

Punyashlok Ahilyadevi Holkar Solapur University, Solapur



Name of the Faculty: Science & Technology

CHOICE BASED CREDIT SYSTEM

Syllabus: Civil Engineering

Name of the Course: Final Year B. Tech

(Syllabus to be implemented w.e.f. June 2021)

**PUNYASHLOK AHILYADEVJI HOLKAR
SOLAPUR UNIVERSITY, SOLAPUR
FACULTY OF SCIENCE & TECHNOLOGY
B. Tech. Civil Engineering**

**Program Educational Objectives (PEOs)
B. Tech. Civil Engineering**

1. Graduate will demonstrate peer-recognized technical competency in the analysis, design and construction of Civil Engineering Structures.
2. Graduate 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. Graduate will be engaged in ongoing learning and professional development through 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

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

- i) Engineering Knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
- ii) Problem Analysis:** Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.
- iii) Design/Development of Solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- iv) Conduct Investigations of Complex Problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions for complex problems:
- v) Modern Tool Usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
- vi) 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.
- vii) 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.
- viii) Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- ix) Individual and Team Work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

- x) **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.
- xi) **Project Management and Finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
- xii) **Life-long Learning:** Recognize the need for, and have the preparation and ability to engage in independent and lifelong learning in the broadest context of technological change.

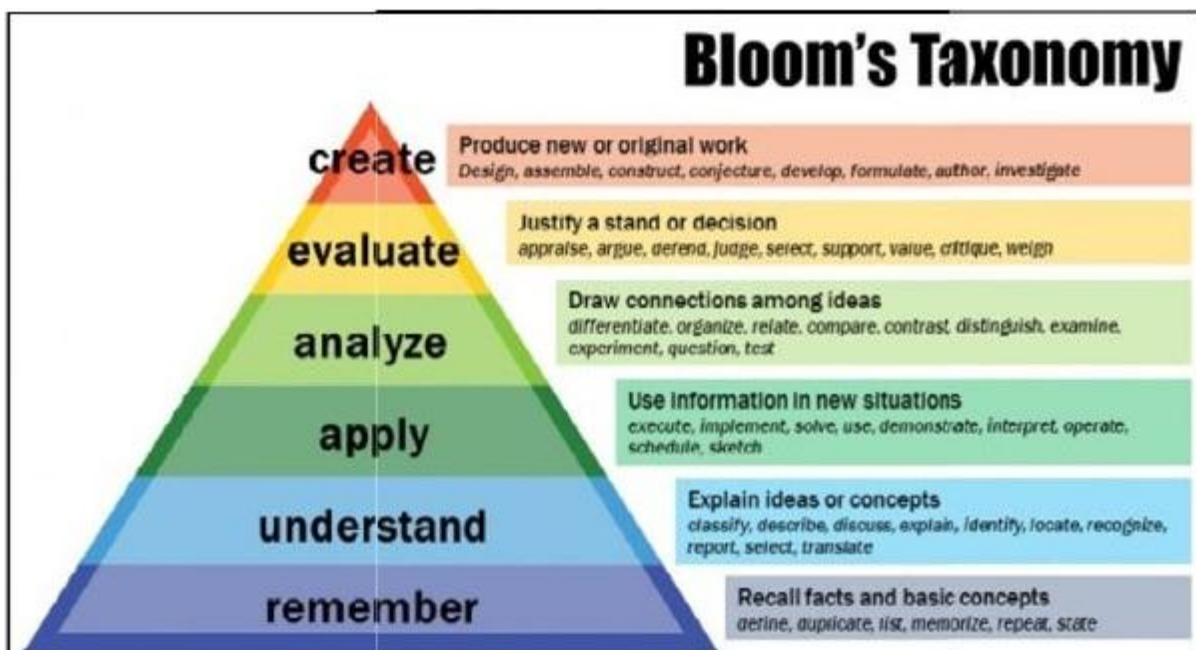
PROGRAM SPECIFIC OUTCOMES (PSOs)

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

Blooms Taxonomy





**PUNYASHLOK AHILYADEVI HOLKAR
SOLAPUR UNIVERSITY, SOLAPUR**
CBCS Curriculum for First Year B. Tech. (All Branches)

W.E.F. 2018-19

1. 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			3	70	30			100
C112	Engineering Mathematics I	3			3	70	30			100
C113	Basic Electrical & Electronics Engineering	4			4	70	30			100
C114	Engineering Mechanics	3			3	70	30			100
C115	Basic Mechanical Engineering	3			3	70	30			100
C116	Communication Skills	1			1		25			25
Total		17			17	350	175			525

• 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	Basic Electrical & Electronics Engineering			2	1			25		25
C114	Engineering Mechanics			2	1			25		25
C115	Basic Mechanical Engineering			2	1			25		25
C116	Communication Skills			2	1			25		25
C117	Workshop Practice			2	1			25		25
Total			1	12	7			175		175
Grand Total		17	1	12	24	350	175	175		700
C118	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	Engineering Graphics & Design	3			3	70	30		100	
C124	Basic Civil Engineering	3			3	70	30		100	
C125	Programming for Problem Solving	2			2		25		25	
C126	Professional Communication	1			1		25		25	
Total		15			15	280	170		450	
C127	Democracy, Elections and Good Governance					30			30	

• **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	Engineering Graphics & Design			4	2			50	50	
C124	Basic Civil Engineering			2	1			25	25	
C125	Programming for Problem Solving			4	2	50#		50	100	
C127	Professional Communication			2	1			25	25	
Total			1	14	8	50		200	250	
Grand Total		15	1	14	23	330	170	200	700	
C128	Democracy, Elections and Good Governance							20		

1. Legends used :

L	Lecture	FA	Formative Assessment
T	Tutorial	SA	Summative Assessment
P	Lab Session	ESE	End Semester Examination
		ISE	In Semester Evaluation
		ICA	Internal Continuous Assessment

Notes:

1. \$ - Indicates approximately half of the total students at F.Y B. Tech. will enroll under Group A and remaining will enroll under Group B.
2. 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.
3. 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
4. # - Indicates the subject 'Programming for Problem Solving' shall have a University 'Practical and Oral Examination' at the end of the semester assessing student's programming skills.
5. 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
6. Internal Continuous Assessment Marks (ICA) are calculated based upon student's performance during laboratory sessions / tutorial sessions
7. 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 ICA of 20 marks and End Semester Examination (ESE) of 30 marks (as prescribed by university, time to time) 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
8. Student must complete induction program of minimum five days before commencement of the regular academic schedule at the first semester.

GUIDELINES FOR INDUCTION PROGRAM (C128)

New entrants into an Engineering program come with diverse thoughts, mind set and different social, economical, 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 the self, 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



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Faculty of Science & Technology

Credit System structure of S. Y. B. Tech. Civil Engineering, Semester- I, (W.E.F. 2019-2020)

Course Code	Theory Course Name	Hrs./week				Credits	Examination Scheme				
		L	T	P	D		ISE	ESE	ICA	Total	
CV211	Concrete Technology, Material Testing & Evaluation	3	-	-	-	3	30	70	-	100	
CV212	Surveying & Geomatics	3	-	-	-	3	30	70	-	100	
CV213	Building Construction & Drawing	2	-	-	-	2	30	70	-	100	
CV214	Introduction to Fluid mechanics	3	-	-	-	3	30	70	-	100	
CV215	Engineering Geology	2	-	-	-	2	30	70	-	100	
CV216	Introduction to Solid Mechanics	3	1*	-	-	4	30	70	-	100	
CV217	Energy Science & Engineering	1	-	-	-	1	25	-	-	25	
	Total	17	1	-	-	18	205	420	-	625	
	Laboratory/Drawings							POE	OE		
CV211	Concrete Technology, Material Testing & Evaluation	-	-	2	-	1	-	-	-	25	25
CV212	Surveying & Geomatics	-	-	2	-	1	-	25	-	25	50
CV213	Building Construction & Drawing	-	-	-	2	1	-	-	-	25	25
CV214	Introduction to Fluid mechanics	-	-	2	-	1	-	25	-	25	50
CV215	Engineering Geology	-	-	2	-	1	-	25	-	25	50
CV218	Lab practice	-	-	2	-	1	-	-	-	25	25
	Total	-	-	10	-	6	-	75	150	225	
	Grand Total	17	1	10	2	24	205	495	150	850	
	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) 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 Engineering to become eligible for award of degree.
- (4) *Laboratory tests and experiments included in syllabus of 'Introduction to Solid Mechanics' shall be conducted in laboratory. Just essential number of tutorial hours, be used for this purpose. The remaining tutorial turns shall be used for problem solving in the subject.





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Faculty of Science & Technology

Credit System structure of S. Y. B. Tech. Civil Engineering, Semester – II, (W. E.F. 2019-2020)

Course Code	Theory Course Name	Hrs./week				Credits	Examination Scheme				
		L	T	P	D		ISE	ESE	ICA	Total	
CV221	Water Supply Engineering	3	-	-	-	3	30	70	-	100	
CV222	Building Planning & Design	3	-	-	-	3	15	35	-	50	
CV223	Hydraulic Engineering	3	-	-	-	3	30	70	-	100	
CV224	Open Elective-I: ICT for development	2	-	-	-	2	50	-	-	50	
CV225	Structural Analysis	3	-	-	-	3	30	70	25	125	
CV226	Engineering Mathematics-III	3	1	-	-	4	30	70	25	125	
	Total	17	1	-	-	18	185	315	50	550	
	Laboratory/Drawings:							POE	OE		
CV221	Water Supply Engineering	-	-	2	-	1	-	-	-	25	25
CV222	Building Planning & Design	-	-	-	2	1	-	75	-	50	125
CV223	Hydraulic Engineering	-	-	2	-	1	-	-	-	25	25
CV224	Open Elective- I : ICT for development	-	-	2	-	1	-	-	-	50	50
CV227	Computer Programming & Numerical Methods	2	-	2	-	3	-	50	-	25	75
	Total	2	0	8	2	7	-	125	175	300	
	Grand Total	19	1	8	2	25	185	415	225	850	
	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) 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 Engineering to become eligible for award of degree.





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Credit System structure of T. Y. B. Tech. Civil Engineering, Semester- I, (W.E.F. 2020-2021)

Course Code	Theory Course Name	Hrs./week				Credits	Examination Scheme				
		L	T	P	D		ISE	ESE	ICA	Total	
CV311	Design of Steel Structures	3	1	-	-	4	30	70	25	125	
CV312	Geotechnical Engineering	4	-	-	-	4	30	70	-	100	
CV313	Waste water Engineering & Air Pollution	3	-	-	-	3	30	70	-	100	
CV314	Highway & Tunnel Engineering	4	-	-	-	4	30	70	-	100	
CV315	Hydrology and Water Resources Engineering	3	1	-	-	4	30	70	25	125	
SL31	Self Learning Module-I (H. S. S.)	-	-	-	-	2	-	50	-	50	
	Total	17	2			21	150	400	50	600	
	Laboratory/Drawings							POE	OE		
CV312	Geotechnical Engineering			2	-	1	-	25	-	25	50
CV313	Waste water Engg. & Air Pollution			2	-	1	-	-	25	25	50
CV314	Highway & Tunnel Engineering			2	-	1	-	-	-	25	25
CV317	Planning & Design of Public Buildings	1	-	-	2	2	-	50	-	25	75
CV318	Mini Project *	-	-	2	-	1	-	-	-	50	50
	Total	1	-	8	2	6	-	100	150	250	
	Grand Total	18	2	8	2	27	150	500	200	850	

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’ using suitable application software /Carry out suitable Experimental work/ Carry out variety of Civil Engineering Surveys and present a report. The Mini project shall be assessed by the respective guide for ICA.

Note:

- 1) 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.
- 2) Internal Continuous Assessment (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, syllabus, report presentation etc., as applicable.
- 3) Students shall undergo a field training of 15 days in the winter vacation after T.Y. B. Tech. Civil - Semester- 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 Civil Semester-II.
- 4) **Self-Learning Module- I at T.Y. B. Tech. Civil Engineering, Semester – I:**
Curriculum for Humanities and Social Sciences, ‘Self Learning Module – I’ is common for all under graduate engineering programs.

(A) Student can select & enroll a ‘Self Learning Module- I’ Course from P.A.H Solapur University, Solapur HSS Course List **SL31-(A)** and appear for University examination.

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

P. A. H. Solapur University, Solapur: HSS Course List

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 University approved minimum eight weeks NPTEL HSS course **SL31-(B)**, complete its assignments and appear for certificate examination conducted by NPTEL.

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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Faculty of SCIENCE & TECHNOLOGY

Credit System structure of T. Y. B. Tech. Civil Engineering, Semester – II, (W. E.F. 2020-2021)

Course Code	Theory Course Name	Hrs./week				Credits	Examination Scheme			
		L	T	P	D		ISE	ESE	ICA	Total
CV321	Foundation Engineering	4	-	-	-	4	30	70	-	100
CV322	Hydraulic Structures & Water Power Engg.	3	-	-	-	3	30	70	-	100
CV323	Professional Elective-I	3	-	-	-	3	30	70	-	100
CV324	Design of Concrete Structures-I	4	-	-	-	4	30	70	-	100
CV325	Principles of Management and Quantitative Techniques	3	1	-	-	4	30	70	25	125
CV326 (SL32)	Self Learning Module-II (Technical)	-	-	-	-	2	-	50	-	50
	Total	17	1	-	-	20	150	400	25	575
	Laboratory/Drawings:						-	POE	OE	
CV321	Foundation Engineering	-	-	-	-	1	-	-	-	25
CV322	Hydraulic Structures & Water Power Engg.	-	-	2	-	1	-	-	25	25
CV323	Professional Elective Course-I	-	-	2	-	1	-	-	-	25
CV324	Design of Concrete Structures-I	-	-	2	-	1	-	-	-	25
CV327	Project on Steel Structures	-	-	-	4	2	-	-	50	50
CV328	Assessment of field training report	-	-	-	-	1	-	-	-	25
	Total	-	-	8	4	7		75	150	225
	Grand Total	17	1	8	4	27	150	475	200	825

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 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.
- 2) Internal Continuous Assessment (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, syllabus, report presentation etc., as applicable.
- 3) Students shall undergo a field training of 15 days in the summer vacation after T.Y.B. Tech Civil Semester-II. The training report shall be assessed in Final Year B. Tech Civil Semester-I by the concerned project guides.

4) Self-Learning Module II at T.Y. B. Tech. Civil Engineering, Semester- II

(A) Student can select a 'Self Learning Module II' (Technical Course) from Course List **SL32-(A)** and appear for university examination.

P. A. H. Solapur University, Solapur: Technical Course List Course List

SL32- (A): Self Learning Module – II (Technical Courses)

No	Course title
1	Geosynthetics and Reinforced Soil Structures
2	Rural Roads
3	Planning for Sustainable Development
4	TQM and MIS in Civil Engineering
5	Earthquake Resistant Non Engineered Construction

OR

(B) Student can select & enroll for university 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 through university system and will make available to student through University / institute website.



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Faculty of SCIENCE & TECHNOLOGY

Credit System structure of Final Year B. Tech. Civil Engg. I; Semester – VII, W. E.F. 2021-2022

Course Code	Theory Course Name	Hrs./week				Credits	Examination Scheme				
		L	T	P	D		ISE	ESE	ICA	Total	
CV411	Engineering Economics, Estimation & Costing	3	-	-	-	3	30	70	-	100	
CV412	Construction Engineering, Management & Construction Practices	3	-	-	-	3	30	70	-	100	
CV413	Design of Concrete Structures-II	3	-	-	-	3	30	70	25	125	
CV414	Earthquake Engineering	3	1	-	-	4	30	70	25	125	
CV415	Professional Elective Course- II	3	-	-	-	3	30	70	25	125	
	Total	15	1	-	-	16	150	350	75	575	
	Laboratory/Drawings:							POE	OE		
CV411	Engineering Economics, Estimation & Costing	-	-	4	-	2	-	25	-	50	75
CV412	Construction Engineering , Management & Construction Practices	-	-	2	-	1	-	-	25	-	25
CV416	Project on R. C. C. Structures	-	-	-	4	2	-	-	25	50	75
CV417	Seminar	-	-	2	-	1	-	-	-	50	50
CV418	Project work	-	-	2	-	1	-	-	-	25	25
CV419	Assessment of report on field training-II	-	-	-	-	1	-	-	-	25	25
	Total	-	-	10	4	8	-	75	200	275	
	Grand Total	15	1	10	4	24	150	425	275	850	

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



PUNYASHLOK AHILYADEVI HOLKAR SOLAPUR UNIVERSITY, SOLAPUR
Faculty of SCIENCE & TECHNOLOGY

Credit System structure of Final Year B. Tech. Civil Engg. II, Semester – VIII, W. E.F. 2021-2022

Course Code	Theory Course Name	Hrs./week				Credits	Examination Scheme				
		L	T	P	D		ISE	ESE	ICA	Total	
CV421	Professional Elective Course- III	4	-	-	-	4	30	70	-	100	
CV422	Professional Elective Course - IV	4	-	-	-	4	30	70	-	100	
CV423	Railway & Harbour Engineering	3	1	-	-	4	30	70	-	100	
CV424	Open Elective-III :Economic policies in India	3	-	-	-	3	30	70	-	100	
CV425	Professional Practice, Law & Ethics	3	-	-	-	3	30	70	-	100	
	Total	17	1	-	-	18	150	350	-	500	
	Laboratory/Drawings							POE	OE		
CV421	Professional Elective Course- III	-	-	2	-	1	-	-	25	25	50
CV422	Professional Elective Course - IV	-	-	2	-	1	-	-	25	25	50
	Project work	-	-	8	-	4	-	-	100	100	200
	Total	-	-	12	-	6	-	150	150	300	
	Grand Total	17	1	12	-	24	150	500	150	800	

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 @ 7 students.
- (2) Elective subject can be offered from the following list, if minimum 15 students opt for that subject.
- (3) Term work assessment: Term Work assessment shall be a continuous process based on the performance of the student in assignments, classtests, quizzes, attendance and interaction during theory and lab sessions, journal writing, report presentation etc., as applicable.

Professional Elective Courses: Student shall choose any one course from a group

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-I	Semester-VI	Masonry Structures	Structural Geology	Construction Engineering Materials	Ecological Engineering
		Structural Analysis by Matrix Methods	Urban Transportation Planning.	Systems Engineering & Economics	Solid and Hazardous Waste Management
		Structural Dynamics	Pavement Design	Infrastructure Planning and Management	Physico-Chemical Processes for Water and Wastewater Treatment
					Hydraulic modeling
					Urban Hydrology and Hydraulics
					Instrumentation & Sensor Technologies for Civil Engg. Applications
					Open Channel flow & River Hydraulics
Prof. Elective-II	Semester-VII	Metal Structure Behaviour- I	Traffic Engineering and Management	Construction Productivity	Environmental Systems
		Advanced Structural Analysis	Geosynthetics and soil structures		Water Power Engineering
		Finite Element Method	Advanced Railway Track		

Prof. Elective- III	Semester -VIII	Industrial Structures	Public Transportation Systems	Construction Cost Analysis	Rural Water Supply and Onsite Sanitation Systems
		Repairs & Rehabilitation of Structures	Airport Planning and Design	Construction Equipment & Automation	Air & Noise Pollution and Control
			High Speed Rail Engineering		Surface Hydrology
Prof. Elective- IV	Semester -VIII	Metal Structure Behaviour - II	Infrastructure Planning and Design	Advanced Concrete Technology	Water and Air Quality Modelling
		Design of Bridges	Transportation Economics	Entrepreneurship	Water Resources Field Methods
			Railway Project Design & Planning for Civil Engineering		
			Ground Improvement Techniques		

पुणवशनांक अहिल्यादेवी हाळकर
सांनापूर विद्यापीठ





Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Final Year B. Tech Civil – Part I

CV- 411 ENGINEERING ECONOMICS, ESTIMATION & COSTING

Teaching Scheme

Lectures:- 3 Hrs/Week, 3 Credits

Examination Scheme

ISE: 30 Marks

ESE: 70 Marks

ICA:- 50 Marks

POE:- 25 Marks

Course Outcomes:

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

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

SECTION –I

Unit 1: 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.

Unit 2: Specifications

(4 Hrs)

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

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 4: Estimation / Measurements for various items (4 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 5: 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, market survey of basic materials. Use of Computers in quantity surveying.

SECTION –II

Unit 6: 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 7: Introduction to Acts

(5 Hrs)

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

Unit 8: 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 9: 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.

INTERNAL CONTINUOUS 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 schedule and 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:

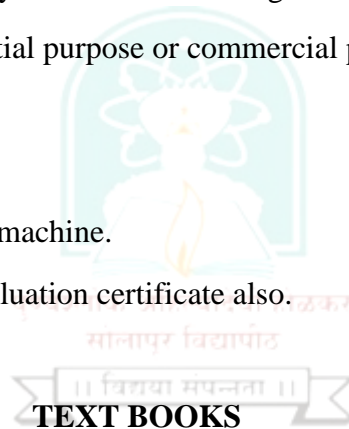
a) A building for residential purpose or commercial purpose.

b) A hotel.

c) A theater

d) Any one construction machine.

The report shall include valuation certificate also.



1. A Textbook of Estimating , Costing & Accounts (Civil), R.C.Kohli, S. Chand Publishing 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 Book Depot.

6. Estimating and Costing – B. N. Dutta- UBS publishers

7. Estimating, Costing , Specification and valuation in civil engineering, Chakroborty M, 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
CV- 412 CONSTRUCTION ENGINEERING, MANAGEMENT & CONSTRUCTION PRACTICES

Teaching Scheme

Lectures:- 3 Hrs/Week, 3 Credits

Practical:- 2 Hrs/Week, 1 Credit

Examination Scheme

ISE: 30 Marks

ESE: 70 Marks

OE:- 25 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: Smoothing and leveling.

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

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
Construction Practices

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, 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 equipments.

Diaphragm Walls – Purpose and Construction Methods, Clamshell, Trenchers,

ESE (OE)

It shall be based on the assignments, Civil Engineering project management reports generated using relevant software and Visit report covering construction safety, construction Practices and construction equipments.

CONSTRUCTION ENGINEERING, MANAGEMENT

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.

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.

CONSTRUCTION PRACTICES

TEXT BOOKS

1. Construction, Planning, Equipment and methods - R. L . Peurifoy McGraw hill book co
New Delhi
2. Construction Equipment Guide, David A. Day, Neal B. H. Benjamin, John Wiley & Sons.
3. Construction Equipment – Mahesh Varma ,Metropolitan book co ,New York
4. Heavy Construction – Planning, Equipment and methods – Jagman Singh, Oxford and
IBH publishers, New Delhi.
5. Construction of Diaphragm Walls, I Hajnal, I Marton, F. Regele Wiley Interscience
Publication, John Wiley & Sons.
6. Structural & cut off Diaphragm walls, R.G.H. Boyes, Applied Science Publishers Ltd.,
London.





Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Final Year B. Tech Civil – Part I

CV- 413 DESIGN OF CONCRETE STRUCTURES-II

Teaching Scheme

Lectures:- 3 Hrs/Week, 3 Credits

Examination Scheme

ISE: 30 Marks

ESE: 70 Marks

ICA:- 25 Marks

Course Outcomes:

At the end of course, students will be able to

1. Analyze and Design of RCC Stairs and Column Footings.
2. Analyze and Design of RCC Retaining walls and Water tanks.
3. Analyze Pre stress concrete sections.
4. Determine Loss of Pre stress and Design of Pre stress Beams.
5. Analyze and Design the End Block of post tensioned PSC girder.

SECTION I

Unit 1: Analysis and design of stairs. (Limit state method)

(6 Hrs)

Design of Stairs, types of stairs, design of simply supported and Dog-legged stairs, Open well stairs with solid waist slab

Unit 2: Analysis and design of Column Footings

(5 Hrs)

Design of isolated square and rectangular column footing, column footings subjected to eccentric load.

Unit 3:-Analysis and design of retaining wall

(5 Hrs)

Analysis and Design of cantilever and counter fort retaining walls

Unit 4: Design of water tank

(6 Hrs)

Design criteria, permissible stresses, Design of circular, rectangular GSR by IS code method

SECTION II: PRESTRESSED CONCRETE

Unit 5: Introduction to pre-stressed concrete (5 Hrs)

Introduction, concepts, systems and methods of pre-stressing.

Unit 6: Analysis of Symmetrical and unsymmetrical sections (4 Hrs)

Analysis of Symmetrical and unsymmetrical sections, thrust line, cable profiles.

Unit 7: Losses in prestress (4 Hrs)

Losses in prestress. - Pre & Post tensioned members.

Unit 8: Design of Prestressed concrete beam (5 Hrs)

Design of rectangular and Symmetrical I sections.

Unit 9: End Block (5 Hrs)

Analysis and design of end blocks by various methods, Stress concentration.



NOTE:

Only IS: 456-2000 shall be allowed in University Exam.

INTERNAL CONTINUOUS ASSESSMENT (ICA)

Assignments on each topic of above syllabus.

TEXT BOOKS

- 1 Reinforced Cement Concrete - B.C. Punmia
2. Reinforced Cement concrete - Jain Vol.I & II
- 3 Prestressed Concrete – N. Krishnaraju.
4. Prestressed Concrete – P. Dayaratnam

REFERENCE BOOKS

- 1 IS: 456-2000 and IS 1343
2. Prestressed Concrete – T.Y.Lin John Willey & sons, Newyork.
3. Prestressed Concrete – Sinha & Roy, S.Chand & Co., New Delhi
4. Prestressed Concrete – Leon Hardt.
5. Reynolds's Reinforced concrete Designer's Handbook





Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Final Year B. Tech Civil – Part I

CV- 414 EARTHQUAKE ENGINEERING

Teaching Scheme

Lectures:- 3 Hrs/Week, 3 Credits

Tutorial:- 1 Hr/Week, 1 Credit

Examination Scheme

ISE: 30 Marks

ESE: 70 Marks

ICA:- 25 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 resistant features for various types of construction.
4. Adopt the provisions of IS 1893-2016 and IS 13920- 2016 Codes.
5. Incorporate the ductility features in the structures.

SECTION – I

Unit: 1 Elements of Seismology

(4 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

(7 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

(7 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 (4 Hrs)

Response to general dynamic loading, Duhamel's integral, rectangular and triangular loading, Earthquake response spectrum, tripartite spectrum, construction of design response spectrum, effect of foundation and structural damping on design spectrum.

SECTION – II

Unit: 5 Principles of earthquake resistant design (6 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)

Philosophy of earthquake resistant design, Provisions of IS 1893 (All Parts), Soft storey, Design spectrum of IS 1893-2016, evaluation of lateral loads due to earthquake on multistory buildings.

Unit: 7 Ductile detailing of RCC members (6 Hrs)

Concept of ductility, different ways of measuring ductility, factors affecting ductility, energy absorption, provisions of IS 13920-2016.

Unit: 8 Earthquake resistant construction (6 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.

INTERNAL CONTINUOUS ASSESSMENT (ICA)

The ICA shall consist of at least one assignment on each unit.

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 Wiley Publication
4. Dynamics of Structures – R. M. Clough and Penzian ,McGraw Hill co.New Delhi
5. Mechanical Vibrations – 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

CV- 415 PROFESSIONAL ELECTIVE COURSE-II
415 (A) METAL STRUCTURE BEHAVIOUR- I

Teaching Scheme

Lectures:- 3 Hrs/Week, 3 Credits

Examination Scheme

ISE: 30 Marks

ESE: 70 Marks

ICA:- 25 Marks

Course Outcomes:

At the end of course, students will be able to

1. Able to design bolted and welded connections for tension and compression members and beams
2. Able to analyze beam column behaviour
3. Able to understand behaviour of Light gauge steel members
4. Able to understand design concepts of cold formed/unrestrained beams
5. Able to understand Fire resistance concept required for present days.

SECTION – I

Unit 1: Design of connections

(8 Hrs)

Types of connections – Welded and Bolted – Throat and Root Stresses in Fillet Welds – Seated Connections – Unstiffened and Stiffened seated Connections – Moment and Shear Resisting Connections – Cleat angle Connections – Split beam Connections – Framed Connections HSEFG bolted connections. design and detailing of various connection - roof truss to column, column to beam, beam to beam and truss to bed block.

Unit 2: Laterally Unrestrained Beams

(8 Hrs)

Lateral Buckling of Beams, Factors affecting lateral stability, IS 800 code provisions, Design Approach. Lateral buckling strength of Cantilever beams, continuous beams, beams with continuous and discrete lateral restraints, Mono-symmetric and non-uniform beams – Design Examples. Concepts of -Shear Center, Warping, Uniform and Non-Uniform torsion.

Unit 3: Beam- Columns in Frames**(7 Hrs)**

Behaviour of Short and Long Beam - Columns, Effects of Slenderness Ratio and Axial Force on Modes of Failure, Biaxial bending, Strength of Beam Columns, Sway and Non-Sway Frames, Strength and Stability of rigid jointed frames, Effective Length of Columns-, Methods in IS 800 -Examples

SECTION -II**Unit 4: Steel Beams with Web Openings****(8 Hrs)**

Shape of the web openings, practical guide lines, and Force distribution and failure patterns. Analysis of beams with perforated thin and thick webs, Design of laterally restrained castellated beams for given sectional properties. Vierendeel girders (design for given analysis results)

Unit 5: Cold formed steel sections**(7 Hrs)**

Techniques and properties, Advantages, Typical profiles, Stiffened and unstiffened elements, Local buckling effects, effective section properties, IS 801& 811 code provisions numerical examples, beam design, column design.

Unit 6: Fire resistance**(7 Hrs)**

Fire resistance level, Period of Structural Adequacy, Properties of steel with temperature, Limiting Steel temperature, Protected and unprotected members, Methods of fire protection, Fire resistance Ratings. Numerical Examples

INTERNAL CONTINUOUS ASSESSMENT (ICA)

The ICA shall consist of at least one assignment on each unit.

Note:

IS 800: 2007, IS 801-2010, IS811-1987 and BS5950 – part 8 to be allowed along with Steel Tables in Exam.

TEXT BOOKS:

1. Design of Steel Structures, N. Subramanian, Oxford, 2008
2. Limit State Design of Steel Structures, S. K. Duggal.
3. Design of steel structure by Limit State Method as per IS: 800- 2007 by Bhavikatti S. S, I K International Publishing House, New Delhi
4. Limit state design in Structural Steel by Dr M. R. Shiyekar
5. Design of Steel structures by K. S. Sai Ram
6. Design of Steel structures by L. S. Jayagopal and D. Tensing

REFERENCE BOOKS

1. Limit state design of Steel Structure by V. L. Shah & Gore, Structures Publication, Pune
2. Limit State Design of Steel Structures by D. Ramchandra & Virendra Gehlot, Scientific Publishers
3. Design of Steel Structures by K. S. Sai Ram, published by Dorling Kindersley (India) Pvt. Ltd.
4. Structural Design and Drawing Reinforced Concrete and Steel by N. Krishnaraju, Universities Press (India) Pvt. Ltd. Hyderabad.
5. Bureau of Indian Standards, IS800-2007, IS875-1987, IS 801-2010, IS 811-1987
6. Steel Tables SP: 6(1) and SP: 6(6)
7. BS5950 Part- 8,
8. INSDAG Teaching Resource: www.steel-insdag.org



Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Final Year B. Tech Civil – Part I

CV- 415 PROFESSIONAL ELECTIVE COURSE-II
415 (B) ADVANCED STRUCTURAL ANALYSIS

Teaching Scheme

Lectures:- 3 Hrs/Week, 3 Credits

Examination Scheme

ISE: 30 Marks

ESE: 70 Marks

ICA:- 25 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 end forces, Bandwidth.

INTERNAL CONTINUOUS ASSESSMENT (ICA)

ICA shall be based upon Problems/ tutorials based on topics in the curriculum.

TEXT BOOKS

1. Structural Analysis by Negi and 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.



Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Final Year B. Tech Civil – Part II

CV- 415 PROFESSIONAL ELECTIVE COURSE-II
415 (C) FINITE ELEMENT METHOD

Teaching Scheme

Lectures:- 3 Hrs/Week, 3 Credits

Examination Scheme

ISE: 30 Marks

ESE: 70 Marks

ICA: 25 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, Hamilton's principle, element mass matrices, evaluation of eigen values and eigen vectors.

INTERNAL CONTINUOUS ASSESSMENT (ICA)

A set of tutorials/ problems based on each unit of syllabus.

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

CV- 415 PROFESSIONAL ELECTIVE COURSE-II
415 (D) TRAFFIC ENGINEERING AND MANAGEMENT

Teaching Scheme

Lectures:- 3 Hrs/Week, 3 Credits

Examination Scheme

ISE: 30 Marks

ESE: 70 Marks

ICA:- 25 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, power performance of vehicles, Road Characteristics, Resistance to the motion of vehicles – Reaction time of 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. Statistical applications in traffic studies and traffic forecasting.

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, Road Lighting and Intelligent Transport System- Definition, Necessities, Application in the present traffic scenario.

Unit-6: ITS (8 Hrs)

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

TERM WORK

1. Field studies on traffic volume at midblock, intersection; O-D studies; speed studies, spot speed, speed and delay; parking demand studies and accident studies. Preparation and submission of report on all field surveys.
2. Assignment on each chapter and field visit report shall be submitted by the students.
3. Brief report on applications of software's used in traffic studies and analysis, such as VISSIM, SIDRA, PASSER III, TSIS, AIMSUN, Dynameq, Dynasmart, and SimTraffic and Transyt-7F.

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

**CV- 415 PROFESSIONAL ELECTIVE COURSE-II
415 (E) GEOSYNTHETICS AND SOIL STRUCTURES**

Teaching Scheme

Lectures:- 3 Hrs/Week, 3 Credits

Examination Scheme

ISE: 30 Marks

ESE: 70 Marks

ICA:- 25 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

INTERNAL CONTINUOUS ASSESSMENT (ICA)

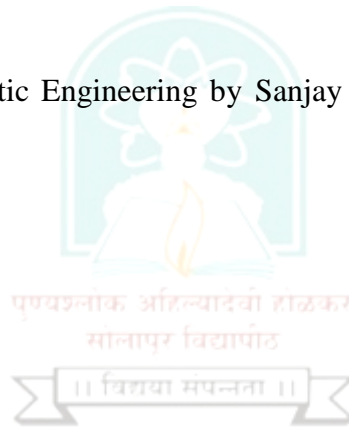
The work for Internal Continuous Assessment (ICA) will consist of total five assignments, based on syllabus. (One assignment for every unit of the syllabus)

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 and A.R.G. Rao, 1998.
2. Geosynthetics for Trails in Wet Areas: 2008, Edition by James Scott Groenier, Bibliogov Publishers, 2012.
3. Fundamentals of Geosynthetic Engineering by Sanjay Kumar Shukla and Jian-Hua Yin, Taylor & Francis, 2008.





Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Final Year B. Tech Civil – Part I

CV- 415 PROFESSIONAL ELECTIVE COURSE-II
415 (F) ADVANCED RAILWAY TRACK

Teaching Scheme

Lectures:- 3 Hrs/Week, 3 Credits

Examination Scheme

ISE: 30 Marks

ESE: 70 Marks

ICA:- 25 Marks

Course Outcomes: At the end of this course, students will be able to

- 1) Supervise a set of workers in the rectification of track defects including use of track machines
- 2) Carry out special repairs to formation, track or bridges.
- 3) Identify and quantify track defects
- 4) Analyse slewing of curves.
- 5) Inspect various track sites like Points and Crossings, curves level crossings and be able to fill the proforma in the inspection registers.

SECTION – I

Unit No 01: Mechanized Maintenance (7)

Maintenance of track with various types of machines including special repairs like with FRM, BCM. Track typing machines. Introduction and working of Dynamic Track stabilizer. Track tamping machines working on Indian Railways. New generation track machines with high productivity.

Unit No 02: Track Renewals (6)

Criterion for track renewal, various types of renewals. Procedure for carrying out renewals and deep screening during renewals. Methodology of track renewal. Track laying standard for manual laying. Complete dismantling of old track and relaying it manually (Work to be done during traffic blocks)

Unit No 03: Track Renewals Track in special Location (6)

Level crossings-Introduction, Different types of level crossing, Accidents on railway crossing, Special precautions for safety of level crossing gates, Maintenance of level

crossings, Inspection of level crossings. Concept of TVU, Bridges-Different components of bridges, Inspection of Railway Bridges, Tracks on bridges, track, sleepers, Guard rails, Rail joints and fittings, Painting of HFL, Trolley refuses, Footpaths and other general items, distressed bridges and its type, Track structures on bridges.

Unit No 04: Rail Metallurgy (4)

Different metallurgical specifications of rails, acceptance criteria for rails, manufacturing of rails. Handling of rails.

SECTION – II

Unit No 05: Long Welded Rail (4)

Concept of LWR, CWR, physics involved in LWR. Temperature zones, normal maintenance of LWR, Emergency maintenance, hot weather patrolling, distressing, buckling phenomenon.

Unit No 06: USFD & Welding of Rails (6)

Understanding the principles of USFD, detection and classification of rail flaws. Measures to be taken for flawed rails. Modern flaw detection techniques. USFD of welded joints. Frequency of testing.

Various methods of welding: Thermit, mobile, gas pressure, electric arc. Chemistry of Thermit welding. Quality and testing of welds. Measures to be taken for distressed welds.

Unit No 07: Investigation of derailments (6)

Classification of Accidents- Train accidents, yard accidents, indicative accidents, equipment failure. Types of derailments and their causes, Various Aspects of derailments, speed, track, engineman ship, rolling stock issues, derailment due to wheel jumping off the rails, gradual derailments by flange climbing, Defects in P. way and its details, Failures of formation, rains, fish plates, sleepers, ballast, Gauge variation and its limits, cross level defects and twist, longitudinal level defects, alignment defects, defective maintenance, lateral stability of tracks Critical wagon parameters-examination of carriage and wagon, spring and spring gear defects, defects of bogies truck on trolley, brakes and brake gear defects. Nadal's formula

Unit No 08: Yard Layouts

(6)

Yards- different types of yards, goods, passenger, marshalling, typical layout. Concept of overrun line, derailing switch, dead end, crossover. Platform Rail level, low level and medium level platforms. Height of platforms and Clearances at platforms. Length of platforms

Crossovers between parallel and non-parallel lines, CSL, Ladders, safety overlaps and provisions.

INTERNAL CONTINUOUS ASSESSMENT (ICA)

ICA shall be based on assignments and tutorial as given below

1. Visit & submission of report for “Field visit to a mechanized track maintenance site”.
2. Students shall visit some sites where machine maintenance is being carried out.
3. Students shall get familiarized with USFD machines to detect flaws in rails and classify them.
4. Students shall sample and then test the ballast for sieve size and wearing parameters.
5. Students shall actually record the track parameters for points and crossings, a level crossings and a curve.
6. Students shall be demonstrated the actual welding of rails being carried out by the Alumino-thermite process.
7. Visit & submission of report for “Field visit to a Railway yard to measure track parameters”.

TEXT BOOKS

1. Railway Track Engineering, J S Mundrey, McGraw Hill Education (India) Private Limited
2. Indian Railway Track, M. M. Agarwal, Ruby Jubilee.

REFERENCE BOOKS:

Monographs issued by IRICEN Pune

1. Hand Book of Material Testing
2. Hand Book of Track Maintenance
3. High Speed Railway - Construction & Maintenance

4. Layout Calculations
5. Long Welded Rails
6. Mechanised Tamping & Stabilisation
7. Mechanised Track Relaying (Quality Control in Mech Tk Relaying)
8. Track Monitoring
9. Turnout
10. Railway Curves
11. USFD Testing of Rails and Welds
12. Welding Techniques
13. Indian Railways General Rules





Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Final Year B. Tech Civil – Part I

CV- 415 PROFESSIONAL ELECTIVE COURSE-II
415 (G) CONSTRUCTION PRODUCTIVITY

Teaching Scheme

Lectures:- 3 Hrs/Week, 3 Credits

Examination Scheme

ISE: 30 Marks

ESE: 70 Marks

ICA:- 25 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.

INTERNAL CONTINUOUS ASSESSMENT (ICA)

The work for Internal Continuous Assessment (ICA) will consist of total six assignments, based on syllabus. (One assignment for every unit of the syllabus)

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



Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Final Year B. Tech Civil – Part I

CV- 415 PROFESSIONAL ELECTIVE COURSE-II
415 (H) ENVIRONMENTAL SYSTEMS

Teaching Scheme

Lectures:- 3 Hrs/Week, 3 Credits

Examination Scheme

ISE: 30 Marks

ESE: 70 Marks

ICA:- 25 Marks

Course Outcomes:

At the end of course, students will be able to

1. To understand the concept of modeling & its classification
2. To introduce about ecological modeling, single and multi-species modeling in brief.
3. To study modeling waste water management system
4. To study equations of continuity

SECTION I

Unit 1: Systems Approach Concept & Analysis

(7 Hrs)

Model Classification, Terminology of Models, Model Building, Fundamental of Modeling, Transport Law, Chemical Equilibrium, Phase Equilibrium Routh's Law, Relative Velocity and Chemical Kinetics

Unit 2: Ecological System

(8 Hrs)

Basic concepts in ecology and ecological modeling, Population Dynamics: Birth and death processes. Single species growth, Prey-predator models: Lotka-Volterra, Rosenzweig-MacArther, Kolmogorov models. Multi-species modelling.

Unit 3: Process Modelling

(8 Hrs)

Linear equilibrium system, Batch Reactor, pH system, Planning Models, Municipal solid waste management, Integrated Solid waste Management, Reuse and Recovery in paper, Plastic, glass and aluminum waste.

SECTION II

Unit 4: Water Modelling (8 Hrs)

Modeling of waste water management systems. Modeling of pesticide management; Modeling of municipal wastewater treatment, Model formulization and their solution, Numerical Techniques of Linear equations, Matrix inversion method, Gasses elimination and gauss-seidal method.

Unit 5: Programming Model (6 Hrs)

Silent feature of optimizations, Linear programming problem, Simplex method, Principals of problem in dual problem, Graphical Method, Principles related to graphical method — Optimum solution and their analysis (Minimization & Maximization) At least one problem of each method along with optimum solution.

Unit 6: Air Dispersion & Equations of Continuity (8 Hrs)

Equations of continuity for rectangular, cylindrical, spherical. Derivation for rectangular coordinate. Numericals based on equation of continuity. Pollutant standard index criteria, toxic air pollutants, Motor vehicle emission, the point source Gaussian Plume models, Transportation Models.

INTERNAL CONTINUOUS ASSESSMENT (ICA)

Internal Continuous Assessment (ICA) shall consist of minimum six assignments based on the entire curriculum.

TEXT BOOKS

1. Fundamentals of Atmospheric Modeling, Jacobson Mark Z., Kluwer Academic Press, 2002.
2. An Introduction to Water Quality Modeling, James A. (Ed), (2nd Ed.), 1992.
3. Techniques for Environmental System Analysis - R. H. Pantell Wiley, NY, 2001.
4. System Analysis and Design - RJ Aguilar, Prentice Hall, Englewood Cliffs, N.J., 1993.

REFERENCE BOOKS

1. Handbook of Environmental and Ecological Modeling, Halling-Sorensen B., Nielsen S.N. and Jorgensen S.E., Lewis Publishers Inc., 1995.
2. Numerical Methods and Analysis- Dr. S. K. Rathore.
3. Transport Phenomenon — Bird
4. Deaton, M.L and Winebrake, J.J., "Dynamic Modeling of Environmental Systems", Springer-Verlag, 2000.
5. Orhon, D and Artan, N., "Modeling of Activated Sludge Systems, Technomic" Publ. Co., 1994.
6. Chapra, S.C. *Surface Water-Quality Modeling", McGraw-Hill, 1997.





Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Final Year B. Tech Civil – Part I

CV- 415 PROFESSIONAL ELECTIVE COURSE-II
415 (I) WATER POWER ENGINEERING

Teaching Scheme

Lectures:- 3 Hrs/Week, 3 Credits

Examination Scheme

ISE: 30 Marks

ESE: 70 Marks

ICA:- 25 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

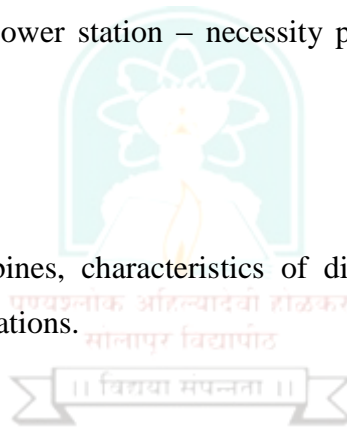
SECTION – II

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 of turbine, 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.

CV- 325 ELECTIVE – I WATER POWER ENGINEERING (Laboratory)
INTERNAL CONTINUOUS ASSESSMENT (ICA)

It shall consist of exercises based on theory.

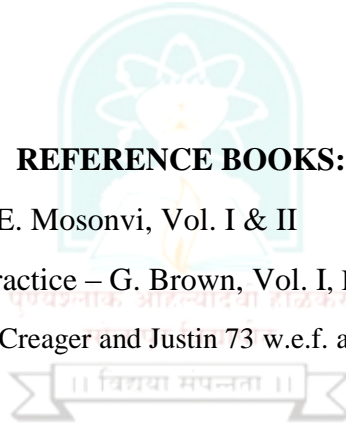
Visit to Water Power Station. Visit report with the salient features and details of station.

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





Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Final Year B. Tech Civil – Part I
CV- 416 PROJECT ON R. C. C. STRUCTURES

Teaching Scheme

Drawing:-4 Hrs/Week, 2 Credits

Examination Scheme

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 CONTINUOUS 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.
- b) Pile foundation for structure with pile cap.
- 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



Punyashlok Ahilyadevi Holkar Solapur University, Solapur

**Final Year B. Tech Civil – Part I
CV- 417 SEMINAR**

Teaching Scheme

Practical:-2 Hrs/Week, 1 Credits

Examination Scheme

ICA: 50 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 area related 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



Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Final Year B. Tech Civil – Part I

CV- 418 PROJECT WORK

Teaching Scheme

Practical:- 2 Hrs/Week, 1 Credit

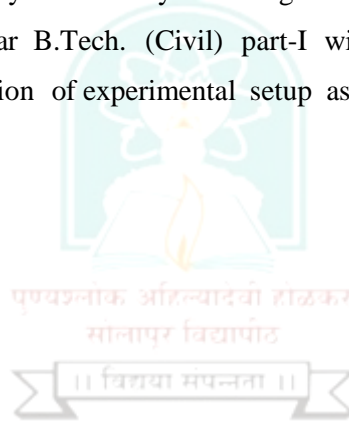
Examination Scheme

ICA:- 25 Marks

Objectives:

- 1) To carry out a thematic design project in one of the specializations of civilengineering
- 2) To carry out a project that will make the students aware of the different facets of civilengineering.

The topic for the Project Work may be from any Civil Engineering and inter-disciplinary arearelated to Civil Engineering. Final Year B.Tech. (Civil) part-I will comprise of literature survey / problem formulation / preparation of experimental setup as the case may be of the identified problem.





Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Final Year B. Tech Civil – Part I

CV- 419 ASSESSMENT OF REPORT ON FIELD TRAINING-II

Teaching Scheme
Credit:- 1 Credit

Examination Scheme
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



Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Final Year B. Tech Civil – Part II

**CV- 421 PROFESSIONAL ELECTIVE COURSE-III
421 (A) INDUSTRIAL STRUCTURES**

Teaching Scheme

Lectures:-4 Hrs/Week, 4 Credits

Practical:- 2 Hrs./Week, 1 Credit

Examination Scheme

ISE: 30 Marks

ESE: 70 Marks

OE: 25 Marks

ICA: 25 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 875 to be allowed along with Steel Tables in Exam.

INTERNAL CONTINUOUS ASSESSMENT (ICA)

- A. A set of tutorials/ problems based on above topics of syllabus
- B. In addition to this, the term work shall consist of a design report and detailed drawings on any one of projects as indicated below:
- Analysis results shall be made for portal frame by using software and detailed drawing shall be prepared for the same
 - Analysis and design of steel tower using software. Prepare detail drawing for the same

TEXT BOOKS

- Pasala Dayaratnam – Design of Steel Structure – 1990.
- Subramanian, N., Design of Steel Structures, Oxford University Press, 2008.
- Ramachandra and Virendra Gehlot, Design of steel structures -Vol. 2, Scientific Publishers, 2012.
- Bhavikatti.S.S., “Design of Steel Structures”, J.K. International Publishing House Pvt.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, Wiley Publication
4. Advanced Design in Structural Steel: John E. Lothers
5. Limit State Design of Structural Steel, M.R. Shiyekar, PHI Learning Pvt. Ltd., Second Edition, 2013
6. Handbook of Machine Foundation, Shrinivasulu P. and VaidyanathanC. Tata McGraw Hill, 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 Academic Publishing





Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Final Year B. Tech Civil – Part I

**CV- 415 PROFESSIONAL ELECTIVE COURSE-III
415 (B) REPAIRS & REHABILITATION OF STRUCTURES**

Teaching Scheme

Lectures:-4 Hrs/Week, 4 Credits

Practical:- 2 Hrs./Week, 1 Credit

Examination Scheme

ISE: 30 Marks

ESE: 70 Marks

OE: 25 Marks

ICA: 25 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.

INTERNAL CONTINUOUS ASSESSMENT (ICA)

The ICA shall consist of at least one assignment on each unit.

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

CV- 421 PROFESSIONAL ELECTIVE COURSE-III
421 (C) PUBLIC TRANSPORTATION SYSTEMS

Teaching Scheme

Lectures:-4 Hrs/Week, 4 Credits

Practical:- 2 Hrs./Week, 1 Credit

Examination Scheme

ISE: 30 Marks

ESE: 70 Marks

OE: 25 Marks

ICA: 25 Marks

Course Outcomes:

At the end of course, students will be able to

1. Understand fundamentals of Public Transportation Systems.
2. Differentiate different PTS user services
3. Select appropriate technology depending upon site specific conditions.
4. Design and implementation of Public Transportation Systems.
5. Apply the various methodologies for Public Transportation Systems.
6. Define the significance of Public Transportation Systems under Indian conditions

SECTION I

Unit 1:

(10 Hrs)

Public Transport: Definitions, modes of public transport and comparison, public transport travel characteristics, trip chaining, technology of bus, rail, rapid transit systems, basic operating elements

Unit 2:

(10 Hrs)

Transit Network Planning: Planning Objectives, principles, considerations, transit lines – types, geometry and characteristics, transit routes and their characteristics

Unit 3:

(10 Hrs)

Transit Scheduling: Components of scheduling process, determination of service requirements, scheduling procedure, marginal ridership, crew scheduling

SECTION-II

Unit 4: (10 Hrs)

Transit Agency and Economics: Organizational structure of transit agency, management and personnel, transit system statistics, performance and economic measures, operations, fare structure

Unit 5: (10 Hrs)

Comparison of transit modes and selection of technology for transit service. Integrated public transport planning; operational, institutional, and physical integration; models for integrated planning; case studies.

Unit 6: (10 Hrs)

Design of Facilities: Design of bus stops, design of terminals – principles of good layout, types of layout, depot location, twin depot concept, crew facilities and amenities.

INTERNAL CONTINUOUS ASSESSMENT (ICA)

Internal Continuous Assessment (ICA) shall consist of minimum six assignments based on the entire curriculum and Report on case studies of Planning & Design of a Public transportation system for at least five selected cities of India. The report shall include the Objectives, Planning, Scheduling Methodology and techniques adopted for Design of a Public transportation system.

Oral examination shall be based on knowledge of student about subject. Weightage of 25 marks is allotted for this part of examination.

TEXTBOOKS

1. Vuchic Vukan R., Urban Transit: Operations, Planning and Economics, Prentice Hall, 2005.
2. Gray G. E., and Hoel L. A., Public Transportation, Prentice Hall, 1992

REFERENCE BOOKS:

1. Public Transit Planning and Operation: Theory, Modelling and Practice by AvishaiCeder
2. Urban Transit Systems and Technology by Vukan R. Vuchik.
3. Studies in the economics of transportation by Beckmann et al.
4. Applied choice analysis: A Primer by David Hensher and WilliumGreene
5. Transportation Decision Making: Principles of Project Evaluation and Programming, Wiley, 2007 by Kumares C. Sinha, Samuel Labi
6. Fundamentals of Transportation Engineering by Fricker and Whitford
7. Public Transportation related analysis using software like TRANSCAD, CUBE Software





Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Final Year B. Tech Civil – Part II

CV- 421 PROFESSIONAL ELECTIVE COURSE-III
421 (D) AIRPORT PLANNING AND DESIGN

Teaching Scheme

Lectures:-4 Hrs/Week, 4 Credits

Practical:- 2 Hrs./Week, 1 Credit

Examination Scheme

ISE: 30 Marks

ESE: 70 Marks

OE: 25 Marks

ICA: 25 Marks

Course Outcomes:

At the end of course, students will be able to

1. Elaborate various components of an airport and aircraft characteristics affecting the design of airports.
2. Design the runway and taxiway geometrics based on the likely aircrafts using the airport.
3. Plan the requirements of terminal area and suggest an optimum layout for the terminal area based on passenger and baggage volume.
4. Suggest a suitable method of grading and leveling work involved in the area along with drainage provisions for surface and subsurface water flows.
5. Understand the various air traffic control aids required for safe landing and take-off of aircrafts at the airport.



SECTION I

Unit - 1 Introduction to Air Port and Air Craft Characteristics: (10 Hrs)

Growth of air transport, airport organization and associations, classifications of airports, airfield components, airport traffic zones and approach areas Components, size, turning radius, speed, aircraft characteristics, Capacity and Delay: Factors affecting capacity, determination of runway capacity related to delay, gate capacity, taxiway capacity.

Unit 2: Airport Planning and Surveys: (10 Hrs)

Runway length and width, sight distances, longitudinal and transverse grades, runway intersections, taxiways, clearances, aprons, numbering, holding apron

Unit 3: Structural Design of Airport Pavements: (10 Hrs)

Introduction- Various Design Factors- Design Methods for Flexible Pavement- Design Methods for Rigid Pavement- LCN System of Pavement Design- Joints in Cement Concrete Pavement- Airport Pavement Overlays- Design of an Overlay

SECTION-II

Unit 4: Planning and design of the Terminal area: (8 Hrs)

Operational concepts, space relationships and area requirements, noise control, vehicular traffic and parking at airports

Unit 5: Airport Grading and Drainage: (10 Hrs)

Grading of airport area, hydrology, design of drainage systems, construction methods, layout of surface drainage and sub-surface drainage system

Unit 6: Air Traffic Control and Aids: (8 Hrs)

Runways and taxiways markings, day and night landing aids, airport lighting and other associated aids

Unit 7: (4 Hrs)

Recent advances and research being done in the topics mentioned in the above units.

INTERNAL CONTINUOUS ASSESSMENT (ICA) & POE

1. Internal Continuous Assessment (ICA) shall consist of minimum six assignments based on the entire curriculum and Report on case studies.
2. Oral examination shall be based on knowledge of student about subject.
3. The visit of Airport site should be carried out to understand the various structures, its construction and operations.

TEXT BOOKS:

1. “Planning and Design of Airports” - Robert Horenjeff, 2nd edition, McGraw Hill Book Co.
2. “Airport Engineering” - G. Glushkov, V.Babkov, Mir Publuisers, Moscow.
3. “Airport Planning and Design”- Khanna, Arora and Jain, Nem Chand and Bros., Roorkee

REFERENCES:

1. Planning and design of Airports by Robert Horenjeff, 2nd Edition, McGraw Hill Book Co.
2. Airport Engineering by G. Glushkov, V. Babkov, Mir Publishers, Moscow
3. Airport Planning and Design by Khanna, Arora and Jain, Nem Chand and Bros., Roorkee
4. Harry, R. Cedergern, ‘Drainage of Highway and Airfield Pavements’, John Wiley and Sons.
5. Virender Kumar and Satish Chandra, ‘Airport Planning and Design’, Galgotia Publication Press





Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Final Year B. Tech Civil – Part II

CV- 421 PROFESSIONAL ELECTIVE COURSE-III
421 (E) HIGH SPEED RAIL ENGINEERING

Teaching Scheme

Lectures:-4 Hrs/Week, 4 Credits

Practical:- 2 Hrs./Week, 1 Credit

Examination Scheme

ISE: 30 Marks

ESE: 70 Marks

OE: 25 Marks

ICA: 25 Marks

Course Outcomes:

At the end of course, students will be able to

1. Introduced the regional planning for an HSR
2. Explain the significance of HSR as a mode of transport.
3. Demonstrate the basic design of HSR
4. Carry out Structural Design of HRS system

SECTION I

Unit 1: Introduction

(10 Hrs)

History, International Experience with High-Speed Rail, classifications, The high-speed network, Potential Benefits of High-Speed Rail, Prospects for a Indian System. Development, engineering, design and construction of high- speed rail (HSR) passenger transport systems with particular emphasis on the unique engineering elements of HSR technology

Unit 2: High speed railway Planning:

(10 Hrs)

General- Regional Planning- Development of New HRS Transportation- Data Required before Site Selection- Site Selection- Surveys for Site Selection- Drawings to be prepared- Estimation of Future Traffic Needs.

Unit 3: HRS Design

(10 Hrs)

Development, engineering, design and construction of high- speed rail (HSR) passenger transport systems with particular emphasis on the unique engineering elements of HSR technology.

SECTION–II

Unit 4: Structural Design of HRS system : (10 Hrs)

Key elements of HSR systems and subsystems including: core systems (trains, power, signal, communication and control), track system and civil infrastructure (earthwork, bridges, viaducts and tunnels).

Unit 5: Civil infrastructure (10 Hrs)

Track system and civil infrastructure (earthwork, bridges, viaducts and tunnels). Also covered are basic design and construction of HSR stations and rolling stock maintenance facilities.

Unit 6: Programs for High-Speed Rail Investment (10 Hrs)

The Current Legislative and Funding Framework, The High-Speed Intercity Passenger Rail Program, Federal Rail Policy Challenges.

INTERNAL CONTINUOUS ASSESSMENT (ICA) & POE

1. Internal Continuous Assessment (ICA) shall consist of minimum six assignments based on the entire curriculum and Report on case studies.
2. Oral examination shall be based on knowledge of student about subject.
3. The visit of nearest Metro railway station shall be carried out to understand the various structures, its construction and operations.

TEXT BOOKS

1. Terry L Koglin, High Speed Rail Planning, Policy, and Engineering, Volume I: Overview of Development and Engineering Requirements Paperback – Import, 8 February 2016
2. Lei, Xiaoyan, High Speed Railway Track Dynamics: Models, Algorithms and Applications

REFERENCE BOOKS:

1. AAR (American Association of Railroads). 2011. Freight and passenger rail: Finding the right balance. Washington, DC: AAR.
2. AASHTO (America Association of State Highway and Transportation Officials). 2011. The forum on funding and financing solutions for surface transportation in the coming decade: Conference report. Washington, DC: AASHT



Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Final Year B. Tech Civil – Part II

CV- 421 PROFESSIONAL ELECTIVE COURSE-III
421 (F) CONSTRUCTION COST ANALYSIS

Teaching Scheme

Lectures:-4 Hrs/Week, 4 Credits

Practical:- 2 Hrs./Week, 1 Credit

Examination Scheme

ISE: 30 Marks

ESE: 70 Marks

OE: 25 Marks

ICA: 25 Marks

Course outcomes:

At the end of this course the students shall be able to

1. Analyze various elements of the cost associated with the engineering project
2. Estimate cost using estimating models
3. Measure progress and track the cost of engineering projects
4. Execute the cost management of project
5. Explain value management process and relate Project Value and Risk
6. carry out earned value analysis in an engineering project

Section I

Unit 1: Cost

(6 Hrs)

Cost Elements - Pricing, Materials, Labour, Engineering, Equipment, Parts and Tools; Economic Costs.

Unit 2: Cost Analysis:

(8 Hrs)

Direct Cost, indirect Cost, Overhead, allowance, Contingency

Unit 3: Cost Estimating :

(8 Hrs)

Estimating Models; Parametric estimating- modular estimating, parametric model, Analogous estimating- ratio estimating, The Three-quarters rule, The Square root rule, Two-Thirds rule, Range estimating

Unit 4: Progress & Cost Control

(8 Hrs)

Progress Measurement and Earned Values; Earned Value for Variable Budgets;

Tracking Cost and Schedule Performance.

Section II

Unit 5: Cost Management: (6 Hrs)

Causes of Change, Feed Forward Techniques, Impact of schedule on cost, Lifecycle costs, Impact of project risk, integrated cost management program

Unit 6 :Value Management: (12 Hrs)

Concept of Value, Dimensions and Measures of Value, Overview of Value Management, Definition' Scope, Key Principles of VM, Key Attributes of VM, Value Management Terms, Need for Value Management in Projects, The Value Management Approach, Cross-functional Framework 'Use of Functions, Structured Decision Process, The VM Process, Benefits of Value Management, Other VM requirements, Relationship between Project Value and Risk, Value Management as an Aid to Risk Assessment

Unit 7: Value Analysis:- (12 Hrs)

Earned Value Management for assessing project performance, Earned Value Management, Earned Value Management Model, Fundamentals of Earned Value, EVM Terminology, Relevancy of Earned Value Management, Conducting an Earned Value Analysis, Performing an Earned Value Assessment, Managing a Portfolio of Projects with Earned Value Management, Important Issues in the Effective Use of Earned Value Management.

Integrating Cost and Value in Projects

INTERNAL CONTINUOUS ASSESSMENT:

1. Analyze various elements of the cost associated with the engineering project with the help of case study
2. Estimate cost using estimating models for a simple civil engineering project (with drawings and Schedule of rates as data)

3. Measure progress and track the cost of engineering projects preferably using software tool
4. Execute the cost management of project for a case study
5. Explain value management process and relate Project Value and Risk
6. carry out earned value analysis in an engineering project for a case study

Reference book:-

1. Project Estimating and Cost Management By Parivs F. Rad PhD, PMP
2. **Project Cost Management guide from PMBOK 5th edition**
3. Project Scheduling and Cost Control: Planning, Monitoring and Controlling the Baseline
by James Taylor
4. Systems Life Cycle Costing: Economic Analysis, Estimation, and Management, John V. Farr, Draft Textbook, Version 1.0.
5. Cost And Value Management In Projects Ray R. Venkataraman and Jeffrey K. Pinto John Wiley & Sons, Inc Inc., Hoboken, New Jersey
6. American Association of Cost Engineers, “SKILLS AND KNOWLEDGE OF COST ENGINEERING”, 1996
7. **Cost Management of Capital Projects (Cost Engineering) by Kurt Heinze - International Edition, August 28, 1996**



Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Final Year B. Tech Civil – Part II

CV- 421 PROFESSIONAL ELECTIVE COURSE-III
421 (G) CONSTRUCTION EQUIPMENT & AUTOMATION

Teaching Scheme

Lectures:-4 Hrs/Week, 4 Credits

Practical:- 2 Hrs./Week, 1 Credit

Examination Scheme

ISE: 30 Marks

ESE: 70 Marks

OE: 25 Marks

ICA: 25 Marks

Course Outcomes:- At the end of the course students will be able to:

1. Compare the Construction equipments in terms of its suitability, efficiency and economy.
2. Explain the 3D printing construction process and components.
3. Explain the application of building management system and automation in on and offsite projects.
4. Solve the construction issues through robotic techniques and Apply Robotics in Construction
5. Apply computer in construction Information processing and explain the concepts of Communication and office automation system

SECTION –I

Unit 1: Mechanized methods

(6Hrs)

Different equipment used in construction: - Equipment for Earthmoving, Dewatering; Concrete mixing, transporting & placing; plastering machines; Prestressing jacks and grouting equipment.

Unit 2: Heavy Machinery: -

(8 Hrs)

Cranes, Hoists and other equipment for lifting; Equipment for transportation of materials. Equipment Productivities;

Unit 3: Robotics in Construction

(8Hrs)

Automation and robotic technologies for customized component, module and building prefabrication- Elementary technologies and single – Task construction robots - Site automation-robotic on site factories.

Selecting robot- Activated concrete cutting robot, concrete floor finishing robot- Ceiling panel positioning robot- Exterior wall painting robot-safety and training- case studies.

Unit 4: Automated 3D Printing Features

(8 Hrs)

Introduction to 3D printed construction, World wide overview: Projects and players, The different technologies, Materials, Design, controls and limitations. Introduction to 3D Construction printer functionality and controls, Slicing and printing, Mixing and feeding materials.

SECTION –II

Unit 5: Building Management System (BMS) and Automation

(8 Hrs)

Concept and application of Building Management System (BMS) and Automation, requirements and design considerations and its effect on functional efficiency of building automation system, architecture and components of BMS- Review and analysis of state- of –art in construction automation

Unit 6: Sensors

(6Hrs)

Field sensors actuators, controllers, non-destructive evaluation, data acquisition , examples of sensors in existing automated equipment.

Unit 7: Off and On site automation in construction

(8Hrs)

Off- site automation in construction Information processing (computer applications), materials processing, case study (concrete batch plant) - Existing and prototype equipment for construction – case study (concrete placement and finishing), final product design session

Unit 8: Building Automation Systems

(08Hrs)

- a) Introduction to building automation systems – components– Heating, ventilation, and air conditioning (HVAC)– Lighting – Electrical systems water supply and sanitary systems– Fire safety – security -Communication and office automation system -Water pump monitoring & control - Control of Computerized HVAC Systems c) Development method of valuation for building estate.
- 1) Data networking– IBMS system and its components – Centralized control equipment’s – substation and field controllers – Gamma building control – energy-efficient building and room automation.

INTERNAL CONTINUOUS ASSESSMENT (ICA)

The ICA shall consist the following

- 1) Report of field visit to see operations of
 - a. Earthmoving equipments-
 - b. Hoisting equipments
 - c. Transportation equipments
- 2) Calculation of cycle time and efficiency of abovementioned construction equipments

- 3) Selection of Robots for Construction activities with explanation of factors influencing its selection
- 4) Detailed case study with drawings and material selection for 3D printing in construction.
- 5) One case study explaining components of building automation systems
- 6) One case study explaining components of building management systems

Text Books/Reference Books

- 1) Construction, Planning, Equipment and methods - R.L . Peurifoy McGraw hill book co New Delhi
- 2) Construction Equipment Guide, David A. Day, Neal B.H. Benjamin, John Wiley & Sons.
- 3) Construction Equipment – Mahesh Varma ,Metropolitanbook co ,New York
- 4) Hand Book of Heavy Construction – Stubbs
- 5) Heavy Construction – Planning, Equipment and methods – Jagman Singh, Oxford and IBH publishers, New Delhi.
- 6) Construction Technology, Prof. S. S. Ataev, Mir Publishers, Moscow.
- 7) Javad Majrouhi Sardroud, (2011),“Automated Management of Construction Projects” LAP Lambert Academic Publishing.
- 8) Wang Shengwei, (2010), “Intelligent Buildings and Building Automation” Taylor & Francis Group.
- 9) Majrouhi Sardroud Javad, (2014), “Automation in Construction Management” Scholars' Press.
- 10) HongleiXu and Xiangyu Wang, (2014), “Optimization and Control Methods in Industrial Engineering and Construction (Intelligent Systems, Control and Automation: Science and Engineering)” Springer.



Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Final Year B. Tech Civil – Part II

CV- 421 PROFESSIONAL ELECTIVE COURSE-III
421 (H) RURAL WATER SUPPLY & ONSITE SANITATION SYSTEMS

Teaching Scheme

Lectures:-4 Hrs/Week, 4 Credits

Practical:- 2 Hrs./Week, 1 Credit

Examination Scheme

ISE: 30 Marks

ESE: 70 Marks

OE: 25 Marks

ICA: 25 Marks

Course Outcomes:

At the end of course, students will be able to

1. Identify the problems pertaining to rural water supply and sanitation.
2. Design water supply and sanitation system for rural community.
3. Design low cost waste management systems for rural areas.
4. Plan and design an effluent disposal mechanism.

SECTION I

Unit 1:

(10 Hrs)

Rural Water Supply: Issues of rural water supply –Various techniques for rural water supply- merits- National rural drinking water program- rural water quality monitoring and surveillance- operation and maintenance of rural water supplies

Unit 2:

(10 Hrs)

Various approaches for planning of water supply systems in rural areas. Selection and Development of preferred sources of water, springs, wells, infiltration wells, radial wells and infiltration galleries, collection of raw water from surface source

Unit 3:

(10 Hrs)

Rural Sanitation: Introduction to rural sanitation- Community and sanitary latrines - Planning of wastewater collection system in rural areas- Treatment and Disposal of wastewater

SECTION-II

Unit 4: (10 Hrs)

Introduction to rural sanitation- Community and sanitary latrines - Planning of wastewater collection system in rural areas- Treatment and Disposal of wastewater - Compact and simple wastewater treatment units and systems in rural areas- stabilization ponds - septic tanks - Imhoff tank- soak pits- low cost excreta disposal systems- Effluent disposal.

Unit 5: (10 Hrs)

Industrial Hygiene And Sanitation: Occupational Hazards- Schools- Public Buildings Hospitals- Eating establishments- Swimming pools – Cleanliness and maintenance and comfort- Industrial plant sanitation.

Unit 6: (10 Hrs)

Solid Waste Management: Disposal of Solid Wastes- Composting- land filling, incineration- Biogas plants - Rural health - Other specific issues and problems encountered in rural sanitation.

INTERNAL CONTINUOUS ASSESSMENT (ICA)

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

1. Case study of water supply and sanitation process in a village (Any Two).
2. Assignments (One Assignment on each unit)

TEXT BOOKS

1. Wright, F.B., Rural Water Supply and Sanitation, E. Robert Krieger Publishing Company, Huntington, New York, 1977
2. Juuti, P., Tapio S. K., and Vuorinen H., Environmental History of Water: Global Views on Community Water Supply and Sanitation, IWA Publishing (Intl Water Assoc), 2007

REFERENCE BOOKS

1. Eulers, V.M., and Steel, E.W., Municipal and Rural Sanitation, 6th Ed., McGraw Hill Book Company, 1965
2. Park, J.E., and Park, K., Text Book of Preventive and Social Medicine, Banarsidas Bhanot, 1972





Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Final Year B. Tech Civil – Part II

CV- 421 PROFESSIONAL ELECTIVE COURSE-III
421 (I) AIR AND NOISE POLLUTION AND CONTROL

Teaching Scheme

Lectures:-4 Hrs/Week, 4 Credits

Practical:- 2 Hrs./Week, 1 Credit

Examination Scheme

ISE: 30 Marks

ESE: 70 Marks

OE: 25 Marks

ICA: 25 Marks

Course Outcomes:

At the end of course, students will be able to

1. Proper understanding 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 equipments.
 3. Apply knowledge of legislation for prevention and control of air pollution.
 4. Knowledge to analyze quality of air in the form of air quality index and dispersion modeling.
 5. Basic information about Noise and its control.
1. Hands on experience on sampling and measurements of air Pollutants

SECTION I

Unit 1:Introduction to Air Pollution

(10 Hrs)

Air and its composition, Structure of the atmosphere, Types of exposures, Air Pollution, 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. Plume behavior. Effect of topography, terrain and structure on Pollutant dispersion. 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. Sampling and measurement of air pollutants. Introduction to National Ambient Air Quality Standards.

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

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.

Air sampling, analysis and Legislation

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



SECTION – II

Unit 4: 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 5: Introduction to Noise (10 Hrs)

Noise pollution: Basics of acoustics and specification of sound; sound power, sound intensity and sound pressure levels; plane, point and line sources, multiple sources; outdoor and indoor

noise propagation; psychoacoustics and noise criteria,

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

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

INTERNAL CONTINUOUS ASSESSMENT (ICA)

The ICA shall consist:

1. Assignments / problems on Air pollution.
2. Sampling and analysis of Ambient Air
3. Sampling and analysis of Automobile exhaust
4. Demonstration of stack gas monitoring

Viva/Oral examination will be based on above theory syllabus and term work

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

LIST OF EXPERIMENTS

1. Sampling of PM 2.5 in ambient air.
2. Sampling of Respirable Suspended Particulate Matter PM10 in ambient air.
3. Sampling of Suspended Particulate Matter in ambient air.
4. Sampling and analysis of nitrogen dioxide in ambient air.

5. Sampling and analysis of sulphur dioxide in ambient air.
6. Measurement of Noise using Sound Level Meter.
7. Demo of Stack monitoring kit.
8. Demo of weather monitoring station.
9. Demo of handy air sampler

Design based Problems (DP) /Open Ended Problem:

1. Analysis of air quality at different places
2. Noise level measuring at different places
3. Design of various control equipment
4. Various case studies related to the subject

Major Equipment:

1. Respirable dust sampler
2. PM2.5 Sampler
3. Stack monitoring kit
4. Sound level meter
5. Handy air sampler etc.



Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Final Year B. Tech Civil – Part II

CV- 421 PROFESSIONAL ELECTIVE COURSE-III
421 (J) SURFACE HYDROLOGY

Teaching Scheme

Lectures:-4 Hrs/Week, 4 Credits

Practical:- 2 Hrs./Week, 1 Credit

Examination Scheme

ISE: 30 Marks

ESE: 70 Marks

OE: 25 Marks

ICA: 25 Marks

Course Outcomes:

At the end of course, students will be able to

1. Conduct Rainfall-Runoff Analysis, Solve Problems.
2. Analyze hydrological and probabilistic data.
3. Conduct frequency analysis, Learn Unit Hydrograph Theory.
4. Determine catchment yield
5. Learn the use of hydrological models and carry out flood routing. learn the use of instruments for the collection of Hydrological Field Data

SECTION I

Unit

(10 Hrs)

Introduction, Hydrological cycle, Hydrological processes, Systems concept and approach, Applications of Hydrology, Field data needed in Hydrology.

Precipitation Processes, Factors affecting precipitation processes Forms of precipitation, climate and seasons in India. Water availability in India and world. Methods of measuring precipitation, location of rain gauge, rainfall mass curve and rainfall hyetograph, intensity-duration-frequency analysis, depth-area-duration analysis, Probable Maximum Precipitation(PMP).

Unit 2:

(10 Hrs)

Statistical parameters, Probability distribution, Frequency analysis, Regression and correlation, Multivariate linear regression and correlation, Analysis of time series. Infiltration, Measurement of Infiltration, Richard's equation, Green – Ampt model, Soil

Conservation Service (SCS) model, Ponding time, Evaporation – process description. Evaporation measurement and estimation, Modified Penman equation, Evapo-transpiration.

Unit 3: (10 Hrs)

Runoff: runoff components, factors affecting runoff, Drainage basin characteristics, basin yield, runoff-rainfall relations. Data Analysis: Correlation, regression analysis, transformations, stochastic process, and time series analysis, Auto correlation analysis and synthetic flow generation models using random variants.

SECTION – II

Unit 4: (10 Hrs)

Hydrograph analysis, Phi-index and Corps of Engineers procedure, Unit hydrograph (UH) theory, UH derivation, Instantaneous UH, Synthetic unit hydrograph, Unit hydrographs of different rainfall durations.

Unit 5: (10 Hrs)

Flood Routing- Introduction, basic equations, Hydrologic/ storage routing in reservoir and Channels, Hydraulic methods of flood routing, Simple cases.

Unit 6: (10 Hrs)

Introduction to Urban Hydrology –General, Climate modification, Catchment response modification, urban development planning, urban drainage design concepts.

INTERNAL CONTINUOUS ASSESSMENT (ICA)

It is based on a minimum six assignments of the above syllabus (per unit one assignment)

ORAL EXAMINATION

It is based on the above assignments.

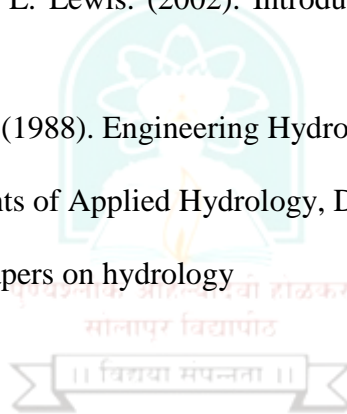
TEXT BOOKS

1. P. Jayarami Reddy, Textbook of Hydrology, Laxmi Publication, New Delhi
2. P. Jayarami Reddy, Stochastic Hydrology, Laxmi Publication, New Delhi

3. R. H. Mccuen and W. M. Snyder, Hydrologic Modelin Statistical Methods and Applications Prentice Hall, New Jersey, U. S. A
4. K. N. Mutreja, Applied Hydrology, Tata McGraw Hill Publication
5. V.T.Chow, Applied Hydrology, Tata McGraw Hill Publication

REFERENCES BOOKS

1. Subramanya, K. (1994), Engineering Hydrology 2nd ed., Tata McGraw-Hill
2. Shaw, E.M. (1994) Hydrology in Practice, 3rd ed., Chapman & Hall
3. Chow, V.T. (1964), Hand book of Applied Hydrology, McGraw-Hill
4. Wilfried Brutsaert. (2005). Hydrology: An Introduction. Cambridge University Bridge.
5. Warren Viessman and Gary L. Lewis. (2002). Introduction to Hydrology. 5/e. Prentice Hall.
6. VenTe Chow and Maidment (1988). Engineering Hydrology. McGraw-Hill.
7. Bhattacharya (2003). Elements of Applied Hydrology, Delhi.
8. Any journals and research papers on hydrology





Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Final Year B. Tech Civil – Part II

CV- 422 PROFESSIONAL ELECTIVE COURSE-IV
422 (A) METAL STRUCTURE BEHAVIOUR- II

Teaching Scheme

Lectures:-4 Hrs/Week, 4 Credits

Practical:- 2 Hrs./Week, 1 Credit

Examination Scheme

ISE: 30 Marks

ESE: 70 Marks

OE: 25 Marks

ICA: 25 Marks

Course Outcomes:

At the end of course, students will be able to

1. To understand the design of connections
2. Analyze and design a Roof truss for given loading conditions
3. To understand the analysis and design concept of round tubular structures
4. To understand the design concept of different type of steel water tank
5. To understand the design concept of lattice tower and steel chimney.

SECTION I

Unit 1: Moment Resistant Beam End Connections (7 Hrs)

Design of moment resistant bolted and welded beam end connections by limit state method

Unit 2: Industrial Roof Trusses (10 Hrs)

Various component of an industrial shed, Types of trusses, load calculation and combination, design of purlins, design of members of a truss.

Unit 3: Round Tubular Structural Members (13 Hrs)

Properties of steel tubes, design of tension member and compression members, design of welded connections, design of flexural members, analysis and design of tubular trusses including purlins and supports

SECTION -II

Unit 4: Elevated Steel Tanks and Stacks (12 Hrs)

Loads acting on tanks including wind and earthquake, design of circular tanks with hemispherical and conical bottom, supporting ring beam, staging for circular tanks including design of columns and foundation, design of rectangular steel tanks including design of staging, columns and foundation.

Unit 5: Lattice Tower (10 Hrs)

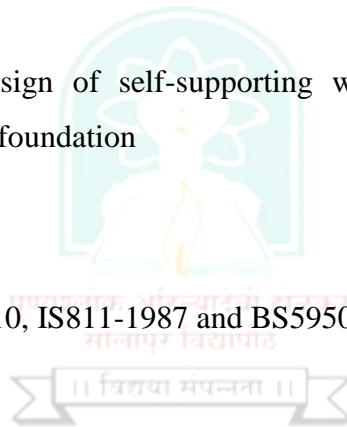
Different configuration of lattice towers, loads acting on lattice towers, Analysis of lattice tower, design of lattice tower including welded or riveted connections for members by limit state method.

Unit 6: Steel Chimney (8 Hrs)

Forces acting on chimney, design of self-supporting welded and bolted chimney and components including design of foundation

Note:

IS 800: 2007, IS 875, IS 801-2010, IS811-1987 and BS5950 – part 8 to be allowed along with Steel Tables in Exam.



INTERNAL CONTINUOUS ASSESSMENT (ICA)

- A. At least one assignment one assignment on each topic.
- B. In addition to this, the term work shall consist of a design report and detailed drawings on any one of projects as indicated below:
 - 1. Roofing system including details of supports using tubular section
 - 2. Design of elevated circular tank with conical bottom or rectangular steel tank.
 - 3. Design of lattice tower or steel chimney.

TEXT BOOKS

- 1. Design of Steel Structures: N Subramanian, Oxford- University Press
- 2. Design of Steel Structures: Punamia, A. K. Jain and Arun Kumar Jain, Laxmi Publication
- 3. Design of Steel Structures: Dayaratnam, Wheeler Publication, New Delhi.

4. Design of steel structures: Krishnamachar, B.S.and Ajitha Sinha D.

REFERENCE BOOKS

1. Design of Steel Structures: Mac. Ginely T.
2. Design of Steel Structures: Kazimi, S. M. and Jindal, R. S., Prentice Hall of India.
3. Design of Steel Structures: Breslar, Lin and Scalzi, John Willey, New York.
4. Design of Steel Structures: Arya and Ajmani, New chand and Bros.
5. Relevant IS codes, BIS Publication, New Delhi
6. Steel structures, Controlling behavior through design: Englekirk, R., Wiley
7. LRFD Steel Design: William T. Segui, PWS Publishing
8. Design of Steel Structures: Edwin H. Gaylord, Charles N. Gaylord and James, Stallmeyer, McGraw-Hill
9. Design of Steel Structures, Vol I and II: Ramchandran, Standard Book House, New Delhi.
10. Design of Steel Structures: Dayaratnam, Wheeler Publication, New Delhi
11. Design of Steel Structures: Breslar, Lin and Scalzi, John Willey, New York.
12. Structural Steel Work: Reynolds, T. J., Kent L.E. and Lazenby, D.W., English University Press.
13. Comprehensive Design of Steel Structures: Punmia, A.K. Jain and Arun Kumar Jain, Laxmi Publications Pvt. Ltd.
14. Design of Steel Structures: Sayal, I. C.and Salinder Singh, Standard Publishers and Distributors.



Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Final Year B. Tech Civil – Part II

CV- 422 PROFESSIONAL ELECTIVE COURSE-IV
422 (B) DESIGN OF BRIDGES

Teaching Scheme

Lectures:-4 Hrs/Week, 4 Credits

Practical:- 2 Hrs./Week, 1 Credit

Examination Scheme

ISE: 30 Marks

ESE: 70 Marks

OE: 25 Marks

ICA: 25 Marks

Course Outcomes:

At the end of course, students will be able to

1. Identify the various elements of bridges along with evaluation of various loads acting on the bridges as per the IRC bridge code
2. Design the Solid Deck slab and T Beam Bridge superstructure for two lane and four lane bridges.
3. Design various components of substructure such as Pier, Abutments, foundations
4. Design Bearing and expansion joint
5. Carry out maintenance and repair of the bridge.



SECTION I

Unit 1:

(6 Hrs)

Components of bridges, Classification, importance of bridges, Investigation for Bridges.

Unit 2:

(10 Hrs)

Standard specification for Road Bridges. I.R.C. bridge code, width of carriageway, clearances, loads to be considered i.e. D.L., L.L., Impact load, wind load, Earthquake load, Longitudinal force, Centrifugal force, buoyancy, Earth pressure, water current force, thermal force etc. Introduction to prestressed concrete bridges - PSC Box girder bridges

Unit 3:

(14 Hrs)

General design considerations for R.C.C. & P.S.C. Bridges., Relative costs of bridge components. Design of reinforced concrete deck slab for two lane and four lane bridges, Pigeaud's theory, beam and slab and T-beam, Courbon's theory.

SECTION – II

Unit 4: (10 Hrs)

Construction Techniques – Construction of sub structure footing, piles, caissons, construction of reinforced earth retaining wall and reinforced earth abutments, super structure – erection method for bridge deck construction by cantilever method, Inspection maintenance and repair of bridges.

Unit 5: (10 Hrs)

Design of sub structure, abutments, Piers, approach slab, well foundation

Unit 6: (10 Hrs)

Bearing and expansion joints, forces on bearings, Types of bearings, design of elastomeric bearings, expansion joints.

INTERNAL CONTINUOUS ASSESSMENT (ICA) & OE

1. Internal Continuous Assessment (ICA) shall consist of minimum six assignments based on each topics of syllabus.
2. Oral examination shall be based on the assignment and the knowledge of student in the topics mentioned in the syllabus.
3. The visit of Bridge site should be carried out to understand the various components of bridge, its construction, repair and maintenance

TEXT BOOKS

1. Essentials of Bridge Engg. by D. Johnsons Victor, Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi.
2. Design of RCC Bridges- Jagdish Jayaram
3. Reinforced Concrete Structures – Vol. II by Dr. B. C. Punmia, Ashok Kumar Jain, Arun Kumar Jain, Laxmi Publications.

REFERENCE BOOKS

1. Concrete Bridge Practice by Dr. V. K. Raina, Tata McGraw Hill
2. Bridge Engg. by S. Ponnuswamy, Tata McGraw Hill

3. K. S. Rakshit, Design and Construction of Highway Bridges, New Central Book agency

IRC CODES

1. IRC 6 (2000), Section II: Loads and stresses.
2. IRC 16 (1989), Section for priming of base course with bituminous primers
3. IRC 18 (2000), Design criteria for PC road bridges (post tensioned concrete)
4. IRC 21(2000), Section III: Cement concrete (Plain and reinforced)
5. IRC 78 (2000), Section VII: Foundations and substructures
6. IRC 83 (1982), Section IX: Bearings, Part I: Metallic bearings (1994)
7. IRC 83 (1987), Section IX: Bearings, Part II: Elastomeric bearings (1994)
8. IRC 83 (1987), Section IX: Bearings, Part III: POT and PTFE bearings (1994)

WEBSITES:

1. www.mahapwd.com
2. www.irc.org.in





Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Final Year B. Tech Civil – Part II

CV- 422 PROFESSIONAL ELECTIVE COURSE-IV
422 (C) INFRASTRUCTURE PLANNING AND DESIGN

Teaching Scheme

Lectures:-4 Hrs/Week, 4 Credits

Practical:- 2 Hrs./Week, 1 Credit

Examination Scheme

ISE: 30 Marks

ESE: 70 Marks

OE: 25 Marks

ICA: 25 Marks

At the end of course, students will be able to

1. Apply Infrastructure Engineering concepts and a understand Project life cycle.
2. Apply the principles of Public private partnership in Infrastructure
3. Explain different risks involved in infrastructure projects and apply risk mitigation techniques.
4. Explain policies and technologies prevailing in infrastructural engineering and the social aspects of infrastructure development.
5. Apply the Information Technology and Systems tools for successful infrastructure Management.

SECTION I

Unit 1: An Overview of Basic Concepts Related to Infrastructure (10 Hrs)

Introduction to Infrastructure, Historical Overview and current status of the Power Sector, Transportation Sectors, Water Supply and Sanitation Sector, Road, Rail, Air, and Port Telecommunications Sector Urban Infrastructure, Rural Infrastructure in India,

An introduction to Special Economic Zones, Organizations and players in the field of Infrastructure, The Stages of an Infrastructure Project Lifecycle, Infrastructure Project Finance.

Unit 2: Public private partnership in Infrastructure (10 Hrs)

Emerging trends in infrastructure, Infrastructure privatization the benefits of Infrastructure privatization Problems with infrastructure privatization.

Challenges in privatization of Water Supply, Privatization of Power, Privatization of Infrastructure in India: Water Supply project- Privatization of road transportation infrastructure in India

Unit 3: Challenges to Successful Infrastructure Planning and Implementation (10Hrs)

Economic and demand risks, Political risks, Socio-Environmental risks, Cultural risks in international infrastructure projects, Legal and contractual issues in Infrastructure. Challenges in construction and maintenance of infrastructure, Infrastructure planning to identify and prioritize preferred areas for development

SECTION –II

Unit 4: Strategies for Successful Infrastructure Project Implementation (10 Hrs)

Risk management framework for Infrastructure Projects, Shaping the planning phase of infrastructure projects to mitigate risks, Designing Sustainable Contracts, Introduction to fair process and negotiation, Negotiating with multiple stakeholders on infrastructure projects, Sustainable development of infrastructure

Unit 5: Advanced Infrastructure (10 Hrs)

Information Technology and Systems for successful infrastructure Management, Innovative design and maintenance of infrastructure facilities, Performance Modelling and Life Cycle Analysis techniques, Capacity Building, Improving the Government's role in infrastructure implementation ,An integrated framework for successful Infrastructure

Unit 6: Planning and Design (10 Hrs)

Infrastructure Management and Design Systems with Future directions

TERM WORK

Assignments based on above syllabus. Minimum five field visits with visit reports.

TEXT BOOKS:-

1. Infrastructure Engineering and Management, Grigg, Neil, Wiley Publication, (1988).
2. Infrastructure management: Integrating design, Construction, Maintenance, Rehabilitation, and Renovation, Hudson, Haas, and Uddin, Tata McGraw Hill Publication, (1997).

REFERENCES BOOKS:-

1. Indian Road Congress Journal.
2. Indian Railways Journal.
3. Indian Water Works Association Journal.
4. World Development Report 1994: Infrastructure for Development (1994)





Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Final Year B. Tech Civil – Part II

CV- 422 PROFESSIONAL ELECTIVE COURSE-IV
422 (D) TRANSPORTATION ECONOMICS

Teaching Scheme

Lectures:-4 Hrs/Week, 4 Credits

Practical:- 2 Hrs./Week, 1 Credit

Examination Scheme

ISE: 30 Marks

ESE: 70 Marks

OE: 25 Marks

ICA: 25 Marks

Course Outcomes:

At the end of course, students will be able to

1. Understand fundamentals of transportation economics
2. Select appropriate technology for economic evaluation of transportation systems depending upon site specific conditions.
3. Apply the various methodologies for Public Transportation Systems.
4. Define the significance of transportation economics under Indian conditions.

SECTION I

Unit 1:

(10 Hrs)

Introductory Concepts in Transportation Decision Making: Overall transportation project development, budgeting, financial planning, the process of transportation project development, models associated with transportation impact evaluation

Unit 2:

(10 Hrs)

Transportation costs - Classification of transportation costs, transportation agency costs, transportation user costs, general structure and behavior of cost functions and road pricing.

Unit 3:

(10 Hrs)

Estimating Transportation Demand and Supply - supply equilibration, dynamics of transportation demand and supply, elasticity of travel demand and supply, classification of elasticity

SECTION-II

Unit 4: (10 Hrs)

Vehicle operating costs: Fuel costs - Maintenance and spares, Depreciation - Crew costs - Value of travel time savings - Accident costs. Appraisal and Economic Evaluation of Transportation Projects, Case Studies, Economic evaluation of highway projects in India

Unit 5: (10 Hrs)

Road-users' cost study in India-Objectives and Methodology, Application of HDM Software. Methods of evaluation - Cost-benefit ratio, first year rate of return, net present value, and internal-rate of return methods.

Unit 6: (10 Hrs)

Financing of road projects - methods – Private Public Partnership (PPP) – Tollcollection - Economic viability of Design-Build-Operate-Transfer Schemes – Risk Analysis – Value for Money analysis – Case Studies.

INTERNAL CONTINUOUS ASSESSMENT (ICA)

पुण्यशलाक अहिल्यादेवी हाळकर
सांगलीकर विद्यापीठ

Internal Continuous Assessment (ICA) shall consist of minimum six assignments based on the entire curriculum. And Report on case studies of Economic evaluation of transportation system for at least five selected cities of India. The report shall include the Objectives, Planning, Scheduling Methodology and techniques adopted for Economic evaluation of transportation system.

Oral examination shall be based on knowledge of student about subject. Weightage of 25 marks is allotted for this part of examination.

TEXTBOOKS

1. Studies in the economics of transportation by Beckmann et al.
2. Applied Transport Economics by Stuart Cole
3. McCarthy, P. Transportation Economics, Blackwell Publishers

4. Transportation Decision Making: Principles of Project Evaluation and Programming, Wiley, by Kumares C. Sinha, Samuel Labi,
5. C. Jotin Khisty, B. Kent Lall, Transportation Engineering: An Introduction, Prentice Hall.

REFERENCE BOOKS

1. Indian Roads Congress, “Manual for Road Investment Decision Model”, Special Publication 38, New Delhi.
2. Indian Roads Congress, “Manual on Economic Analysis of Highway Projects”, Special Publication 30, New Delhi. Revised version.
3. John Hibbs, Transport Economics & Policy: A Practical Analysis of Performance, Efficiency and Marketing Objectives Kogan Page
4. Economics of Urban Transport by Kenneth A Small and Erik T Verhoef
5. Principles of Traffic and Highway Engineering by Garber and Hoel
6. Economic Evaluation of highway projects in India-IRC
7. Road Users cost study in India - IRC
8. Swait, Louviere and Hensher, Stated Preference Methods
9. Moshe Ben Akiva, Discrete Choice Analysis: Theory and Analysis to Travel Demand
10. Applied choice analysis: A Primer by David Hensher and Willium Greene
11. Discrete choice methods with simulation- by Kenneth Train
12. HDM Software and manuals



Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Final Year B. Tech Civil – Part II

CV- 422 PROFESSIONAL ELECTIVE COURSE-IV
422 (E) RAILWAY PROJECT DESIGN & PLANNING FOR CIVIL
ENGINEERING

Teaching Scheme

Lectures:-4 Hrs/Week, 4 Credits

Practical:- 2 Hrs./Week, 1 Credit

Examination Scheme

ISE: 30 Marks

ESE: 70 Marks

OE: 25 Marks

ICA: 25 Marks

Course Outcomes:

At the end of course, students will be able to

1. Analyse the aspects which have to be considered for planning a railway project.
2. Identify the technical parameters which have to go into a project.
3. Estimate the very broad cost of the project.
4. Assess the financial viability of the project based on inputs of revenue.
5. Analyse and make an intelligent choice between various options for type /spans for bridges, be able to plan a rough alignment on a topo sheet.
6. Plan a rough alignment on a topo sheet.

SECTION I

Unit 1: Technical factors in project planning

(10 Hrs)

Railway Loading- Introduction, Different types of loading. Historical different types of loading, RBG, HM, DFC. Concepts of EUDL for bending and shear.

Different types of survey. Traffic survey, Definition of Traffic Survey, Objects of Traffic Survey, PETS, FLS.

Terms of Reference, Field Work, Methodology to be adopted in the assessment of traffic prospects and traffic forecasting, Estimation of quantities of land, earthwork, bridges and their costs.

Detailed project report: factors to be studied and included in the DPR like TOR, alignment, standards adopted, traffic survey, estimating.

Unit 2: Schedule of Dimensions (5 Hrs)

Understanding the importance of Schedule of Dimensions, Over dimensioned Consignments.

Unit 3: Inter Department overview (10 Hrs)

Signaling, Electrified traction, Operating control and concepts, traction, Carriage and wagons each of these sections will familiarize the student with important technical features and specifications pertaining to the various departments, their evolution and impact and interface with Civil and track engineers.

Unit 4: Different types of Railway projects and typical features (8 Hrs)

Gauge conversions, Doubling/ tripling/ quadrupling lines, New Lines, yard remodeling, Sidings. High speed, Heavy haul and typical features of each.

Unit 5: Drawing of index plan and sections, GAD's and seeking to reduce costs and time (10 Hrs)

Identify the alignment, draw index plan and sections for the project, optimization of project costs and time.

Unit 6: Sidings (7 Hrs)

Private and assisted sidings, rules for sanction, maintenance of sidings. Policy matters regarding sidings

Unit 7: Fundamentals of bridge design for Railway criterion (10 Hrs)

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

INTERNAL CONTINUOUS ASSESSMENT (ICA)

ICA shall be based on

1. Project: the student will be required to plot a railway alignment between two given points on a topo sheets, he should be able to assess the quantities and make out an estimate for the project.

2. A visit to Section Engineer Traction, Signaling, a carriage maintenance facility, and control room at Sholapur, visit to a concrete sleeper plant and submit a report.
3. Field work: report on the site visit to construction site.
4. Report on visit to various Engineer offices. Project Work Design of a project from a topo sheet,
5. Marking the alignment, drawing the longitudinal and vertical profile, estimating the quantities and costs.

TEXT / REFERENCE BOOKS

1. Modern P Way: M Srinavasa, Lichiberger Bernard: Track Compendium (Formation, P.way) Maintenance and Economics)
2. A Textbook of Railway Engineering S.C. Saxena and S.P. Arora
3. Bridge Substructure and Foundation Code
4. Indian Railway Permanent Way Manual
5. Schedule of dimensions Indian Railways
6. Indian Railway Code for the Engineering Department
7. Indian Railway Engineering Code
8. Indian Railway General Rules
9. Indian Railway LWR Manual
10. RDSO manual for formations Rules for opening of Railways
11. Conrad Esweld: Modern Railway Track
12. Technical Diary IPWE publication



Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Final Year B. Tech Civil – Part II

CV- 422 PROFESSIONAL ELECTIVE COURSE-IV
422 (F) GROUND IMPROVEMENT TECHNIQUES

Teaching Scheme

Lectures:-4 Hrs/Week, 4 Credits

Practical:- 2 Hrs./Week, 1 Credit

Examination Scheme

ISE: 30 Marks

ESE: 70 Marks

OE: 25 Marks

ICA: 25 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 the site
5. Apply various techniques of soil Modification by inclusions and confinement.

SECTION I

Unit 7: 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.

INTERNAL CONTINUOUS ASSESSMENT (ICA)

At least two assignments shall be given on each unit based on concept, theory and design of ground improvement technique. Minimum 12 assignments shall be given.

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.



Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Final Year B. Tech Civil – Part II

CV- 422 PROFESSIONAL ELECTIVE COURSE-IV
422 (G) ADVANCED CONCRETE TECHNOLOGY

Teaching Scheme

Lectures:-4 Hrs/Week, 4 Credits

Practical:- 2 Hrs./Week, 1 Credit

Examination Scheme

ISE: 30 Marks

ESE: 70 Marks

OE: 25 Marks

ICA: 25 Marks

Course Outcomes:

At the end of course, students will be able to

1. Select proper admixtures to obtain concrete of desired properties
2. Adopt appropriate type of special concrete for desired results
3. Design a concrete mix of required strength and workability properties
4. Adopt appropriate method for repairs and rehabilitation of concrete structures

SECTION I

Unit 1:

(6 Hrs)

Review of cements including blended cement, chemical and physical process of hydration.

Aggregates-Coarse aggregates, Natural sand, Crushed sand.

Unit 2:

(8 Hrs)

Addition to Concrete:- Review of types covering pulverized fuel ash, ground granulated blast furnaces slag and silica fume, Rice husk Ash, manufacture, physical characteristics, effects on properties of concretes. Admixtures: - Plasticizers, Super plasticizers, retarder, accelerators, Curing compounds and their effects on properties of concrete.

Unit 3:

(8 Hrs)

Properties of Fresh Concrete: Workability setting, bleeding and segregation. Theory and application principles governing in concrete placing and compaction of concrete Durability & impermeability, microstructure and carbonation of concrete, fire resistance

Unit 4: (8 Hrs)

Special Concretes: - High performance concrete, High Strength concrete, fiber reinforced concrete, Light weight concrete, High density and radiation shielding concrete, High volume fly ash concrete, Self compacting concrete, Recycled concrete.

SECTION-II

Unit 5: (10 Hrs)

Special Processes & technology for particular types of structures: Mass concrete, Sprayed concrete, Ferro-cement concrete, pumped concrete, Roller compacted concrete, Sustainability of concrete industry.

Unit 6: (4 Hrs)

Ready mixed Concrete: Types of plants, Concrete specification, Process adopted for central RMC plant, Distribution & transport, Code recommendations, quality control.

Unit 7: (8 Hrs)

Mix design: Review of methods & philosophies, mix design for special purpose (High grade concrete), variability of results.

Unit 8: (3 Hrs)

Quality concepts: Definitions, principles & standards, quality control in concrete Construction, tools for quality management.

Unit 9: (5 Hrs)

Repair & rehabilitation: Visual inspection of concrete structure, distress in concrete, Non-destructive test, crack repair techniques, damage assessment procedure, deterioration-causes & prevention, strengthening techniques.

INTERNAL CONTINUOUS ASSESSMENT (ICA)

It shall consist following experiments

1. Tests on fresh concrete Workability tests,
2. hardened concrete: Strength test- compression, flexure
3. Effects of additives in concrete: Effects on workability and strength of concrete.
4. Effects of admixtures in concrete: Effects on workability and strength of concrete.
5. Mix design for high performance concrete: Experimental
6. Non destructive testing of concrete-
 - Rebound hammer,
 - Ultra sonic pulse velocity test



TEXT BOOK

1. Concrete Technology, Theory and Practice by M.S. Shetty, S, Chand Publications, New Delhi
2. Concrete Mix Design- N. Krishna Raju - Sehgal Publishers

REFERENCE BOOKS

1. High performance concrete by P.C. Aitkin , Taylor and Francis, New York NY 10016
2. Concrete Technology by A.R. Santhakumar, Oxford university press, New Delhi
3. Concrete Technology by Neville, Pearson education limited, London
4. Advanced Concrete Technology Constituent materials- John Newman, Ban Seng Choo-London Press.
5. Concrete- P.K. Mehta, P J M Monteiro,- Prentice Hall, New Jersey



Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Final Year B. Tech Civil – Part II

CV- 422 PROFESSIONAL ELECTIVE COURSE-IV
422 (H) ENTREPRENEURSHIP

Teaching Scheme

Lectures:-4 Hrs/Week, 4 Credits

Practical:- 2 Hrs./Week, 1 Credit

Examination Scheme

ISE: 30 Marks

ESE: 70 Marks

OE: 25 Marks

ICA: 25 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, 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 Marketing, 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.

Note: The subject may be taught with respect to suitable case studies and industrial visits. Audio video films shall be used on the above topics.

INTERNAL CONTINUOUS ASSESSMENT (ICA)

1. Preparation of preliminary and final project report of anyone small scale industry from civil Engineering field.
2. Report based on two industrial visits.

TEXT BOOKS

- 1) Patterns of Entrepreneurship, Jack M. Kaplan Wiley Publications.
- 2) Planning and Industrial Unit, Jay Narayan Vyas, GranthVitrana 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.
- 5) Entrepreneurship and small business, WEBER, LEWIS, VOLERY, SCHAPER, Wiley

publications.



Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Final Year B. Tech Civil – Part II

CV- 422 PROFESSIONAL ELECTIVE COURSE-IV

422 (I) WATER & AIR QUALITY MODELLING

Teaching Scheme

Lectures:-4 Hrs/Week, 4 Credits

Practical:- 2 Hrs./Week, 1 Credit

Examination Scheme

ISE: 30 Marks

ESE: 70 Marks

OE: 25 Marks

ICA: 25 Marks

Course Outcomes:

At the end of course, students will be able to

1. To be able to understand the water quality programs and their implementation including the water sampling and analysis
2. To be able to use water sampling and analysis techniques, water quality data analysis and WQI calculations. Students are also be able to understand of water quality modelling and exposure to some of the conventionally used water quality models.
3. Learning of the techniques employed in the monitoring of particulates and gaseous pollutants in ambient air and stack gas
4. Gaining knowledge about modelling of air quality through the use of different software

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.

INTERNAL CONTINUOUS ASSESSMENT (ICA)

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

1. Water quality monitoring programs; Development and use of water quality indices; Use of water quality modeling software.

2. Laboratory work: Sox analysis by West and Geake method; NO_x analysis by Jacobs and Hochheiser method; Stack monitoring; Tail pipe emissions monitoring; Preparation and analysis of samples in AAS and IC; Measurement of indoor air quality; Noise monitoring; Air modeling software - ISCST3; AERMOD, CALROADS, CALPUFF, etc.
3. Assignments (One Assignment on each unit)

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, Air and 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, Happer and 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.



Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Final Year B. Tech Civil – Part II

CV- 422 PROFESSIONAL ELECTIVE COURSE-IV
422 (J) WATER RESOURCES FIELD METHODS

Teaching Scheme

Lectures:-4 Hrs/Week, 4 Credits

Practical:- 2 Hrs./Week, 1 Credit

Examination Scheme

ISE: 30 Marks

ESE: 70 Marks

OE: 25 Marks

ICA: 25 Marks

Course Outcomes:

At the end of course, students will be able to

1. Apply the knowledge of different aspects related to irrigation for better irrigation
2. Decide irrigation charges
3. Utilise proper technique of flow measurement through streams and canals.
4. Apply the appropriate method of water distribution
5. Use appropriate techniques of watershed management

SECTION I

Unit 1:

(10 Hrs)

Irrigation development in India, Importance of Irrigation in Agriculture, Historical evolution of irrigation in India, Irrigation development during pre-colonisation, Colonisation and post-colonisation, Different types of Irrigation prevalent in India: Warabandi, Shejpali and South Indian systems, Focus of Irrigation in India, Command area development approach and farmers participation

Unit 2:

(10 Hrs)

Irrigation policy and institutions, Present status of irrigation policy and institutions, Irrigation related conflicts,

Unit 3:

(10 Hrs)

The institutional transformation needed, Constraints in effecting institutional transformation, Irrigation financing, Water pricing, Water market, Policy changes.

SECTION – II

Unit 4: (10 Hrs)

Measurement of flow through the streams and canals by weirs and notches effect of end contractions. Calibration of weirs and notches. Area velocity method, dilution techniques, tracers. Field methods for detecting flow direction of laminar flow through canals.

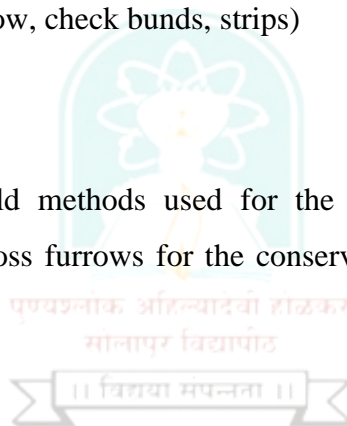
Unit 5: (10 Hrs)

Approaches used in distribution of water to farmers through canals- Tail to head and head to tail, drawbacks and benefits of each. Methods of distribution of water for irrigation through canals - volumetric method, area method, Farmers group, benefits and drawbacks of associated with each method. Field methods used for allocation of water to different crops from canal (wild flooding – furrow, check bunds, strips)

Unit 6: (10 Hrs)

Water shed management - field methods used for the conservation of soil and water. Applications of check dams, cross furrows for the conservation of water and ground water recharge.

*Site visit for the canal/stream



INTERNAL CONTINUOUS ASSESSMENT (ICA)

It is based on the minimum six assignments of the above syllabus (per unit one assignment).

ORAL EXAMINATION

It is based on the above assignments.

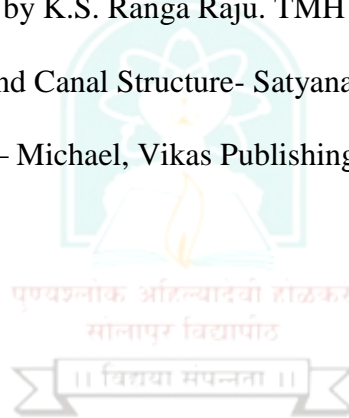
TEXT BOOKS

1. Fluid Mechanics – A. K. Jain-Khanna Pub., Delhi.
2. Fluid Mechanics – Modi and Seth – Standard Book House, Delhi.

3. Irrigation Engineering and Hydraulic Structures-S. K. Garg, Khanna Publishers, Delhi.
4. Engineering hydrology- K. Subramanian, Tata McGraw- Hill Publishers.
5. Water Management, Conservation, Harvesting and Artificial Recharge- Dr. A. S. Patel, Dr. D. L. Shah, New Age International Publishers.

REFERENCES BOOKS

1. Rakesh Hooja, Management of Water for Agriculture: Irrigation, Water sheds and Drainage” Rawat Publications, New Delhi, 2006.
2. Open Channel Hydraulics by V.T. Chow. McGraw Hill Publication.
3. Flow through Open Channel by K.S. Ranga Raju. TMH Ltd. New Delhi.
4. Design of Minor Irrigation and Canal Structure- Satyanarayan and R. Murthy
5. Irrigation theory & Practice – Michael, Vikas Publishing House.





Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Final Year B. Tech Civil – Part II

CV- 423 RAILWAY, AIRPORT & HARBOUR ENGINEERING

Teaching Scheme

Lectures:-4 Hrs/Week, 4 Credits

Examination Scheme

ISE: 30 Marks

ESE: 70 Marks

ICA: 25 Marks

Course outcomes:

At the end of course, students will be able to

1. Acquires capability of choosing alignment and also design geometric aspects of railway system, runway and taxiway
2. Understand the Construction techniques and Maintenance of Track laying and Railway stations and calculate the material quantities required for construction.
3. Illustrate different types of signals explain the working principles of railway interlocking system.
4. Gain an insight on the planning and site selection of Airport Planning and design.
5. Analyze and design the elements for orientation of runways and passenger facility systems.
6. Understand the various features in Harbours and Ports, their construction, coastal protection works and coastal Regulations to be adopted.

SECTION-I

RAILWAY ENGINEERING

Unit 1: Railway Planning and Design

(15 Hrs)

Significance of Road, Rail, Air and Water transports – Coordination of all modes to achieve sustainability – Elements of permanent way – Rails, Sleepers, Ballast, rail fixtures and fastenings, – Track Stress, Various resistance and their evaluation, Hauling capacity, Tractive effort, coning of wheels, creep in rails, defects in rails – Route alignment surveys, conventional and modern methods- – Soil suitability analysis – Geometric design of railways, gradient, super elevation, widening of gauge on curves- Points and Crossings.

Unit 2: Railway Construction and Maintenance (10 Hrs)

Earthwork – Stabilization of track on poor soil, Calculation of Materials required for track laying – Construction and maintenance of tracks – Modern methods of construction & maintenance – Railway stations and yards and passenger amenities- Urban rail – Infrastructure for Metro, Mono and underground railways. RDSO specifications

Unit 3: Signaling and Interlocking (5 Hrs)

Signaling and Interlocking: Objects of signaling, types of signals, Interlocking and devices used in interlocking.

SECTION- II

AIRPORT & HARBOUR ENGINEERING

Unit 4: Airport Planning (10 Hrs)

Air transport characteristics-airport classification-airport planning: objectives, components, layout characteristics, socio-economic characteristics of the Catchment area, criteria for airport site selection and ICAO stipulations, Typical airport layouts, Case studies, Parking and circulation area.

Unit 5: Airport Design (10 Hrs)

Runway Design: Orientation, Wind Rose Diagram - Runway length - Problems on basic and Actual Length, Geometric design of runways, Configuration and Pavement Design Principles – Elements of Taxiway Design – Airport Zones – Passenger Facilities and Services – Runway and Taxiway Markings and lighting.

Unit 6: Dock and Harbours Engineering (10 Hrs)

Definition of Basic Terms: Harbor, Port, Satellite Port, Docks, Waves and Tides – Planning and Design of Harbours: Requirements, Classification, Location and Design Principles – Harbour Layout and Terminal Facilities – Coastal Structures: Piers, Break waters, Wharves, Jetties, Quays, Spring Fenders, Dolphins and Floating Landing Stage – Dredging – Maintenance of Ports and Harbours – Navigational aids.

TERM WORK

Assignment on each chapter and field visit report shall be submitted by the students.

TEXT BOOKS

1. Railway Engineering by Satish Chandra and Agarwal M.M., Oxford University Press, New Delhi
2. Airport Engineering by Khanna & Arora – Nemchand Bros, New Delhi.
3. Docks and Harbour Engineering by Bindra S.P. – Dhanpathi Rai & Sons, New Delhi.
4. RDSO Codes

REFERENCES BOOKS

1. 'Railway Engineering' by Saxena & Arora – Dhanpat Rai, New Delhi.
2. 'Transportation Engineering Planning Design' by Wright P.H. & Ashfort N.J. – John Wiley & Sons.
3. 'Airport Engineering' by Virendra Kumar, Dhanpat Rai Publishers, New Delhi.
4. 'Transportation Engineering' by Srinivasa Kumar R, University Press, Hyderabad
5. Railway and track Engineering- by Mundrey J.S.- Tata McGraw-Hill Education
6. Docks and Harbour Engineering Oza, Charotar Publication House



Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Final Year B. Tech Civil – Part II

CV- 424 OPEN ELECTIVE-III: ECONOMIC POLICIES IN INDIA

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. Analyze India's economic growth and development
2. Assess industrial reforms in a mixed economic set-up
3. Suggest tax reforms and financial sector reforms
4. Explain Indian banking sector developments
5. Analyze India and WTO regulations
6. Analyze recent policy initiatives

SECTION – I

Unit 1:

(4 Hrs)

Characteristics of Indian Economy on the eve of independence, Development Strategies in India: Planning in India: Objectives Strategies and Evaluation, 11th five year plan

Unit 2:

(4 Hrs)

Trend and Structure of National Income since 1951, Economic Reforms in India since 1991, Critique of Indian Economic Policies-Pre and Post Reforms

Unit 3:

(5 Hrs)

Demographic Features and Indicators of Development, Poverty: Concept, Causes and Government policies, Unemployment in India: Concept, Causes and Government policies, Inflation: Nature and extent

Unit 4: (5 Hrs)

Sectoral performance I:

Agriculture: Growth, Productivity Trends and Crop Patterns, Green Revolution, Recent Issues in Indian Agriculture

Unit 5: (4 Hrs)

Growth , Trends and patterns in Agriculture: Rural Credit & Marketing, WTO & Agriculture

SECTION-II

Unit 6: (5 Hrs)

Industrial Sector in Pre-reform Period, Industrial Sector in Post-reform Period, Issues and Problems of Public Sector

Unit 7: (5 Hrs)

Sectoral performance II:

Role of Infrastructure in economic development, Indian Financial System: Money Market and Monetary Policy, Capital Market in India and Working of SEBI

Unit 8: (5 Hrs)

Sectoral performance III:

Foreign Trade and Balance of Payment, Role of Foreign Capital-FDI and Multinational Corporations

Unit 9: (5 Hrs)

Fiscal Federalism in India, Government Finance : Union and States, 12th and 13th Finance Commissions

Unit 10: (4 Hrs)

Governance of the Economy:

Implementation of Economic Policies, Parallel Economy, Role of Bureaucracy and Delivery Mechanism in Implementation of Economic Policies, Implementation of Economic Policies: Role of Panchayat and Pressure Groups

TEXT BOOK

1. Indian Economy; Gaurav Datt and Aswani Mahajan; S. Chand and Company LTD. Ram Nagar, New Delhi-110055.
2. The Indian Economy; S.K. Ray; Prentic, Hall of India Private Limited New Delhi - 110001

REFERENCE BOOKS

1. Ahluwalia, IJ and IMD Little (Eds) (1999), Indian Economic Reforms and Development. (Essays in Honour of Manmohansingh) Oxford University, Press, New Delhi.
2. Bardhan, P.K (9th edition) (1999), The political economy of development in India, Oxford University, Press, New Delhi.
3. Bawa, R.S and P.S.Raikhy (Ed) (1997) structural changes in Indian economy, Guru Nanak Dev University Press, Amritsar.
4. Brahmananda, P.R. and V.R Panchmukhi (Eds) (2001) Development Experience in the Indian economy: Interstate Perspectives, Bookwel Delhi.
5. Chakravartym .S (1987), Development Planning : The Indian Experience, Oxford University, Press, New Delhi.
6. Government of India, Economic Survey (Annual) Ministry of Finance, New Delhi.
7. Jaban. B,(1992) The Indian Economy —problems and prospects, Viking New Delhi.
8. Parikh.K.S (1999) India Development Report — 1999 — 2000 Oxford University, Press, NeW Delhi.
9. Reserve Bank of India, Report on currency and finance (Annual)
10. Sri R.K. and B. Chatterjee (2001) Essays in Honour of Prof P.R.Brahmanandha), Deep & Deep Publications, New Delhi



Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Final Year B. Tech Civil – Part II

CV- 425 PROFESSIONAL PRACTICE, LAW & ETHICS

Teaching Scheme

Lectures:- 3 Hrs/Week, 3 Credits

Examination Scheme

ISE: 30 Marks

ESE: 70 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. Explain legal and practical aspects of Civil Engineering profession

Section I

Unit 1- Professional Practice –

(7)

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)

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: (8)

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; Complex contract 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; Cost escalation; Delays, Suspensions & Terminations; Time extensions & Force Majeure; Delay Analysis; Liquidated damages & Penalties; Insurance & Taxation; Performance and Excusable Non-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: (7)

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: (8)

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: (8)

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. Wadhwa (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





Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Final Year B. Tech Civil – Part II

CV- 426 PROJECT WORK

Teaching Scheme

Practical:- 8 Hrs/Week, 4 Credits

Examination Scheme

OE: 100 Marks

ICA: 100 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.

