Punyashlok Ahilyadevi Holkar Solapur University, Solapur

पुण्यश्लोक अहिल्यादेवी होळकर
सोलापूर विद्यापीठ
।। विद्यया संपन्नता ।।

NAAC Accredited-2015
'B' Grade (CGPA 2.62)

Name of the Faculty: Science & Technology

CHOICE BASED CREDIT SYSTEM

Syllabus Structure: B. Tech. (Civil Engineering)

S.Y. B.Tech (Civil Engineering) w.e.f. Academic Year 2021-22

T.Y. B.Tech (Civil Engineering) w.e.f. Academic Year 2022-23

Final Year B. Tech (Civil Engineering) w.e.f. Academic Year 2023-24

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

FACULTY OF SCIENCE & TECHNOLOGY

B. Tech. Civil Engineering

Program Educational Objectives (PEOs):

1. Graduates will demonstrate peer-recognized technical competency in the analysis,design and construction of Civil Engineering Structures.

2. Graduates will demonstrate leadership and initiative to advance professional and organizational goals with commitment to ethical standards of profession, teamwork and respect for diverse cultural background.

3. Graduates will be engaged in ongoing learning and professional developmentthrough pursuance of higher education and self-study.

4. Graduates will be committed to create practice of engineering and other professionals in a responsible manner contributing to the socio-economic development of the society.

Program Outcomes (POs)

B. Tech. Civil Engineering

(A) PROGRAM OUTCOME (POs)

The program outcomes of B. Tech. Civil Engineering Program are as following:

1. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/development of solutions**: Design solutions for complex engineering problems anddesignsystemcomponentsorprocessesthatmeetthespecifiedneedswithappropriateconsi deration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct investigations of complex problems**: User research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and teamwork**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project management and finance**: Demonstrate knowledge and understanding of theengineeringandmanagementprinciplesandapplythesetoone'sownwork, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES (PSOs)
B. Tech. Civil Engineering

The program specific outcomes of B. Tech. Civil Engineering Program are as following:

1) Students will be able to survey, conduct geo-technical investigations, plan, analyze, design, estimate and construct residences, public buildings, industrial buildings, townships and infrastructural projects by adopting appropriate construction methods.

2) Students will be able to analyze and design the water resources systems, municipal and industrial waste treatment plants with due consideration to pollution free environment.

3) Students will be able to use appropriate application software, develop skills necessary for professional practice as a Civil Engineer and prepare themselves for education & for Public service commissions

PUNYASHLOK AHILYADEVI HOLKAR

SOLAPUR UNIVERSITY, SOLAPUR FACULTY OF ENGINEERING & TECHNOLOGY

CBCS Curriculum for First Year B. Tech. (All Branches)

W.E.F. 2020-21

Semester I : Theory Courses

Course Code	*Name of the Course*	*Engagement Hours*			*Credits*	*FA*	*SA*		*Total*
		L	*T*	*P*		*ESE*	*ISE*	*ICA*	
C011/ C012	Engineering Physics / Engineering Chemistry	3			3	70	30		100
C112	Engineering Mathematics-I	3			3	70	30		100
C113	Basics of Civil and Mechanical Engineering	4			4	70	30		100
C114	Engineering Mechanics	3			3	70	30		100
C115	Universal Human Values	2			2	50			50
C116	Communication Skills	1			1		25		25
Total		**16**			**16**	**330**	**145**		**475**

Semester I: Laboratory / Tutorial Courses

Course Code	*Name of the Course*	*Engagement Hours*			*Credits*	*FA*	*SA*		*Total*
		L	*T*	*P*		*ESE*	*ISE*	*ICA*	
C011/ C012	Engineering Physics / Engineering Chemistry $			2	1			25	25
C112	Engineering Mathematics-I		1		1			25	25
C113	Basics of Civil and MechanicalEngineering @			2	1			25	25
C114	Engineering Mechanics			2	1			25	25
C116	Communication Skills			2	1			25	25
C117	Creativity & Design Thinking			2	1			50	50
C118	Workshop Practice			2	1			50	50
Total				**12**	**7**			**225**	**225**
Grand Total		**16**	**1**	**12**	**23**	**330**	**145**	**225**	**700**
C119	Induction Program	*** Please see note below*							

Semester II: Theory Courses

Course Code	*Name of the Course*	*Engagement Hours*			*Credits*	*FA*	*SA*		*Total*
		L	*T*	*P*		*ESE*	*ISE*	*ICA*	
C011/ C012	Engineering Physics / Engineering Chemistry $	3			3	70	30		100
C122	Engineering Mathematics - II	3			3	70	30		100
C123	Basic Electrical & Electronics Engineering	3			3	70	30		100
C124	Programming for problem solving	2			2		25		25
C125	Engineering Graphics and CAD	2			2	70	30		100
C126	Professional Communication	1			1		25		25
Total		**14**			**14**	**280**	**170**		**450**

Semester II: Laboratory / Tutorial Courses

Course Code	*Name of the Course*	*Engagement Hours*			*Credits*	*FA*	*SA*		*Total*
		L	*T*	*P*		*ESE (POE)*	*ISE*	*ICA*	
C011/ C012	Engineering Physics / Engineering Chemistry$			2	1			25	25
C122	Engineering Mathematics- II		1		1			25	25
C123	Basic Electrical & Electronics Engineering			2	1			25	25
C124	Programming for problem solving			4	2	50#		50	100
C125	Engineering Graphics and CAD			4	2			50	50
C126	Professional Communication			2	1			25	25
	Total			**14**	**8**	**50**		**200**	**250**
Grand Total		**14**	**1**	**14**	**22**	**330**	**170**	**200**	**700**
C127	Democracy, Elections and Good Governance *					**50**			**50**

Legends used–

L Lecture
T Tutorial
P Lab Session

FA Formative Assessment
SA Summative Assessment
ESE End Semester Examination
ISE In Semester Evaluation
ICA Internal Continuous Assessment

Notes-

1. $ - Indicates approximately half of the total students at F. Y. will enroll under Group A and remaining will enroll under Group B.

   Group A will take up course of Engineering Physics (theory & laboratory) in Semester I and will take up course of Engineering Chemistry (theory & laboratory) in semester II.

   Group B will take up course of Engineering Chemistry (theory & laboratory) in Semester I and will take up course of Engineering Physics (theory & laboratory) in semester II.

2. # - Indicates the subject 'Programming for Problem Solving' shall have a University 'Practical andOral Examination' at the end of the semester assessing student's programming skills.

3. @ - For the Course (C113) Basics of Civil and Mechanical Engineering, Practicals of Basics of Civil Engineering and Basics of Mechanical Engineering will be conducted in alternate weeks.

4. In Semester Evaluation (ISE) marks shall be based upon student's performance in minimum two tests& mid-term written test conducted & evaluated at institute level.

   Internal Continuous Assessment Marks (ICA) are calculated based upon student's performance during laboratory sessions / tutorial sessions.

5. *- Democracy, Elections & Good Governance is mandatory course. The marks earned by student with this course shall not be considered for calculation of SGPA/CGPA. However, student must complete End Semester Examination (ESE) of 50 marks (as prescribed by university) for fulfillment of this course. This course is not considered as a passing head for counting passing heads for ATKT. However, student must pass this subject for award of the degree.

6. Student must complete induction program of minimum five days before commencement of the regular academic schedule at the first semester.

GUIDELINES FOR INDUCTION PROGRAM (C119)

New entrants into an Engineering program come with diverse thoughts, mind set and different social, economic, regional and cultural backgrounds. It is important to help them adjust to the new environment and inculcate in them the ethos of the institution with a sense of larger purpose.

An induction program for the new UG entrant students is proposed at the commencement of the first semester. It is expected to complete this induction program before commencement of the regular academic schedule.

Its purpose is to make new entrants comfortable in their new environment, open them up, set a healthy daily routine for them, create bonding amongst the peers as well as between faculty and students, develop awareness, sensitivity and understanding of theself, people around them, society at large, and nature.

The Induction Program shall encompass (but not limited to) below activity –

1. Physical Activities
2. Creative Arts
3. Exposure to Universal Human Values
4. Literary Activities
5. Proficiency Modules
6. Lectures by Experts / Eminent Persons
7. Visit to Local Establishments like Hospital /Orphanage
8. Familiarization to Department

Induction Program Course do not have any marks or credits however performance of students for Induction Program is assessed at institute level using below mandatory criteria –

1. Attendance and active participation
2. Report writing

PUNYASHLOK AHILYADEVI HOLKAR SOLAPUR UNIVERSITY, SOLAPUR
Faculty of Science & Technology
Credit System structure of S. Y. B. Tech. Civil Engg. - I, Semester- III, (W.E.F. 2021-2022)

Course Code	Theory Course Name	Hrs./week				Credits	Examination Scheme				
		L	T	P	D		ISE	ESE		ICA	Total
CE 31 C	Surveying & Geomatics	3	-	-	-	3	30	70		-	100
CE32C	Fluid Mechanics and Fluid Machines	3	-	-	-	3	30	70		-	100
CE33C	Concrete Technology, Material Testing & Evaluation	2	-	-	-	2	30	70		-	100
CE34C	Building Construction & Drawing	2	-	-	-	2	30	70		-	100
CE35C	Structural Mechanics-I	3	-	-	-	3	30	70		-	100
	Total	**14**	**-**	**_**	**-**	**13**	**150**	**350**		**-**	**500**
	Laboratory/Drawings							**POE**	**OE**		
CE36L	Surveying & Geomatics	-	-	2	-	1	-	50	-	25	75
CE37L	Fluid Mechanics and Fluid Machines	-	-	2	-	1	-	25	-	25	50
CE38L	Concrete Technology, Material Testing & Evaluation	-	-	2	-	1	-	-	-	25	25
CE39L	Building Construction & Drawing	-	-	-	2	1	-	-	-	25	25
CE 410 L	Lab Practice	-	-	2	-	1	-	-	-	25	25
	Total	**-**	**-**	**8**	**-**	**5**	**-**	**75**		**125**	**200**
	Grand Total	**14**	**1**	**8**	**2**	**18**	**150**	**425**		**125**	**700**
	Environmental Science	1	–	–	-	–	–	–		–	–

Abbreviations: L- Lectures, P –Practical, T- Tutorial, D- Drawing, ISE -Internal Tests, ESE - University Examination (Theory &/ POE &/Oral examination), ICA- Internal Continuous Assessment.

Note:

(1) The number of students in a practical/Tutorial batch shall be 20. New batch shall be formed if the number of remaining students (after forming batches of 20) exceeds 9.

(2) Internal Continuous Assessment (ICA): ICA shall be a continuous process based on the performance of the student in assignments, class tests, quizzes, attendance and interaction during theory and lab sessions, journal writing, report presentation etc., as applicable

(3) Student is required to study and pass Environmental Science subject in Second Year of B. Tech. Civil Engineering to become eligible for award of degree.

PUNYASHLOK AHILYADEVI HOLKAR SOLAPUR UNIVERSITY, SOLAPUR
Faculty of Science & Technology
Credit System structure of S. Y. B. Tech. Civil Engg.- II, Semester – IV, W. E.F. 2021-2022

Course Code	Theory Course Name	Hrs./week				Credits	Examination Scheme				
		L	T	P	D		ISE	ESE		ICA	Total
CE41C	Environmental Engineering-I	3	-	-	-	3	30	70		-	100
CE42C	Building Planning & Design	2	-	-	-	2	15	35		-	50
CE43C	Structural Mechanics-II	3	1	-	-	4	30	70		25	125
CE44B	Engineering Mathematics-III	3	1	-	-	4	30	70		25	125
CE45B	Engineering Geology	2	-	-	-	2	30	70		-	100
	Total	**13**	**2**	**-**	**-**	**15**	**135**	**315**		**50**	**500**
	Laboratory/Drawings:							**POE**	**OE**		
CE46L	Environmental Engineering-I	-	-	2	-	1	-	-	-	25	25
CE47L	Building Planning & Design	-	-	-	2	1	-	50	-	25	75
CE48L	Computer Programming & Numerical Methods	2	-	2	-	3	-	50	-	25	75
CE49L	Engineering Geology	-	-	2	-	1	-	25	-	25	50
	Total	**2**	**0**	**6**	**2**	**7**	**-**	**125**		**100**	**225**
	Grand Total	**15**	**2**	**6**	**2**	**22**	**135**	**440**		**150**	**725**
	Environmental Science	1	–	–		–	–	–		–	–

Abbreviations: L- Lectures, P –Practical, T- Tutorial, D- Drawing, ISE -Internal Tests, ESE - University Examination (Theory &/ POE &/Oral examination), ICA- Internal Continuous Assessment.

Note:

(1) The number of students in a Practical/Tutorial batch shall be 20. New batch shall be formed if the number of remaining students (after forming batches of 20) exceeds 9.

(2) Internal Continuous Assessment (ICA): ICA shall be a continuous process based on the performance of the student in assignments, class tests, quizzes, attendance and interaction during theory and lab sessions, journal writing, report presentation etc., as applicable.

(3) Student is required to study and pass Environmental Science subject in Second Year of B. Tech. Civil Engineering to become eligible for award of degree.

PUNYASHLOK AHILYADEVI HOLKAR SOLAPUR UNIVERSITY, SOLAPUR
Faculty of Science & Technology
Credit System structure of T. Y. B. Tech. Civil Engg.- I, Semester- V, (Revised from 2022-2023)

Course Code	Theory Course Name	Hrs./week				Credits	Examination Scheme				
		L	T	P	D		ISE	ESE		ICA	Total
CE51C	Design of Steel Structures	3	-	-	-	3	30	70		-	100
CE52C	Geotechnical Engineering	3	-	-	-	3	30	70		-	100
CE53C	Highway and Tunnel Engineering	3	-	-	-	3	30	70		-	100
CE54C	Hydrology and Water Resources Engineering	3	-	-	-	3	30	70		-	100
CE55C	Design of Concrete Structures I	3	-	-	-	3	30	70		-	100
CE56 C	Environmental Engineering-II	3	-	-	-	3	30	70		-	100
SL-5	HSS Course – Elective (Self Learning mode)	-	-	-	-	1	-	50		-	50
	Total	**18**	**-**	**-**	**-**	**19**	**180**	**470**		**-**	**650**
	Laboratory/Drawings							**POE**	**OE**		
CE57L	Geotechnical Engineering	-	-	2	-	1	-	25	-	25	50
CE58L	Highway & Tunnel Engineering	-	-	2	-	1	-	-	-	25	25
CE59L	Planning & Design of Public Building	1	-	-	2	2	-	50	-	25	75
CE510L	Environmental Engineering-II	-	-	2	-	1	-	-	25	25	50
	Total	**1**	**-**	**6**	**2**	**5**	**-**	**100**		**100**	**200**
	Grand Total	**19**	**-**	**6**	**2**	**24**	**180**	**570**		**100**	**850**

Abbreviations: L- Lectures, P –Practical, T- Tutorial, D- Drawing. *- Alternate week, ISE -Internal Tests, ESE – University Examination (Theory &/ POE &/Oral examination), ICA- Internal Continuous Assessment.

Note:- Students shall undergo a field training of 15 days in the winter vacation after T.Y. B. Tech Part I and submit the field training report, which shall be assessed by faculty associated with 'Principles of Management and Quantitative Techniques', in T.Y. B. Tech. Part II.

1) Self-Learning Module- I at T.Y. B. Tech. Civil Engineering, Semester – I:

(A) Student can select & enroll a 'Self Learning Module- I' (HSS) Course from following list

SL31- A:- Self Learning Module – I (HSS)

No	Course title
1	Economics
2	Intellectual Property Rights for Technology Development and Management
3	Introduction to Sociology
4	Stress and Coping
5	Professional Ethics & Human Value

OR

(B) Student can select and enroll for minimum eight weeks NPTEL HSS course SL31-(B), complete its assignments, and appear for certificate examination conducted by NPTEL. The list of courses as shown in Table SL31-(B) will be updated from time to time by Institute. Latest updated list will be valid for selection of self learning Module-I (HSS) courses.

More details about NPTEL are available at http://nptel.ac.in

SL31-(B): Self Learning Module-I (HSS)

University approved NPTEL- HSS course List (SL31-B)

No	Course title	No	Course title
1	Soft skills	15	Management of Inventory Systems
2	Introduction to Modern India Political Thought	16	Economic Growth and Development
3	Intellectual Property	17	Ethic in Engineering Practice
4	Technical English for Engineers	18	Corporate Social Responsibility
5	Developing Soft Skills and Personality	19	Marketing Management –I
6	Educational Leadership	20	Marketing Research and Analysis
7	Microeconomics: Theory & Applications	21	Selected Topics in Decision Modeling
8	Engineering Economics	22	Innovation, Business Models and Entrepreneurship
9	Human Resource Development	23	Simulation of Business Systems: An Applied Approach
10	Project Management for managers	24	Sustainability through Green Manufacturing Systems: An Applied Approach
11	Data Analysis and Decision Making - I	25	Total Quality Management - I
12	E-Business	26	Introduction to Operations Research
13	Working Capital Management	27	Knowledge Management
14	Industrial Safety Engineering		

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Credit System structure of T. Y. B. Tech. Civil Engg. –II, Semester –VI, W. E.F. 2022-2023

Course Code	Theory Course Name	Hrs./week				Credits	Examination Scheme				
		L	T	P	D		ISE	ESE		ICA	Total
CE61C	Foundation Engineering	3	-	-	-	3	30	70		-	100
CE62C	Hydraulic Structures and Water Power Engg.	3	-	-	-	3	30	70		-	100
CE63E	Professional Elective Course-I	3	-	-	-	3	30	70		-	100
CE64C	Design of Concrete Structures II	3	-	-	-	3	30	70		-	100
CE65C	Principles of Management and Quantitative Techniques	3	-	-	-	3	30	70		-	100
CE66C	Railway & Harbour Engineering	3	-	-	-	3	30	70		-	100
	Total	**18**	**-**	**-**	**-**	**18**	**180**	**420**		**-**	**600**
	Laboratory/Drawings:						**-**	**POE**	**OE**		
CE67L	Project on Steel Structures	-	-	-	2	1	-	-	25	25	50
CE68L	Principles of Management and Quantitative Techniques	-	-	2	-	1			25	25	50
CE69L	*Mini Project using Application Software			2		1				25	25
	Total	**-**	**-**	**4**	**2**	**3**		**50**		**75**	**125**
	Grand Total	**18**	**-**	**4**	**2**	**21**	**180**	**470**		**75**	**725**

Abbreviations: L- Lectures, P –Practical, T- Tutorial, D- Drawing, ISE -Internal Tests, ESE - University Examination (Theory &/ POE &/Oral examination), ICA- Internal Continuous Assessment.

* The students shall carry out ‘Mini Project’ in any one of the using suitable application software. The Mini project shall be assessed by the concerned subject teachers for ICA.

Note:

1) Students shall undergo a field training of 15 days in the summer vacation after T.Y. B. Tech. Part II. The training report shall be assessed in Final Year B.Tech. Part -I by the concerned ‘Seminar’ guides.
2) Internal Continuous Assessment (ICA): ICA shall be a continuous process based on the performance of the student in assignments, class tests, quizzes, attendance and interaction during theory and lab sessions, journal writing, report presentation etc., as applicable
3) The batch size for the practical/tutorial is of 15 students. On forming the batches, if the number of remaining students exceeds 7 students, then a new batch be formed.

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Credit System structure of Final Year B. Tech. Civil Engg. I; Semester – VII, W. E.F. 2023-2024

Course Code	Theory Course Name	Hrs./week				Credits	Examination Scheme				
		L	T	P	D		ISE	ESE		ICA	Total
CE71C	Estimating, Costing and Valuation	3	-	-	-	3	30	70		-	100
CE72C	Earthquake Engineering	2	-	-	-	2	30	70		-	100
CE73C	Construction Management and Practices	3	-	-	-	3	30	70		-	100
CE74E	Professional Elective Course- II	3	-	-	-	3	30	70		-	100
	Total	**12**	**-**	**-**	**-**	**11**	**120**	**280**		**-**	**400**
	Laboratory/Drawings:							**POE**	**OE**		
CE75L	Estimating , Costing and Valuation	-	-	4	-	2	-	50	-	25	75
CE76L	Construction Management and Practices	-	-	2	-	1	-	-	-	25	25
CE77P	Project on R. C. C. Structures	-	-	-	2	1	-	-	25	50	75
CE78S	Seminar	-	-	2	-	1	-	-	25	25	50
CE79V	Assessment of report on field training	-	-	-	-	1	-	-	-	25	25
	Total	**-**	**-**	**8**	**2**	**6**	**-**	**100**		**150**	**250**
	Grand Total	**12**	**-**	**8**	**2**	**17**	**120**	**380**		**150**	**650**

Abbreviations: L- Lectures, P –Practical, T- Tutorial, D- Drawing, ISE -Internal Tests, ESE - University Examination (Theory &/ POE &/Oral examination), ICA- Internal Continuous Assessment.

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Faculty of Science & Technology
Credit System structure of Final Year B. Tech. Civil Engg. II, Semester– VIII, W. E.F. 2023-2024

Course Code	Theory Course Name	Hrs./week				Credits	Examination Scheme				
		L	T	P	D		ISE	ESE		ICA	Total
CE81H	Professional Practice, Law & Ethics	3	-	-	-	3		100		-	100
CE75E	Professional Elective Course- III	3	-	-	-	3		100		-	100
SL-2	Self Learning Technical Course (Elective)	3	-	-	-	3	-	100		-	100
	Total	**9**	**-**	**-**	**-**	**9**		**300**		**-**	**300**
	Laboratory/Drawings							**POE**	**OE**		
CE8P	Project work	-	-	10	10	10	-	-	150	150	300
	Total	**-**	**-**	**10**	**10**	**10**	**-**	**150**		**150**	**300**
	Grand Total	**9**		**10**	**10**	**19**		**450**		**150**	**600**

Abbreviations: L- Lectures, P –Practical, T- Tutorial, D- Drawing, ISE -Internal Tests, ESE - University Examination (Theory &/ POE &/Oral examination), ICA- Internal Continuous Assessment.

.**Note:**

1) Project group be of maximum of 7 students.
2) Internal *Continuous* Assessment (ICA): ICA shall be a continuous process based on the performance of the student in assignments, class tests, quizzes, attendance and interaction during theory and lab sessions, journal writing, report presentation etc., as applicable
3) Self-Learning Module II at final year B. Tech. Civil Engineering, Semester- II. Student can select a 'Self Learning Module II' (Technical Course) from Course List SL41-(A) and appear for examination.
4) Those students going outside the Institute for project / Internship / Training for entire 8 th Semester shall complete the theory subjects in Self learning mode and appear for examination OR can take MOOC which shall be of minimum twelve weeks duration. from approved platform and submit certificate of completion along with the assessment marks in lieu of University and Institute Examination. However, student needs to submit an application in this regard that they are opting for examination on MOOC platform with certification in lieu of University Examination. Also, they must appear for University examination for the course "Professional Practice, Law & Ethics" and also complete the Project report and appear for OE for the course of "Project work"

Professional Elective Courses and Self Learning Technical Course (Elective): Student shall choose any one course of the following OR Respective NPTEL/MOOC Courses

Elective No	Semester	(I) Structural Engineering	(II) Geotechnical Engineering & Transportation Engg.	(III) Construction Engineering & Management	(IV) Environmental Engineering &Hydraulics, Hydrology & Water Resources Engineering
Prof. Elective-II	**Semester-VII**	Advanced Structural Analysis	Traffic Engineering and Management	Construction Productivity	Water Power Engineering
		Advanced Design of Concrete Structures	Geosynthetics and reinforced soil structures	Entrepreneurship	Air and Noise Pollution and Control
		Finite Element Method		Optimization Techniques	
Prof. Elective-III	**Semester-VIII**	Repairs & Rehabilitation of Structures	Urban Transportation Planning.	Cost Management of Engineering Projects	Water and Air Quality Modelling
		Industrial Structures	Ground improvement Techniques	Disaster Management	
		OR Student can select & enroll for approved minimum eight week technical course from various NPTEL technical courses, Or any other approved MOOC platform, complete its assignments and appear for certificate examination conducted by NPTEL Or respective MOOC platform BOS Chairman / Coordinator will announce the list of approved NPTEL/MOOC online courses of minimum eight weeks duration for 'Professional Elective Course- III' from the available NPTEL/MOOC courses and will make available to student through institute website.			
Self Learning Technical course (Elective)		Concrete composites	Rural Roads	TQM and MIS in Civil Engineering	Planning for Sustainable Development
		OR Student can select & enroll for approved minimum eight week technical course from various NPTEL technical courses, Or any other approved MOOC platform, complete its assignments and appear for certificate examination conducted by NPTEL Or respective MOOC platform. BOS Chairman / Coordinator will announce the list of approved NPTEL/MOOC online courses of minimum eight weeks duration for 'Self Learning Module-II (Technical)' from the available NPTEL/MOOC courses and will make available to student through institute website.			

Calculations of Credits
B. Tech. Civil Regular Course

No	Semester	Credits
1	1	24
2	2	23
3	3	18
4	4	22
5	5	24
6	6	21
7	7	17
8	8	19
	Total	**168**

FINAL YEAR B.TECH

Civil Engineering Honors Pattern

SEMESTER-I

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Final Year B. Tech Civil – Part I

CE71C ESTIMATING, COSTING & VALUATION

Teaching Scheme
Lectures:- 3 Hrs/Week, 3 Credits

Examination Scheme
ISE: 30 Marks
ESE: 70 Marks

Course Outcomes:

Upon successful completion of course the students will be able to:

1) Write technical specifications for civil engineering works.
2) Carry out rate analysis based on market rates, schedule of rates and other relevant standard documents and codes.
3) Take off quantities of items of construction for civil engineering works.
4) Prepare tender documents and explain contract procedures.
5) Prepare the valuation reports for land and buildings.
6) Analyze and evaluate economic alternatives for civil engineering projects.

SECTION –I

Unit 1: Specifications (4 Hrs)

Types, requirements and importance, detailed specifications for buildings, roads, minor bridges and industrial structures.

Unit 2 : Estimation / Measurements for various items (5 Hrs)

Introduction to the process of Estimation;, taking out quantities from the given requirements of the work, comparison of different alternatives, Bar bending schedules, Mass haul Diagrams, Estimating Earthwork and Foundations, Estimating Concrete and Masonry, Finishes, Interiors, MEP works; BIM and quantity take-offs

Unit 3: Rate analysis (4 Hrs)

Purpose, importance and necessity of the rate analysis, factors affecting, task work, daily output from different equipment/ productivity.

Unit t 4: Costing **(5 Hrs)**

Adding equipment costs; labour costs; Material survey-Thumb rules for computation of materials requirement for different materials for buildings, percentage breakup of the cost, cost sensitive index, and market survey of basic materials. Use of Computers in quantity surveying.

SECTION –II

Unit 5: Tender **(5 Hrs)**

Preparation of tender documents, importance of inviting tenders, contract types, relative merits, prequalification. general and special conditions, termination of contracts, extra work and Changes, penalty and liquidated charges, Settlement of disputes,R.A. Bill & Final Bill, Payment of advance, insurance, claims, price variation, etc. Preparing Bids- Bid Price buildup: Material, Labour, Equipment costs, Risks, Direct & Indirect Overheads, Profits; Bid conditions.

Unit 6 : Introduction to Acts **(5 Hrs)**

Minimum wages, Workman's compensation, Contracts, Arbitration, Easement rights.

Unit 7: Principles of valuation **(5 Hrs)**

A) Definition of value, price and cost. Attributes of value, Different types of values- Book value, salvage value, scrap value, replacement value, reproduction value, earning value, Market value, Potential value, Distress value, Speculation value, Sentimental value. Accommodation value, Essential characteristics of market value.

B) Valuer and his duties, purpose of valuation and its function. Factors affecting the valuation of properties-tangible and intangible properties, Landed properties- free hold and leasehold properties, different types of lease.

Unit 8: **Methods of Valuation** **(8 Hrs)**

a) Rental method of valuation. Form of rent, different types of rent, standard rent.

b) Value of land, belting method of valuation, Valuation based on land and building- item wise, carpet area basis, unit basis, cubic content basis.

c) Development method of valuation for building estate.

d) Valuation on profit basis for lodges, cinema theatres, hotels, motels etc. valuation for compulsory acquisition of land, structure by the Government. Valuation for rating purpose, Methods for assessing ratable value of property, Rental method, Comparison method, fundamental principles of rating valuation.

e) Valuation from yield and from life, gross yield and net yield, outgoing, capitalized value, Year's purchases-Single rate and dual rate, reversion value of land, annuity- perpetual, whole life, deferred, Sinking fund.

Unit 9: Engineering Economics (5 Hrs)

Cost & Cost Control –Techniques, Types of Costs, Lifecycle costs, Time value of money (present and future worth of cash flows). Investment Analysis – NPV, ROI, IRR, Payback Period, Depreciation, Depreciation and different methods of calculating depreciation (straight line method, declining balance method, sinking fund method, quantity survey method), Depreciated cost, Obsolescence.

TEXT BOOKS

1. A Textbook of Estimating , Costing & Accounts (Civil), R.C.Kohli, S. ChandPublishing New Delhi
2. Civil Estimating and Costing, A. K. Upadhyay, S. K. Katuria and Sons
3. Elements of Estimating and Costing – S. C. Rangwala - Charotar Publication
4. Civil Engineering Contracts and Estimates – B. S. Patil- Orient Blackswan publication.
5. Professional Practice (Estimating and Valuation) – Roshan Nanavati – Lakhani BookDepot.
6. Estimating and Costing – B. N. Dutta- UBS publishers
7. Estimating, Costing , Specification and valuation in civil engineering, ChakrobortyM, Khanna Publishers.
8. Valuation of real Properties – S. C. Rangwala- Charotar Publishing House Ltd.

REFERENCE BOOKS

1. Relevant Indian Standard Specifications (IS 1200)
2. World Bank Approved Contract Documents.
3. FIDIC Contract Conditions.
4. Acts Related to Minimum Wages, Workman's Compensation, Contract, and Arbitration.
5. C.P.W.D. specifications
6. C.P.W.D. schedule of rates.
7. Standard specifications Volumes I & II (P. W. D. Maharashtra)

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Final Year B. Tech Civil – Part I

CE75L ESTIMATING, COSTING & VALUATION

Teaching Scheme
Practical:- 4hrs/week, 2 Credits

Examination Scheme
POE:- 50 Marks
ICA:- 25 Marks

INTERNAL CONTINIUOS ASSESSMENT (ICA)

The ICA shall consist the following

1) Reading the Drawings (Plan and section) Minimum 3- drawings need to be given for (reading only) such as

a) Watchman's cabin b) Compound wall. c) Septic tank / water tank. d) Building drainage system. e) Kitchen platform. f) Cement godown. g) Staircase block. h)A small culvert

2) Market survey of basic material rates and labour wages

3) Detailed specification for minimum five civil engineering items. (One each from Roads, Irrigation works, Water Supply & Sanitation & three from buildings)

4) Computer aided

a) Detailed estimate for a two storied building

i) Selecting the items from drawing.

ii) Preparing abstract as per DSR or standard building items.

iii) Take of quantities related to buildings (all items need to be taken)

iv) Preparing the bill of quantity (BOQ).

Note: Estimate shall include compound wall with gate, sanitary scheduleand electrification schedule.

b) Estimate for structural steel shed.

5) Rate Analysis: (Civil engineering items.)

One each from (Road, Irrigation work, Water supply and sanitation) and five from buildings.

6) Schedule of reinforcement any two of the following

a) Column and column footing.

b) Beam and Slab

c) Staircase.

7) Valuation reports for any two of the following:

a) A building for residential purpose or commercial purpose.

b) A hotel.

c) A theater

d) Any one construction machine.

The report shall include valuation certificate also.

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Final Year B. Tech Civil – Part I

CE72C EARTHQUAKE ENGINEERING

Teaching Scheme
Lectures:-2 Hrs/Week, 2 Credits

Examination Scheme
ISE: 30 Marks
ESE: 70 Marks

Course Outcomes:

At the end of course, students will be able to

1. Apply the principles of Earthquake resistant philosophy in planning, design and construction of building.
2. Perform the dynamic analysis of structures under earthquake load.
3. Incorporate the Earthquake re us types of construction.
4. Adopt the provisions of IS 18 6 Codes.
5. Incorporate the ductility featu

Unit: 1 Elements of Seismology **(3 Hrs)**

General effects of an earthquake, terminology, structure of earth, causes of an earthquake, plate tectonic theory, seismic waves, magnitude and intensity, methods of measurement, energy released, seismograph, strong motion earthquakes, accelerogram, soil liquefaction, prominent earthquakes of India.

Unit: 2 Free vibrations of single degree-of-freedom systems **(5 Hrs)**

Dynamic loads and dynamic analysis, degrees of freedom, Un damped free vibrations, multiple elastic forces, viscously damped vibrations, equations of motion and solution, logarithmic decrement.

Unit: 3 Forced vibrations of single degree-of-freedom systems **(5 Hrs)**

Forced vibrations (harmonic loading) of single degree of freedom systems. Un damped and

Viscously damped vibrations, equations of motion and solution, Force transmitted to foundation, transmissibility, response to harmonic support excitations.

Unit: 4 Response spectrum theory **(3 Hrs)**

Response to general dynamic loading, Duhamel's integral, rectangular loading, Earthquake response spectrum, tripartite spectrum, construction of design response spectrum.

SECTION – II

Unit: 5 Principles of earthquake resistant design **(5 Hrs)**

Planning aspects, symmetry, simplicity, regularity. Resistance of structural elements and structures for dynamic load, design criteria, strength and deflection.

Unit: 6 Evaluations of Seismic Forces **(5 Hrs)**

Planning aspects, symmetry, simplicity, regularity. Resistance of structural elementsand structures for dynamic load, design criteria, strength and deflection, Concept of ductility, different ways of measuring ductility, factors affecting ductility, energy absorption, provisions of IS 13920-2016.

Unit: 7 Earthquake resistant construction **(4 Hrs)**

Failure mechanism of different types of masonry construction, Construction aspects of Masonry and Timber structures, Retrofitting and strengthening techniques of low cost and low rise buildings. Provisions of I.S. 4326 and IS 13935.

TEXT BOOKS:

1. Elements of Earthquake Engineering – Jai Krishna, South Asian Pub. New Delhi
2. Earthquake Resistant, Design of Masonry and Timber Structures – A.S. Arya
3. Earthquake Resistant Design of R. C. C. Structures – S. K. Ghosh

REFERENCE BOOKS

1. Dynamics of Structures –A.K. Chopra
2. Structural Dynamics - Mario Paz CBS Publication
3. Earthquake Resistant Structures –D.J. Dowrick John Wiely Publication
4. Dynamics of Structures – R. M. Clough and Penzian ,McGraw Hill co.New Delhi
5. Mechanical Vibrat ions – G. R. Grover Roorkee University, Roorkee
6. Analysis and Design of Foundations for Vibrations – P. J. Moove. Oxford and I. B. H. Publication, Delhi
7. Foundation Design Manual – N. V. Nayak, Dhanpatrai and sons, Delhi
8. Manual of Earthquake Resistant Non engineering Construction, University of Roorkee
9. Elements Seismology – Rochter
10. IS 1893-2016 –Part I, IS 13920-2016, IS: 4326 and IS 13935.
11. Earthquake Tips published by NICEE, IIT Roorkee.
12. Government of Maharashtra Earthquake resistant Design of house guiding lines and assessment of damages.

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Final Year B. Tech Civil – Part I

CE73C CONSTRUCTION MANAGEMENT AND PRACTICES

Teaching Scheme
Lectures:- 3 Hrs/Week, 3 Credits

Examination Scheme
ISE: 30 Marks
ESE: 70 Marks

Course Outcomes:

At the end of course, students will be able to

1. Plan the project and prepare Bar chart and Network to optimize the project duration and cost
2. Update the network and re-evaluate the resources.
3. Use appropriate project management application software for planning, tracking and reporting progress of civil engineering projects.
4. Calculate output of earthmoving, hoisting, dredging equipments.
5. Adopt appropriate safety measures for various Civil Engineering Projects.
6. Explain prefabricated constructions, Diaphragm wall constructions, advanced formwork and Hot Mix Plant.

SECTION I

Unit 1: **(8 Hrs)**

Project Management: Introduction, Steps in Project Management, Work Breakdown Structure (WBS). Gantt (Bar) Chart, Mile Stone chart.

Development of network: Representation by Activity on Arrow (AOA) and Activity on Node (AON), Fulkerson's Rule.

Critical Path Method (CPM): Introduction, Time estimates, floats, critical path.

Unit 2: **(6 Hrs)**

Network compression: - Least Cost and Optimum Duration.

Resource allocation: Smoothening and levelling. Numerical Problem on Resource Allocation and Levelling.

Updating: Need, steps, project duration, and calculation for updated network. Numerical Problem on Updating.

Unit 3: **(6 Hrs)**

Performance Evaluation and Review Techniques (PERT)

Concept of probability, Normal and Beta Distribution, Central limit theorem. Time estimates and calculations of project duration, critical path, slack, probability of project completion.

Precedence Network (only concept)

Unit 4: **(3 Hrs)**

Project Management Software (PMS): Introduction to applications of PMS (such as MS Excel, MS Project, Primavera, and PRINCE) and Open Source software. Reports generated by the software and its interpretation. Introduction to BIM (Building Information Modeling).

SECTION II

Unit 5 Construction safety **(4 Hrs)**

Safety against accidents on various construction sites such as building, dam, road, tunnel, bridge, fabrication and erection works, etc. Safety at various stages of construction. Safety measures in construction.

Unit 6 Mechanical v/s Manual construction **(8 Hrs)**

Introduction -Conceptual planning of new project, site access and services,

Excavation in Earth: Earth moving equipments - Tractors, Bulldozers, Scrappers, Power shovel, Hoes, simple numerical problems based on cycle time and production rates, Numerical Problem on Cycle Time and frequency of scrapers, Drag line, Compactors- types and performance, operating efficiencies. Asphalt mixing and batching plant (hot mix plant), sensor paver.

Unit 7 Prefabricated Units and Advanced formworks **(6 Hrs)**

Prefabricated construction –relative economy, elements and simple connections, cranes. Advanced formworks- Aluform, Tunnel Form, Mivan Formwork.

Unit 8 Special constructions **(4 Hrs)**

Floating and dredging equipment's. Diaphragm Walls – Purpose and Construction Methods, Clamshell, Trenchers,

TEXT BOOKS

1. A Management Guide to PERT/CPM: Weist J. D. ,Levy, Prentice Hall of India, New Delhi, 2nd Ed. 1982
2. PERT and CPM Principles and Applications: Srinath L. S., East West Publication, New Delhi, 3rd Ed. 1995.
3. PERT and CPM- B. C. Punmia, K. K. Khandelwal, Laxmi Publications, New Delhi, 4th Ed. 2012.
4. Computerized Project Management Technique for Manufacturing and construction: Samaras T.T., Kim Yensueng, Prentice Hall of India, New Delhi, 1979.
5. Principles of Construction Management: Roy Pilcher , Tata McGraw Hill Publications.
6. Construction, Planning, Equipment and methods - R. L . Peurifoy McGraw hill book co New Delhi.
7. Construction Equipment Guide, David A. Day, Neal B. H. Benjamin, John Wiley & Sons.
8. Construction Equipment – Mahesh Varma ,Metropolitan book co ,New York
9. Heavy Construction – Planning, Equipment and methods – Jagman Singh, Oxford and IBH publishers, New Delhi.
10. Construction of Diaphragm Walls, I Hajnal, I Marton, F. Regele Wiley Interscience Publication, John Wiley & Sons.
11. Structural & cut off Diaphragm walls, R.G.H. Boyes, Applied Science Publishers Ltd., London

REFERENCE BOOKS

1. CPM in Construction Practice, Antill J. M., John Wiley and Sons.
2. Construction Project Management – Planning, Scheduling and Control- Chitkara K.K., Tata McGraw Hill Publications New Delhi, 4th Ed. 2002.
3. Construction Planning and Management through System Techniques: Verma M., Metropolitan Publication, 3rd Ed. 1985.
4. Construction Project Management- Bennett J. M. Clough R. H., Butterworth's Wiley John, New Delhi, 1972.
5. Construction Scheduling with Primavera Enterprise- Marchman D.A., Thomson/Brooks-Cole.

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Final Year B. Tech Civil – Part I

CE76L CONSTRUCTION MANAGEMENT AND PRACTICES

Teaching Scheme	**Examination Scheme**
Practicals:- 2 Hrs/Week, 1 Credits	**ICA:** 25 Marks

INTERNAL CONTINIUOS ASSESSMENT (ICA)

The ICA shall consist the following.

It shall be based on the

1. Assignments on each Chapter
2. Civil Engineering project management reports generatedusing relevant software
3. Visit report should include application of work break down Structure, precedence network, CPM and PERT to any civil Engineering Projects. Report should also involve construction safety measures and construction equipments used at site.

Professional Elective –II

Courses: Student shall choose any one course of the following

Elective No	Semester	(I) Structural Engineering	(II) Geotechnical Engineering & Transportation Engg.	(III) Construction Engineering & Management	(IV) Environmental Engineering &Hydraulics, Hydrology & Water Resources Engineering
Prof. Elective-II	**Semester-VII**	Advanced Structural Analysis	Traffic Engineering and Management	Construction Productivity	Water Power Engineering
		Advanced Design of Concrete Structures	Geosynthetics and reinforced soil structures	Entrepreneurship	Air and Noise Pollution and Control
		Finite Element Method		Optimization Techniques	

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Final Year B. Tech Civil – Part I

CE74E PROFESSIONAL ELECTIVE COURSE-II
CE74E (A) ADVANCED STRUCTURAL ANALYSIS

Teaching Scheme
Lectures:- 3 Hrs/Week, 3 Credits

Examination Scheme
ISE: 30 Marks
ESE: 70 Marks

Course Outcomes:

At the end of course, students will be able to

1. Draw ILD for indeterminate structures
2. Analyze the beams curved in plan and beams resting on elastic foundation
3. Analyze the Beam column
4. Analyze the structures using structure oriented stiffness method.
5. Analyze the structures using member oriented stiffness method

SECTION I

Unit 1: Influence Line Diagrams for Indeterminate Structures (8 Hrs)

Muller- Breslau's Principle and Moment Distribution Method. Continuous beams, portal frames and two hinged arches.

Unit 2: Beams curved in plane (7 Hrs)

Determinate and indeterminate beams curved in plan.

Unit 3: Beams on elastic foundations (7 Hrs)

Analysis of infinite, Semi-infinite and finite beams

SECTION – II

Unit 4: Beam columns (7 Hrs)

Concept of geometric and material non linearity, governing differential equation, Analysis of beam- columns subjected to different loadings and support conditions,

Stiffness and carry-over factors for beam-columns, fixed end actions due to various loads.

Unit 5: Stiffness method of structural analysis (8 Hrs)

Analysis of continuous beams, trusses and plane frames by structure oriented stiffness approach.

Unit 6: Member oriented stiffness Method (8 Hrs)

Stiffness matrices of beam, truss, plane frame, grid, pin and rigid jointed space frame elements on member axes. Transformation of matrices on structure axes. Over-all joint stiffness matrix and nodal load vector, assembly rules, Calculation of member endforces, Bandwidth.

TEXT BOOKS

1. Structural Analysis by Negiand Jangid.
2. Analysis of structure by Vazirani and Ratwani,Vol.II
3. Advanced Theory of Structures by Vazirani and Ratwani.
4. Theory of Elastic Stability by Timoshenko and Gere.
5. Matrix Analysis of Framed structures by Gere and Weaver.
6. Structural Analysis–A Matrix approach by Pandit and Gupta.
7. Mechanics of Structures Vol.I, II and III by Junnarkar and Shah.
8. Basic structural Analysis by C.S.Reddy.

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Final Year B. Tech Civil – Part I

CE74E PROFESSIONAL ELECTIVE COURSE-II
CE74E (B) ADVANCED DESIGN OF CONCRETE STRUCTURES

Teaching Scheme
Lectures:- 3 Hrs/Week, 3 Credits

Examination Scheme
ISE: 30 Marks
ESE: 70 Marks

Course Outcomes:

At the end of course, students will be able to

1) Analyse and design Grid Slab and Circular Slab
2) Analyse and design footings, rafts and piles
3) Analyse and design G.S.R and E.S.R and U.S.R.

SECTION I

Unit 1: **(8 Hrs)**

Analysis and Design of Flat Slab, Grid Slab and Circular Slab.

Unit 2: **(7 Hrs)**

Analysis and Design of Combined Footing and Raft Foundation

Unit 3:

Analysis and Design of pile foundation with pile cap.

SECTION – II

Unit 4: **(7 Hrs)**

Water Tanks: Design criteria, permissible stresses, Design of circular water tanks G.S.R and E.S.R by approximate method and I. S. code method.

Unit 5: **(8 Hrs)**

Design of rectangular tanks G.S.R and E.S.R by approximate method and I. S. Code method.

Unit 6: **(8 Hrs)**

Design of underground circular water tanks.

Text Books:

1. Reinforced Concrete, Limit State Design by Ashok K. Jain, New Chand and Bros. Roorkee.
2. Advanced Reinforced Concrete Design by N. Krishnaraju- CBS Publishers & Distributors.
3. Reinforced Concrete Structures Vol. I & Vol. II by Jain and Jaikrishna
4. Reinforced Concrete Structures Vol. I & Vol. II by B.C. Punmia, A. K. Jain, Arun K. Jain

Reference Books:

1. Advanced Reinforced Concrete Design by P.C. Varghese- Prentice Hall of India.2. IS: 456-2000.
2. Fundamentals of Reinforced Concrete- Sinha & Roy
3. Limit State Design of Reinforced Concrete - P.C. Varghese, Prentice Hall of India, New Delhi.
5. Handbook of Reinforced Concrete: SP- 16.

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Final Year B. Tech Civil – Part I

CE74E PROFESSIONAL ELECTIVE COURSE-II
CE74E (C) FINITE ELEMENT METHOD

Teaching Scheme
Lectures:- 3 Hrs/Week, 3 Credits

Examination Scheme
ISE: 30 Marks
ESE: 70 Marks

Course Outcomes:

At the end of course, students will be able to

1. Find solution to problems using direct approach methods like Rayleigh – Ritz or Galerkin‟s Method
2. Analyze 1-D problems related to structural analysis like Bars, Trusses, Beams and Frames using finite element approach.
3. Solve 2-D & 3D problems using knowledge of theory of elasticity.
4. Apply Shape function, Natural Co-Ordinate systems, and classification of Isoparametric & Axisymmetric elements
5. Analyze plate & shell elements
6. Students will be able to implement the knowledge of numerical methods in FEM to find the solution to the various problems in statics and dynamics.

SECTION I

Unit 1: Introduction to Finite Element Method: (5 Hrs)

Principle of minimum potential energy, variation principle, Galerkin approach, Rayleigh – Ritz method, Point Collocation method, Least square method, Finite element procedure

Unit 2: 1-D Element Problems: (6 Hrs)

Discretization, nodes, element incidence, displacement model, shape function, selection of order of polynomials, application to bars with constant and variable cross section subjected to axial forces. Development of element stiffness matrix and nodal load vector for truss, beam and plane frame elements. Transformation of matrices, relevant structural engineering applications.

Unit 3: 2-D Element Problems: **(6 Hrs)**

2-D elements of triangular and quadrilateral shapes for plane stress and plane strain problems. Pascal‟s triangle, convergence requirements and compatibility conditions, shape functions, boundary conditions, element aspect ratio.

Unit 4: 3-D Element Problems: **(5 Hrs)**

Development of element stiffness matrix and nodal load vector for Tetrahedron, Hexahedral elements

SECTION -II

Unit 5: Isoperimetric Elements: **(7 Hrs)**

Shape function, Natural Co-Ordinate systems, classification- Isoperimetric, sub parametric, super- parametric elements 1-D, 2D & 3D Isoperimetric elements, Gauss-quadrature integration.

Unit 6: Axisymmetric Elements: **(5 Hrs)**

Development of element stiffness matrix and nodal load vector.

Unit 7: Plate and Shell Elements: **(6 Hrs)**

Formation of stiffness matrix for plate bending elements of triangular and quadrilateral shapes, cylindrical thin shell elements

Unit 8: Finite Element Applications to Structural Dynamics: **(5 Hrs)**

Formulation, Hamillon's principle, element mass matrices, evaluation of eigen values and eigen vectors.

TEXT BOOKS

1. Bhavikatti. S. S, “Finite Element Analysis”, New Age International Publishers, 2007.
2. Chandrupatla, R.T. and Belegundu, A.D., “Introduction to Finite Elements in Engineering”, Prentice Hall of India, 2007.

REFERENCE BOOKS

1. The finite Element Method (Fourth Edition) Vol I & II by O. C. Zienkiewicz& R. L. Taylor.

2. An Introduction to Finite Element Method by J. N. Reddy.

3. Concepts & Applications of Finite Element Analysis by R. D. Cook.

4. Fundamentals of Finite Element Techniques by C. A. Brebbin& J. J. Common.

5. Introduction to Finite Element Method by C. S. Desai & J. F. Abel.

6. Programming in Finite Element Method by Dr. C. A. Krishnamoorthy (TMH Publication).

7. Introduction to Finite Element in Engineering by T. R. Chandrapatla and Belegundu

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Final Year B. Tech Civil – Part I

CE74E PROFESSIONAL ELECTIVE COURSE-II
CE74E (D) TRAFFIC ENGINEERING AND MANAGEMENT

Teaching Scheme
Lectures:- 3 Hrs/Week, 3 Credits

Examination Scheme
ISE: 30 Marks
ESE: 70 Marks

Course Outcomes:

At the end of course, students will be able to

1. Undertake various traffic studies and analysis of traffic data including parking studies and calculation of parking demand.
2. Explain relation between flow, density, speed, concept of level of service for urban and rural area.
3. Explain the regulations on vehicle, driver and speed and Vehicle as per Motor Vehicle Rules.
4. Design intersections and signals and propose various traffic signs, road marking and lighting at various locations.
5. Explain applications and principles of various modern instruments used in traffic studies.

SECTION I

Unit-1: Introduction and Traffic Characteristics (8 Hrs)

a) Introduction: Components of road traffic, the vehicle, driver and road, Objectives-Scope of Traffic Engineering.

b) Traffic characteristics: Road user characteristics, vehicular characteristics-static and dynamic characteristics, Road Characteristics, – Reaction time of the driver.

Unit-2: Traffic Engineering Studies and Analysis (8 Hrs)

Sampling in traffic studies; adequacy of sample size; Application of sampling methods for traffic studies. Traffic parameter studies and Analysis: Objectives and Method of study – Definition of study area- Sample size – Data Collection and Analysis- Interpretation of

following Traffic Studies- Volume, Spot Speed, Speed and Delay , Origin and Destination, - parking on street and off street Parking- space consideration, parking demand, parking load and duration, space demand relation. Accidents- Causes, Analysis, Measures to reduce Accident.

Unit-3:Traffic Flow and Capacity **(6 Hrs)**

Nature of Traffic flow, Approaches to understand Traffic Flow, Parameters connected with Traffic Flow, Categories of traffic flow, uninterrupted traffic flow model, Analysis of speed, flow and density relationship, Empirical studies of traffic stream Characteristics. Highway Capacity and level of service, capacity of urban and rural roads, PCU concept.

SECTION-II

Unit-4: Traffic Regulations and Control **(8 Hrs)**

Traffic Regulation: General regulations, regulations on vehicles- Vehicle registration requirements and accessories, vehicle inspection, inspection coverage, general control for motorist pedestrian, regulations on drivers- driver licensing, speed control- methods of control devices speed zoning, one way street – necessity, requirements, advantages and disadvantages. Central Motor Vehicle Rules.

Unit-5: Traffic Control Devices **(7 Hrs)**

Traffic Control Devices: Traffic signs, traffic Markings, islands, types of intersection and channelization, Rotary intersection design and traffic signal design by IRC and Webster's method- vehicle actuated and synchronized signals, signal coordination and Road Lighting.

Unit-6: ITS **(8 Hrs)**

Introduction to Intelligent Transport System- Application of ITS to Traffic Management System- Public Transportation Management System – ITS Case studies.

TEXT BOOKS:

1. Traffic Engineering by Matson, Smith and Hurd McGraw Hill & Co publication.
2. Traffic Engineering and Transport Planning by Dr. L.R.Kadiyali., Khanna Publishers.
3. Highway Engineering by Khanna and Justo, Nem Chand & Bros publication.
4. Traffic Engineering – An Introduction by Wells, G.R., Griffin, London publication.

REFERENCE BOOKS:

1. Traffic Engineering by Pignataro, Prentice Hall publications
2. Highway Traffic Analysis and Design by Salter, R.J and Hounsell, N.B., Mac Millan publishers, 1996.
3. Highway capacity Manual-2000.
4. An Introduction to Transportation Engineering by JotinKhistey and Kent Lall, Prentice Hall publication, 2002.
5. Traffic Engineering by Roger P. Roess, Elena S. Prassas& William R. McShane, Fourth Edition, Pearson Education, South Asia

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Final Year B. Tech Civil – Part I

CE74E PROFESSIONAL ELECTIVE COURSE-II
CE74E (E) GEOSYNTHETICS AND SOIL STRUCTURES

Teaching Scheme
Lectures:- 3 Hrs/Week, 3 Credits

Examination Scheme
ISE: 30 Marks
ESE: 70 Marks

Course Outcomes:

At the end of course, students will be able to

1. Identify the different types of geo textile and their suitability for the soil reinforcement structures;
2. Perform the laboratory testing of Geo synthetics
3. Design RE retaining structures
4. Design the soil reinforcement for erosion control, Drainage and filtration
5. Design soil reinforcement using Geo synthetic for pavement application and landfills

SECTION I

Unit-1: **(6 Hrs)**

Introduction: Historical background of reinforced soil, Principles of reinforced soil through Mohr circle analysis.

Different types of geosynthetics: Types of geosynthetics like geotextiles, geogrids, geonets, geocells, geo-composites, their manufacturing methods.

Unit-2: **(8 Hrs)**

Testing methods for geosynthetics: Techniques for testing of different index properties,strength properties, Apparent Opening Size, In-plane and cross-plane permeability tests,assessment of construction induced damage, and extrapolation of long term strength properties from short term tests.

Unit-3: **(8 Hrs)**

Reinforced Soil retaining walls: Different types of walls like wrap-around walls, full-height panel walls, discrete-facing panel walls, modular block walls Design methods as per BS-8006 and FHWA methods Construction methods for reinforced soil retaining walls.

Reinforced soil slopes: Basal reinforcement for construction on soft clay soils, construction of steep slopes with reinforcement layers on competent soils, Different slope stability analysis methods like planar wedge method, bi-linear wedge method, and circular slip methods.

SECTION-II

Unit-4: **(8 Hrs)**

Erosion control on slopes using geosynthetics. Applications in foundations: Binquet and Lee's approach for analysis of foundations with reinforcement layers.

Drainage and filtration applications of geosynthetics: Different filtration requirements, filtration in different types of soils and criteria for selection of geotextiles, estimation of flow of water in retaining walls, pavements, etc. and selection of geosynthetics.

Unit-5: **(8 Hrs)**

Pavement application: Geosynthetics for separation and reinforcement in flexible pavements, design by Giroud-Noiray approach, reflection cracking and control using geosynthetics. Use of geosynthetics for construction of heavy container yards and railway lines.

Unit-6: **(7 Hrs)**

Construction of landfills using geosynthetics: Different components of modern landfills, collection techniques for leachate, application of different geosynthetics like geonets, geotextiles for drainage in landfills, use of geomembranes and Geosynthetic Clay Liner (GCL) as barriers

TEXT BOOKS

1. Koerner, R.M. "Designing with Geosynthetics", Prentice Hall, New Jersey, USA, 4th edition, 1999.
2. Jewell, R.A., "Soil Reinforcement with Geotextiles", Special Publication No. 123,CIRIA, Thomas Telford. London, UK,1996.
3. Geosynthetics - New Horizons, Eds. G.V. Rao, PK Banerjee, J.T. Shahu, G.V. Ramana, Asian Books Private Ltd., New Delhi,2004.

REFERENCE BOOKS

1. Geosynthetics Asia 1997: Select papers by C.V.J. Varma, G. Venkatappa Rao andA.R.G. Rao,1998.
2. Geosynthetics for Trails in Wet Areas: 2008, Edition by James Scott Groenier ,Bibligov Publishers,2012.
3. Fundamentals of Geosynthetic Engineering by Sanjay Kumar Shukla and Jian-HuaYin, Taylor & Francis,2008.

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Final Year B. Tech Civil – Part I

CE74E PROFESSIONAL ELECTIVE COURSE-II
CE74E (F) CONSTRUCTION PRODUCTIVITY

Teaching Scheme
Lectures:- 3 Hrs/Week, 3 Credits

Examination Scheme
ISE: 30 Marks
ESE: 70 Marks

Course outcomes:

At the end of the course the students will be able to:

1. Assess productivity effects & reasons of low productivity in construction industry.
2. Differentiate responsibilities & roles of project participants to improve productivity.
3. Measure and analyze productivity using classical methods of data gathering.
4. Apply advance construction management approaches to improve productivity.
5. Present and implement productivity improvement findings.
6. Explore impact factors affecting productivity and quantity lost productivity.

SECTION-I

Unit 1: Productivity and its measurement Method (7 Hrs)

Introduction to Productivity — Definitions – Productivity Measurement–Need for Productivity Measurement MPSA Principles-Quantity Measurement Methods – Performance Factor Calculations and Forecasting – Percentage Complete using Earned Value.

Unit 2: Productivity Index and Productivity Though (8 Hrs)

Productivity index -Causes of low productivity and techniques of their elimination- Improving Productivity through Pre-Planning - Record Keeping, Control, Change Orders, and Defect Analysis –

Unit 3: Labour productivity (7 Hrs)

Labour productivity - Improving labour Productivity with New Technologies -Advantages from increased labour productivity.

SECTION-II

Unit 4: Factors Influencing Productivity **(7 Hrs)**

Factors Influencing Productivity – Sources of Lost Time –Tools to Identify Productivity Loss -Productivity

Unit 5: Productivity Improvement Methods **(8 Hrs)**

Improvement Methods – Influence of Human Factors on Productivity – Motivation – Methods of Motivating for Improved Productivity.

Unit 6: Work Sampling **(8 Hrs)**

Introduction to Work Sampling-Productivity Calculations and Spreadsheets-Performance Progress.

Measurements – Tour Approach – Crew Approach – Foreman Delay Survey – Implementation – Crew Balance Charts – Flow Diagrams.

References

1. Productivity Improvement in Construction - Oglesby, C., Parker, H., and Howell, G. New York: McGraw Hill, 1989.

2. Managing Performance in Construction, Leonard E. Bernold and Simaan M. AbouRizk, John Wiley & Sons.

3. Construction Productivity Management - Paul O. Olomalaiye,Ananda K.W. Jayawardane, Frank C. Harris, Prentice Hall.

4. Construction Productivity: Measurement and Improvement - James J. Adrian,Stipes Pub LLC. 5. Labour productivity – J P Srivastava, Oxford & IBH Publishing Company, 1982

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Final Year B. Tech Civil – Part I

CE74E PROFESSIONAL ELECTIVE COURSE-II

CE74E (G) ENTREPRENEURSHIP

Teaching Scheme
Lectures:- 3 Hrs/Week, 3 Credits

Examination Scheme
ISE: 30 Marks
ESE: 70 Marks

Course outcomes:

By the end of the course the students should be able to

1) Exhibit skills necessary to craft strategies and initiatives which can enable growth and sustainability in an entrepreneurial venture.
2) Prepare preliminary and final project report
3) Exhibit higher-level critical thinking skills, evidenced by analysis, evaluation, and synthesis.
4) Demonstrate skills to establish and manage the accounting process, to employ break even and cost-volume-profit tools.

SECTION – I

Unit 1: (10 Hrs)

Meaning, Definition and concept of Enterprise, Entrepreneurship and Entrepreneurship Development, Evolution of Entrepreneurship, risks involved with entrepreneurship, barriers to Entrepreneurship, Factors affecting entrepreneurial growth. Entrepreneur, qualities of a successful entrepreneur, types of entrepreneurs (on basis of business, motivation, stages of development, entrepreneurial activity), functions of an entrepreneur, entrepreneurial competencies, types of entrepreneurial competencies. Concepts of Intrapreneurship, Entrepreneur v/s Intrapreneur, Entrepreneur Vs. Entrepreneurship, Entrepreneur Vs. Manager, Role of Entrepreneurship in Economic Development, Factors affecting Entrepreneurship, Problems of Entrepreneurship. Creativity and Innovation, Innovation and Entrepreneurship.

Unit 2: (10 Hrs)

Women Entrepreneurship:- Meaning, Characteristic features, Problems of Women Entrepreneurship in India, Developing Women Entrepreneurship in India, reasons for the slow growth of women entrepreneurship, remedies to solve the problems of women entrepreneurs. Measures taken for the development of women.Entrepreneurship In India:- Training of Rural Youth For Self Employment, BANKS, NABARD, Industrial Policy, FICCI Ladies Organization (FLO), National Alliance of Young Entrepreneurs (NAYE).

Unit 3: **(10 Hrs)**

Role of Government in promoting Entrepreneurship, MSME policy in India, Agencies for Policy Formulation and Implementation: District Industries Centres (DIC), Small Industries Service Institute (SISI),Entrepreneurship Development Institute of India (EDII), National Institute of Entrepreneurship & Small Business Development (NIESBUD), National Entrepreneurship Development Board (NEDB). Financial Support System: Forms of Financial support, Long term and Short term financial support, Sources of Financial support, Development Financial Institutions, Investment Institutions. Finance, Institutional finance to Entrepreneurs, Preparation of Business Plans, Commercial Banks, Other financial institutions like IDBI,IFCI, ICICI, IRBI, LIC, UTI, SFCs, SIDCs, SIDBI, EXIM.

Bank Institution Support to Entrepreneurs: Need for Institutional support - Small Entrepreneurs: NSIC, SIDO, SSIB, SSICS, SISI, DICs, and Industrial Estates Specialized Institutions.

SECTION – II

Unit 4: **(10 Hrs)**

Finance Analysis and accountancy: Estimation of cost of project and means of financing, working capital requirement and its financing, estimates of working results working capital and fixed capital assessment incentives from financial institutions and government, financial ratios, their significance, break even analysis cash flow charts financial statements.

Unit 5: **(10 Hrs)**

Project Report: Preliminary and final project report preparation, financial technical commercial and economic viability project implementation process project profiles.

Unit 6: **(10 Hrs)**

Introduction to Marking, Market study, Goal sitting, Sale and Sales Promotion. Industrial and commercial tax laws (major features only), Risk and Risk analysis, goal setting and decision making, Communication skills development and barriers.

TEXT BOOKS

1) Patterns of Entrepreneurship, Jack M. Kaplan Wiley Publications.
2) Planning and Industrial Unit, Jay Narayan Vyas, GranthVitran Shreyas, Opp. Jain Temple Near Navrangpura Bus Stop, Navrangpura
3) Financing an Industrial Unit, Jay Narayan Vyas and Dilip Patel, Granthvitaran Ahmadabad .
4) Entrepreneurship Development Vol. I, II & III, Vasant Desai, Himalaya Publishing house.

REFERENCE BOOKS

1) Entrepreneurship for the Nineties, Gordon B. Baty, Prentice Hall Inc. College Technical Reference by Granthvitaran.
2) Small Scale Industry Handbook, Jay Narayan Vyas, Granth Vitaran Ahmedabad
3) The Practice of Entrepreneurship, Geoffery G. Meredith R.E. Nelson and P. A. Neck, Published by International Labour Office, CH 1211, Geneva 22, Switzerland
4) Entrepreneurship Theory at Cross Road, Mathew J. Manimala, Biztantra publications.

Entrepreneurship and small business, WEBER, LEWIS, VOLERY, SCHAPER, Wiley Publication.

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Final Year B. Tech Civil – Part I

CE74E PROFESSIONAL ELECTIVE COURSE-II

CE74E (H) Optimization Techniques

Teaching Scheme
Lectures:- 3 Hrs/Week, 3 Credits

Examination Scheme
ISE: 30 Marks
ESE: 70 Marks

Course Outcomes:

By the end of the course the students should be able to

1.Lead a team, as well as work as a member of a team, for effective management of construction projects.

2. Apply the various Optimization techniques for decision making in construction industry.

3. Successfully manage the inventory of a project or industry.

4. Assess and assure about quality of materials and workmanship, in Civil Engineering projects.

5. Manage resources library and market rates, Perform rate analysis .Prepare a WBS (Work Breakdown structure) and Prepare an estimate etc. using the ERP system.

5. Calculate revenue to date for the project, evaluate the performance of a firm based on financial statements and manage working capital of a construction company.

SECTION – I

Unit 1: Definition and Functions of Management **(10 Hrs)**

Planning: Process of planning, Management by objectives. Organizing: Formal and informal organization, centralization, decentralization, line, line and staff, functional organization. Leading, directing, controlling and coordination. Communication process, motivation.

Unit 2: **(10 Hrs)**

Importance of Decision Making, steps in decision making. Decision under certainty: Linear Programming, Formulation of simple L-P model, Graphical method, Simplex method, Duality. Application of Linear Programming in ‘Transportation Problems’: North-West corner method, Least cost method, Vogel’s Approximation method (Only Initial Basic Feasible Solution) and Application of Linear Programming in ‘Assignment problems’.

(4 Hrs)

Unit 3:

Decision under uncertainty: Wald's, Savage, Hurvitz and Laplace criterion of optimism and regret, expected monitory value, Theory of games (dominance pure and mixed strategy). Decision under risk: Decision tree.

Unit 4: **(10 Hrs)**

Queuing or waiting line theory: Applications, Characteristics, Waiting Time and Idle Time costs, Single channel Queuing Problems for calculating average number of customers and average time in system and queue. Monte Carlo Simulation: Concept, procedure and advantages.

SECTION – II

Unit 5: **(10 Hrs)**

Introduction to Dynamic Programming: Need and characteristics, stage and state, process of dynamic programming. Introduction to emerging optimization techniques: Artificial Neural Networks, Fuzzy Logic, Genetic Algorithms (Only concept of each technique).

Unit 6: **(10 Hrs)**

Inventory control Introduction, inventory cost, EOQ analysis, ABC analysis, safety stocks. Construction ERP Benefits, best practices: ISO Documents, Responsibilities, Document Directory Structures, Safety Measures, Approval system for Purchase, Work Orders and Billing, User permissions, The master libraries in the ERP system – Resources Master Library, Construction Activity Specifications Master Library, Rate Analysis Library Estimation using an ERP system-WBS, BOQ, ABC, OH&CP. Financial management: Construction accounting, Chart of Accounts, Financial statements – Profit and loss, Balance sheets, Financial ratios, Working capital management Linear break even analysis: Problems. Quality control: Concept, Statistical Methods, Control charts (X, R, p, c charts).

TEXT BOOKS

1 A. S. Deshpande, A Text book of Principles of Management and Personnel Management, Vora Publications, New Delhi, 1987.

2 Tripathi P. C., P N Reddy, Principles of Management, , Tata McGraw Hill International, New Delhi, 4th Ed. 2011.

3 Hamdy A. Taha, Operation Research, Prentice Hall of India, New Delhi, 8th Ed.2011

4 Menon K. S., Store Management, McMillan Co. New Delhi, 2nd Ed. 1998.

5 Dahlgaard J.J., Kai Kristesen, Gopal K. Kanji, Fundamentals of TQM- Eswar Press, First Indian Reprint 2004.

6 E. L. Grant, Statistical Quality Control- Wiley International Education, 6th Ed.

7 Peterson, S. J., "Construction Accounting and Financial Management", Pearson Education, Upper Saddle River, New Jersey, 2005..

REFERENCE BOOKS

1 Stoner J.A.F, Freeman R. E., Gilbert D. R., Management: Prentice Hall of India, New Delhi, 4 th Ed 2008.

2 Koontz Z. H., Weihrich H, Essentials of Management: Tata McGraw Hill Publications , 2000.

3 Wagner H. M., Principles of Operation Research: Prentice Hall of India, 2nd Ed.1925.

4 Richard Bronson Govindsami N., Operation Research: Shaum's outline series, Tata McGraw Hill , 2nd Ed.2004

5 Gopal Krishnan, Sudeshan, Material Management:.

6 Juran J. M., A. B. Godfrey, Handbook of Quality Control- Mc Graw- Hill International, 5th Ed.

7 Udo Linden, Mrunalini Kulkarni, Hit-Office Construction ERP technical manual, Engineering Design Software and Services Pvt. Ltd., Pune, April 2018 Edition.

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Final Year B. Tech Civil – Part I

CE74E PROFESSIONAL ELECTIVE COURSE-II
CE74E (I) WATER POWER ENGINEERING

Teaching Scheme
Lectures:- 3 Hrs/Week, 3 Credits

Examination Scheme
ISE: 30 Marks
ESE: 70 Marks

Course Outcomes: On completion of the course, the students will be able to:

1. Estimate the available hydropower in a project
2. Select suitable types of hydro-power system for particular site conditions
3. Design penstock and anchor blocks
4. Analyze the different types of loads on power plants
5. Design the components of Tidal power plant

SECTION – I

Unit 1: **(5 Hrs)**

Introduction: Sources of energy, types of power station, choice of type of generation, component of water power project, types of hydro power schemes, general layouts of various hydropower schemes.

Unit 2: **(4 Hrs)**

Estimation of hydro power potential, basic water power equation, gross head, net head nature of supply, storage and pondage. Method of computing hydrographs, mass curves, flow duration curves. Nature of demand: Load curve, load duration curves, load factor, plant factor, plant use factor, firm power secondary power.

Unit 3: **(5 Hrs)**

Intake structures - Types, level of intake, hydraulics of intake structures, trash rack, transition, conduit intake gates.

Unit 4: **(3 Hrs)**

Conduits: Types, economic section, power canals, pen-stock types, hydraulic design and economic diameter pipe supports, anchor blocks, tunnels – classification, location and hydraulic design, tunnel linings .

Unit 5: Air Dispersion & Equations of Continuity **(5 Hrs)**

Surge Tank: Functions and behaviour of the surge tanks, location, types of surge tanks, basic design criteria of simple surge tank, forebay

SECTION – II

Unit 6: **(5 Hrs)**

Power station: General arrangements of a power station, power house, sub-structure and super structure, under ground power station – necessity principal, types, development and economics.

Unit 7: **(5 Hrs)**

Turbines: Classification of turbines, characteristics of different types, choice of type ofturbine, turbine setting and cavitations.

Unit 8: **(4 Hrs)**

Tail race: Functions, types, channel and tunnel draft tubes, function and principal types .

Unit 9: **(4 Hrs)**

Pumped storage plants, purpose and general layout of pumped storage schemes, main types, typical arrangements of the upper reservoirs, economics of pumped storage plants.

Unit 10: **(5 Hrs)**

Tidal power stations: Classification according to the principle of operation and general description of different types, depression power plants.

TEXT BOOKS:

i) Hydro Power Structures – R. S. Varshney (ISBN 8185240787)

ii) Water Power Engineering – M. M. Dandekar, Vikas Pub. House Pvt. Ltd.

iii) Water Power Engineering – P. K. Bhattacharya, Khanna Pub., Delhi

iv) Water Power Engineering – M. M. Deshmukh, Dhanpat Rai and Sons

v) Textbook Of Water Power Engineering- Sharma R. K. , Sharma T. K Publisher: S Chand & Company Ltd.

REFERENCE BOOKS:

i) Water Power Development – E. Mosonvi, Vol. I & II

ii) Hydro-electric Engineering Practice – G. Brown, Vol. I, II & III

iii) Hydro – Electric Hand Book – Creager and Justin 73 w.e.f. academic year 2018-19 T. E. (CIVIL) PART

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Final Year B. Tech Civil – Part I

CE74E PROFESSIONAL ELECTIVE COURSE-II
CE74E (J) AIR AND NOISE POLLUTION AND CONTROL

Teaching Scheme
Lectures:-3 Hrs/Week, 3 Credits

Examination Scheme
ISE: 30 Marks
ESE: 70 Marks

Course Outcomes:

At the end of course, students will be able to

1. Understand about the various air pollutants, their source of generation, their impacts, their effect on human, plants, environment and materials.
2. Apply knowledge of meteorology for controlling air pollution and Design air pollution controlling equipment.
3. Apply knowledge of legislation for prevention and control of air pollution.
4. Acquire knowledge to analyze quality of air in the form of air quality index and dispersion modeling.
5. Understand about Noise pollution and its control.
6. Apply the knowledge of sampling and measurements of air Pollutants

SECTION I

Unit 1:Introduction to Air Pollution (10 Hrs)

Air Pollution, Air and its composition, Structure of the atmosphere, units of measurement. Sources of air pollution (Natural and Artificial, Primary and Secondary, point and Non-Point, Line and Area, Stationary and mobile sources) and its classification, Major air Pollutants and their characteristics, Specific group pollutants such as CFC, GHG etc. Air Pollutants from various industrial sectors. Indore Air Quality, Odor Pollution, Impact of air pollution on human health, vegetation, aquatic life, flora and fauna and Monuments & Buildings, etc

Unit 2: Pollutant Dispersion **(10 Hrs)**

Concept of atmospheric stability, Meteorology, Adiabatic and Environmental Lapse rate. Effect of topography. Effect of wind on Pollutant dispersion. Concept of maximum mixing depth and ventilation coefficient. Wind rose diagram, Plume behavior, Plume rise and Effective stack height.

Air Quality: Introduction to Air quality index and Comprehensive Environmental Pollution Index etc. and its application.

Unit 3: Impacts of Air Pollution **(10 Hrs)**

Extreme air Pollution scenarios: Acid Rain, Global Warming, Smog(s), Ozone layer depletion, Urban Heat Islands, etc. Various treaties and protocols: Kyoto Protocol and Montreal Protocol etc. Episodes.

Dispersion modeling: Introduction to Dispersion modeling, its applications and limitations. Introduction to Gaussian Plume model and GLC determination

SECTION – II

Unit 4: Air sampling, analysis and Legislation **(10 Hrs)**

Air sampling and pollution measurement methods, principles and instruments, Ambient air quality and emission standards, Air pollution indices (aerosols, fog, smog index, etc), Air (Prevention and Control) Pollution Act, 1981, legislation and regulations.

Unit 5: Control of gaseous pollutants and Pollution **(10 Hrs)**

Control principles of Removal of gaseous pollutants by adsorption, absorption, reaction and other methods. Introduction to control methods and equipment for Particulate matter and gases. Working of scrubbers, Electrostatic Precipitator, Gravity settlers, Cyclone separator, Filter bags etc. Other mechanisms of air pollution control such as Biochemical Processes, catalytic processes etc.

Unit 6: Effects, Standards, Monitoring and Control of Noise **(10 Hrs)**

Basics of acoustics and specification of sound; sound power, sound intensity and sound pressure levels; point and line sources, multiple sources; outdoor and indoor noise propagation; psychoacoustics and noise criteria.

Effects of noise on health, annoyance rating schemes; special noise environments: Infrasound, ultrasound, impulsive sound and sonic boom; noise standards and limit values; noise instrumentation and monitoring procedure. Noise indices. Noise control methods.

TEXT BOOKS

1. Air pollution – Wark and Warner
2. Air Pollution – Rao and Rao, TMH
3. Environmental Engineering – by Peavy and Rowe, TMH.
4. Air Pollution and Control- Murali Krishna, Jain Brothers
5. Environmental Pollution Control and Engineering, Rao C.S., New Age International (P) Limited, 1st Ed., 1991.
6. Air Pollution, Perkin, H.G. McGraw Hill 1974.
7. Sources and Control of Air Pollution, R J Heinsohn and R L Kabel, Prentice Hall, 1999
8. Air Pollution Control Equipment Calculations, L Theodore, John Wiley and Sons, 2008

REFERENCE BOOKS

1. Air pollution – Martin Crawford
2. Air Pollution and Control Technologies- Y. Anjaneyulu, Allied Publishers
3. Fundamentals of Air Pollution- Raju BSN, IBH Publisher
4. An Introduction to Air Pollution- R. K. Trivedi and Goyal, BS Publications.
5. Air Pollution. Physical and Chemical Fundamentals, Sainfeld, J.H. McGraw Hill, N.Y. 1975.
6. Air Pollution: Measurement, Modeling and Mitigation, A Tiwari and J Colls, Taylor & Francis, 2010
7. Catalytic Air Pollution Control, Hack, Furraoto and Gulati,John Wiley and Sons, 2009

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Final Year B. Tech Civil – Part I
CE77P PROJECT ON R. C. C. STRUCTURES

Teaching Scheme	**Examination Scheme**
Drawing:- 2 Hrs/Week, 1 Credits	**OE:** 25 Marks
	ICA:- 50 Marks

Course Outcomes:

At the end of course, students will be able to

1. Apply codal provisions in the analysis and design of structures in accordance with relevant IS codes.
2. Prepare detailed drawing of R.C.C section of designed building.
3. Perform the analysis using relevant application software.

INTERNAL CONTINIUOS ASSESSMENT (ICA)

The ICA shall consist of detailed design & drawing of the following R.C. structures by Limit State method unless specified.

1) 3D Analysis and Design of RC Building up to G+10

3D modeling and analysis of RC Framed Building Structure under design load combinations including earthquake loads. Use of commercial software. Analysis of results for design of structural Elements.

2) Any one from the following.

a) Combined trapezoidal footing/ raft foundation / Pile foundation for structure with pile cap.
b) Analysis and design of cantilever retaining wall.
c) Water tank (GSR/USR/ESR) by working stress method using IS 3370.

Note:

i. 3D Computer analysis of for project No.1 shall be performed for Dead Load,
ii. Live Load & Earthquake Loads using relevant application software and IS codes

iii. Structural drawing showing reinforcement details shall be prepared with provision of IS: 13920

TEXT BOOK

1. S.U. Pillai and D. Menon, Reinforced Concrete Design, Tata McGraw Hill, 3rd Edition.
2. P. Agarwal and M. Shrikhande, Earthquake Resistant Design of Structures, Prentice-Hall of India Private Limited, 2006.

REFERENCE BOOKS

1. T. Paulay and M.J.N. Priestley, Seismic Design of Reinforced Concrete and Masonry Buildings, John Wiley and Sons Inc., 1992.
2. S.K. Duggal, Earthquake Resistant Design of Structures, Oxford University Press, 2007.
3. IS 456 (2000), Plain and Reinforced Concrete - Code of Practice, Bureau of Indian Standards, New Delhi.
4. IS 1893 (Part 1): 2016 and IS 1893(Part 3): 2014, Criteria for Earthquake Resistant Design of Structures, Bureau of Indian Standards, New Delhi.
5. IS 13920 (2016), Code of Practice for Ductile Detailing of Reinforced Concrete Structures subjected to Seismic Forces, Bureau of Indian Standards, New Delhi.
6. IS 3370 (Part I): 2009, Code of Practice for Concrete Structures for Storage of Liquids Part I General Requirements. Bureau of Indian Standards, New Delhi
7. IS 3370 (Part II): 2009, Code of Practice for Concrete Structures for the Storage of Liquids Part II Reinforced Concrete Structures. Bureau of Indian Standards, New Delhi.
8. IS 3370 (Part IV): 1997, Code of Practice for Concrete Structures for the Storage of Liquids, Design Tables. Bureau of Indian Standards, New Delhi.
9. IS 11682 (1985): Criteria for Design of RCC Staging for Overhead Water Tanks

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Final Year B. Tech Civil – Part I
CE78S SEMINAR

Teaching Scheme
Practical:-2 Hrs/Week, 1 Credits

Examination Scheme
ICA: 25 Marks
OE : 25 Marks

Objectives:

1) To expose the students to a variety of subjects and research activities in Civil Engineering in order to enrich their academic experience.
2) To acquaints department members with all final year students within the department and learn about each students' seminar activities.
3) To give an opportunity for students to develop skills in presentation and discussion of various topics in a public forum.

The topic for the Seminar may be related to Civil Engineering area and inter-disciplinary arearelated to Civil Engineering such as

1) Structural Engineering
2) Environmental Engineering
3) Geotechnical Engineering
4) Transportation Engineering
5) Infrastructural Engineering
6) Water Resources Engineering
7) Town & Country Planning
8) Construction Engineering
9) Surveying & Remote Sensing Techniques
10) Project Management
11) Legal Aspects in Civil Engineering
12) Earthquake Engineering
13) Disaster Management

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Final Year B. Tech Civil – Part I

CE79V ASSESSMENT OF REPORT ON FIELD TRAINING

Teaching Scheme	**Examination Scheme**
Credit:- 1 Credit	**ICA**:- 25 Marks

The basic objective of this Field Training Programme is to expose the students to,

1. Gain direct field/ practical experience with the actual civil engineering work processes such as Surveying, marking out, Mixing, Quality control, Reinforcement (i.e., cutting, bending and placement), Measurements, advance construction equipment, Curing, Centering etc.
2. It is intended that the students understand how theoretical aspects are put into actual action in the form of field activities.

In this light following exercise assignments are required to be covered by engaging students at actual work sites.

1. Marking out building plan on field.
2. Centering details in multi-storey buildings
3. Reinforcement details of all RCC structural members
4. Excavation and bed concreting for different structures (e.g., Bridges, Dams, Buildings etc.)
5. Road pavement work. (Pavement Layer construction and Quality control tests)
6. Plumbing accessories and techniques.
7. Measurements, units and rates for important raw materials.
8. Set of documents for new construction works(Scheduling, Detailed Project Reports)
9. Bank loans, processing, repayment details and running bill preparations
10. Scheduling

Report should include daily progress of the construction works along with detail photographs.

FINAL YEAR B.TECH

Civil Engineering Honours Pattern

SEMESTER II

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Final Year B. Tech Civil – Part II

CE81H PROFESSIONAL PRACTICE, LAW & ETHICS

Teaching Scheme
Lectures:- 3 Hrs/Week, 3 Credits

Examination Scheme
ESE: 100 Marks

Course Outcomes:

1. Explain role of various stakeholders in the Civil Engineering profession and
2. Draft and interpret contracts and contracts management in civil engineering, dispute resolution mechanisms and laws governing engagement of labour
3. Explain process of filing Intellectual Property Rights and Patents.
4. Interpret and explain fundamental ethics governing the profession society as practitioners of the civil engineering profession.
5. Exlain legal and practical aspects of Civil Engineering profession

Section I

Unit 1- Professional Practice – **(7Hrs)**

Respective roles of various stakeholders:

Government (constituting regulatory bodies and standardization organizations, prescribing norms to ensure safety of the citizens); Standardization Bodies (ex. BIS, IRC) (formulating standards of practice); professional bodies (ex. Institution of Engineers(India), Indian Roads Congress, IIA/ COA, ECI, Local Bodies/ Planning Authorities) (certifying professionals and offering platforms for interaction);Clients/ owners (role governed by contracts); Developers (role governed by regulations such as RERA); Consultants (role governed by bodies such as CEAI); Contractors (role governed by contracts and regulatory Acts and Standards); Manufacturers/ Vendors/ Service agencies (role governed by contracts and regulatory Acts and Standards).

Unit2- Professional Ethics – **(7 Hrs)**

Definition of Ethics, Professional Ethics, Business Ethics, Corporate Ethics, Engineering

Ethics, Personal Ethics;

Code of Ethics as defined in the website of Institution of Engineers (India); Profession, Professionalism, Professional Responsibility, Professional Ethics; Conflict of Interest, Gift Vs Bribery, Environmental breaches, Negligence, Deficiencies in state-of-the-art; Vigil Mechanism, Whistleblowing, protected disclosures.

Unit3:General Principles of Contracts Management: (8Hrs)

Indian Contract Act, 1972 and amendments covering General principles of contracting;Contract Formation & Law; Privacy of contract; Various types of contract and their features;Valid & Voidable Contracts; Prime and sub-contracts; Joint Ventures & Consortium; Complexcontract terminology; Tenders, Request For Proposals, Bids & Proposals; Bid Evaluation; Contract Conditions & Specifications; Critical /" Red Flag" conditions; Contract award &Notice To Proceed; Variations & Changes in Contracts; Differing site conditions; Costescalation; Delays, Suspensions & Terminations; Time extensions & Force Majeure; DelayAnalysis; Liquidated damages & Penalties; Insurance & Taxation; Performance and ExcusableNon-performance; Contract documentation; Contract Notices; Wrong practices in contracting(Bid shopping, Bid fixing, Cartels); Reverse auction; Case Studies; Build-Own-Operate &variations; Public-Private Partnerships; International Commercial Terms;

SECTION II

Unit4 *:*Arbitration, Conciliation and Alternative Dispute Resolution) system: (7Hrs)

Arbitration – meaning, scope and types – distinction between laws of 1940 and 1996; UNCITRAL model law – Arbitration and expert determination; Extent of judicial intervention; International commercial arbitration; Arbitration agreements – essential and kinds, validity, reference and interim measures by court; Arbitration tribunal – appointment, challenge, jurisdiction of arbitral tribunal, powers, grounds of challenge, procedure and court assistance; Award including Form and content, Grounds for setting aside an award, Enforcement, Appeal and Revision; Enforcement of foreign awards – New York and Geneva Convention Awards; Distinction between conciliation, negotiation, mediation and arbitration, confidentiality, resort to judicial proceedings, costs; Dispute Resolution Boards; Lok Adalats

Unit5 : Engagement of Labour and Labour & other construction-related Laws: (8Hrs)

Role of Labour in Civil Engineering; Methods of engaging labour- on rolls, labour sub-

contract, piece rate work; Industrial Disputes Act, 1947; Collective bargaining; Industrial Employment (Standing Orders) Act, 1946; Workmen's Compensation Act, 1923; Building & Other Construction Workers (regulation of employment and conditions of service) Act (1996) and Rules (1998); RERA Act 2017, NBC 2017

Unit6: Law relating to Intellectual property: (8Hrs)

Introduction – meaning of intellectual property, main forms of IP, Copyright, Trademarks, Patents and Designs, Secrets; Law relating to Copyright in India including Historical evolution of Copy Rights Act, 1957, Meaning of copyright – computer programs, Ownership of copyrights and assignment, Criteria of infringement, Piracy in Internet – Remedies and procedures in India; Law relating to Patents under Patents Act, 1970 including Concept and historical perspective of patents law in India, Patentable inventions with special reference to biotechnology products, Patent protection for computer programs, Process of obtaining patent – application,examination, opposition and sealing of patents, Patent cooperation treaty and grounds for opposition, Rights and obligations of patentee, Duration of patents – law and policy considerations, Infringement and related remedies.

Text/Reference Books:

1. B.S. Patil, Legal Aspects of Building and Engineering Contracts, 1974.
2. The National Building Code, BIS, 2017
3. RERA Act, 2017
4. Meena Rao (2006), Fundamental concepts in Law of Contract, 3rd Edn. ProfessionalOffset
5. Neelima Chandiramani (2000), The Law of Contract: An Outline, 2nd Edn. AvinashPublications Mumbai
6. Avtarsingh (2002), Law of Contract, Eastern Book Co.
7. Dutt (1994), Indian Contract Act, Eastern Law House
8. Anson W.R. (1979), Law of Contract, Oxford University Press
9. Kwatra G.K. (2005), The Arbitration & Conciliation of Law in India with case law onUNCITRAL Model Law on Arbitration, Indian Council of Arbitration
10. Wadhera (2004), Intellectual Property Rights, Universal Law Publishing Co.
11. T. Ramappa (2010), Intellectual Property Rights Law in India, Asia Law House
12. Bare text (2005), Right to Information Act

13. O.P. Malhotra, Law of Industrial Disputes, N.M. Tripathi Publishers
14. K.M. Desai(1946), The Industrial Employment (Standing Orders) Act
15. Rustamji R.F., Introduction to the Law of Industrial Disputes, Asia Publishing House

Prof. Elective-III

Semester-VIII

Elective No	Semester	(I) Structural Engineering	(II) Geotechnical Engineering & Transportation Engg.	(III) Construction Engineering & Management	(IV) Environmental Engineering &Hydraulics, Hydrology & Water Resources Engineering
Prof. Elective-III	Semester-VIII	Repairs & Rehabilitation of Structures	Urban Transportation Planning.	Cost Management of Engineering Projects	Water and Air Quality Modelling
		Industrial Structures	Ground improvement Techniques	Disaster Management	

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Final Year B. Tech Civil – Part I

CE75E PROFESSIONAL ELECTIVE COURSE-III
CE75E (A) REPAIRS & REHABILITATION OF STRUCTURES

Teaching Scheme
Lectures:-3 Hrs/Week, 3 Credits

Examination Scheme
ESE: 100 Marks

Course Outcomes:

At the end of course, students will be able to

1. Understand the fundamentals of maintenance and repair strategies.
2. Identify for serviceability and durability aspects of concrete.
3. Know the materials and techniques used for repair of structures.
4. Decide the appropriate repair and retrofitting techniques.

SECTION I

Unit 1: Assessment and Maintenance of structures (10 Hrs)

Repair and rehabilitation, facts of maintenance, importance of maintenance various aspects of inspection, assessment procedure for evaluating damaged structure, causes of deterioration. Repair Strategies: Causes of distress in concrete structures, construction and design failures, condition assessment and distress-diagnostic techniques, assessment procedure for inspection and evaluating a damaged structure.

Unit 2: Serviceability and Durability of Concrete (10 Hrs)

Quality assurance for concrete construction, concrete properties – strength, permeability, thermal properties and cracking. Effects due to climate, temperature, chemicals, corrosion.

Unit 3: Materials and Techniques for Repair (10 Hrs)

Special concretes and mortar, concrete chemicals, special elements for accelerated strength gain, expansive cement, polymer concrete, sulphur infiltrated concrete, ferro cement, fibre reinforced concrete, bacterial concrete, rust eliminators and polymers coating for rebars

during repair, foamed concrete, mortar and dry pack, vacuum concrete, gunite and shotcrete, epoxy injection, mortar repair for cracks, shoring and underpinning

SECTION – II

Unit 4: Repair, Rehabilitation and Retrofitting Techniques (10 Hrs)

Repairs to overcome low member strength, deflection, cracking, chemical disruption, weathering corrosion, wear, fire, leakage and marine exposure.

Unit 5: Repair of structure (10 Hrs)

Common types of repairs repair in concrete structures, repairs in under water structures. Strengthening of Structures: Strengthening Methods, retrofitting, jacketing.

Unit 6: Health Monitoring and Demolition Techniques (10 Hrs)

Long term health monitoring techniques, engineered demolition techniques for dilapidated structures, use of sensors for building instrumentation.

TEXT BOOK

1) Concrete Technology, Theory and Practice by M.S. Shetty, S, Chand Publications, New Delhi

REFERENCE BOOKS

1. Concrete Technology by A.R. Santakumar, Oxford University press
2. Defects and Deterioration in Buildings, E F & N Spon, London
3. Non-Destructive Evaluation of Concrete Structures by Bungey - Surrey University
4. Maintenance and Repair of Civil Structures, B.L. Gupta and Amit Gupta, Standard Publications.
5. Concrete Repair and Maintenance Illustrated, RS Means Company Inc W. H. Ranso, (1981)
6. Building Failures: Diagnosis and Avoidance, EF & N Spon, London, B .
7. Mehta, P.K and Montevic. P.J., Concrete- Microstructure, Properties and Materials, ICI, 997
8. Jackson, N., Civil Engineering Materials, ELBS, 1983.

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Final Year B. Tech Civil – Part II

CE75E PROFESSIONAL ELECTIVE COURSE-III
CE75E (B) INDUSTRIAL STRUCTURES

Teaching Scheme
Lectures:-3 Hrs/Week, 3 Credits

Examination Scheme
ESE: 100 Marks

Course Outcomes:

At the end of course, students will be able to

1. Plan different types of industrial structures.
2. Analyze shed using single storey portal frame with and without gantry
3. Analyze and design pressed circular steel tanks.
4. Analyze steel chimney.
5. Analyze and design steel towers.
6. Analyze and design foundation for rotary machine and impact machine.

SECTION I

Unit 1: **Introduction to industrial structures** **(6 Hrs)**

Classification of industries and industrial structures – General requirements of various industries – Planning and layout of buildings and components. Introduction to PEB Structures.

Unit 2: **Portal Frame** **(12 Hrs)**

Industrial shed using single storey portal frame with and without gantry.

Unit 3: **Steel tank** **(12 Hrs)**

Analysis and Design of circular steel tank, Pressed steel (rectangular) tank.

SECTION II

Unit 4: **Chimneys (steel)** **(10 Hrs)**

Loads and stresses in chimney shaft, Earthquake and wind effect, Stresses due to temperature difference, combined effect of loads and temperature, temperature.

Unit 5: **Steel towers** **(12 Hrs)**

Types and configuration, Analysis and design of steel towers

Unit 6: **Machine foundations** **(8 Hrs)**

Introduction, machine vibration, structural design of foundation to rotary machines, impact machines, vibration characteristics, design consideration of foundation to impact machine.

Note:

IS 800: 2007, IS 875to be allowed along with Steel Tables in Exam

TEXT BOOKS

1. Pasala Dayaratnam – Design of Steel Structure – 1990.
2. Subramanian, N., Design of Steel Structures, Oxford University Press, 2008.
3. Ramachandra and Virendra Gehlot, Design of steel structures -Vol. 2, ScientificPublishers, 2012.
4. Bhavikatti.S.S., "Design of Steel Structures", J.K. International Publishing HousePvt.Ltd., 2009.
5. Limit State Design of Steel Structures, By Ram Chandra and Virendra Gehlot Vol-II,2007.

REFERENCE BOOKS

1. Steel Designers Manual: ELBS Low Priced 4th Edition Year
2. Principles of Space Structures: N. Subramanian.
3. Limit State Design of Steel Structures as per IS 800/2007 by S.Kanthinathan, WileyPublication
4. Advanced Design in Structural Steel: John E. Lothers
5. Limit State Design of Structural Steel, M.R. Shiyekar, PHI Learning Pvt. Ltd., SecondEdition, 2013
6. Handbook of Machine Foundation, Shrinivasulu P. and VaidyanathanC. Tata McGrawHill, 1978.
7. SP:6 -1964, Handbook for Structural Engineers.
8. IS 800:2007, Code of Practice for General Construction in Steel.
9. LRFD Steel Design: William T. Segui, PWS Publishing
10. IS 2974-1 (1982)Code of Practice for Design and Construction of Machine Foundations
11. Pre - Engineered Steel Building by by K S Vivek , P Vyshnavi Lambert AcademicPublishing.

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Final Year B. Tech Civil – Part II

CE75E PROFESSIONAL ELECTIVE COURSE-III
CE75E (C) URBAN TRANSPORTATION PLANNING

Teaching Scheme
Lectures:-3 Hrs/Week, 3 Credits

Examination Scheme
ESE: 100 Marks

Course Outcomes:

After completion of the course, students will be able to

1. Design and carry out surveys to provide the data required for transportation planning.
2. Prepare zonal demand generation and attraction regression models.
3. Prepare demand distribution models and modal split models for mode choice analysis.
4. Develop and calibrate trip generation rates for specific types of land use developments.
5. Compare among planning alternatives that best integrate multiple objectives such as technical feasibility and cost minimization.

Section-I

Unit 1: **(6)**

Land use and Transportation System: Introduction-Urban system Components-Concepts and definitions-Criteria for measuring urban sprawl— Location theory-urban growth or decline

Unit2: **(8)**

Transportation Planning Process: Introduction-Definition-Factors to be considered; Land use transportation planning; systems approach-Stages-Inventory of Existing Conditions-Difficulties in implementation.

Unit3: **(8)**

Transport Surveys: Basic Movements- Study Area-Zones-Surveys- Planning of different types of surveys and interpretation, Travel demand; Traffic surveys for mass transit system planning. -

Section-II

Unit 4: **(6 Hrs)**

Trip Generation and Distribution: Factors governing trip generation and attraction – Application of Regression Analysis- Methods of trip distribution; Growth and Synthetic Models Calibration and Application of gravity model. -Category analysis. Problems

Unit 5: **(6 Hrs)**

Modal Split and Assignment: Factors affecting modal split; Modal split in transport planning; Principles of traffic assignment; assignment techniques. Problems

Unit 6: **(6 Hrs)**

Land Use Models – Lowry Model-Hansen's Accessibility Model-Density -Saturation Gradient Model-Problems (Except on Lowry Model).

Unit 7: **(4**Hrs**)**

Mass Transit Systems: Types- Capacity, Fleet planning and Scheduling

TEXT BOOKS

1. `Traffic Engineering and Transportation Planning' - Kadiyali, L. R., Khanna Publication, New Delhi, 2009.
2. "Transportation Engineering –An Introduction"- JotinKhisty and B. Kent Lall, PHI, New Delhi, 3rd Indian Edition, 2006.
3. `Principles of Urban Transport System Planning' - Hutchinson, B.G., McGraw Hill Book Co., London, UK, 1982.

REFERENCE BOOK

1. Institute of Traffic Engineers - An Introduction to Highway Transportation Engineering, New York., 1982.

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Final Year B. Tech Civil – Part II

CE75E PROFESSIONAL ELECTIVE COURSE-III
CE75E (D) GROUND IMPROVEMENT TECHNIQUES

Teaching Scheme
Lectures:-3 Hrs/Week, 3 Credits

Examination Scheme
ESE: 100 Marks

Course Outcomes:

At the end of course, students will be able to

1. Classify ground modification techniques for various type of soil
2. Design shallow compaction system as well as deep dynamic compaction system
3. Design hydraulic modification system such as PVD system, sand drains, stone columns, dewatering systems
4. Apply various techniques of Physico-Chemical modification which suits the soil at site
5. Apply various techniques of soil Modification by inclusions and confinement.

SECTION I

Unit 1: Introduction (10 Hrs)

Ground modification option in dealing with difficult soils, objectives of ground improvement. Role of ground improvement in foundation engineering – classification of ground modification techniques – Geotechnical problems in alluvial, lateritic and black cotton soils –Factors to be considered in the selection of the best soil improvement technique.

Unit 2: Mechanical modification (10 Hrs)

Introduction, aim of mechanical modification; surface compaction of soil, various equipment for compaction and their suitability for different soils.

In-situ Densification methods in cohesionless soils: Rapid impact compaction, Deep Dynamic compaction, Vibro flotation, Sand compaction piles and deep compaction and blasting.

In-situ Densification methods in cohesive soils: Introduction, Consolidation, Preloading with sand drains, and fabric drains, Stone columns and Lime piles, installation techniques, simple design , relative merits of above methods and their limitations.

Unit 3: Hydraulic modification **(10 Hrs)**

Dewatering, purpose of dewatering during construction stage and post construction stage, methods of dewatering such as ditch and sump method, Well point system , deep well system, Vacuum dewatering system, Electro-osmotic method ; advantages and limitations of each method Seepage analysis for two dimensional flow, fully penetrating slots in homogeneous deposits (simple cases only).

SECTION II

Unit 4: Thermal modification and slope stabilization **(8 Hrs)**

Heat treatment of soils, methods of heating soil in situ; ground freezing introduction, techniques of in situ artificial ground freezing,

Slope stabilization Concept, various methods, Growing vegetation, drainage, anchoring, micro piling bolting Soil nailing etc.

Unit 5: Physico-Chemical modification **(8 Hrs)**

Mechanical stabilization: Soil aggregate mixture, properties and proportioning techniques, soft aggregate stabilization, compaction, field compaction control. Cement stabilization, Mechanism, factors affecting and properties, use of additives, design of soil cement mixtures, construction techniques.

Lime and Bituminous Stabilization: Types of admixtures, mechanism, factors affecting, design of mixtures, construction methods.

Unit 6: Modification by inclusions and confinement **(7 Hrs)**

Grout injections, suspension and solution grouts, grouting equipment and methods, Applications. Reinforced Earth: Principles, components of reinforced earth, factors governing design of reinforced earth walls, Introduction to reinforced earth, load transfer mechanism and strength development, soil types and reinforced earth, anchored earth nailing reticulated micro piles, soil dowels, soil anchors, reinforced earth retaining walls.

Unit 7: Fundamentals of bridge design for Railway criterion **(7 Hrs)**

Different types of bridges plate girders, composite girders, open web girders, underslung, box, PSC RCC spans, etc. and design criterion.

TEXT BOOKS:

1. Engineering principles of ground modification by M. R. Hausmann, McGraw hill publication
2. Ground Improvement Techniques- Purushothama Raj P. (1999), Laxmi Publications, New Delhi.
3. Construction and Geotechnical Method in Foundation Engineering- Koerner R.M. (1985) - McGraw Hill Pub. Co., New York.

REFERENCE BOOKS:

1. Foundation and earth retaining structures by Muni Budhu John Wiley and sons
2. Ground Improvement by M.P. Moseley and K. KirschSpon press
3. Das, B.M., Principles of Foundation Engineering, Fourth Edition, PWS Publishing, 1999.
4. Boweven R., Text Book on Grouting in Engineering Practice, Applied Science Publishers Ltd.
5. Donald .H. Gray & Robbin B. Sotir, Text Book on Bio Technical & Soil Engineering Slope Stabilization, John Wiley
6. Rao G.V. & Rao G.V.S., Text Book On Engineering with Geotextiles, Tata McGraw Hill
7. Soil stabilization, Principles and Practice—Ingles C.G. and Metcalf J. B. (1972), Butter worth, London.
8. Shroff A. V. "Grouting Technology in Tunneling and Dam, Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi-1999
9. Moseley M. D. Ground Treatment, Blackie Academic and Professional, 1998.
10. Van Impe W. E., Text Book on Soil Improvement Techniques and Their Evolution, Balkena Publishers.

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Final Year B. Tech Civil – Part II
CE75E PROFESSIONAL ELECTIVE COURSE-III
CE75E (E) COST MANAGEMENT OF ENGINEERING PROJECTS

Teaching Scheme
Lectures:-3 Hrs/Week, 3 Credits

Examination Scheme
ESE: 100 Marks

Course Outcomes:

At the end of course, students will be able to

1. Plan the project and prepare Bar chart and Network to optimize the project duration and cost
2. Update the network and re-evaluate the resources.
3. Use appropriate project management application software for planning, tracking and reporting progress of civil engineering projects.
4. Calculate output of earthmoving, hoisting, dredging equipments.
5. Adopt appropriate safety measures for various Civil Engineering Projects.
6. Explain prefabricated constructions, Diaphragm wall constructions, advanced formwork and Hot Mix Plant.

SECTION I

Unit 1: INTRODUCTION **(8 Hrs)**

Introduction and Overview of the Strategic Cost Management Process.

Unit 2: COST CONCEPTS **(6 Hrs)**

Cost concepts in decision-making; Relevant cost, Differential cost, Incremental cost and Opportunity cost. Objectives of a Costing System; Inventory valuation; Creation of a Database for operational control; Provision of data for Decision Making.

Unit 3: PROJECT MANAGEMENT **(6 Hrs)**

Project: meaning, Different types, why to manage, cost overruns centers, various stages of project execution: conception to commissioning. Project execution as conglomeration of technical and nontechnical activities. Detailed Engineering activities. Pre project execution main clearances and documents. Project team: Role of each member. Importance Project site: Data required with significance. Project contracts. Types and contents. Project execution Project cost control. Bar charts and Network diagram. Project commissioning: mechanical and process.

SECTION II

Unit 4: COST BEHAVIOR AND PROFIT PLANNING (4 Hrs)

Cost Behavior and Profit Planning Marginal Costing; Distinction between Marginal Costing and Absorption Costing; Break-even Analysis, Cost-Volume-Profit Analysis. Various decision-making problems. Standard Costing and Variance Analysis. Pricing strategies: Pareto Analysis. Target costing, Life Cycle Costing. Costing of service sector. Just-in-time approach, Material Requirement, Planning, Enterprise Resource Planning, Total Quality Management and Theory of constraints. Activity-Based Cost Management, Bench Marking; Balanced Score Card and Value-Chain Analysis. Budgetary Control; Flexible Budgets; Performance budgets; Zero-based budgets. Measurement of Divisional profitability pricing decisions including transfer pricing.

Unit 5: Mechanical v/s Manual construction (8 Hrs)

Quantitative techniques for cost management, Linear Programming, PERT/CPM, Transportation Problems, Assignment problems, Simulation, Learning Curve Theory.

TEXT BOOKS

1. A Management Guide to PERT/CPM: Weist J. D. ,Levy, Prentice Hall of India, New Delhi, 2nd Ed. 1982
2. PERT and CPM Principles and Applications: Srinath L. S., East West Publication, New Delhi, 3rd Ed. 1995.
3. PERT and CPM- B. C. Punmia, K. K. Khandelwal, Laxmi Publications, New Delhi, 4th Ed. 2012.
4. Computerized Project Management Technique for Manufacturing and construction: Samaras T.T., Kim Yensueng, Prentice Hall of India, New Delhi, 1979.
5. Principles of Construction Management: Roy Pilcher , Tata McGraw Hill Publications.
6. Construction, Planning, Equipment and methods - R. L . Peurifoy McGraw hill book co New Delhi.
7. Construction Equipment Guide, David A. Day, Neal B. H. Benjamin, John Wiley & Sons. Construction Equipment – Mahesh Varma ,Metropolitan book co ,New York
8. Heavy Construction – Planning, Equipment and methods – Jagman Singh, Oxford and IBH publishers, New Delhi.

9. Construction of Diaphragm Walls, I Hajnal, I Marton, F. Regele Wiley Interscience Publication, John Wiley & Sons.
10. Structural & cut off Diaphragm walls, R.G.H. Boyes, Applied Science Publishers Ltd., London.

REFERENCE BOOKS

1. CPM in Construction Practice, Antill J. M., John Wiley and Sons.
2. Construction Project Management – Planning, Scheduling and Control- Chitkara K.K., Tata McGraw Hill Publications New Delhi, 4th Ed. 2002.
3. Construction Planning and Management through System Techniques: Verma M., Metropolitan Publication, 3rd Ed. 1985.
4. Construction Project Management- Bennett J. M. Clough R. H., Butterworth's Wiley John, New Delhi, 1972.
5. Construction Scheduling with Primavera Enterprise- Marchman D.A., Thomson/Brooks-Cole.

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Final Year B. Tech Civil – Part II

CE75E PROFESSIONAL ELECTIVE COURSE-III

CE75E (F) DISASTER MANAGEMENT

Teaching Scheme
Lectures:-3 Hrs/Week, 3 Credits

Examination Scheme
ESE: 100 Marks

Course Outcomes:

By the end of the course students will be able to

1) Apply various disaster preparedness, mitigation and management techniques.
2) Apply the Geo-informatics techniques for prepare hazard zonation maps for Disaster management.
3) Apply the various schemes and programmes of International, National and State and District Level Agencies for disaster management.

SECTION-I

Unit 1: Environmental Hazards and Disasters **(08)**

Meaning of Environmental hazards, Environmental Disasters and Environmental stress. Concept of Environmental Hazards, Environmental stress & Environmental Disasters. Differentapproaches & relation with human Ecology- Landscape Approach- Ecosystem Approach- Perception approach- Human ecology & its application in geographical researches.

Unit 2: Types of Environmental hazards and Disasters:- **(08)**

Natural disaster and Planetary Hazards

Earthquake Hazards/ disasters- Introduction, general characteristics, mechanism, causes and effects of Earthquakes, prediction, seismic zones, seismic waves, vulnerability, damage potential - magnitude and intensity, Earthquake Hazards in India- Human adjustment, perception and mitigation of earthquake.

Volcanic Hazards/Disasters:- Volcanoes Causes of volcanism, volcanic materials, hazardous effects and impacts of volcanic eruptions.

Landslide and Land Degradation:- Causes, tectonic conditions, erosion, avalanches, rock fall, damage assessment. Landslide prone area in India.

Cyclones and Tsunamis:- Structure and nature of cyclones (Tropical cyclones & Local storms) & tsunamis, characteristics, hazard donation, factors, hazard potential, impact assessment. Cyclone prone areas in India.

Floods:- General characteristics, causes, Flood hazards India, geomorphology and floods, flood forecasting, river and coastal floods, flash floods, lake outburst, risks, environmental planning, flood control and management (Human perception & mitigation).

Droughts:- Cause and Impacts of droughts- Drought hazards in India- Drought control measures.

Man-made Disaster and Extra Planetary Hazards/ Disasters

Man induced Hazards /Disasters-Physical hazards/ Disasters-Soil Erosion

Soil Erosion:- Mechanics & forms of Soil Erosion- Factors & causes of Soil Erosion, Conservation measures of Soil Erosion.

Mining:- Mining and environment, land & environment degradation and management, Mined land reclamation.

War and Chemicals disaster: - Release of toxic chemicals Hazardous wastes, reactivity,toxicity, nuclear war, biological weapons, armed conflicts, land mines etc.

Sedimentation processes: - Global Sedimentation problems, Regional Sedimentation problems. Sedimentation & Environmental problems- Corrective measures of Erosion & Sedimentation.

Biodiversity Extinction and Deforestation:- Biodiversity, species at risks, loss of biodiversity, management of species diversity, deforestation its causes & adverse effects.

Biological hazards/ disasters: - Population Explosion.

Unit 3: **Disaster Management:- Three Stages** **(06 Hrs)**

Pre-disaster stage (Preparedness):- Introduction to disaster preparedness, Three A's of disaster preparedness, principles of disaster preparedness, steps in disaster preparedness, Preparing hazard zonation maps, Predictability/ Forecasting & warning, preparing disaster preparedness plan. Land use zoning- Preparedness through (IEC) Information, education and Communication. Disaster resistant house construction- Population reduction in vulnerable areas- Awareness.

Emergency stages: - Planning, mitigation, preparedness, response and recovery.

Post Disaster stage (Rehabilitation):- Physical and Social Infrastructure, Social and economic rehabilitation, Repair and retrofitting, Political Administrative Aspect.

SECTION-II

Unit 4: **(05)**

Natural Disaster Reduction and Management:- Provision of Immediate relief measures to disaster affected people-Prediction of Hazards & Disasters-Measures of adjustment to natural hazards.

Unit 5: **(09)**

Disaster Mitigation:-

Disaster Mitigation through Development: Disaster Mitigation: Basic Concepts, Meteorological and Seismological observation, Structured and Non Structured Mitigation, disaster mitigation strategies, importance of Information and Communication in Disaster Mitigation, Relationship between Disaster and Development, Sustainable Development for Disaster Mitigation, Importance of various Agencies/sectors involved for disaster mitigation. Education on disasters -Community involvement, The adjustment of Human Population to Natural hazards & disasters. Role of database in Disaster Mitigation, GIS and GPS applications.

Role of Media

Monitoring Management- Programme of disaster research and mitigation of disaster of following organizations. International Council for Scientific Unions (ICSU)-Scientific committee on problems of the Environment (SCOPE), International Geosphere Biosphere programme (IGBP) -

World federation of Engineering Organizations (WFED). National Academy of Sciences-World Meteorological organizations (WMO). Various U.N agencies like UNCRD, IDNDR, WHO, UNESCO, UNICEF, UNEP.

Unit 6: Agencies in Disaster Management (9Hrs)

International Agencies: United Nations and its specialized agencies like UNDP, FAO, WHO AEC (Atomic Energy Commission), United Nations Disaster Management Cell, New Delhi. International Federation of Red Cross and Red Crescent Societies (IFRC) and National Red Cross/Red Crescent Societies.

National Agencies: Disaster Management Cell (Ministry of Home Affairs, Govt. of India), National Institute of Disaster Management, Indian Red Cross Society, Planning Commission, National Civil Defense Organization, Bharat Scouts and Guides. Military and Para-Military Forces; Corporate Bodies etc.

State and District Level Agencies: Disaster Management cells at state level and District level, District Magistrate office, Role and Responsibilities of DM in prevention, preparedness, mitigation, relief and rehabilitation; local bodies and role of different functionaries.

TEXT BOOKS

1. The Environment as Hazards, Kates, B.I& White, G.F, Oxford, New York, 1978
2. Disaster Management, R.B. Singh, Rawat Publication, New Delhi, 2000.
3. Disaster Management H.K. Gupta, Universities Press, India, 2003.
4. Space Technology for Disaster Mitigation in India (INCED), R.B. Singh, University of Tokyo, 1994.
5. Disaster Management in Hills, Dr. Satender, Concept Publishing Co., New Delhi, 2003.
6. Plan for Earthquake, Disaster, Mitigation, Disaster Management, A.S. Arya, V.K. Sharma, Action IIPA Publication New Delhi, 1994.
7. An overview on Natural and Man-made Disaster & their Reduction, R.K. Bhandani, SIR, New Delhi.
8. Disaster Mitigation, Preparedness, Recovery and Response, P. C. Sinha, SBS Publishers and Distributors Pvt. Ltd.
9. Introduction to International Disaster Management, D. P. Coppola, Butterworth-Heinemann.
10. Disaster Management M. Sharma, Vinod K., NCDM, IIPA, New Delhi, 1994

11. Housing in Disaster prone areas, National Building Organization and U.N. Regional Centre, Mathur G.C., ESCAP, New Delhi, 1986.
12. Disaster Management, Dr. Mrinalini Pandey, Wiley Publication.

REFERENCE BOOKS

1. Disaster Management in India – A Status Report, National Disaster Management Division, Ministry of Home Affairs, Govt. of India, 2004.
2. Disaster Management and Preparedness, Collins Larry R. and Scheind Thomas D.(2000)., Taylor and Francis, 2000.
3. Disaster Management, Sharma V.K., Indian Institute of Public Administration, NewDelhi, 1995.
4. National Disaster Response Plan, NCDM, New Delhi, 2001.

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Final Year B. Tech Civil – Part II

CE75E PROFESSIONAL ELECTIVE COURSE-III
CE75E (G) WATER & AIR QUALITY MODELLING

Teaching Scheme
Lectures:-3 Hrs/Week, 3 Credits

Examination Scheme
ESE: 100 Marks

Course Outcomes:

At the end of course, students will be able to

1. Analyze the water quality programs and their implementation including the water sampling and analysis
2. Implement water quality data analysis and WQI calculations.
3. Make use of water quality parameters for modelling andexposure to some of the conventionally used water quality models.
4. Implement the techniques employed in the monitoring of particulates and gaseous pollutants in ambient air and stack gas .
5. Categories air and water qualia index

SECTION I

Unit 1: **(10 Hrs)**

Casual and statistical models-Characteristics- Steps in model development - Importance of model building.- conservation of mass and mass balance –calibration and verification of models; Transport phenomena – Advection, diffusion, dispersion, simple transport models; chemical reaction kinetics – Law of mass action, Rate constants, reaction order, types of reactions, equilibrium principles.

Unit 2: **(10 Hrs)**

Water quality models – Historical development – Mass balance equation – Streeter - Phelps Equation – Modification to Streeter – Phelps Equation – Waste load allocations – Dissolved oxygen in Rivers and estuaries; Lake Water Quality Models; Models for Nitrogen, Bacteria, Phosphate and toxicants - Ground Water Quality Modeling -Contaminant solute transport equation, Numerical methods.

Unit 3: **(10 Hrs)**

Chemistry of air Pollutants - Atmospheric reactions, sinks for air pollution –Transport of air Pollutants - Meteorological settling for dispersal of air pollutants– Vertical structure of temperature and stability, atmospheric motions, Wind and shear, self-cleaning of atmosphere; transport and diffusion of stack emissions – atmospheric characteristics significant to transport and diffusion of stack emission – stack plume characteristics.

SECTION-II

Unit 4: **(10 Hrs)**

Types modeling technique, modeling for non-reactive pollutants, single source, short term impact, multiple sources and area sources, Fixed box models- diffusion models – Gaussian plume derivation-modifications of Gaussian plume equation- long term average-multiple cell model- receptor oriented and source oriented air pollution models, model performance, accuracy and utilization.

Unit 5: **(10 Hrs)**

Categories of water quality index. Determination of water quality index (WQI): Industrial and municipal effluent index, ambient water quality index, combined water quality index and Delphi method.

Unit 6: **(10 Hrs)**

Categories of air quality index. Determination of air quality index (AQI): National AQI, Extreme value indices, Regional indices.

TEXT BOOKS

1. Steven C. Chapra, Surface Water Quality Modeling, Tata McGraw-Hill Companies, Inc., New Delhi, 1997.
2. J.L. Schnoor, Environmental Modeling Fate and Transport of Pollutants in Water, Airand Soil, John Wiley & Sons Inc., New York, 1996.

REFERENCE BOOKS

1. Arthur C. Stern, Air Pollution, Air Pollutants, their transformation and Transport, (Ed.), (Third Ed.) Volume I, Academic Press, 2006.
2. Deaton and Wine Brake, Dynamic Modeling of Environmental Systems, Wiley &Sons, 2002
3. E.V. Thomson, Principles of Surface Water Quality Modeling and Control, Happerand Row Publishers New York, 1987.
4. M.D. Palmer, Water Quality Modeling, the World Bank Washington DC.
5. Lohani B. N. and North A. M. Environmental Quality Management, South Asian Publishers Pvt. Ltd., New Delhi, 1984.

Technical Course List Final Year B.Tech Sem : II

No	Course title
1	Concrete composites
2	Rural Roads
3	TQM and MIS in Civil Engineering
4	Planning for Sustainable Development

SL2: Self Learning Module – II (Technical Courses)

OR

a. Student can select & enroll for approved minimum eight week technical course from various NPTEL technical courses, complete its assignments and appear for certificate examination conducted by NPTEL.

BOS Chairman / Coordinator will announce the list of approved NPTEL online courses of minimum eight weeks duration for 'Self Learning Module-II (Technical)' on commencement of the Semester-II of respective academic year from the available NPTEL courses and will make available to student through institute website.

List of NPTEL Technical Courses

1. Entrepreneurship Essentials
2. Intellectual Property
3. Introduction to accounting and finance for civil engineers
4. Introduction to Civil Engineering Profession
5. Product Engineering and Design Thinking
6. Finite Element Method
7. Optimization for civil Engineering
8. Retrofitting and Rehabilitation of Civil Infrastructure
9. Development and applications of special concretes
10. Theory of Plates and shells
11. Advanced Foundation Engineering
12. Earthquake Resistance Design of Foundations
13. Soil Structure Interaction
14. Geo synthetics and Soil Reinforcement
15. Traffic Engineering
16. Air Pollution and Control
17. Environmental Impact Assessment
18. Ground Water Hydrology and Management
19. Water and Waste water Treatment
20. Hydraulic Engineering
21. Basic Construction Materials
22. Construction Methods and Equipment Management
23. Safety in Construction
24. Infrastructure Economics
25. Maintenance and Repair of Concrete Structure

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Final Year B. Tech Civil – Part II

SL-2 SELF LEARNING TECHNICAL COURSE ELECTIVE
SL-2 (A) CONCRETE COMPOSITES

Teaching Scheme
Lectures:-3 Hrs/Week, 3 Credits

Examination Scheme
ESE: 100 Marks

Course Outcomes: -

At the end of the course, students will be able to

1. Produce and test Fabre reinforced concrete
2. Design and cast ferrocement products
3. Produce Silica fume Concrete
4. Design and cast Polymer concrete

Unit No.	Details	Teaching hours
	Section-I	
1	**Fiber Reinforced Concrete** Introduction, properties of constituent materials, Mix proportion, mixing, casting methods, properties of freshly mixed concrete (Fiber reinforced concrete), workability tests, mechanical properties, Behaviour of Fiber reinforced concrete under Compression, tensile, flexure, research findings, application of Fiber Reinforced Concrete.	12
2	**Ferro cement** Introduction, materials used, mechanical properties, construction techniques, design in direct tension, applications, merits as structural materials.	10
	Section-II	
3	**Silica Fume Concrete** Introduction, physical and chemical properties of silica Fume, reaction mechanism of silica fume, properties of silica fume concrete in fresh state, mechanical properties and durability of silica fume concrete.	11

4 **Polymer concrete** **(11Hrs.)**

Introduction, classification, properties of constituent materials, polymer impregnated concrete, polymer concrete, application.

5. **High Strength Concrete –** **(5Hrs)**

Microstructure – Manufacturing and Properties – Design of HSC Using Erintroy Shaklokmethod – Ultra High Strength Concrete. High Performance Concrete – Requirements and Properties of High Performance Concrete – Design Considerations

References:

1. Concrete Technology & Design by R. N. Swamy, Surrey University Press.
2. Special Structural Concrete by Rafat Siddique, Galgotia pub. Pvt. Ltd.
3. Fiber Reinforced Cement Composites by P.N.Balaguru, S.P.Shah, Mc-Graw Gill
4. Fiber Cement and Fiber Concrete by John Wiley and sons.
5. Fracture Mechanics and Structural Concrete by Bhushan L. Karihal Longman Scientificand Technical John Wiley and sons.

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Final Year B. Tech Civil – Part II

SL-2 SELF LEARNING TECHNICAL COURSE ELECTIVE
SL-2 (B) RURAL ROADS

Teaching Scheme	**Examination Scheme**
Lectures:-3Hrs/Week, 3 Credits	**ISE:** 100 Marks

Course Outcomes: -

On completion of the course, the students will be able to,

1. Plan the rural roads and develop rural road network.
2. Design different elements of road geometrics of rural roads.
3. Apply the knowledge of using locally available materials for construction and aimat low cost rural roads.
4. Design the rural road pavement as per IRC standards.
5. Carry out construction and maintenance of rural roads.

SECTION-I

Unit 1: Planning of Rural Roads:

Problems associated with planning of low volume rural roads in India. Rural road network planning- principles and methods. Recent developments on rural roads in India.

Unit 2: Location Surveys and Geometric Design:

Location surveys, geometric design standards for rural roads, special considerations for rural roads in hilly terrain.

Unit 3: Pavement Materials:

Soil Investigations, Properties and specifications of materials, Utilization of locally available and waste materials in village road projects like fly ash, iron and steel slag, recycled and other waste material etc, stabilized roads, road aggregates, materials for bituminous construction, cement and concrete, special pavements.

SECTION-II

Unit 4: Pavement Design:

Design factors, pavement thickness design as per IRC SP:72, internal drainage measures, design of semi-rigid pavement, roller compacted cement concrete pavement, special pavements like inter-locking block paving, design of fly ash embankments.

Unit 5: Specifications and Construction:

Earthwork, sub-base, base course and surface course – materials, specifications and construction steps and use of different equipment, construction of special pavements, construction of fly ash embankments, lime fly ash stabilized soil, lime fly ash bound macadam, lime fly ash concrete, roller compacted concrete, dry lean fly ash concrete, cement stabilised fly ash, quality control in construction, Specifications and tests for quality controlas per IRC.

Unit 6: Road Drainage and Maintenance of Rural Roads:

Types of drainage, surface and sub-surface drains for low volume roads.

Maintenance of Rural Roads: Types of maintenance, maintenance of unpaved roads, maintenance of paved roads, maintenance of semi-rigid and roller compacted concrete pavements, maintenance of special pavements, Rehabilitation.

REFERENCES:

1. Soil Mechanics for Road Engineers‖, Her Majesty‘s Stationary Office (HMSO), London.
2. IRC, Manual for Rural Roads, Indian Roads Congress, 2002.
3. Relevant IRC Publications
4. PIARC, International Road Maintenance Hand Book- Maintenance of Paved Roads, France
5. PIARC, International Road Maintenance Hand Book- Maintenance of Unpaved Roads, France.

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Final Year B. Tech Civil – Part II

SL-2 SELF LEARNING TECHNICAL COURSE ELECTIVE SL-2 (C) TQM AND MIS IN CIVIL ENGINEERING

Teaching Scheme		**Examination Scheme**
Lectures:-3Hrs/Week, Credits	3	**ESE:** 100 Marks

Course Outcomes:

After completion of the course the student will be able to

1. Compare quality control, quality assurance, total quality control and total qualitymanagement (TQM)
2. Apply the TQM tools such as Six Sigma, Kaizen, Supply Chain Management
3. Develop an MIS for a construction organization associated with building works.
4. Prepare typical checklist for concreting activity, form work activity, steelreinforcement activity

SECTION-I

Unit 1:

Quality – various definitions and interpretation. Importance of quality in construction. Factors affecting good quality of construction. Importance of quality on a project in the context of global challenges.

Unit 2:

a) Difference between, quality control, quality assurance, total quality control and total quality management (TQM)

b) Process based approach for achieving TQM. Study of ISO 9001 principles

c) Quality manual – Importance, contents, documentation. Importance of check-lists inachieving quality. Typical checklist for concreting activity, formwork activity, steel reinforcement activity.

Unit 3:

TQM – Necessity, advantages. Six sigma as a tool in TQM. Supply chain management as a tool in TQM. Benchmarking in TQM. Kaizen in TQM. Defects in construction and measuresto prevent rectify defects.

SECTION-II

Unit 4:

Introduction to Management Information systems (MIS)

Overview, Definition. MIS and decision support systems, Information resources, management subsystems of MIS. Management information system structure based on management activity whether foroperational control, management control or strategic planning.

Unit 5:

a) Survey of information systems technology w. r. t hardware, software, communicationstechnology, data processing, Information processing.
b) Concepts of information, planning and control, Information based support systems. Development of an MIS for a construction organization associated with building works.

TEXT BOOKS

1. Total Engineering Quality Management – Sunil Sharma – Macmillan India Ltd.
2. Quality Control and Total Quality Management by P. L. Jain- Tata McGraw Hill Publ. Company Ltd.
3. Total Project Management – The Indian Context - P. K. Joy Macmillan India Ltd.

REFERENCE BOOKS

1. Management –Principal, process and practices by Bhat – Oxford University Press.
2. Financial management by Shrivastava- Oxford University Press
3. Management Information Systems – Gordon B. Davis, Margrethe H. Olson – Tata McGraw Hill Publ. Co.

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Final Year B. Tech Civil – Part II

SL-2 SELF LEARNING TECHNICAL COURSE ELECTIVE
SL-2 (D) PLANNING FOR SUSTAINABLE DEVELOPMENT

Teaching Scheme
Lectures:-3Hrs/Week, 3 Credits

Examination Scheme
ESE: 100 Marks

Course Outcomes:

After completion of the course the student will be able to…

1. Identify the performance criteria, resource commitment, and measurement of sustainability and integration of sustainability programs
2. Explain about innovative sustainable methods and their uses in civil Engineering.
3. Connect with others who can help in facilitating peace, justice, inclusion and strong institutions in their country
4. Support the development of policies promoting all the pillars of sustainability and related approaches

SECTION-I

Unit 1:

Sustainable Development-explains and critically evaluates the concept of sustainable development, Environmental degradation and poverty Sustainable development: its main principles, the evolution of ideas about sustainability,

Unit 2:

Strategies for promoting sustainable development, resistances to the concept, and some alternative approaches. Examine some important current issues and areas of debate in relationto sustainable development.

Unit 3:

Innovation for sustainable development- Environmental management and innovationstrategies.

SECTION-II

Unit 4:

Societal transformations. Institutional theory. Governance for sustainable development. Policy responses to environmental degradation

.

Unit 5 :

Capacity development for innovation. Research methods.

TEXT BOOKS

1. M.H. Fulekar, Bhawana Pathak, R.K. Kale (2013) Environment and Sustainable Development, Springer Nature.
2. T.G. Carpenter (2001) The Environment, construction and sustainable Development, Willey- Blackwell.

REFERENCES

2. Mog, J.M. (2004) Struggling with Sustainability – A Comparative Framework for Evaluating Sustainable Development Programs“, World Development 32(12): 2139– 2160. IISD commentary on the OECD's Draft Principles for International Investor Participation in Infrastructure (PDF – 68kb)

3. Arundel, A., R. Kemp, and S. Parto (2004) Indicators for Environmental Innovation: What and How to Measure, forthcoming in International Handbook on Environment and Technology Management (ETM), edited by D. Annandale, J. Phillimore and D. Marinova, Cheltenham, Edward Elgar.

4. Douthwaite, B. (2002) Enabling Innovation. A practical guide to understanding andfostering innovation, London

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Final Year B. Tech Civil – Part II

CE8P PROJECT WORK

Teaching Scheme	**Examination Scheme**
Practical:- 10 Hrs/Week, 10 Credits	**OE:** 150 Marks
	ICA: 150 Marks

Project work at B. Tech. (Civil) Part-II is continuation of Project Work of Final Year B. Tech. (Civil) Part-I on any topic from Civil Engineering area or interdisciplinary area related to Civil Engineering. The project work should be completed at Final Year B. Tech. (Civil) Part-II level. Student shall submit the report and present the project work for defense.

Honours Group Final Year B.Tech Civil Engineering

Group I: Honors in Sustainability Engineering

Group II: Honors in Infrastructure Engineering

Group III: Honors in Design and Development

Group IV: Honors in Disaster Management and Mitigation

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SOLAPUR UNIVERSITY, SOLAPUR
FACULTY OF ENGINEERING & TECHNOLOGY

Honors in Sustainability Engineering
(With B. Tech. Civil Engineering)

WEF batch of 2020-21

Effective to S. Y. B. Tech Hons. batch of 2021-22

Course Code	*Course Name*	*Hrs./week*			*Credits*	*Examination Scheme*			
		L	*T*	*P*		*ESE*	*ISE*	*ICA*	*Total*
Semester - IV									
Hn411	Environmental Laws and Impact Assessment	3	1		4	70	30	25	125
Semester - V									
Hn512	Construction Materials: Sustainability and Usability	3		2	4	70	30	25	125
Semester - VI									
Hn613	Sustainable Materials and Green Buildings	4		2	5	70	30	25	125
	Seminar			2*	1			50	50
Semester - VII									
Hn714	Sustainable Engineering & Technology	3		2	4	70	30	25	125
	Mini Project			2*	1			50	50
Sub Total		13	1	10	19	280	120	200	600

* indicates contact hours

Punyashlok Ahilyadevi Holkar Solapur University, Solapur
Final. Y. B. Tech. (Civil Engineering) – I, Semester- VII
Hn714: Sustainable Engineering and Technology

Teaching Scheme	**Examination Scheme**
Lectures – 3 Hrs/Week, 3 Credits	**ISE –** 30 Marks
Practical – 2 Hr/Week, 1 Credit	**ESE –**70 Marks
	ICA – 25 Marks

Course outcomes:

Upon successful completion of course, the students will be able to:

1. Figure out the relevance and the concept of sustainability and the global initiatives in this Direction.
2. Aquent and explain different types of environmental pollution problems and their sustainable Solutions.
3. Apply the environmental regulations and standards
4. Observe and incorporate the concepts related to conventional and non-conventional energy
5. Implement the broad perspective of sustainable practices by utilizing engineering knowledge and principles

SECTION-I

Unit 1: (08)

Sustainability: Introduction, concept, evolution of the concept; Social, environmental and economic sustainability concepts; Sustainable development, Nexus between Technology and Sustainable development; Millennium Development Goals (MDGs) and Sustainable Development Goals (SDGs), Clean Development Mechanism (CDM).

Unit 2: (06)

Environmental Pollution: Air Pollution and its effects, Water pollution and its sources, Zero waste concept and 5R concepts in solid waste management; case studies, Greenhouse effect, Global warming.

Unit 3: (06)

Climate change, Ozone layer depletion, Carbon credits, carbon trading and carbon foot print, legal provisions for environmental protection.

SECTION-II

Unit 4: **(08)**

Environmental management standards: ISO 14001:2015 frame work and benefits, Scope and goal of Life Cycle Analysis (LCA), Circular economy, Bio-mimicking, Environment Impact Assessment (EIA), Industrial ecology and industrial symbiosis.

Unit 5: **(06)**

Resources and its utilization: Basic concepts of Conventional and non-conventional energy, General idea about solar energy, Fuel cells, Wind energy, Small hydro plants, bio-fuels, Energy derived from oceans and Geothermal energy.

Unit 6: **(06)**

Sustainability practices: Basic concept of sustainable habitat, Methods for increasing energy efficiency in buildings, Green Engineering, Sustainable Urbanization, Sustainable cities, Sustainable transport.

INTERNAL CONTINUOUS ASSESSMENT (ICA)

Internal Continuous Assessment (ICA) submission shall consist of the following –
Minimum 6 Assignments (One Assignment on each unit)

TEXT BOOKS

1. Allen, D. T. and Shonnard, D. R., Sustainability Engineering: Concepts, Design and Case Studies, Prentice Hall.
2. Bradley. A.S; Adebayo,A.O., Maria, P. Engineering applications in sustainable design and development, Cengage learning
3. Mackenthun, K.M., Basic Concepts in Environmental Management, Lewis Publication, London, 1998

REFERENCE BOOKS

1. Environment Impact Assessment Guidelines, Notification of Government of India, 2006.
2. ECBC Code 2007, Bureau of Energy Efficiency, New Delhi Bureau of Energy Efficiency Publications-Rating System, TERI Publications - GRIHA Rating System
3. Ni bin Chang, Systems Analysis for Sustainable Engineering: Theory and Applications, McGraw-Hill Professional.
4. Twidell, J. W. and Weir, A. D., Renewable Energy Resources, English Language Book Society (ELBS).
5. Purohit, S. S., Green Technology - An approach for sustainable environment, Agrobios

Publication

PUNYASHLOK AHILYADEVI HOLKAR SOLAPUR UNIVERSITY, SOLAPUR

FACULTY OF ENGINEERING & TECHNOLOGY

Honors in Infrastructure Engineering
(With B. Tech. Civil Engineering)

WEF batch of 2020-21

Effective to S. Y. B. Tech Hons. Batch of 2021-22

Course Code	*Course Name*	*Hrs./week*			*Credits*	*Examination Scheme*			
		L	*T*	*P*		*ESE*	*ISE*	*ICA*	*Total*
Semester-IV									
Hn411	Applications of Information Technology and Information systems	3	1		4	70	30	25	125
Semester-V									
Hn512	Planning and Design of Rural Roads	3		2	4	70	30	25	125
Semester-VI									
Hn613	Roads and Highway Project Development	4		2	5	70	30	25	125
	Seminar			2*	1			50	50
Semester-VII									
Hn714	Bridge and Grade Separated Structures	3		2	4	70	30	25	125
	Mini Project			2*	1			50	50
Sub Total		13	1	10	19	280	120	200	600

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

B. Tech. Civil Engg- I; Semester – VII

Hn- 714- Bridge and Grade Separated Structures

Teaching Scheme	**Examination Scheme**
Lectures – 3 Hrs/Week, 3 Credits	**ISE –** 30 Marks
Practical – 2 Hr/Week, 1 Credit	**ESE –**70 Marks
	ICA – 25 Marks

Course outcomes:

After studying this course, students will be able to:

1. Identify the suitable techniques to construct the structure based on site condition
2. Prepare the work schedule for any type of super structure construction.
3. Identify the techniques to implement in construction of Embankment, Retaining wall, breast wall in hill road.
4. Identify the suitable method and equipment to construct a Road, Dams, Harbour, River work and pipelines.
5. Prepare a suitable plan for erection of new plants like Batching and mixing plant, Ready mix concrete plant at site.
6. Manage and maintain the equipment and its cost control.

SECTION-I

Unit1: Introduction to Bridges (8 Hours)

Basic Elements of a Bridge. Types of bridges and grade separated structures for highways, standard specifications for road bridges and grade separated structures to fulfil traffic and Structural and Hydraulic design requirements.

Unit 2: Sub Structure Construction (7 hours)

Techniques of Box jacking – Pipe Jacking -under water construction of diaphragm walls and basement-Tunnelling techniques – Piling techniques -Dewatering and stand by Plant equipment for underground open excavation.

Unit 3: Superstructure Construction (7 hours)

Launching girders, bridge decks, offshore platforms – Material handling - erecting lightweight components on tall structures - Erection of articulated structures - Fabrication and erection of steel trusses and frames. Bridge testing for safe carrying capacity, strengthening of bridges, aesthetical treatments. Bridge bearings, joints, approaches, construction and maintenance aspects.

SECTION-II

Unit 4: Construction of Embankment & Retaining Wall (8 hours)

Embankment Construction - Ground improvement techniques, Retaining and Breast walls on hill road, wing walls and approaches and cofferdams.

Unit 5: Equipment Management (7 Hours)

Factors affecting selection of equipment and methods –Planning - Equipment Management in Projects - Maintenance Management – Replacement - Cost Control of Equipment – Depreciation Analysis, Methods of calculation of depreciation- Safety Management.

Unit 6: Time planning – project work breakdown: (7 Hours)

Time planning – project work breakdown determining activities involved, assessment of duration, CPM / PERT network analysis, work scheduling, methods of work scheduling, factors affecting work scheduling, Problems. Planning Control System – resource

production, project cost, project time, codification and project management, information system, use of software

INTERNAL CONTINIUOS ASSESSMENT (ICA)

Internal Continuous Assessment (ICA) shall consist of minimum six assignments based onthe entire curriculum

Text Books:

1. D.Johnson Victor, “Essentials of bridge Engineering”- Oxford, IBH publishing company. 2. Ponnuswamy, “Bridge Engineering”-McGraw Hill Publication, 1989.

3. K.K. Chitkara. “Construction Project Management Planning, Scheduling and Controlling”- Tata McGraw Hill publications

4. S.C. Sharma “Construction Equipment and its Management”- Khanna Publishers

Reference Books:

1.Vazirani Ratwani & M. G. Aswani, “Design of Concrete Bridges”- Khanna Publishers, New Delhi

2. “Design of Bridges”- Dr. Krishna Raju, Oxford & IBH Publishing company Limited. 5. “Analysis and design of Bridges”- M. A. Jayaram, Sapna Publishers, Bangalore.

3. Peurifoy, R.L., and Clifford,JS “Construction Planning Equipment and Method”- McGraw Hill Book Co. Inc

3. Relevant IRC & ASTM Standard

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FACULTY OF ENGINEERING & TECHNOLOGY

Honors in Design and Development
(With B. Tech. Civil Engineering)

WEF batch of 2020-21

Effective to S. Y. B. Tech Hons. batch of 2021-22

Course Code	***Course Name***	***Hrs./week***			***Credits***	***Examination Scheme***			
		L	***T***	***P***		***ESE***	***ISE***	***ICA***	***Total***
Semester - IV									
Hn411	Design Thinking	3	1		4	70	30	25	125
Semester - V									
Hn512	Managing Innovation and Entrepreneurship	3		2	4	70	30	25	125
Semester - VI									
Hn613	Engineering System Design Optimization	4		2	5	70	30	25	125
	Seminar			2*	1			50	50
Semester - VII									
Hn714	Civil Engineering System Analysis and Design	3		2	4	70	30	25	125
	Mini Project			2*	1			50	50
Sub Total		13	1	10	19	280	120	200	600

* indicates contact hours

Punyashlok Ahilyadevi Holkar Solapur University, Solapur
Final. Y. B. Tech. (Civil Engineering) – I, Semester- VII
Hn714: Civil Engineering System Analysis and Design

Teaching Scheme	**Examination Scheme**
Lectures – 3 Hrs/Week, 3 Credits	**ISE –** 30 Marks
Practical – 2 Hr/Week, 1 Credit	**ESE –**70 Marks
	ICA – 25 Marks

Course outcomes:

Upon successful completion of course, the students will be able to:

1. Explain the concepts of system engineering.
2. Apply Measures of Effectiveness for goals and outcomes
3. Apply various tasks of system development
4. Perform the Need Assessment for Systems Development
5. Apply various aspects of system planning
6. Apply various aspects of system design

SECTION-I

Unit1: Fundamental Concepts in Systems Engineering: (6 Hrs)

basic concept of system, systems considerations in civil engineering, development of civil engineering systems, some terms and concepts related to systems thinking, global initiatives in the study of systems

Unit 2: Measures of Effectiveness (MOE) : (8 Hrs)

Classification of system outcomes, hierarchy of desired outcomes: values, goals, and objectives, moes linked with goals and objectives, dimensions of moes. Properties of a desirable moe, common moes used in decision making at any phase of system development , goals and moes at each phase of civil engineering systems development, desired properties of a set of moes for a given analysis

Unit 3: Tasks Within the Systems Development: (8 Hrs)

analytical tasks at each phase of civil systems development, model classification, tools for the task of systems description, analyzing systems in civil engineering, tsystem evaluation, examples of tasks at each phase of systems development

SECTION-II

Unit4: Need Assessment for Systems Development: (8 Hrs)

stages of the needs assessment phase, assessment of system needs, mechanisms for assessing system needs, assessing system needs using user-targeted mechanisms, assessing long-term system needs via demand and supply trends, some issues and considerations in needs assessment

Unit 5: Systems Planning: (8 Hrs)

dimensions (perspectives) of civil system planning, evolving and emerging contexts of systems planning, principles of civil systems planning, system planning process, barriers to effective planning, computations in civil systems planning

Unit 6: System Design: (6 Hrs)

classifications of engineering design, engineering design process, logical and physical design, evaluation of alternative conceptual designs, applications of systems design in selected areas of civil engineering, design failures in civil engineering

INTERNAL CONTINUOUS ASSESSMENT (ICA)

Internal Continuous Assessment (ICA) submission shall consist of the following –

1. Assignments (One Assignment on each unit)

TEXT BOOKS

1. Samuel Labi, Introduction to Civil Engineering Systems: A Systems Perspective to the Development of Civil Engineering Facilities, John Wiley & Sons, Inc., Hoboken, New Jersey , 2014.
2. Geoffrey Gordon, “System Simulation”, Second edition, Prentice Hall, India, 2002.
3. Jerry Banks and John S.Carson, Barry L.Nelson, David M.Nicol, “Discrete Event System Simulation”, Third edition, Prentice Hall, India, 2002.

REFERENCE BOOKS

1. Robert E. Shannon, “System Simulation The art and science”, Prentice Hall, New Jersey, 1995.

D.S. Hira, “System Simulation”, S. Chand and company Ltd, New Delhi, 2001.

PUNYASHLOK AHILYADEVI HOLKAR
SOLAPUR UNIVERSITY, SOLAPUR
FACULTY OF ENGINEERING & TECHNOLOGY

Honors in Disaster Management and Mitigation
(With B. Tech. Civil Engineering)

WEF batch of 2020-21

Effective to S. Y. B. Tech Hons. batch of 2021-22

Course Code	*Course Name*	*Hrs./week*			*Credits*	*Examination Scheme*			
		L	*T*	*P*		*ESE*	*ISE*	*ICA*	*Total*
Semester - IV									
Hn411	Disaster Management	3	1		4	70	30	25	125
Semester - V									
Hn512	Risk Assessment and Vulnerability Analysis	3		2	4	70	30	25	125
Semester - VI									
Hn613	Disaster Preparedness and Response	4		2	5	70	30	25	125
	Seminar			2*	1			50	50
Semester - VII									
Hn714	Recovery, Rehabilitation and Reconstruction	3		2	4	70	30	25	125
	Mini Project			2*	1			50	50
Sub Total		13	1	10	19	280	120	200	600

* indicates contact hours

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Final. Y. B. Tech. (Civil Engineering) – I, Semester- VII

Hn714: Recovery, Rehabilitation and Reconstruction

Teaching Scheme	**Examination Scheme**
Lectures – 3 Hrs/Week, 3 Credits	**ISE –** 30 Marks
Practical – 2 Hr/Week, 1 Credit	**ESE –**70 Marks
	ICA – 25 Marks

Course outcomes:

Upon successful completion of course, the students will be able to:

6. Provide the solution for rehabilitation, reconstruction and development
7. Demonstrate the role of different organizations in rehabilitation
8. Elaborate about disaster resistant house construction
9. Explain the concepts of speedy recovery, linking Recovery with safe development
10. Explain the community based approach in disaster management

SECTION-I

Unit 1: Rehabilitation, Reconstruction and Development (8)

Rehabilitation, Reconstruction and Development-Concept, Meaning, Types of Rehabilitation and Reconstruction, Importance of Disaster Mitigation, Cost – benefit analysis, relationship between vulnerability and development, Damage Assessment- Post Disaster Damage assessment, estimated damage assessment due to probable disasters. Sample Surveys, Epidemiological Surveillance, Nutrition Centered Health Assessment, Remote sensing and Aerial photography, nature and damage to houses and

infrastructure due to different disasters.

Unit 2: Role of Different Organizations in Rehabilitation (8)

The Government and Disaster Recovery and rehabilitation, Disaster and Non-Governmental efforts, Role of Local Institutions; Insurance, Police, Media, Reconstruction, Speedy Reconstructions- Essential services, Social infrastructures, Immediate shelters/camps, Contingency plans for reconstructions, Development of Physical and Economic Infrastructure- Developing Physical and Economic Infrastructure, Environmental Infrastructure development

Unit 3: Disaster Resistant House Construction (7)

Guidelines for Disaster resistant construction, traditional techniques, Seismic strengthening of houses in low rain/High rainfall area, earthquake resistant construction technique, Funding arrangements- Funding arrangements at state level and central level, Fiscal discipline, role of International agencies, mobilization of community for resource generation

SECTION-II

Unit 4: Rehabilitation (7)

Rehabilitation - Socio- economic Rehabilitation- Temporary Livelihood Options and Socio-Economic Rehabilitation, Education and awareness and role of Information Dissemination, Participative Rehabilitation, Role of various agencies in Recovery Work- Monitoring and Evaluation of rehabilitation work, Rehabilitation process

Unit 5: Recovery (6)

Concept of recovery, livelihood and approach to reconstruction, Livelihood restoration, Speedy recovery, Linking Recovery with safe development, Creation of Long-term job opportunities

Unit 6: Community linkage in disaster management (8)

Community based Approach, Community Based Disaster Management, Human Behavior and Response: Individual, Community, Institutional, Community Participation and Awareness, Community Health During Disasters: Drinking Water, Food and Nutrition, Hygiene and Sanitation, Community Health Management, Emergency Health Operations, Remote Area Planning, Leadership and Coordination in Disaster Management, Life skills, Time Management Skills

INTERNAL CONTINUOUS ASSESSMENT (ICA)

Internal Continuous Assessment (ICA) submission shall consist of the following –

1. Assignments (One Assignment on each unit)

TEXT BOOKS

1. Murthy D.B.N. (2012) Disaster Management, Deep and Deep Publication PVT. Ltd. New Delhi.
2. Dr. Mrinalini Pandey, Disaster Management, Wiley India Pvt. Ltd.
3. Disaster Management: Future Challenges and Opportunities, Jagbir Singh, K W Publishers Pvt. Ltd.

4. Biodiversity, Environment and Disaster Management, Laxmi Publications. Biodiversity, Environment and Disaster Management, Shailesh Shukla, Shamna Hussain, Unique Publications.
5. Earth and Atmospheric Disaster Management: Nature and Manmade, C. K. Rajan Navale Pandharinath, B S Publication

REFERENCE BOOKS

1. "Natural Hazards and Disaster Management: Vulnerability and Mitigation" by R B Singh, Rawat Publications; Reprint edition (1 January 2006)
2. "Disaster Management and Mitigation" by Prof R B Singh, World Focus (1 January 2016)
3. "DISASTER MITIGATION: EXPERIENCES AND REFLECTIONS" by Alka Dhameja and Pardeep Dhameja, Prentice Hall India Learning Private Limited; New title edition (1 January 2001)
4. "Management and Mitigation of Natural Disasters" by Rajan Kumar Sahoo, Regal Publications; 1st edition (1 April 2014), Deep & Deep Publications (30 March 2007)
5. "Disaster Mitigation and Management: Post-Tsunami Perspectives" by Jegadish P Gandhi,
6. Disasters: Strengthening Community Mitigation and Preparedness" by Khanna B K, New India Publishing Agency (1 January 2011)
7. "Strengthening Resilience in Post – Disaster Situations: Stories, Experience and Lessons from South Asia" by IDRC Academic Foundation (1 January 2011)
8. "Disaster Management at Health Care Settings Comprehensive Assessment and Effective Mitigation" by Shreen Gaber, Lulu.com (18 November 2015)
9. "Disaster Education and Management" by Rajendra Kumar Bhandari, Springer Nature; 2014th edition (10 December 2013)
10. Disaster Science and Management, Tushar Bhattacharya, McGraw Hill Education (India) Pvt. Ltd.