforced Concrete	Bureau of Indian Standards	BIS
6	IS:875 Design loads (other than earthquake) for buildings and structures	Bureau of Indian Standards	BIS

S. No.	Title of Book	Author	Publication
7	IS:3370 (I and II) Concrete structures for the storage of liquids	Bureau of Indian Standards	BIS

- **WEBSITES**

S. No.	Address
1	www.nptel.iitm.ac.in
2	http://www.sefindia.org/
3	www.slideshare.net/asif108/
4	www.youtube.com/watch?v=2L1DTLV8bQk
5	www.civilengineersforum.com

12. COURSE CURRICULUM DEVELOPMENT MEMBERS

S. No.	Name and Designation	Contact No.	Email
1	Dr. C. N. Thombare	9421680550	cnthombre@yahoo.co.in

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE -1

DiplomaProgramme	CIVIL		
Course Name	Building Services	Course code	R18CE5102
Course Category	Specialized III	Credits	5

COURSE TEACHING, ASSESSMENT AND EVALUATION SCHEME:

Teaching scheme		Evaluation scheme									
		Direct assessment- Weightage - 80%									
		Theory outcome		Practical outcome							Total
				TERMWORK					PRACTICAL	ORAL	
Theory Allotted hrs	Practical Allotted hrs	ESE marks	TTA marks	TW marks	SW marks	AS marks	TU Marks	Total	Practical Marks	OR marks	Total marks
3	2	80	20	20	05	--	-	25	-	@25	150
		Indirect assessment- Weightage - 20%									
		Mid semester students feedback						End of the course survey			

End semester examination-ESE, Two tests average-TTA, Term Work- TW, Student Activity-SW, Assignments –AS, Tutorials- TU, Oral -OR

1. RATIONALE

Effective building cannot be created in absence of essential services, hence the civil engineer shall also be well versed with some of the common services related with the buildings. Also building cannot be used for occupancy unless various services required for effective working of a building is provide. It creates healthy & working environment in the building. By considering design aspect and recent materials student will develop skills and ability to become an entrepreneur for these services.

2. EXPECTED PROFICIENCY

Develop entrepreneurship skills and acquaint the knowledge for providing various services in the building.

3. COURSE OUTCOMES (COs)

Students will be able to

1. Apply suitable material by calculating heat loss and heat gain in building.
2. Describe suitable method to create better lighting and ventilation.
3. Select suitable material and method for prevention of dampness, leakages in the building.
4. Suggest suitable material and technique for acoustical treatment.
5. Select appropriate material and technique to treat building from termite and fire protection.
6. Plan and design the water supply and drainage system for small building.

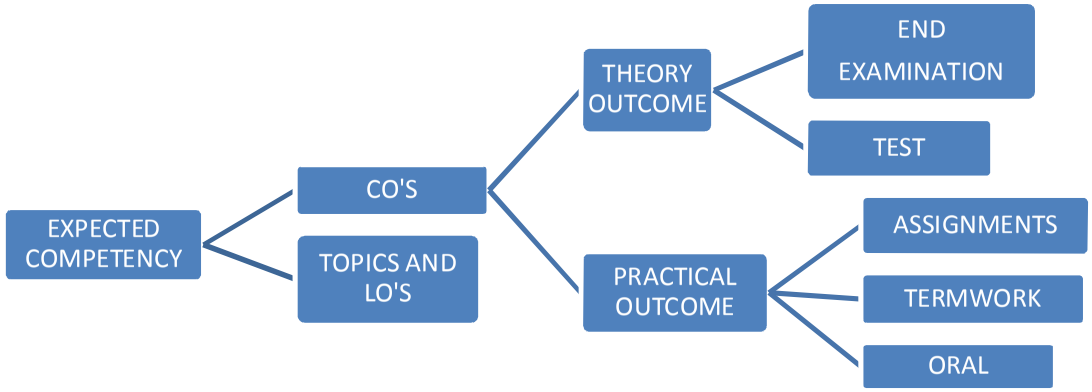
COURSE NAME	Building Services	COURSE CODE	R18CE5102

4. CO –PO MATRIX

Course Name: Building Services Course Code: R18CE5102	PO 1 Basic and Discipline Specific knowledge	PO 2 Problem Analysis	PO 3 Design or Development of Solutions	PO 4 Engineering Tools, Experimentation and Testing	PO 5 Engineering Practices for Society, sustainability and Environment	PO 6 Project Management	PO 7 Life-Long Learning	PSO 1 Construction planning and detailing	PSO 2 Construction execution, supervision and maintenance
CO1		1	3		2		1	3	1
CO2		1	2		2			2	1
CO3		1	2		1				2
CO4		1	2	3				3	1
CO5	1	2		1	1			1	2
CO6	3	2		1	1			1	3

Rating scale '**3**' for high, '**2**' for medium, **'1'** for low **'0'** for no correlation

5. COURSE MAP



COURSE NAME	Building Services	COURSE CODE	R18CE5102

6. DETAILED COURSE CONTENTS

Sr. No.	Unit Outcomes (UOs)	Topics and Sub-topics	Marks	Hours	Mapped CO
1	1.1 Discuss necessity and principles of thermal insulation. 1.2 Apply different insulating material to minimize heat gain and loss in the building. 1.3 State the various methods of thermal insulation. 1.4 Calculate heat loss, heat gain and thermal transmittance value.	**Thermal Insulation of Building** 1.1 Thermal Insulation – Introduction, Necessity, Definition of terms, principals of thermal insulation. 1.2 Heat transfer, comfort factors, heat exchange of building, climatic zones of India. 1.3 Thermal insulation types, forms & finishes, methods of thermal insulation. Function of Insulation, Advantages. 1.4 Calculation of heat loss & heat gain, thermal transmittance value.	16	08	CO1
2	2.1 Discuss the necessity of ventilation, air conditioning and lighting in building. 2.2 State the systems of ventilation and air conditioning. 2.3 Explain the comfort factors for ventilation. 2.4 Describe different methods to create better lighting and ventilation. 2.5 Select suitable type of air condition system for various building according to condition.	**Ventilation, Air conditioning and Lighting** 2.1 Ventilation – Definition, Comfort factors, Systems of ventilation, Wind effect, Stack effect, Necessity of ventilation, orientation with respect to ventilation. Area of opening Calculation. 2.2 Lighting- Principals, day lighting, Design of windows, sky Component, orientation, artificial and supplementary illumination. 2.3 Air Conditioning - Definition, purpose and principals of comfort air conditioning. 2.4 Essential of ideal air conditioning systems. Systems of air conditioning their installation & working.	12	08	CO2
3	3.1 State the effect of dampness on building. 3.2 Select suitable material for prevention of dampness, water proofing of building. 3.3 Suggest suitable method or technique for damp proofing, water proofing of building. 3.4 Describe the characteristics and properties of the material used for damp proofing and water proofing.	**Damp proofing and Water Proofing** 3.1 Sources of dampness. Effects of dampness. 3.2 Techniques of damp prevention. Materials used for damp proofing. Damp proofing treatment in buildings. 3.3 Definition & necessity of water proofing, Conventional and advanced methods of water proofing. 3.4 Water proofing treatment in W.C, Bathroom, Terrace. Precautions taken while doing water proofing.	12	08	CO3
4	4.1 State the characteristics of sound. 4.2 Discuss the acoustical defects. 4.3 Select the suitable material and technique for	**Acoustic & Sound Insulation** 4.1 Introduction, characteristic of audible sound. Behavior of sound and its effect, Acoustical defects.	16	08	CO4

COURSE NAME	**Building Services**	COURSE CODE	**R18CE5102**

Sr. No.	Unit Outcomes (UOs)	Topics and Sub-topics	Marks	Hours	Mapped CO
	acoustical treatment. 4.4 Calculate absorption power and reverberation time for acoustical design.	4.2 Sound Absorption, Sound absorbents or acoustical materials & their requirement, absorption power & reverberation time calculation. 4.3 Acoustics of Building. Requirement & conditions of good acoustics. Principles in acoustical Design. 4.4 Effect and types of Noise, Transmission of noise, comfort standards, noise control, sound insulation.			
5	5.1 State the effect termite on building. 5.2 Select suitable material for prevention of termite proofing and fire protection of building. 5.3 Suggest suitable method or technique for termite proofing and fire protection of building. 5.4 Describe the characteristics and properties of the material used for termite proofing and fire protection. 5.5 State the necessity of home automation.	**Termite Proofing & Fire Protection of Building & Home Automation** 5.1 Termite proofing - Essentials of termite proofing, termite- proofing method. 5.2 Fire Protection- Fire safety, fire load, grading of occupancies by fire load. Fire resistant construction of walls, columns, roofs, floors, wall opening & fire escape elements 5.3 Fire Layout, fire hydrant, different tools and equipment used to prevent fire, fire alarm. 5.4 Introduction to Home automation, advantages and disadvantages, elements of home automation, system of home automation.	12	08	CO5
6	6.1 Explain the principles governing for design of water supply system and building drainage. 6.2 Enlist various fastening and fixtures required for water supply arrangement in building. 6.3 Describe procedure for taking service connection. 6.4 State various problems occurred and remedial measures in water supply arrangement. 6.5 List various appurtances and fittings required for house drainage system. 6.6 Discuss the methods of testing of drainage line.	**Building water supply and drainage** 6.1 Principles governing design of building water supply system. Layout of water supply arrangement. Estimating water quantity requirement. 6.2 Water supply fixtures – ferrule, gooseneck, stopcock, bib cock, tap cock, mixer, showers, non return valve, water meters. 6.3 Various types of distribution pipes and fittings, testing, inspection and maintenance of building water supply system. 6.4 Definition of terms, Aims and Principles used in house drainage. 6.5 Pipes and traps, function, characteristics, Sanitary fittings. 6.6 Septic tank, Gully trap chamber, inspection chamber, ITC, manhole, testing of drainage system.	12	08	CO6

7. PRACTICAL –ASSIGNMENTS-STUDENT ACTIVITIES- (Separate table for each)

S. No.	Assignments	Topic No.	Hours Allotted	Mapped CO
1	Study of different thermal insulation material and methods of thermal insulation	01	02	CO1
2	Study of functional requirement and systems of ventilation.	02	02	CO2
3	Study of working & installation of different kinds of air conditioning systems used in public building.	02	02	CO2
4	Comparative study on technical & economic points of different kinds of water proofing chemicals available and popular in its local market from self collected market information.	03	02	CO3
5	Study of acoustical materials and its installation in buildings.	04	02	CO4
6	Study by handling in person at site/shop of various water supply fixtures.	05	02	CO6
7	Study by handling in person at site/in shop of various drainage fixtures.	06	02	CO6
8	Drawing of water supply arrangement for small buildings.	05	04	CO6
9	Drawing of drainage arrangement for small buildings.	06	04	CO6
--	Total	--	22	--

S. No.	Student Activity	Topic No.	Hours Allotted	Mapped CO
1	Study by actual site/factory visit or video of construction, working & installation of different kinds of fire extinguishing systems used in high-rise building.	05	04	CO3
2	Study by actual site/factory visit or video of working & installation of home automation system used in residential or public building.	06	04	CO5
--	Total	--	08	--

S. No.	Practical	Topic No.	Hours Allotted	Mapped CO
--	**Practical –assignments-student activities submission**	**--**	**2**	**--**
--	**Total**	**--**	**32**	**--**

8. EVALUATION SCHEME FOR PRACTICAL / ASSIGNMENTS/STUDENT ACTIVITIES

Rubrics for Assignments

Category	4	3	2	1
Structure	Very well structured	Well constructed	Structured but missing links	Unstructured
Understanding of concepts	Complete understanding	Substantial understanding	Some understanding	Limited understanding
Graphics	Neat ,accurate and enhance understanding	Neat and accurate	Some illustrations are misleading and redundant	Least accurate and not neat
Timely completion of activity	Maximum	Moderate	Satisfactory	Least

Category	4	3	2	1
Overall understanding	Maximum	Moderate	Satisfactory	Least

Rubricks for Student Activities

Category	4	3	2	1
Behavior	Never display disruptive behavior	Rarely display	occasionally	almost
Writing	Well written organized clear and easy	Adequately	Fairley	Poorly
Understanding	Clear complete and concise	Mostly clear and little concise	Unclear	Incompletes and not concise
Effort	Always on task	Mostly	Sometime	Rarely
Presentation	Orderly and effectively	Orderly and little effectively	orderly	Not orderly

Rubricks for Orals

Category	4	3	2	1
Behavior	Never display disruptive behavior	Rarely display	occasionally	almost
Delivery	Relaxed, Self confident, show natural body movement	Demonstrate quick recovery from minor mistake	Nervous, self conscious and monotone voice	Poorly performed
Understanding	Clear complete and concise	Mostly clear and little concise	Unclear	Incompletes and not concise
Vocabulary	Wide range of vocabulary and there is no repetition.	Quite Wide range of vocabulary and there is not lot of repetition	Some new vocabulary and few new expression	Student tends to repeat words all the time.
Presentation	Orderly and effectively	Orderly and little effectively	orderly	Not orderly
Body Language	Keep eye contact and aren't nerves expression	Keep eye contact and few nerves expression	Doesn't Keep eye contact and some nerves expression	Do not try to Keep eye contact and some nerves expression

9. SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Topic No.	Topic Title	Mapped CO % OR Emphasis	Distribution of Marks			
			Cognitive level			Total Marks
			Remember	Understand	Apply	
1	Thermal Insulation of Building	CO1	04	08	04	16
2	Ventilation, Air conditioning and Lighting	CO2	02	06	04	12
3	Damp proofing and Water Proofing	CO3	02	06	04	12
4	Acoustic & Sound Insulation	CO4	02	08	06	16
5	Termite Proofing and Fire protection of building & Home automation	CO5	04	08	00	12
6	Building Water Supply and Building Drainage	CO6	02	06	04	12
Total		--	**16**	**42**	**22**	**80**

10. SAMPLE MODEL QUESTION BANK FOR THEORY AND TEST EXAMINATIONS

S. No	Unit	Mapped CO	Cognitive level R/U/A	Question
1	1	CO1	R	Enlist different thermal insulating material.
2	1	CO1	U	Describe thermal balance equation..
3	1	CO1	A	Calculate heat gain and heat loss as per given data.

11. LEARNING RESOURCES

- **BOOKS**

Sr. No.	Title of Book	Author	Publication
1	Plumbing Design & Practice	S. Deolalikar	McGraw – Hill, New Delhi Tata.
2	Building Services	Prof. S. M. Patil	Patil Publication, Mumbai
3	A to Z of Practical bldg. & its management	Sandeep Mantri	Satya Prakshan , New Delhi.
4	Building Construction	Bindra & arora	Dhanpat Rai Publishing
5	Building Construction	Rangwala	Chorotor Publishing house, Anand.
6	National Building Code 2006	BIS	Bureau of Indian standards, New Delhi.

- **MAGAZINES**

Sr No	Name of Title
1	Indian Plumbing Today
2	Sourcing Hardware For a Complete Building Products Business
3	Better Homes and Gardens
4	Civil Engineering and Construction Review
5	New Building Materials and Construction World
6	The Master Builder
7	Architecture + Design

- **WEBSITES**

S. No.	Address
1	https://sanitaryware.org
2	https://www.slideshare.net
3	https://en.wikipedia.org
4	www.youtube.com

12. COURSE CURRICULUM DEVELOPMENT MEMBERS

S. No.	Name and Designation	Contact No.	Email
1	Prof. R. S. Kengale	9881293044	rskengale@rediffmail.com

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE -1

Diploma Programme	CIVIL		
Course Name	Geo Informatics	Course code	R18CE5107
Course Category	Specialised III	Credits	5

COURSE TEACHING, ASSESSMENT AND EVALUATION SCHEME:

Teaching scheme		Evaluation scheme									
		Direct assessment - Weightage - 80%									
		Theory outcome		Practical outcome							Total
				TERMWORK					PRACTICAL	ORAL	
Theory Allotted Hrs	Practical Allotted Hrs	ESE marks	TTA marks	TW marks	SW marks	AS marks	TU Marks	Total	Practical Marks	OR marks	Total marks
3	2	80	20	16	05	04	-	25	-	25@	150
		Indirect assessment – Weightage - 20%									
		Mid semester students feedback							End of the course survey		

End Semester Examination - ESE, Two tests average - TTA, Term Work - TW, Student Activity - SW, Assignments – AS, Tutorials - TU, Oral - OR, @ - Internal Oral

1. RATIONALE

In many instances civil engineer requires to decide about planning, design and execution of the project. Effective decisions cannot be made in absence of adequate information. To generate such information lot of spatial & attribute data is required. Much of such data can be collected reliably in stipulated time & cost by Remote Sensing (RS). This data is converted in to information & made available almost in no time to the managers' end through a Geographic Information System (GIS). Through this course students will be introduced to RS & GIS, the alternatives to conventional surveying and maps and very useful in resources planning & management.

2. EXPECTED PROFICIENCY

Carry out surveys for civil engineering works.

3. COURSE OUTCOMES (COs)

After completing this course Students will be able to

1. State the role of electromagnetic energy in remote sensing.
2. Explain the characteristics of RS platforms, sensors, programs & products.
3. Carry out image interpretation.
4. Use remote sensing products & systems.
5. Explain characteristics and role of every component of GIS.
6. Describe functions and applications of GIS.

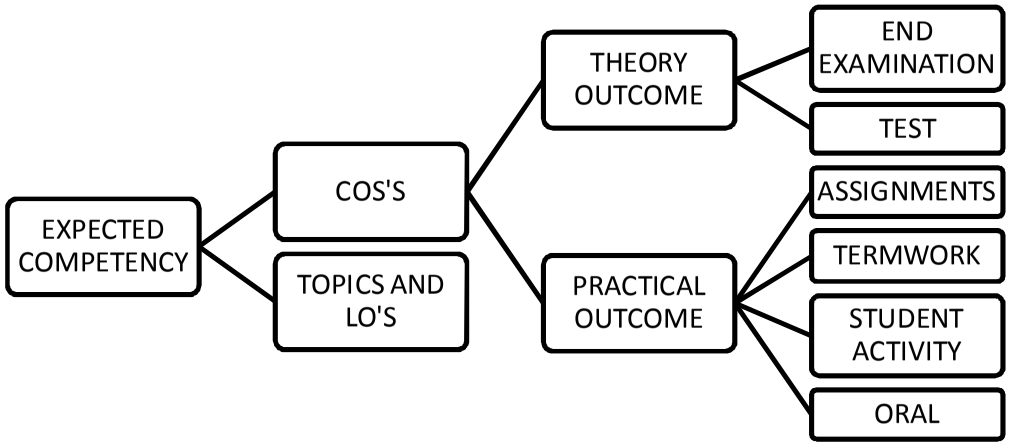
COURSE NAME	Geo Informatics	COURSE CODE	R18CE5107

4. CO –PO MATRIX

Course Name: Geo Informatics Course code: R18CE5107	PO 1 Basic and Discipline Specific knowledge	PO 2 Problem Analysis	PO 3 Design or Development of Solutions	PO 4 Engineering Tools, Experimentation and Testing	PO 5 Engineering Practices for Society, sustainability and Environment	PO 6 Project Management	PO 7 Life-Long Learning	PSO 1 Construction planning and detailing	PSO 2 Construction execution, supervision and maintenance
CO1	3			1					
CO2	3			1					
CO3	3	1		1		1			
CO4	3				1	1		1	
CO5	3			1			1		
CO6	2			3			1	1	

Rating scale **'3'** for high, '**2**' for medium, **'1'** for low **'0'** for no correlation

5. COURSE MAP



COURSE NAME	Geo Informatics	COURSE CODE	R18CE5107

6. DETAILED COURSE CONTENTS

Sr. No.	Unit Title Unit Outcomes (UOs)	Topics and Sub-topics	Marks	Hours	Mapped CO
1.	**Remote Sensing (RS) & Electromagnetic Energy** 1a. Define electromagnetic energy. 1b. State suitability of different bands of electromagnetic spectrum in remote sensing. 1c. Point out importance of interaction of EM energy with atmosphere. 1d. State the role interaction of EM energy in identification of earth objects. 1e. Draw spectral reflectance curve for water, vegetation & soil.	1.1 Electromagnetic energy. Electromagnetic spectrum. Spectral regions. Interaction of EM energy with atmosphere – Scattering, absorption & refraction. Atmospheric window. 1.2 Interaction of EM energy with earth objects – Reflection, emission, scattering, transmission & absorption. Fundamental equation of RS. 1.3 Identification of matter by electromagnetic energy. Spectral signature. Spectral signature for water, vegetation & soil.	12	7	CO1
2.	**RS Platforms, Sensors, Programs & Products** 2a. Differentiate the platforms for remote sensing. 2b. Classify the sensors for remote sensing. 2c. Compare the resolutions of the remote sensors. 2d. List the characteristics of RS satellite programs. 2e. Select remote sensing data products.	2.1 Platforms for remote sensing: Airborne – Balloons & aircrafts, Space borne – Geostationary & Sun synchronous satellites. 2.2 Remote sensors & their types. Commonly used sensors. Resolution of sensors. 2.3 RS satellite programs – Features & capabilities of LANDSAT, SPOT & IRS. 2.4 RS data products: Photographs - Black & white and coloured, false colour composites, mosaic & orthophoto. Digital images.	16	10	CO2
3.	**Interpretation of Remotely Sensed Images** 3a. List the aspects of photographic interpretations. 3b. Carry out geo-referencing of a RS image. 3c. Distinguish methods & keys of visual interpretation. 3d. Interpret the RS image visually. 3e. Describe activities in digital image processing.	3.1 Introduction. Aspects of photographic interpretations. Geo-referencing of RS images. 3.2 Visual interpretation: Methods to study RS images - Logical search & fishing Expedition. Photo interpretation keys - Selection & elimination. Elements of visual interpretation. 3.3 Digital Image processing – Rectification, enhancement, transformation & classification of an image. Data merging. Reference data or ground truth.	12	7	CO3
4.	**Applications of Remote Sensing** 4a. Describe the applications of remote sensing. 4b. State principal of LIDAR scanner survey.	4.1 Applications of Remote Sensing for - Land use & land cover mapping, Disaster management, resource inventory & management, mapping.	12	7	CO4

COURSE NAME	Geo Informatics	COURSE CODE	R18CE5107

Sr. No.	Unit Title Unit Outcomes (UOs)	Topics and Sub-topics	Marks	Hours	Mapped CO
	4c. Explain the mobile mapping system. 4d. List advantages & limitations of underground utility survey. 4e. Describe the methods of underground utility survey.	4.2 LIDAR Scanner survey – Introduction, principle, instrument, method to work with LIDAR Scanner, suitability of LIDAR scanner survey. Mobile mapping systems. 4.3 Underground utility survey – Introduction, necessity, advantages & limitations. Methods of underground utility survey – Inductive, acoustic & magnetic. Cable locators & Ground Probing Radar (GPR).			
5.	**Introduction to Geographic Information System** 5a. Define GIS and list its objectives. 5b. Describe the components of GIS. 5c. Differentiate spatial and aspatial data. 5d. Compare vector and raster data. 5e. Explain the process of management of aspatial data.	5.1 Introduction, definition & objectives of GIS. Components of GIS – People, procedure, hardware, software & data. Spatial & attribute data. 5.2 Spatial data models – Vector & Raster - capabilities, advantages, disadvantages. Forms of vector data – Points, lines & polygon. 5.3 Management of aspatial data. Database management system - Need, characteristics, functions, advantages, disadvantages & uses. Keys and data models in DBMS for GIS.	12	7	CO5
6.	**Functions & Applications of GIS** 6a. List the factors affecting selection of data. 6b. Describe functions of GIS. 6c. Select the methods of data analysis. 6d. Explain applications of GIS. 6e. State errors in and limitations of GIS.	6.1 Metadata & Factors affecting data selection. Data acquisition for GIS. 6.2 Functions of GIS – Inputting, manipulation, management, query & analysis and visualization. 6.3 Data analysis – Data, topological & cartographic modeling. Network analysis. Overlaying. Spatial statistics. 6.4 Applications of GIS – Elevation modeling. Slope, Inter visibility & Watershed analysis. Errors in GIS. Limitations of GIS.	16	10	CO6

7. PRACTICAL –SSIGNMENTS - STUDENT ACTIVITIES - TUTORIALS

Sr. No.	Practical (Student should perform all of following practicals)	Unit No.	Hours Allotted	Mapped CO
1.	Interpret given RS image visually.	3	4	CO3
2.	Locate a underground utility such as a electrical cable using active remote sensing instrument.	4	2	CO4
3.	Review features & capabilities of QGIS software.	5	2	CO5
4.	Utilize interface and tools in QGIS software.	5	4	CO5
5.	Create vector data set in GIS (By scanning, digitization & geo-referencing of paper map).	6	2	CO6
6.	Link attributes data set to a vector data set.	6	2	CO6
7.	Network/overlay/buffer or such other analysis on data set created in practical numbers 5 & 6.	6	4	CO6
-	**Total**	-	**20**	-

Sr. No.	Assignments	Unit No.	Hours Allotted	Mapped CO
1.	Study of important radiometric quantities, theories of electromagnetic energy and basic laws of radiation.	1	2	CO1
2.	Study of features & applicability of various latest remote sensing data products available with NRSA.	2	2	CO2
-	**Total**	-	**4**	-

Sr. No.	Student Activity	Unit No.	Hours Allotted	Mapped CO
1.	Visit to an office of a RS professional & submitting report of it.	4	2	CO4
2.	Collecting information about features & functionalities about commercial GIS software & submitting it along with term work.	5	2	CO5
3.	Arranging Expert's lecture on applications of GIS in Civil Engineering. Report on it shall be prepared & submitted along with term work.	6	2	CO6
-	**Total**	-	**6**	-

Sr. No.	Practical	Unit No.	Hours Allotted	Mapped CO
-	**Practical –assignments-student activities submission**	-	**2**	-
-	**Total**	--	**32**	-

Instructions:

1. Practical will be carried out in groups of students.
2. Each group will consist of about five students.
3. Each student from the group shall be given chance to handle the instrument, to understand the function of different components & use of the instrument.
4. Drawing, plotting should be considered as part of practicals.

Remarks:

1. The list of practicals/tutorials/student activities given above is suggestive. One or more such practicals/tutorials/student activities can be replaced with another or modified to attain the expected outcomes and proficiency more effectively.
2. The practicals/assignments/student activities should be so designed that students acquires outcomes in all domains - cognitive, psychomotor and affective.
3. Even though mainly outcomes in psychomotor domain are listed under practicals/assignments/student activities, it will also lead to development of outcomes in affective domain also.
4. The affective domain outcomes (social skills & attitudes) those will be developed through practicals/assignments/student activities includes – practice good housekeeping, maintain instruments & tools, demonstrate working as a team member & a leader and follow safety & ethical practices.
5. Acquisition of outcomes such as valuing, organizing and characterizing under affective domain will take place in the student gradually over three years of diploma program.
6. The skills associated with each of the practical/assignment/student activity are to be assessed using the 'Rubrics' given under 'Evaluation Scheme for Practicals/Assignments/Student Activities'.

8. EVALUATION SCHEME FOR PRACTICAL / ASSIGNMENTS / STUDENT ACTIVITIES

Rubrics for Practical

Category	4	3	2	1
Experimental procedure & handling of the instruments	Follows procedure as instructed and safe & correct handling of the instruments	Little oversight towards procedure, safety & handling of the instruments	Considerable oversight towards procedure, safety and handling of the instruments	Careless about the procedure safety & handling of the instruments.
Data documentation, data analysis & results interpretation	Correct Documentation of all data, Correct calculations and Error in result worked out correctly is within the limit	Correct documentation of majority of data, Minor errors in calculations and Error in results worked out correctly is not within the limit	Incorrect documentation of majority of data, Major errors in calculations and Error in result worked out incorrectly.	Incomplete & wrong documentation of data, Incomplete & wrong calculations and Error in result not worked out.
Team spirit	Contributes a fair share to work	Sometimes depends on others to complete the work	Many times depends on others to complete the work	Always depends on others to complete the work
Timely completion of activity	Maximum	Moderate	Satisfactory	Least
Overall understanding	Maximum	Moderate	Satisfactory	Least

Rubrics for Assignments

Category	4	3	2	1
Quantity & Source of information	All subtopics covered in detail & clear documentation of sources of information	All subtopics are mostly covered and clear documentation of sources of information with some missing links	Some of the subtopics are not covered in detail and part documentation of sources of information with some missing links	Some of the subtopics are not covered at all and part documentation of sources of information with too many missing links
Quality of information, graphics and presentation.	Clear description with all supporting details, relevant & neat graphics and well structure presentation.	Clear description with some supporting details, relevant but messy graphics. and structured presentation.	Clear description with no supporting details, neat but irrelevant graphics and structured presentation with missing links.	Irrelevant description, irrelevant & messy graphics and unstructured presentation.
Understanding of concepts and mistakes	Complete understanding and no mistakes	Substantial understanding and 90 % Free of mistakes	Some understanding and 75 % free of mistakes	Limited understanding and 50 % free of mistakes
Timely completion of activity	Maximum	Moderate	Satisfactory	Least
Overall understanding	Maximum	Moderate	Satisfactory	Least

Rubrics for Student Activities

Category	4	3	2	1
Leadership qualities	Assume the role willingly & demonstrate ability fully	Assume the role willingly but demonstrate ability partly	Assume the role unwillingly though demonstrate ability fully	Assume the role unwillingly & demonstrate ability partly
Planning & Execution	Proper planning & execution	Proper planning but improper execution	Improper planning but proper execution	Improper planning & execution
Quality of report, graphics and presentation.	Clear description with all supporting details, relevant & neat graphics and well structure presentation.	Clear description with some supporting details, relevant but messy graphics. and structured presentation.	Clear description with no supporting details, neat but irrelevant graphics and structured presentation with missing links.	Irrelevant description, irrelevant & messy graphics and unstructured presentation.
Timely completion	Maximum	Moderate	Satisfactory	Least
Overall understanding	Maximum	Moderate	Satisfactory	Least

Rubrics for Oral

Category	4	3	2	1
Knowledge of Course content	Accurately states the main points and details in answer to the question.	Adequately states the main points and details in answer to the question.	States most of the main points but miss out details in answer to the question.	States few main points and details in answer to the question.

Category	4	3	2	1
Delivery	Effectively and creatively delivers the information while staying on topic and considering the audience	Adequately delivers the information while staying on the topic and considering the audience.	Delivers the information but does not stay on topic. Little consideration on audience.	Little or no attempt is made to deliver the information and stay on topic.
Vocabulary	Wide range of vocabulary and there is no repetition.	Quite Wide range of vocabulary and there is not lot of repetition	Some new vocabulary and few new expression	Student tends to repeat words all the time.
Body Language and eye contact	Good straight posture and eye contact.	Most of the times straight posture and moderate eye contact	Occasionally straight posture and little eye contact	Plump posture and very little eye contact

9. MAJOR EQUIPMENT/ INSTRUMENTS /TOOLS REQUIRED

Sr. No.	Equipment Name with Specifications	Practical
1	Remotely sensed images	1
2	Cable Locator	2
3	Computers & its peripherals	3 to 7
4	QGIS software	3 to 7

10. SPECIFICATION TABLE FORQUESTION PAPER DESIGN

Topic No.	Unit Title	Mapped CO% OR Emphasis	Distribution of Marks			
			Cognitive level			Total Marks
			Remember	Understand	Apply	
I	Remote Sensing (RS) & Electromagnetic Energy	CO1	4	4	4	12
II	RS Platforms, Sensors, Programs & Products	CO2	4	4	8	16
III	Interpretation of Remotely Sensed Images	CO3	4	4	4	12
IV	Applications of Remote Sensing	CO4	4	4	4	12
V	Introduction to Geographic Information System	CO5	4	4	4	12
VI	Functions & Applications of GIS	CO6	4	4	8	16
Total			**24**	**24**	**32**	**80**

Note: *This specification table shall be used as general guide lines to assist students for learning and to assist teachers for teaching and assessment. The actual distribution of marks in the question paper may vary from the above table.*

11. SAMPLE MODEL QUESTION BANK FOR THEORY AND TEST EXAMINATIONS

Sr. No.	Unit	Mapped CO	Cognitive level R/U/A	Question
1	6	CO6	R	Illustrate factors affecting selection of data for GIS.
2	6	CO6	U	Explain manipulation as function of GIS.
3	6	CO6	A	Prepare brief note on application of GIS in watershed analysis.

12. LEARNING RESOURCES

- **BOOKS**

Sr. No.	Title of Book	Author	Publication
1	Surveying, Vol . III	Dr. B. C. Punmia,	Laxmi Publications, Delhi ISBN 10: 8170088259 ISBN 13: 9788170088257
2	Surveying, Vol. II	Dr. K. R. Arora	Standard Book house, Delhi. ISBN:978-81-89401-24-5
3	Surveying, Vol. II	S. K. Duggal	The Tata McGraw Hill Co., Delhi ISBN 13: 978-0-07-053471-1 ISBN 10: 0-07-053471-3
4	Surveying	A. Bannister, S. Raymond & R. Baker	Pearson Education, Delhi. ISBN 81-317-0066-6
5	Higher Surveying	Dr. A. M. Chandra	New Age International, Delhi. ISBN 10: 8122438121, ISBN 13: 9788122438123
6	Advanced Surveying	Shelar, Mali, Patil	Nirali Prakashan, Pune. 978-93-5164-351-7
7	Fundamentals of RS	George Joseph	University Press (I), Hyderabad. ISBN 978 93 86235 46 6
8	Principles of Remote Sensing	Paul J. Curran	Longman Scientific & Technical, Hongkong. ISBN-13: 978-0582300972 ISBN-10: 0582300975
9	Remote Sensing and Image Interpretation	T. M. Lillesand, R. W. Kiefer & J. W. Chipman	John Willey and Sons (Asia) Pvt. Ltd., New Delhi. ISBN: 978-1-118-34328-9
10	Textbook of RS and GIS	Anji Reddy, M.	BS Publications, Hyderabad. ISBN 10: 9381075972 ISBN 13: 9789381075975
11	Remote Sensing & GIS	Basudeb Bhatiya	Oxford University Press, ISBN: 9780198072393
12	An Introduction to GIS	Ian Heywood	Pearson Education Asia ISBN-13: 978-0273722595 ISBN-10: 027372259X
13	Fundamentals of GIS	D. Chakraborthy & R. Sahoo	Viva Books, Delhi ISBN-10: 8130900416 ISBN-13: 978-8130900414

Sr. No.	Title of Book	Author	Publication
14	Principles of GIS	P. A. Burrough, R. A. McDonnell	Oxford University Press ISBN: 9780198742845
15	Concept & Techniques of GIS	Lo & Yeung	Prentice Hall of India, Delhi. ISBN-13: 978-0131495029 ISBN-10: 013149502X
16	Learning & Using GIS	W. Gorr & K. Kurland	Cengage Learning (I), Delhi. ISBN-13: 978-1418835583 ISBN-10: 1418835587
17	The GIS Book	George B. Korte	OnWord Press U.S. ISBN-10: 1566900476 ISBN-13: 978-1566900478

- **SOFTWARE/ TOOLS/ MODELS**

Sr. No.	Name	Company	Freeware/commercial
1	QGIS – An open source GIS software.	--	Freeware

- **WEBSITES**

Sr. No.	Address
1	www.nrsa.gov.in
2	www.remotesensing.org
3	www.iirs-nrsa.gov.in
4	www.gisdevelopment.com
5	www.surveyofindia.gov.in
6	www.wikipedia.com

13. COURSE CURRICULUM DEVELOPMENT MEMBERS

S. No.	Name and Designation	Contact No.	Email
1	Prof. A. S. Shelar	9423558189	ani_shel@yahoo.com

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE -1

Diploma Programme	CIVIL		
Course Name	Earthquake Engineering	Course code	R18AM5110
Course Category	Specialized III	Credits	5

COURSE TEACHING, ASSESSMENT AND EVALUATION SCHEME:

Teaching scheme		Evaluation scheme									
		Direct assessment- Weightage = 80%									
		Theory outcome		Practical outcome					Practical	Oral	Total
Theory Allotted hrs	Practical Allotted hrs	ESE marks	TTA marks	TW marks	SW Marks	AS marks	TU marks	TW Total	Practical Marks	OR marks	Total marks
3	2	80	20	20	05	--	--	25	-	@25	150
		Indirect assessment- Weightage - 20%									
		Mid semester students feedback				End of the course survey					

End semester examination-ESE, Two tests average-TTA, Term Work- TW, Student Activity-SW, Assignments –AS, Tutorials- TU, Oral -OR

1. RATIONALE

This course is the specialized subject for Civil Engineering. The students having interest in structural engineering and perceive career in this field have a better option to choose this course. Earthquake is a natural disaster phenomenon which could not be denied but its impact on the structure can be reduced by proper analysis and design to minimize loss of property and lives. In recent past, a major part of the peninsular India experienced earthquakes periodically; therefore study of earthquake engineering is introduced in the curriculum of final year civil engineering diploma students.

2. EXPECTED PROFICIENCY

The aim of this course is to help the student to attain the following industry identified competency through implementing Indian Standard codal provisions for construction of Earthquake Resistant Buildings.

3. COURSE OUTCOMES (COs)

Students will be able to

1. Explain the terminology and concepts used in earthquake engineering discipline.
2. Determine the intensity of the earthquake based on the causes of earthquake in the given site condition.
3. Prepare the plan of the building for seismic sustainability in the given situation.
4. Predict the failure pattern of the building due to construction defect.
5. Supervise construction of masonry building to improve seismic behaviour.
6. Implement various codal provisions for construction of buildings.
7. Implement safety precautions in pre and post earthquake situations to minimize loss and restore public utility services.

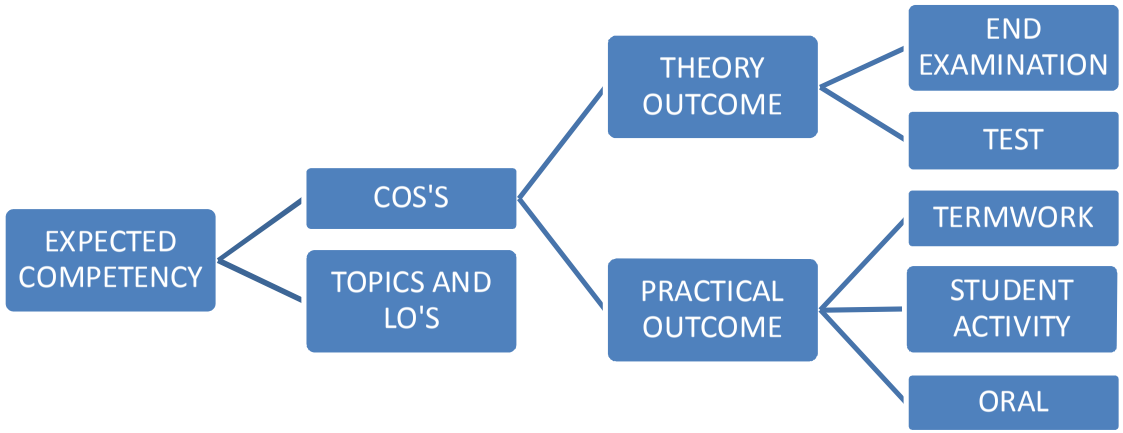
COURSE NAME	Earthquake Engineering	COURSE CODE	R18AM5110

4. CO –PO MATRIX

Course Name: Earthquake Engineering Course Code: R18AM5110	PO 1 Basic and Discipline specific knowledge	PO 2 Problem analysis	PO 3 Design/ development of solutions	PO 4 Engineering Tools, Experimentation and Testing	PO 5 Engineering practices for society, sustainability and environment	PO 6 Project Management	PO 7 Life-long learning	PSO 1 Construction planning and detailing	PSO 2 Construction execution, supervision and maintenance
CO1	2	3	2						
CO2	3	3							
CO3		3			3	2	3	1	
CO4		2	3						
CO5		3	2	2					1
CO6				3					

Rating scale '**3'** for high, '**2**' for medium, **'1'** for low **'0'** for no correlation

5. COURSE MAP



COURSE NAME	Earthquake Engineering	COURSE CODE	R18AM5110

6. DETAILED COURSE CONTENTS

S. No.	Unit Outcomes (UOs)	Topics and Sub-topics	Marks	Hours	Mapped CO
1	**Unit I: Introduction to earthquake engineering** 1a. Define various terms. 1b. Explain seismic waves 1c. Identify appropriate Seismic zone from zone map.	1.1 Definition and meaning of terms: Focus, Epicenter, Focal depth, foreshocks, aftershocks, magnitude & intensity of Earthquake. Seismic waves, Body waves. 1.2 Natural period, fundamental natural period, nodal natural period, response spectrum, seismic mass, seismic weight, structural response factor, time history analysis, earthquake zones, zone map, zero period acceleration. 1.3 Measurement of earthquake shaking & its working principle, Richter scale.	16	8	CO1
2	**Unit-II : Causes and effects of earthquake** 2a. Explain formation of earth and movement of tectonic plates. 2b. Describe damage to the buildings and water bodies due to earthquake.	2.1 Formation of earth and its cores. Formation, types & movement of tectonic plates, Elastic rebound theory, Types of earthquake & Faults. 2.2 Ground shaking, Ground failure, Tsunami and fire.	12	8	CO2
3	**Unit-III : General planning and design aspects** 3a. Explain different terms for earthquake resistant building 3b. Draw various stable geometric shapes of buildings 3c. Select appropriate site for earthquake resistant building	3.1 Terminology for Earthquake resistant Building: Base, base dimensions, centre of mass, centre of stiffness, design eccentricity, design seismic base shear (V_b), diaphragm, storey drift, storey shear, weak storey 3.2 Plan of Building- symmetry, regularity, separation of blocks, simplicity, enclosed area, separate building for different functions, soft storey effect 3.3 Choice of site- Stability of slopes, loose sand	12	6	CO3
4	**Unit-IV : Concrete and masonry buildings** 4a. Enlist different causes of failure of buildings. 4b. Estimate damage to brick masonry buildings. 4c. Estimate damage to stone masonry buildings. 4d. Implement general rules to improve seismic behavior of masonry buildings.	4.1 Typical damage and failure of brick masonry, causes of damages in brick masonry. 4.2 Damage to buildings: Sliding of roof of support, falling of infill walls, crushing of column ends, diagonal cracking of column beam joints, pulling out of reinforcement bars, foundation sinking and tilting. 4.3 Typical damage and failure of stone masonry, causes of	12	8	CO4

COURSE NAME	**Earthquake Engineering**	COURSE CODE	**R18AM5110**

S. No.	Unit Outcomes (UOs)	Topics and Sub-topics	Marks	Hours	Mapped CO
		damages in stone masonry 4.4 Precautions to improve earthquake resistance of masonry buildings: mortar, wall enclosure, openings in walls, masonry bond, horizontal bands, section of bands, dowels at corners and junctions, vertical reinforcement in walls			
5	**Unit-V: Codal provisions and design philosophy** 5a. Implement general provisions for construction of earthquake resistant building. 5b. Check reinforcements in different structural elements. 5c. Estimate base shear for simple building frames.	5.1 IS: 1893 (part I)-2002: General provisions and principles for design of earthquake resistant buildings. 5.2 IS:13920-1993 Ductile detailing of RCC structures subjected to seismic forces: Sketches with reinforcement details of columns, beams and beam to column connections showing longitudinal steel , splicing of steel, transverse steel, stirrups. 5.3 Determination of design base shear using equivalent static lateral force method, distribution of design base shear.	16	10	CO5
6	**Unit-VI: Disaster management in earthquake situation** 6a. Implement safety measures for buildings to minimize damage. 6b. Maintain and restore public utility services. 6c. Take steps to enhance earthquake resistant of existing buildings and new construction from past learning.	6.1 Guidelines for Earthquake preparedness: Individual, Home and community planning 6.2 Post earthquake handling of building, Lifelines, Roads, Bridges, communication systems, electricity, water distribution systems 6.3 Learning from Prominent past earthquakes in India: Koyna, Killari(Latur), Jabalpur, Bhuj.	12	6	CO6

7. ASSIGNMENTS-STUDENT ACTIVITIES

S. No.	Term Work (Assignments)	Topic No.	Hours Allotted	Mapped CO
1	Define Focus, Epicenter, Focal depth, foreshocks, aftershocks, magnitude and intensity of Earthquake, Seismic waves, Body waves. Explain Richter's scale.	1	4	CO1
2	State the earthquake zones with zone map and state any four cities in India in each earthquake zone. List out the causes and damages that can be occurred in the masonry and concrete structures due to earthquake.	2	4	CO2
3	List out the repairing methods for framed buildings against earthquake damages. Check the plan of any one structure for suitability against earthquake.	3	4	CO3
4	Decide the structural sustainability of existing masonry structure against earthquake shocks. Decide the structural sustainability of existing framed structure against earthquake shocks	4	4	CO4
5	Draw typical sketches of beam, column and beam to column junction showing reinforcement details as per I.S. 13920-1993. State and explain various methods to determine earthquake forces as per Indian standard	5	4	CO5
6	Enumerate the damages occurred to the structures during Killari and Bhuj earthquakes. List out the retrofitting methods to improve seismic behavior of masonry structures.	6	4	CO6
--	**Total**	--	**24**	--

S. No.	Student activity	Topic No.	Hours Allotted	Mapped CO
1	Preparation of report based on site visit	1	4	CO1

S. No.	Practical	Topic No.	Hours Allotted	Mapped CO
--	**Assignments-student activities submission**	--	**4**	--
--	**Total**	--	**32**	--

8. EVALUATION SCHEME FOR PRACTICAL / ASSIGNMENTS/STUDENT ACTIVITIES

Rubrics for Assignments

Category	4	3	2	1
Structure	Very Well Structured	Well Constructed	Structured But Missing Links	Unstructured
Understanding of Analytical Concepts	Complete Understanding	Substantial Understanding	Some Understanding	Limited Understanding
Mathematical Errors	Least Errors	90 % Free of Errors	75 % Free of Errors	50 % Free of Errors
Graphics	Neat ,Accurate And Enhance Understanding	Neat And Accurate	Some Illustrations Are Misleading And Redundant	Least Accurate And Not Neat
Timely Completion of Activity	Maximum	Moderate	Satisfactory	Least

COURSE NAME	Earthquake Engineering	COURSE CODE	R18AM5110

Category	4	3	2	1
Overall Understanding	Maximum	Moderate	Satisfactory	Least

9. SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Topic No.	Topic Title	Teaching Hours	Distribution of Marks			
			Cognitive level			Total Marks
			Remember	Understand	Apply	
1	Introduction to earthquake engineering	10	4	4	8	16
2	Causes and effects of earthquake	06	4	4	4	12
3	General planning and design aspects	08	4	4	4	12
4	Concrete and masonry buildings	10	4	4	8	16
5	Codal provisions and design philosophy	08	4	4	4	12
6	Disaster management in earthquake situation	06	4	4	4	12
Total		**48**	**24**	**24**	**32**	**80**

10. SAMPLE MODEL QUESTION BANK FOR THEORY AND TEST EXAMINATIONS

S. No	Topic	Mapped CO	Cognitive level R/U/A	Question
1	1	CO1	R	Define: Focus, Epicenter, Focal depth.
2	1	CO1	U	Explain various types of seismic waves.
3	1	CO1	A	Show different earthquake zones in the map of India.

11. LEARNING RESOURCES

- **BOOKS**

Sr. No.	Title of Book	Author	Publication
1	Earthquake Resistant Design of Structures	Pankaj Agarwal and Manish Shrikhande	Prentice Hall of India ISBN-10 8120328922 ISBN-13 9788120328921
2	Elements of Earthquake Engineering	Jai Krishna, A. R. Chandrashekharan and B. Chandra	South Asian Publishers Pvt Ltd. ISBN-10 8170031834 ISBN-13 9788170031833
3	A Textbook of Earthquake Resistant Structure	Dr. S. M. Dumne	Nikita Publication Latur ISBN 978-93-85124-09-9
4	Earthquake Resistant Design of Structures	Duggal S. K.	Oxford University Press ISBN10 0198083521 ISBN-13 9780198083528

- **I. S. Codes**

1	IS:1893(Part I):2002 ,Indian Standard Criteria for Earthquake Resistant Design of Structures- General Provisions and Buildings , BIS, New Delhi.
2	IS: 13920:1993 Ductile Detailing of Reinforced Concrete Structures subjected to Seismic forces-Code of Practice, BIS, New Delhi.
3	IS:456:2000 - Plain and Reinforced concrete code of Practice
4	IS: 875 (Part 1-5) - 1987 code of practice of design loads for Buildings and structures
5	IS:13935- Repair and seismic strengthening of building: Guidelines

- **WEBSITES**

S. No.	Address
1	www.nptel.iitm.ac.in
2	https://youtu.be/uBMqJMXhs4M
3	https://youtu.be/n0_LNyfQTJg
4	www.tn.gov.in/tsunami/digitallibrary/ebooks
5	https://www.nicee.org/EQTips.php

12. COURSE CURRICULUM DEVELOPMENT MEMBERS

S. No.	Name and Designation	Contact No.	Email
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