SRI VENKATESWARA UNIVERSITY
COLLEGE OF ENGINEERING
TIRUPATI - 517502 (A.P.) INDIA

4 YEAR B.TECH. CIVIL ENGINEERING (CBCS)
Scheme of Instructions and Evaluation
&
Syllabus
w.e.f. ACADEMIC YEAR 2018-19
(From the batch admitted during the academic year 2018-2019)

S.V. UNIVERSITY COLLEGE OF ENGINEERING: TIRUPATI

DEPARTMENT OF CIVIL ENGINEERING

VISION OF THE INSTITUTE

To be the leader in the creation and development of globally competitive human capital in engineering education for technological, economic and social enrichment of the society, through its open and flexible academic programs.

MISSION OF THE INSTITUTE

1. To be recognized as a premier institution offering engineering education programs, training human resources oriented to problem solving and system development.
2. To carry out research in engineering and technology relevant to all segments of the society.
3. To assume leadership in sustainable technological growth of the Indian society
4. To be a natural destination for excellence and diversity in though and practice.

VISION OF THE DEPARTMENT

To produce globally competitive and committed Civil Engineers with ethical values to cater to the needs of the society and strive for sustainable development through research and innovation.

MISSION OF THE DEPARTMENT

1. To impart quality education with the support of state-of-art Infrastructure and faculty.
2. To inculcate inquisitiveness, infuse training and research for the societal development.
3. To address growing needs of sustainable infrastructure development.
4. To provide technical advice and support to the industry.
5. To provide awareness of global economic problems and contribute to Nation building.
6. To provide entrepreneurial skills for the upliftment of the country.

PROGRAMME EDUCATIONAL OBJECTIVES (PEOS)

1. To provide students with the fundamental, technical knowledge and skills in mathematics, sciences and engineering to recognize, analyze and solve complex problems in the areas of Structural, Geotechnical, Hydraulics and Water Resources, Transportation and Environmental engineering.
2. To provide students with individual working skills and practical experience and to fulfill their professional duties and communicate effectively in teamwork, ethical thinking, technical leadership, and lifelong learning.
3. To make the students responsible professionals to work in various positions in industry or government and/or succeed in graduate or other professional organizations.
4. To train the students to become engineers, managers, scientists, researchers and innovators and make substantial contributions to the society.
5. To guide the students to use modern tools to solve complex engineering problems
6. To make the students to strive for the improvement of the quality of life and improve the standard of living by providing environmental sustainability.

PROGRAM OUTCOMES

PO1 Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complexengineering problems.

PO2 Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principlesof mathematics, natural sciences, and engineering sciences.

PO3 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.

PO4 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.

PO5 Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6 The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequentresponsibilities relevant to the professional engineering practice.

PO7 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.

PO8 Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9 Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10 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.

PO11 Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as amember and leader in a team, to manage projects and in multidisciplinary environments.

PO12 Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technologicalchange.

PROGRAMME SPECIFIC OUTCOMES (PSO'S)

PSO1: Specify, Design, test and evaluate foundations and super structure for residences, public buildings, industries, irrigation structures, transportation amenities and environmental Engineering systems.

PSO2: Development of state of art skills for using modern tools, as entrepreneur in the domain field or in multidisciplinary environment.

SRI VENKATESWARA UNIVERSITY COLLEGE OF ENGINEERING

TIRUPATI – 517 502

(Autonomous Institute)

B.Tech. Degree Program (CBCS) Regulations-2018

(To come into effect from the batch admitted in the academic year 2018-2019)

CHOICE-BASED CREDIT SYSTEM

1.	**Preamble** B.Tech Degree Program is of four academic years with each academic year being divided into two consecutive (one odd + one even) semesters. Choice-Based Credit System (CBCS) is a flexible system of learning and provides choice for students to select from the prescribed elective courses. A course defines learning objectives and learning outcomes and comprises of lectures/tutorials/laboratory work/field work/projectwork/viva/seminars/assignments/presentations/self-study etc. or a combination of some of these. Under the CBCS, the requirement for awarding a degree is prescribed in terms of number of credits to be completed by the students. The CBCS permits students to: i. choose electives from a wide range of elective courses offered by the Departments of the Institute. ii. undergo additional courses of interest iii. adopt an inter-disciplinary approach in learning iv. make the best use of expertise of the available faculty
2.	**Minimum Qualification** A pass in Intermediate Examination conducted by the Board of Intermediate Education of Andhra Pradesh with Mathematics, Physics and Chemistry as optional subjects or any equivalent examination recognized by Sri Venkateswara University.
3.	**Branches of Study**

	The branches of study in B.Tech Degree Program are: i) Chemical Engineering ii) Civil Engineering iii) Computer Science and Engineering iv) Electrical and Electronics Engineering v) Electronics and Communication Engineering vi) Mechanical Engineering
4.	**Semester** Each semester shall consist of 18weeks with a typical academic work of 30 hours/week equivalent to 90 instruction days. However, number of instruction days may be reduced to 72, when necessary, with an increased number of instruction hours per course per week.
5.	**Credit** A unit by which the course work is measured. It determines the number of hours of instructions required per week. One credit is equivalent to one hour of teaching (lecture/tutorial) or two hours of practical work/field work per week.
6.	**Classification of Courses** Courses in the program comprise of Basic, Core, Elective and Audit courses. **Basic Courses** Basic Courses may be of two types; Basic Sciences and Basic Engineering Sciences. These are intended to consolidate the basic concepts. **Core Courses** These are the courses intended to knowledge development and enhancement in the chosen branch of study. **Elective Courses** Elective courses are to be chosen from pool of courses. These courses ✓ Are supportive to the discipline of study ✓ provide an expanded scope ✓ enable an exposure to some other branch/domain ✓ nurture student's proficiency/skill.

Audit Courses

Courses outside the prescribed range of credits for students interested to supplement their knowledge/skills.

7. Course Registration

Every student has to register for the set of Courses offered by the Department in that Semester including those of Open Elective courses of the other Departments, Audit and MOOCS with the total number of Credits being limited by considering the permissible weekly contact hours (30/Week).

8. MOOCS and e-Learning

Students can register for the MOOC offered by any authorized Institutions/Agencies through online with the approval of the Head of the Department concerned. The certificate issued by the Institutions/Agencies after successful completion of the course shall be considered for the award of the Grade to that course in accordance with the Grading Pattern as specified in the Clause 15.

9. **Credits required for Award of Degree**

A student shall become eligible for the award of B.Tech degree, if he/she earns 160 credits by passing all the basic, core and elective courses along with practicals prescribed for the program.

10. **Scheme of Instruction**

10.1	The Joint-Boards of Studies (JBoS) shall formulate the scheme of instruction and examinations, and detailed syllabi for all the courses of the First and Second Semesters which shall be mostly common for all the branches of study.
10.2	The Pass Board of Studies (BoS) of each Department shall formulate the scheme of instruction and examination, and detailed syllabi for all the courses of the subsequent six semesters taking into account of the credits offered in the first and second semesters in conformity with clause 7.0.
10.3	The detailed syllabus of each theory course shall be organized into five units of equal weight.

11. **Course Numbering Scheme**

Each course number is denoted by eight alpha-numerals, four alphabets followed by three numerals.

Code of the department offering the	CO : Commerce CE : Civil Engineering CH : Chemical Engineering CS : Computer Science and Engineering CY : Chemistry

		course	EC: Electronics and Communication Engineering EE : Electrical and Electronics Engineering EO : Economics EN : English MA : Mathematics ME : Mechanical Engineering PH : Physics PA : Public Administration HT : History PS : Psychology BO : Biology MG : Management
		Type of the Course	HS : Human Sciences BS : Basic Sciences ES : Engineering Sciences PC : Program Core PE : Program Elective OE : Open Elective MC: Mandatory Course AC : Audit Course
		Nature of course	T: Theory X : Project work I : Internship P: Practical D : Design and Drawing
		Semester	1,2, …
		Course Number	01, 02, …

12.	**Attendance Requirements**	
	12.1	A student is required to complete the study of the Program satisfying the attendance requirements in all the Semesters within a maximum period of eight academic years from the year of admission to become eligible for the award B.Tech degree failing which he/she forfeits his/her admission.
	12.2	A student shall be detained in a Semester if he/she fails to satisfy the attendance requirements given below: i. A student shall attend at least 50 percent of the hours of instruction taken by the teacher, in each course. ii. A student shall attend at least 75 percent of the hours of instruction taken for all the courses put together in that Semester.

	12.3	The principal shall condone the shortage of attendance of a student provided he/she satisfies the clause 12.2 (i) and obtains at least 65 percent of overall attendance.
	12.4	A student who fails to satisfy the attendance requirements specified in clauses 12.2 and 12.3 shall repeat that Semester in the subsequent academic years with the written permission of the Principal subject to the clause 12.1.
	12.5	A student shall not be permitted to study any semester more than three times during the entire Programme of study.
	12.6	A student who satisfies the attendance requirements specified in either of the clauses 12.2 and 12.3 in any semester may be permitted to repeat that semester canceling the previous attendance and sessional marks of that semester with the written permission of the Principal. However, this facility shall not be extended to any student more than twice during the entire Programme of study as specified in clause 12.1.
	12.7	Gap year(s) shall be availed by the student himself/herself who wants to pursue entrepreneurship by taking a break of one year at any time after completing II year of study. A committee shall be constituted to evaluate the proposal submitted by the student and decide on permitting the student to avail the Gap Year. Students shall be permitted to rejoin the succeeding year from the date of commencement of class work and shall be under the academic regulations in force at that time. Gap year may be extended by another year (i.e. a total of two years) and shall not be counted for the maximum period of eight academic years for the completion of the program.
13.	**Evaluation**	
	13.1	Evaluation shall be done through Internal Tests and Semester End Examination. For each theory course, there shall be two sessional tests. Each test is of two hours duration carrying 40 marks. End-Semester Examination is of 3 hours duration carrying 60 marks. Sessional marks for a maximum of 40 shall be awarded based on the performance of the two sessional tests.
	13.2	For each practical course except project work, the sessional marks for a maximum of 40 shall be awarded based on the continuous assessment of practical work by the teacher concerned. An End-Semester Examination of 3 hours duration carrying 60 marks shall be conducted by two examiners, one external and one internal appointed by the Principal. The Principal shall appoint the external examiner from among the panel of examiners recommended by the Chairman, BoS concerned. He shall appoint the internal examiner nominated by the Head of the Department concerned.

	13.3	The guide shall assess the progress of project work continuously and award marks for a maximum of 40. A committee consisting of one external examiner and two internal examiners from the department shall value the project work and conduct viva-voce for a maximum of 60 marks.The Principal shall appoint the external examiner from among the panel of examiners recommended by the Chairman, BoS concerned. He shall appoint the internal examiner nominated by the Head of the Department concerned.
	13.4	Sessional Test I shall be conducted in the middle of the semester i.e. after the completion of 50 % of instruction days covering 50% of the syllabus.
	13.5	Sessional Test II shall be conducted immediately after the completion of the last instruction day covering the remaining 50 % of the syllabus.
	13.6	An End-Semester Examination in each theory course shall be conducted after the last working day of the semester covering the entire syllabus prescribed for that course.
	13.7	It is mandatory for a student to attend both the sessional tests in each theory course. The weighted average of the marks secured in two tests is awarded as sessional marks. A weightage of 0.8 shall be assigned for the better performance of the two tests whereas for the other test it shall be 0.2. If a student is absent for any of the internal tests for whatsoever reason, the marks awarded for that test shall be zero.
	13.8	The students shall be permitted to verify the valuation of answer scripts of sessional tests.
	13.9	The valuation and verification of answer scripts of Sessional Tests shall be completed within fifteen days after the conduct of the respective Sessional Tests.
	13.10	The valuation of End-Semester Examination answer scripts shall be arranged by the Controller of Examinations as per the University procedures in vogue.
14.	**Question Paper Setting**	
	14.1	Model Question Paper for each theory course shall be prepared by the teacher within 30 days from the commencement of the Semester and the same shall be forwarded to the Controller of Examinations through the Chairman, BOS concerned. Two questions shall be set from each unit of the syllabus, out of which one question shall be answered by the student. Each question of the unit carries a maximum of 12 marks. However, the Chairman, BoS shall accord exception in question paper format, if necessary. The question papers shall assess the understanding of the concepts and their applications in solving problems and at least 50% of the questions shall be numerical. Further, the question papers of

		design-oriented courses shall assess the abilities of analyzing and evaluating design alternatives.
	14.2	For each theory course, the question paper shall be set by an external paper setter. The Chairman, BoS shall recommend a panel comprising at least six external paper setters for each theory course to the University. The University shall arrange for setting the question paper by appointing one external paper setter from that panel.
15.	**Grading and Grade Points** **Grade Point**: It is a numerical weight allotted to each letter grade on a 10-point scale **Letter Grade:** It is an index of the performance of students in a said course. Grades are denoted by letters O, A+, A, B+, B, C, P and F. **Semester Grade Point Average (SGPA)**: It is a measure of student's performance in a semester. **Cumulative Grade Point Average (CGPA)**: It is a measure of overall performance of a student over all semesters. **Letter Grades and Grade Points:** A 10-point grading system with the letter grades are as given below: **Grades and Grade Points**	

Letter Grade	Range of Marks	Grade Point
O (Outstanding)	91 - 100	10
A+(Excellent)	81 – 90	9
A(Very Good)	71 – 80	8
B+(Good)	61 - 70	7
B(Above Average)	51 - 60	6
C(Average)	41 - 50	5
P (Pass)	40	4
F(Fail)	<40	-
Ab (Absent)	-	-

A student obtaining Grade F shall be considered failed and shall be required to reappear in the Semester- end examination.

Computation of SGPA and CGPA

SGPA is the ratio of sum of the product of the number of credits with the grade points scored by a student in all the courses and the sum of the number of credits of all the courses in the semester.

$$\textbf{SGPA } (S_i) = \sum_{i=1}^{N} (C_i \times G_i) / \sum_{i=1}^{N} C_i$$

where C_i is the number of credits of the i^{th} course, G_i is the grade point scored in the i^{th} course and N is the number of courses in the semester

The CGPA is also calculated in the same manner taking into account all the courses taken over all the semesters of the program.

$$\textbf{CGPA} = \sum_{i=1}^{M} (C_i \times S_i) / \sum_{i=1}^{M} C_i$$

where S_i is the SGPA of the i^{th} semester, C_i is the total number of credits in that semester and M is the number of semesters.

	SGPA and CGPA shall be rounded off to two decimal points and reported in the transcripts.	
	15.1	In each semester, every student who satisfies the attendance requirements has to register for the semester-end examination, failing which he/she shall not be promoted to the next semester. Any such student who has not registered for the semester-end examination in a semester shall repeat that semester in the next academic year with the written permission of the Principal.
	15.2	To pass a course in the program, a student has to secure a minimum of 40% of maximum marks in the semester-end examination and a minimum Grade of P overall (both sessional and semester-end examination marks put together). A student obtaining Grade F shall be considered failed and shall be required to reappear for the semester-end examination. A student shall not be allowed to reappear for the semester-end examination in a course which he/she has already passed the course to improve the score.
	15.3	A student who has failed in a course shall be allowed to reappear for the semester-end examination as and when it is conducted in the normal course. The Sessional Marks obtained by the student shall be carried over for declaring the results.
	15.4	The semester-end examination in any course of a particular regulation shall be conducted three times. Thereafter, the students who failed in that course shall take the semester-end examination in the equivalent papers of the subsequent regulation, suggested by the Chairman, BoS concerned.
16.	**Ranking and Award of Prizes / Medals**	
	16.1	Ranks shall be awarded in each branch of study on the basis of Cumulative Grade Point Average (CGPA) for the top three students.
	16.2	The students who have become eligible for the award of the degree by passing regularly all the eight Semesters shall only be considered for the award of ranks.
	16.3	Award of prizes, scholarships and other honors shall be according to the rank secured by the student and in conformity with the desire of the Donor.
17.	**Grievance Redressal Committee** The Principal shall constitute a Grievance Redressal Committee of three Professors from the faculty of the college for a period of two years. The senior most among them shall be convener of the committee who receives the grievances from the students and places the	

	same before the committee for its consideration. The committee shall submit its redressal recommendations to the Principal for his consideration.	
18.	**Transitory Regulations**	
		A student who has been detained in any semester of a particular regulation for not satisfying the attendance requirements shall be permitted to rejoin in the corresponding semester of the same regulation provided the clauses 12.1 and 12.5 hold good.
19.	**Amendment to Regulations:** Sri Venkateswara University reserves the right to amend the regulations at any time in future without any notice. Further, the interpretation of any of the clauses of the regulations entirely rests with the University.	

SRI VENKATESWARA UNIVERSITY COLLEGE OF ENGINEERING
DEPARTMENT OF CIVIL ENGINEERING
SCHEME OF INSTRUCTION – CHOICE BASED CREDIT SYSTEM
B.Tech. Civil Engineering (R-18), Effective from batch admitted in 2018-19

FIRST SEMESTER

Course Code	Course Title	Scheme of Instruction(Hours/Week)				No. of Credits	Scheme of Evaluation		
		Lecture	Tutorial	Practical	Total		Sessional Marks	Semester End Examination Marks	Total
MABST 101	Mathematics – I	3	1	-	4	4	40	60	100
CYBST 102	Engineering Chemistry	3	1	-	4	4	40	60	100
ENHST 103	English	2	-	-	2	2	40	60	100
EEEST 104	Basic Electrical & Electronics Engineering	3	1	-	4	4	40	60	100
MEEST 105	Engineering Graphics & Design	2	-	3	5	3.5	40	60	100
ENHSP 106	English Communication Lab	-	-	3	3	1.5	40	60	100
Total		13	3	6	22	19	240	360	600

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SECOND SEMESTER

Course Code	Course Title	Scheme of Instruction(Hours/Week)				No. of Credits	Scheme of Evaluation		
		Lecture	Tutorial	Practical	Total		Sessional Marks	Semester End Examination Marks	Total
MABST 201	Mathematics – II	3	1	-	4	4	40	60	100
PYBST 202	Engineering Physics	3	1	-	4	4	40	60	100
CSEST 203	Programming for Problem solving	2	1	-	3	3	40	60	100
CEEST 204	Engineering Mechanics	3	1	-	4	4	40	60	100
MEESP 205	Workshop/Manufact-uring Practices	-	-	3	3	1.5	40	60	100
CSESP 206	Computer Programming Lab	-	-	3	3	1.5	40	60	100
CEMCT 207	Environmental Science	4	-	-	4	-	100	-	100
Total		15	4	6	25	18	340	360	700

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THIRD SEMESTER

Course Code	Course Title	Scheme of Instruction(Hours/Week)				No. of Credits	Scheme of Evaluation		
		Lecture	Tutorial	Practical	Total		Sessional Marks	Semester End Examination Marks	Total
MABST 301	Mathematics – III	3	-	-	3	3	40	60	100
CEPCT 302	Strength of Materials	3	1	-	4	4	40	60	100
CEPCT 303	Surveying	3	1	-	4	4	40	60	100
CEPCT 304	Building Materials and Construction Technology	3	-	-	3	3	40	60	100
MEEST 305	Basic Mechanical Engineering	2	-	-	2	2	40	60	100
CEPCT 306	Engineering Geology	2	1	-	3	3	40	60	100
CEPCP 307	Surveying Lab	-	-	3	3	1.5	40	60	100
CEPCP 308	Engineering Geology Lab	-	-	2	2	1	40	60	100
Total		16	3	5	24	21.5	420	480	800

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FOURTH SEMESTER

Course Code	Course Title	Scheme of Instruction(Hours/Week)				No. of Credits	Scheme of Evaluation		
		Lecture	Tutorial	Practical	Total		Sessional Marks	Semester End Examination Marks	Total
PAMCT 401	Constitution of India	3	-	-	3	-	100	-	100
MABST 402	Mathematics – IV	3	-	-	3	3	40	60	100
CEPCT 403	Fluid Mechanics and Hydraulic Machines	3	1	-	4	4	40	60	100
CEPCT 404	Structural Analysis	3	1	-	4	4	40	60	100
CEPCT 405	Environmental Engineering	3	-	-	3	3	40	60	100
CEPCT 406	Soil Mechanics	3	1	-	4	4	40	60	100
CEPCD 407	Computer aided Building Drawing	-	-	4	4	2	40	60	100
CEPCP 408	Fluid Mechanics and Hydraulic Machines Lab	-	-	2	2	1	40	60	100
CEESP 409	Materials Testing Lab	-	-	2	2	1	40	60	100
Total		18	3	8	29	22	420	480	900

Note: Industry Internship (Not less than 4 weeks) after IV/ VI Semesters during summer. Performance reflected in VII Semester.

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FIFTH SEMESTER

Course Code	Course Title	Scheme of Instruction(Hours/Week)				No. of Credits	Scheme of Evaluation		
		Lecture	Tutorial	Practical	Total		Sessional Marks	Semester End Examination Marks	Total
CEPCT 501	Hydraulic Engineering	3	1	-	4	4	40	60	100
CEPET 502	Programme Elective – I	3	-	-	4	4	40	60	100
CEPCT 503	Foundation Engineering	3	-	-	3	3	40	60	100
CEPET 504	Programme Elective – II	3	-	-	3	3	40	60	100
CEPCT 505	Reinforced Concrete Design	3	1	-	3	3	40	60	100
CEPCT 506	Design of Steel Structures	3	-	-	3	3	40	60	100
CEPCP 507	Hydraulic Engineering Lab	-	-	2	2	1	40	60	100
CEPCP 508	Soil Mechanics Lab	-	-	3	3	1.5	40	60	100
Total		**18**	**2**	**5**	**25**	**22.5**	**320**	**480**	**800**

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SIXTH SEMESTER

Course Code	Course Title	Scheme of Instruction(Hours/Week)				No. of Credits	Scheme of Evaluation		
		Lecture	Tutorial	Practical	Total		Sessional Marks	Semester End Examination Marks	Total
CEPCT 601	Hydrology and Water Resources Engineering	2	1	-	3	3	40	60	100
CEPCT 602	Transportation Engineering	3	-	-	3	3	40	60	100
CEOET 603	Programme Elective – III	3	-	-	3	3	40	60	100
CEPET 604	Programme Elective– IV	3	-	-	3	3	40	60	100
CEPET 605	Open Elective – I Online	-	-	-	-	3	MOOCs		100
CEPET 606	Open Elective – II Online	-	-	-	-	3	MOOCs		100
CEPCP 607	Environmental Engineering Lab	-	-	2	2	1	40	60	100
CEPCP 608	Transportation Engineering Lab	-	-	2	2	1	40	60	100
MGHST 609	Management(Organizational Behaviour)	2	1	-	3	3	40	60	100
Total		**13**	**2**	**4**	**19**	**23**	**280**	**420**	**700 + 200**

Note: Industry Internship (Not less than 4 weeks) after IV/ VI Semesters during summer. Performance reflected in VII Semester.
Open Elective - MOOCS : 2 coutses - Study in III to VI Semesters, Performance reflected in VI Semester

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SEVENTH SEMESTER

Course Code	Course Title	Scheme of Instruction(Hours/Week)				No. of Credits	Scheme of Evaluation		
		Lecture	Tutorial	Practical	Total		Sessional Marks	Semester End Examination Marks	Total
CEPCT 701	Estimation & Costing	3	-	-	3	3	40	60	100
CEPET 702	Programme Elective – V	3	-	-	3	3	40	60	100
CEHST 703	Professional Practice, Law & Ethics	3	1	-	4	4	40	60	100
CEPCI 704	Industry Internship	-	-	6	6	3	100	-	100
CEPCX 705	Project Work - Phase I	-	-	6	6	3	100	-	100
Total		**9**	**1**	**12**	**22**	**16**	**320**	**180**	**500**

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EIGTH SEMESTER

Course Code	Course Title	Scheme of Instruction(Hours/Week)				No. of Credits	Scheme of Evaluation		
		Lecture	Tutorial	Practical	Total		Sessional Marks	Semester End Examination Marks	Total
CEOET 801	Programme Elective – VI	3	-	-	3	3	40	60	100
CEPET 802	Open Elective – III Online	-	-	-	-	3	MOOCs		100
CEPET 803	Open Elective – IV Online	-	-	-	-	3	MOOCs		100
CEPCX 804	Project Work - Phase II	-	-	18	18	9	40	60	100
Total		**3**	**-**	**18**	**21**	**18**	**80**	**120**	**200 +200**

Open Elective - MOOCS : 2 coutses - Study in III to VIII Semesters, Performance reflected in VIII Semester

CREDIT DISTRUBUTION CHART

S. No.	Category	SEMESTER								Total	Suggested Break up of Credits (Total 160)
		First	Second	Third	Fourth	Fifth	Sixth	Seventh	Eighth		
1	Humanities and Social Sciences including Management courses	3.5					3	4		10.5	12*
2	Basic Science courses	8	8	3	3					22	25*
3	Engineering Science courses including workshop , drawing, basics of electrical/mechanical/computer etc	7.5	10	6	1					24.5	24*
4	Programme core courses			12.5	18	15.5	8	3		57	48*
5	Programme Elective courses relevant to chosen specialization/branch					7	6	3	3	19	18*
6	Open subjects–Electives from other technical and/or Emerging subjects						3	6	3	12	18*
7	Project work, seminar and internship in industry or elsewhere							6	9	15	15*
8	Mandatory Courses [Environmental Sciences, Induction Program, Indian Constitution, Essence of Indian Traditional Knowledge]		0		0					0	(non-credit)
	Total number of credits	19	18	21.5	22	22.5	20	22	15	160	160*
	Number of Hours per week	22	25	24	29	25	22	25	24	Odd Sem. – 96 Even – Sem. - 100	
	Total Number of marks	600	700	800	900	800	800	700	300	5600	

I Semester – Scheme &Syllabus

(R18 Regulations)

SRI VENKATESWARA UNIVERSITY COLLEGE OF ENGINEERING
DEPARTMENT OF CIVIL ENGINEERING
SCHEME OF INSTRUCTION – CHOICE BASED CREDIT SYSTEM
B.Tech. Civil Engineering (R-18), Effective from batch admitted in 2018-19

FIRST SEMESTER

Course Code	Course Title	Scheme of Instruction(Hours/Week)				No. of Credits	Scheme of Evaluation		
		Lecture	Tutorial	Practical	Total		Sessional Marks	Semester End Examination Marks	Total
MABST 101	Mathematics – I	3	1	-	4	4	40	60	100
CYBST 102	Engineering Chemistry	3	1	-	4	4	40	60	100
ENHST 103	English	2	-	-	2	2	40	60	100
EEEST 104	Basic Electrical & Electronics Engineering	3	1	-	4	4	40	60	100
MEEST 105	Engineering Graphics & Design	2	-	3	5	3.5	40	60	100
ENHSP 106	English Communication Lab	-	-	3	3	1.5	40	60	100
Total		13	3	6	22	19	240	360	600

MABST 101 MATHEMATICS - I

Instruction Hours/Week: 3(L) +1(T) Credits:4

Sessional Marks : 40 End Semester Examinations Marks: 60

UNIT I

Differential Equations: Linear differential equations of second and higher order with constant coefficients-particularintegrals-homogeneous differential equations with variable coefficients-method of parameters-simulation equations.

UNIT II

Laplace Transforms I: Laplace transforms of standard functions-inverse transforms-transforms of derivatives and integrals-derivatives of transforms-integrals of transforms.

UNIT III

Laplace Transforms II: Transforms of periodic functions-convolution theorem-applications to solution of ordinary differential equations.

UNIT IV

Calculus: Roll's and Mean value theorems - Taylor's and Maclaurins's series-maxima and minima for functions of two variables - Infinite series - Convergence Tests series of positive terms - comparison, Ratio tests - Alternating series - Leibnitz's rule - Absolute and conditional convergence.

UNIT V

Multiple Integrals: Curve tracing (both Cartesian and polar coordinate) - Evaluations of double and Triple integrals-change of order of integrations-change of variables of integrations-simple applications to areas and volumes.

Text/Reference Books

1. B S Grewal, Higher Engineering Mathematics, 40th Edition, Khanna Publications, 2007.
2. M K Venkataraman, Engineering Mathematics, National Publishing Company, Chennai.
3. B V Ramana, Higher Engineering Mathematics, 6th Reprint, Tata McGraw-Hill, 2008.
4. Bali and Iyengar, Engineering Mathematics, 6th Edition, Laxmi Publications, 2006.

Course Outcomes:

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

CO 1: Analyze & apply differential equations to engineering problems .
CO2: Use shift theorems to compute the Laplace transform, inverse Laplace transform.
CO3: The solutions of second order, linear equations with constant coefficients initial value problem for an nth order ordinary differential equation using the Laplace transform.
CO4: Expand functions as power series using Maclaurin's and Taylor's series and Analyze Infinite series.
CO5: Draw an approximate shape by using curve tracing method and Use multiple integral in evaluating area and volume of any region bounded by the given curves.

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	0	2	0	0	0	0	2	2	2
CO2	3	2	2	1	2	0	0	0	0	2	2	2
CO3	3	2	2	1	2	0	0	0	0	2	2	2
CO4	3	2	2	0	2	0	0	0	0	2	2	2
CO5	3	2	2	0	2	2	0	0	0	2	2	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

CYBST 102 ENGINEERING CHEMISTRY

Instruction Hours/week :3(L) +1(T) Credits : 4

Sessional Marks : 40 End Semester Examinations Marks : 60

UNIT I

Atomic and molecular structure (**12 lectures**)

Postulates of quantum chemistry.Schrodinger equation.Particle in a box solutions Molecular orbitals of diatomic molecules and plots of the multicentreorbitals.Equations for atomic and molecular orbitals. Energy level diagrams of diatomics. Pi-molecular orbitals of butadiene and benzene. Band structure of solids and the role of doping on band structures.

UNIT II

Spectroscopic techniques and applications

Principles of spectroscopy and selection rules.Electronic spectroscopy.Fluorescence and its applications in medicine.Vibrational and rotational spectroscopy of diatomic molecules.Applications.Nuclear magnetic resonance and magnetic resonance imaging, surface characterisation techniques.

UNIT III

Chemical equilibria, Intermolecular forces and potential energy surfaces

Use of free energy in Thermodynamic functions: energy, entropy and free energy. Estimations of entropy and free energies.Free energy and emf.Cell potentials, the Nernst equation and applications.Use of free energy considerations in metallurgy through Ellingham diagram.Equations of state of real gases and critical phenomena.

UNIT IV

Periodic properties

Effective nuclear charge, penetration of orbitals, variations of s, p, d and f orbital energies of atoms in the periodic table, electronic configurations, atomic and ionic sizes, ionization energies, electron affinity and electronegativity, polarizability, oxidation states, coordination numbers and geometries, hard soft acids and bases, molecular geometries, Born- Haber cycle, The use of reduction potentials, Properties of ionic and covalent compounds.

UNIT V

Stereochemistry, **Organic reactions and synthesis of a drug molecule**

Representations of 3 dimensional structures, structural isomers and stereoisomers, configurations and symmetry and chirality, enantiomers, diastereomers, optical activity, absolute configurations and conformational analysis. Introduction to reactions involving substitution, addition, elimination, oxidation, reduction, cyclization and ring openings.Synthesis of a commonly used drug molecule.

Reference/Text Books

1. University chemistry, by B. H. Mahan

2. Chemistry: Principles and Applications, by M. J. Sienko and R. A. Plane

3.Fundamentals of Molecular Spectroscopy, by C. N. Banwell

4. Engineering Chemistry (NPTEL Web-book), by B. L. Tembe, Kamaluddin and M. S. Krishnan

5. Physical Chemistry, by P. W. Atkins

6. Organic Chemistry: Structure and Function by K. P. C. Volhardt and N. E. Schore, 5th Edition.

7. Principles of physical chemistry, Puri, Sharma and Pattania

Course Outcomes:

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

1. analyse microscopic chemistry in terms of atomic and molecular orbitals and intermolecular forces.

2. rationalise bulk properties and processes using thermodynamic considerations.

3. distinguish the ranges of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques.

4. rationalise periodic properties such as ionization potential, electronegativity, oxidation states and electronegativity.

5. list major chemical reactions that are used in the synthesis of molecules.

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	1	-	-	3	-	-	-	-	3
CO2	3	3	2	1	-	-	3	-	-	-	-	3
CO3	3	3	2	1	-	-	3	-	-	-	-	3
CO4	3	3	2	1	-	-	3	-	-	-	-	3
CO5	3	3	2	1	-	-	3	-	-	-	-	3

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

ENHST 103 ENGLISH

Instruction Hours/week :2(L) Credits : 2

Sessional Marks : 40 End Semester Examinations Marks : 60

UNIT I

Vocabulary Building

The concept of Word Formation- Root words from foreignlanguagesand their use in English- Acquaintancewith prefixes and suffixes from foreign languages in English form derivatives- Synonyms,antonyms,and standard abbreviations.

UNIT II

Basic Writing Skills

SentenceStructures – Useof phrases andclauses in sentences –Importanceofproperpunctuation - Creating coherence – Organizingprinciplesof paragraphs in documents -Techniques for writingprecisely

UNIT III

Identifying Common Errors in Writing

Subject-verb agreement -Noun-pronoun agreement -Misplaced modifiers -Article -Prepositions -Redundancies -Clichés.

UNIT IV

NatureandStyleofsensible Writing

Describing - Defining - Classifying –Providingexamples or evidence –Writingintroductionand conclusion.

UNIT V

Writing Practices

Comprehension - Précis Writing –Essay Writing

Reference/Text Books:

1. Practical English Usage. Michael Swan. OUP. 1995.

2. Remedial English Grammar. F.T. Wood. Macmillan.2007

3. On Writing Well. William Zinsser. Harper ResourceBook. 2001

4. Study Writing. LizHamp- Lyonsand Ben Heasly. Cambridge University Press. 2006.

5. Communication Skills. Sanjay KumarandPushplata. Oxford University Press. 2011.

6. Exercises in Spoken English. Parts.I-III. CIEFL, Hyderabad. Oxford University Press.

Course Outcomes:

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

1. learn the elements of grammar and composition of English Language.
2. Learnliterary texts such as Short stories and prose passages.
3. maintain linguistic competence through training in vocabulary, sentence structures and pronunciation.
4. develop communication skills by cultivating the habit of reading comprehension passages.
5. develop the language skills like listening, speaking, reading and writing.
6. makeuse of self-instructed learner friendly modes of language learning through competence.

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	1	-	-	3	-	-	-	-	3
CO2	3	3	2	1	-	-	3	-	-	-	-	3
CO3	3	3	2	1	-	-	3	-	-	-	-	3
CO4	3	3	2	1	-	-	3	-	-	-	-	3
CO5	3	3	2	1	-	-	3	-	-	-	-	3
CO6	1	-	-	-	-	3	-	3	3	3	-	3

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

EEEST 104 BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

Instruction Hours/Week : 3 (L) +1(T) Credits: 4

Sessional Marks : 40 End Semester Examination Marks:60

Unit-I

Electric DC Circuits: Kirchhoff's Voltage & Current laws, Superposition Theorem, Star – Delta Transformations.

AC Circuits: Complex representation of Impedance, Phasor diagrams, Power & Power Factor, Solution of Single Phase Series & Parallel Circuits. Solution of Three Phase circuits and Measurement of Power in Three Phase circuits.

Unit-II

Single Phase Transformers: Principle of Operation of a Single Phase Transformer, EMF equation, Regulation and Efficiency of a single phase transformer.

DC Machines: Principle of Operation, Classification, EMF and Torque equations, Characteristics of Generators and Motors

UNIT-III

Three Phase Induction Motor: Principle of Rotating Magnetic Field, Principle of Operation of 3-φ I.M., Torque-Speed Characteristics of 3-φ I.M.

UNIT-IV

p-n junction operation, diode applications, Zener diode as regulator.

Transistor and applications: Introduction to transistors, BJT Characteristics, biasing and applications.

UNIT-V

Integrated Circuits: Operational amplifiers, Applications: adder, subtractor, Integrator and Differentiator. Digital Circuits: logic gates, Combinational Logic circuits, Flip-Flops, counters and shift registers, Laboratory measuring instruments: digital multi-meters and Cathode Ray Oscilloscopes (CRO's).

Text Books :

1. Electrical Technogy by Edward Hughes
2. Basic Electrical Engineering byNagrath and Kothari

Course Outcomes :

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

1. understand the basic concepts of D.C. single phase and 3- phase supply and circuits and solve basic electrical circuit problems
2. understand the basic concepts of transformers and motors used as various industrial drives

3. understand the concept of power factor improvement for industrial installations and concepts of most economical power factor
4. understand the operation and characteristics of diodes, transistors, integrated circuits and digital circuits.

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	2	1	-	-	-	-	-	-	1
CO2	3	2	2	2	1	-	-	-	-	-	-	1
CO3	3	2	2	2	1	-	-	-	-	-	-	1
CO4	3	2	2	2	1	-	-	-	-	-	-	1

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

MEEST 105 ENGINEERING GRAPHICS AND DESIGN

Instruction Hours/week :2(L) +3(P) Credits : 3.5
Sessional Marks : 40 Semester End Examination Marks : 60

Unit I

Introduction to Engineering Drawing

Principles of Engineering Graphics and their significance, usage of Drawing instruments,lettering, Conic sections including the Rectangular Hyperbola (General method only);Cycloid,Epi-cycloid, Hypo-cycloid and Involutes.

Unit II

Scales
Scales– construction of Plain &Diagonal Scales.

Projections of points, lines
Projections of Points and lines inclined to both planes, including traces;

Unit III

Projections of planes

Projections of planes (Regular surfaces only) inclined Planes-Auxiliary Planes;
Projections of Regular Solids (Simple solids - cylinder, cone, prism & pyramid)thoseinclined to both the Planes-Auxiliary Views;

Unit IV

Isometric Projections& Orthographic projections
Principles of Orthographic Projections-Conventions Draw simple objects, dimensioning and scale.Principlesof Isometric projection – Isometric Scale, Isometric Views, Conventions; Isometric Views of lines, Planes, Simple and compound Solids; Conversion of Isometric
Views to Orthographic Views and Vice-versa, Conventions;

Unit V
Introduction to CAD

CAD workstation and peripherals, Demonstrating knowledge of the theory of CAD software [such as: The Menu System, Toolbars Standard, Object Properties, Draw, Modify and Dimension, Drawing Area (Background, Crosshairs, Coordinate System), Dialog boxes and windows, Shortcut menus (Button Bars), The Command Line (where applicable), The Status Bar, Different methods of zoom used in CAD, Select and erase objects.;

Text/Reference Books:

1. Bhatt N.D., Panchal V.M. &Ingle P.R., (2014), Engineering Drawing, CharotarPublishing House
2. Shah,M.B.&RanaB.C.(2008),EngineeringDrawingandComputerGraphics,PearsonEducation
3. AgrawalB.&AgrawalC.M.(2012),Engineering Graphics, TMH Publication
4. Narayana, K.L. &P Kannaiah(2008),Text book on Engineering Drawing, ScitechPublishers
5. Corresponding set of) CAD Software Theory and User Manuals

Course Outcomes:

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

1. make a distinction between first angle projection and third angle projection of drawing.
2. draw hyperbola, parabola, Involutes and Cycloidal curves.
3. draw sections of solids including cylinders, cones, prisms and pyramids.
4. draw projections of lines, planes, solids and sections of solids.
5. draw orthographic projections of lines, planes, and solids.

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1	2	2	2	-	-	-	-	2	-	2
CO2	2	1	2	2	2	-	-	-	-	2	-	2
CO3	2	1	2	2	2	-	-	-	-	2	-	2
CO4	2	1	2	2	2	-	-	-	-	2	-	2
CO5	2	1	2	2	2	-	-	-	-	2	-	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

ENHSP 106 ENGLISH COMMUNICATION LAB

Instruction Hours/week :3 Credits :1.5
Sessional Marks : 40 End Semester Examinations Marks : 60

Listening Comprehension -Pronunciation, Stress and Rhythm -Common Everyday Situations: Conversations andDialogues -Communication at Workplace -Interviews -Formal Presentations

Reference/Text Books:

1. Practical English Usage. Michael Swan. OUP. 1995.
2. RemedialEnglish Grammar.F.T. Wood. Macmillan.2007
3. OnWritingWell.William Zinsser. Harper ResourceBook. 2001
4. StudyWriting.LizHamp– Lyonsand Ben Heasly.CambridgeUniversity Press. 2006.
5. Communication Skills. SanjayKumarandPushpalata. Oxford University Press. 2011.
6.Exercises in Spoken English.PartsI-III.CIEFL, Hyderabad. Oxford University Press

Course Outcomes:

1. The student will acquire basic proficiency in English including reading and listening comprehension, writing and speaking skills.

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1	2	2	2	-	-	-	-	2	-	2

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SECOND SEMESTER

Course Code	Course Title	Scheme of Instruction(Hours/Week)				No. of Credits	Scheme of Evaluation		
		Lecture	Tutorial	Practical	Total		Sessional Marks	Semester End Examination Marks	Total
MABST 201	Mathematics – II	3	1	-	4	4	40	60	100
PYBST 202	Engineering Physics	3	1	-	4	4	40	60	100
CSEST 203	Programming for Problem solving	2	1	-	3	3	40	60	100
CEEST 204	Engineering Mechanics	3	1	-	4	4	40	60	100
MEESP 205	Workshop/Manufact-uring Practices	-	-	3	3	1.5	40	60	100
CSESP 206	Computer Programming Lab	-	-	3	3	1.5	40	60	100
CEMCT 207	Environmental Science	4	-	-	4	-	100	-	100
Total		15	4	6	25	18	340	360	700

MABST 201 MATHEMATICS II

Instruction Hours/Week : 3(L) +1(T) Credits : 4
Sessional Marks : 40 End Semester Examinations Marks : 60

Unit I

Matrices: rank of a matrix-solution of system of linear equations-Eigen values, vectors –Canley-Hamilton theorem-quadratic forms-diagonalization.

Unit II

Vector Calculus: Gradient, Divergence, Curl of a vector and related properties-line, surface, volume integrals- Green's, Stokes's and Gauss Divergence theorems and its applications.

Unit III

Fourier Series: Fourier series-even and odd functions, periodic functions-half range sine and cosine series-harmonic analysis.

Unit IV

Special Functions I: Gamma and Beta functions-series solutions of differential equations-ordinary points.

Unit V

Special Functions II: Bessel function-recurrence formulae-generating function for $J_n(X)$-Lengender polynomials-recurrence formulae-generating function for $P_n(X)$ - Rodriguez's formula - orthogonality of Lengender polynomials.

Text/Reference Books

1. B S Grewal, Higher Engineering Mathematics, 40th Edition, Khanna Publications, 2007.
2. M K Venkataraman, Engineering Mathematics, National Publishing Company, Chennai.
3. B V Ramana, Higher Engineering Mathematics, 6th Reprint, Tata McGraw-Hill, 2008.
   Bali and Iyengar, Engineering Mathematics, 6th Edition, Laxmi Publications, 2006.

Course Outcomes:

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

CO 1: Check whether the system of linear equations is consistent or not, Use Cayley-Hamilton theorem to find inverses or powers of matrices and Use Eigen values and vectors to reduce Quadratic forms to normal form.
CO2: Analyze motion problems from real lines to curves and surfaces in 3-D and use tools such as divergence and curl of vector and gradient, directional derivatives that play significant roles in many

applications, Use Green's theorem, Stokes' theorem and divergence theorem evaluate the applications of integrals.
CO3: Find the Fourier series to represent function as a series of constants times sine and cosine functions of different frequencies in order to observe periodic phenomenon.
CO4: Evaluate certain improper integrals to make them simple with introduction of Gamma and Beta functions.
CO5: Study certain special functions that arise in solving certain ordinary differential equations to model many physical phenomena by using Bessel's and Legendre's equations.

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	0	2	0	0	0	0	2	2	2
CO2	3	2	2	1	2	0	0	0	0	2	2	2
CO3	3	2	2	1	2	0	0	0	0	2	2	2
CO4	3	2	2	0	2	0	0	0	0	2	2	2
CO5	3	2	2	0	2	2	0	0	0	2	2	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

PYBST 202 ENGINEERING PHYSICS

Instruction: Hours/Week: 3 (L) +1(T) Credits: 4
Sessional Marks: 40 End Semester Examinations Marks :60

UNIT I

Wave Optics

Interference: Huygen`s Principle-Principle of Superposition-Interference of Light-Young`s double slit experiment- -Newton's Rings.
Diffraction: Fraunhofer Diffraction at a Single Slit and a Circular Aperture-Plane Diffraction grating –Resolving Power-Rayleigh`s Criterion-Resolving power of Grating and Microscope.
Lasers : Introduction – Spontaneous and Stimulated Emission of Radiation – Population Inversion – Types of Lasers – Ruby Laser – He-Ne Laser – Semiconductor Laser – Applications of Lasers.

UNIT II

Mechanics of Rigid Body

Rigid Body-Rotational Motion and Kinematics Relations-Kinetic Energy and Angular Momentum of a Rotating Body-Equation of Motion of a Rigid body (Torque of a Rigid Body)-Combined Translation and Rotational Motion of a Rigid Body- Body Rolling on an inclined Plane.

Mechanics of Continuous Media

Elasticity, Stress and Strain- Hook`s Law and Behaviour of Wire Under Load- Elastic Constants-Relation Between Elastic Modulii-Types of Supports, Beams and Loads-Different types of Bending-Cantilever with an End Load. Ultrasonic Waves - Sound Absorption and Reverberation -Sabine Formula - Acoustics of Buildings.

UNIT III

Electromagnetism and magnetic properties of Materials

Laws of Electrostatistics- Electric Current- Laws of Magnetism- Ampere`s, Faraday`s laws-Maxwells Equations – Polarization - Permeability and dielectric constant- Polar and non-polar Dielectrics, Clausius-Mossotti equation, Applications of Dielectrics.
Magnetization - Permeability and Susceptibility- Classification of Magnetic Materials, Ferromagnetism-Magnetic Domains and Hesteresis, Applications of ferromagnetic materials.

UNIT IV
Quantum Mechanics

Wave – Particle duality – de Broglie Concept of Matter Waves – Properties of Matter Waves – Davison and Germer Experiment – G.P.Thomson Experiment – Heisenberg's Uncertainty Principle – Schrödinger's Time Independent and Time Dependent Wave equation – Significance of Wave Function – Electron in an Infinite Square Potential Well – Probability Densities and Energy Levels.

UNIT V

NanoPhysics and Nanotechnology

Introduction to Nanomaterials –Properties: Optical Properties – Quantum Confinement – Electrical properties. Synthesis of Nanomaterials: Ball milling, Arc deposition method – Chemical Vapour Deposition-Pulsed laser deposition. Characteristics of C^{60} (Zero dimensional), Carbon Nanotubes (One Dimensional) and Graphene(Two Dimensional). Applications of Nanomaterials.

Text Books / Reference Books:

1. R.K.Gaur and S.L.Gupta ``Engineering Physics" Sultan and Chand Pub., New Delhi
2. S.L.Gupta and SanjeevGupta`UnifiedPhysics`Vol.I Jai PrakashNath& Co., Meerut.
3. HitendraK.Malik and A.K.Singh ``Engineering Physics" Tata MCGraw Hill Education PVt.Ltd., New Delhi
4. M.N.Avadhanulu and P.G.Kshirsagar ``A Text Book of Engineering Physics`` S.Chand and Company Pvt.Ltd., New Delhi
5. B.L Theraja, "Modern physics", S.Chand& Company.
6. V. Raghavan "Material Science", Tata McGraw Hill Publications.
7. M.S.RamachandraRao and Shubra Singh, ``Nanoscience and Nanotechnology`` Wiley India Pvt.Ltd, New Delhi

Course Outcomes:

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

1. Develop appropriate competence and working knowledge of laws of modern Physics in understanding advanced technical engineering courses
2. understand the quantum mechanics and ultimately the quantum behaviour of charged particles when they are in motion.
3. identify and apply appropriate analytical and mathematical tools of Physics in solving Engineering problems
4. apply the basic principles of Mechanics of rigid body and continuous media and their applications
5. understand the principles in electrostatics and electromagnetics and magnetic properties of materials.

6. understand size depended properties of nanodimensional materials and their effective utilization in making nano- and micro-devices for further microminiaturization of electronic devices.
7. think and participate deeply, creatively, and analytically in emerging areas of engineering technology.
8. learnthe basics of instrumentation, design of laboratory techniques, measurement, data acquisition, interpretation, and analysis.
9. provide multidisciplinary experiences throughout the curriculum.

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	2	-	-	-	-	3	-	-	1
CO2	3	2	2	2	-	-	-	-	3	-	-	1
CO3	3	2	2	2	-	-	-	-	3	-	-	1
CO4	3	2	2	2	-	-	-	-	3	-	-	1
CO5	3	2	2	2	-	-	-	-	3	-	-	1
CO6	3	2	2	2	-	-	-	-	3	-	-	1
CO7	3	2	2	2	-	-	-	-	3	-	-	1
CO8	3	2	2	2	-	-	-	-	3	-	-	1
CO9	3	2	2	2	-	-	-	-	3	-	-	1

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

CSEST 203 PROGRAMMING FOR PROBLEM SOLVING

Instruction Hours / Week : 2(L) + 1(T) Credits : 3
Sessional Marks : 40 Semester End Examination Marks : 60

UNIT-I

Introduction to Programming -Introduction to components of a computer system (disks, memory, processor, where a program is stored and executed, operating system, compilers etc.) -
Idea of Algorithm: steps to solve logical and numerical problems. Representation ofAlgorithm: Flowchart/Pseudocode with examples -From algorithms to programs; source code, variables (with data types) variables and memory locations, Syntax and Logical Errors in compilation, object and executable code -Arithmetic expressions and precedence**.**

UNIT-II

Conditional Branching and Loops - Writing and evaluation of conditionals and consequent branching - Iteration and loops -Arrays (1-D, 2-D), Character arrays and Strings.

UNIT-III

Basic Algorithms -Searching, Basic Sorting Algorithms (Bubble, Insertion and Selection) -Finding roots of equations, notion of order of complexity through example programs (no formal definition required).

UNIT-IV

Functions -Functions (including using built in libraries), Parameter passing in functions, call by value, Passing arrays to functions: idea of call by reference - Recursion, as a different way of solving problems. Example programs, such as Finding Factorial, Fibonacci series, Ackerman function etc - Quick sort or Merge sort.

UNIT-V

Structure -Structures, Defining structures and Array of Structures- Idea of pointers, Defining pointers, Use of Pointers in self-referential structures, notion of linked list (no implementation) File handling.

Text Books / Reference Books :

1. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill
2. E. Balaguruswamy, Programming in ANSI C, Tata McGraw-Hill
3. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India.

COURSE OUTCOMES:

1. Learn about fundamentals of computer and programming language, draw flow chart to solve given problem logically and develop algorithm to solve given program

2. Able to use the concept of branching and looping to design efficient C program and be able to apply the concepts of user defined function and recursion to support reusability

3. Able to discuss basic algorithmic analysis for simple algorithms; determine appropriate algorithmic approaches to a real world problems.

4. Apply fundamental programming concepts, using a functional programming language, to solve problems.

5. Design and develop a modular program in C for commercial billing activities using an array of structures and pointers.

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	1	3	-	-	-	3	1	-	1
CO2	3	3	3	1	3	-	-	-	3	1	-	1
CO3	3	3	3	1	3	-	-	-	3	1	-	1
CO4	3	3	3	1	3	-	-	-	3	1	-	1
CO5	3	3	3	1	3	-	-	-	3	1	-	1

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

CEEST 204 ENGINEERING MECHANICS

Instruction Hours/Week: 3(L) + 1(T) Credits :4

Sessional Marks: 40 End Semester Examination : 60

UNIT I

STATICS : Basic concepts – System of force, Concurrent and non-concurrent coplanar and non-coplanar forces – Resultant – Moment of force and its application – Couples and resultant of force systems – Equilibrium of systems of forces – Free body diagrams, Equations of equilibrium of coplanar systems and spatial systems.

UNIT II

Analysis of plane trusses : Types of supports – Types of trusses – Analysis of trusses using method of joints and method of sections.

UNIT III

CENTRE OF GRAVITY AND MOMENTS OF INERTIA: Theory of Pappus – Centroids of composite figures – Areas of gravity of bodies – Moment of inertia – Parallel and perpendicular axis theorems – Moments of inertia of composite areas (rolled and built up sections) – Radius of gyration of areas.

UNIT IV

SIMPLE STRESES AND STRAINS : Elasticity and plasticity – Types of stresses and strains – Hooke's law – Stress-strain diagram for mild steel – Working stress – Factor of safety.
Lateral strain – Poisson's ratio and volumetric strain – Elastic moduli and relationship between elastic constants – Bars of varying section – Composite bars – Temperature stresses.

UNIT V

STRAIN ENERGY : Gradual, sudden and impact loading – Endurance limit principles of virtual work and its applications.

TEXT BOOKS :

1. Ghose D.N. – Applied Mechanics and Strength of Materials.
2. Timoshenko & Young – Engineering Mechanics.
3. Junarkar SB – Mechanics of Structures – Vol. I.
4. Junarkar SB – Elements of Applied Mechanics.

Course Outcomes :

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

1. apply the basic knowledge of force system.
2. know the types of supports occur in civil engineering structures
3. know the geometrical properties of different cross sections.
4. understand different types of stresses and strains, elastic constants.
5. understand the behavior of different internal forces under different types of loading.

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO22
CO1	3	3	3	1	3	-	-	-	3	1	-	1	3	1
CO2	3	3	3	1	3	-	-	-	3	1	-	1	3	1
CO3	3	3	3	1	3	-	-	-	3	1	-	1	3	1
CO4	3	3	3	1	3	-	-	-	3	1	-	1	3	1
CO5	3	3	3	1	3	-	-	-	3	1	-	1	3	1

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

MEESP 205 WORKSHOP/MANUFACTURING PRACTICES

Instruction Hours/week **:** 3(P) Credits : 1.5
Sessional Marks : 40 End Semester Examinations Marks : 60

Workshop Practice:
1.Machineshop
2.Fittingshop
3.Carpentry
4.Electrical wiring
5.Weldingshop
6.Casting
7.Smithy
8.Plasticmoulding&GlassCutting

choose any of the above Five for practice

Examinations could involve the actual fabrication of simple components, utilizing one or More of the techniques covered above.

Detailed contents

1.ManufacturingMethods-casting,forming,machining,joining, advancedmanufacturing methods
2. CNCmachining, Additivemanufacturing
3. Fittingoperations&powertools
4. Electrical&Electronics
5. Carpentry
6. Plastic moulding, glass cutting
7. Metalcasting
8. Welding(arc welding&gas welding), brazing

The above course content is learnt by online videos/ppt presentations.

Text/ReferenceBooks:

1. HajraChoudhuryS.K.,HajraChoudhuryA.K.andNirjharRoyS.K.,"Elementsof Workshop Technology", Vol. I 2008and Vol. II 2010, Media promoters and publishersprivatelimited,Mumbai.
2. KalpakjianS.AndStevenS.Schmid,"ManufacturingEngineeringandTechnology", 4th edition,PearsonEducationIndiaEdition,2002.
3. GowriP.HariharanandA.SureshBabu,"ManufacturingTechnology–I" Pearson Education,2008.
4. RoyA.Lindberg,"ProcessesandMaterialsof Manufacture",4th edition,PrenticeHall India,1998.
5. RaoP.N., "ManufacturingTechnology",Vol.IandVol.II,TataMcGrawHillHouse, 2017

Laboratory Outcomes

- Upon completion of this laboratory course, students will be able to fabricate components with their own hands.
- They will also get practical knowledge of the dimensional accuracies and dimensional tolerances possible with different manufacturing processes.
- By assembling different components, they will be able to produce small devices of their interest.

Course Outcomes

Upon completion of this course, the students will gain knowledge of the different manufacturing processes which are commonly employed in the industry to fabricate components using different materials.

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	3	2	-	-	-	2	-	-	2
CO2	3	2	3	3	2	-	-	-	2	-	-	2
CO3	3	2	3	3	2	-	-	-	2	-	-	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

CSESP 206 COMPUTER PROGRAMMING LAB

Instruction Hours / Week ; 3(P) Credits : 1.5
Sessional Marks : 40 Semester End Examination Marks : 60

Assignments in C

Variable types and type conversions:
Simple computational problems using arithmetic expressions
Branching and logical expressions:
Problems involving if-then-else structures
Loops, while and for loops:
Iterative problems e.g., sum of series
1D Arrays: searching, sorting:
1D Array manipulation
2D arrays and Strings
Matrix problems, String operations
Functions, call by value
Simple functions
Numerical methods (Root finding, numerical differentiation, numericalintegration):
Programming for solving Numerical methods problems
Recursion, structure of recursive calls
Recursive functions
Pointers, structures and dynamic memory allocation
Pointers and structures

Assignments in C and JAVA
File handling
File operations

Course Outcomes:

At the end of the course, students will be able to develop Programming concepts to

1. formulate simple algorithms for arithmetic and logical problems.
2. translate the algorithms to programs (in C language).
3. test and execute the programs and correct syntax and logical errors.
4. implement conditional branching, iteration and recursion.
5. decompose a problem into functions and synthesize a complete program using divide and conquer approach.
6. use arrays, pointers and structures to formulate algorithms and programs.
7. apply programming to solve matrix addition and multiplication problems and searching and sorting problems.
8. to apply programming to solve simple numerical method problems, namely rot finding of function, differentiation of function and simple integration

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12

CO1	3	3	3	1	2	-	-	1	1	-	-	2
CO2	3	3	3	1	2	-	-	1	1	-	-	2
CO3	3	3	3	1	2	-	-	1	1	-	-	2
CO4	3	3	3	1	2	-	-	1	1	-	-	2
CO5	3	3	3	1	2	-	-	1	1	-	-	2
CO6	3	3	3	1	2	-	-	1	1	-	-	2
CO7	3	3	3	1	2	-	-	1	1	-	-	2
CO8	3	3	3	1	2	-	-	1	1	-	-	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

CEMCT 207 ENVIRONMENTAL SCIENCE

Instruction Hours/week**:** 4(L) Credits :--
Sessional Marks : 100 End Semester Examinations Marks : --

UNIT I

Environmental Studies and Natural Resources
Definition, Scope and importance of Environment, Environmental studies, Need for public awareness
Components of Environment- Atmosphere, Hydrosphere, Lithosphere.
Renewable and **Non Renewable Resources and associated problems**
Water resources: Use and over utilization of surface and ground water, floods, drought, conflicts over water, dams benefits and problems.
Forest resources: Use and over exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people.
Land resources: Land as a resource, land degradation, Man induced landslides, soil erosion and desertification.
Mineral resources: Use and overexploitation, Environmental effects of extracting and using mineral resources, case studies.
Food resources: World food problems, changes caused agriculture and overgrazing, effects of modern agriculture, fertilizer – pesticide problems, water logging, salinity, Case studies.
Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. Case studies.
Role of an individual in conservation of natural resources.

UNIT II

Ecosystem and Biodiversity
Ecosystem - Concept of an ecosystem.
Structure and functions of an ecosystem.
Producers, consumers and decomposers.
Energy flow in the ecosystem.
Ecological succession.
Food chains, food webs and ecological pyramids.
Introduction, types, characteristic features, structure and function of the following ecosystem.
(a) Forest ecosystem. (b) Grassland ecosystem
(c)Desert ecosystem. (d) Aquatic ecosystem (ponds, streams, lakes, rivers, oceans, estuaries)
Biodiversity and its conservation:
Definition, genetic species and ecosystem diversity.
Biogeographically classification of India.
Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values.
Biodiversity at global, National and local levels.
India as a mega-diversity nation.
Hot-spots of biodiversity.
Threats to biodiversity: habitat loss, poaching of wildlife, man – wildlife conflicts.
Conservation of biodiversity: in-situ and ex-situ conservation of biodiversity.

UNIT – III

Environmental pollution and Global Effects

Definition, Causes, Effects, and control measures of (a) Air pollution (b) Water pollution (c) Soil pollution (d) Marine pollution (e) Noise pollution (f) Thermal pollution (g) Nuclear hazards
Solid waste Management: Causes, effects and control measures of urban and industrial wastes.
Role of an individual in prevention of pollution.
Pollution case studies.
Disaster management: Floods, earthquakes, cyclone, landslides, Tsunami.
Climate change-Global warming, Acid rain, Ozone depletion.

UNIT – IV

Environment Issues and Management

- Environment and Human health – Epidemic diseases, HIV/AIDS, Aviation Flue, Water Borne Diseases.
- Environmental Impact Assessment, Sustainable Development, Clean Production and Clean Development Mechanisms
- Environment Legislation: Environmental Protection Act, Water Act, Air Act, Wild Life Protection Act, Forest Conservation Act, Public Liability & Insurance Act, Issues involved in Enforcement of Environmental legislation.

UNIT – V

Social Issues and the Environment

- Population growth, Population Explosion, Population Control, Women and Child welfare.
- Urbanization, Industrialization, Development projects, Resettlement and Rehabilitation of people – Problems concerned, Case studies.
- Consumerism and Waste Products Conservation, Public Awareness, Water Conservation, Rain water harvesting, watershed management, Wasteland reclamation, Human Rights, Value education, Environmental ethics- Issues and possible solution.
- Role of information Technology in Environment and Human Health.

Text Books / Reference Books :

1. AnubhaKaushik& C P Kaushik, Environmental studies, New age International Publishers, 2008
2. Benny Joseph, Environmental studies, Tata McGraw-Hill Publishers, 2005
3. M Chandra Sekhar, Environmental Science, Hi-Tech Publishers, 2004
4. Keerthinarayana and Daniel Yesudian, Principles of Environmental Sciences and Engineering , Hi-Tech Publishers, 2005

5. AmalK.Datta, Introduction to Environmental Science and Engineering, Oxford & IBH Publishing Co.Pvt.Ltd, 2000
6. SanthoshkumarGarg,RajeshawriGarg and RajniGarg, Ecological and Environmental studies, Khanna publishers, 2006
7. Gilbert M, Introduction to Environmental Engineering and Science, Masters Publication by Prentice –Hall of India Private Ltd., 1991
8. William P Cunningham and Mary Ann Cunningham, Principles of Environmental Science, Tata McGraw Hill Publishing Co.Ltd, 2002

Course Outcomes:

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

1. acquire knowledge in
    - diverse components of environment and natural resources
    - ecosystem and biodiversity & its conservation methods
    - population growth and human health
    - green technology
2. identify and resolve the issues related to sources of different types of pollutions
3. provide solutions to individuals, industries and government for sustainable development of natural resources
4. apply environmental ethics in protection of diversified ecosystems.

Course	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO1**	**PO1**	**PO1**	**PSO**	**PSO2**
CO1	-	2	3	-	3	2	3	2	-	-	-	2	3	-
CO2	-	2	3	-	3	2	3	2	-	-	-	2	3	-
CO3	-	2	3	-	3	2	3	2	-	-	-	2	3	-
CO4	-	2	3	-	3	2	3	2	-	-	-	2	3	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

SRI VENKATESWARA UNIVERSITY COLLEGE OF ENGINEERING
DEPARTMENT OF CIVIL ENGINEERING
SCHEME OF INSTRUCTION – CHOICE BASED CREDIT SYSTEM
B.Tech. Civil Engineering (R-18), Effective from batch admitted in 2018-19

THIRD SEMESTER

Course Code	Course Title	Scheme of Instruction(Hours/Week)				No. of Credits	Scheme of Evaluation		
		Lecture	Tutorial	Practical	Total		Sessional Marks	Semester End Examination Marks	Total
MABST 301	Mathematics – III	3	-	-	3	3	40	60	100
CEPCT 302	Strength of Materials	3	1	-	4	4	40	60	100
CEPCT 303	Surveying	3	1	-	4	4	40	60	100
CEPCT 304	Building Materials and Construction Technology	3	-	-	3	3	40	60	100
MEEST 305	Basic Mechanical Engineering	2	-	-	2	2	40	60	100
CEPCT 306	Engineering Geology	2	1	-	3	3	40	60	100
CEPCP 307	Surveying Lab	-	-	3	3	1.5	40	60	100
CEPCP 308	Engineering Geology Lab	-	-	2	2	1	40	60	100
Total		16	3	5	24	21.5	420	480	800

4 year B.Tech. Degree Course
Civil Engineering
Choice Based Credit System
(With effect from the academic year 2018-19)

III Semester – Syllabus

MABST 301 Mathematics – III

Instruction Hours/week : 3(L) **Credits :3**

Sessional Marks : 40 **Semester-end Examination: 60**

Course Educational Objective (CEOs)

1. To introduce the solution methodologies for second order Partial Differential Equations with applications in engineering

2. To provide an overview of probability and statistics to engineers

UNIT I

Complex analysis - I: Analytical functions - Cauchy-Riemann equations – Construction of Analytic functions- Complex integration - Cauchy's theorem - Integral formula - Evaluation of integrals.

UNIT II

Complex analysis - II: Taylor's and Laurent's' series- Transformations- Conformal mapping - Bilinear transformations - Transformation of $1/z$, z^2, sin z and cos z.

UNIT III

Complex analysis –III: Singularities - Poles - Residues - Residue theorem – Contour integration- Evaluation of real integrals

UNIT IV

Partial differential equations - I : Formation of differential equations - Classification - First order linear partial differential equations – Lagrange's' linear equation - Method of multipliers - first order non-linear partial differential equations - Charpits method.

UNIT V

Partial differential equations - II: Method of separation of variables - One dimensional wave equation - Heat equation – Laplace's equation.

Text Books:

1. Grewal B S, Higher Engineering Mathematics, 40th Edition, Khanna Publications, 2007.
2. Venkataraman M K, Engineering Mathematics, Vol. I & II, National Publishing Company, 1993.
3. Venkataraman M K, Engineering Mathematics, National Publishing Company, 1995.
4. Grewal B S, Engineering Mathematics, 13th Edition, Khanna Publications.
5. Kreyszig E, Advanced Engineering Mathematics, 8th edition, Wiley, 1998.

Course Outcomes (COs)

At the end of the course students will be able to

CO 1: After the completion of course, students will be able to understand the analyticity of complex functions and conformal mappings, Apply Cauchy's integral formula and Cauchy's integral theorem to evaluate improper integrals along contours.
CO2: Apply Taylor's and Laurent's series to solve problems, Describe conformal mappings between various plane regions.
CO3: Compute the residue of a function and use the Residue Theory to evaluate a contour integral or an integral over the real line.
CO4: Formulate/solve/classify the solutions of Partial differential equation, Identify linear and nonlinear PDE and solve nonlinear PDE by Charpit's method.
CO5: Apply Variables separable methods to solve boundary value problems and Find the solution of one dimensional wave equation, heat equation and Laplace equation.

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	0	2	0	0	0	0	2	2	2	3	2
CO2	3	2	2	1	2	0	0	0	0	2	2	2	3	2
CO3	3	2	2	1	2	0	0	0	0	2	2	2	3	2
CO4	3	2	2	0	2	0	0	0	0	2	2	2	3	2
CO5	3	2	2	0	2	2	0	0	0	2	2	2	3	2

CEEST 302 STRENGTH OF MATERIALS

Instruction Hours/week : 3(L) +1(T) **Credits :4**

Sessional Marks : 40 **Semester-end Examination :60**

Course Educational Objective (CEOs)

To acquire the knowledge about behavior of members subjected to various types of forces on the members.

1) To impart procedure for drawing shear force and bending moment diagrams for beams.
2) To make the student able to analyze flexural stresses in beams due to different loads.
3) To enable the student to apply the concepts of strength of materials in engineering applications and design problems.

UNIT I

SHEAR FORCE AND BENDING MOMENT:

Definition of beam - Types of beams - Concept of shear force and bending moment - S.F and B.M diagrams for cantilever, simply supported and overhanging beams subjected to point loads, u.d.l, uniformly varying loads and combination of these loads - Point of contraflexure - Relation between S.F, B.M and rate of loading at a section of a beam.

UNIT II

FLEXURAL STRESSES AND SHEAR STRESSES:

Theory of simple bending - Distribution of flexural stresses and shear stresses - Resilience due to flexure and shear. Principal stresses and principal strains - Mohr's circle of stresses – Theories of failure.

UNIT III

BENDING STRESSES AND SHEAR STRESSES:

Stresses under the combined action of direct loading and B.M - Core of a section - Circular, rectangular and triangular (solid and hollow) - Determination of stresses in the case of chimneys, retaining walls and dams.

UNIT IV
COLUMNS AND STRUTS:

Introduction – classification of columns – Axially loaded compression members – Euler's crippling load theory – derivation of Euler's critical load formulae for various end conditions – Equivalent length – Slenderness ratio – Euler's critical stress – Limitations of Euler's theory – Rankine – Gordon formula – eccentric loading and Secant formula – Prof. Perry's formula.

UNIT V

CYLINDERS:

Thin cylinders subjected to internal fluid pressure - Thick cylinders under internal and external pressure - Compound cylinders.

TEXT BOOKS:

1) Mechanics of Structures Vol.I & Vol.II by S.B.Junnarkar.
2) Analysis of Structures by Vazirani & Ratwani.
3) Strength of Materials Vol.I & Vol.II by Timoshenko.
4) Strength of Materials by Andrew Pytal and Ferdinand L.Singer (Longman).

REFERENCES:

1) Engineering Mechanics by Egor. P. Popov.

Course Outcomes (COs)

After completion of the course the student will have:

1) Develop shear force and bending moment diagrams for different load cases
2) Compute the flexural stresses for different load cases and different cross-sections

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	1	-	-	-	-	-	-	-	3	1
CO2	3	3	3	3	1	-	-	-	-	-	-	-	3	1

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

CEPCT 303 SURVEYING

Instruction Hours/week : 3(L) +1(T) **Credits :4**

Sessional Marks : 40 **Semester-end Examination :60**

Course Educational Objective (CEOs)

1) Highlight the purpose of surveying in civil engineering construction,
2) Explain different types of curves, their requirement and curve setting.
3) Formulate survey observations and perform calculations
4) Train on utilization of surveying instruments like EDM, Total station and GPS.

The first step in engineering practice is surveying and the soundness of any civil engineering work is dependent on the reliability and accuracy of surveying. Therefore, it is imperative that a student of engineering should have good knowledge of surveying. To impart the knowledge of surveying and latest technologies in surveying it is necessary to introduce this subject in the curriculum.

UNIT – I

Introduction and Basic Concepts: Introduction, Objectives, classification and principles of surveying, Scales, Shrinkage of Map, Conventional symbols and Code of Signals, Surveying accessories, phases of surveying.

Measurement of Distances and Directions

Linear distances- Approximate methods, Direct Methods- Chains- Tapes, ranging, Tape corrections, indirect methods- optical methods- E.D.M. method.

Prismatic Compass- Bearings, included angles, Local Attraction, Magnetic Declination and dip.

UNIT - II

Levelling and Contouring

Leveling- Basics definitions, types of levels and levelling staves, temporary adjustments, methods of levelling, booking and Determination of levels- HI Method-Rise and Fall method, Effect of Curvature of Earth and Refraction.

Contouring- Characteristics and uses of Contours, Direct & Indirect methods of contour surveying, interpolation and sketching of Contours.

Computation of Areas and Volumes

Areas - Determination of areas consisting of irregular boundary and regular boundary (coordinates, MDM, DMD methods), Planimeter.

Volumes - Computation of areas for level section and two level sections with and without transverse slopes, determination of volume of earth work in cutting and embankments, volume of borrow pits, capacity of reservoirs.

UNIT - III

Theodolite Surveying: Types of Theodolites, Fundamental Lines, temporary adjustments, measurement of horizontal angle by repetition method and reiteration method, measurement of vertical Angle, Trigonometrical levelling when base is accessible and inaccessible.

Traversing: Methods of traversing, traverse computations and adjustments, Gale's traverse table, Omitted measurements.

UNIT - IV

Tacheometric Surveying: Principles of Tacheometry, stadia and tangential methods of Tacheometry.
Curves: Types of curves and their necessity, elements of simple curve, setting out of simple Curves, Introduction to compound curves. Elements of Reverse curve - Transition curve – length of curve – Elements of transition curve - Vertical curves.

UNIT - V
MODERN SURVEYING INSTRUMENTS:

Modern Field Survey Systems: Principle of Electronic Distance Measurement, Modulation, Types of EDM instruments, Distomat, Total Station – Parts of a Total Station – Accessories –Advantages and Applications, Field Procedure for total station survey, Errors in Total Station Survey; Global Positioning Systems- Segments, GPS measurements, Applications of GPS.

TEXT BOOKS:
1. Surveying and levelling by R. Subramanian, Oxford university press, New Delhi.
2. Chandra A M, "Higher Surveying", New age International Pvt. Ltd., Publishers, New Delhi, 2002.
3. Hoffman. B, H. Lichtenegga and J. Collins, Global Positioning System - Theory and Practice, Springer -Verlag Publishers, 2001.

REFERENCES:
1. Arthur R Benton and Philip J Taety, Elements of Plane Surveying, McGraw Hill – 2000.
2. Arora K R "Surveying Vol 1, 2 & 3), Standard Book House, Delhi, 2004.
3. Surveying (Vol – 1, 2 & 3), by B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain - Laxmi Publications (P) ltd., New Delhi.
4. Chandra A M, "Plane Surveying", New Age International Pvt. Ltd., New Delhi, 2002.
5. Surveying by Bhavikatti; Vikas publishing house ltd.
6. Duggal S K, "Surveying (Vol – 1 & 2), Tata McGraw Hill Publishing Co. Ltd. New Delhi, 2004.
7. Surveying and leveling by R. Agor Khanna Publishers 2015.

Course Outcomes (COs)

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

1. Measure and layout elevations and relative position of points, understand plans and field notes.
2. Perform computations using information gathered from differential levelling, traversing, area calculations, and volume/ earthwork.
3. Ability to design and set out curves
4. Ability to use modern surveying equipment ,Calculate angles, distances and levels, Identify data collection methods and prepare field notes
5. Understand the working principles of survey instruments, Estimate measurement errors and apply corrections Interpret survey data and compute areas and volumes

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	2	1	-	-	-	-	-	-	-	3	1
CO2	3	3	3	2	1	-	-	-	-	-	-	-	3	1
CO3	3	3	3	2	1	-	-	-	-	-	-	-	3	1
CO4	3	3	3	2	1	-	-	-	-	-	-	-	3	1
CO5	3	3	3	2	1	-	-	-	-	-	-	-	3	1

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

* * * * *

CEPCT 304 BUILDING MATERIALS AND CONSTRUCTION TECHNOLOGY

Instruction Hours/Week : 3(L) Credits : 3
Sessional Marks : 40 End Semester Examinations Marks : 60

Course Educational Objective (CEOs)

- To understand the suitability of masonry materials for construction.
- To learn the characteristics of different types of mortar tests
- To know about aggregates.
- To learn about high grade cements,
- To learn about Non-distractive testing methods.
- To understand different types construction practices
- To Learn Causes of damage and deterioration of concrete structures and their repairs
- To learn the application of civil engineering Construction equipment

UNIT-I

STONES-BRICKS

Stone as building material-criteria for selection-Tests on stones-Deterioration and preservation of stone work

Bricks-Classification-Manufacture of clay bricks-Tests on bricks-Compressive strength-Water absorption-Efflorescence-Bricks for special use-Refractory bricks

UNIT-II

CEMENT-AGGREGATES - CONCRETE

Cement ingredients-Manufacturing process-Types and grades-properties of cement -Hydration-Compressive strength-Tensile strength- Soundness and consistency-Setting time-Aggregates-Natural stone aggregates- Crushing strength-Impact strength-Flakiness-Abrasion Resistance-Grading-Sand-Bulking.

Concrete- Manufacture-Batching plants-RMC-Properties of fresh concrete-Slump-Flow and compaction-Principles of Hardened concrete-Compressive, Tensile and shear strength-Modulus of Rupture-Tests

UNIT-III

TIMBER AND OTHER MATERIALS

Timber- Market forms-Industrial timber-Plywood-Veneer- Thermocole-Panels of laminates-Steel -Aluminium and other metallic materials-composition-Uses-Market forms-Mechanical treatment-Paints-Varnishes-Distempers- Bitu mens

UNIT-IV

CONSTRUCTION PRACTICES

Types of foundations-Stone Masonry-Brick Masonry- Composite Masonry-Cavity walls-Flooring-Formwork-Centering and shuttering sheet piles-Slip and Moving forms-Roofs and roof covering- Joints in Concrete-Plastering and Pointing-Shoring-Scaffolding-Under pinning-Submerged structures.

UNIT-V

CONSTRUCTION EQUIPMENT

Selection of equipment for earth work, concreting, material handling and erection of structures-Dewatering and pumping equipments

TEXTS BOOKS

1. R.K. Rajput, Engineering Materials, S.Chand and company Ltd., 2000.
2. M.S.Shetty, Concrete Technology (Theory and Practice), S.Chand and company Ltd., 2003
3. Gambir, M.L, Concrete Technology, Tata Mc graw hill Publishing Company,1995.
4. Shetty, M.S., Concrete Technology, Theory and Practice, S.Chand and Company, 2003.

REFERENCE BOOKS

1. Arora, S.P. and Bindra, S.P., Building Construction, Dhanpat Rai and Sons, 1997.
2. Punmia, B.C., Building Construction, Lakshmi Publications (P) Ltd., 1993.
3. Peurifoy, R.L., Formwork for Concrete Structures, Mc graw hill book Co., 1999.

Course Outcomes (COs)

After completion of the course the student will have:

1. To find the suitability various building materials at a particular location in the building construction.
2. To know the preparation of concrete and tests to be performed
3. Ability to utilize various modern building materials like timber products, protective coatings, and fibre textiles
4. Able to know the different types of concretes their application, mix design and tests.
5. To develop acquaintance over service requirements like protectives, damp and termite proofing.
6. Able to repair and rehabilitation of distressed structures and use of construction equipment in the field.

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	-	-	-	-	-	-	-	1	3	1
CO2	3	3	3	3	-	-	-	-	-	-	-	1	3	1
CO3	3	3	3	3	-	-	-	-	-	-	-	1	3	1
CO4	3	3	3	3	-	-	-	-	-	-	-	1	3	1
CO5	3	3	3	3	-	-	-	-	-	-	-	1	3	1
CO6	3	3	3	3	-	-	-	-	-	-	-	1	3	1

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

MEEST 305 BASIC MECHANICAL ENGINEERING

Instruction Hours/Week : 2(L) Credits : 2
Sessional Marks : 40 End Semester Examinations Marks : 60

COURSE OBJECTIVES:

1. To give overall picture of mechanical engineering from the point of view of basic concepts.
2. To learn about basic laws of thermodynamics.
3. To give insight into IC engines, steam engines, and steam turbines, gas turbines.
4. To make known the basic manufacturing processes and machine tools.
5. To learn about power transmission devices.

UNIT – I

Introduction to Thermodynamics – Concept of a system – Types of Systems, Thermodynamic Equilibrium – Properties, State, Process and Cycle, Zeroth Law, Energy Interactions – Heat and work, Types of work.

First and Second Laws of Thermodynamics: First law, Cycle and process, Specific heats, Heat interactions in a closed system for various processes, Limitations of First law, Concept of Heat Engine (H.E.) and reversed heat engine (Heat pump and refrigerator) , Efficiency/COP, Second Law: Kelvin – Plank and Clausius Statements , Carnot Cycle, Carnot Efficiency, Property of Entropy – T- S and P – V diagrams

UNIT – II

Thermal Power Plant: Thermal power plant layout – Four circuits – Rankine cycle, Boilers: Fire tube Vs Water Tube; BobCock and Wilcox, Cochran Boilers, Steam Turbines, Impulse Vs. Reaction Turbines, Compounding of Turbines.

UNIT – III

Internal Combustion Engines (IC): I.C. 2 – Stroke and 4 – Stroke engines – S.I. engines and C.I. engines – Differences Heat transfer – Modes – Thermal resistance concept, Conduction, Composite walls and Cylinders. Combined Conduction and Convection – Overall Heat transfer Coefficient, Simple Numerical Problems in Heat transfer

UNIT – IV

Manufacturing Processes : Engineering Materials ; Classification , Properties of materials, Metal Casting, Moulding, Patterns, Hot working and Cold working , Extrusion, Forging, Rolling and Drawing.

Machine Tools and Machining Processes – Lathe Machines and Lathe operations, Milling machines, Types – Milling operations , Shaper, Planer, Drilling and Grinding machines.
Welding – Gas welding, Arc Welding, Soldering and Brazing.

UNIT – V

Power Transmission – Transmission of Mechanical Power, Belt drives, Simple Numerical Problems, Gear Drives – Simple Numerical Problems , Basics of Automotive vehicle – Brakes – Types - Clutch and Differential

TEXT BOOKS:

1. Mathur, M.L., Mehta F.S. and Tiwari R.P., Elements of Mechanical Engineering, Jain Brothers, New Delhi, 2011.
2. Roy K.P. and HazraChowdary, S.K., Elements of Mechanical Engineering, Media Promoters and Publishers Pvt., Ltd, 2002.
3. Rudramoorthy R., Thermal Engineering, Tata McGrawHill Book Company, New Delhi, 2003.
4. HazraChowdary, S.K., and Bose, Workshop Technology ,Vol. I and II, Media Promoters and Publishers Pvt. Ltd., 2002.

COURSE OUTCOMES: At the end of the course, the student will be able to

1. Understand basics of thermodynamics and components of thermal plant
2. Identify engineering materials and their properties, manufacturing methods encountered in engineering practice.
3. Understand basics of heat transfer, refrigeration and internal combustion engines.
4. Understand mechanism of power transfer through belt, chain, rope and gear drives.
5. Understand functions and operations of machine tools including milling, grinding, and shaping machines.

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	-	1	-	-	-	-	-	-	-	-	-
CO2	3	2	2	-	1	-	-	-	-	-	-	-	-	-
CO3	3	2	2	-	1	-	-	-	-	-	-	-	-	-
CO4	3	2	2	-	1	-	-	-	-	-	-	-	-	-
CO5	3	2	2	-	1	-	-	-	-	-	-	-	-	-
CO6	3	2	2	-	1	-	-	-	-	-	-	-	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

CEPCT 306 ENGINEERING GEOLOGY

Instruction Hours/Week : 2(L) +1(T) Credits : 3
Sessional Marks : 40 End Semester Examinations Marks : 60

Course Educational Objective (CEOs)

1. To learn various geological parameters.
2. Identification of minerals
3. Identification of rocks.
4. Identification of geologic structures

UNIT – I

Introduction to geology and its various branches -Role of Earth Sciences in Civil Engineering Operations

Processes acting at the surface of the earth - Volcanism, Geological action of wind, glaciers, rivers and oceans - Application of Earth Science in Civil Engineering Practices, Understanding the earth, internal structure and composition. Weathering, erosion and denudations process on earth material and natural agencies, Geological work of wind, river underground water and glaciers.

UNIT - II

Mineralogy: Mineral properties, composition and their use in the manufacture of construction materials – Quartz Group; Feldspar Group; Kaolin; Asbestos; Carbonate Group ; Gypsum; Mica Group; Ore minerals - Iron ores; pyrite; Chlorite. Study of minerals like Garnet, Olivine, Hornblende, Augite, Calcite, Talc, Kyanite, Bauxite and Clay minerals.

UNIT – III

Petrology: Origin and formation of rocks - Classification of rocks - Igneous, Sedimentary and Metamorphic rocks - Their textures and structures -Study of rocks like Granite, Gabbro, Dolerite, Basalt, Breccia, Conglomorate, Sand stone, Shale, Limestone, Laterite, Quartzite, Schist, Gneiss, Marble, Slate. Definition of rock - Rock forming processes - Geological classification of rocks - Megascopic study, Chemical and Mineralogical Composition of rock.

UNIT – IV

Structural Geology: Elements of structural geology like strike, dip, outcrop. Study of folds, joints, faults and their importance in civil engineering works. Dykes and sills, common structures and textures - Out crop, strike and dip study of common geological structures associating with the rocks such as folds, faults unconformities, and joints – their important types. Their importance insitu and drift soils, common types of soils, their origin and occurrence in India.

UNIT – V

Geology of dams, reservoirs, tunnels landslides and rock falls. Earthquakes. Groundwater exploration. Rock as construction materials. Site selection for dams and tunnels – analysis of

failures in dams and tunnels - Seismic zones of India - Earth quakes, their causes and effects. Seismic waves, Richter scale. Landslides - causes and effects; Tsunami –causes and effects.

TEXT BOOKS:

1. A text book of geology By Mukharjee.P.K.
1. Principles of Engineering geology and Geotechnics By Krynine & Judd
2. Geology for Engineers by Blyth & de freitaus
3. Fundamental of Engineering Geology by F.H.Bell.
4. A Text Book of Engineering Geology - N.Chennakesavulu.
5. Engineering and general Geology by Parbin Singh
6. Engineering Geology by R.E.Goodman

Course Outcomes (COs)

After completion of the course the student will have:

1. To apply the geological knowledge to Civil Engineering Constructions, at different stages. The kind of study exposes the geological draw backs, if any.
2. To help the site engineers to take suitable precautionary measures to overcome the drawbacks but also to take advantage of the site geology findings wherever possible.
3. To take precautionary measures in civil engineering constructions based on geological parameters.

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	1	1	3	3	-	-	-	-	-	3	1
CO2	3	3	2	1	1	3	3	-	-	-	-	-	3	1
CO3	3	3	2	1	1	3	3	-	-	-	-	-	3	1

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

CEPCP 307 SURVEYING LAB

Instruction Hours/week : 3 (P) **Credits : 1.5**

Sessional Marks : 40 **Semester-end Examination : 60**

Course Educational Objective (CEOs)

- To apply the possess knowledge about survey field techniques
- To apply the possess knowledge about traverse survey
- To determine distances, areas of polygons
- To gain knowledge of modern field measurement tools and techniques

EXERCISE – 1
Measurement of distance by chain, Tape and Area of a polygon by cross staff survey
EXERCISE – 2
Compass traversing and adjustment of closing error by Bowditch method (Graphical method)
EXERCISE – 3
Plane table survey; finding the area of a given boundary
EXERCISE – 4
Fly levelling: Height of the instrument method and rise and fall method.
EXERCISE – 5
Fly levelling; Longitudinal Section and Cross sections of a given road profile.
EXERCISE – 6
Theodolite Survey: Determining the Horizontal and Vertical Angles Finding the distance between two inaccessible points.
EXERCISE – 7
Tachometric survey: Heights and distance problems using tachometric principles.
EXERCISE – 8
Set out simple curve using Perpendicular offsets from long chord and Rankine's deflection angles method.
EXERCISE – 9
Total Station: Determination of area using total station.
EXERCISE – 10
Total Station: Determination of Remote height.

Course Outcomes (COs)

After completion of the course the student will have:
1. Ability to use the techniques, skill and surveying equipment for engineering practice.
2. Applying mathematics concepts in the field of surveying.
3. Develop an understanding of modern surveying equipment

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	1	1	-	-	1	-	-	-	3	1
CO2	3	3	3	3	1	1	-	-	1	-	-	-	3	1
CO3	3	3	3	3	1	1	-	-	1	-	-	-	3	1

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

CEPCP 308 ENGINEERING GEOLOGY LAB

Instruction Hours/week : 2 (P) **Credits :1**

Sessional Marks : 40 **Semester-end Examination :60**

Course Educational Objective (CEOs)

1. To enable the student to learn various geological structures
2. To find the properties of minerals,
3. Identification of rocks
4. Field applications
5. To study geological maps

List of Experiments:

1. Description of the geological models.
2. Study of the Physical properties of Minerals.
   Mega-scopic identification of
   a. Rock forming minerals – Quartz group, Feldspar group, Garnet group, Mica group & Talc, Chlorite, Olivine, Kyanite, Asbestos, Tourmelene, Calcite, Gypsum, etc…
   b. Ore forming minerals – Magnetite, Hematite, Pyrite, Pyralusite, Graphite, Chromite, etc…
3. Study and Identification of the Rocks.
   Megascopic description and identification of rocks.
   a) Igneous rocks – Types of Granite, Pegmatite, Gabbro, Dolerite, Syenite, Granite Poryphery, Basalt, etc…
   b) Sedimentary rocks – Sand stone, Ferrugineous sand stone, Lime stone, Shale, Laterite, Conglamorate, etc…

   Metamorphic rocks – Biotite – Granite Gneiss, Slate, Muscovite & Biotite schist, Marble, Khondalite, etc…
4. Structural Geology Problems
   a) Thickness Problems.
   b) Strike and Dip Problems
   c) Bore Hole or Three point problems.
5. Study of the Geological Maps.
6. Description of the geological modals.
7. Study of the Physical properties of Minerals.
8. Study and Identification of the Rocks.
9. Structural Geology Problems
   a) Thickness Problems.
   b) Strike and Dip Problems
   c) Bore Hole or Three point problems.

Course Outcomes (COs)

After completion of the course the student will :

1. The study and identification of minerals, rocks and structures with their utilization in civil engineering works.

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	1	1	3	3	-	-	-	-	-	3	1

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

SRI VENKATESWARA UNIVERSITY COLLEGE OF ENGINEERING
DEPARTMENT OF CIVIL ENGINEERING
SCHEME OF INSTRUCTION – CHOICE BASED CREDIT SYSTEM
B.Tech. Civil Engineering (R-18), Effective from batch admitted in 2018-19

FOURTH SEMESTER

Course Code	Course Title	Scheme of Instruction(Hours/Week)				No. of Credits	Scheme of Evaluation		
		Lecture	Tutorial	Practical	Total		Sessional Marks	Semester End Examination Marks	Total
PAMCT 401	Constitution of India	3	-	-	3	-	100	-	100
MABST 402	Mathematics – IV	3	-	-	3	3	40	60	100
CEPCT 403	Fluid Mechanics and Hydraulic Machines	3	1	-	4	4	40	60	100
CEPCT 404	Structural Analysis	3	1	-	4	4	40	60	100
CEPCT 405	Environmental Engineering	3	-	-	3	3	40	60	100
CEPCT 406	Soil Mechanics	3	1	-	4	4	40	60	100
CEPCD 407	Computer aided Building Drawing	-	-	4	4	2	40	60	100
CEPCP 408	Fluid Mechanics and Hydraulic Machines Lab	-	-	2	2	1	40	60	100
CEESP 409	Materials Testing Lab	-	-	2	2	1	40	60	100
Total		18	3	8	29	22	420	480	900

Note: Industry Internship (Not less than 4 weeks) after IV/ VI Semesters during summer. Performance reflected in VII Semester.

4 year B.Tech., Degree Course
Civil Engineering
Choice Based Credit System
(With effect from the academic year 2018-19)

IV Semester – Syllabus

PAMCT 401 CONSTITUTION OF INDIA

Instruction Hours/Week : 3(L) **Credits : -**
Sessional Marks : 100 **End Semester Examinations Marks : -**

Course Objectives:

- To Enable the student to understand the importance of constitution
- To understand the structure of executive, legislature and judiciary
- To understand philosophy of fundamental rights and duties
- To understand the autonomous nature of constitutional bodies like Supreme Court and high court controller and auditor general of india and election commission of india.
- To understand the central and state relation financial and administrative.

UNIT-I

Introduction to Indian Constitution: Constitution' meaning of the term, Indian Constitution - Sources and constitutional history, Features - Citizenship, Preamble, Fundamental Rights and Duties, Directive Principles of State Policy.

UNIT-II

Union Government and its Administration Structure of the Indian Union: Federalism, Centre- State relationship, President: Role, power and position, PM and Council of ministers, Cabinet and Central Secretariat, Lok Sabha, Rajya Sabha, The Supreme Court and High Court: Powers and Functions;

UNIT-III

State Government and its Administration Governor - Role and Position - CM and Council of ministers, State Secretariat: Organisation, Structure and Functions

UNIT-IV

A.Local Administration - District's Administration Head - Role and Importance, Municipalities - Mayor and role of Elected Representative - CEO of Municipal Corporation PachayatiRaj: Functions PRI: Zila Panchayat, Elected officials and their roles, CEO Zila Panchayat: Block level Organizational Hierarchy - (Different departments), Village level - Role of Elected and Appointed officials - Importance of grass root democracy

UNIT-V

Election Commission: Election Commission- Role of Chief Election Commissioner and Election Commissionerate State Election Commission:, Functions of Commissions for the welfare of SC/ST/OBC and women

REFERENCES:

1. Durga Das Basu, Introduction to the Constitution of India, Prentice – Hall of India Pvt. Ltd.. New Delhi
2. Subash Kashyap, Indian Constitution, National Book Trust
3. J.A. Siwach, Dynamics of Indian Government & Politics
4. D.C. Gupta, Indian Government and Politics
5. H.M.Sreevai, Constitutional Law of India, 4th edition in 3 volumes (Universal Law Publication)
6. J.C. Johari, Indian Government and Politics Hans
7. J. Raj Indian Government and Politics
8. M.V. Pylee, Indian Constitution Durga Das Basu, Human Rights in Constitutional Law, Prentice – Hall of India Pvt. Ltd.. New Delhi
9. Noorani, A.G., (South Asia Human Rights Documentation Centre), Challenges to Civil Right), Challenges to Civil Rights Guarantees in India, Oxford University Press 2012

E-RESOURCES:

1. nptel.ac.in/courses/109104074/8
2. nptel.ac.in/courses/109104045/
3. nptel.ac.in/courses/101104065/
4. www.hss.iitb.ac.in/en/lecture-details
5. www.iitb.ac.in/en/event/2nd-lecture-institute-lecture-series-indian-constitution

Course Outcomes: At the end of the semester/course, the student will be able to have a clear knowledge on the following:

1. Know the sources, features and principles of Indian Constitution.
2. Learn about Union Government, State government and its administration.
3. Get acquainted with Local administration and Pachayati Raj.
4. Be aware of basic concepts and developments of Human Rights.
5. Gain knowledge on roles and functioning of Election Commission

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	2	-	3	2	-	-	-	-	-
CO2	-	-	-	-	-	2	-	3	2	-	-	-	-	-
CO3	-	-	-	-	-	2	-	3	2	-	-	-	-	-
CO4	-	-	-	-	-	2	-	3	2	-	-	-	-	-
CO5	-	-	-	-	-	2	-	3	2	-	-	-	-	-
CO6	-	-	-	-	-	2	-	3	2	-	-	-	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

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MABST 402 Mathematics - IV

Instruction Hours/Week : 3(L) **Credits : 3**
Sessional Marks : 40 **End Semester Examinations Marks : 60**

Course Educational Objective (CEOs)

The objective of this course is

1. to familiarize the students with numerical methods of solving the non-linear equations, interpolation, differentiation, integration, and ordinary differential equations.

2. to impart knowledge in basic concepts and few techniques in probability and statistics in relation to the engineering applications.

Unit 1: Solution to algebraic equations

Solution of polynomial and transcendental equations: bisection method, Newton-Raphson method and Regula-Falsi method. finite differences, relation between operators, interpolation using Newton's forward and backward difference formulae. Interpolation with unequal intervals: Newton's divided difference and Lagrange's formulae.

Unit 2: Numerical differentiation and integration

Numerical Differentiation, numerical integration- trapezoidal rule and Simpson's 1/3rd and 3/8 rules. Ordinary differential equations-Taylor's series, Euler and modified Euler's methods. Runge-Kutta method of fourth order for solving first and second order equations.

Unit 3: Probability

probability axioms, addition law and multiplicative law of probability, conditional probability, Baye's theorem, random variables (discrete and continuous)**,** probability distribution: Binomial - Poisson approximation to the binomial distribution and normal distribution-their properties.

Unit 4: Testing of Hypothesis

Formulation of null hypothesis, critical regions, level of significance.

Large sample tests: test for single proportion, difference of proportions, test for single mean and difference of means.

Unit 5: Small Sample Tests

Student t-distribution (single mean, two means and paired t-test), Testing of equality of variances (F-test), $\chi 2$ - test for goodness of fit, $\chi 2$ - test for independence of attributes.

Textbooks:

1. B. S. Grewal, Higher Engineering Mathematics, 44/e, Khanna Publishers, 2017.
2. P. Kandasamy, K. Thilagavathy, K. Gunavathi, Numerical Methods, S. Chand & Company, 2/e, Reprint 2012.

References

1. Veerarajan T., Engineering Mathematics, Tata McGraw-Hill, New Delhi, 2008.
2. Erwin kreyszig, Advanced Engineering Mathematics, 9/e, John Wiley & Sons, 2006.
3. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.

Course Outcomes:

At the end of the course students will be able to

1. evaluate approximating the roots of polynomial and transcendental equations by different algorithms.
2. Apply different algorithms for approximating the solutions of ordinary differential equations to its analytical computations.
3. apply discrete and continuous probability distributions
4. design the components of a classical hypothesis test
5. infer the statistical inferential methods based on small and large sampling tests

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	2	2	-	-	-	-	1	-	-	-	-
CO2	3	3	3	2	2	-	-	-	-	1	-	-	-	-
CO3	3	3	3	2	2	-	-	-	-	1	-	-	-	-
CO4	3	3	3	2	2	-	-	-	-	1	-	-	-	-
CO5	3	3	3	2	2	-	-	-	-	1	-	-	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

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CEPCT 403 FLUID MECHANICS AND HYDRAULIC MACHINES

Instruction Hours/Week : 3(L) +1(T) Credits : 4
Sessional Marks : 40 End Semester Examinations Marks: 60

Course Educational Objective (CEOs)

1. To understand the significance of fluid properties
2. To understand the principles of pressure measuring devices and computation of Hydrostatic forces.
3. To understand the basic principles of fluid flow
4. To learn the measurement of flow through pipes, channels and from tanks
5. To learn laminar and turbulent characteristics of pipe flows
6. To study the characteristics of pumps and turbines

UNIT – I

FLUID PROPERTIES: Definition of a fluid –Density, Specific weight, Specific volume, Specific gravity – Viscosity – Bulk modulus of elasticity – Vapour pressure – Surface tension and capillarity- Pressure at a point – Absolute and gauge pressures

FLUID STATICS Pascal's law – Pressure measurement – Manometers- Mechanical gauges – Hydrostatic pressure and force: horizontal, vertical and inclined planes.

UNIT – II

FLUID FLOW CONCEPTS: Flow characteristics – Velocity – Acceleration – Types of flow – Streamlines, Path lines, Streak lines – Stream function, Velocity potential, flow-net – Circulation and Vorticity.

FUNDAMENTAL EQUATIONS : Continuity equation – Euler's equation of motion along a streamline – Bernoulli's equation – Applications of Bernoulli's Equation – Free jets and vortex flows - Linear momentum equation - Impacts of jets on free and fixed moving vanes – Moment of momentum equation – Torque on Sprinklers.

UNIT III

DIMENSIONAL ANALYSIS AND SIMILITUDE

Dimensional Analysis and Hydraulic Similitude: Dimensional homogeneity, Buckingham's Pi method. Dimensionless groups, Similitude, Types of models, model studies.

FLOW MEASUREMENT

Velocity measurement – Pitot tubes – Flow measurements: Flow through pipes- Venturi meter, Orifice meter and Nozzle meter- Flow through Channels: Weir and notches – Flow through tanks: Orifice and Mouth pieces.

UNIT IV

LAMINAR FLOW- Laminar flow through: circular pipes, annulus and parallel plates. Stoke's law, Measurement of viscosity.
TURBULENT FLOW- Reynolds experiment, Transition from laminar to turbulent flow. Definition of turbulence, scale and intensity, Causes of turbulence, Turbulent flow in pipes. Reynolds stresses, semi-empirical theories of turbulence, Prandtl's mixing length theory, universal velocity distribution equation. Resistance to flow of fluid in smooth and rough pipes,

UNIT V

HYDRAULIC TURBINES:– Classifications of turbines – Pelton Wheel, Francis Turbine and Kaplan Turbine velocity triangles at inlet and outlet – work done and efficiency– Draft Tube theory- Specific Speed – Characteristic Curves .

CENTRIFUGAL PUMPS : Components – Working – Types – Work done – Heads – Losses and Efficiencies – Specific Speed – Multi Stage Pumps – Performance Characteristic Curves – Net positive Suction Head (NPSH).

Course Outcomes (COs)

After completion of the course the student will have:

1. Able to solve fluid flow problems using fundamental principles
2. Able to compute hydrostatic forces on plane and curved surfaces
3. Able to measure pressure, velocity and discharge
4. Able to perform model analysis
5. Able to analyze the flow problems in laminar and turbulent flow conditions
6. Able to analyze the characteristics of pumps and turbines

TEXT BOOKS

1. Hydraulics and Fluid Mechanics including Hydraulic Machines by P.N. Modi and S.M. Seth – Twentieth edition 2015, Standard Book House , New Delhi.
2. Fluid Mechanics and Hydraulic Machines by R.K.Rajput - 2002 Publication, S.Chand & Company Ltd., New Delhi.
3. Fluid Mechanics and Hydraulic Machines by R.K.Bansal -Revised Ninth edition 2010, Laxmi Publications (P) Ltd., New Delhi.

REFERENCE BOOKS

1. Fluid Mechanics by Victor L. Streeter and E.Benjamin Wylie, Keith W. Bedford – Edition 2010, Tata Mc Graw Hill Education Private Limited, New Delhi.

2. Fluid Mechanics and Turbo machines by Madan Mohan Das. – First Edition 2009, PHI Learning Pvt.Ltd., New Delhi.

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	-	-	-	-	-	-	-	-	3	1
CO2	3	3	3	3	-	-	-	-	-	-	-	-	3	1
CO3	3	3	3	3	-	-	-	-	-	-	-	-	3	1
CO4	3	3	3	3	-	-	-	-	-	-	-	-	3	1
CO5	3	3	3	3	-	-	-	-	-	-	-	-	3	1
CO6	3	3	3	3	-	-	-	-	-	-	-	-	3	1

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

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CEPCT 404 STRUCTURAL ANALYSES

Instruction Hours/Week : 3(L)+1(T) Credits : 4
Sessional Marks : 40 End Semester Examinations Marks : 60

Course Objectives

1) to teach the student with basic concepts for determination of principal stresses and strains in various structural elements.
2) to demonstrate analytical methods for determining strength & stiffness and assess stability of structural members.
3) to train the student compute shear stresses in different cross-sections and analyze failure mechanisms.
4) to make the student analyze circular shafts subjected to torsion
5) to make the student determine critical loads for columns with different end conditions.

UNIT I

DEFLECTIONS:

Relationship between curvature, slope and deflection - Differential equation for the elastic line of a beam - Slope and deflection of cantilevers and simply supported beams by integration method, moment area method and conjugate beam method. Uniform bending – slope, deflection and radius of curvature – Differential equation for elastic line of a beam – Double integration and Macaulay's methods. Determination of slope and deflection for cantilever and simply supported beams under point loads, U.D.L. uniformly varying load-Mohr's theorems – Moment area method – application to simply supported and overhanging beams- analysis of propped cantilever beams under UDL and point loads.

UNIT II

TORSION OF CIRCULAR SHAFTS:

Theory of pure torsion in solid and hollow circular shafts - Transmission of power - Combined bending, torsion and end thrust.

SPRINGS:

Types of springs - Close and open coiled helical springs under axial loads and axial couple - springs in series and parallel - Carriage or leaf springs.

UNIT III

INFLUENCE LINES AND MOVING LOADS:

Influence lines for reactions, BM and SF; Curves of maximum BM and SF for single, two and multiple loads, udl longer and shorter than span, enveloping parabolic and EUDL – forces in truss members.

UNIT IV

ENERGY THEOREMS:

Virtual work and energy principles - Maxwell's, Betti's theorems, Castigliano's first theorem and unit load method - Deflection of simple beams and pin-jointed trusses. Strain energy in linear elastic system, expression of strain energy due to axial load, bending moment and shear force. Introduction to finite element method for plane stress and plane strain.

UNIT V

INDETERMINATE STRUCTURES:

Indeterminate Structural Analysis – Determination of static and kinematic indeterminacies – Analysis of plane trusses with two degrees of internal and external indeterminacy - Castigliano's theorem–II – Lack of fit.

TEXT BOOKS:

1) Analysis of Structures Vol.I & II by V.N.Vazirani & M.N.Ratwani.
2) Intermediate Structural Analysis by Wang.
3) Mechanics of Structures Vol.II by S.B.Junarkar.
4. Structural Analysis by L.S.Negi & R.S.Jangid.
5) Theory of Structures - Vol.I by S.P.Gupta, G.S.Pandit & R.Gupta.
6) Fundamentals of Structural Analysis by Sujit Kumar Roy & Subrata Chakrabarty.

Course Outcomes:

On completion of the course, the student will be able to:

1. Understand various engineering properties of materials
2. Estimate magnitudes under combined loads in members and structures
3. Determine shear stresses for different cross-sections.
4. Determine deflection at any point on a beam under simple or combined loads
5. Apply failure criteria to implement in design of structural members.
6. Analyze members under torsion, combined torsion and bending moment for Determination of energy absorption.

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	2	-	-	-	-	-	-	-	3	1
CO2	3	3	3	3	2	-	-	-	-	-	-	-	3	1
CO3	3	3	3	3	2	-	-	-	-	-	-	-	3	1
CO4	3	3	3	3	2	-	-	-	-	-	-	-	3	1
CO5	3	3	3	3	2	-	-	-	-	-	-	-	3	1
CO6	3	3	3	3	2	-	-	-	-	-	-	-	3	1

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

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CEPCT 405 ENVIRONMENTAL ENGINEERING

Instruction Hours/Week : 3(L) Credits : 3
Sessional Marks : 40 End Semester Examinations Marks : 60

Course Educational Objective (CEOs)

1. To know the different sources of water and water demand.
2. To analyze the distribution network
3. To learn about the sources of water pollution
4. To know the design concepts of water treatment plant
5. To study the different aspects of Air pollution.

UNIT – I

Sources and Demand of Water

Different sources of water, quantity and quality of different sources, Types and variation in water demand, factors affecting water demand, design period, population forecasting – Different methods and their suitability.

Water Collection, Conveyance and Distribution:

Intake works for collection of surface water – Conveyance of water – Gravity and pumping – Their design – Different materials used for conveying conduits and their suitability, systems of distribution – Distribution reservoirs – Distribution networks, design of simple and complex pipe networks, pipe accessories – Valves and their location and suitability.

UNIT – II

Water uses and Quality Requirements

Sources of water pollution, water borne, water carried and water related diseases – Need for protected water supply, water quality – Physical, chemical and biological characteristics, water quality requirement and standards for different uses.

Water Treatment :

Conventional water treatment processes units and their functions. Theory and design of aeration, coagulation, flocculation and clarification, Determination of optimum dose of alum for coagulation of water.

UNIT – III

Filtration and Disinfection:

Theory of Filtration – Different types of filters and their design. Disinfection – Disinfectants mechanism of disinfection – Different types, Break point chlorination – Types of calculation – Doses of disinfectant.

UNIT – IV

Advanced Treatment Methods:

Removal of fluorides, arsenic, hardness, iron and manganese, salinity, colour, organic chemical and biological residues – Adsorption with activated carbon, ion exchange resins, membrane processes, chemical oxidation and softening.

UNIT – V

Air Pollution :

Types of pollutants, their sources and impacts, air pollution meteorology, air pollution control, air quality standards and limits.

Noise Pollution :

Impacts of noise, permissible limits of noise pollution, measurement of noise and control of noise pollution.

TEXT BOOKS :

1. Water Treatment Principles and Design by James M. Montgomery.
2. Water Supply Engineering, by S.K.Garg.
3. Environmental Engineering by H.S.Peavy et al.
4. Water Supply and Sewerage, by E.W.Steel.
5. Air pollution and its Control by C.S.Rao

Course Outcomes (COs)

After completion of the course the student will :

1. Able to estimate the water demand of any area and understand the water conveyance systems
2. Able to describe water quality parameters and design
3. Able to plan and design water treatment plant
4. Able to understand advanced water treatment technologies
5. Able to apply advanced technologies or principles to control air pollution.

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	2	1	3	3	-	2	-	-	-	3	1
CO2	3	3	2	2	1	3	3	-	2	-	-	-	3	1
CO3	3	3	2	2	1	3	3	-	2	-	-	-	3	1
CO4	3	3	2	2	1	3	3	-	2	-	-	-	3	1
CO5	3	3	2	2	1	3	3	-	2	-	-	-	3	1

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

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CEPCT 406 SOIL MECHANICS

Instruction Hours/Week : 3(L)+1(T) Credits : 4
Sessional Marks : 40 End Semester Examinations Marks : 60

Course Objectives:

The objective of this course is:

1) To enable the student to find out the index properties of the soil and classify it.
2) To enable the students to differentiate between compaction and consolidation of soils and to determine the consolidation settlement.
3) To enable the student to determine permeability of soils using various methods.
4) To impart the concept of seepage of water through soils and determine the seepage discharge.
5) To enable the students to determine Shear Strength of soils using various methods.

UNIT I:

SOIL COMPOSITION AND PHASE RELATIONSHIPS: Types of soils - formation and deposition - Phase composition and *Soil as 3−Phase system- Weight-Volume parameters :* moisture content, unit weights, degree of saturation, voids ratio, porosity, specific gravity, mass specific gravity - Relationship between various soil parameters - Determination of Moisture content, Specific gravity and Unit weights using various methods.

UNIT II

IDENTIFICATION AND CLASSIFICATION OF SOILS: Index properties- Determination of particle size-Dry Sieve Analysis &Sedimentation Analysis- *Determination of* Consistency limits-liquid limit, plastic limit, shrinkage limit - Indices from Index properties-Density Index, Plasticity, Liquidity and Consistency indices, Flow & Toughness indices - Soil classification based on particle size , texture - Unified and Indian standard soil classification systems – Engineering significance of classification and classification parameters- Tests for field identification of soils

UNIT III

SOIL WATER & EFFECTIVE STRESS PRINCIPLE: Mode, Occurrence and types of soil water – Geostatic stresses in soils - capillarity – Total Stress- Pore water pressure- Effective Stress Principle - nature of effective stress, effect of ground level, surcharge &water table on effective stress.

PERMEABILITY & SEEPAGE ANALYSIS: Darcy's law- coefficient of permeability: determination by constant-head and falling-head methods-Permeability of stratified soils - factors affecting Permeability -Movement of water through soils- stream and potential functions - flow nets, graphical method to plot flow nets- seepage pressure - quick sand condition.

UNIT IV

CONSOLIDATION OF SOILS - comparison between compaction and consolidation, initial, primary & secondary consolidation - Terzaghi's theory of consolidation, final settlement of soil deposits, computation of consolidation settlement and secondary consolidation.

UNIT – V

SHEAR STRENGTH OF SOILS : Shear strength of soils - Mohr'-Coulomb Failure Criteria - Measurement of shear strength - Direct shear, Unconfined compression and Tri-axial compression tests - Shear strength parameters - Shear strength of cohesive and cohesion less soils - Test conditions - Stress Paths under different stress conditions

TEXT BOOKS

1. C. Venkataramiah, Geotechnical Engineering, New age International Pvt . Ltd, (2002).
2. K. R. Arora, Soil Mechanics and Foundation Engg., Standard Publishers and Distributors, Delhi.

REFERENCES:

1. Gopal Ranjan & A. S. R. Rao, Basic and Applied Soil Mechanics, New age International Pvt . Ltd, New Delhi.
2. Braja M. Das Principles of Geotechnical Engineering, Cengage Learning
3. B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, Soil Mechanics and Foundation, Laxmi publications Pvt. Ltd., New Delhi

Course Outcomes:

At the end of the course, the student must be able to:

1. Identify and classify various soils based on their characteristics.
2. Compute effective stress under different conditions
3. Evaluate permeability and seepage of soils.
4. Understand consolidation in soils and calculate consolidation time and settlement of soils.
5. Understand shear strength theories and determine Shear Characteristics of soils

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	1	-	-	-	-	-	-	-	3	1
CO2	3	3	3	3	1	-	-	-	-	-	-	-	3	1
CO3	3	3	3	3	1	-	-	-	-	-	-	-	3	1
CO4	3	3	3	3	1	-	-	-	-	-	-	-	3	1
CO5	3	3	3	3	1	-	-	-	-	-	-	-	3	1

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

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CEPCD 407 COMPUTER AIDED BUILDING DRAWING

Instruction Hours/Week : 4(D) Credits : 2
Sessional Marks : 40 End Semester Examinations Marks : 60

Course Educational Objective (CEOs)

1) Develop Parametric design and the conventions of formal engineering drawing
2) Produce and interpret 2D & 3D drawings
3) Communicate a design idea/concept graphically/ visually
4) Examine a design critically and with understanding of CAD - The student learn to interpret drawings, and to produce designs using a combination of 2D and 3D software.
5) Get a Detailed study of an engineering artifact

UNIT- I

INTRODUCTION; Introduction to concept of drawings, Interpretation of typical drawings, Planning drawings to show information concisely and comprehensively; optimal layout of drawings and Scales; Introduction to computer aided drawing, coordinate systems, reference planes. Commands: Initial settings, Drawing aids, Drawing basic entities, Modify commands, Layers, Text and Dimensioning, Blocks. Drawing presentation norms and standards.

UNIT- II

SYMBOLS AND SIGN CONVENTIONS: Materials, Architectural, Structural, Electrical and Plumbing symbols. Rebar drawings and structural steel fabrication and connections drawing symbols, welding symbols; dimensioning standards

UNIT- III

MASONRY BONDS: English Bond and Flemish Bond – Corner wall and Cross walls – One brick wall and one and half brick wall

UNIT- IV

BUILDING DRAWING: Terms, Elements of planning building drawing, Methods of making line drawing and detailed drawing. Site plan, floor plan, elevation and section drawing of small residential buildings. Foundation plan. Roof drainage plans. Depicting joinery, standard fittings & fixtures, finishes. Use of Notes to improve clarity

UNIT- V

PICTORIAL VIEW: Principles of isometrics and perspective drawing. Perspective view of building. Fundamentals of Building Information Modelling (BIM)

It may be advisable to conduct Theory sessions along with Lab demonstrations.

List of Drawing Experiments:

1. Buildings with load bearing walls including details of doors and windows.
2. Taking standard drawings of a typical two storeyed building including all MEP, joinery, rebars, finishing and other details and writing out a description of the Facility in about 500 -700 words.
3. RCC framed structures
4. Reinforcement drawings for typical slabs, beams, columns and spread footings.
5. Industrial buildings – North light roof structures – Trusses
6. Perspective view of one and two storey buildings.

COURSE OUTCOMES:

At The end of the course the student will be able to

1. Develop drawing skills for effective demonstration of building details.
2. Draw building plans using Computer Aided Design and Drafting software's.
3. Develop engineering project drawings incorporating details and design parameters in 2D & 3D.
4. Examine efficacy of CAD design.

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	2	-	-	-	-	2	-	-	3	1
CO2	3	3	3	3	2	-	-	-	-	2	-	-	3	1
CO3	3	3	3	3	2	-	-	-	-	2	-	-	3	1
CO4	3	3	3	3	2	-	-	-	-	2	-	-	3	1
CO5	3	3	3	3	2	-	-	-	-	2	-	-	3	1

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

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20CE 408 FLUID MECHANICS AND HYDRAULIC MACHINES LAB

Instruction Hours/Week : 2(P) Credits : 1
Sessional Marks : 40 End Semester Examinations Marks : 60

Course Educational Objective (CEOs)

1. To conduct experiments on measuring devices
2. To conduct experiments on Turbines and Pumps

LIST OF EXPERIMENTS

1. Calibration of Small Orifice
2. Calibration of Venturimeter
3. Calibration of Orifice meter
4. Calibration of Bend meter
5. Calibration of Triangular Notch
6. Measurement of Viscosity
7. Verification of Bernoulli's Theorem
8. Flow visualization
9. Characteristic curves of pumps
10. Characteristic curves of turbines

Course Outcomes (COs)

After completion of the course the student will have:

1. Able to determine types of flow
2. Able to calibrate the flow measuring devices
3. Able to draw performance characteristic curves

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	-	-	-	-	-	-	-	-	3	1
CO2	3	3	3	3	-	-	-	-	-	-	-	-	3	1
CO3	3	3	3	3	-	-	-	-	-	-	-	-	3	1

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

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CEESP 409 MATERIAL TESTING LAB

Instruction Hours/Week : 2(P) Credits : 1
Sessional Marks : 40 End Semester Examinations Marks : 60

Course Educational Objective (CEOs)

The experimental work involved in the laboratory should make the student understand the fundamental modes of loading of the structures and to determine mechanical properties of materials.

Course objectives:

1) Impart on experimental determination and evaluation of mechanical characteristics and advanced behavior of metallic and non-metallic structural materials.
2) Demonstrate the deformation and fracture behavior of structural materials.
3) Teach experimental procedures and common measurement instruments, equipment, devices.
4) Handling and testing the structural components behaviour by adopting Non destructive techniques
5) Throw light on variety of established material testing procedures and techniques

LIST OF EXPERIMENTS

1. Tension and Torsion Test on Mild Steel bar and HYSD bar
2. (a) Deflection Test on Simply Supported Beam
   (b) Charpy Impact Test
3. (a) Deflection Test on Fixed Beam
   (b) Izod Impact Test
4. (a) Compression Test on Wood
   (b) Shear Test on Wood
5. (a) Test on Closed coil Helical Spring
   (b) Bending Test on Carriage Spring
6. (a) Deflection Test on beam under Uniform Bending
   (b) Bending Test on R.S. Joist
7. Sieve Analysis of coarse and fine aggregates
8. Bulking of Sand by Volume and Weight methods
9. Normal consistency, Initial and Final Setting Times of Cement
10. Tests on concrete
    a) Slump Test
    b) Compressive Strength of Concrete Cubes
    c) Compaction Factor Test
    d) Compressive Strength of Concrete Cylinders
11. (a) Specific gravity & Water absorption of Coarse aggregate
    (b) Specific gravity of Cement
12. Water absorption and Compressive Strength of Bricks

Course Outcomes (COs)

After completion of the course the student will be able to

1. acquire the knowledge and behavior in finding the properties of different materials.

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	-	-	-	-	-	-	-	-	3	1

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

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SRI VENKATESWARA UNIVERSITY COLLEGE OF ENGINEERING
DEPARTMENT OF CIVIL ENGINEERING
SCHEME OF INSTRUCTION – CHOICE BASED CREDIT SYSTEM
B.Tech. Civil Engineering (R-18), Effective from batch admitted in 2018-19

FIFTH SEMESTER

Course Code	Course Title	Scheme of Instruction(Hours/Week)				No. of Credits	Scheme of Evaluation		
		Lecture	Tutorial	Practical	Total		Sessional Marks	Semester End Examination Marks	Total
CEPCT 501	Hydraulic Engineering	3	1	-	4	4	40	60	100
CEPET 502	Programme Elective – I	3	-	-	4	4	40	60	100
CEPCT 503	Foundation Engineering	3	-	-	3	3	40	60	100
CEPET 504	Programme Elective – II	3	-	-	3	3	40	60	100
CEPCT 505	Reinforced Concrete Design	3	1	-	3	3	40	60	100
CEPCT 506	Design of Steel Structures	3	-	-	3	3	40	60	100
CEPCP 507	Hydraulic Engineering Lab	-	-	2	2	1	40	60	100
CEPCP 508	Soil Mechanics Lab	-	-	3	3	1.5	40	60	100
Total		**18**	**2**	**5**	**25**	**22.5**	**320**	**480**	**800**

CEP 501C HYDRAULIC ENGINEERING

Instruction Hours/Week : 3(L) Credits : 3
Sessional Marks : 40 End Semester Examinations Marks : 60

COURSE EDUCATIONAL OBJECTIVES (CEOs)

1. To understand the concept of dimensional analysis
2. To know the concept of flow through pipes and losses in pipes
3. To understand the basic concepts of channel flows
4. To learn specific energy and specific force concepts
5. To analyze and compute uniform and gradually varied flows

UNIT I

Dimensional Analysis and Hydraulic Similitude: Dimensional homogeneity, Rayleigh , Buckingham's Pi methods. Dimensionless groups, Similitude, Model studies, Types of models. Application of dimensional analysis and model studies to fluid flow problem.

UNIT II

Flow through Pipes: Loss of head through pipes, Darcy-Weisbach equation, minor losses, total energy line, hydraulic gradient line, Pipes in series, equivalent pipes, pipes in parallel, siphon, power transmission through pipes, nozzles. Analysis of pipe networks: Hardy Cross method, water hammer in pipes and control measures, branching of pipes, three reservoir problem.

UNIT III

Introduction to Open Channel Flow-Comparison between open channel flow and pipe flow, geometric parameters of a channel, classification of open channels, classification of open channel flow, Velocity Distribution of channel section.

Uniform Flow-Continuity Equation, Energy Equation and Momentum Equation, Characteristics of uniform flow, Chezy's formula, Manning's formula. Factors affecting Manning's Roughness Coefficient "n .Most economical section of channel. Computation of Uniform flow, Normal depth.

UNIT IV

Non-Uniform Flow- Specific energy, Specific energy curve, critical flow, discharge curve Specific force , Critical depth. Channel Transitions. Measurement of Discharge and Velocity – Venturi Flume, Standing Wave Flume, Parshall Flume, Broad Crested Weir. Measurement of Velocity-

Current meter, Floats, Hot-wire anemometer. Gradually Varied Flow-Dynamic Equation of Gradually Varied Flow, Classification of channel bottom slopes, Classification of surface profiles, Characteristics of surface profiles. Computation of water surface profile by graphical, Direct and standard step methods.

UNIT V

Hydraulic Jump- Theory of hydraulic jump, Elements and characteristics of hydraulic jump in a rectangular Channel, length and height of jump, location of jump, Types, applications. Energy dissipation and other uses, surge as a moving hydraulic jump. Positive and negative surges.

Text/Reference Books:

1. Hydraulics and Fluid Mechanics, P.M. Modi and S.M. Seth, Standard Book House
2. Theory and Applications of Fluid Mechanics, K. Subramanya, Tata McGraw Hill.
3. Open channel Flow, K. Subramanya, Tata McGraw Hill.
4. Open Channel Hydraulics, Ven Te Chow, Tata McGraw Hill.
5. Burnside, C.D., "Electromagnetic Distance Measurement," Beekman Publishers, 1971.

COURSE OUTCOMES (COs)

1. Able to find out dimensions of the parameters
2. Able to find out losses in pipes
3. Able to design channel transitions and hydraulics jump stilling basins
4. Able study the effects of hydraulic structures on flow

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	1	-	-	-	-	-	-	-	3	1
CO2	3	3	3	3	1	-	-	-	-	-	-	-	3	1
CO3	3	3	3	3	1	-	-	-	-	-	-	-	3	1
CO4	3	3	3	3	1	-	-	-	-	-	-	-	3	1

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

CEPET 502 ADVANCED ENVIRONMENTAL ENGINEERING
(PROGRAMME ELECTIVE – I)

Instruction Hours/Week : 3(L) **Credits : 3**
Sessional Marks : 40 **End Semester Examinations Marks : 60**

Course Educational Objective (CEOs)

1.To study the characteristics of sludge and different methods of tertiary treatment of wastewater.
2. To understand the different methods of disposal of wastewater.
3. To study the different types of air pollutants, its effects and controlling measures.
4.To know the causes, effects and controlling measures of noise pollution
5.To study the concept of Municipal Solid Waste Management.

UNIT I

SLUDGE MANAGEMENT IN WASTEWATER TREAMENT: Quantity and characteristics; and types of sludges; sludge conditioning and dewatering; handling, treatment, sludge utilization and disposal.

TERITIARY TREATMENT FOR WASTEWATER: Tertiary treatment ; Removal of nitrogen, phosphorus, heavy metals, suspended solids and pathogenic bacteria.

UNIT II

EFFLUENT DISPOSAL Standards for disposal ; disposal into surface water bodies ; Self purification, zones of pollution. Dissolved oxygen sag curve; Streeter - Phelps equation; Marine disposal ; On land disposal and treatment systems - overflow, flooding and irrigation.

ONSITE DISPOSAL SYSTEM: Septic tank and effluent disposal system.

UNIT III

AIR POLLUTION :

Types of pollutants; their sources and impacts; air pollution meteorology; air pollution control; air quality standards and limits.

UNIT - IV

NOISE POLLUTION Impacts of noise; permissible limits of noise pollution; Measurement of noise and control of noise pollution.

UNIT-V

MUNICIPAL SOLIDWASTES: Characteristics; generation; collection and transportation of solid waste; Engineered systems for solid waste management (reuse/recycle ,energy recovery, treatment and disposal).

Course Outcomes (COs)

1. Able to characterize sludge and explain about different types of tertiary treatment of wastewater.

2. Able to explain about different methods of disposal of wastewater.

3. Able to explain about different types of air pollutants, its effects and controlling measures.

4. Able to apply measures for noise pollution

5. Able to manage Municipal Solid Waste.

TEXT BOOKS :

1. Sewage Disposal and Air Pollution Engineering, by S.K.Garg.

2. Environmental Engineering by H.S.Peavy et al.

3. Water Supply and Sewerage, by E.W.Steel and Mc.Ghee.

4. Air pollution and its Control by C.S.Rao

REFERENCE BOOKS :

1. Wastewater Engineering, Treatment, Disposal, and Reuse by Metcalf and Eddy.

2. Techobanglous, G.Theisen, H. and Ehasin, R.(1996). Solid waste engineering principlesandManagement Issues – McGraw Hill, Tokyo.

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	2	1	3	3	-	2	-	-	-	3	1
CO2	3	3	2	2	1	3	3	-	2	-	-	-	3	1
CO3	3	3	2	2	1	3	3	-	2	-	-	-	3	1
CO4	3	3	2	2	1	3	3	-	2	-	-	-	3	1
CO5	3	3	2	2	1	3	3	-	2	-	-	-	3	1

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

CEPCT 503 FOUNDATION ENGINEERING

Instruction Hours/Week : 3(L) Credits : 3
Sessional Marks : 40 End Semester Examinations Marks : 60

Course Objectives:

The objective of this course is:

1) To explain Shear strength of soils and determination methods
2) To teach slope stability analysis and assessment of earth pressures.
3) To impart knowledge on bearing capacity and settlement of shallow foundations.
4) To throw light on soil exploration and. methods of soil improvement.

UNIT – I

Stability of Slopes: Infinite and finite earth slopes in sand and clay – types of failures – factor of safety of infinite slopes – stability analysis by Swedish arc method, standard method of slices – Taylor's Stability Number-Stability of slopes of dams and embankments - different conditions.

UNIT – II

Earth Pressure Theories: Rankine's & Coulomb's theory of earth pressure – Culmann's graphical method - earth pressures in layered soils.

Earth Retaining Structures: Types of Retaining Structures - Stability Considerations of Gravity and Cantilever Retaining Walls

UNIT – III

Compaction of Soils: Compaction of Soil - theory of compaction - compaction of cohesive and Cohesionless soils, Determination of optimum moisture content - maximum dry density.

Effective Stress in Soils: Effective Stress Principle - Introduction, effective stress principle, nature of effective stress, effect of water table. Surcharge, Capillary action, seepage pressure, quick sand condition. Stresses in soils - due to point load, line load, strip load, uniformly loaded circular, rectangular loaded area. Influence factors, Isobars, Boussinesq's equation, Newmark's Influence Chart, Pressure bulb concept.

UNIT-IV

Bearing Capacity and Shallow Foundations – Determination of bearing capacity – factors influencing bearing capacity – analytical methods to determine bearing capacity – Terzaghi's theory – settlements - IS Methods.

UNIT -V

Deep Foundations: **Pile Foundations**– Types of piles – Load carrying capacity based on static and dynamic formulae- Pile load tests - pile groups in sands and clays- Negative skin friction.

Well Foundations: Types – Different shapes – Components of well foundation – forces acting on well foundations - Design Criteria – Determination of staining thickness and plug - construction and Sinking of wells – Tilt and shift.

TEXT BOOKS:

1. C. Venkataramiah, Geotechnical Engineering, New age International Pvt . Ltd, (2002).
2. Gopal Ranjan & A.S.R.Rao, "Basic and Applied Soil Mechanics".

REFERENCES:

1. Braja M. Das Principles of Geotechnical Engineering, Cengage Learning
2. Purushtoma Raj, Soil Mechanics and Foundation Engineering, Pearson Publications
3. Bowles, J.E., Foundation Analysis and Design (1988) – 4th Edition, McGraw-Hill Publishing Company, Newyork.

Course Outcomes:

Upon the successful completion of this course:

The student will be able to:

1. Assess stability of slopes and Earth Pressures.
2. Determine safe bearing capacity and settlement of shallow foundations.
3. Calculate load carrying capacity of piles.
4. Determine the well staining thickness

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	1	-	-	-	-	-	-	-	-	1
CO2	3	3	3	3	1	-	-	-	-	-	-	-	-	1
CO3	3	3	3	3	1	-	-	-	-	-	-	-	-	1
CO4	3	3	3	3	1	-	-	-	-	-	-	-	-	1

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

CEPET 504 REMOTE SENSING AND GIS

(PROGRAMME ELECTIVE – II)

Instruction Hours/Week : 3(L) Credits : 3
Sessional Marks : 40 End Semester Examinations Marks : 60

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Course Objectives:

1) Introduce the basic principles of Remote Sensing and GIS techniques.
2) teach various types of satellite sensors and platforms
3) impart concepts of visual and digital image analyses
4) teach concepts of principles of spatial analysis
5) teach application of RS and GIS to Civil engineering

UNIT – I

Introduction to photogrammetry:

Principles & types of aerial photograph, geometry of vertical aerial photograph, Scale & Height measurement on single vertical aerial photograph, Height measurement based on relief displacement, Fundamentals of stereoscopy, fiducially points, parallax measurement using fiducially line.

UNIT – II

Remote sensing:

Basic concepts and foundation of remote sensing – elements involved in remote sensing, electromagnetic spectrum, remote sensing terminology and units. Energy resources, energy interactions with earth surface features and atmosphere, resolution, sensors and satellite visual interpretation techniques, basic elements, converging evidence, interpretation for terrain evaluation, spectral properties of water bodies, introduction to digital data analysis.

UNIT – III

Geographic information system:

Introduction, GIS definition and terminology, GIS categories, components of GIS, fundamental operations of GIS, A theoretical framework for GIS. Data collection and input overview, data input and output. Keyboard entry and coordinate geometry procedure, manual digitizing and scanning, Raster GIS, Vector GIS – File management, Spatial data – Layer based GIS, Feature based GIS mapping.

UNIT – IV

GIS spatial analysis:

Computational Analysis Methods (CAM), Visual Analysis Methods (VAM), Data storage-vector data storage, attribute data storage, overview of the data manipulation and analysis. Integrated analysis of the spatial and attribute data.

UNIT – V

Water resources applications:

Land use/Land cover in water resources, Surface water mapping and inventory –Watershed management for sustainable development and Watershed characteristics – Reservoir sedimentation, Fluvial Geomorphology – Ground Water Targeting, Identification of sites for artificial Recharge structures – Inland water quality survey and management, water depth estimation and bathymetry.

TEXT BOOKS:

1. B. Bhatta, Remote Sensing and GIS by Oxford University Press, New Delhi.
2. Satheesh Gopi, Advanced surveying: Total station GIS and remote sensing, Pearson publication.

REFERENCES:

1. George Joseph, Fundamentals of remote sensing, Universities press, Hyderabad.
2. C. P. Lo Albert, K.W. Yonng, Concepts & Techniques of GIS, Prentice Hall (India) Publications.
3. M. Anji Reddy Remote sensing and GIS, B. S. Publications, New Delhi.
4. L. R. A. Narayana, Remote Sensing and its applications, University Press 1999.

Course outcomes

At the end of the course the student will be able to

1. Comparing with ground, air and satellite based sensor platforms.
2. Interpret the aerial photographs and satellite imageries.
3. Create and input spatial data for GIS application.
4. Apply RS and GIS concepts in water resources engineering.
5. Applications of various satellite data.

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	-	3	-	-	-	-	-	-	-	3	3
CO2	3	3	3	-	3	-	-	-	-	-	-	-	3	3
CO3	3	3	3	-	3	-	-	-	-	-	-	-	3	3
CO4	3	3	3	-	3	-	-	-	-	-	-	-	3	3
CO5	3	3	3	-	3	-	-	-	-	-	-	-	3	3

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

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CEPCT 505 REINFORCED CONCRETE DESIGN

Instruction Hours/Week : 3(L)+1 (T) Credits : 4
Sessional Marks : 40 End Semester Examinations Marks : 60

Course Educational Objective (CEOs)

1. To understand the general mechanical behavior of reinforced concrete members.
2. Ability to analyze and design reinforced concrete flexural members and compression members.
3. To help the student develop an intuitive feeling about structural & material vise behavior and design of RC systems & elements.
4. To teach concepts of working stress and limit state methods.
5. To impart design procedure of RC elements in flexure, shear and torsion.
6. To teach design procedure for short and long RC columns.
7. To explain design procedure of RC footings
8. To demonstrate design of RC slab

UNIT – I

INTRODUCTION

Introduction:

Concepts of Reinforced concrete Design – Working Stress Method - Limit State method –

Material Stress- Strain Curves – Safety factors – Characteristic values. Stress Block parameters –

IS – 456 – 2000. **Beams:** Limit state analysis and design of singly reinforced, doubly reinforced,

T and L beam sections

DESIGN FOR FLEXURE – WORKING STRESS METHOD

Assumptions, permissible stresses in concrete and steel, balanced design, transformed area method, analysis and design for flexure of singly and doubly reinforced and flanged sections.

LIMIT STATE METHOD

UNIT – II

DESIGN PRINCIPLES: Basic Design Principles - Stress strain curves for concrete and steel - Characteristic strengths and loads - Partial safety factors - Stress block - Various limit states.
DESIGN FOR FLEXURE: Limit state of collapse in flexure - Ultimate flexural strength - Balanced, under-reinforced and over-reinforced sections - Design of singly and doubly reinforced rectangular beams - Design of flanged beams.

UNIT - III

DESIGN FOR SHEAR, TORSION AND BOND: Shear-Truss analogy - Design of beams for shear and torsion - Anchorage and development length.

LIMIT STATES OF SERVICEABILITY: Deflection (short and long term) - Cracking.

UNIT – IV

DESIGN OF SLABS, STAIR CASES AND BEAMS:
Design of one way and two way slabs - Design of stair cases - Design of continuous beams and slabs.

UNIT – V

DESIGN OF COMPRESSION MEMBERS: Columns - Reduction factors - Axially loaded - Eccentrically loaded columns - Uniaxial moment - Biaxial moment (for practice only and not for University Examination).

DESIGN OF FOUNDATIONS: Types of footings - Design of wall footings and isolated, pad stepped and sloped footings - Square, rectangular subjected to axial load.

TEXT BOOKS:

1) Reinforced Concrete by Limit State Design by AK Jain.
2) Reinforced Concrete Design by SN Sinha.
3) LSD of Reinforced Concrete Structures by Ramachandra.
4) Reinforced Concrete Design by Unni Krishna Pillai and Devdas Menon.
5) Reinforced Concrete Design by P.C. Varghese.

I S CODE OF PRACTICE
IS 456- 2000 Code of practice for Reinforced Concrete Structures.

NOTE : All the designs to be taught in Limit State Method
Following plates should be prepared by the students.
1. Reinforcement particulars of T-beams and L-beams.
2. Reinforcement detailing of continuous beams.
3. Reinforcement particulars of columns and footings.
4. Detailing of One way, Two way and continuous slabs

Course Outcome:
After completing the course, the student will be able to,

1. Understand the basic concepts of working stress and limit state design methods
2. Design various RC elements like beams, columns, footings and slabs.
3. Apply design concepts to complex structural systems in advanced courses.

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	-	2	-	-	-	-	-	-	-	1
CO2	3	3	3	3	-	2	-	-	-	-	-	-	-	1
CO3	3	3	3	3	-	2	-	-	-	-	-	-	-	1

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

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CEPCT 506 DESIGN OF STEEL STRUCTURES

Instruction Hours/week : 3(L) **Credits :3**

Sessional Marks : 40 **Semester-end Examination: 60**

Course Objectives

1) To teach different types of Connections and relevant IS code provision.
2) To impart with design procedures of beams and columns.
3) To enable Design of truss elements
4) To enable design of column bases
5) To teach design and Plate and Gantry Girders with curtailment of flanges.

UNIT -I:

Connections:

Bolted connections – Bolt value, Welded connections: Advantages and disadvantages of welding-Strength of welds-Butt and fillet welds: Design stresses – IS Code requirements. Design of fillet weld subjected to in plane and out of plane.

UNIT -II:

Beams:

Design of simple and compound beams-Curtailment of flange plates - IS Code-provision - Beam - to - beam connection, shear, buckling, check for deflection and bearing, laterally unsupported beams.

UNIT -III:

Tension Members and Compression members:

Design of members in direct tension and bending –effective length of columns. Slenderness ratio – permissible stresses. Design of compression members.

UNIT -IV:

Design of built-up columns and column bases:

Built-up columns with lacing and/or battening system. Design of Eccentrically loaded columns, Splicing of columns. **Design of Column bases:** slab base and gusseted base under axial load and moment.

UNIT -V:

Plate Girders:

Design of plate girder – IS code Provisions – Welded – Curtailment of flange plates, stiffeners – splicing and connections.

The students should prepare the following plates.

- Plate 1 Detailing of simple beams
- Plate 2 Detailing of Compound beams including curtailment of flanges
- Plate 3 Detailing of Column including lacing and battens.
- Plate 4 Detailing of Column bases – slab base and gusseted base
- Plate 5 Detailing of steel roof trusses including joint details.
- Plate 6 Detailing of Plate girder including curtailment, splicing

TEXT BOOKS

1. N. Subramanian, Steel Structures Design and Practice, Oxford University Press.
2. S. K. Duggal, Design of steel structures, Tata Mc Graw Hill, New Delhi.

REFERENCES

1. Sarwar Alam Raz, Structural Design in Steel, New Age International Publishers, New Delhi
2. M. Raghupathi, Design of Steel Structures, Tata Mc. Graw-Hill.
3. N. Krishna Raju; Structural Design and Drawing, University Press.

I S Codes:

1) Indian Standard Code for General Construction in Steel, 3rd revision, Indian Standards Institution, New Delhi, 2008.

2) IS – 875, Code of practice for design loads (other than earth quake) for buildings and structures (Part-1-Part 5), Bureau of Indian standards.

3) Steel Tables.

Course Outcomes:

At the end of this course the student will be able to

1. Explain relevant IS codes
2. Analysis and design of flexural members and detailing
3. Design compression members of different types with connection detailing
4. Design Plate Girder and Gantry Girder with connection detailing

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	3	-	-	-	-	-	-	-	3	3
CO2	3	3	3	3	3	-	-	-	-	-	-	-	3	3
CO3	3	3	3	3	3	-	-	-	-	-	-	-	3	3
CO4	3	3	3	3	3	-	-	-	-	-	-	-	3	3

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

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CEPCP 507 HYDRAULIC ENGINEERING LAB

Instruction Hours/week : 2 (P) **Credits :1**

Sessional Marks : 40 **Semester-end Examination :60**

Course Educational Objective (CEOs)

1. To conduct experiments on pipe and open channel flows

LIST OF EXPERIMENTS

1 Determination of Friction factor of the pipe material

2 Determination of Head Loss coefficient due to Sudden contraction

3 Determination of Head loss coefficient due to Gate valve in a pipe line

4 Determination of Head Loss coefficient due to Bend in a pipe line

5 Velocity Distribution coefficients in Open channel flows

6 Gradually Varied Flow profile computations on a horizontal and rectangular channels

7 Characteristics of Hydraulic Jump.

Course Outcomes (COs)

After completion of the course the student will

1 Able to compute losses in pipe flow

2 Able to determine characteristics of gradually varied flow and hydraulic jump

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	3	-	-	-	-	-	-	-	3	3
CO2	3	3	3	3	3	-	-	-	-	-	-	-	3	3

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

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CEPCP 508 SOIL MECHANICS LABORATORY

Instruction Hours/week : 3 (P) **Credits :1.5**

Sessional Marks : 40 **Semester-end Examination: 60**

Course Educational Objective (CEOs)

The objective of this course is:

1) To enable the student to find out the index properties of the soil and classify it.
2) To enable the students to differentiate between compaction and consolidation of soils and to determine the consolidation settlement.
3) To enable the student to determine permeability of soils using various methods.

LIST OF EXPERIMENTS

1. Specific gravity
2. Atterberg's Limits.
3. Field density-Core cutter and Sand replacement methods
4. Grain size analysis by sieving
5. Hydrometer Analysis Test
6. Permeability of soil - Constant and Variable head tests
7. Compaction test
8. Consolidation test (to be demonstrated)
9. Direct Shear test
10. Triaxial Compression test (UU Test)
11. Unconfined Compression test
12. Vane Shear test
13. Differential free swell (DFS)
14. CBR Test

Course Outcomes:

At the end of the course, the student must be able to:

1. Identify various soils based on their characteristics.
2. Evaluate permeability and seepage of soils.
3. Determine plasticity characteristics of various soils.

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	2	-	-	-	-	-	-	-	3	1
CO2	3	3	3	3	2	-	-	-	-	-	-	-	3	1
CO3	3	3	3	3	2	-	-	-	-	-	-	-	3	1

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

AN OPEN ELECTIVE – MOOCS COURSE IS TO BE STUDIE

SRI VENKATESWARA UNIVERSITY COLLEGE OF ENGINEERING
DEPARTMENT OF CIVIL ENGINEERING
SCHEME OF INSTRUCTION – CHOICE BASED CREDIT SYSTEM
B.Tech. Civil Engineering (R-18), Effective from batch admitted in 2018-19

SIXTH SEMESTER

Course Code	Course Title	Scheme of Instruction(Hours/Week)				No. of Credits	Scheme of Evaluation		
		Lecture	Tutorial	Practical	Total		Sessional Marks	Semester End Examination Marks	Total
CEPCT 601	Hydrology and Water Resources Engineering	2	1	-	3	3	40	60	100
CEPCT 602	Transportation Engineering	3	-	-	3	3	40	60	100
CEPET 603	Programme Elective – III	3	-	-	3	3	40	60	100
CEPET 604	Programme Elective– IV	3	-	-	3	3	40	60	100
CEOET 605	Open Elective – I Online	-	-	-	-	3	MOOCs		100
CEOET 606	Open Elective – II Online	-	-	-	-	3	MOOCs		100
CEPCP 607	Environmental Engineering Lab	-	-	2	2	1	40	60	100
CEPCP 608	Transportation Engineering Lab	-	-	2	2	1	40	60	100
MGHST 609	Management(Organizational Behaviour)	2	1	-	3	3	40	60	100
Total		**13**	**2**	**4**	**19**	**23**	**280**	**420**	**700 + 200**

Note: Industry Internship (Not less than 4 weeks) after IV/ VI Semesters during summer. Performance reflected in VII Semester.
Open Elective - MOOCS : 2 coutses - Study in III to VI Semesters, Performance reflected in VI Semester

4 year B.Tech. Degree Course
Civil Engineering
Choice Based Credit System
(With effect from the academic year 2018-19)

VI Semester – Syllabus

CEPCT 601 HYDROLOGY & WATER RESOURCES ENGINEERING

Instruction Hours/week : 2 (L)+1 (T) **Credits :3**

Sessional Marks : 40 **Semester-end Examination :60**

Course Educational Objective (CEOs)

1. To understand the phases of hydrologic cycle
2. To learn the measurement of evaporation and infiltrations
3. To understand the concept of unit hydrograph
4. To learn determination of flood and methods of flood routing
5. To learn irrigation requirements of crops and design of canals

UNIT I

Introduction - hydrologic cycle, water-budget equation, applications in engineering, sources of data.
Precipitation - forms of precipitation, types of precipitation, measurement of precipitation, rain gauge network, mean precipitation over an area, classification of rainfall- estimation of missing rainfall data- depth-area-duration relationships, maximum intensity-duration-frequency relationship, Probable Maximum Precipitation (PMP).

UNIT II

Abstractions From Precipitation - evaporation process, evaporimeters, reservoir evaporation and methods for its reduction, evapotranspiration, measurement of evapotranspiration, potential evapotranspiration equations, actual evapotranspiration, interception, depression storage, infiltration, infiltration capacity, measurement of infiltration, infiltration indices.

UNIT III

Runoff - runoff volume, SCS-CN method of estimating runoff volume, flow-duration curve, flow-mass curve, hydrograph, factors affecting hydrograph, components of hydrograph, base flow separation, effective rainfall, unit hydrograph- Derivation of unit hydrograph of different durations - Distribution graph
Ground Water - saturated formations, aquifer properties, geologic formations, well hydraulics: steady state flow in wells, equilibrium equations for confined and unconfined aquifers, aquifer tests. Open wells – yield – recuperation test.

UNIT IV
FLOODS:

Importance of flood studies - Methods of estimating flood peak - Empirical formulae - Rational method - Components of a Hydrograph - Base flow separation - Unit hydrograph - Derivation of unit hydrograph of different durations - Distribution graph - Gumbles method of flood frequency analysis.

FLOOD ROUTING: Basic equation - Types - Routing by Puls and Muskingum methods

UNIT V

IRRIGATION- Water requirement of crops-Crops and crop seasons, cropping pattern, duty and delta; Quality of irrigation water; Soil-water relationships, root zone soil water, consumptive use, irrigation requirement, frequency of irrigation; Methods of irrigation: surface, sub-surface, sprinkler and trickle / drip irrigation.

CANALS: Design of non-erodible channels- methods of economic section and permissible velocity- design of erodible channels-Regime approach-Kennedy's silt theory and Lacey's regime theory.

Course outcomes (Cos)

1. Able to calculate to mean precipitation
2. Able to prepare DAD and IDF curves
3. Able to develop flood hydrograph
4. able to compute flood magnitude and route of floods through reservoir and strems
5. Able to compute yield of well
6. To determine the irrigation water requirement and design of irrigation canals

Text/Reference Books:

1. K Subramanya, Engineering Hydrology, Mc-Graw Hill.
2. K N Muthreja, Applied Hydrology, Tata Mc-Graw Hill.
3. K Subramanya, Water Resources Engineering through Objective Questions, Tata Mc-Graw Hill.
4. G L Asawa, Irrigation Engineering, Wiley Eastern
5. L W Mays, Water Resources Engineering, Wiley.
6. J D Zimmerman, Irrigation, John Wiley & Sons
7. C S P Ojha, R Berndtsson and P Bhunya, Engineering Hydrology, Oxford.

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	1	-	-	-	-	-	-	-	3	1
CO2	3	3	3	3	1	-	-	-	-	-	-	-	3	1
CO3	3	3	3	3	1	-	-	-	-	-	-	-	3	1
CO4	3	3	3	3	1	-	-	-	-	-	-	-	3	1
CO5	3	3	3	3	1	-	-	-	-	-	-	-	3	1
CO6	3	3	3	3	1	-	-	-	-	-	-	-	3	1

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

CEPCT 602 TRANSPORTATION ENGINEERING

Instruction Hours/week : 3(L) **Credits : 3**

Sessional Marks : 40 **Semester-end Examination :60**

COURSE EDUCATIONAL OBJECTIVES (CEOs)

1. Identify the requirements of highways and apply the knowledge for planning highway alignment.
2. Estimate the geometrics for highways
3. Select appropriate highway materials and design the various highway pavements.
4. Estimate the traffic requirements from traffic studies.
5. Understand the various components of Railways, Airports and Docks and Harbors.

UNIT I

HIGHWAY DEVELOPMENT AND PLANNING:

Highway Development in India – Necessity for Highway Planning- Different Road Development Plans- Classification of Roads- Road Network Patterns – Highway Alignment- Factors affecting Alignment- Engineering Surveys

UNIT – II

HIGHWAY GEOMETIC DESIGN:

Importance of Geometric Design- Design controls and Criteria- Highway Cross Section Elements- Sight Distance Elements- Stopping sight Distance, Overtaking Sight Distance and intermediate Sight Distance- Design of Horizontal Alignment- Design of Super elevation and Extra widening- Design of Transition Curves-Design of Vertical alignment-Gradients- Vertical curves.

UNIT - III

PAVEMENT DESIGN: Aggregates and bitumen - desirable properties, tests - Aggregate bitumen mixes - Design by Marshall method., Pavement Types, components and their functions, design factors, flexible pavement design - IRC methods based on CBR only. Rigid pavement design - Calculation of stresses, design of joints, dowel bars, tie bars, thickness of pavement by IRC procedure.

UNIT – IV

TRAFFIC ENGINEERING:

Basic Parameters of Traffic-Volume, Speed and Density- Traffic Volume Studies- Parking Studies and Parking characteristics- Road Accidents-Causes and Preventive measures- Accident Data Recording – Condition Diagram and Collision Diagrams--Road Traffic Signs – Types and Specifications – Road markings- -Types of Road Markings- Design of Traffic Signals –Webster Method –IRC Method-Types of Intersections – Conflicts at Intersections- Types of At-Grade Intersections and Grade Separated Intersections - Channelization: Objectives –Traffic Islands and Design criteria- Rotary Intersection – Concept of Rotary and Design Criteria- Advantages and Disadvantages of Rotary Intersection.

UNIT – V

INTRODUCTION TO RAILWAY, AIRPORT AND HARBOUR ENGINEERING:

Site selection – Engineering Surveys- Permanent way components – Cross Section of Permanent Way - Points &Crossings -Turn outs- Stations and Yards.

Factors affecting selection of site for Airport – Airport layout and terminal area -Aircraft Characteristics- Geometric Design of Runway- Computation of Runway length – Correction for runway length – Orientation of Runway – Wind Rose Diagram – Runway Lighting system.

Harbours - Types of harbours, site selection- ports, classification of ports – docks - break water, types of breakwaters, quays, jetties, wharves, dolphins, fender systems, aprons, transit sheds and ware houses, dredging.

COURSE OUTCOMES (COs)

1. Estimate the requirements and design highway pavements.
2. Apprehend different components of Railways, Airports and Harbours.

TEXT BOOKS:

1. Highway Engineering – S.K.Khanna & C.E.G.Justo, Nemchand & Bros., 7th edition (2000).
2. Railway Engineering – A text book of Transportation Engineering – S.P.Chandola – S.Chand & Co. Ltd. – (2001).
3. Airport Planning and Design- S.K.Khanna and Arora,Nemchand Bros.
4. Docks and Harbour Engineering - S.P.Bindra.

REFERENCES:

1. Highway Engineering – S.P.Bindra , Dhanpat Rai & Sons. – 4th Edition (1981)
2. Traffic Engineering & Transportation Planning – Dr.L.R.Kadyali, Khanna publications – 6th Edition – 1997.
3. Railway Engineering – August – Prabha & Co., 15th Edition – 1994.
4. Docks and Harbour Engineering - R.Srinivasan.

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	2	1	-	-	-	-	-	-	-	3	1
CO2	3	3	3	2	1	-	-	-	-	-	-	-	3	1

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

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CEPET 603 CONCRETE TECHNOLOGY

(PROGRAMME ELECTIVE – III)

Instruction Hours/week : 3 (L) **Credits :3**

Sessional Marks : 40 **Semester-end Examination :60**

Course objectives:

1) Explain the functional role of ingredients of concrete and apply this knowledge to mix design philosophy
2) Develop fundamental knowledge in the fresh and hardened properties of concrete
3) Produce the testing methodology to evaluate the properties of concrete during fresh and hardened stage
4) Knowledge on the behaviour of concrete with response to stresses developed.
5) Knowledge on the special concretes And design a concrete mix which fulfils the required properties for fresh and hardened concrete

UNIT-I

Cements and Aggregates:

General, Manufacture of Portland cement by dry process, Approximate oxide composition limits of OPC, Bogue's compounds, heat liberation from a setting cement, structure of hydrated cement, water requirements for hydration.

Types Of Cements: Ordinary Portland cement, Rapid hardening cement, Sulphate resisting cement, Slag cement, Quick setting cement, Super sulphated cement, Portland pozzolana cement, air entraining cement, coloured cement, expansive cement,High alumina cement.

Aggregates: Classification, source, size and shape texture and influence of texture on strength, specific gravity of aggregates, moisture in aggregates, bulking of fine aggregate, methods used for determination of moisture content of aggregates, grading of aggregates, sieve analysis, standard grading curve, grading limits of fine aggregates as per IS ; gap grading.

UNIT-II

Water & Admixtures:

Quality of water for mixing concrete, Tolerable concentrations of some impurities in mixing water, permissible limit for solids as per IS456-2000, use of sea water for mixing concrete.

Admixtures And Construction Chemicals:

General, plasticizers and super plasticizers – Dosage, mixing procedure, equipment, effect of super plasticizes on the properties of hardened concrete, Retardors, accelerators. Air-entraining admixtures, factors affecting amount of air-entrainment, effect of air-entrainment on the properties of concrete, fly ash, effect of fly ash on fresh and hardened concrete, high volume fly ash concrete, silica fume, available forms, effect of silica fume on compressive strength of concrete, construction chemicals for curing, construction chemicals for water proofing.

UNIT-III

Fresh Concrete:

Workability, factors affecting workability, slump test, Kelly ball test, V-B test, compaction factor test, segregation, bleeding, volume batching and weigh batching, hand mixing, machine mixing, mixing time, compaction of concrete, hand compaction, compaction by vibration, internal vibrator, form work vibrator, table vibrator, platform vibrator, surface vibrator.

UNIT-IV

Hardened Concrete:

General; water-cement ratio; gel/space ratio; gain of strength with age; maturity concept of concrete; effect of maximum size of aggregate on strength.

Test On Hardened Concrete: Compression test; moulds and compacting; curing; failure of compression specimen; effect of height/diameter ration strength; flexural strength of concrete; tensile strength of concrete; non-destructive testing methods

Elasticity, Creep And Shrinkage: Elastic properties of aggregate, Factor's affecting modulus of elasticity, poisson's ratio, creep and factors affecting creep, shrinkage and factors affecting shrinkage.

Durability Of Concrete: Factors contributing to cracks in concrete, sulphate attack and methods of controlling sulphate attack, chloride attack, corrosion of steel and its control.

UNIT-V

Special Concretes And Concreting Methods:

Fibre reinforced concrete; Fibres used, factors effecting properties, aspect ratio of fibres, orientation of fibres, workability, mixing, applications, current development in FRC.

No-fines concrete: mix proportion, drying shrinkage, Thermal conductivity, applications.

Ferrocement: Casting techniques, hand plastering, semi-mechanized process, Centrifuging, guniting, applications.

Light-weight concrete: Natural and artificial light-weight aggregates, properties of common light-weight concretes. High performance concrete.

Proportioning Of Concrete Mixes

Concept of mix design, variables in proportioning ,different methods of mix design, nominal mix and design mix, Indian standard method of mix design.

TEXT BOOK

1. Concrete technology by M.S.Shetty, S.Chand & Company Pvt. Ltd., New Delhi

REFERENCE BOOKS

1. Properties of concrete by A.M.Neville, Longman Publishers
2. Concrete technology by M.L.Gambhir, Tata McGraw-Hill Publishing company Ltd., New Delhi.

Course Outcomes:

At the end of the course student is able to

1. Understand various ingredients of concrete and their role.
2. Examine knowledge on the fresh and hardened properties of concrete.
3. Design concrete mixes using various methods.
4. Perceive special concretes for accomplishing performance levels

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	2	2	-	-	-	-	-	-	-	3	3
CO2	3	3	3	2	2	-	-	-	-	-	-	-	3	3
CO3	3	3	3	2	2	-	-	-	-	-	-	-	3	3
CO4	3	3	3	2	2	-	-	-	-	-	-	-	3	3

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

CEPET 604 ADVANCED FOUNDATION ENGINEERING

PROGRAMME ELECTIVE - IV

Instruction Hours/week : 3 (L) **Credits :3**

Sessional Marks : 40 **Semester-end Examination :60**

Course Objectives:

The objective of this course is:

5) To throw light on Soil exploration methods.
6) To teach .methods of soil improvement for Shallow Foundation.
7) To impart knowledge on braced cuts and components design.
8) To explain the concept of Sheet Pile Walls.
9) To enable students to design suitable foundations in expansive soils.

UNIT I

Soil Exploration: Methods of soil exploration – Boring and Sampling methods – Penetration Tests – Pressure meter – Programme planning and preparation of soil investigation report.

UNIT II

Isolated Footings − Classification and purpose, Contact pressure under footings, proportioning of Isolated footings.

Strap & Combined Footings: Need of Strap & Combined Footings-Types of Combined Footings-Proportioning of Rectangular & Trapezoidal Combined Footings -Strap Footing

UNIT III

Braced Excavations: Braced cut - Apparent pressure diagrams for cuts in both sands and clays - Types of bracing systems - Design of various components of bracing - Bottom heave of cuts in soft clays - Piping failure of cuts in sands

UNIT IV

Sheet Pile Walls: Types of sheet pile walls – Free cantilever sheet pile – Cantilever sheet pile in Cohesionless soils – Cantilever sheet pile in cohesive soils. Anchored sheet pile wall with free earth support method – Rowe's moment reduction curves – Anchored sheet pile with fixed earth support method – Design of Anchors.

UNIT V

Foundations on Expansive Soils: Expansive soils, parameters of expansive soils, classification of expansive soils, preventive measures for expansive soil, design of foundation in swelling soils−drilled piers, belled drilled pier, undreamed piles, construction of under reamed piles,

TEXT BOOKS:

3. V.N.S.Murthy, " Advanced Foundation Engineering", CBS Publishers.
4. Gopal Ranjan & A.S.R.Rao, "Basic and Applied Soil Mechanics", New Age Publishers

REFERENCES:

4. Braja M. Das, "Principles of Geotechnical Engineering", Cengage Learning.
5. Purushtoma Raj, " Ground Improvement Techniques " .Pearson Publications

6. Bowles, J.E., Foundation Analysis and Design (1988) – 4th Edition, McGraw-Hill Publishing Company, Newyork.

Course Outcomes (Cos) Upon the successful completion of this course:

The student will be able to:

1. Choose appropriate soil exploration method
2. Suggest suitable ground improvement methods.
3. Design bracing systems and Sheet pile walls
4. Design suitable foundations on expansive soils

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	3	-	-	-	-	-	-	-	3	3
CO2	3	3	3	3	3	-	-	-	-	-	-	-	3	3
CO3	3	3	3	3	3	-	-	-	-	-	-	-	3	3
CO4	3	3	3	3	3	-	-	-	-	-	-	-	3	3

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

CEOET 605 OPEN ELECTIVE - I

Instruction Hours/week : 3 (L) **Credits :3**

Sessional Marks : 40 **Semester-end Examination :60**

ONE COURSE FROM AMONG THE OPEN ELECTIVE COURSES TO BE STUDIED.

CEOET 606 OPEN ELECTIVE - I

Instruction Hours/week : 3 (L) **Credits :3**

Sessional Marks : 40 **Semester-end Examination :60**

ONE COURSE FROM AMONG THE OPEN ELECTIVE COURSES TO BE STUDIED.

CEPCP 606 ENVIRONMENTAL ENGINEERING LAB

Instruction Hours/week : 2(P) **Credits :1**

Sessional Marks : 40 **Semester-end Examination :60**

Course Educational Objective (CEOs)

1 To be aware of water quality analysis
2 To be aware of wastewater analysis
3 To be aware of how to interpret the results

Water Analysis

1. (a) Determination of Color.
   (b) Determination of Taste and Temperature
2. Determination of (a) Total Suspended and Dissolved Solids.
   (b) Organic and Inorganic Solids.
3. (a) Determination of pH and Electrical Conductivity.
   (b) Determination of Turbidity.
4. (a) Determination of Acidity.
   (b) Determination of Alkalinity.
5. Determination of Hardness and sulphates
6. Determination of Chlorides.
7. (a) Determination of Dissolved Oxygen.
   (b) Determination of Residual Chlorine.
8. (a) Determination of Optimum Coagulant Dose.
   (b) Demonstration of determination of MPN Index of water.

Waste water Analysis

9. Determination of Settle able Solids.
10. Determination of Nitrates
11. Determination of Phosphates
12. Determination of BOD of sewage water
13. Determination of COD of sewage water

Course Outcomes (COs)

After completion of the course the student will :

1. Able to Perform common environmental experiments relating to water quality and wastewater characteristics
2. Able to Statistically analyze and interpret laboratory results
3. Demonstrate good written and oral communication skills

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	2	-	3	3	-	1	-	-	-	3	1
CO2	3	3	2	2	-	3	3	-	1	-	-	-	3	1
CO3	3	3	2	2	-	3	3	-	1	-	-	-	3	1

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

CEPCP 607 TRANSPORTATION ENGINEERING LAB

Instruction Hours/week : 2 (P) **Credits :1**

Sessional Marks : 40 **Semester-end Examination :60**

Course Educational Objective (CEOs)

1. To enable to study different highway construction materials.
2. To facilitate students to perform different tests on highway construction materials.

CYCLE – I

1. Specific Gravity and Water Absorption Test.
2. Aggregate Impact Test
3. Elongation Index Test
4. Flakiness Index Test
5. Angularity Test
6. Los Angles Abrasion Test
7. Aggregate Crushing Test
8. Stripping Value of Aggregate

CYCLE – II

1. Flash & Fire Point Test
2. Softening point Test
3. Specific Gravity of Bitumen
4. Penetration Test on Bitumen
5. Ductility Test

Course Outcomes (COs)

After completion of the course the student will have:

1. Able to perform various tests for selection of various materials used in highway construction

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	-	1	-	-	-	-	3	-	-	3	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

MGHST 608 MANAGEMENT (ORGANIZATIONAL BEHAVOIUR)

Instruction Hours/Week : 2(L)+1(T) Credits : 3
Sessional Marks : 40 End Semester Examinations Marks : 60

Course Educational Objective (CEOs)

1. Understand the Nature of Management;

2. Identify and Describe the Functions of Management;

3. Understand the Social Responsibilities of Business; and

4. Appreciate the Interests of Various Stakeholders in the Business.

Unit – I

Role of Management – Concept – Significance – Functions – principles of Management - Patterns of Management: Scientific – Behavioral – Systems – Contingency. Decision Making & Controlling – Process – Techniques. Planning – Process – Problems — Making It Effective. Controlling - System of Controlling – Controlling Techniques – Making Controlling Effective. Nature of Management - Social Responsibili Ties of Business -

Manager and Environment Levels in Management - Managerial Skills - Planning - Steps in Planning Process - Scope and Limitations - Short Range and Long Range Planning - Flexibility in Planning ¬Characteristics of asound Plan - Management by Objectives (MBO) - Policies and Strategies - Scope and Formulation - Decision Making - Techniques and Processes.

Unit-II

Organising - Organisation Structure and Design – Authority and Responsibility Relationships - Delegation of Authority and Decentralisation - Interdepartmental Coordination - Emerging Trends in Corporate Structure, Strategy and Culture - Impact of Technology on Organisation-al design - Mechanistic vs Adoptive Structures - Formal and Informal Organisation.

Organizational Behavior – Introduction to OB – Organizing Process – Departmentation Types – Making Organizing Effective - Understanding Individual Behavior – Perception – Learning – Personality Types – Johor window- Transactional Analysis.

Unit – III

Perception and Learning - Personality and Individual Differences - Motivation and Job Performance - Values, Attitudes and Beliefs – Stress Management - Communication Types-Process - Barriers – Making Communication Effective.

Unit – IV

Group Dynamics - Leadership - Styles - Approaches - Power and Politics - Organisational Structure - Organisational Climate and Culture - Organisational Change and Development.
Group Dynamics & Motivation – Benefits of Groups – Types of Groups – Group Formation and Development, Motivation – Concept of Motivation - Motivational Theories of Maslow, Herzberg, David Mc Clelland, and Porter and Lawler.

Unit – V

Leadership and Organizational Culture and Climate: Leadership – Traits Theory – Managerial Grid – Transactional Vs Transformational Leadership – Qualities of good Leader, Change Management – Conflict Management Comparative Management Styles and approaches – Japanese Management Practices Organisational Creativity and Innovation -Management of Innovation - Entrepreneurial Management – Benchmarking - Best Management Practices across the world - Select cases of Domestic & International Corporations - Management of Diversity.

Reference Books:

1. Organizational Behavior, Stephen P. Robbins, Pearson Education.
2. Organizational Behaviour, S.S.Khanka, S.Chand
3. Organizational Behavior , Mishra .M.N ,Vikas
4. Management and Organizational behavior, Pierce Gardner, Cengage.
5. Principles of Management, Koonz, Weihrich and Aryasri, Tata McGraw Hill.
6. Management and Organizational Behaviour, Subbarao P, Himalaya Publishing House.
7. Organizational Behaviour, Sarma, Jaico Publications.
8. Principles of Management, Murugesan, Laxmi Publications.

Course Outcomes (COs)

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

1. Understand the Nature of Management;
2. Identify and Describe the Functions of Management;
3. Understand the Social Responsibilities of Business; and
4. Appreciate the Interests of Various Stakeholders in the Business.

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	2	2	-	1	2	-	2	-	-	-	-	-	-
CO2	1	2	2	-	1	2	-	2	-	-	-	-	-	-
CO3	1	2	2	-	1	2	-	2	-	-	-	-	-	-
CO4	1	2	2	-	1	2	-	2	-	-	-	-	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

SRI VENKATESWARA UNIVERSITY COLLEGE OF ENGINEERING
DEPARTMENT OF CIVIL ENGINEERING
SCHEME OF INSTRUCTION – CHOICE BASED CREDIT SYSTEM
B.Tech. Civil Engineering (R-18), Effective from batch admitted in 2018-19

SEVENTH SEMESTER

Course Code	Course Title	Scheme of Instruction(Hours/Week)				No. of Credits	Scheme of Evaluation		
		Lecture	Tutorial	Practical	Total		Sessional Marks	Semester End Examination Marks	Total
CEPCT 701	Estimation & Costing	3	-	-	3	3	40	60	100
CEPET 702	Programme Elective – V (Watershed Management)	3	-	-	3	3	40	60	100
CEHST 703	Professional Practice, Law & Ethics	3	1	-	4	4	40	60	100
CEPCI 704	Industry Internship	-	-	6	6	3	100	-	100
CEPCX 705	Project Work - Phase I	-	-	6	6	3	100	-	100
Total		**9**	**1**	**12**	**22**	**16**	**320**	**180**	**500**

4 year B.Tech. Degree Course
Civil Engineering
Choice Based Credit System
(With effect from the academic year 2018-19)

VII Semester – Syllabus

CEPCT701 ESTIMATION & COSTING

Instruction Hours/week : 3(L) **Credits : 3**

Sessional Marks : 40 **Semester-end Examination :60**

Course Educational Objective (CEOs)

1) To impart basic knowledge on different types of estimation
2) To enrich with specifications and tender procedures.
3) To give insights on various types of contract agreements.
4) To inculcate data preparation for abstract estimation
5) To teach procedure for valuation of buildings.

UNIT - I

General items of work in building - Standard units - Principles of working out quantities for detailed and abstract estimates, approximate and detailed estimates of simple buildings.

Methods of estimation-advantages-types of estimates-detailed estimates of residential buildings-single storied and multi-storeyed buildings-earthwork-foundations-Super structure-Fittings including sanitary and electrical fittings-paintings.

UNIT - II

Specifications-Detailed and general specifications-construction specifications-sources- types of specifications-Tender notices-types-corrigendum notice-tender procedures Drafting model tenders.

UNIT - III

Data-Rate analysis-abstract estimate-report to accompany estimate-measurement book –bills-types. Rate analysis for the following items:

Earth work for foundations and basement of buildings
Mortars: Cement mortar (1:4)
Foundation Concrete: Cement Concrete (1:5:10)
Reinforced Concrete: Lintels, slabs, beams, columns (1:2:4)
Brick work: Constructed with first class bricks with L.M. (1:1.5) and C.M (1:6
Stone masonry: C.R.S - Ist sort constructed with C.M. (1:2) and R.R.Masonry C.M (1:2).
Flooring: (a) with Cuddapah or Shahbad slabs. (b) Ellis pattern flooring with 10 cm.
Concrete and 20mm cement concrete surface - Mosaic flooring.
Roofing: (a) R.C.C roof 10cm thick, 2 courses of flat tiles to top.

(b) A.C. corrugated sheet roofing on steel purlins.

Plastering: C.M. (1:4) 12 mm thick.

Pointing : a) with C.M (1:3) flush pointing to R.R.masonry.
b) C.M (1:3) for brick masonry.

Painting: a) White washing and colour washing of walls: 2 coats.
b) Painting iron and wood work: 3 coats.

Wood work: Panelled doors and windows.

UNIT - IV

Contracts, Types of contracts, contract document, conditions of contracts, contract procedure, termination of contracts, specification important condition of contract, arbitration and legal requirements.

UNIT - V

Valuation:

Introduction, technique of valuation, elements of valuation and factors affecting valuation, methods of valuation of land property and building property, rate of interest for sale, purchase, mortgage, Fixation of rent.

Valuation – Gross income, Net income, Outgoings, Scrap value, Salvage value, Obsolescence, Annuity, Capitalized value, Year's purchase, Sinking fund, Depreciation; Determination of depreciation.

TEXT BOOKS:

1. Text book of estimating and costing - B.N.Dutta.
2. Estimating Costing by G.S.Biride.
3. Valuation by Rangwala.
4. A.P.D.S.S. Standard data book Vol.II.
5. A.P.Department standard specifications.
6. Professional practice - by Roshan Namvati

Course Outcomes (COs)

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

1. Understand basics on methods and types of estimation.
2. Formulate specifications and tender documents.
3. Prepare contract agreements
4. Determine rate analysis of different items.
5. Valuation of buildings.

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	2	1	-	-	-	-	-	-	-	3	1
CO2	3	3	3	2	1	-	-	-	-	-	-	-	3	1
CO3	3	3	3	2	1	-	-	-	-	-	-	-	3	1
CO4	3	3	3	2	1	-	-	-	-	-	-	-	3	1
CO5	3	3	3	2	1	-	-	-	-	-	-	-	3	1

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

CEPET 702 WATERSHED MANAGEMENT
(PROGRAMME ELECTIVE – V)

Instruction Hours/Week : 3(L) Credits : 3
Sessional Marks : 40 End Semester Examinations Marks : 60

Course Educational Objectives (CEOs)

1. To learn about Rainfall-Runoff analysis and estimation and design of storm
2. To known about effective watershed management methods and optimization
3. To understand about different soil conservation equation and principles
4. To understand about water harvesting techniques and artificial recharge techniques

UNIT I
WATERSHED HYDROLOGY:
Basic characteristics – Rainfall analysis – Runoff analysis – Estimation of design storm and the design flood – Flood routing – Flood mitigation through planning of reservoir capacities and operation of reservoirs.

UNIT II
WATERSHED MANAGEMENT:
Classification of effective watershed management methods – Factors affecting integrated watershed management – Watershed inventory – Problem definition and scope – Consultation process – Developing workable management options – Evaluation of constraints and criteria – Simple assessment methods.

UNIT III
SOIL CONSERVATION:
Soil loss estimation – Universal soil loss equation – Soil erosion principles – Gully erosion – Design of permanent gully control structures – Stream bank erosion – Erosivity and erodability – Engineering measures and control practices.

UNIT IV

WATER HARVESTING TECHNIQUES: Farm ponds – percolation tanks – Drop spillway chutes and flumes – Pipe spillways.

UNIT V

ARTIFICIAL GROUNDWATER RECHARGE TECHNIQUES:

Artificial recharge – Considerations – Methods – Induced infiltration – Water spreading – Flooding – Artificial recharge basins and ditches – Natural channel modifications – Recharge pits and shafts – Recharge wells.

REFERENCE BOOKS:

1. Prof. R. Suresh, "Watershed Hydrology " Standard Publishers.
2. Isobel W. Heathiote. "Integrated Watershed Management – Principles and Practices".
3. Schwab, G.O. & others, "Soil and water Conservation Engineering".
4. Prof. R. Suresh, "Soil and water Conservation Engineering".(Standard Publishers).
5. Wayne A. Pettyjohu, "Introduction to Artificial Ground Water Recharge" Scientific Publishers, Jodhpur.
6. Murthy J. V. S., "Watershed Management".

Course Outcomes (COs)

1. Able to explain about Rainfall-Runoff analysis and estimation and design of storm
2. Able to do the effective watershed management methods and optimization
3. Able to understand about different soil conservation equations and principles
4. Able to apply the knowledge of water harvesting techniques and artificial recharge techniques

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	1	-	-	-	-	-	-	-	3	1
CO2	3	3	3	3	1	-	-	-	-	-	-	-	3	1
CO3	3	3	3	3	1	-	-	-	-	-	-	-	3	1
CO4	3	3	3	3	1	-	-	-	-	-	-	-	3	1

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

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CEHST 703 PROFESSIONAL PRACTICE, LAW & ETHICS

Instruction Hours/Week : 3 (L)+1(T) Credits : 4
Sessional Marks : 40 End Semester Examinations Marks : 60

Course Educational Objective (CEOs)

1. To make the students understand the types of roles they are expected to play in the society as practitioners of the civil engineering profession

2. To develop some ideas of the legal and practical aspects of their profession

UNIT I

Professional Practice – 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)

UNIT II

Professional Ethics – 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.

UNIT III

General Principles of Contracts Management: *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;

UNIT IV

Engagement of Labour and Labour & other construction-related Laws: 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

UNIT V

Law relating to Intellectual property: 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:

B.S. Patil, Legal Aspects of Building and Engineering Contracts, 1974.
The National Building Code, BIS, 2017
RERA Act, 2017
Meena Rao (2006), Fundamental concepts in Law of Contract, 3rd Edn. Professional Offset
Neelima Chandiramani (2000), The Law of Contract: An Outline, 2nd Edn. Avinash Publications Mumbai
Avtarsingh (2002), Law of Contract, Eastern Book Co.
Dutt (1994), Indian Contract Act, Eastern Law House
Anson W.R. (1979), Law of Contract, Oxford University Press
Kwatra G.K. (2005), The Arbitration & Conciliation of Law in India with case law on UNCITRAL Model Law on Arbitration, Indian Council of Arbitration

Course Outcomes:

At the end of the course, student is able to:

1. To develop some ideas of the legal and practical aspects of their profession
2. To understand the types of roles they are expected to play in the society as practitioners of the civil engineering profession.

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	2	-	3	2	-	-	-	-	-
CO2	-	-	-	-	-	2	-	3	2	-	-	-	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

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CEPCI 704 INDUSTRY INTERNSHIP

Instruction Hours/Week : 6 (P) Credits : 3
Sessional Marks : 100 End Semester Examinations Marks : -

Course Educational Objectives (CEOs)

- To enable the students to have practical work knowledge in convenient group on a project involving theoretical and experimental studies related to Civil Engineering
- Exposing the students to practical know-how in the chosen area of Civil Engineering
- Preparations of Detailed Project Report.

Course Outcomes (Cos)

1. To enable the students to acquire practical knowledge.
2. Capable of carrying out Civil Engineering works in the field.

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	3	2	-	-	-	3	3	3	-	3	3
CO2	3	3	2	3	2	-	-	-	3	3	3	-	3	3

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

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CEPCX 705 PROJECT WORK – PHASE I

Instruction Hours/Week : 6 (P) Credits :3
Sessional Marks : 100 End Semester Examinations Marks : -

Course Educational Objectives (CEOs)

- To enable the students to work in convenient group on a project involving theoretical and experimental studies related to Civil Engineering
- Carrying out project work in the chosen area of Civil Engineering
- Preparations of Detailed Project Report

Course Outcomes (Cos)

1. To enable the students to work in convenient group
2. Capable of doing a project involving theoretical and experimental studies.
3. Modern trend and technology in civil engineering

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	3	2	-	-	-	3	3	3	-	3	3
CO2	3	3	2	3	2	-	-	-	3	3	3	-	3	3
CO3	3	3	2	3	2	-	-	-	3	3	3	-	3	3

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

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SRI VENKATESWARA UNIVERSITY COLLEGE OF ENGINEERING
DEPARTMENT OF CIVIL ENGINEERING
SCHEME OF INSTRUCTION – CHOICE BASED CREDIT SYSTEM
B.Tech. Civil Engineering (R-18), Effective from batch admitted in 2018-19

EIGTH SEMESTER

Course Code	Course Title	Scheme of Instruction(Hours/Week)				No. of Credits	Scheme of Evaluation		
		Lecture	Tutorial	Practical	Total		Sessional Marks	Semester End Examination Marks	Total
CEPET 801	Programme Elective – VI (Water resources system analysis)	3	-	-	3	3	40	60	100
CEOET 802	Open Elective – III Online	-	-	-	-	3	MOOCs		100
CEOET 803	Open Elective – IV Online	-	-	-	-	3	MOOCs		100
CEPCX 804	Project Work - Phase II	-	-	18	18	9	40	60	100
Total		**3**	**-**	**18**	**21**	**18**	**80**	**120**	**200 +200**

Open Elective - MOOCS : 2 coutses - Study in III to VIII Semesters, Performance reflected in VIII Semester

4 year B.Tech. Degree Course
Civil Engineering
Choice Based Credit System
(With effect from the academic year 2018-19)

VIII Semester – Syllabus

CEPET 801 WATER RESOURCES SYSTEM ANALYSIS
(PROGRAMME ELECTIVE – VI)

Instruction Hours/Week : 3(L) Credits : 3
Sessional Marks : 40 End Semester Examinations Marks : 60

Course Objectives:

1) Teach Concepts of systems techniques in water resources engineering
2) Teach Linear Optimization concepts
3) Demonstrate the Development system approach to reservoir operation
4) Planning water allocation to different crops
5) Expertise on River operation policies

UNIT 1

Concept of System and System Analysis - Definition and Types of Systems - Basic Principles of Systems Approach and Analysis. Systems Techniques in Water Resources.

UNIT II

Introduction to Optimization - Linear and Dynamic Programming - Simulation - Combined Simulation and Optimization. Economics of Water Resources Projects - Cost Benefit Analysis - Cost Allocation among various projects in a Multi-purpose Project.

UNIT III

Systems Approach to Reservoir - Deterministic Flows - Reservoir Sizing and Reservoir Operations. Basic Concepts of Random Flows Reliability.

UNIT IV

Application of Linear Programming to Water Resources Systems - Irrigation Water Allocation for Single and Multiple Crops. Reservoir Operation for Irrigation and Hydropower Generation.

UNIT V

Applications of Dynamic Programming to Water Resources Systems - Optimal Crop Water Application - Steady State Reservoir Operating Policy for Irrigation. Real Time Reservoir Operation for Irrigation.

TEXT BOOKS:

1. Loucks, D. P. and Eelco Van Beek, Water Resources systems planning and management: An Introduction to methods, models and applications. (2005), UNESCO.
2. Vedula, S. and Mujumdar, P. P., Water resources Systems: Modeling techniques and analysis, (2005), Tata McGraw Hill, New Delhi.

REFERENCES:

1. Mays, L.W. and Tung, Y.K., Hydro systems Engineering and Management, (1992). McGraw Hill, USA.
2. Simonovic, S.P., Managing water resources: Methods and tools for a systems approach, (2009). UNESCO Publishing, France.
3. R. K. Sharma & T. K. Sharma, A Textbook Of Irrigation Engineering, S. Chand and Company Limited, New Delhi

Course Outcomes:

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

1. Apply basic principles of system approach.
2. Judging Economics of water resources of multipurpose projects.
3. Apply optimization principles to single and multi crop applications.
4. Designing reservoir operation leading to optimum crop water application.

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	1	-	-	-	-	-	-	-	3	1
CO2	3	3	3	3	1	-	-	-	-	-	-	-	3	1
CO3	3	3	3	3	1	-	-	-	-	-	-	-	3	1
CO4	3	3	3	3	1	-	-	-	-	-	-	-	3	1

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

CEOET 802 OPEN ELECTIVE - III

Instruction Hours/Week : 3(L) Credits : 3
Sessional Marks : 40 End Semester Examinations Marks : 60

ONE COURSE FROM AMONG THE OPEN ELECTIVE COURSES TO BE STUDIED.

CEOET 803 OPEN ELECTIVE - III

Instruction Hours/Week : 3(L) Credits : 3
Sessional Marks : 40 End Semester Examinations Marks : 60

ONE COURSE FROM AMONG THE OPEN ELECTIVE COURSES TO BE STUDIED.

CEPCX 804 PROJECT WORK- PHASE II

Instruction Hours/Week : 18 (P) Credits : 9
Sessional Marks : 40 End Semester Examinations Marks : 60

Course Educational Objectives (CEOs)

- To enable the students to work in convenient group on a project involving theoretical and experimental studies related to Civil Engineering
- Carrying out project work in the chosen area of Civil Engineering
- Preparations of Detailed Project Report

Course Outcomes (Cos)

1. To enable the students to work in convenient group
2. Capable of doing a project involving theoretical and experimental studies.
3. Modern trend and technology in civil engineering

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	3	2	-	-	-	3	3	3	-	3	3
CO2	3	3	2	3	2	-	-	-	3	3	3	-	3	3
CO3	3	3	2	3	2	-	-	-	3	3	3	-	3	3

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

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SRI VENKATESWARA UNIVERSITY COLLEGE OF ENGINEERING
DEPARTMENT OF CIVIL ENGINEERING
SCHEME OF INSTRUCTION – CHOICE BASED CREDIT SYSTEM
B.Tech. Civil Engineering (R-18), Effective from batch admitted in 2018-19

PROFESSIONAL ELECTIVE COURSES

S.NO.	SUBJECT
1	ADVANCED STRUCTURAL ANALYSIS
2	ADVANCED ENVIRONMENTAL ENGINEERING
3	ADVANCED FOUNDATION ENGINEERING
4	REMOTE SENSING AND GIS
5	PRESTRESSED CONCRETE
6	ENVIRONMENT IMPACT ASSESSMENT
7	TRAFFIC ENGINEERING AND MANAGEMENT
8	CONCRETE TECHNOLOGY
9	STRUCTURAL DYNAMICS
10	BUILDING CONSTRUCTION PRACTICE
11	REPAIR AND REHABILITATION OF STRUCTURES
12	FINITE ELEMENT METHODS
13	PREFABRICATED STRUCTURES
14	TALL STRUCTURES
15	ENTREPRENEURSHIP AND INCUBATION
16	SUBSURFACE INVESTIGATION AND INSTRUMENTATION
17	GROUND IMPROVEMENT TECHNIQUES
18	EXPANSIVE SOILS
19	GEOTECHNIQUES FOR DESIGN OF UNDERGROUND STRUCTURES
20	WATER RESOURCES SYSTEM ANALYSIS
21	URBAN HYDROLOGY
22	WATERSHED MANAGEMENT
23	HYDROPOWER DEVELOPMENT
24	SUSTAINABLE WATER RESOURCES DEVELOPMENT
25	RIVER BASIN MANAGEMENT
26	COASTAL ENGINEERING
27	ENVIRONMENT POLLUTION AND CONTROL
28	INDUSTRIAL WASTE & WASTE WATER ENGINEERING
29	AIR POLLUTION ENGINEERING
30	AIRPORT PLANNING AND DESIGN
31	DOCKS AND HARBOUR ENGINEERING
32	TRAFFIC ANALYSIS

1. ADVANCED STRUCTURAL ANALYSIS

COURSE OBJECTIVES:

1) To impart knowledge on energy theorems.
2) To enable the student analyze indeterminate trusses
3) To teach procedure for analysis of fixed and continuous beams.
4) To enable the student undergo analysis procedure using slope deflection method.
5) To illustrate analysis procedure using moment distribution method.
6) To demonstrate various methods of analysis of structural members such as indeterminate beams, frames, etc. which enables the student to solve for forces in various complex structural systems.

UNIT – I

STATICALLY INDETERMINATE BEAMS:

Analysis of propped cantilevers - Shear force and bending moment diagrams - Deflections.

Analysis of fixed beams with udl, point loads, uniformly varying load, couple - shear force and bending moment diagrams - Deflections - Effect of sinking of support.

UNIT – II

STATICALLY INDETERMINATE FRAMES:

(i) Slope deflection method, continuous beams with degree of indeterminacy not exceeding three, effect of sinking.

(ii) Moment distribution method, continuous beams and frames with sway limited to single bay single storey, effect of sinking.

UNIT – III

KANI'S METHOD:

Continuous beams, settlement of supports, single bay portal frames with side sway. Analysis of multi-storeyed frames using substitute frame method, portal and cantilever methods.

UNIT – IV

INTRODUCTION TO MATRIX METHODS:

Flexibility and stiffness Coefficients – Force and Displacement methods – Application to beams.

UNIT – V

PLASTIC ANALYSIS:

Theory of plastic bending – Idealized stress – strain diagram – Shape factor – Moment- curvature relationships – Plastic hinges – Collapse Mechanisms – Analysis of fixed and continuous beams and portal frames – Statical method and mechanism metod of analysis

TEXT BOOKS:

1. R.S.Khurmi, Theory of Structures, Dhanpat Rai Publishing Company (p) Ltd, 2009
2. L. S. Negi, Basic Structural Analysis, Tata McGraw Hill

REFERENCES

1. Timoshenko & Young, Theory of Structures, Tata McGraw Hill
2. Junarkar S. B., Structural Mechanics Vol I & II, Charotar Publishers
3. S. K. Roy & S. Chakraborthy, Fundamentals of Structural Analysis.

Course Outcomes:

At the end of the course student will be able to

- Apply energy theorems for analysis of indeterminate structures
- Analyze indeterminate structures with yielding of supports
- Analyze beams using slope deflection and moment distribution methods

Analyze portal frames using slope deflection and moment distribution methods

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2. ADVANCED ENVIRONMENTAL ENGINEERING

Course Educational Objective (CEOs)

1.To study the characteristics of sludge and different methods of tertiary treatment of wastewater.

2. To understand the different methods of disposal of wastewater.

3. To study the different types of air pollutants, its effects and controlling measures.

4.To know the causes, effects and controlling measures of noise pollution

5.To study the concept of Municipal Solid Waste Management.

UNIT I

SLUDGE MANAGEMENT IN WASTEWATER TREAMENT: Quantity and characteristics; and types of sludges; sludge conditioning and dewatering; handling, treatment, sludge utilization and disposal.

TERITIARY TREATMENT FOR WASTEWATER: Tertiary treatment ; Removal of nitrogen, phosphorus, heavy metals, suspended solids and pathogenic bacteria.

UNIT II

EFFLUENT DISPOSAL Standards for disposal ; disposal into surface water bodies ; Self purification, zones of pollution. Dissolved oxygen sag curve; Streeter - Phelps equation; Marine disposal ; On land disposal and treatment systems - overflow, flooding and irrigation.

ONSITE DISPOSAL SYSTEM: Septic tank and effluent disposal system.

UNIT III

AIR POLLUTION :

Types of pollutants; their sources and impacts; air pollution meteorology; air pollution control; air quality standards and limits.

UNIT - IV

NOISE POLLUTION Impacts of noise; permissible limits of noise pollution; Measurement of noise and control of noise pollution.

UNIT-V

MUNICIPAL SOLIDWASTES: Characteristics; generation; collection and transportation of solid waste; Engineered systems for solid waste management (reuse/recycle ,energy recovery, treatment and disposal).

Course Outcomes (COs)

1. Able to characterize sludge and explain about different types of tertiary treatment of wastewater.

2. Able to explain about different methods of disposal of wastewater.

3. Able to explain about different types of air pollutants, its effects and controlling measures.

4. Able to apply measures for noise pollution

5. Able to manage Municipal Solid Waste.

TEXT BOOKS :

1. Sewage Disposal and Air Pollution Engineering, by S.K.Garg.
2. Environmental Engineering by H.S.Peavy et al.
3. Water Supply and Sewerage, by E.W.Steel and Mc.Ghee.
4. Air pollution and its Control by C.S.Rao

REFERENCE BOOKS :

1. Wastewater Engineering, Treatment, Disposal, and Reuse by Metcalf and Eddy.

2. Techobanglous, G.Theisen, H. and Ehasin, R.(1996). Solid waste engineering principlesandManagement Issues – McGraw Hill, Tokyo.

3. ADVANCED FOUNDATION ENGINEERING

Course Objectives:

The objective of this course is:

10) To throw light on Soil exploration methods.
11) To teach .methods of soil improvement for Shallow Foundation.
12) To impart knowledge on braced cuts and components design.
13) To explain the concept of Sheet Pile Walls.
14) To enable students to design suitable foundations in expansive soils.

UNIT I

Soil Exploration: Methods of soil exploration – Boring and Sampling methods – Penetration Tests – Pressure meter – Programme planning and preparation of soil investigation report.

UNIT II

Isolated Footings − Classification and purpose, Contact pressure under footings, proportioning of Isolated footings.

Strap & Combined Footings: Need of Strap & Combined Footings-Types of Combined Footings-Proportioning of Rectangular & Trapezoidal Combined Footings -Strap Footing

UNIT III

Braced Excavations: Braced cut - Apparent pressure diagrams for cuts in both sands and clays - Types of bracing systems - Design of various components of bracing - Bottom heave of cuts in soft clays - Piping failure of cuts in sands

UNIT IV

Sheet Pile Walls: Types of sheet pile walls – Free cantilever sheet pile – Cantilever sheet pile in Cohesionless soils – Cantilever sheet pile in cohesive soils. Anchored sheet pile wall with free earth support method – Rowe's moment reduction curves – Anchored sheet pile with fixed earth support method – Design of Anchors.

UNIT V

Foundations on Expansive Soils: Expansive soils, parameters of expansive soils, classification of expansive soils, preventive measures for expansive soil, design of foundation in swelling soils−drilled piers, belled drilled pier, undreamed piles, construction of under reamed piles,

TEXT BOOKS:

5. V.N.S.Murthy, " Advanced Foundation Engineering", CBS Publishers.
6. Gopal Ranjan & A.S.R.Rao, "Basic and Applied Soil Mechanics", New Age Publishers

REFERENCES:

7. Braja M. Das, “Principles of Geotechnical Engineering”, Cengage Learning.
8. Purushtoma Raj, “ Ground Improvement Techniques “ .Pearson Publications
9. Bowles, J.E., Foundation Analysis and Design (1988) – 4th Edition, McGraw-Hill Publishing Company, Newyork.

Course Outcomes (Cos) Upon the successful completion of this course:

The student will be able to:

- Choose appropriate soil exploration method
- Suggest suitable ground improvement methods.
- Design bracing systems and Sheet pile walls
- Design suitable foundations on expansive soils

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4. REMOTE SENSING AND GIS

Course Objectives:

6) Introduce the basic principles of Remote Sensing and GIS techniques.
7) teach various types of satellite sensors and platforms
8) impart concepts of visual and digital image analyses
9) teach concepts of principles of spatial analysis
10) teach application of RS and GIS to Civil engineering

UNIT – I

Introduction to photogrammetry:

Principles & types of aerial photograph, geometry of vertical aerial photograph, Scale & Height measurement on single vertical aerial photograph, Height measurement based on relief displacement, Fundamentals of stereoscopy, fiducially points, parallax measurement using fiducially line.

UNIT – II

Remote sensing:

Basic concepts and foundation of remote sensing – elements involved in remote sensing, electromagnetic spectrum, remote sensing terminology and units. Energy resources, energy interactions with earth surface features and atmosphere, resolution, sensors and satellite visual interpretation techniques, basic elements, converging evidence, interpretation for terrain evaluation, spectral properties of water bodies, introduction to digital data analysis.

UNIT – III

Geographic information system:

Introduction, GIS definition and terminology, GIS categories, components of GIS, fundamental operations of GIS, A theoretical framework for GIS. Data collection and input overview, data input and output. Keyboard entry and coordinate geometry procedure, manual digitizing and scanning, Raster GIS, Vector GIS – File management, Spatial data – Layer based GIS, Feature based GIS mapping.

UNIT – IV

GIS spatial analysis:

Computational Analysis Methods (CAM), Visual Analysis Methods (VAM), Data storage-vector data storage, attribute data storage, overview of the data manipulation and analysis. Integrated analysis of the spatial and attribute data.

UNIT – V

Water resources applications:

Land use/Land cover in water resources, Surface water mapping and inventory –Watershed management for sustainable development and Watershed characteristics – Reservoir sedimentation, Fluvial Geomorphology – Ground Water Targeting, Identification of sites for artificial Recharge structures – Inland water quality survey and management, water depth estimation and bathymetry.

TEXT BOOKS:

3. B. Bhatta, Remote Sensing and GIS by Oxford University Press, New Delhi.
4. Satheesh Gopi, Advanced surveying: Total station GIS and remote sensing, Pearson publication.

REFERENCES:

5. George Joseph, Fundamentals of remote sensing, Universities press, Hyderabad.
6. C. P. Lo Albert, K.W. Yonng, Concepts & Techniques of GIS, Prentice Hall (India) Publications.
7. M. Anji Reddy Remote sensing and GIS, B. S. Publications, New Delhi.
8. L. R. A. Narayana, Remote Sensing and its applications, University Press 1999.

Course outcomes

At the end of the course the student will be able to

- Comparing with ground, air and satellite based sensor platforms.
- Interpret the aerial photographs and satellite imageries.
- Create and input spatial data for GIS application.
- Apply RS and GIS concepts in water resources engineering.
- Applications of various satellite data.

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5. PRESTRESSED CONCRETE

Course Objectives

1) Analyze PSC beams with straight, concentric, eccentric, bent and parabolic tendons and design beams of rectangular and I sections for flexure.
2) Design shear reinforcements, structural elements for shear, torsion and anchorage as per the provisions of BIS.
3) Interpret the transmission mechanism of pre-stressing force by bond and compute deflection of beams under loads

UNIT -I

Introduction:

Principles of pre-stressing – pre stressing systems - pre-tensioning and post tensioning- Advantages and limitations of Pre stressed concrete- need for high strength materials. Methods of pre-stressing: Pre-tensioning (Hoyer system) and Post-tensioning methods (Freyssinet system and Gifford- Udall System).

UNIT -II

Losses of pre-stress:

Loss of pre-stress in pre-tensioned and post-tensioned members due to elastic shortening, shrinkage and creep of concrete, relaxation of stress in steel, anchorage slip and frictional losses.

UNIT -III

Flexure and shear:

Analysis of beams for flexure and shear - beams pre-stressed with straight, concentric, eccentric, bent and parabolic tendons- Kern line - Cable profile - design of PSC beams (rectangular and I sections) using IS 1343. Analysis and design of rectangular and I beams for shear. Introduction to Transmission length and End block (no Design and Analytical problems).

UNIT – IV

Deflections:

Control of deflections- Factors influencing deflections - short term deflections of uncracked beams- prediction of long time deflections.

UNIT – V

Composite beams:

Different Types- Propped and Unpropped- stress distribution- Differential shrinkage- Analysis of composite beams.

TEXT BOOKS:

1. N. Krishna Raju, Prestressed Concrete, Tata Mc.Graw Hill Publications.
2. Praveen Nagrajan, Prestressed Concrete Design, Pearson publications, 2013.

REFERENCES:

1. T.Y. Lin & Ned H. Burns, Design of Prestressed Concrete Structures, John Wiley & Sons.
2. Ramamrutham, Prestressed Concrete, Dhanpatrai Publications.
3. Rajagopalan, Prestressed concrete, Narosa Publishing House.
4. BIS code on prestressed concrete, IS 1343 to be permitted into the examination Hall.

Course Outcomes

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

- Understand the concepts of pre-stressing and methods of pre stressing.
- Compute losses of pre-stress in pre-stressed concrete members.
- Design PSC beams under flexure and shear.
- Estimate the short and long term deflections of PSC beams

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6. ENVIRONMENT IMPACT ASSESSMENT

Course Objectives:

1) To impart knowledge on different concepts of Environmental Impact Assessment
2) To teach procedures of risk assessment
3) To teach the EIA methodologies and the criterion for selection of EIA methods
4) To teach the procedures for environmental clearances and audit

UNIT –I:

Concepts and methodologies of EIA

Impacts of Development on Environment – Rio Principles of Sustainable Development- Environmental Impact Assessment (EIA) – Objectives – Historical development Initial environmental Examination, Elements of EIA, - factors affecting E-I-A Impact evaluation and analysis, preparation of Environmental Base map, Classification of environmental parameters- Criteria for the selection of EIA Methodology, E I A methods, Ad-hoc methods, matrix methods,

Network method Environmental Media Quality Index method, overlay methods and cost/benefit Analysis.

UNIT – II

Impact of Developmental Activities and Land Use

Baseline monitoring, Prediction and Assessment of Impact on land, water, air, noise and energy, flora and fauna - Matrices – Networks – Checklist Methods - Mathematical models for Impact prediction – Analysis of alternatives. Introduction and Methodology for the assessment of soil and ground water, Delineation of study area, Identification of actives. Procurement of relevant soil quality, Impact prediction, Assessment of Impact significance, Identification and Incorporation of mitigation measures. E I A in surface water, Air and Biological environment: Methodology for the assessment of Impacts on surface water environment, Air pollution sources, Generalized approach for assessment of Air pollution Impact.

UNIT –III

Assessment of Impact on Vegetation, Wildlife and Risk Assessment

Introduction - Assessment of Impact of development Activities on Vegetation and wildlife, environmental Impact of Deforestation – Causes and effects of deforestation - Risk assessment and treatment of uncertainty-key stages in performing an Environmental Risk Assessment-advantages of Environmental Risk Assessment. Plan for mitigation of adverse impact on water, air and land, water, energy, flora and fauna – Environmental Monitoring Plan – EIA Report Preparation – Review of EIA Reports – Environmental Clearance. Baseline monitoring of Socio economic environment – Identification of Project Affected Personal – Rehabilitation and Resettlement Plan- Economic valuation of Environmental impacts – Cost benefit Analysis.

UNIT – IV

Environmental audit:

Introduction - Environmental Audit & Environmental legislation objectives of Environmental Audit, Types of environmental Audit, Audit protocol, stages of Environmental Audit, onsite activities, evaluation of Audit data and preparation of Audit report.

UNIT – V

Environmental Acts and Notifications:

The Environmental protection Act, The water preservation Act, The Air (Prevention & Control of pollution Act), Wild life Act - Provisions in the EIA notification, procedure for environmental clearance, procedure for conducting environmental impact assessment report- evaluation of EIA report. Environmental legislation objectives, evaluation of Audit data and preparation of Audit report. Post Audit activities, Concept of ISO and ISO 14000. EIA Notification and Legal Framework–Stakeholders and their Role in EIA– Selection & Registration Criteria for EIA Consultants – Screening and Scoping in EIA – Drafting of Terms of Reference.

TEXT BOOKS:

1. Canter Larry W., Environmental Impact Assessment, McGraw-Hill education Edi (1996)
2. Y. Anjaneyulu,Environmental Impact Assessment Methodologies, B. S. Publication, Hyderabad.

REFERENCES:

1. Peavy, H. S, Rowe, D. R, Tchobanoglous, Environmental Engineering, G.Mc-Graw Hill International Editions, New York 1985
2. J. Glynn and Gary W. Hein Ke, Environmental Science and Engineering, Prentice Hall Publishers
3. Suresh K. Dhaneja, Environmental Science and Engineering, S.K., Katania & Sons Publication, New Delhi.
4. H. S. Bhatia Environmental Pollution and Control, Galgotia Publication (P) Ltd, Delhi

Course Outcomes

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

- Prepare EMP, EIS, and EIA report**.**
- Identify the risks and impacts of a project**.**
- Choose an appropriate EIA methodology**.**
- Evaluation the EIA report**.**
- Estimate the cost benefit ratio of a project**.**
  Know the role of stakeholder and public hearing in the preparation of EIA**.**

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7. TRAFFIC ENGINEERING AND MANAGEMENT

Course Objectives:

1) Introduce the basic principles of Traffic engineering.
2) To give an overview of Traffic engineering, various surveys to be conducted, ,
3) impart concepts of traffic regulation
4) teach concepts of traffic safety and management.

UNIT – I

TRAFFIC CHARACTERISTICS:

Road Characteristics – Classification – Functions and standards – Road user characteristics – PIEV theory – Vehicle – Performance characteristics – Fundamentals of Traffic Flow – Urban Traffic problems in India

UNIT – II

TRAFFIC SURVEYS:

Traffic Surveys – Speed, journey time and delay surveys – Vehicle Volume Survey – Methods and interpretation – Origin Destination Survey – Methods and presentation – Parking Survey – Methods, interpretation and presentation – Statistical applications in traffic studies and traffic forecasting – level of service – Concept, application and significance.

UNIT – III

TRAFFIC ENGINEERING REGULATION AND CONTROL:

Capacity of Rotary intersection and Design – Capacity of signalized intersections – Traffic signals, warrants, type – Design and coordination – Intersection channelisation – Grade separation - Traffic signs and road markings.

UNIT – IV

TRAFFIC SAFETY AND ENVIRONMENT:

Road accidents – Causes, effect, prevention, and cost – street lighting – Traffic and environment hazards – Air and Noise Pollution, causes, health effects and abatement measures.

UNIT – V

TRAFFIC MANAGEMENT:

Area Traffic Management System – One way street system, exclusive traffic lanes, tidal flow operation, staggering of work hours and road pricing – Non road pricing options _ Parking charges, Public transport, Subsidies, Vehicle License fees, Road Building, Permit system, Physical Traffic Management Transport System Management (TSM) and Transport Demand Management (TDM)-- Introduction to Intelligent Transportation Systems (ITS)- ITS Applications in Traffic Management.

TEXT BOOKS:

1. Kadiyali. L.R. Traffic Engineering and Transport Planning, Khanna Publishers, Delhi,2008.
2. Khanna .K and Justo C.E.G. and Veeraragavan, A Highway Engineering, Nem Chand Bros., Roorkee, Revised 10th Edition, 2014.
3. Salter. R.I and Hounsell N.B, Highway Traffic Analysis and design, Macmillan Press Ltd.1996.
4. Roger P.Roess, William R.Mcshane and Elena S.Prassas, Traffic Engineering-Second Edition, Prentice Hall Publishers,, Upper Saddle River, New Jersey 1998

REFERENCES:

1. Partha Chakroborty and Animesh Das Principles of Transportation Engineering, PHI Learning Pvt. Ltd., 2005
2. Indian Roads Congress (IRC) Specifications: Guidelines and special publications on Traffic Planning and Management.
3. C. Jotin Khisty, Kent Lall, Transportation Engineering: An Introduction, Prentice Hall, 1998
4. Hobbs. F.D. Traffic Planning and Engineering,University of Brimingham, Peragamon Press Ltd, 1994.
5. Taylor MAP and Young W, Traffic Analysis – New Technology and New Solutions, Hargreen Publishing Company , 1998.
6. Jason C.Yu Transportation Engineering, Introduction to Planning, Design and Operations, Elseevier, 1992.

Course outcomes

At the end of the course the student will have gained knowledge on

- characteristics of traffic elements
- various types of traffic surveys and their significance
- Apply traffic regulation and safety measures.
- Applications of traffic management measures.

8. CONCRETE TECHNOLOGY

Course objectives:

6) Explain the functional role of ingredients of concrete and apply this knowledge to mix design philosophy
7) Develop fundamental knowledge in the fresh and hardened properties of concrete
8) Produce the testing methodology to evaluate the properties of concrete during fresh and hardened stage
9) Knowledge on the behaviour of concrete with response to stresses developed.
10) Knowledge on the special concretes And design a concrete mix which fulfils the required properties for fresh and hardened concrete

UNIT-I

Cements and Aggregates:

General, Manufacture of Portland cement by dry process, Approximate oxide composition limits of OPC, Bogue's compounds, heat liberation from a setting cement, structure of hydrated cement, water requirements for hydration.

Types Of Cements: Ordinary Portland cement, Rapid hardening cement, Sulphate resisting cement, Slag cement, Quick setting cement, Super sulphated cement, Portland pozzolana cement, air entraining cement, coloured cement, expansive cement,High alumina cement.

Aggregates: Classification, source, size and shape texture and influence of texture on strength, specific gravity of aggregates, moisture in aggregates, bulking of fine aggregate, methods used for determination of moisture content of aggregates, grading of aggregates, sieve analysis, standard grading curve, grading limits of fine aggregates as per IS ; gap grading.

UNIT-II

Water & Admixtures:

Quality of water for mixing concrete, Tolerable concentrations of some impurities in mixing water, permissible limit for solids as per IS456-2000, use of sea water for mixing concrete.

Admixtures And Construction Chemicals:

General, plasticizers and super plasticizers – Dosage, mixing procedure, equipment, effect of super plasticizes on the properties of hardened concrete, Retardors, accelerators. Air-entraining admixtures, factors affecting amount of air-entrainment, effect of air-entrainment on the properties of concrete, fly ash, effect of fly ash on fresh and hardened concrete, high volume fly ash concrete, silica fume, available forms, effect of silica fume on compressive strength of concrete, construction chemicals for curing, construction chemicals for water proofing.

UNIT-III

Fresh Concrete:

Workability, factors affecting workability, slump test, Kelly ball test, V-B test, compaction factor test, segregation, bleeding, volume batching and weigh batching, hand mixing, machine mixing, mixing time, compaction of concrete, hand compaction, compaction by vibration, internal vibrator, form work vibrator, table vibrator, platform vibrator, surface vibrator.

UNIT-IV

Hardened Concrete:

General; water-cement ratio; gel/space ratio; gain of strength with age; maturity concept of concrete; effect of maximum size of aggregate on strength.

Test On Hardened Concrete: Compression test; moulds and compacting; curing; failure of compression specimen; effect of height/diameter ration strength; flexural strength of concrete; tensile strength of concrete; non-destructive testing methods

Elasticity, Creep And Shrinkage: Elastic properties of aggregate, Factor's affecting modulus of elasticity, poisson's ratio, creep and factors affecting creep, shrinkage and factors affecting shrinkage.

Durability Of Concrete: Factors contributing to cracks in concrete, sulphate attack and methods of controlling sulphate attack, chloride attack, corrosion of steel and its control.

UNIT-V

Special Concretes And Concreting Methods:

Fibre reinforced concrete; Fibres used, factors effecting properties, aspect ratio of fibres, orientation of fibres, workability, mixing, applications, current development in FRC.

No-fines concrete: mix proportion, drying shrinkage, Thermal conductivity, applications.

Ferrocement: Casting techniques, hand plastering, semi-mechanized process, Centrifuging, guniting, applications.

Light-weight concrete: Natural and artificial light-weight aggregates, properties of common light-weight concretes. High performance concrete.

Proportioning Of Concrete Mixes

Concept of mix design, variables in proportioning ,different methods of mix design, nominal mix and design mix, Indian standard method of mix design.

TEXT BOOK

2. Concrete technology by M.S.Shetty, S.Chand & Company Pvt. Ltd., New Delhi

REFERENCE BOOKS

3. Properties of concrete by A.M.Neville, Longman Publishers
4. Concrete technology by M.L.Gambhir, Tata McGraw-Hill Publishing company Ltd., New Delhi.

Course Outcomes:

At the end of the course student is able to

- Understand various ingredients of concrete and their role.
- Examine knowledge on the fresh and hardened properties of concrete.
- Design concrete mixes using various methods.
- Perceive special concretes for accomplishing performance levels.

9. STRUCTURAL DYNAMICS

Course Educational Objective (CEOs)

- Able to find the response of the structures subjected to dynamic loads.
- Abilities to analysis and design of Earthquake resisting Structures.

UNIT I

THEORY OF VIBRATIONS:

Introduction- Elements of a vibratory system – Degrees of Freedom –Free and Forced – Undamped and Damped –Vibrations

SINGLE DEGREE OF FREEDOM SYSTEM:

Formulation and solution of the equation of motion –Response of Free vibration system – Critical damping – Logarithmic decrement –Response to harmonic excitation –Dynamic magnification factor

UNIT II

MULTI DEGREE OF FREEDOM SYSTEM

Formulation of equations of motion of MDOF- Evaluation of structural property matrices – undamped free vibrations –Evaluation of natural frequencies and mode shapes.

UNIT III

ENGINEERING SEISMOLOGY

Earthquake phenomenon – cause of earthquakes – Seismic waves – Terms associated with earthquakes – Magnitude and intensity of an earthquake –Scales – Energy released – Earthquake measuring instrument –Seismic zones of India.

UNIT IV

INTRODUCTION TO EARTHQUAKE RESISTANT DESIGN

Concept of earthquake resistant design – Regular and irregular configurations – Design Earthquake loads – Basic load combinations – Lateral load resisting systems – Determination of design lateral forces – Equivalent lateral force procedure – Lateral distribution of base shear – provisions of IS: 1893(part I)- 2002

UNIT V

DUCTILE DETAILING

Ductility – definition –Types –Choice of construction materials –Unconfined concrete – Confined concrete – Factors affecting Ductility – Ductile detailing provisions as per IS:13920-1993 – Ductile detailing of beams, columns and beam-column joint.

TEXT BOOKS

1. Mario Paz - Structural Dynamics Theory and Computations, CBS Publishers
2. Anil Kumar Chopra, Dynamics of Structures, Prentice Hall India Pvt. Ltd.
3. O Pankaj Agarwal & Manish Shrikhonde - Earthquake Resistant Design of Structures, Prentice Hall India Pvt. Ltd.

REFERENCES:

1. R.W.Clough & J.penzien, Dynamics of Structures, Mc. Graw Hill Publications,
2. J.J.Humar, Dynamics of Structures, Prentice Hall India Pvt. Ltd.
3. Jaikrishna & Chandra Sekar Elements of Earthquake Engineering, South Asian Publications N.D.

Course Outcomes (COs)

After completion of the course the student will be:

1. Able to find the response of the structures subjected to dynamic loads.
2. Abilities to analysis and design of Earthquake resisting Structures

10. BUILDING CONSTRUCTION PRACTICE

Course Objectives:

1) Impart in investigation of soil condition, Deciding and design of suitable foundation for different structures
2) Examining the good materials to be used for the construction work
3) Teach to supervision of different types of masonry
4) Illustrate the methodology in selection of materials, design and supervision of suitable type of floor and roof.
5) Teach the methodology of constructing advances structures

UNIT -I:

Structural Components:

Foundations – classification of Foundations – consideration in selection of foundation types – Masonry – Brick and block walls – Cavity walls – Damp–proof courses and membranes – Mortars – Arches and openings – Windows – Glass and glazing –Doors – Stairs – Types and Applications – Cladding to external walls – Flat roofs – Dormer windows – Formwork & Scaffolding – Precast concrete frames – Portal frames – Types – components – Framed structures – Components – Construction Procedure – Panel walls – National Standards.

UNIT -II:

Internal Construction and Finishes

Internal elements – Internal walls – Construction joints – Internal walls, fire protection –separating walls – Partitions – Plasters and plastering – Domestic floors and finishes – Sound insulation – Timber, concrete and metal stairs–Internal doors – Door – Fire resisting doors – Plasterboard ceilings – Suspended ceilings –Paints and painting – Components of Paints – Types of Paint – Considerations in Selecting Paints – Cement Paints – Oil Paints –Emulsion - Paints – Whitewash and Colour wash – Application of Paints –Distempers – Varnishes – Safety –Joinery production – Composite boarding – National Standards.

UNIT- III:

Construction of high rise buildings:

Construction methods and techniques using different materials, Minerals, Admixtures in-situ concrete, Precast Concrete & Structural Steel, finished concrete, tunnel form, fire Fighting, Safety & Hazards, Job Safety Analysis. Innovative methods of construction – Slip form technology, Jump form technology, Aluform & Tunnel Form Technology, Dry wall technology, Plastering Machines.

UNIT -IV:

Concepts and components of bridges:

Bridges, Steel Bridges, Arch Bridges, Cantilever Bridges Segmental construction & Box Girders. Construction of special type of bridges such as cable stayed bridge, suspension and Pre-stressed bridge, construction of foundation and Super structure. Construction of Metro Railway & Monorail - Underground and over ground structures, different methods and techniques of construction. Problems and solutions – during maintenance and upkeep of structures. Fire, Ventilation, Dewatering and power supply, Subsidence, Vibration etc., Concept of Magrail.

UNIT -V:

Construction of Power Generating Structures

Atomic Power stations, Thermal power stations- Generation Power Plants, Windmills, Transmission towers, Chimneys (single and multi-flue), cooling towers - Natural draft cooling towers (NDCT) & Induced draft cooling tower (IDCT), Ash handling system, Containment Structure, Electro Static Precipitator (ESP), Case study of Kaiga atomic power station, Madras atomic power station. Or Any other Case Study and Safety Hazards

TEXT BOOKS:

1. Roy Chudley and Roger Greeno, Construction Technology, Prentice Hall, 2005.
2. Peurifoy, Construction Planning, Equipment and methods, Tata McGraw Hill Publication

REFERENCES

1. Mahesh Varma, Construction Equipment Planning and Applications –
2. Kumar Niraj Jha, - Formwork for Concrete Structures, Mc Graw Hill Publication
3. Sushil Kumar "Building Materials and construction", 20th edition, reprint 2015, Standard Publishers
4. B. C. Punmia, Ashok Kumar Jain, Arun Kumar Jain, Building Construction, Laxmi Publications (P) Ltd., New Delhi.

Course outcomes:

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

- Classify suitable materials for buildings and adopt suitable construction techniques.
- Adopt suitable internal finishes and maintenance work to enhance durability of buildings.
- Design of high rise buildings.
- Design of power generation structures.

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11. REPAIR AND REHABILITATION OF STRUCTURES

Course Objective

1) To describe causes of distress in concrete structures and plan repair strategies.
2) To explain issues on serviceability and durability of concrete.
3) To throw light on various repair materials and their characteristics.
4) To demonstrate repair techniques and protection measures.
5) To illustrate suitable retrofitting schemes.

UNIT I

Maintenance and repair strategies:

Maintenance, Repair and Rehabilitation, Facets of Maintenance, importance of Maintenance, Various aspects of Inspection, Assessment procedure for evaluating a damaged structure, causes of deterioration. Non-destructive Testing Techniques.

UNIT II

Serviceability and Durability of Concrete

Quality assurance for concrete – Strength, Durability and Thermal properties, of concrete Cracks, different types, causes – Effects due to climate, temperature, Sustained elevated temperature, Corrosion - Effects of cover thickness and cracking.

UNIT III

Materials for Repair

Special concretes and mortar, concrete chemicals, special elements for accelerated strength gain, Expansive cement, polymer concrete, sulphur infiltrated concrete, Ferro cement, Fiber reinforced concrete.

UNIT IV

Techniques for Repair And Protection Methods

Strengthening of Structural elements, Repair of structures distressed due to corrosion, fire, leakage, earthquake. Rust eliminators and polymers coating for rebars during repair, foamed concrete, mortar and drypack, vacuum concrete, Gunite and Shotcrete, Epoxy injection, Mortar repair for cracks, shoring and underpinning. Methods of corrosion protection, corrosion inhibitors, corrosion resistant steels, coatings and cathodic protection. Engineered demolition techniques for dilapidated structures – case studies

UNIT V

Retrofitting of Structures

Repairs to overcome low member strength. Deflection, Cracking, Chemical disruption, weathering corrosion, wear, fire, leakage and marine exposure.

TEXT BOOKS:

1. Dension Campbell, Allen and Harold Roper, Concrete Structures, Materials,
2. Maintenance and Repair, Longman Scientific and Technical, U.K.

REFERENCES:

1. R T. Allen and S.C. Edwards, Repair of concrete Structures, Blakie and sons, UK.
2. Santhakumar, A. R. Training Course notes on damage assessment and Repair in Structures
3. Raikar, R. N. Learning from failures – deficiencies in Design, construction and service – R&D centre (SDCPL), Raikar Bhavan, Bombay.
4. N. Palaniappan, Estate Management, Anna Institute of Management, Madras.
5. F. K. Garas, J. L. Clarke, G.S.T. Armer, Structural Assessment, Butterworths, UK.
6. A.R. Santhakumar, Concrete chemicals – Theory and applications, Indian society for construction Engineering and Technology, Madras.

Course outcomes:

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

- Understand evaluation procedure and plan for repair.

- Design suitable rehabilitation scheme for serviceability and durability.
- Choose suitable repair material for different magnitudes of distress.
- Apply efficient repair and retrofitting schemes.

12. FINITE ELEMENT METHODS

Course Objectives

1) Introduce fundamentals of elasticity and steps involved in FEM.
2) To describe element stiffness matrix formulation for 1D and 2D cases.
3) To impart isoparametric formulation concepts.
4) To teach formulation of stiffness matrix for axi-symmetric problems.
5) To demonstrate numerical solution techniques used in FEM.

UNIT-I

Introduction:

Concepts of FEM – Steps involved – merits & demerits – energy principles – Discretization – Rayleigh –Ritz method of functional approximation. Principles of Elasticity: Equilibrium equations – strain displacement relationships in matrix form – Constitutive relationships for plane stress, plane strain and Axi-symmetric bodies of revolution with axi-symmetric loading.

UNIT-II

One Dimensional & Two Dimensional Elements: Stiffness matrix for bar element – shape functions – 1D and 2D elements – types of elements for plane stress and plane strain analysis – Displacement models – generalized coordinates – shape functions – convergent and compatibility requirements – Geometric invariance – Natural coordinate system – area and volume coordinates

UNIT-III

Element stiffness matrix:

Generation of element stiffness and nodal load matrices for 3-node triangular element and four noded rectangular elements.

UNIT-IV

Isoparametric Formulation:

isoparametric elements for 2D analysis –formulation of CST element, 4 – noded and 8-noded iso-parametric quadrilateral elements –Lagrangian and Serendipity elements. AXI-SYMMETRIC ANALYSIS: Basic principles-Formulation of 4-noded isoparametric axi-symmetric element

UNIT-V

Solution techniques:

Numerical Integration, Static condensation, assembly of elements and solution techniques for static loads.

TEXT BOOK:

1. Tirupathi R Chandraputla, Finite Element Analysis for Engineering and Technology, Universities Press Pvt Ltd, Hyderabad. 2003.
2. C. S. Krishna Murthy Finite Element analysis-Theory & Programming, Tata Mc.Graw Hill Publishers.

REFERENCES:

1. H.V. Lakshminaryana, Finite element analysis and procedures in engineering, 3rd edition, Universities press, Hyderabad.
2. Robert D. Cook, Michael E Plesha, Concepts and applications of Finite Element Analysis, John Wiley & sons Publications
3. S. Rajasekharan, Finite element analysis in Engineering Design, S. Chand Publications, New Delhi.

Course Outcomes

Upon completion of the course, the student will be able to

- Develop finite element formulations of 1D & 2D problems.
- Solve complex problems using FEM.
- Formulate isoparametric elements with different irregular boundaries.
- Implement solution techniques for higher order problems in practice.
- Apply concepts for carrying out research.
- Apply concepts for modeling of non-linear materials and geometry.

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13. PREFABRICATED STRUCTURES

OBJECTIVE:

To understand the principles of prefabrication, behaviour and design of prefabricated components and structural connections.

UNIT I INTRODUCTION

Need for prefabrication - Principles - Materials - Modular co-ordination – Standardization – Systems Production – Transportation – Erection Disuniting of Structures.

UNIT II PREFABRICATED COMPONENTS

Behaviour of structural components – Large panel constructions – Construction of roof, floor slabs and Wall panels – Columns – Shear walls.

UNIT III DESIGN PRINCIPLES

Design of Structural components – Beam, Column and Corbel - Stress limitations – Handling without cracking, handling with controlled cracking – Design for stripping forces

UNIT IV JOINTS IN STRUCTURAL MEMBERS

Joints for different structural connections – Beam to Column, Beam to Beam, Column to Column, Column to Foundation, Connections between wall panels, Connections between floor panels - Dimensions and detailing – Design of expansion joints- Jointing Materials.

UNIT V DESIGN FOR EARTHQUAKES AND CYCLONES

Progressive collapse – Codal provisions – Equivalent design loads for considering abnormal effects such as earthquakes, cyclones etc. - Importance of avoidance of progressive collapse.

OUTCOMES:

The student shall be able to design the prefabricated elements and also have the knowledge of the construction methods in using these elements.

TEXTBOOKS:

Koncz T., Manual of Precast Concrete Construction, Vols. I, II and III, Bauverlag, GMBH, 1971.
Structural Design Manual, Precast Concrete Connection Details, Society for the Studies in the Use of Precast Concrete, Netherland Betor Verlag, 1978.
Haas. A.M., Precast Concrete Design and Applications,CRC Press,1983.
PCI Manual for Structural Design of Architectural Precast Concrete, PCI Publication number MNL-121-77,1977.
M.Levitt, “Precast Concrete Material, Manufacture, Properties and Usage” Applied Science Publishers Ltd., 1982.
A.S.G. Bruggeling and G.F.Huyghe, Prefabrication with concrete, Netherlands: A.A. Balkema Publishers, 1991.
Lasslo Mokk, “Prefabricated Concrete for Industrial and Public Structures Budapest

REFERENCES:

Building Materials and Components, CBRI, India, 1990.

Glover C.W, Structural Precast Concrete, Asia Publishing House, 1965

PCI Design Hand Book, 6th Edition, 2004.

14. TALL STRUCTURES

OBJECTIVE:

To understand the design philosophy of tall buildings, the loading and behaviour of structural systems. To enlighten the students on modern techniques available for the analysis of tall buildings.

UNIT I DESIGN CRITERIA AND MATERIALS

Design Philosophy - Modern concepts – Materials used - High Performance Concrete, Fibre Reinforced Concrete, Light weight concrete, Self Compacting Concrete, Glass, High strength steel.

UNIT II LOADING

Gravity Loading – Dead load, Live load – Live load reduction techniques, Impact load, Construction load, Sequential loading. Wind Loading – Static and Dynamic Approach, Analytical method, Wind Tunnel Experimental methods. Earthquake Loading – Equivalent lateral Load analysis, Response Spectrum Method, Combination of Loads.

UNIT III BEHAVIOUR OF STRUCTURAL SYSTEMS

Factors affecting the growth, height and structural form, Behaviour of Braced frames, Rigid Frames, in filled frames, Shear walls, Coupled Shear walls, Wall – Frames, Tubular, Outrigger braced, Hybrid systems.

UNIT IV ANALYSIS

Modeling for approximate analysis, Accurate analysis and reduction techniques, Analysis of structures as an integral unit, Analysis for member forces, drift and twist. Computerized 3D analysis, Evaluation of frequency of vibration of structures – Buckling analysis of tall structures

UNIT V DESIGN PARAMETERS

Design for differential movement, Creep and Shrinkage effects, Temperature Effects and Fire Resistance.

OUTCOMES:

The student should have an understanding on the behaviour of tall buildings subjected to lateral building. The students should have knowledge about the principles of designing

safer tall structures as per the existing codes.

TEXTBOOKS:

Bryan Stafford Smith and Alex Coull, Tall Building Structures, Analysis and Design, John Wiley and Sons, Inc., 1991.
Taranath B.S, Structural Analysis and Design of Tall Buildings, McGraw Hill, 1988

REFERENCES:

Coull, A. and Smith Staford.B, Tall Buildings , Pergamon Press, London, 1997.
LinT.Y. and Burry D.Stotes, Structural Concepts and Systems for Architects and Engineers, John Wiley, 1994.
Lynn S.Beedle, Advances in Tall Buildings, CBS Publishers and Distributors, Delhi, 1996.

15. ENTREPRENEURSHIP AND INCUBATION

Course Objectives:

- To emphasize the importance of entrepreneurship as an alternative to employment and impart entrepreneurial skills among the students.
- To enable students understand the opportunities available to start a business.
- To familiarize the process of business incubation/incubators..
- To impart knowledge about various sources of support (Financial and Non-financial) available to start an enterprise.

Unit I: Fundamentals of Entrepreneurship

Fundamentals of Entrepreneurship – Evolution and Theories of Entrepreneurship – Characteristics of Entrepreneurs –Myths of Entrepreneurship – Kakinada Experiment -Elements of leadership – Role of Entrepreneurs in Indian economy – Social and Ethical Perspectives of Entrepreneurship - Corporate entrepreneurship – Social Entrepreneur
Caselets: Business cases of TATA, Infosys, Bajaj Auto.

Unit II: Ideation and Evaluation of Value Proposition of Business Ideas
Opportunity identification – Ideations process - Sources of business ideas – Role of creativity – Sources of Innovation - Business Idea Evaluation - Product/ Service design – Design Thinking - Customer Value Proposition (CVP) – Business models
Caselets: Business cases of OYO, Paytm and Flipkart/ Smartmart
Activity: Idea generation in groups and CVP

Unit III:Business Organizations and Venture Establishment
Forms of business organisations/ownership – Techno-economic feasibility assessment – Financial feasibility – Market feasibility – Preparation of Business plan – Business canvas & Lean canvas – Challenges & Pitfalls in selecting new venture
Activity: Preparation of business plan (draft)

Unit IV: Business Incubation
Fundamentals of business incubation - Business incubator models & business environment - Services of incubators - Pre requisites of incubator - Famous incubator centers - Legal challenges for Entrepreneurship - Intellectual Property Protection
Activity: Business plan presentation.

Unit V:Mentoring & Financing
Principles and practices of business incubation - Types of incubators and benefits – Corporate & Educational institutional incubators - Expectation from the incubators - Sources of finance – Bootstrapping –Debt Financing – Equity Financing - Government Support – Financial & Non-financial– Venture Capitalists & Angel Investors
Activity: Business plan final version

Course outcomes :

- choose entrepreneurship as an alternative career.
- distinguish between corporate and social entrepreneurs.
- examine and build customer value proposition.
- analyze feasibility of business ideas.
- summarize the importance of IPR.
- compare various supports schemes provided by GOI.
- develop suitable business plan.

Learning Outcomes:

At the end of this unit students will be able to:

- organize VC/Seed capital /Angel financiers and understand as to how they operate (L3)
- select a suitable incubator and build a feasible business model. (L3)

Text Book:

1. T.V Rao, Donald F. Kuratko, Entrepreneurship,A South-Asian Perspective, Cengage Learning, 2012
2. Datsy Davies,Indian Startups, Amazon Asia-Pacific Holdings Private Limited, 2016

Reference Books:

1. P.N.Rath, Sarjue Pandita, Entrepreneurship: Startup India & Stand up India, Lexicon Publishing House, 2018
2. Madhurima Lall, Shikha Sahai, Entrepreneurship, Excel Books (P) Ltd. 2008
3. Rajeev Roy, Entrepreneurship, Oxford Higher Education. 2011
4. H. Nandan, Fundamentals of Entrepreneurship, PHI Learning (P) Ltd, 2013

Web Resources:

1. https://strategyzer.com/canvas/business-model-canvas
2. https://canvanizer.com/new/lean-canvas
3. https://www.interaction-design.org/literature/article/5-stages-in-the-design-thinking-process
4. http://www.yourarticlelibrary.com/essay/entrepreneurship-essay/developing-achievement-motivation-among-entrepreneurs/40676
5. https://msme.gov.in/
6. http://niryatbandhu.iift.ac.in/2.0/main.asp
7. https://t-hub.co/
8. http://www.apinnovationsociety.com/index.php

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16. SUBSURFACE INVESTIGATION AND INSTRUMENTATION

Course Objectives:

1) To discuss the importance of site investigation,
2) To narrate various exploration techniques
3) To describe soil sampling techniques.
4) To train with insitu sub soil exploration methods
5) To demonstrate instrumentation for sub soil exploration.

UNIT -I

Exploration and geophysical methods:

Exploration program planning -methods of exploration- preliminary and detailed design- spacing and depth of bores, data presentation. Geophysical exploration and interpretation, seismic and electrical methods, cross bore hole, single bore hole – up hole -down hole methods.

UNIT -II

Exploration Techniques

Methods of boring and drilling, non-displacement and displacement methods, drilling in difficult subsoil conditions, limitations of various drilling techniques, stabilization of boreholes, bore logs.

UNIT -III

Soil Sampling

Sampling Techniques – quality of samples – factors influencing sample quality - disturbed and undisturbed soil sampling advanced sampling techniques, offshore sampling, shallow penetration samplers, preservation and handling of samples.

UNIT -IV

Field Testing In Soil Exploration

Field tests, penetration tests, Field vane shear, Insitu shear and bore hole shear test, pressure meter test, dilatometer test - plate load test–monotonic and cyclic; field permeability tests – block vibration test. Procedure, limitations, correction and data interpretation.

UNIT -V

Instrumentation

Instrumentation in soil engineering, strain gauges, resistance and inductance type, load cells, earth pressure cells, settlement and heave gauges, pore pressure measurements - slope indicators, sensing units, case studies.

TEXT BOOKS:

1. Alam Singh and Chowdhary G. R., "Soil Engineering in Theory and Practice, Volume-2, Geotechnical testing and instrumentation, CBS Publishers and Distributors, New Delhi, 2006.

2. Dunnicliff J., and Green, G. E., "Geotechnical Instrumentation for Monitoring Field Performance", John Wiley, 1993.

REFERENCES:

1. Bowles J. E., "Foundation Analysis and Design", 5th Edition, The McGraw-Hill companies, Inc., New York, 1995.
2. Hanna T. H., "Field Instrumentation in Geotechnical Engineering", Trans Tech., 1985.
3. Hunt R. E., "Geotechnical Engineering Investigation Manual, McGraw Hill, 1984.

Outcomes:

At the end of the course student is able to

- Plan and execute sub soil investigation programme.
- Handle both laboratory and insitu testing techniques.
- Carry out collection, handling and preservation of samples.
  Handle instruments during sub soil exploration process.

17. GROUND IMPROVEMENT TECHNIQUES

Course Objectives:

The objective of this course is:

1) To understand need for different ground improvement methods adopted for improving the properties of remoulded and in-situ soils by adopting different techniques
2) To make the student understand how the reinforced earth technology and soil nailing can obviate the problems posed by the conventional retaining walls.
3) To know geotextiles and geosynthetics can to improve the performance of soils.
4) To learn the concepts, purpose and effects of grouting.

UNIT I PROBLEMATIC SOIL AND IMPROVEMENT TECHNIQUES

Role of ground improvement in foundation engineering – Methods of ground improvement – Geotechnical problems in alluvial, lateritic and black cotton soils – Selection of suitable ground improvement techniques based on soil conditions.

UNIT II DEWATERING

Dewatering Techniques - Well points – Vacuum and electroosmotic methods – Seepage analysis for two dimensional flow for fully and partially penetrated slots in homogeneous deposits – Design for simple cases.

UNIT III INSITU TREATMENT OF COHESIONLESS AND COHESIVE SOILS

Insitu densification of cohesionless soils - Dynamic compaction - Vibroflotation, Sand compaction piles and deep compaction. Consolidation of cohesionless soils - Preloading with sand drains, and fabric drains, Stabilization of soft clay ground using stone columns and Lime piles- Installation techniques – Simple design - Relative merits of above methods and their limitations.

UNIT IV EARTH REINFORCEMENT

Concept of reinforcement – Types of reinforcement material – Reinforced earth wall – Mechanism

– Simple design - Applications of reinforced earth; Functions of Geotextiles in filtration, drainage, separation, road works and containment applications.

UNIT V GROUTING TECHNIQUES

Types of grouts – Grouting equipments and machinery – Injection methods – Grout monitoring – Stabilization with cement, lime and chemicals – Stabilization of expansive soil.

OUTCOME:

Based on the knowledge gained student will be in a position to identify and evaluate the deficiencies if any in the deposits of the given project area and capable of providing alternative methods to improve its quality so that the structures built on it will be stable and serve the intended purpose.

TEXTBOOKS:

Purushothama Raj. P, “Ground Improvement Techniques”, Firewall Media, 2005.

Koerner, R.M. “Construction and Geotechnical Methods in Foundation Engineering”, McGraw Hill, 1994.

REFERENCES:

Moseley, M.P., “Ground Improvement Blockie Academic and Professional”, Chapman and Hall, Glasgow, 2004.

Jones C.J.F.P. “Earth Reinforcement and Soil Structure”, Thomas Telford Publising, 1996.

Koerner, R.M., “Designing with Geosynthetics” (Fourth Edition), Prentice Hall, Jersey, 2012.

IS Code 9759 : 1981 (Reaffirmed 1998) “Guidelines for Dewatering During Construction”, Bureau of Indian Standards, New Delhi.

IS Code 15284 (Part 1): 2003 “Design and Construction for Ground Improvement – Guidelines” (Stone Column), Bureau of Indian Standards, New Delhi

Course Outcomes:

By the end of the course, the student should be able to

- Perceive the knowledge of various methods of ground improvement and their suitability to different field situations.
- Design a reinforced earth embankment and check its stability.
- Understand the functions of Geosynthetics and their applications in Civil Engineering practice.
- Understand the concepts and applications of grouting.

18. EXPANSIVE SOILS

Course Objectives:

1) Familiarize Students with Nature of Soils and Soil Structure
2) Equip student with concepts of Swelling and methods of determination
3) Understand foundation practices in expansive soils
4) Familiarize different materials and techniques for stabilization
5) Understand procedure to improve shear strength of expansive soils

UNIT - I

Clay Mineralogy: Nature of Soils-Clay mineral structure- Cation exchange – Soil water- Soil Structure-Soil water interaction

UNIT- II

Swelling Characteristics- Swelling- Factors effecting Swelling- Swelling Potential- Swell Pressure- Methods of Determination-Factors effecting Swelling potential and swell pressure- Heave- Factors effecting Heave- Methods of determination of heave.

UNIT-III

Foundation Practices in Expansive Clays: Sand Cushion-Belled Piers-CNS layer technique-Under reamed Pile foundation- Construction Techniques- Design Specifications- Load-carrying capacity in compressive and uplift of single and multi under reamed piles in clays and sands-Granular pile Anchors.

UNIT-IV

Lime Soil columns and Lime Slurry pressure injection- Stabilization with admixtures-Propounding- Vertical and Horizontal Moisture barriers.

UNIT: V

Shear strength of expansive soils- Katti's concept of bilinear envelope- Stress –state variables in partly saturated soils- Frelend's strength parameters- Determination of matrix suction by axis translation technique- field suction measurement.

TEXT BOOKS:

1. F. C. Chen, Foundation on Expansive Soils, Elsevier Scientific Publishing Company, Newyork
2. J. D. Nelson and D. I. Miller, Expansive soils- Problems and Practice in Foundation and pavement Engineering, John Wiley & Sons Inc

REFERENCES:

1. D. G. Fredlund and H. Rhardjo, Soil Mechanics for Unsaturated Soils, WILEY Inter Science Publication, John Wiley & Sons, Inc
2. D. R. Katti, A. R. Katti, Behavior of Saturated Expansive Soils and Control Methods, Taylor and Francis
3. Gopal Ranjan and A. S. Rao, Basic and Applied Soil Mechanics, New Age International Publishers, New Delhi
4. Handbook on Under reamed and Bored Compaction Pile Foundations-CBRI, Roorkee

Codes:

IS: 2720 (Part XV)-1977 Measurement of Swelling Pressure of Soils

Course Outcomes:

At the end of this course the student will be able to

- Demonstrate behavior of expansive soils.
- Explain need of foundation practice on expansive soils.

- Perform methods of stabilization of expansive soils.
- Select additives and methodology for stabilization.
  Apply the gained knowledge for suitable performance.

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19. GEOTECHNIQUES FOR DESIGN OF UNDERGROUND STRUCTURES

Course Objective:

1) To teach excavation methods and design of supporting systems
2) To train analysis of deep excavation techniques
3) Explain the design procedure of excavation supporting systems.
4) To demonstrate excavation and protection procedure to be adopted during constructions carrying out below the ground level.
5) To teach the elements and construction process of tunnel

UNIT-I

Excavation Methods and Lateral Supporting System

Introduction - excavation methods and lateral supporting systems – retaining walls – strutting systems – factors influencing on the selection of the retaining strut system – case history. Lateral earth pressure for design of supporting systems - Rankine's and Coulomb's earth pressure theory – earth pressure for design of excavation.

UNIT II

Analysis of Deep Excavation

Introduction - free and fixed earth support method – shear failure of strutted walls – push in – basal heave - upheaval – sand boiling - Stress and deformation analysis of excavation: simplified method – beam on elastic foundation method – finite element method.

UNIT III

Design of Excavation Supporting Systems

Introduction – design methods and factor of safety – retaining wall – structural components in braced excavations – strut systems – anchor systems – tests of anchors.

UNIT IV

Excavation and Protection of Adjacent Buildings

Introduction – protection of building using the behaviour of excavation induced deformation – building protection by auxiliary methods – construction defects and remedial measures – building rectification methods.

UNIT V

Design of Tunnel

Introduction - longitudinal and transverse profile of tunnel structure - tunnel protection against fire - advanced systems of anti-water insulation of underground structures - loading types of shallow and deep tunnels, rock mass classification - mining technologies of deep excavation - shield technology, execution technology of shallow underground structures, sewerage objects - trenchless technologies.

TEXT BOOKS:

1. Chang – Yu Ou, Deep Excavation Theory and Practice, Taylor & Francis Group, London, UK, 2006.
2. Terzaghi, K. and Peck, R. B, John, Soil Mechanics in Engineering Practice, Wiley & Sons, New York, 1967.

REFERENCES:

1. Holtz, R.D. and Kovaces, W.D, An Introduction to Geotechnical Engineering., Prentice – Hall, Inc., Englewood Cliffs, NJ, 1981.
2. Hausman, M. R., Engineering Principles of Ground Modification, McGraw – Hill Publishing Company, New York, 1990.
3. Hoek, E., Brown, E.T., Underground excavations in rock, The Institution of Mining and Metallurgy, London, SW7 2BP, England, 1980.
4. Megaw T. M., and Bartlett, J. V., Tunnels: planning, design, construction by Ellis Horwood, 1983.

Course Outcome:

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

- Analyze the underground structures.
- Design the underground structures.
- Analyze and design various supporting systems that needs for underground construction.
- Planning to Protect the adjacent building due to underground construction.
- Planning to be followed in tunnel construction.

20. WATER RESOURCES SYSTEM ANALYSIS

Course Objectives:

6) Teach Concepts of systems techniques in water resources engineering
7) Teach Linear Optimization concepts
8) Demonstrate the Development system approach to reservoir operation
9) Planning water allocation to different crops
10) Expertise on River operation policies

UNIT 1

Concept of System and System Analysis - Definition and Types of Systems - Basic Principles of Systems Approach and Analysis. Systems Techniques in Water Resources.

UNIT II

Introduction to Optimization - Linear and Dynamic Programming - Simulation - Combined Simulation and Optimization. Economics of Water Resources Projects - Cost Benefit Analysis - Cost Allocation among various projects in a Multi-purpose Project.

UNIT III

Systems Approach to Reservoir - Deterministic Flows - Reservoir Sizing and Reservoir Operations. Basic Concepts of Random Flows Reliability.

UNIT IV

Application of Linear Programming to Water Resources Systems - Irrigation Water Allocation for Single and Multiple Crops. Reservoir Operation for Irrigation and Hydropower Generation.

UNIT V

Applications of Dynamic Programming to Water Resources Systems - Optimal Crop Water Application - Steady State Reservoir Operating Policy for Irrigation. Real Time Reservoir Operation for Irrigation.

TEXT BOOKS:

3. Loucks, D. P. and Eelco Van Beek, Water Resources systems planning and management: An Introduction to methods, models and applications. (2005), UNESCO.
4. Vedula, S. and Mujumdar, P. P., Water resources Systems: Modeling techniques and analysis, (2005), Tata McGraw Hill, New Delhi.

REFERENCES:

4. Mays, L.W. and Tung, Y.K., Hydro systems Engineering and Management, (1992). McGraw Hill, USA.

5. Simonovic, S.P., Managing water resources: Methods and tools for a systems approach, (2009). UNESCO Publishing, France.
6. R. K. Sharma & T. K. Sharma, A Textbook Of Irrigation Engineering, S. Chand and Company Limited, New Delhi

Course Outcomes:

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

- Apply basic principles of system approach.
- Judging Economics of water resources of multipurpose projects.
- Apply optimization principles to single and multi crop applications.
- Designing reservoir operation leading to optimum crop water application.

21. URBAN HYDROLOGY

Course Objectives

1) To impart impact of urbanization on catchment hydrology.
2) Narrate the importance of rainfall runoff data for urban hydrology.
3) Teach techniques for peak flow estimation for storm water drainage system design.
4) Explain the design concepts of components in urban drainage systems.
5) Train for preparation of master urban drainage system.

UNIT -I:

Introduction:

Urbanization and its effect on water cycle – urban hydrologic cycle – Effect of urbanization on hydrology. **Precipitation Analysis**: Importance of short duration of rainfall and runoff data, methods of estimation of time of concentration and design of urban drainage systems, Intensity-Duration -Frequency (IDF) curves, design storms for urban drainage systems.

UNIT -II:

Methods of Urban Drainage:

Time of concentration, peak flow estimation approaches, rational method, NRCS curve number approach, runoff quantity and quality, wastewater and storm water reuse , major and minor

systems. Drainage systems**:** Open channel, underground drains, appurtenances, pumping, source control.

UNIT -III:

Analysis and Management:

Storm water drainage structures, design of storm water network- Best Management Practices– detention and retention facilities, swales, constructed wetlands, models available for storm water management.

UNIT -IV:

Master drainage plans:

Issues – typical urban drainage master plan, interrelation between water resources investigation and urban planning processes, planning objectives, comprehensive planning , use of models in planning.

UNIT –V:

Hydrological models:

General principles of hydrological modelling - The Rational Method - The time-area method - The unit hydrograph method - Physically based distributed models - Physically based partially distributed models - Hydraulic modelling - Model calibration and validation - Probabilistic models - Expert systems

TEXT BOOKS:

1. Akan A.O and R.L. Houghtalen, Urban Hydrology, Hydraulics and Stormwater Quality: Engineering Applications and Computer Modelling (2006), Wiley International.
2. Hall M. J., Urban Hydrology (1984), Elsevier Applied Science Publisher.

REFERENCES BOOKS:

1. Geiger W. F., J Marsalek, W. J. Rawls and F. C. Zuidema, Manual on Drainage in Urbanised area' (1987 – 2 volumes), UNESCO,
2. Wanielista M. P. and Eaglin, Hydrology – Quantity and Quality Analysis (1997), Wiley and Sons.
3. Stahre P. and Urbonas B., Stormwater Detention for Drainage (1990), Water Quality and CSO Management, Prentice Hall.
4. Maksimovic C. and J. A. Tejada-Guibert, Frontiers in Urban Water Management – Deadlock or Hope (2001), IWA Publishing.

Course Outcomes

At the end of the course the student will be able to

- Develop intensity duration frequency curves for urban drainage systems.
- Develop design storms to size the various components of drainage systems.
- Apply best management practices to manage urban flooding.
- Develop master drainage plan for an urbanized area.

22. WATERSHED MANAGEMENT

Course Educational Objectives (CEOs)

5. To learn about Rainfall-Runoff analysis and estimation and design of storm
6. To known about effective watershed management methods and optimization
7. To understand about different soil conservation equation and principles
8. To understand about water harvesting techniques and artificial recharge techniques

UNIT I

WATERSHED HYDROLOGY:

Basic characteristics – Rainfall analysis – Runoff analysis – Estimation of design storm and the design flood – Flood routing – Flood mitigation through planning of reservoir capacities and operation of reservoirs.

UNIT II

WATERSHED MANAGEMENT:

Classification of effective watershed management methods – Factors affecting integrated watershed management – Watershed inventory – Problem definition and scope – Consultation process – Developing workable management options – Evaluation of constraints and criteria – Simple assessment methods.

UNIT III

SOIL CONSERVATION:

Soil loss estimation – Universal soil loss equation – Soil erosion principles – Gully erosion – Design of permanent gully control structures – Stream bank erosion – Erosivity and erodability – Engineering measures and control practices.

UNIT IV

WATER HARVESTING TECHNIQUES: Farm ponds – percolation tanks – Drop spillway chutes and flumes – Pipe spillways.

UNIT V

ARTIFICIAL GROUNDWATER RECHARGE TECHNIQUES:

Artificial recharge – Considerations – Methods – Induced infiltration – Water spreading – Flooding – Artificial recharge basins and ditches – Natural channel modifications – Recharge pits and shafts – Recharge wells.

REFERENCE BOOKS:

1. Prof. R. Suresh, “Watershed Hydrology “ Standard Publishers.
2. Isobel W. Heathiote. “Integrated Watershed Management – Principles and Practices”.

3. Schwab, G.O. & others, “Soil and water Conservation Engineering”.
4. Prof. R. Suresh, “Soil and water Conservation Engineering”.(Standard Publishers).
5. Wayne A. Pettyjohu, “Introduction to Artificial Ground Water Recharge” Scientific Publishers, Jodhpur.
6. Murthy J. V. S., “Watershed Management”.

Course Outcomes (COs)

- Able to explain about Rainfall-Runoff analysis and estimation and design of storm
- Able to do the effective watershed management methods and optimization
- Able to understand about different soil conservation equations and principles
- Able to apply the knowledge of water harvesting techniques and artificial recharge techniques

23. HYDROPOWER DEVELOPMENT

Course Objectives:

1) Teach Students with concepts of Power potential in the world and India
2) Impart with different types of Hydropower Plants and Classification
3) demonstrate different Water Conveyance systems
4) Teach turbines draft tubes and water hammers
5) Throw light on Design of Power house planning

UNIT 1

Introduction: Sources of power - Status of Power potential in the world and India. Transmission voltages and Hydropower - Estimation of water power potential. Source of Hydropower - Runoff and Stream flow. Stream flow analysis - Hydrograph, Mass curve and Flow duration curve.

UNIT II

Hydropower Plants - Classification - Low and High head plants, Pumped storage plants Run - of - river plants - General arrangement of Run - of - river plants, Valley dam plants, High head diversion plants. Pumped storage plants - Advantages - Types of Pumped storage plants, Two and three unit arrangements.

UNIT III

a. Water Conveyance systems.

Penstocks, Anchor blocks - Design criteria for Penstocks - Economical diameter of Penstock.

Anchor blocks - Design principles of Anchor blocks. Valves, Bends and Manifolds

b. Intakes, canals and tunnels - Types of Intakes, Losses in Intakes, Air entrainment at Intakes - Inlet Aeration. Trash racks.

UNIT IV

Turbines - Main types - Hydraulic features - Turbine site, Constructional features - Lay out and arrangement. Draft tubes - Cavitation in Turbines - Governing of Turbines. Turbine Characteristics

- Model testing - Water Hammer - Resonance in Penstocks. Surge tanks - Types and design principles of Simple Surge Tank.

UNIT V

Power house planning - Surface Power stations - Power house structure - Power house dimensions - Lighting and ventilations in Power house. Underground power stations - Location of Underground Power station - Components of Underground Power station. Features of some Typical Hydro - Power projects in India.

TEXT BOOKS:

1. Irrigation engineering and Hydraulic structures by S. K. Garg, Standard Book House.
2. Irrigation and water power engineering by Punmia & Lal, Laxmi publications Pvt. Ltd., New Delhi.

REFERENCES:

1. S K Sharma, A Textbook Of Irrigation Engineering and Hydraulic Structures, S. Chand and Company Limited, New Delhi
2. P. N. Modi, Irrigation and Water Resources & Water Power, Standard Book House.
3. G. L. Asawa, Irrigation and water resources engineering, New Age International Publishers
4. Dilip Kumar Majumdar, Irrigation water management, Principles and Practice, PHI Pvt. Ltd. NewDelhi.

Course Outcomes:

At the end of this course the student will be able to

- Understand the different sources of hydropower and estimation of potential.
- Hypothesizing the relevant procedures for planning hydro power plants.
- Design effective water conveyance systems and design.
- Design power house and features.

24. SUSTAINABLE WATER RESOURCES DEVELOPMENT

Course Objectives:

1) Demonstrate Role of water in National Development
2) Explain Water Resources Systems Analysis
3) Impart on Evaluation and monitoring of water quality and management of water distribution networks
4) Teach different methods for water balancing
5) Visualize Interstate Water Dispute Acts

UNIT I Introduction: Water Resources Potential, Demand and Development -Role of water in National Development - Assessment of Water Resources of the country - River Basins - Hydro-meteorological and Hydrological Data. Assessment of Utilizable flows - Conventional and non-conventional methods - Estimation of Water need- National Water Policy. Conjunctive use of surface and ground water. Future Water Requirements - Scope of development.

UNIT II

Water Resources Planning and Project Formulation- Water Resources Planning - Single and Multipurpose Projects - Project Formulation, Comparison of Alternatives - Cost Benefit Analysis. Cost Allocation among various purposes. Water Resources Systems Analysis - Optimization Approaches.

UNIT III

Environmental Aspects of Integrated water Resources Development -Evaluation and monitoring of water quality and management of water distribution networks for Irrigation, Flood control and Power generation - Catchment Treatment and Watershed Management. Command Area Development - Resettlement and Rehabilitation.

UNIT IV

Management Strategies for Excess and Deficit Water Balances

Flood Control & Management - Various methods of Control - Administrative Planning - Management Programmes and Flood Cushioning -Structural Methods. Non-structural Methods - Flood forecasting & Warning, Flood plain zoning and Flood proofing. Drought Prone Area Development - Soil Conservation Methods.

UNIT V

Riparian Rights and Inter Basin Linking of Rivers - Indian Scenario - Various Proposals and their Status - Dr. K. L. Rao's Proposal, Capt. Dastur's Garland Canal, National Perspective Plan, NWDA Link and Peninsular Rivers Development Component - Overall Benefits and Major constraints. Water Laws of India - Regulating Authorities - Interstate Water Dispute Acts - River Water Tributes - Cauvery, Krishna Godavari and Vamsadahra Tribunals.

TEXT BOOKS:

1. A Textbook Of Irrigation Engineering and Hydraulic Structures, S K Sharma, S. Chand and Company Limited, New Delhi
2. Water Resource Engineering: R. L. Linsley & J. B. Fragini, MCgrohly

REFERENCES:

1. P. N. Modi, Irrigation and Water Resources & Water Power, Standard Book House.
2. A.S. Gordman, Principles of Water Resource engineering:
3. S. K. Garg, Irrigation engineering and Hydraulic structures, Standard Book House.

Punmia & Lal, Irrigation and water power engineering, Laxmi Publications pvt. Ltd., New Delhi.

Course Outcomes:

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

- Estimate Water need**.**
- Develop Water Resources Planning**.**
- Explain roll of Regulating Authorities**.**
- Design Catchment Treatment and Watershed Management**.**
  Understand Rights and Inter Basin Linking of Rivers**.**

25. RIVER BASIN MANAGEMENT

Course Objectives:

1) Teach the basic concepts of river basin management
2) Demonstrate the various types flows and catchment process
3) Explain various monitoring systems and regulations in river basin management
4) Teach river basin management techniques

UNIT -I

Introduction:

Basic Concepts of River Basin Management (RBM) - Integrated River Basin Management (IRBM) - River Basin Organizations (RBOs) - Types. Theories and Principles of IRBM - Need for RBM & Need for Irrigation-Objectives and Benefits of IRBM - Key Activities and Challenges in IRBM - Various Guiding Principles of IRBM - Scenarios in Developed and Developing Countries.

UNIT -II

River Systems:

Recapitulation of Basic Principles of Hydrology - River Basins and Catchments - Hydrologic, Geomorphological, Physical & Chemical Processes. Stream Corridors, Stream Order Model- Functions of River Systems - Provisioning, Regulating, Cultural and Supporting Services - Low Base Flows - Ecological Stresses to Rivers - Human Interventions and Impacts - Man's Attitude towards Nature and Development. Engineered River Systems.

UNIT - III

Tools and Methods of IRBM:

Monitoring and Water Resources Information System - Monitoring, Acquisition and Processing of Water Resources Data - Statistical Tools - Decision Support Systems. Governance Issues - Water Governance - Its Importance - Fundamental Requirements for Good TBM - Rules, Regulations and Laws - Various Acts Enforced by Government of India for River Basin Management and Development.

UNIT - IV

River Basin Planning And Management - I (Strategies)

Water Resources Planning and Management of - Need, Various Aspects and Approaches of Planning and Management - Planning Process - Operational Management - Instruments of

Operational Management - Water Quality Management - Water Charges and Cost Recovery - Issues related to Water Right and Water Allocation.

UNIT - V

River Basin Planning And Management – II (Technological)

River Restoration: Disturbances to River Systems - River Restoration Planning and Design. Implementation, Monitoring and Adoptive Management - Sediment Management in Rivers - Preliminary Sedimentation Aspects, Sediment Inflow Reduction - Recovery, Increase or Reallocation of Storage Volume - Pressure Flushing, Empty Flushing, Dredging, Dry Excavation and Structural Modifications.

TEXT BOOKS:

1. A Handbook for Integrated Water Resources Management in Basins Published by Global Water Partnership and International Network of Basin Organizations (INBO)
2. Lawrence K. Wang and Chih Ted Yang, Modern Water Resources Engineering Edited, Humana Press

REFERENCES

1. Santosh Kumar Garg Irrigation Engineering and Hydraulic Structure, Khanna Publishers.
2. Chow V. T., D. R Maidment and L. W. Mays, Applied hydrology, Tata McGraw Hill Education Pvt. Ltd, (2011), New Delhi.
3. Mays L.W., Water Resources Engineering Wiley India Pvt. Ltd, (2013).
4. Integrated River Basin Management - www.universitywaterspectrumpartnership.org.

Course Outcomes:

At the end of the course, student is able to

- Summarise the concepts of river basin management.
- Implement the techniques in river basin management.
- Compare methods and tools in river basin management
- Check the river basin to obtain most possible benefits.
- Planning and management of river basin.

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26. COASTAL ENGINEERING

OBJECTIVES:

To provide an overview of the analysis and design procedures used in the field of coastal engineering

To enable students to determine the characteristics of waves, coastal structures and shore protection and modeling in coastal engineering

UNIT I INTRODUCTION TO COASTAL ENGINEERING

Introduction - Wind and waves – Sea and Swell - Introduction to small amplitude wave theory – use of wave tables- Mechanics of water waves – Linear (Airy) wave theory – Wave measurement.
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UNIT II WAVE PROPERTIES AND ANALYSIS

Introduction to non-linear waves and their properties – Waves in shallow waters – Wave Refraction, Diffraction and Shoaling – Hindcasting of waves - Short term wave analysis – wave spectra and its utilities - Long term wave analysis- Statistical analysis of grouped wave data.

UNIT III TYPES AND WAVE TRANSFORMATION

Tide analysis and prediction, storm surge, seiches and seasonal fluctuations - Long term water level fluctuations – Wave shoaling; wave refraction; wave breaking; wave diffraction

UNIT IV COASTAL STRUCTURES AND SHORE PROTECTION

Risk analysis – design wave – Break waters – Shore protection – groins, seal walls, offshore breakwaters, artificial nourishment

UNIT V MODELING IN COASTAL ENGINEERING

Physical modeling in Coastal Engineering – Limitations and advantages – Role of physical modeling in coastal engineering – Numerical modeling – Modeling aspects – limitations

OUTCOME:

On successfully completing this course unit, students will be able to:

Calculate the wave transformations

Appreciate the multi-faceted nature of coastal problems and the techniques of coastal engineering analysis, modeling and design of coastal structures and shore protection.

TEXTBOOKS:

Kamphuis, J.W., Introduction to coastal engineering and management, 2000

Dean, R.G. and Dalrymple, R.A., Water wave mechanics for Engineers and Scientists, Prentice-Hall, Inc., Englewood Cliffs, New Jersey, 1994.
Mani, J. S. Coastal Hydrodynamics. PHI Learning Pvt. Ltd., 2012.

REFERENCES:

Ippen, A.T., Estuary and Coastline Hydrodynamics, McGraw-Hill Book Company, Inc., New York, 1978.
Sorenson, R.M., Basic Coastal Engineering, A Wiley-Interscience Publication, NewYork, 1978.
Coastal Engineering Manual, Vol. I-VI, Coastal Engineering Research Centre, Dept. of the Army, US Army Corps of Engineers, Washington DC, 2006.

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27. ENVIRONMENT POLLUTION AND CONTROL

Course Objectives

1) Impart knowledge on aspects of air pollution & control and noise pollution
2) Impart concepts of treatment of waste water from industrial source.
3) Differentiate the solid and hazardous waste based on characterization
4) Introduce sanitation methods essential for protection of community health.
5) Provide basic knowledge on sustainable development.

UNIT – I:

Air Pollution:

Air pollution Control Methods–Particulate control devices – Methods of Controlling Gaseous Emissions – Air quality standards. Noise Pollution: Noise standards, Measurement and control methods – Reducing residential and industrial noise – ISO14000.

UNIT –II:

Industrial waste water Management:

Strategies for pollution control – Volume and Strength reduction – Neutralization – Equalization – Proportioning – Common Effluent Treatment Plants – Recirculation of industrial wastes – Effluent standards.

UNIT – III:

Solid Waste Management: solid waste characteristics – basics of on-site handling and collection – separation and processing – Incineration- Composting-Solid waste disposal methods – fundamentals of Land filling. **Hazardous Waste**: Characterization – Nuclear waste – Biomedical wastes – Electronic wastes – Chemical wastes – Treatment and management of hazardous waste-Disposal and Control methods.

UNIT – IV: Environmental Sanitation: Environmental Sanitation Methods for Hostels and Hotels, Hospitals, Swimming pools and public bathing places, social gatherings (melas and fares), Schools and Institutions, Rural Sanitation-low cost waste disposal methods.

UNIT – V:

Sustainable Development: Definition- elements of sustainable developments-Indicators of sustainable development- Sustainability Strategies- Barriers to Sustainability–Industrialization and sustainable development – Cleaner production in achieving sustainability- sustainable development.

TEXT BOOKS

1. Peavy, H. S., Rowe, D.R, Tchobanoglous, Environmental Engineering, G.Mc-Graw Hill International Editions, New York 1985.
2. J. G. Henry and G.W. Heinke, Environmental Science and Engineering, Pearson Education.

REFRENCES:

1. G. L. Karia and R.A. Christian, Waste water treatment- concepts and design approach, Prentice Hall of India
2. M. N. Rao and H. V. N. Rao, Air pollution, Tata Mc.Graw Hill Company.
3. Ruth F. Weiner and Robin Matthews Environmental Engineering, 4th Edition Elesevier, 2003.
4. K. V. S. G. Murali Krishna, Air Pollution and Control by, Kousal & Co. Publications, New Delhi.

Course Outcomes:

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

- Understand the fundamentals of solid waste management, practices adopted in his town/village and its importance in keeping the health of the city.
- Identify the air pollutant control devices and have knowledge on the NAAQ standards and air emission standards.
- Differentiate the treatment techniques used for sewage and industrial wastewater treatment.
- Inventing the methods of environmental sanitation and the management of community facilities without spread of epidemics.
- Appreciate the importance of sustainable development while planning a project or executing an activity.

28. INDUSTRIAL WASTE & WASTE WATER ENGINEERING

Course Objectives:

1) To teach Health and Environment Concerns in waste water management
2) To teach material balance and design aspects of the reactors used in waste water treatment.
3) To impart knowledge on selection of treatment methods for industrial waste water
4) To teach common methods of treatment in different industries
5) To provide knowledge on operational problems of common effluent treatment plant

UNIT -I

Industrial water Quantity and Quality requirements:

Boiler and cooling waters–Process water for Textiles, Food processing, Brewery Industries, power plants, fertilizers, sugar mills Selection of source based on quality, quantity and economics. Use of Municipal wastewater in Industries – Adsorption, Reverse Osmosis, Ion Exchange, Ultra filtration, Freezing, Elutriation, Removal of Colour, Odour and Taste.

UNIT -II

Basic theories of Industrial Wastewater Management: Industrial waste survey - Measurement of industrial wastewater Flow-generation rates – Industrial wastewater sampling and preservation of samples for analysis -Wastewater characterization-Toxicity of industrial effluents-Treatment of wastewater-unit operations and processes-Volume and Strength reduction – Neutralization and Equalization, Segregation and proportioning- recycling, reuse and resources recovery

UNIT -III

Industrial wastewater disposal management: Discharges into Streams, Lakes and oceans and associated problems, Land treatment - Common Effluent Treatment Plants: advantages and suitability, Limitations and challenges- Recirculation of Industrial Wastes- Effluent Disposal Method

UNIT – IV

Process and Treatment of specific Industries-1: Manufacturing Process and origin, characteristics, effects and treatment methods of liquid waste from Steel plants, Fertilizers, Textiles, Paper and Pulp industries, Oil Refineries, Coal and Gas based Power Plants

UNIT – V

Process and Treatment of specific Industries-2: Manufacturing Process and origin, characteristics, effects and treatment methods of liquid waste from Tanneries, Sugar Mills, Distillers, Dairy and Food Processing industries, Pharmaceutical Plants

TEXT BOOK

1. M. N. Rao and A. K. Dutta, Wastewater Treatment, Oxford & IBH, New Delhi.
2. K.V. S. G. Murali Krishna, Industrial Water and Wastewater Management

REFERENCES

1. A. D. Patwardhan, Industrial Wastewater treatment, PHI Learning, Delhi
2. Metcalf and Eddy Inc., Wastewater Engineering, Tata McGraw Hill co., New Delhi.
3. G. L. Karia & R.A. Christian Wastewater Treatment- Concepts and Design Approach, Prentice Hall of India.

Course Outcomes:

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

- Design treatment methods for any industrial wastewater.
- Examine the manufacturing process of various industries.
- Assess need for common effluent treatment plant for an industry
  Test and analyse BOD, COD, TSS and MPN in wastewater.

29. AIR POLLUTION ENGINEERING

Course Objectives:

1) To teach the basics of air pollution
2) To impart the behaviour of air due to metrological influence
3) To throw light on air quality management
4) To teach the design of air pollution control methods

UNIT -I

Air Pollution:

Sampling and analysis of air pollutants, conversion of ppm into $\mu g/m^3$. Definition of terms related to air pollution and control - secondary pollutants - Indoor air pollution – Ozone holes and Climate Change and its impact - Carbon Trade.

UNIT-II

Thermodynamics and Kinetics of Air-pollution:

Applications in the removal of gases like SOx, NOx, CO and HC - Air-fuel ratio- Computation and Control of products of combustion, Automobile pollution. Odour pollution control, Flares.

UNIT -III

Meteorology and Air Pollution:

Properties of atmosphere: Heat, Pressure, Wind forces, Moisture and relative Humidity, Lapse Rates - Influence of Terrain and Meteorological phenomena on plume behavior and Air Quality - Wind rose diagrams and Isopleths Plume Rise Models

UNIT-IV

Ambient Air Quality Management:

Monitoring of SPM - RPM SO2; NOx and CO - Stack Monitoring for flue gases - Micro-meteorological monitoring – Noise Monitoring - Weather Station. Emission Standards- Gaussian Model for Plume Dispersion.

UNIT-V

Air Pollution Control Methods: Control of particulates – Control at Sources, Process Changes, Equipment modifications, Design and operation of Control Equipments –Control of NOx and SOx emissions – Environmental friendly fuels - In-plant Control Measures, process changes, methods of removal and recycling. Environmental criteria for setting industries and green belts.

TEXT BOOKS:

1. M. N. Rao and H. V. N. Rao, Air Pollution, Tata McGraw Hill Company.
2. K. V. S. G. Murali Krishna, Air Pollution and Control Laxmi Publications, New Delhi, 2015.

REFERENCE:

1. R. K. Trivedy and P. K. Goel, An Introduction to Air pollution, B.S. Publications.
2. Wark and Warner, Air Pollution, Harper & Row, New York.
3. Garg, S. K, Environmental Engineering Vol. II (Sewage Disposal and Air Pollution Engineering), Khanna Publishers.
4. Arya, S. P., Air Pollution Meteorology and Dispersion, Oxford University Press.

Course Outcomes:

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

- Evaluating the ambient air quality based on the analysis of air pollutants
- Design particulate and gaseous control measures for an industry
- Judge the plume behaviour in a prevailing environmental condition

  Estimate carbon credits for various day to day activities

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30. AIRPORT PLANNING AND DESIGN

Course objectives:

1) Introduction to the growth of air transport and aircraft characteristics.
2) Competence in building the background in Airport engineering and understanding its features with a technical sense.
3) Synthesis in incorporating the planning and design of airport.
4) Required Development of the theoretical basis of subject and to design the various airport components.
5) Better Comprehension of various probable alternatives to design airport components

UNIT – I

Growth and Characteristics of Airport and Aircraft:

Growth of air transport, airport organization and associations, Classifications of airports airfield components, airport traffic zones and approach areas. Aircraft Components, size turning radius, speed, airport characteristics.

UNIT – II

Airport Engineering:

Airport site selection – factors affecting site selection and surveys- runway orientation – wind rose diagram – basic runway length – correction for runway length – terminal area – layout and functions – concepts of terminal building – simple building, linear concept, pier concept and satellite concept – typical layouts

UNIT – III

Capacity and Delay, Airport planning, surveys and Design:

Factors affecting capacity, Determination of runway capacity related to delay, gate capacity, and Taxiway capacity Airport Site Selection, Runway length and width, sight distances, longitudinal and transverse grades, runway intersections, taxiways, clearances, aprons, numbering, holding apron, noise control, Problems.

UNIT – IV

Airport Grading, Planning and Design of the Terminal area:

Operational concepts, space relationships and area requirements, vehicular traffic and parking at airports. Grading of airport area, hydrology, Airport Drainage, Air Traffic Control and Aids: design of drainage systems, construction methods, layout of surface drainage and subsurface drainage system, Problems. Runways and taxiways markings, day and night landing aids, airport lighting, ILS and other associated aids.

UNIT –V

Geometric design of runways and taxiways

Aircraft characteristics – influence of characteristics on airport planning and design – geometric design elements of runway – standards and specifications as per - functions of taxiways – taxiway geometric design – geometric elements and standard specifications – runway and taxiway lighting.

TEXT BOOKS:

1. Khanna, Arora and Jain, Airport Planning and Design, Nem Chand and Bros., Roorkee
2. Rangwala, Airport Engineering – Charotar Publisher

REFERENCES:

1. R. Srinivasa Kumar, Transportation Engineering: Railways, Airports, Docks and Harbors, Universities Press Pvt Ltd, Hyderabad. 2014.
2. Virender Kumar and Satish Chandra, Airport Planning and Design, Galgotia Publication press.
3. Robert Horenjeff, Planning and Design of Airports, 2nd edition, McGraw Hill Book Co.

Course Outcomes

At the end of the course, student is able to

- Obtain a basic Knowledge of the fundamental issues in Airport engineering.
- Demonstrate the clear understanding of the airport components.
- Learn principles in airport components geometric
- Learn the airport components capacity and delays
- Learn critical factors consideration in airport grading and design
- Obtain Knowledge on air traffic control aids
- Design and be able to apply these principles in field

31. DOCKS AND HARBOUR ENGINEERING

Course Objectives:

The course will address the following:

1) To teach Water Transportation in India
2) To impart knowledge on water waves and effects on harbour and structure design
3) Development of facilities that are required for setting up of a port
4) Planning of ports for effective cargo handling and economical considerations

UNIT – I

Water Transportation:

Scope, Merits, Developments of Water Transportation in India, Inland waterways, River, canal, Inland water Transportation, Development of Port & Harbors, Harbor Classification, Site Selection, Harbor Dimensioning

UNIT – II

Natural Phenomena: Wind, Ties, Water waves, Wave decay & Ports, Wave Diffraction Breaking, Reflection, Littoral drift, Sedimentation transport, Effects on Harbor and Structure Design

UNIT – III

Harbor Infrastructure:

Types of Break Waters, Jetty, Dock Fenders, Wharves, Dolphin Mooring accessories, Repair facilities, Wet Docks, Lift Docks, Dry Docks, Gates for Graving docks, Floating Docks, Slipways, Locks and Gates

UNIT – IV

Port Facility:

Transit Shed, Warehouses, Cargo handling, Container Handling, Inland pot facility, Navigational Aids, Types, Requirements of Signals, Lighthouses, Bean lights, Buoys, Dredging & Coastal protection, Types of Dredges, Choices, usage of dredge material, Sea wall protection, Sea wall revetments, bulkhead.

UNIT – V

Planning of Ports:

Regional and intercontinental transportation development, forecasting cargo & Passenger demand, regional connectivity, Cargo handling, Capacity of Port, Economic Evaluation of Port projects, Impact of Port activities.

TEXT BOOKS

1. Bindra, S.P, A Course in Docks and Harbor Engineering, Dhanpat Rai and Sons, New Delhi, India, 1992.
2. R. Srinivasa Kumar, Transportation Engineering: Railways, Airports, Docks and Harbors, Universities Press Pvt Ltd, Hyderabad. 2014.

REFERENCES

1. Alozo Def. Quinn, Design and Construction of Ports and Marine Structures, McGraw-Hill Book Company, New York
2. Srinivasan R., Docks & Tunnel Engineering, Charotar Publishing House, Anand.
3. Seetharaman, S., Dock and Harbour Engineering, Umesh Publications, New Delhi, India, 1999.
4. V.N. Vazirani and S.P. Chandola, Docks and Harbour Engineering – Text book of Transport Engineering Vol. II, Khanna Publishers, New Delhi.

Course outcomes:

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

- Enhance the knowledge on Docks and Harbour Engineering for water transportation in the context of regional and intercontinental transportation.
- Know techniques planning and designing the Infrastructures required for Harbour and Port area.
- Analyze cargo and passenger demand forecasting cargo handling capacity of ports and economic evaluation of port project.
- Understand environmental and other impact impended due to water transportation and port activities.

32. TRAFFIC ANALYSIS

Course Objectives:

1) To impart on traffic flow analysis
2) To illustrate queuing theory
3) To teach pedestrian traffic flow
4) To teach shock wave theory and traffic simulation

UNIT-I:

Traffic Flow Description:

Types of Statistical Distributions; Discrete And Continuous Distributions; Counting And Interval Distributions used In Traffic Analysis; Poisson's Distribution for Vehicle Arrivals; Headway Distributions – Exponential Distribution; Shifted Exponential Distribution; Erlang Distribution; Composite Distribution.

UNIT-II:

Queuing Theory:

Introduction to Queuing Theory; Notation Used For Describing A Queue System; Analysis of M/M/1 System; Assumptions and Derivation of System State Equations; Application of M/M/1 Analysis for Parking Garages and Toll Plazas - Queuing Theory - D/D/1 System: Traffic Interruptions Like Accidents Or Bottlenecks; Traffic Signal Analysis As D/D/1 System; Computation of Delays and Queue Dissipation Time.

UNIT-III:

Pedestrian Delays and Gaps:

Pedestrian Gap Acceptance and Delays; Concept of Blocks, Anti-Blocks, Gaps and Non-Gaps; Underwood's Analysis for Pedestrian Delays; Warrants for Pedestrian Crossing Facilities – Minimum Vehicular Volume Warrant, Minimum Pedestrian Volume Warrant, Maximum Pedestrian Volume Warrant;

UNIT-IV:

Shockwave Theory:

Concept of Shockwave; Causes for Traffic Interruptions and Shockwaves; Flow-Density Diagram use in Shockwave Analysis; Use of Time-Space Diagram For Shockwave Description; Bottleneck Situations and Shockwaves; Traffic Signal and Shockwave Theory; Numerical Examples For Application of Shockwave Theory;

UNIT-V:

Traffic Simulation:

Introduction To Simulation; Need For Simulation Modelling; Steps In Simulation; Interval Oriented And Event Oriented Simulation; Use of Random Numbers In Simulation; Random Number Generation Methods; Computing Headways And Arrival Times Based on Random Numbers; Basic Concepts Of Simulation Modelling Application for Signalised Intersections, Pedestrian Crossings and Transit Scheduling.

TEXT BOOKS:

1. Traffic Flow Theory: A Monograph , TRB Special Report 165

2. C. S. Papacostas, Fundamentals of Transportation Engineering –Prentice Hall India Publication

REFERENCE:

1. F. L. Mannering & W. P. Kilareski, Highway Engineering and Traffic Analysis –John Wiley Publishers.
2. A. D. May, Traffic Flow Fundamentals, Prentice Hall India Publication
3. Mcshane & Rogers, Fundamentals of Traffic Engineering

Course Outcomes:

At the end of the course, student is able to

- Apply the knowledge on traffic volume studies.
- Analysis of traffic for parking and toll plazas.
- Apply the concepts of shocking theory.
- Preparation of traffic simulation models.

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OPEN ELECTIVE COURSES OFFERED FOR OTHER DEPARTMENTS

S.NO.	SUBJECT
1	GEOTECHNICS OF EARTHQUAKE
2	OPTIMIZATION TECHNIQUES
3	INTEGRATED WATER RESOURCES MANAGEMENT
4	CONSTRUCTION PRACTICES
5	URBAN PLANNING AND DEVELOPMENT
6	PROJECT FORMULATION AND APPRAISAL

7	FUNDAMENTALS OF NANO SCIENCE
8	RAILWAYS, AIRPORTS AND HARBOUR ENGINEERING

1. GEOTECHNICS OF EARTHQUAKE

OBJECTIVES:

- To understand the dynamics of earth and its response, effect on different earth structures and measures to mitigate the effects.

UNIT I SEISMOLOGY AND EARTHQUAKE

Internal structure of the Earth – Continental Draft and Plate tectonics – Faults – Elastic rebound theory – Other sources of seismic activity – Geometric notation – Location of Earthquakes – Size of Earthquake.

UNIT II BASICS OF VIBRATION

Introduction - Nature of dynamic loads – Vibrations of single degree freedom system- Free vibrations of spring- Mass systems – Forced vibrations – Viscous damping - Transmissibility – Principles of vibrating measuring instruments - Effect of Transient and Pulsating loads – Vibrations of multi degree freedom system.

UNIT III WAVE PROPAGATION AND DYNAMIC SOIL PROPERTIES

Wave in unbounded media – Waves in a semi – Infinite body – Waves in a layered body - Attenuation of stress wave – Measurement of Dynamic soil properties – Stress – Strain behavior of cyclically loaded soils –- Strength of cyclic loaded soils.

UNIT IV STRONG GROUND MOTION AND SEISMIC HAZARD ANALYSIS

Strong Motion measurement – Ground Motion parameters – Estimation of ground motion parameters - Spatial variability of ground motion - Identification and evaluation of earthquake sources – Deterministic Seismic Hazard Analysis - Probabilistic Seismic Hazard analysis.

UNIT V DESIGN GROUND MOTION

One dimensional ground response analysis – Two and three dimensional analysis – Effect of local site condition on ground motion – Design parameters – Development of design parameters – Development ground motion time histories – Application of software package – Codal recommendations .

OUTCOME:

1. Students are able to develop the design ground motion for an area based on bed rock motion and types of soils, so that the effects of earthquakes can be mitigated.

REFERENCES:

1. Kameswara Rao, N.S.V., Dynamics soil tests and applications, Wheeler Publishing - New Delhi, 2000.
2. Krammer S.L., Geotechnical Earthquake Engineering, Prentice Hall, international Series, Pearson Education (Singapore) Pvt. Ltd., 2004.
3. Kameswara Rao, Vibration Analysis and Foundation Dynamics, Wheeler Publishing, New Delhi, 1998.
4. Wai-Fah Chen and Cgharles Scawthem, Earthquake Engineering Hand book, Caspress, 2003.
5. Robert W. Day, Geotechnical Earthquake Engineering Hand book, Second Edition, McGraw Hill, 2012.
6. Ikuo Towhata, “Geotechnical Earthquake Engineering” Springer series in Geomechanics and Geoengineering, Scientific Publishing services Pvt. Ltd., 2008.
7. Swami Saran, "Soil Dynamics and Machine Foundation, Galgottia Publications Pvt. Ltd., New Delhi-110002, 1999

2. OPTIMIZATION TECHNIQUES

Course Educational Objective (CEOs)

This course gives an opportunity for the students to know the various optimization techniques which can be adopted in design, construction and maintenance of any engineering system.

Linear Programming, Non Linear Programming, Dynamic Programming techniques are explained in detail. Advanced optimization techniques such as Genetic algorithm, Evolutionary search algorithm, Simulated Annealing and Ant Colony Optimization are briefly introduced.

UNIT I INTRODUCTION

Activity- Design methodology - Mathematical models -Design Variables, Objective Function, Unconstrained functions – Single variable – Several variables – Equality Constraints - Inequality constraints - Problem Formulation – Generalized Newton Raphson method

UNIT II LINEAR PROGRAMMING (LP)

Introduction to LP and formulation of Linear Programming problems, Graphical solution method, alternative or multiple optimal solutions, Unbounded solutions, Infeasible solutions, Maximization – Simplex Algorithm, Minimization – Simplex Algorithm using Big-M method, Two phase method, Duality in linear programming, Transportation & Assignment Problems, Integer linear programming.

UNIT III NONLINEAR PROGRAMMING

Optimality criteria – unconstrained function of single variables –several variables- Unidirectional search - Direct search methods – pattern search method - constrained function of single variable – several variables – Gradient Based Methods.

UNIT IV DYNAMIC PROGRAMMING AND NETWORK ANALYSIS

Pipeline network problem –solution of network – optimality – allocation process -probability in PERT analysis, project time cost trade off, introduction to resource smoothing and allocation – optimization by dynamic programming – simulation methods.

UNIT V NON-TRADITIONAL METHODS

Simulated Annealing – Algorithm- Boltzmann's equation – stability – Genetic Algorithm and Evolutionary Strategy –Choice of population – genetic operators- survival of the fittest – two bar pendulum – generation – Ant Colony Optimization –probability – finding the short path – pheromone trail.

OUTCOMES:

1. Upon completion of the course, the student will be able to understand importance of optimization of industrial process management, apply basic concepts of mathematics to formulate an optimization problem analyze and appreciate variety of performance measures for various optimization problems.

TEXT BOOK:

1. Rao, S.S: “Engineering Optimization: Theory and Practice”, John Wiley & Sons,Inc, 2009.
2. Taha, H.A,“Operations Research: An Introduction, Pearson,2013.
3. N D Vohra, Quantitative Techniques in management, Tata McGraw Hill, 2006.

REFERENCES:

1. Goldberg, D.E, “Genetic Algorithms in search, Optimization and Machine Learning”, Eddison and Wesley, 1989.
2. Dorigo, M and Stutzle, T,” Ant Colony Optimization”, MIT Press, Cambridge, 2004.
3. Deb, K, Optimization for Engineering Design, Prentice Hall of India.2012.
4. Ravindran, A , Ragsdell, K.M, Reklaitis, G.V, “Engineering Optimization: Methods and Applications”, Wiley, New York,2006.
5. Hadley, G,"Linear programming", Narosa Publishing House, New Delhi, 1992.

3. INTEGRATED WATER RESOURCES MANAGEMENT

Course Educational Objective (CEOs)

To introduce the students to the interdisciplinary analysis of water and design of intervention strategies.

To develop knowledge base on capacity building on IWRM.

UNIT I IWRM FRAMEWORK

Definition – meanings –objectives- evolution of IWRM- IWRM relevance in water resources management – Importance of paradigm shift in India: processes and prospective outcomes.

UNIT II CONTEXTUALIZING IWRM

IWRM in Global and Regional water partnership - MDG goals - UN formulations-Institutional Transformation- bureaucratic reforms and inclusive development.

UNIT III EMERGING ISSUES IN WATER MANAGEMENT

IWRM and Irrigation – Domestic - Drinking water Management in the context of Climate change-Flood –Drought – Pollution – Water poverty-sanitation and health-Conceptual problems and policy issues.

UNIT IV IWRM AND WATER RESOURCES DEVELOPMENT IN INDIA

Rural Development-Ecological sustainability- Watershed Development and conservation-Ecosystem Regeneration – waste water reuse-Sustainable livelihood and food security-Links between water –health- and poverty.

UNIT V ASPECTS OF INTEGRAL DEVELOPMENT

Capacity building - Solutions for effective Water Management. Case studies on conceptual framework of IWRM – IWRM and regional and global partnership – Emerging issues – IWRM and water resources development

OUTCOME:

At the completion of the course, the student will be able to apply appropriate management techniques different components of water resources under IWRM framework.

TEXTBOOKS:

Mollinga .P. etal " Integrated Water Resources Management", Water in South Asia Volume I, Sage Publications, 2006

Sithamparanathan, Rangasamy, A., and Arunachalam, N., "Ecosystem Principles and Sustainable Agriculture", Scir Publisher, Chennai, 1999.

REFERENCES:

Cech Thomas V., Principles of Water Resources: History, Development, Management and Policy. John Wiley and Sons Inc., New York. 2003.

Murthy, J.V.S., "Watershed Management in India", Wiley Eastern Ltd., New York, 1995.

Dalte, S.J.C., "Soil Conservation and Land Management", International Book Distribution, India, 1986.

4. CONSTRUCTION PRACTICES

Course Educational Objective (CEOs)

1. To introduce students about the basic construction practices such as construction materials, metals, construction methods, modern materials and service requirements commonly used in buildings.

UNIT I CONSTRUCTION MATERIALS

Stone as building material - Criteria for selection - Bricks - Classification - Bricks for special use - Cement - Ingredients - Types and Grades - Aggregates - Light weight concrete blocks - Concrete – Ingredients - Other types of Concrete - Durability of Concrete.

UNIT II METALS

Steel and Cast Iron- Composition - Market forms - Aluminum and its alloys - Composition - Aluminium composite panel - Uses - Market forms - Copper and its alloys - Zinc and other metals.

UNIT III CONSTRUCTION TECHNIQUES

Types of Foundations - Stones masonry - Brick masonry - Composite masonry - Cavity walls - Formwork - Shoring – Scaffolding - Selection of construction equipment for various works.

UNIT IV MODERN MATERIALS

Glass - Ceramics - Fibre glass reinforced plastic - Fibre textiles - Composite materials - Geomembranes and Geotextiles for earth reinforcement - floor finish materials for residential/industrial buildings

UNIT V SERVICE REQUIREMENTS

Painting, Distempering and white washing - Fire Protection - Thermal insulation - Ventilation and air conditioning - Acoustics and Sound insulation - Damp proofing - Termite proofing.

OUTCOMES:

1. Students completing the course will have understanding about the basic building materials and different construction techniques and practices. They will be able to plan the requirements of any construction project.

TEXTBOOKS:

1. Varghese.P.C, Building Materials, Second Edition, Prentice Hall Inc., 2015.
2. Dr.S.K.Sharma, Building Construction, S. Chand and Company Ltd., 2014.
3. P.Purushothama Raj, Building Construction Materials and Techniques, Pearson India Education Ltd. 2016.
4. Santhakumar.A.R., Concrete Technology, Oxford University Press ,India, 2006

REFERENCES:

1. Rajput.R.K., Engineering Materials, Fifth Edition, S. Chand and Company Ltd., 2014.
2. Shetty.M.S., Concrete Technology (Theory and Practice), S. Chand and Company Ltd., 2013.
3. Varghese.P.C., Building Constructions, PHI Learning Private Limited, 2007
4. Punmia, B.C., Building Construction, Laxmi Publications (P) Ltd., 2016
5. Peurifoy, R.L, Schexnayder,C.J., Shapira,A., Schmitt. R., Construction Planning, Equipment and Methods, Tata McGraw-Hill, 2010.

5. URBAN PLANNING AND DEVELOPMENT

OBJECTIVES:

To enable students to have the knowledge on planning process and to introduce to the students about the regulations and laws related to Urban Planning.

UNIT I BASIC ISSUES Definition of Human settlement, Urban area, Town, City, Urbanisation, Suburbanisation, Urban sprawl, Peri-urban areas, Central Business District (CBD), Classification of urban areas – Trend of Urbanisation at International, National, Regional and State level.

UNIT II PLANNING PROCESS

Principles of Planning – Types and Level of Plan, Stages in Planning Process – Goals, Objectives, Delineation of Planning Areas, Surveys and Questionnaire Design.

UNIT III DEVELOPMENT PLANS, PLAN FORMULATION & EVALUATION

Scope and Content of Regional Plan, Master Plan, Detailed Development Plan, Development Control Rules, Transfer of Development Rights , Special Economic Zones- Development of small town and smart cities-case studies

UNIT IV PLANNING AND DESIGN OF URBAN DEVELOPMENT PROJECTS

Site Analysis, Layout Design, Planning Standards, Project Formulation – Evaluation, Plan Implementation, Constraints and Implementation, Financing of Urban Development Projects.

UNIT V LEGISLATION, DEVELOPMENTAND MANAGEMENT OF URBAN SYSTEM

Town and Country Planning Act, Land Acquisition and Resettlement Act etc., Urban Planning Standards and Regulations, Involvement of Public, Private, NGO, CBO and Beneficiaries.

OUTCOMES:

The students completing the course will have the ability to

- describe basic issues in urban planning
- formulate plans for urban and rural development and
- plan and analyse socio economic aspects of urban and rural planning

TEXTBOOKS:

1. Goel, S.L Urban Development and Management, Deep and Deep publications, New Delhi 2002
2. George Chadwick, A Systems view of planning, Pergamon press, Oxford 1978
3. Singh V.B, Revitalised Urban Administration in India, Kalpaz publication, Delhi, 2001
4. Edwin S.Mills and Charles M.Becker, Studies in Urban development, A World Bank publication, 1986

REFERENCES:

1. Tamil Nadu Town and Country Planning Act 1971, Government of Tamil Nadu, Chennai
2. Goel S.L., Urban Development and Management, Deep and Deep Publications, New Delhi, 2002
3. Thooyavan, K.R., Human Settlements – A Planning Guide to Beginners, M.A Publications, Chennai, 2005
4. CMDA, Second Master Plan for Chennai, Chennai 2008

6. PROJECT FORMULATION AND APPRAISAL

OBJECTIVES:

To study and understand the formulation, costing of construction projects, appraisal, Risk analysis and Project finance.

UNIT I PROJECT FORMULATION

Project – Concepts – Capital Budgeting - Generation and Screening of Project Ideas - Project identification –Pre Feasibility Report and its Clearance - Project Estimates and Techno-Economic Feasibility Report- Detailed Project Report.

UNIT II PROJECT COSTING

Project Cash Flows – Time Value of Money – Cost of Capital.

UNIT III PROJECT APPRAISAL

NPV – BCR – IRR – ARR – Urgency – Pay Back Period – Assessment of Various Methods – Indian Practice of Investment Appraisal – International Practice of Appraisal

UNIT IV RISK ANALYSIS IN CAPITAL BUDGETING

Introduction, Types and Sources of Risk in Capital Budgeting, Risk Adjusted Discount Rate, Certainty Equivalent Approach, Probability Distribution Approach, Sensitivity Analysis, Simulation Analysis, Decision Tree Approach

UNIT V PROJECT FINANCING

Project Finance – Means of Finance – Financial Institutions – Special Schemes – Key Financial Indicators – Ratios – Public Private Partnership.

OUTCOME:

On completion of this course the students will be able to know the formulations of projects, projects costing, appraisal and financing.

REFERENCES:

1. Prasanna Chandra, "Projects – Planning, Analysis, Selection, Implementation Review", McGraw Hill Publishing Company Ltd., 8th Edition, New Delhi. 2014.
2. Joy P.K., "Total Project Management - The Indian Context", New Delhi, Macmillan India Ltd., 2010.
3. Rajiv Srivastava, Anil Misra, "Financial Management", Oxford University Press, 2nd Edition, New Delhi, 2015.

7. FUNDAMENTALS OF NANO SCIENCE

OBJECTIVES

To learn about basis of nanomaterial science, preparation method, types and application.

UNIT I INTRODUCTION

Nanoscale Science and Technology- Implications for Physics, Chemistry, Biology and Engineering-Classifications of nanostructured materials- nano particles- quantum dots, nanowires-ultra-thinfilms-multilayered materials. Length Scales involved and effect on properties: Mechanical, Electronic, Optical, Magnetic and Thermal properties. Introduction to properties and motivation for study (qualitative only).

UNIT II GENERAL METHODS OF PREPARATION

Bottom-up Synthesis-Top-down Approach: Co-Precipitation, Ultrasonication, Mechanical Milling, Colloidal routes, Self-assembly, Vapour phase deposition, MOCVD, Sputtering, Evaporation, Molecular Beam Epitaxy, Atomic Layer Epitaxy, MOMBE.

UNIT III NANOMATERIALS

Nanoforms of Carbon - Buckminster fullerene- graphene and carbon nanotube, 92 Single wall carbon Nanotubes (SWCNT) and Multi wall carbon nanotubes (MWCNT)- methods of synthesis(arc-growth, laser ablation, CVD routes, Plasma CVD), structure -property Relationships applications- Nanometal oxides- ZnO, TiO_2,MgO, ZrO_2, NiO, nanoalumina, CaO, $AgTiO_2$, Ferrites, Nanoclays-functionalization and applications-Quantum wires, Quantum dotspreparation, properties and applications

UNIT IV CHARACTERIZATION TECHNIQUES

X-ray diffraction technique, Scanning Electron Microscopy - environmental techniques, Transmission Electron Microscopy including high-resolution imaging, Surface Analysis techniques-AFM, SPM, STM, SNOM, ESCA, SIMS-Nanoindentation

UNIT V APPLICATIONS

NanoInfoTech: Information storage- nanocomputer, molecular switch, super chip, nanocrystal,
Nanobiotechlogy: nanoprobes in medical diagnostics and biotechnology, Nano medicines, Targetted drug delivery, Bioimaging - Micro Electro Mechanical Systems (MEMS), Nano Electro Mechanical Systems (NEMS)- Nanosensors, nano crystalline silver for bacterial inhibition, Nanoparticles for sunbarrier products - In Photostat, printing, solar cell, battery

OUTCOMES: Upon completing this course, the students

Will familiarize about the science of nanomaterials
Will demonstrate the preparation of nanomaterials
Will develop knowledge in characteristic nanomaterial

TEXT BOOKS

A.S. Edelstein and R.C. Cammearata, eds., "Nanomaterials: Synthesis, Properties and Applications", Institute of Physics Publishing, Bristol and Philadelphia, 1996.

N John Dinardo, "Nanoscale charecterisation of surfaces & Interfaces", 2nd edition, Weinheim Cambridge, Wiley-VCH, 2000

REFERENCES

G Timp (Editor), "Nanotechnology", AIP press/Springer, 1999.

Akhlesh Lakhtakia (Editor),"The Hand Book of Nano Technology,Nanometer Structure, Theory, Modeling and Simulations". Prentice-Hall of India (P) Ltd, New Delhi, 2007.

8. RAILWAYS, AIRPORTS AND HARBOUR ENGINEERING

OBJECTIVE:

To introduce the students about Railways planning, design, construction and maintenance and planning design principles of airport and harbour

UNIT I RAILWAY PLANNING AND CONSTRUCTION

Elements of permanent way – Rails, Sleepers, Ballast, rail fixtures and fastenings, Selection of gauges - Track Stress, coning of wheels, creep in rails, defects in rails – Route alignment surveys, conventional and modern methods--Geometric design of railway, gradient, super elevation, widening of guage on curves- Level Crossings. .

UNIT II RAILWAY CONSTRUCTION AND MAINTENANCE

Earthwork – Stabilization of track on poor soil - Tunneling Methods, drainage and ventilation Calculation of Materials required for track laying - Construction and maintenance of tracks – Railway Station and yards and passenger amenities

UNIT III AIRPORT PLANNING

Air transport characteristics-airport classification-air port 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 IV AIRPORT DESIGN

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

UNIT V HARBOUR ENGINEERING

Definition of Basic Terms: Harbour, 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 – Inland Water Transport – Wave action on Coastal Structures and Coastal Protection Works – Environmental concern of Port Operations – Coastal Regulation Zone, 2011

OUTCOMES:

On completing the course, the students will have the ability to Plan and Design various civil Engineering aspects of Railways, Airports and Harbour.

TEXTBOOKS:

1. Subramanian K.P., Highways, Railways, Airport and Harbour Engineering, Scitech Publications (India), Chennai, 2010
2. Saxena Subhash, C.and Satyapal Arora, ACourse in Railway Engineering, DhanapatRai and Sons, Delhi, 1998
3. Khanna.S.K. Arora.M.G and Jain.S.S, Airport Planning and Design, Nemachand and Bros, Roorkee, 1994

REFERENCES:

1. C.Venkatramaiah., Transportation Engineering-Vol.2 Railways, Airports, Docks and Harbours, Bridges and Tunnels., Universities Press (India) Private Limited, Hyderabad, 2015.
2. Mundrey J S, Railway Track Engineering, McGraw Hill Education (India) Private Ltd, New Delhi, 2013.