Kandula Srinivasa Reddy Memorial College of Engineering, Kadapa

(Affiliated to JNTUA, Anantapuramu, Accredited By NBA, Accredited By NAAC)
(An ISO 9001-2000 Certified Institute)

Regulations for UG Programs in Engineering (R14UG)

(Approved on 25-08-2014)

KSRM College of Engineering, Kadapa-516003, AP

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Regulations for UG Programs in Engineering

1.0 Nomenclature

1.1 *Academic Term*: Extent of time during which academic instructions are initiated and completed

1.2 *Academic Year*: Academic Term of, approximately, one year duration that usually starts in June/July and ends in April/May next

1.3 *Semester*: Either of two Academic Terms that make up an Academic Year

1.4 *Major*: A specific field of study. Example: Civil Engineering

1.5 *Minor*: An area outside of, or complementary to, a Major. Example: For Civil Engineering major, Computer Science is a minor and vice versa

1.6 *Subject*: An area of knowledge that is studied as part of a Course

1.7 *Core*: A subject that is mandatory for a Major course of study

1.8 *Elective*: A subject that is selected for study to suit one's individual needs

1.9 *Audit Subject*: A subject that is studied to meet certain requirements but has no credits assigned to it

1.10 *Self-Study Subject*: A subject that is learnt by a student on own under the guidance of a Faculty member

1.11 *Humanities*: Subjects that describe and interpret human achievements, problems and historical changes at individual and societal levels covering the disciplines of literature, history, and philosophy

1.12 *Social Sciences*: Subjects that describe the mental and behavioural activities of individuals, groups, organizations, institutions, and nations covering the disciplines of anthropology, economics, linguistics, political science, and psychology

1.13 *Exam*: A test to measure one's progress, knowledge, or ability in a subject

1.14 *Credit*: A numerical weight given to a subject

1.15 *Grade*: A numerical or alphabetic designation measuring the level of achievement in an exam

1.16 *Attendance*: Physical presence of oneself in a classroom/laboratory for purpose of a scheduled academic instruction

1.17 *Course*: A series of subjects that constitute a Major field of study

1.18 *Branch*: Same as Course

1.19 *Program*: Same as Course

1.20 *Degree*: An academic title conferred to honour distinguished achievement

2.0 Short Title and Application

2.1 These rules and regulations may be called as R14UG and come into force from Academic Year 2014-15 and exist until superseded by new regulations

2.2 These rules and regulations are applicable to all under graduate courses in engineering and technology leading to Bachelor's Degree in Technology (B. Tech)

2.3 The Major courses offered, at present, are:

2.3.1 Civil Engineering

2.3.2 Electrical and Electronics Engineering

2.3.3 Mechanical Engineering

2.3.4 Electronics and Communications Engineering

2.3.5 Computer Science and Engineering

2.3.6 Chemical Engineering

2.4 The Institute may offer new Majors in future to which these rules and regulations will be applicable

3.0 Suspension and Amendment of Rules

3.1 Academic Council has the authority to suspend a rule temporarily

3.2 Academic Council has the authority to amend a rule

3.3 For affirmative action on any suspension or amendment of a rule, an affirmative vote of three-fifths of the members present and voting shall be required in Academic Council

4.0 Requirements for Admission

4.1 At present, admissions into first-year class of various Majors are governed by Government and the Affiliating University. The eligibility criteria and procedure for admission are prescribed by Government and Affiliating University

4.2 A student is not allowed change of Major after admission into first-year

4.3 A student must fulfil medical standards required for admission

4.4 The selected students are admitted into first-year class after payment of the prescribed fees

5.0 Structure of the B. Tech course

5.1 Duration: The duration of B. Tech degree course is four academic years

5.2 Terms: At present, the four academic years consists of one Academic Year term for First-year and two semester terms for each of second, third, and fourth academic years of study

5.3 Working Days: Calendar for any academic term shall be announced at least four weeks before its commencement. Minimum number of working days are 180 and 90 for year- and semester-terms respectively

5.4 Curriculum: Each Major shall have core, elective and audit subjects drawn from five categories of subject areas - i) Basic Sciences (BS), ii) Humanities and Social Sciences (HS), iii) Basic Engineering and Design (ED), iv)

Professional Major (PJ), and v) Professional Minor (PN). The curriculum for each Major shall be approved by its corresponding Board of Studies and then by the Academic Council. First year curriculum is common to all Majors

5.5 Credits: All subjects that are assessed for marks have credits assigned to them. The credits assigned to subjects shall be given in curriculum. The total number of credits for entire course is 180 for all Majors. The distribution of total credits Academic Term-wise is given in Table 1

Table 1Academic Term-wise Total Credits

Academic Term	Total Credits
First Year	45
Second Year – First Semester	22
Second Year – Second Semester	22
Third Year – First Semester	22
Third Year – Second Semester	22
Fourth Year – First Semester	22
Fourth Year – Second Semester	25
Total for entire course	180

5.6 The curriculum and syllabus is given in Annexure-1 and Annexure-2 respectively

5.7 Responsibility and Advising: It is the responsibility of the student to understand and know the regulations and requirements to earn the degree. Each student admitted in to the degree programs is assigned to a Faculty Advisor who assists the student in designing an effective program of study. Students should consult their Faculty Advisors for selection of electives and for general advice on academic program

6.0 Registration and Enrolment

6.1 Prior to opening of each regular term, every student shall register for all the credit-bearing and audit subjects listed in curriculum of the term. Excepting first-year, the registration for a term shall be done during a specified week after end examinations of previous term. In first-year, the registration shall be done within six working days from date of joining. Recommendation of Faculty Advisor is needed for registration

6.2 A student can also register optionally for one self-study subject per term that does not carry any credits. A student can take any subject of any Major as self-study subject, satisfying any prerequisites if any, on the recommendation of concerned Faculty Advisor

6.3 Late registration will be permitted with a fine, decided from time to time, up to six working days from the last date specified for registration

6.4 A student will be eligible for registration for a term if she or he i) is promoted to that term, ii) has cleared all fees to the Institute, library and hostel of previous term, and iii) is not disqualified for registration by a disciplinary action of the Institute

6.5 A student will be enrolled and allowed to attend the classes on successful registration and payment of necessary fees to Institution, library, and hostel

6.6 Registration and enrolment will be controlled by the Office of the Controller of Examinations

7.0 Assessment Procedure – Internal Tests and End Examinations

7.1 Performance of students in all subjects is assessed continuously through internal assessment tests and an End examination

7.2 Allocation of internal assessment and End examination marks

7.2.1 For theory subjects, the allocation is 30 marks for internal assessment and 70 marks for End examination totalling 100 marks

7.2.2 For laboratory/drawing/project work subjects, the allocation is 50 marks for internal assessment and 50 marks for End examination totalling 100 marks

7.2.3 For seminar/viva voce/industrial training subjects' total 100 marks are allocated for internal assessment. There shall be no end examination for these subjects

7.2.4 For all audit subjects the allocation is 30 marks for internal assessment and no allocation for End examination

7.3 Internal Assessment Examinations

7.3.1 Internal assessment means performance evaluation of students by faculty members who teach the subjects

7.3.2 For theory subjects, including audit subjects, the internal assessment shall be done by midterm tests. For a year-term subject three midterm tests shall be conducted. For a semester-term subject two midterm tests shall be conducted. The faculty member of the concerned subject will assess the marks in midterm tests.

Each midterm test will be of one and half hour duration and evaluated for 30 marks. Internal assessment marks in a subject will be calculated as weighted sum of individual midterm test marks in that subject. For a year-term subject the weights are: 20% for the least midterm mark and 40% weight for each of remaining two midterm marks. For a semester-term subject the weights are: 20% for the least midterm marks and 80% for the other midterm mark. Any fractional mark after adding all contributions is rounded up to next integer mark

If any student abstains for any midterm test, she or he will be awarded zero marks for that midterm test.

7.3.3 For laboratory/practical/drawing subjects, the internal assessment will be based on regular laboratory work over full term. The assessment will be done by the faculty concerned. The students shall be informed sufficiently early of the procedure to be followed for internal assessment

7.3.4 For self-study subjects, the assessment is through assignments, quizzes, seminars and/or viva-voce. The students shall be informed sufficiently early of the procedure to be followed for assessment

7.3.5 For subjects like seminar, project-work, industrial training, and comprehensive viva-voce, the internal assessment will be done by a Department Committee consisting of two senior faculty members and faculty guide of concerned student. The assessment procedure will be informed sufficiently early to the students

7.4 End examinations

7.4.1 End examinations shall be conducted after completion of coursework in each term

7.4.2 The question papers for theory subjects shall be set by faculty members outside of the Institute. The external faculty members for question paper setting shall be appointed by the Principal

7.4.3 Evaluation of answer scripts shall be done by faculty members from outside of the Institute appointed by the Principal

7.4.4 For laboratory subjects, end examination shall be conducted by a committee consisting of two internal examiners. One examiner shall be appointed by Head of Department of concerned Major, and the other examiner shall be appointed by the Principal

7.4.5 For project work viva-voce, end examination shall be conducted by a committee consisting of one internal examiner, one external examiner, and the concerned guide of the student. Internal examiner shall be appointed by Head of Department of concerned Major, and the external examiner shall be appointed by the Principal

7.4.6 If a student abstains from End examination of any subject, for any reason, she or he shall be awarded zero marks in that subject

7.4.7 There is no end examination for self-study and audit subjects

8.0 Method of Assigning Letter Grades and Grade Points

8.1 For all credit-bearing subjects, performance of a student in a subject is indicated by a letter grade that corresponds to absolute marks earned in that subject. Each letter grade is assigned a numeric Grade Point that is used to compute Grade Point Average on a scale of 0 to 10

8.2 Performance of a student in both internal assessment and End examination will be considered for awarding grades for credit bearing subjects. Total marks earned in a subject is the sum of marks obtained in internal and End examinations in that subject

8.3 Pass grade A+ to D- is assigned to a subject based on total marks earned in that subject provided that a student earns at least i) 35% of marks in End

examination marks and ii) 40% of marks in internal and End examination marks put together; otherwise fail grade F will be assigned to that subject

8.4 Grade I will be assigned to a subject if a disciplinary action is pending and is not resolved before publication of results. Office of Controller of Examinations shall resolve the pending disciplinary action within six working days from the date of publication of results and change the grade to any of A+ to D- or F

8.5 Grade X will be assigned to a subject if a student abstains for End examination of that subject

8.6 The absolute marks and corresponding letter grade and grade points are given in Table2

Table 2 Letter Grades and Grade Points

Absolute Marks	Letter Grade	Grade Points	Remark
95-100	A+	10.0	Pass
90-94	A	9.5	Pass
85-89	A-	9.0	Pass
80-84	B+	8.5	Pass
75-79	B	8.0	Pass
70-74	B-	7.5	Pass
65-69	C+	7.0	Pass
60-64	C	6.5	Pass
55-59	C-	6.0	Pass
50-54	D+	5.5	Pass
45-49	D	5.0	Pass
40-44	D-	4.5	Pass
0-39	F	0.0	Fail
-	I	0.0	Result Withheld
-	X	0.0	Absent for End Exam

8.7 SGPA: Semester Grade Point Average indicates the performance of a student in all credit-bearing subjects of a term. SGPA is calculated as the weighted average of Grade Points of all subjects of the term with corresponding credits of subjects as weights. Audit and self-study subjects are not considered for SGPA calculation

8.8 CGPA: Cumulative Grade Point Average indicates the performance of a student in all terms up to and including the current term under consideration. CGPA is calculated as the weighted average of SGPAs with total credits in each term as the weights

8.9 Grade Card: All students shall be issued Grade Cards after the publication of results of a term. Grade Card is a statement of performance of a student in a term. It contains information about each registered subject: type of subject, allocated credits, and letter grade earned. SGPA and CGPA will also be indicated

9.0 Requirements for Completing Subjects

9.1 A student shall complete all credit-bearing and audit subjects successfully to be eligible for award of degree

9.2 Credit-bearing subjects: A student is considered to have completed a credit-bearing subject successfully and earned credits if she or he obtains a pass grade from A+ to D- in that subject. If a student receives fail grade F or X in any subject, she or he must register for supplementary End examination for that subject as and when opportunity arises and improve grade to pass grade

9.3 Audit subjects: A student is considered to have successfully completed an audit subject if she or he earns at least 40% of marks in internal assessment marks. A student may request for makeup tests to satisfy this requirement by paying requisite fee

9.4 Self-study subjects: Based on internal assessment, the faculty guide concerned will certify whether a student has successfully completed the subject or not. Grade card will list successfully completed self-study subjects

10.0 Requirements for taking End Examinations and Promotion

10.1 A student is eligible to take regular End Examinations of current term if she or he full fills the attendance requirement

10.2 A student shall be promoted from current term to succeeding term on satisfying the attendance and total credits-earned requirements

10.3 Attendance Requirement

10.3.1 Attendance of students shall be recorded for credit-bearing and audit subjects as per the workload indicated in curriculum

10.3.2 Total class-periods conducted shall be reckoned from beginning to end of a term as published in academic calendar

10.3.3 Aggregate Percentage of Attendance is calculated using total number of class-periods attended as numerator and total number of class-periods conducted for the concerned class as the denominator

10.3.4 A minimum aggregate attendance of 75% is required for promotion to succeeding term and be eligible to take End examinations of current term

10.3.5 A student can appeal to the Principal for condoning deficiency in aggregate attendance if she or he gets 65% or more aggregate attendance presenting a valid reason for deficiency. Such a student will be granted promotion if the Principal pardons the deficiency. Principal has the right to reject the appeal if he/she is not satisfied with the

performance of the student or the reason cited for deficiency of the attendance

10.3.6 A student earning less than 65% aggregate attendance will be denied promotion. A student who is not promoted on basis of attendance shall be removed from the rolls and shall register for the same term when opportunity arises. The current term record of the student is cancelled automatically

10.4 Credits-Earned Requirement

10.4.1 This rule is applicable for promotion of a student from second-year second-semester to third-year first-semester, and from third-year second-semester to fourth-year first-semester

10.4.2 A student who is denied promotion for want of requisite credits shall take supplementary examinations, as and when offered, and earn credits to be eligible for promotion

10.4.3 For promotion from second-year second-semester to third-year first-semester, a student must earn at least 26 credits from first year and second year–first semester subjects

10.4.4 For promotion from third-year second-semester to forth-year first semester, a student must earn at least 44 credits from first year, second year and third year–first semester subjects

10.5 A student can forego promotion and opt to repeat the current term on written request. Recommendation of the concerned Faculty Advisor is required for cancellation of promotion. This option shall be exercised before the commencement of the End examinations of the current term[$]

11.0 Revaluation of End Examination Scripts

11.1 Revaluation of End Examination scripts is allowed for theory subjects only by paying requisite fee

11.2 Procedure for Revaluation: The current valuation is annulled and the script will be sent for revaluation by an external examiner appointed by the Principal. Marks obtained in the revaluation will be awarded for that subject

11.3 A student can apply for revaluation in a subject only once

12.0 Supplementary End Examinations

12.1 Students are eligible to take Supplementary examinations in subjects with fail grade F or X only

12.2 Supplementary examinations for first year subjects will be conducted along with supplementary semester examinations of second, third and fourth year subjects

12.3 Supplementary examinations for even semester subjects will be conducted with regular examinations of odd semester subjects

12.4 Supplementary examinations for odd semester subjects will be conducted with regular examinations of even semester subjects

12.5 For subjects of second semester of fourth year special supplementary examinations will be conducted in second week following the results publication date of the current semester

12.6 A student will be allowed to improve grade in any theory subject provided she or he has completed coursework of all terms but before award of provisional/final degree[$]

13.0 Requirements for Award of B. Tech degree

13.1 Time Limit for completion of requirements for award of degree is eight calendar years from the date of admission. A student who could not complete all the requirements in this time limit shall forego admission and will be removed from the rolls of the Institute

13.2 A student shall be eligible for award of B. Tech degree provided she or he has:

13.2.1 Registered and successfully completed all required credit-bearing and audit subjects with a total of 180 credits

13.2.2 Secured a CGPA of 4.5 or more

13.2.3 Cleared all dues to the Institute, library and hostel

13.2.4 No disciplinary action is pending against her or him

13.2.5 Satisfied any other stipulation of the affiliating University

13.3 Award of Class: Each student will be given class in degree based on CGPA as follows:

Table 3 Class of Degree

Class of Degree	Range of CGPA
Pass Class	>= 4.5 but <5.5
Second Class	>= 5.5 but <6.5
First Class	>= 6.5 but <7.5
First Class with Distinction	>= 7.5

13.4 Degree will issued under the seal of affiliating University

14.0 Transitory Regulations

14.1 A student who initially joins the Institute in a previous Regulation and has to re-join in an academic-term of the present Regulations, due to any reason, shall be bound by the rules of the current Regulations. Board of Studies of the concerned Major will specify, extra or otherwise, academic coursework to be undertaken by such students who re-join the current Regulations

[$]Decision is pending on this clause

Annexure-1 Curriculum for B. Tech (Civil Engineering)

First Year

Subject Code	Subject Category	Subject Title	L	T	P	IM	EM	CR
14211001	BS	Mathematics-1	3	1	0	30	70	5
14211002	BS	Mathematics-2	3	1	0	30	70	5
14221003	BS	Engineering Physics	2	0	0	30	70	3
14231004	BS	Engineering Chemistry	2	0	0	30	70	3
14241005	HS	English	2	0	0	30	70	3
14031006	ED	Engineering Drawing	1	0	3	30	70	5
14051007	ED	Problem Solving and Programming in C	3	0	0	30	70	5
14991008	ED	Engineering Workshop	0	0	3	50	50	4
14051009	ED	Programming in C Lab	0	0	3	50	50	4
14991010	BS	Engineering Sciences Lab	0	0	3	50	50	4
14241011	HS	English Language and Communication Skills Lab	0	0	3	50	50	4
		Total	16	2	15	410	690	45

Second Year – First Semester

Subject Code	Subject Category	Subject Title	L	T	P	IM	EM	CR
14022101	PN	Basic Electrical and Electronics Engineering	3	1	0	30	70	3
14212102	BS	Probability and Statistics	3	1	0	30	70	3
14012103	ED	Engineering Mechanics	3	1	0	30	70	3
14012104	PJ	Mechanics of Materials-1	3	1	0	30	70	3
14012105	PJ	Introduction to Surveying	3	1	0	30	70	3
14012106	PJ	Building Materials	3	1	0	30	70	3
14012107	PJ	Surveying Lab-1	0	0	3	50	50	2
14012108	PJ	Strength of Materials Lab	0	0	3	50	50	2
14022109	PN	Basic Electrical and Electronics Engineering Lab[#]	0	0	3	-	-	-
		Total	18	6	9	280	520	22

Second Year – Second Semester

Subject Code	Subject Category	Subject Title	L	T	P	IM	EM	CR
14012201	PJ	Engineering Geology	3	0	0	30	70	3
14012202	HS	Environmental Studies#	3	0	0	-	-	-
14012203	PJ	Mechanics of Materials-2	3	1	0	30	70	3
14012204	PJ	Advanced Surveying	3	1	0	30	70	3
14012205	PJ	Fluid Mechanics-1	3	1	0	30	70	3
14012206	PJ	Building Construction	3	1	0	30	70	3
14012207	PJ	Structural Analysis	3	1	0	30	70	3
14012208	PJ	Surveying Lab 2	0	0	3	50	50	2
14012209	ED	Computer Aided Building Drawing Lab	0	0	3	50	50	2
		Total	21	5	6	280	520	22

Third Year – First Semester

Subject Code	Subject Category	Subject Title	L	T	P	IM	EM	CR
14013101	PJ	Matrix Methods of Structural Analysis	3	1	0	30	70	3
14013102	PJ	Fluid Mechanics-2	3	1	0	30	70	3
14013103	PJ	Soil Mechanics	3	1	0	30	70	3
14013104	PJ	Introduction to Reinforced Concrete Design	3	1	0	30	70	3
14013105	PJ	Hydraulic Machinery	3	1	0	30	70	3
14013106	PJ	Water Supply Engineering	3	1	0	30	70	3
14013107	PJ	Fluid Mechanics and Hydraulic Machinery Lab	0	0	3	50	50	2
14013108	PJ	Soil Mechanics Lab-1	0	0	3	50	50	2
14013109	PJ	Engineering Geology Lab#	0	0	3	-	-	-
14013110	PJ	Industrial Training Seminar#	0	0	0	-	-	-
		Total	18	6	9	280	520	22

Third Year – Second Semester

Subject Code	Subject Category	Subject Title	L	T	P	IM	EM	CR
14253201	HS	Managerial Economics and Financial Analysis	3	0	0	30	70	3
14013202	PJ	Highway Engineering	3	1	0	30	70	3
14013203	PJ	Design of Steel Structures	3	1	0	30	70	3
14013204	PJ	Wastewater and Solid Waste Engineering	3	1	0	30	70	3
14013205	PJ	Hydrology	3	1	0	30	70	3
14013206 14013207 14013208	PJ	Elective-1 1. Concrete Technology 2. Prestressed Concrete Design 3. Construction Planning and Management	3	1	0	30	70	3
14013209	PJ	Environmental Engineering Lab	0	0	3	50	50	2
14013210	PJ	Concrete Technology Lab	0	0	3	50	50	2
		Total	18	5	6	280	520	22

Fourth Year – First Semester

Subject Code	Subject Category	Subject Title	L	T	P	IM	EM	CR
14014101	PJ	Advanced Reinforced Concrete Design	3	1	0	30	70	3
14014102	PJ	Traffic Engineering	3	1	0	30	70	3
14014103	PJ	Irrigation and Hydraulics Structures	3	1	0	30	70	3
14014104	PJ	Quantity Surveying and Valuation	3	1	0	30	70	3
14014105	PJ	Foundation Engineering	3	1	0	30	70	3
14014106 14014107 14014108	PN	Elective-2 1. Introduction to Optimization Techniques 2. Introduction to Digital Image Processing 3. Introduction to Database Concepts	3	1	0	30	70	3
14254109	HS	Professional Ethics[#]	3	0	0	-	-	-
14014110	PJ	Highway Engineering Materials Lab	0	0	3	50	50	2
14014111	PJ	Soil Mechanics Lab-2	0	0	3	50	50	2
		Total	21	6	6	280	520	22

Fourth Year – Second Semester

Subject Code	Subject Category	Subject Title	L	T	P	IM	EM	CR
14014201	PJ	Design and Drawing of Irrigation Structures	2	0	2	30	70	3
14014202	PJ	Remote Sensing & GIS	3	1	0	30	70	3
14014203 14014204 14014205	PJ	Elective-3 1. Basic Soil Dynamics and Machine Foundations 2. Bridge Engineering 3. Repair and Rehabilitation of Structures	3	0	0	30	70	3
14014206 14014207 14014208	PJ	Elective-4 1. Railways, Docks and Harbour Engineering 2.Hydropower Engineering 3.Disaster Management and Mitigation	3	0	0	30	70	3
14014209	PJ	Project	0	0	0	50	50	10
14014210	PJ	Comprehensive Viva-voce	0	0	0	100	0	3
		Total	11	1	2	270	330	25

Legend: L-Lecture Periods/week; T-Tutorial Periods/week; P-Lab/Drawing Periods per week; IM-Internal Assessment Marks; EM-End Exam Marks; CR-Credits; PJ-Professional Major; PN-Professional Minor; BS-Basic Sciences; HS-Humanities and Social Sciences; ED-Basic Engineering and Design
# Indicates Audit Subject

Term-wise Summary of Marks and Credits

Term	IM	EM	CR
First Year	410	690	45
Second Year – First Semester	280	520	22
Second Year – Second Semester	280	520	22
Third Year – First Semester	280	520	22
Third Year – Second Semester	280	520	22
Fourth Year – First Semester	280	520	22
Fourth Year – Second Semester	270	330	25
Total	2080	3620	180
	5700		

Composition of Curriculum

Subject Category	TS	TC	%C
Basic Sciences	6	23	12.8
Humanities and Social Sciences	6	19	10.6
Basic Engineering and Design	5	21	11.7
Professional Major	41	111	61.7
Professional Minor	4	6	3.3
Total	62	180	100.0

Legend: TS-Total subjects (including Audit Subjects); TC-Total credits; %C-Percentage credits

Annexure-2: Syllabus

Subject Code	Subject Category	Subject Title	L	T	P	IM	EM	CR
14211001	BS	Mathematics-1	3	1	0	30	70	5

Objectives:

* To make the students to understand differential equations and to make use these equations not only in mathematics but also in solving engineering problems.

* To make the students to understand the importance of differential calculus double integrals and triple integrals.

* To make the students to understand Fourier series and apply them in solving problems.

* To inculcate the concept of partial differential equations and its application to solve wave equation and heat equations.

Unit I: Differential equations of first order and first degree: Exact, Non exact, Linear and Bernoulli equations. Applications: Orthogonal trajectories, Newton's law of cooling, Law of natural growth and decay.

Linear differential equations of second and higher order with constant coefficients andR.H.S term of the type e^{ax}, sin ax, cosax, polynomials in x , e^{ax} V(x), xV(x) - Method of variation of parameters – Cauchy's linear equation –Legendre's linear equation.

Unit II: Taylor's series – Maclaurin's series – Functions of two or more variables Jacobians – Maxima and minima of functions of two variables – Lagrange's method of undetermined multipliers.Radius of curvature.Curve tracing – Cartesian, polar and parametric curves.

Unit III:Multiple Integrals: Evaluation of double integrals in Cartesian coordinates,and polar coordinates - Change of variables in double integrals - Change the order of integration in double integrals - Evaluation of triple integrals in Cartesian and polar coordinates - Change of variables in triple integrals –Areas by double integration-Volumes by triple integrals.

Unit IV: Fourier series: Determination of Fourier coefficients - Fourier series - Even and odd functions - Fourier series in an arbitrary interval - Functions having points of discontinuity- Half range Fourier sine and cosine expansions. Parseval's formulae – Complex form of Fourier series – Practical harmonic analysis.

Unit V:Partial Differential Equations: Formation of partial differential equations by eliminating arbitrary constants and arbitrary functions - Method of separation of variables. Solution of one dimensional wave equation - Solution of one dimensional heat equation -Solution of Laplace's equation.

Text Books:

1. Higher Engineering Mathematics, Dr. B.SGrewal, Khanna Publishers-42 edition.
2. Advanced Engineering Mathematics, Erwin Kreyszig, Willey Publications, 9th edition- 2013

Reference Books:

1. Higher Engineering Mathematics, B.VRamana, Mc. Graw Hill Education(India) Private Limited.
2. Engineering Mathematics Volume -1, Dr. D.S Chandra Sekharaiah, Prism Books Pvt. Limited.

3. Advanced Engineering Mathematics by N. Bali, M Goyal, Firewall Media 7th edition.

Outcomes:

- Students are able to understand and apply differential equations in solving hydro dynamics and fluid mechanics problems.
- Students are able to apply Fourier series in harmonic analysis.
- Students are able to understand wave equation and heat equations and solve them by the method of separation of variables.

Subject Code	Subject Category	Subject Title	L	T	P	IM	EM	CR
14211002	BS	Mathematics-2	3	1	0	30	70	5

Objectives:

* This course aims at providing the students with the concepts of matrices and basics of linear algebra which will be useful in solving simultaneous linear equations.

* Our emphasis will be more on logical and problem solving development in Numerical methods and their applications in solving Engineering problems when analytical methods fails.

* To make the students to understand Laplace transforms and inverse Laplace transforms.

* The students gain the knowledge about vector differentiation and vector integration.

Unit I : Matrices: – Rank – Echelon form – Normal form – Solution of linear system of homogeneous and non-homogeneous equations – Eigen values, eigen vectors for real matrices – Cayley- Hamilton theorem – Inverse and powers of a matrix. Linear transformations – Orthogonal transformations. Diagonalization of a matrix. Quadratic forms – Reduction of quadratic form to canonical form by orthogonal reduction and their nature.

Unit II : Solution of algebraic and transcendental equations - False - position method - Newton - Raphson method.
Solution of System of equations: Crout'smethod- Gauss seidel iteration method.
Interpolation – Introduction - Finite differences - Forward differences - Backward differences - Newton's forward and backward difference formulae for interpolation - Lagrange's formula for unequal intervals- Inverse interpolation.

Unit III: Numerical differentiation: Finding first and second order derivatives using Newton's formulae. Numerical integration – Newton - Cote's quadrature formula - Trapezoidal rule – Simpson's 1/3 rule – Simpson's 3/8 rule.
Numerical solution of ordinary differential equations - Solution by Taylor's series –Picard's method of successive approximations –Runge - Kutta methods of second and fourth order – Milne's predictor - corrector method.

Unit IV:Laplace transforms of standard functions – Properties of Laplace Transforms - Transforms of derivatives and integrals- Evaluation of integrals by Laplace transforms – Unit step function – Second shifting theorem – Dirac's delta function . Laplace transform of periodic functions – Convolution theorem. Inverse Laplace Transforms – Applications of Laplace transforms to ordinary differential equations.

Unit V: Vector calculus - Vector differentiation : Scalar point function - Vector point function -Vector operator Del – Gradient – Divergence - Curl and their related properties -Laplacian and Second order operators. Vector integration: Line, Surface and Volume integrals-Green's theorem in a plane, Stoke's

theorem and Gauss-divergence theorems (statement only). Application of Green's Strokes and Gauss divergence theorems.

Textbooks:

1. Higher Engineering Mathematics, Dr. B.SGrewal, Khanna Publishers-42 edition.
2. Introductory methods of Numerical Analysis, S.SSastry, 5th edition.
3. Advanced Engineering Mathematics, Erwin Kreyszig, Willey Publications, 9th edition- 2013.

References:

1. Engineering Mathematics – III B, Dr. M.KVenkata Raman, 13th edition.
2. Higher Engineering Mathematics, B.VRamana, Mc. Graw Hill Education(India) Pvt. Limited.
3. Numerical Methods, S. Arumugam, A.Thangapandi Isaac, A. Soma Sundaram, Second edition, Scitech Publications (India) Pvt. Limited.

Outcomes:

- Students are able to understand and applied numerical methods in solving simultaneous equations and transcendental equations.
- Students are able to understand Laplace transforms and vector calculus concepts and their applications.

Subject Code	Subject Category	Subject Title	L	T	P	IM	EM	CR
14221003	BS	Engineering Physics	2	0	0	30	70	3

UNIT – 1: PHYSICAL OPTICS, LASERS AND FIBRE OPTICS

INTRODUCTION:- Interference in thin films by reflection – Newton's Rings-Fraunhofer diffraction due to single slit, double slit and diffraction grating.

LASERS:- Introduction –characteristics of laser-Spontaneous and simulated demission of radiation-Einstein's coefficients-population inversion – Excitation mechanisms and optical resonator-Ruby laser – Hene laser- Application of lasers.

FIBER OPTICS:- Introduction-Construction and working principle of optical fiber-Numerical aperture and acceptance angle- Types of optical fibers- Attenuation and loses in fivers- Optical fiber communication system- Applications of optical fibers in communications sensors and medicine.

UNIT – 2: CRYSTALLOGRAPHY AND ULTRASONICS

CRYSTALLOGRAPHY:- Introduction –Space lattice –unit Cell lattice parameters- Bravis lattice – Crystal systems- Packing fractions of SC, BCC and FCC – Structures of NAcl and diamond –Directions and planes in Crystals – Miller indices – InterPlanar spacing in cubic crystals – X-ray diffraction – Bragg's law- Laue and powder methods- Defects in solide: point defects, line defects(Qualitative) – Screw and edge dislocation, Burgers Vector.

ULTRASONICS:- introduction- production of ultrasonic's by piezoelectric method- properties and detection- applications in non –destructive testing.

UNIT-3: ELEMENTS OF THERMODYNAMICS, SPECIAL THEORY OF RELATIVITY

ELEMENTS OF THERMODYNAMICS:- Introduction- concept of temperature- heat- thermodynamic-terminology –work-heat exchange-internal energy- law of conservation of energy- first law of thermodynamic- carnot-cysle- second law of thermodynamic –third law of thermodynamic.

SPECIAL THEORY OF RELATIVITY:-

Introduction-space time and motion – frame of reference – Galileo's principle of relativity- Galilean transformation – Einstein's principle of relativity-Lorentz transformation –consequences of special relativity.

UNIT- 4: SEMICONDUCTORS AND MAGNETIC MATERIALS:-

SEMICONDUCTOR PHYSICS: Introduction- Intrinsic and extrinsic semiconductors- Drift and diffusion currents and Einstein's equation- Hall effect- Direct and Indirect band gasp semiconductors- working principle of p-n junction diode, LED, Laser diode and photo diode.

MAGNETIC MATERIALS:- Introduction and basic definitions- Origin of Magnetic moments- Bohr magneton- Classification of magnetic materials into dia, para, ferro, antiferro and ferri magnetic materials- Hysteresis- Soft and hard magnetic materials and applications.

UNIT- 5: SUPER CONDUCTIVITY AND PHYSICS OF NANO-MATERIALS

SUPERCONDUCTIVITY: Introduction- Meissonier effect- Properties of Superconductors- Type I and Type II Superconductors- Flux quantization- London penetration depth- ac and dc Josephson effects- BCS theory(Qualitative)- Higher T superconductors- Applications of superconductors.

PHYSICS OF NANO-MATERIALS:- Introduction- Significance of Nano-scale- surface area and quantum confinement- physical properties: optical, thermal, mechanical and magnetic properties- Synthesis of nano-materials: ball mill, chemical vapour deposition , sol-gel, plasma arcing and thermal evaporation –Properties of carbon nanotubes- High strength applications- properties of grapheme- Graphenen-based field effect transistor- Applications of nano-materials.

Subject Code	Subject Category	Subject Title	L	T	P	IM	EM	CR
14231004	BS	Engineering Chemistry	2	0	0	30	70	3

Objectives:

- Knowledge in Chemistry serves as basic nutrient for the understanding and thereby design of materials of importance in life. Thus the advancement in Engineering depend on the outcome of basic sciences.
- The Engineering Chemistry course for undergraduate students is framed to strengthen the fundamentals of chemistry and then build an interface of theoretical concepts with their industrial/engineering applications.
- The course main aim is to impart in-depth knowledge of the subject and highlight the role of chemistry in the field of engineering.
- An attempt has been made to logically correlate the topic with its application.
- After the completion of the course, the student would understand about the concepts of chemistry in respect of water, Polymers with their applications, Energy sources, material chemistry and Advanced chemistry.

UNIT – I :

Water: Introduction, Hardness: Causes, expression of hardness – units – Types of hardness, estimation of temporary & permanent hardness of water, analysis of water, numerical problems. Boiler troubles – Scale

& Sludge formation, caustic embrittlement, corrosion, priming & foaming, Softening of water (Internal & External treatment – Lime soda, Zeolite, Ion exchange process) Reverse osmosis, electro dialysis

UNIT – II :
Polymers: Types of Polymerization, Mechanism (chain growth & Step growth). Plastics: Thermoplastic resins & Thermo set resins. Compounding of plastics, preparation, properties, engineering applications of polyethylene, PVC, Bakelite, Nylon. Conducting polymers: Poly acetylene, Polyaniline, conduction, doping, Applications. Rubber – Natural rubber, vulcanization. Elastomers – Buna-s, Butyl rubber, Thiokol Rubbers, Fibres – Polyester fiber, Inorganic polymers – Silicones.

UNIT – III :
Energy sources: Batteries, fuels, classification – conventional fuels (solid, liquid, gaseous) Solid fuels – coal and their significance, Liquid fuels – primary – petroleum – refining of petroleum – cracking, knocking, synthetic petrol – Bergius and Fischer Tropsech's process; Gaseous fuels – natural gas, analysis of flue gas by Orsat's method, combustion – problems, Calorific value of fuel – HCV, LCV, determination of calorific value by Junker's gas calorie meter. Nuclear energy, Solar cells.

UNIT – IV :
Material Chemistry: Cement: composition of Portland cement, manufacture of port land Cement, setting & hardening of cement (reactions). Refractories: Classification, Characteristics of a good refractory. Lubricants: Criteria of a good lubricant, mechanism, properties of lubricants: Cloud, point, pour point, flash & fire point, Viscocity. Rocket Propellents – Classification and Characteristics of good propellents.

UNIT – V :
Advance Chemistry: Green Chemistry: Introduction, Goals and Significance of green chemistry, basic components of green chemistry, industrial applications – products from natural materials, Green solvents, Green fuels and e-green propellents, Bio-catalysis.
Photo Chemistry: Introduction Fluorescence, Phosphorescence, Luminiscentcompounds, Photo and light responsive compounds.
Catalysis: Introduction, action of catalyst (Catalytic promoters and catalytic poisons) Types of Catalysis.
Instrumental Techniques: Chromatography, UV-visible spectroscopy, IR Spectrophotometry, AAS.

TEXTBOOKS
1. A Text Book of Engineering Chemistry, Jain and Jain, DhanapathRai Publishing Company, New Delhi, 15th Edition, 2010.
2. Text Book of Engineering Chemistry, Shashichawla, DhanapathRai Publications, New Delhi, 4th Edition, 2011.

REFERENCES
1. Text Book of Engineering Chemistry – C. Parameswara Murthy, C.V. Agarwal and Andra Naidu, BS Publications, Hyderabad, 3rd Edition, 2008.
2. Engineering Chemistry by K.B. Chandra Sekhar, UN. Das and Sujatha Mishra, SCITECH, Publications India Pvt. Limited, Chennai, 2nd Edition, 2012.
3. Text Book of Engineering Chemistry by S.S. Dara&Mukkati S. Chand & Co Publishers, New Delhi, 2006.
4. Chemistry of Engineering Materials by C.V. Agarwal, C.P. Murthy, A. Naidu, BS Publications.

Subject Code	Subject Category	Subject Title	L	T	P	IM	EM	CR
14241005	HS	English	2	0	0	30	70	3

Objectives:

a) To improve the language proficiency of the students in English with an emphasis on LSRW skills.
b) To develop an awareness in the students about the significance of silent reading and comprehension.
c) To equip the students to study academic subjects with greater facility through theoretical and practical components of the syllabus.
d) To develop study skills as well as communication skills in formal and informal situations.
e) To enable students to express themselves fluently and appropriately in social and professional contexts.
f) To develop an awareness in the students about writing as an exact and formal skill.

PART-1: DETAILED STUDY

1) A dissertation upon Roast pig – Charles Lamb
2) The post master – Rabindranath Tagore
3) Spoken English and Broken English – George Bernard Shaw
4) Building a New state - A.P. J Abdul Kalam
5) The wood Rose – AbburiChaya Devi

PART-II NON-DETAILED STUDY

1) My struggle for an education – Booker T. Washington
2) A city Night-piece – Oliver Goldsmith
3) Indian crowds – Nirad C. Chowdari
4) The worship of the wealthy – G.KChesterston
5) MokshagundamVisveswaraya – An Autobiography

Grammar & Vocabulary

1)Exercises on Comprehension, Letter Writing, Technical Report writing, E-mail Writing, Curriculum Vitae

2) Exercises onRemedial grammar covering common errors in English, Transformation covering interchange of parts of speech Active/Passive voice,Direct & Indirect Speech, Simple, Compound & Complex.

Vocabulary development covering: Synonyms & Antonyms, One word substitutes,Prefixes and suffixes, Idioms & phrases, Words often confused and paragraph writing.

Subject Code	Subject Category	Subject Title	L	T	P	IM	EM	CR
14031006	ED	Engineering Drawing	1	0	3	30	70	5

Objectives:

- By studying the engineering drawing, a student becomes aware of how industry communicates technical information. Engineering drawing teaches the principles of accuracy and clarity in presenting the information necessary about objects.
- This course develops the engineering imagination i.e., so essential to a successful design. Learning techniques of engineering drawing changes the way one thinks about technical images.
- It is ideal to master the fundamentals of engineering drawing first and to later use these fundamentals for a particular application, such as computer aided drafting. Engineering Drawing is the language of engineers and by studying this course, engineering students will eventually be able to prepare drawings of various objects being used in technology.

UNIT-1:
Introduction: Principles of Engineering Graphics and their significance- Drawing instruments and their use- Conventions in Drawing- Lettering- BIS Conventions.

Curves: (a) Conic sections –General method only (b) Cycloid, Epicycloids and Hypocycloid and (c) Involutes

UNIT- II:
Projection of Points and Lines: Principles of orthographic projection- conventions- First and Third angle projections. Projections of points, Lines inclined to one or both planes, Problems on projections, Finding True lengths & traces.

Projection of Planes: Projections of regular plane surfaces/figures, Projection of planes using auxiliary planes.

UNIT-III:
Projections of Solids: Projections of regular solids inclined to one or both planes.

Sections of Solids: Section planes and sectional views of right regular solids- Prism, Cylinder, Pyramid and Cone. True shape of sections.

UNIT- IV:
Development of Surfaces: Development of surfaces of Right regular solids- Prisms, Cylinder, Pyramid, Cone and their sectional parts.

Introduction to AutoCAD: Co-ordinate systems, Setting of Drawing space, Preparatory commands-limits, Snap, Grid and Orho, Viewing commands -Zoom, Pan &Osnap; Geometry commands (Only Line, Circle and Arc) and editing commands.

UNIT- V:
Isometric Projections: Principles of isometric projection -isometric views-Conventions- isometric views of Lines, Plane figures, Simple and Compound Solids- Isometric projection of objects having non isometric lines.

Orthographic Projections: Conversion of isometric projections/views to Orthographic Views-Conventions.

TEXT BOOKS:
1. Engineering Drawing, N.D.Bhat, Charotar Publishers
2. Engineering Drawing, K.L. Narayana,P.Khanniah, Scitech Pub.
3. Engineering Drawing, BasantAgrawal,C.M.Agrawal, Tata McGraw-Hill

REFERENCES:
1. Engineering Drawing, Shah and Rana, 2/e,Pearson Education
2. Engineering Drawing,B.V.R. Guptha,J.K.Publishers
3. Engineering Drawing and Graphics, Venugopal, New age Publishers
4. Engineering Drawing, Johle, Tata McGraw-Hill

Subject Code	Subject Category	Subject Title	L	T	P	IM	EM	CR
14051007	ED	Problem Solving and Programming in C	3	0	0	30	70	5

Objectives:

- Students will be able to understand the syntax and semantics of C programming language and other features of the language.
- To make the student solve problems, implement them using C language.

UNIT-I
Introduction to Computers: Introduction, Computer Hardware, Computer Software, Algorithms, Flowcharts.

Introduction to C: Introduction, Basic structure of 'C' program, Character set, Tokens, Keywords and Identifiers, Constants, Variables, Data types, Declaration of variables.

UNIT-II
Managing of Input/output operations, Reading a character, writing a character, Formatted input, Formatted output, Operators and Expressions.

Decision Making & Branching: If, Switch, Goto statements. Decision making and looping: While, Do, For, Break, Continue, Exit statements.

UNIT-III
Functions: Introduction, Need for user define functions, Definition of function, Return values and their types, Function declaration, Category of functions, Recursion, Passing parameters to the function, Storage classes.

Arrays: Introduction, One dimensional arrays, Declaration of one dimensional arrays, Initialization of one-dimensional arrays, Two dimensional arrays, Initializing two-dimensional arrays, Multi-dimensional arrays, Math function.

UNIT-IV
Strings: Introduction, Declaration and initializing string variables, Reading strings and writing strings, Arithmetic operations on characters, String handling functions.

Pointers: Introduction, Understanding pointers, Accessing the address of a variable, Declaration and initialization of pointer variables, Accessing a variable through its pointers.

UNIT-V
Structures and Unions: Introduction, Defining a structure, Declaring structure variables, Accessing structure members, Structure initialization, Arrays of structures, User defined data types, Unions.

File Management in C: Introduction, Defining and opening a file, Closing a file, I/O operations on files, Random access to files.

Text Books:

1. Programming in C & Data Structures, E.Balaguruswamy, 4th Edition, Tata McGraw-Hill.
2. Programming in C, ReemaThareja, Oxford University Press.

Reference Books:

1. Programming with C, Ron S Gottfried, 3rd Edition, TMH – Schuam Outline Series.
2. The C Programming Language, B.W.Kernignan& Dennis M. Ritchie, 2nd Edition 2003, PHI.

3. Let Us C, YashavanthP.Kenetkar, 7th Edition, BPB Publications, 2007.
4. Programming in C, Ajay Mittal, Pearson Education, 2010.

Subject Code	Subject Category	Subject Title	L	T	P	IM	EM	CR
14991008	ED	Engineering Workshop	0	0	3	50	50	4

PART A - ENGINEERING WORKSHOP

Objectives: The budding Engineer may turn out to be a technologist, scientist, entrepreneur, practitioner, consultant etc. There is a need to equip the engineer with the knowledge of common and newer engineering materials as well as shop practices to fabricate, manufacture or work with materials. Essentially he should know the labour involved, machinery or equipment necessary, time required to fabricate and also shouldbe able to estimate the cost of the product or job work. Hence engineering work shop practice is included to introduce some common shop practices and on hand experience to appreciate the use of skill, tools, equipment and general practices to all the engineering students.

1. TRADES FOR EXERCISES:

a. Carpentry shop– Two joints (exercises) involving tenon and mortising, grooveand tongue: Making middle lap T joint, cross lap joint, mortise and tenon Tjoint, Bridle T joint from out of 300 x 40 x 25 mm soft wood stock

b. Fitting shop– Two joints (exercises) from: square joint, V joint, half round jointor dove tail joint out of 100 x 50 x 5 mm M.S. stock

c. Sheet metal shop– Two jobs (exercises) from: Tray, cylinder, hopper or funnelfrom out of 22 or 20 guageG.I. sheet

d. House-wiring– Two jobs (exercises) from: wiring for ceiling rose and twolamps (bulbs) with independent switch controls with or without looping, wiringfor stair case lamp, wiring for a water pump with single phase starter.

e. Foundry– Preparation of two moulds (exercises): for a single pattern and adouble pattern.

f. Welding – Preparation of two welds (exercises): single V butt joint, lap joint,double V butt joint or T fillet joint

2. TRADES FOR DEMONSTRATION:

a. Plumbing
b. Machine Shop
c. Metal Cutting

Apart from the above the shop rooms should display charts, layouts, figures,circuits, hand tools, hand machines, models of jobs, materials with names suchas different woods, wood faults, Plastics, steels, meters, gauges, equipment, CDor DVD displays, First aid, shop safety etc. (though they may not be used for theexercises but they give valuable information to the student). In the class work orin the examination knowledge of all shop practices may be stressed upon ratherthan skill acquired in making the job.

REFERENCE BOOKS:

1. Work shop Manual / P.Kannaiah/ K.L.Narayana/ SciTech Publishers.
2. Engineering Practices Lab Manual, Jeyapoovan, SaravanaPandian, 4/e
Vikas
3. Dictionary of Mechanical Engineering, GHFNayler, Jaico Publishing House.

Part B - I.T. WORKSHOP

Objectives:

- To make the students know about the internal parts of a computer, assembling a computer from the parts, preparing a computer for use by installing the operating system

- To provide Technical training to the students on Productivity tools like Word processors, Spreadsheets, Presentations

Task 1: Learn about Computer: Identify the internal parts of a computer, and its peripherals. Represent the same in the form of diagrams including Block diagram of a computer. Write specifications for each part of a computer including peripherals and specification of Desktop computer. Submit it in the form of a report.

Task 2: Assembling a Computer: Disassemble and assemble the PC back to working condition. Students should be able to trouble shoot the computer and identify working and non-working parts. Student should identify the problem correctly by various methods available (eg: beeps). Students should record the process of assembling and trouble shooting a computer.

Task 3: Install Operating system: Student should install Windows on the computer. Student may install another operating system (including proprietary software) and make the system dual boot or multi boot. Students should record the entire installation process.

Task 4: Word Processor: Students should be able to create documents using the word processor tool. Some of the tasks that are to be performed are inserting and deleting the characters, words and lines, Alignment of the lines, Inserting header and Footer, changing the font, changing the colour, including images and tables in the word file, making page setup, copy and paste block of text, images, tables, linking the images which are present in other directory, formatting paragraphs, spell checking, etc. Students should be able to prepare project cover pages, content sheet and chapter pages at the end of the task using the features studied. Students should submit a user manual of the word processor considered.

Task 5: Spread sheet: Students should be able to create, open, save the application documents and format them as per the requirement. Some of the tasks that may be practiced are Managing the worksheet environment, creating cell data, inserting and deleting cell data, format cells, adjust the cell size, applying formulas and functions, preparing charts, sorting cells. Students should submit a user manual of the Spread sheet application considered.

Task 6: Presentations: creating, opening, saving and running the presentations, selecting the style for slides, formatting the slides with different fonts, colours, creating charts and tables, inserting and deleting text, graphics and animations, bulleting and numbering, hyperlinking, running the slide show, setting the timing for slide show. Students should submit a user manual of the Presentation tool considered.

Task 7: Browsing Internet: Students should access the internet browsing. Students should search the Internet for required information. Students should be able to create e-mail account and send email. They should get acquaintance with applications like Facebook, skype etc.

References:

1. Introduction to Computers, Peter Norton, McGraw Hill
2. MOS study guide for word, Excel, Powerpoint& Outlook Exams", Joan Lambert, Joyce Cox, PHI.
3. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education.
4. Trouble shooting, Maintaining& Repairing PCs", Bigelows, TMH

Subject Code	Subject Category	Subject Title	L	T	P	IM	EM	CR
14051009	ED	Programming in C Lab	0	0	3	50	50	4

Objectives:

- To make the student learn C Programming language.
- To make the students solve problems, implement them using C language.

LIST OF EXPERIMENTS:

1. Practice DOS and LINUX commands necessary for design of C programs.
2. Write, edit, debug, compile and execute sample C programs to understand the programming environment.
3. a) Write a C program to find the sum of the individual digits of a given number.
   b) Write a C program to check whether a given number is a palindrome or not.
4. a) Write a C program to generate & print first n terms of the Fibonacci sequence.
   b) Write a C program to find the roots of a quadratic equation.
5. a) Write a C program to compute the factorial of a given number.
   b) Write a C program to generate all the prime numbers within a given range
6. a) Write a C program to generate PASCAL triangle.
   b) Write a C program to find the GCD of two integers.
7. a) Write a C program to evaluate the function Sin(x) as defined by the infinite series expression.

   $$\text{Sin(x)} = \frac{x}{1!} - \frac{x^3}{3!} + \frac{x^5}{5!} - \frac{x^7}{7!} + \cdots.$$

   b) Write a C program to find the square root of a given number.
8. a) Write a C program to find both smallest and largest number in a list of integers.
   b) Write a C program to perform multiplication of two matrices.
9. Write a C program to read a matrix and perform the following operations.
   i) Print transpose of a matrix.
   ii) Removal of duplicates from an ordered array.
10. a) Write a C program to perform arithmetic operations using functions.
    b) Write a C program to find the factorial of a given number using recursive function.
11. a) Write a C program to count the number of vowels, constants, blank spaces, digits and special characters in a given string.
    b) Write a C program to check whether a given string is palindrome or not.
12. Write a C program to read two strings and perform the following operations without using built-in string library functions.
    i) String length determination.
    ii) Comparison of two strings.
    iii) Concentration of two strings.
    iv) String reversing.

13. a) Write a C program to swap the contents of two variables using pointers.
    b) Write a C program to understand the usage of pointer to pointer.
14. Write a C program to define a structure with the following members.
    Roll No., Name, marks in Sub1, Sub2, Sub3. Read the n students records and find the total marks of each student and print the result in the following format.

Roll No.	Name	Sub1	Sub2	Sub3	Total Marks	Result
1234	XXX	40	50	90	180	Distinction

15. Write a C program to copy the contents of one file into another file.

Subject Code	Subject Category	Subject Title	L	T	P	IM	EM	CR
14991010	BS	Engineering Sciences Lab	0	0	3	50	50	4

PART A - ENGINEERING PHYSICS LAB

LIST OF EXPERIMENTS

1. Determination of radius of curvature of a plano-convex lens by forming newton's rings.
2. Determination of thickness of a thin object using parallel fringes
3. Determination of rigidity modulus of a material in the form of a wire using torsional pendulum.
4. Determination of magnetic field along the axis of a current carrying coil using Stewart-Gee's method
5. Determination fo wavelengths of the prominent lines of mercury by a plane transmission diffraction grating using spectrometer
6. Determination of dispersive power of the material of a prism using spectrometer
7. Determination of energy gap of a material of p-n junction
8. Melde's experiment – transverse and longitudinal modes

PART B - ENGINEERING CHEMISTRY LAB

OBJECTIVES

- This course on Chemistry Lab is designed with 12 experiments in an academic year. It is common to all branches of Engineering in B.Tech 1st Year.
- The objective of the course is that the student will have exposure to various experimental skills which is very essential for an Engineering student.
- The experiments are selected from various areas of Chemistry like Conductometry, Polymers, Energy sources and water.
- Also the student is exposed to various tools like Analytical Balance, pH meter, Viscometer, conductometer, Bomb calorimeter, etc.

LIST EXPERIMENTS

I. Introduction to Lab – Analytical Balance, Molarity, Normality, Calculations, Glass ware.

II. WATER ANALYSIS:

1. Determination of total hardiness of water by EDTA method.
2. Estimation of Dissolved Oxygen present in given water sample by Winkler's method
3. Determination of Acidity of water
4. Estimation of chloride ions using Potassium Chromite Indicator.

III. CONDUCTOMETRY

1. Conductometric titrations of strong acid Vs strong base (Neutralization titration)
2. Conductometric titrations of Barium Chloride Vs Sodium Sulphate (Precipitation titration)

IV. PHYSICAL PROPERTIES

1. Determination of viscosity of oils by Redwood viscometer I & II.
2. Determination of calorific value of fuel sample using Bomb Calorimetry

V. TITRIMETRY

1. Estimation of Iron by Diphenyl amine indicator
2. Determination of Copper by EDTA method
3. Determination of Copper by Iodometry

VI. Preparation of Phenol Formaldehyde resin (Bakelite)

REFERENCES

1. Vogel's Text book of Quantitative Chemical Analysis, J. Mendham et.al., Pearson Education, Sixth Edition, 2012.
2. Laboratory manual on Engineering Chemistry, Anupama Rajput, DhanpatRai& Co Publications.
3. Essentials of Experimental Engineering Chemistry, Shashichawla, DhanpatRai& Co Publications.

OUTCOME

The student is expected to learn from this laboratory course the concept of error and its analysis. It also allows the student to develop experimental skills to design new experiments in Engineering. With the exposure to these experiments the student can compare the theory and correlate with experiment.

Subject Code	Subject Category	Subject Title	L	T	P	IM	EM	CR
14241011	HS	English Language and Communication Skills Lab	0	0	3	50	50	4

1. Listening skills

Low level
a) Fun in the sun
b) Home and family
c) Snake in the house
d) A horse is a horse of course
e) The wonder of Wales.
High level
a) Winter wonderland
b) Great trip, Great country
c) Keeping in shape
d) Asia tour
e) I like to use my hands.

2. Situational dialogues

a) Group discussion
b) Interviewing
c) Making acquaintances
d) Sight seeing
e) Arguing

3. Phonetics

a) Vowel sounds
b) Consonant sounds
c) Phonetic Transcription

4. Text to speech
5. Dictionary
6. Idioms
7. Telephone skills
8. Debate
9. Describing objects, situations, people
10. Information transfer
11. Accent, Stress, Intonation
12. JUST A MINUTE (JAM)

SOFTWARE: GLOBARENA & K-VAN SOLUTIONS.

Subject Code	Subject Category	Subject Title	L	T	P	IM	EM	CR
14022101	PN	Basic Electrical and Electronics Engineering	3	1	0	30	70	3

UNIT - I
ELECTRICAL CIRCUITS: Basic definitions, Types of elements, Ohm's Law, Resistive networks, Kirchoff's Laws, Inductive networks, capacitive networks, Series, Parallel circuits and Star-delta and delta-star transformations.

UNIT - II
DC MACHINES : Principle of operation of DC Generator – emf equation - types – DC motor types – torque equation – losses and efficiency testing of D.C.Motors,Three point starter TRANSFORMERS : Principle of operation of single phase transformers – emf equation – losses – efficiency and regulation

UNIT - III
AC MACHINES :Principle of operation of alternators – regulation by synchronous impedance method – Principle of operation of induction motor – slip – torque characteristics – applications.

UNIT-IV
DIODE AND ITS CHARACTERISTICS: PN Junction diode, Symbol, V-I characteristics, Diode Applications, Rectifiers-Half Wave, Full Wave and Bridge Rectifiers (Simple Problems).
TRANSISTORS: PNP and NPN Junction Transistor, Transistor as an Amplifier, Single Stage CE Amplifier, Frequency Response of CE Amplifier, Concepts of Feedback Amplifier, Necessary conditions for Oscillators, SCR Characteristics and Applications.

UNIT-V
ELECTONIC INSTRUMENTATION: Electronic multi meter and digital voltmeter, Integrating volt meter, Successive approximation DVM, Principles of CRT (Cathode Ray Tube), Deflection Sensitivity, Electrostatic and Magnetic Deflection, Applications of CRO-Voltage, Current and Frequency Measurements.

TEXTBOOKS:
1. Fundamentals of Electrical and Electronics Engineering by T. Thyagarajan, 5th Edition, SCITECH Publications, 2007.
2. Fundamentals of Electrical Engineering and technology by William D Stanley,John R. Hackworth, Richard L Jones – Thomson Learning
3. Principles of Electrical and Electronics Engineering by V.K.Mehta, S.Chand & Co.
4. Electronic devices and circuits – R.L.Boylestad and Louis Nashelsky, 9th Edition, PEI/PHI.
5. Industrial Electronics by G.K.Mittal-PHI.
6. Modern Electronic Instrumentation and Measurement Techniques-Albert D.Helfrick, WillamD.Cooper.
REFERENCES:
1. Introduction to Electrical Engineering – M.S Naidu and S. Kamakshaiah, TMH Publ.
2. Basic Electrical Engineering by Kothari and Nagarath, TMH Publications, 2nd Edition.
3. Millman's Electronic Devices and Circuits-J.Millman and C.C.Halkias, Satyabratajit, 2nd Edition, 1998, TMH

Subject Code	Subject Category	Subject Title	L	T	P	IM	EM	CR
14212102	BS	Probability and Statistics	3	1	0	30	70	3

Unit I: Random variables - Discrete random variables - Continuous random variables –Probability distribution function – Discrete and continuous probability distribution – Mathematical Expectation, Variance and standard deviation of probability distribution. Binomial , Poisson and Geometric distributions - Related properties.

Unit II: Continuous distributions: Uniform – Exponential- Gamma – Normal – Log normal- Weibull distributions and related properties.

Unit III: Test of Hypothesis - Population and sample - Confidence interval of mean from normal distribution- Statistical hypothesis - null and alternative hypothesis – level of significance - Test of significance - Tests based on normal distribution –z -test for means and proportions. Small samples - t-test for one sample, two sample problem and paired t-test - F-test - Chi-square test (testing of goodness of fit and independence).

Unit IV: Correlation and regression – Correlation – Co-efficient of correlation – lines of Regression- Relation between correlation and Regression co-efficients- rank correlation – Fitting of a straight line using the method of least squares - Multiple linear regression and its applications.

Unit V: Statistical quality control: Concept of quality of a manufactured product - defect and defectives - Causes of variation - Random and assignable causes -The principle of Shewhart control chart – Charts for attributes and variable quality characteristics - Construction and operation of p-chart, c-chart, X-bar chart and R-chart.

Text Books

1. Higher Engineering Mathematics, Dr. B.SGrewal, Khanna Publishers-42 edition.
2. Walpole and Myrs, Probability & Statistics for Engineers & Scientists, Seventh edition, Pearson Education Asia, 2002,
3. Johnson, Probability & Statistics for Engineers, Fifth edition, Prentice Hall of India.
Reference Books:
1. Probability & Statistics by E. Rukmangadachari& E. Keshava Reddy Pearson Publisher
2. Statistical Methods by S.PGuptha, S Chand Publications.

Subject Code	Subject Category	Subject Title	L	T	P	IM	EM	CR
14012103	ED	Engineering Mechanics	3	1	0	30	70	3

UNIT-I Basic Concepts and Coplanar Force Systems

Brief history of Mechanics – Concept of force, particle and rigid body – Basic laws of Mechanics – Newton's laws – Dimensions and units – Numerical accuracy – Operations with forces: Addition, subtraction, resolution, couple, moment about a point, moment about a line, replacing force-couple system by a single force - Resultant of coplanar force systems: concurrent system, parallel system, non-concurrent non-parallel system, distributed force systems – Concept of equilibrium – Applications to concurrent, parallel, non-concurrent non-parallel systems

UNIT-II Applications of Equilibrium for Analysis of Beams and Trusses

Beams – Types of supports: simple, roller, fixed, inclined roller – Types of beams: Simple, cantilever, propped, fixed, continuous beams – Free body diagrams – Support reactions for determinate beams with concentrated and distributed forces

Trusses – Uses – Parts of a truss – Geometry: Pratt, Warren, North light, Howe, Fink – Stability – Cantilever and simply supported trusses – Analysis of determinate and plane trusses: method of joints, method of sections, graphical methods

Friction – State of impending motion – Laws of friction – Problems on ladder friction

UNIT-III Properties of Areas and Volumes

Areas and volumes by integration – Concept of centroid – Theorems of Pappus and Guldinus – Centroid of simple areas and volumes – Centroid of composite areas – Second and product moment of areas – radius of gyration – Transfer theorems: parallel and perpendicular axis theorems – Moment of inertia of simple areas by integration – Moment of inertia of composite areas – Mass moment of inertia of simple solids

UNIT-IV Kinematics of Particles and Rigid Bodies

Concept of particle – Planar motion: displacement, velocity and acceleration in Cartesian and polar coordinates – Free motion and projectiles – Rectilinear and curvilinear motion – Constrained and relative motion

Concept of rigid body – Planar motion: translation, rotation, general plane motion – Instantaneous centre of rotation

UNIT-V Dynamics of Particles and Rigid Bodies

Dynamics of Particles – Newton's laws of motion – D'Alembert's principle – Principle of work and energy – Principle of impulse and momentum

Dynamics of Rigid Bodies – Equations of plane motion – Principles of linear and angular momentum

TEXTBOOKS

1. Engineering Mechanics – SS Bhavikatti and KG Rajashekarappa
2. Engineering Mechanics – MC Goyal and GS Raghuvanshi

REFERENCES

1. Mechanics for Engineers: Statics and Dynamics – Beer and Johnston
2. Engineering Mechanics: Statics and Dynamics – IH Shames
3. Schaum's Outline of Engineering Mechanics – Nelson et al

Subject Code	Subject Category	Subject Title	L	T	P	IM	EM	CR
14012104	PJ	Mechanics of Materials-1	3	1	0	30	70	3

UNIT-I Basics of Deformable Bodies

Deformable solids – Concept of stress – Types of stress: tension, compression, shear, bearing stresses – Concept of strain – Types of strain: linear, shear strains – Poisson effect and lateral strain – Volumetric strain – Elastic constants – Deformation of simple and compound bars – Thermal stresses – Gradual, sudden and impact loadings – Endurance and fatigue limits – Strain energy due to normal and shear stresses – Stress-strain relationships for different materials – Yield, ultimate and working stresses – Factor of safety – Hook's law in 1, 2, and 3 dimensions – Stress concentrations and Saint-Venent's principle

UNIT-II Shear force and Bending Moment Diagrams

Action of beam – Internal forces at a section: axial force, shear force and bending moment – Relations among rate of loading, shear force and bending moment at a section – Shear force and bending moment diagrams for cantilever, simple and overhanging beams with point and distributed forces – Maximum bending moment – Points of contra flexure

UNIT-III Bending Theory of Beams

Theory of simple bending – Assumptions – Location of neutral axis – Flexural stress and shear stress distribution across beam sections – Design of beams for strength – Stresses in composite beams: equivalent section and modular ratio – Shear flow in thin and hollow sections

UNIT-IV Deflections of Beams

Deformation under transverse loading – Equation of elastic curve– Macaulay's method – Area-Moment theorems – Conjugate beam method – Computation of slopes and deflections in cantilever and simple beams – Application to leaf springs – Application to propped cantilever

UNIT-V Torsion and Helical Springs

Circular shafts – Deformation and stresses – Statically indeterminate shafts – Design of transmission shafts – Thin-walled hollow shafts – Torsion of noncircular shafts

Helical Springs – Close and open coiled springs – Deformation and stresses due to axial force and twisting moment – Springs in series and parallel – Design of springs

TEXTBOOKS

1. Mechanics of Materials – BC Punmia, AK Jain and AK Jain

REFERENCES

1. Strength of Materials: Mechanics of Solids – RK Rajput
2. Mechanics of Materials – Beer, Johnston and DeWolf

Subject Code	Subject Category	Subject Title	L	T	P	IM	EM	CR
14012105	PJ	Introduction to Surveying	3	1	0	30	70	3

UNIT – I Surveying Principles and Chain surveying
Basic concepts: Surveying – Definition; Classification; Principles of Surveying; Measurements: Basic Measurements and methods; Plan and map; Scales used for Maps and Plans.

Chain surveying: Principles of Chain Surveying; Basic Definitions; Well-Conditioned Triangle; Selection of Survey Stations and Survey Lines; Field work; Recording Measurements; Types Cross – Staff; Instruments for setting out right angles: Obstacles in Chain Survey; Cross – Staff Survey.

UNIT – II Compass Surveying
Compass surveying: Traversing; Meridians; Bearings; Magnetic Dip and Declination; Prismatic compass and Surveyor Compass ; Compass Traverse; Local attraction; Plotting of a survey work; Errors in Compass Surveying; Limits of accuracy.

UNIT – III Plane Table Survey
Plane table surveying: Plane table and its accessories; setting up; Plane tabling methods, Resection by trial and error method, Graphical method, Tracing paper method, Lehmann rules, Two point and Three point Problems ,Errors in plane tabling

UNIT-IV Levelling and Contouring
Levelling: Basic definitions; Different methods of levelling; Classification of direct levelling methods; Levels – Dumpy level, Tilting level, Auto level; Levelling staff; Level field book; Profile levelling; Cross sectioning; Reciprocal levelling. Sources of errors in levelling; Reduction of Levels – Rise and fall, Height of Instrument, Degree of Precision

Contouring: Introduction, contour interval, Characteristics of contours; Methods of locating contours; Direct and indirect methods of contouring; Interpolation and sketching of contours; Location of a contour gradient – Uses of contour maps

UNIT – V Areas and Volumes

Areas and volumes: Computation of areas from field notes and plotted figures; areas of figures at boundaries by Midordinate rule, Trapezoidal rule, Average ordinate rule, Simpson's rule Computation of straight volumes of Level, Two-Level and Side- Hill two-Level Sections using Trapezoidal and Prismoidal rules. Computation of volumes of Borrow Pits by Spot Levels and Reservoirs by contours

TEXTBOOKS

1. Surveying (Vol-1 & 2),by Dr. K. R. Arora. *Standard Book House, Delhi, 2004*
2. Surveying (vol. 1 &2) by Dr. B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain – Laxmi Publications (P) ltd., New Delhi

REFERENCES:

1. Surveying and Levelling by T.P.Kanetkar and S.V.Kulkarni, *United Book Corporation, Pune, 1994*
2. *Text book of surveying by C.Venkataramaiah, Universities Press.*
3. Surveying and Levelling by R.Subramanian, *Oxford university press, New Delhi.*

Subject Code	Subject Category	Subject Title	L	T	P	IM	EM	CR
14012106	PJ	Building Materials	3	1	0	30	70	3

UNIT I - LOAD BEARING MATERIALS

Conventional Materials: Stones: classification of rocks – quarrying – dressing – properties –uses of stones – tests for stones. Bricks: composition – manufacturing – classification – qualities – uses – test for bricks. Timber: classification of trees – structure of tree – seasoning – wood product – uses.

UNIT II – CEMENTITIOUS MATERIALS

Cement: Introduction – ingredients – manufacture – dry and wet process – types of cement – properties – tests - uses – Mortar: functions – requirements – types – properties – uses – tests on mortar. Concrete: Ingredients – functions – w/c ratio – grades – admixtures – test on concrete – properties – uses. RCC: Characteristics – elements - advantages – disadvantages – lime – flyash – pozzolona – GGBS.

UNIT III - SPECIAL CONSTRUCTION MATERIALS

Steel: introduction – types – properties – uses – market forms - Fiber reinforced concrete – types of fibres – steel fibres – SFRC – properties – applications. Lightweight concrete – types. High density concrete, High strength concrete – advantages – applications, High performance concrete – properties – Applications of steel, aluminum, lead, zinc, copper and gun metals.

UNIT IV – FINISHINGS

Paints: Functions – constituents – characteristics – selection – types of paints – defects. Varnishes: Elements – properties – types. Distempers: composition – properties. Asbestos: Properties – uses – asbestos cements products. Glass: Constituents – composition – classification – properties – market form – uses. Plastic: constituents – classification – properties – uses.

UNIT V - RECENT CONSTRUCTION MATERIALS

Reactive powder concrete – properties, Geopolymer concrete – advantages, Blended cement concrete – use of mineral admixtures – properties, Self health monitoring concrete, Bacterial concrete, Self compacting concrete – properties – advantages, Ready mixed concrete – advantages – stone as a flooring material – ceramic tiles – vitrified tiles – wooden tiles – flooring tiles – miscellaneous materials.

Textbooks:
1. Building Materials – P.C. Varghese
2. Building Materials – S. K. Duggal
3. Building Materials – S.C. Rangwala
References:
1. Building Materials – sushil kumar

Subject Code	Subject Category	Subject Title	L	T	P	IM	EM	CR
14012107	PJ	Surveying Lab-1	0	0	3	50	50	2

LIST OF EXPERIMENTS

1. To find the area of the given field by Chain & Cross Staff

2. Find the distance between two inaccessible points using chaining Obstacles.

3. Locate the corners of the building structure with chain surveying.

4. Find the distance between two inaccessible points by the use of compass.

5. Locate a building by using compass with allowable adjustments.

6. Locate points by using Radiation and Intersection methods of Plane Tabling.

7. Locate a new Instrument Station point by using two point problem.

8. Locate a new instrument station by Bessels's Graphical Method.

9. Find the level difference between two points using Height of Instrument and Rise and fall methods.

10. To Prepare a Contour Chart.

Subject Code	Subject Category	Subject Title	L	T	P	IM	EM	CR
14012108	PJ	Strength of Materials Lab	0	0	3	50	50	2

List of Experiments

1. Tension test on metals
2. Compression test on Wood / Concrete
3. Torsion test on metals
4. Hardness (Brinell / Rockwell) test on metals
5. Impact (Charpy / Izod) test on metals
6. Deflection test on beams
7. Shear test on metals
8. Tests on Springs
9. Compression strength on Bricks

10. Size, Water absorption and Efflorescence tests on bricks
11. Demonstration of tests on Tiles
12. Demonstration on verification of Maxwell's reciprocal theorem
13. Demonstration on bend and re-bend test

Subject Code	Subject Category	Subject Title	L	T	P	IM	EM	CR
14022109	PN	Basic Electrical and Electronics Engineering Lab#	0	0	3	-	-	-

Part – A Electrical Lab:

1. Verification of KCL and KVL.
2. Swinburne's test on DC shunt machine(predetermination of efficiency of a given D.C shunt machine working as motor and generator)
3. OC & S.C Test on 1-Ø Transformer (Predetermination of efficiency and regulation at given power Factor)
4. Brake test on 3-phase Induction motor(determination of performance characteristics)
5. Speed control of D.C Shunt motor by
   a) Armature voltage control b)field flux control method
6. Brake test on D.C shunt motor

Part – B- Electrical Lab:

1. Study of CRO (Measurement of Voltage ,Frequency and phase of periodic signals)
2. V-I Characteristics of PN junction Diode.
3. Full Wave Rectifier with and without capacitive filter.
4. Input and output characteristics of Common Emitter (CE) configuration.
5. Frequency response of a single stage CE amplifier.
6. Sinusoidal signal generation using RC phase shift oscillator circuit

Subject Code	Subject Category	Subject Title	L	T	P	IM	EM	CR
14012201	PJ	Engineering Geology	3	0	0	30	70	3

UNIT – I

INTRODUCTION: Importance of geology from Civil Engineering point of view. Brief case studies of failure of some Civil Engineering constructions due to geological draw backs. Importance of Physical geology, Petrology and Structural geology

WEATHERING OF ROCKS :Its effect over the properties of rocks, importance of weathering with REFERENCE to dams, reservoirs and tunnels weathering of common rock like —Granite.

UNIT – II

MINERALOGY :Definition of mineral, Importance of study of minerals, Different methodsof study of minerals. Physical properties of minerals in the identification of minerals. Study of physical properties of following common rock forming minerals: Feldspar , Quartiz , Flint , Jasper, Olivine , Augite , Hornblende , Muscovite , Biotite , Asbestos, Chlorite , Kyanite , Garnet, Talc , Calcite. Study of other common economicsminerals such as Pyrite, Hematite , Magnetite, Chrorite , Galena , Pyrolusite , Graphite, Magnesite, and Bauxite.

UNIT – III

PETROLOGY :Definition of rock: Geological classification of rock, formation of rocks, common structures and textures of Igneous. Sedimentary and Metamorphic rocks. Their distinguishing features, Megascopic study of Granite, Dolerite, Basalt, Pegmatite, Laterite, Conglomerate, Sand Stone, Shale, Limestone, Gneiss, Schist, Quartzite, Marble and Slate.

UNIT – IV

STRUCTURAL GEOLOGY : Definition, Strike, dip, outcrop, study of common geological structures associating with the rocks such as folds, faults un conformities, and joints– their important types. Their importance in civil engineering works - types of soils, their origin and occurrence in India.

UNIT – V

ENGINEERING GEOLOGY : Geology of dams and reservoirs, tunnels, land slides, rock falls, earth quakes Ground water exploration. Rock as a construction material.

TEXT BOOKS:

1) A Text Book of Geology by Mukharjee P.K
2) Engineering Geology by N.Chennkesavulu, Mc-Millan, India Ltd. 2005
3) Engineering Geology by D.Venkata Reddy, Vikas Publications, New Delhi.
4) A Text Book of Engineering Geology by S.K. Garg.

REFERENCES:

1. Engineerring geology by Prabin singh
2. F.G. Bell, Fundamental of Engineering Geology Butterworths, Publications, New Delhi, 1992
3. Krynine & Judd, Principles of Engineering Geology & Geotechnics, CBS Publishers & Distribution,
4. Foundations of Engineering Geology by Tony Waltham, Special Indian Edition, CRC Press New Delhi.

Subject Code	Subject Category	Subject Title	L	T	P	IM	EM	CR
14012202	HS	Environmental Studies[#]	3	0	0	-	-	-

Unit I

Multidisciplinary nature of environmental studies: Definition, scope and importance – Need for public awareness; Natural Resources: Renewable and non-renewable resources – Natural resources and associated problems; (a) Forest resources – Use and over-exploitation, deforestation, case studies – Timber extraction, mining, dams and their effects on forest and tribal people; (b) Water resources – Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems; (c) Mineral resources – Use and exploitation, environmental effects of extracting and using mineral resources, case studies; (d) Food resources : World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies; (e) Energy resources –Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources. Case studies; (f) Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification; Role of an individual in conservation of natural resources; equitable use of resources for sustainable lifestyles

Unit II

Ecosystems: Concept of an ecosystem – Structure and function 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 ecosystems (a) Forest ecosystem, (b) Grassland ecosystem, (c) Desert ecosystem, (d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Unit III

Biodiversity and its conservation: Introduction – Definition : genetic, species and ecosystem diversity; Bio-geographical 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-sports of biodiversity; Threats to biodiversity : habitat loss, poaching of wildlife, man-wildlife conflicts; Endangered and endemic species of India; Conservation of biodiversity : In-situ and Ex-situ conservation of biodiversity

Unit IV
Environmental Pollution: Definition – Cause, 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, earthquake, cyclone and landslides

Unit V
Social Issues and the Environment: From Unsustainable to Sustainable development – Urban problems related to energy – Water conservation, rain water harvesting, watershed management – Resettlement and rehabilitation of people; its problems and concerns; • Environmental ethics : Issues and possible solutions; Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, case studies; Wasteland reclamation; Consumerism and waste products; Environment Protection Act; Air (Prevention and Control of Pollution) Act; Water (Prevention and control of Pollution) Act; Wildlife Protection Act; Forest Conservation Act; Issues involved in enforcement of environmental legislation; Public awareness

Human Population and the Environment: Population growth, variation among nations – Population explosion – Family Welfare Programme; Environment and human health; Human Rights; Value Education; HIV/AIDS; Women and Child Welfare; Role of Information Technology in Environment and human health, case studies; Field work: Visit to a local area to document environmental assets river/forest/grassland/hill/mountain - Visit to a local polluted site-Urban/Rural/Industrial/Agricultural; Study of common plants, insects, birds; Study of simple ecosystems-pond, river, hill slopes, etc.

TEXTBOOKS:
1. Text book of Environmental Studies for Undergraduate Coursesby ErachBharucha for University Grants Commission,Universities Press.
2. Environmental Studies by Benny Joseph,Mc.Graw HillPublications.
3. Principles and a basic course of Environmental science for under graduate course by Kousic, KouShic.
4. Text book of Environmental Sciences and Technology by M.AnjiReddy, BS Publication.

REFERENCES:
1. Environmental sciences and engineering – J. Glynn Henry and Gary W. Heinke – Printice hall of India Private limited.
2. Environmental Studies by AninditaBasak – Pearson education
3. Introduction to Environmental engineering and science by Gilbert M. Masters and Wendell P. Ela - Printice hall of India Private limited

Subject Code	Subject Category	Subject Title	L	T	P	IM	EM	CR
14012203	PJ	Mechanics of Materials-2	3	1	0	30	70	3

UNIT-I Transformation of Stress and Strain, and Failure Criteria

Transformation of Stress: Transformation of plane stress – Principal stresses – Maximum shear stress – Mohr's circle for plane stress; Transformation of plane strain – Mohr's circle for plane strain – Measurement of strain – Strain rosette

Failure Theories: Yield criteria for ductile materials under plane stress – Yield criteria for brittle materials under plane stress – Application to circular shafts, thin and thick cylindrical shells

UNIT-II Columns and Combined Loadings

Columns: Stability – Effect of slenderness and end conditions – Euler's theory of elastic stability – Rakine's theory – Eccentric loading: the Secant formula – Design of columns

Combined Loadings - Action of direct loads and bending moments – Applications to stability analysis of chimneys and retaining walls; Unsymmetrical bending: unsymmetrical and thin walled sections – Shear center for simple sections

UNIT-III Fixed and Continuous Beams

Fixed beams – Use of Area-Moment theorems – Shear force and bending moment diagrams – Deflections; Continuous Beams – Theorem of three moments – Support sinking – Shear force and bending moment diagrams

UNIT-IV Arches and Cables

Arches: Eddy's theorem – Three hinged parabolic and circular arches – Shear force and bending moment diagrams – Two hinged parabolic and circular arches – Shear force and bending moment diagrams – Effect of temperature – Rib shortening – Tied arches

Cables: Cable Profile and cable forces under uniform and point loads – Thermal effects

UNIT-V Energy Methods

Strain energy – Strain energy density – Strain energy due to normal and shear stresses – Strain energy and work done by applied forces– Principle of virtual work – Castigliano's theorems – Theorem of minimum potential energy – Maxwell's reciprocal theorems – Unit load method – Applications to trusses and beams

TEXTBOOKS

1. Mechanics of Materials – BC Punmia, AK Jain and AK Jain

REFERENCES

2. Strength of Materials: Mechanics of Solids – RK Rajput
3. Mechanics of Materials – Beer, Johnston and DeWolf

Subject Code	Subject Category	Subject Title	L	T	P	IM	EM	CR
14012204	PJ	Advanced Surveying	3	1	0	30	70	3

UNIT – I – Vernier, Electronic Theodolite, Total Station
Theodolite surveying: Theodolite – Parts – Definitions - Fundamental Axes - Measurement of Horizontal Angles by Repetition and Reiteration Methods - Measurement of Vertical angles, direct angles and deflection angles - Prolonging a straight line

Total station instrument: Introduction, Functions, performed, Parts; Handling and setting up a Total Station Instrument. Measuring horizontal angles, Deflection angles, Azimuths, Vertical or Zenith angles; Sights and Marks, Adjustments of Total Station Instruments and their accessories. Sources of Error in Total Station work.

UNIT – II
Tacheometry: Principle of stadia method – Tacheometric constants and their determination – Determination of distances and elevations of points by stadia and tangential methods – Errors in stadia surveying.

Trigonometric Levelling: Introduction; Determination of the level of the top of an object, When its base is accessible and When its base is not accessible; Determination of the height of the object when the two instrument stations are not in the same vertical plane; Axis signal correction; Difference in elevation by single observation and reciprocal observations, Refraction and Curvature Correction

UNIT – III – Traverse Survey
Traverse survey -Theodolite traversing – Open and closed traverse – Closing errors, Balancing the error – Bowditch Method– – Transit method, Checks in traverses. Errors in Theodolite traversing. Traverse Computations – Coordinate systems – Omitted measurements

UNIT – IV – Horizontal Curves
Curves: Principles of simple and compound curves – Curve ranging – Offsets from long chord – Rankine's method one theodolite method – Two theodolite method. Reverse curve between parallel straights – Super elevation

UNIT – V – Transition curves and Vertical Curves
Transition curves – Ideal shape – Spiral transition curves - length of transition curve - Setting out methods - Uses and characteristics of transition curve – Principles of compound curve – Types and elements of Vertical curves.

TEXTBOOKS
1. Surveying and Levelling Parts 1 & 2 by T.P. Kanetkar and S.V.Kulkarni. *United Book Corporation, Pune, 1994*
2. Surveying and leveling Vol. II&III by B.C Punmia. Ashok Kumar Jain and Arun Kumar Jain – Laxmi Publications (P) ltd., New Delhi

REFERENCES:

1. Plane Surveying by A.M. Chandra.*New age International PVt.Ltd., Publishers, New Delhi, 2002.*
2. Surveying Vol. 1and 2 – By S.K. Duggal. Tata Mc. Graw Hill Publishing Co.
3. Surveying Vol. 1 & II by Dr. K. R. Arora; Standard Book House;

Subject Code	Subject Category	Subject Title	L	T	P	IM	EM	CR
14012205	PJ	Fluid Mechanics-1	3	1	0	30	70	3

Unit – I – Fluid Properties and Statics
Fluid Properties: Definition of a fluid–Fluid as continuum – Density – Specific weight – Specific volume – Specific gravity – Compressibility –Vapour pressure – Surface tension and capillarity – Viscosity and Newton's law of viscosity – Newtonian and non-Newtonian fluids

Fluid Statics: Pressure at a point – Pascal's law–Pressure variation in a static fluid – Atmospheric, gauge and absolute pressures – Measurement of pressure: Piezometer, simple and differential manometers, Bourdon's pressure gauge – Hydrostatic forces on plane and curved surfaces – Buoyant force and centre of buoyancy

Unit – II – Fluid Kinematics
Description of fluid in motion: Lagrangian and Eulerian methods, concept of control volume and surface – Types of flows –Velocity and acceleration at point, local and convective acceleration, normal and tangential components – Streamline, Streakline, Pathline, Streamtube – Continuity equation in Cartesian and polar coordinates–Stream function and velocity potential function – Flow net – Fluid motion: linear and angular deformations, rotation, vortex, circulation

Unit – III – Energy Theorem and Applications to Flow Measurement
Euler's equation of motion along a streamline–Bernoulli's energy equation – Velocity measurement: Pitot tube and Pitiot-static tube – Discharge measurement – Orifice: classification, coefficients, submerged flow – Mouthpiece: types, coefficients, free flow condition –Venturi- and orificemeters: parts, construction,

standard dimensions, coefficients – Notches and weirs: classification, flow through triangular, rectangular and trapezoidal notches and weirs, end contractions, velocity of approach, Cipolletti notch, broad crested weir

Unit – IV – Laminar Flow in Pipes
Regimes of flow: Reynolds' experiment, Reynolds' number, laminar, turbulent, transitional flows – Laminar flow in circular pipes: velocity distribution, Hagen-Poiseuille equation, loss of head – Laminar flow between parallel plates: velocity distribution, loss of head

Unit – V – Turbulent Flow in Pipes
Turbulent flow: velocity distribution, hydro-dynamically rough and smooth boundaries, loss of head, Darcy-Weisbach equation, Moody's chart – Analysis of pipe flow: hydraulic grade line, total energy line, minor losses in sudden expansion, sudden contraction, bend, elbow, pipe fittings, entry and exit losses, Pipes in series and parallel, Siphon

Textbooks:
1. P.N. Modi &S.M. Seth, *Hydraulicsand Fluid Mechanics including Hydraulic Machines*, Standard Book House, New Delhi.
2. R.K.Bansal,*AtextbookofFluidMechanicsandHydraulicmachinery*,LaxmiPublications(P) Ltd.

Reference Books:
1 Streeter&Wylie,*FluidMechanics*, McGraw Hills Publications.
2. C.M. White,*Fluid Mechanics*, McGraw Hills Publications.
3. Bernard Massey,*Mechanics ofFluids*, Taylor &Francis.

Subject Code	Subject Category	Subject Title	L	T	P	IM	EM	CR
14012206	PJ	Building Construction	3	1	0	30	70	3

UNIT I – BUILDING PLANNING & PRINCIPLES

Principles of Planning - Planning Regulations and Byelaws – Housing Analysis - Orientation of Building – Functional Requirements of a Building- Types of buildings - Role and Uses of Computers in Planning

UNIT II - MASONRY

Masonry - Stone Masonry - Rubble and Ashlar Masonry - Brick Masonry - Bond - Types of bonds - English and Flemish bonds - Composite masonry – Stone masonry - Concrete Masonry - Reinforced masonry- Types of walls - Types of Partition walls, Design of brick walls – estimating brick wall thickness for a high rise building

UNIT III – FLOORS, ROOFS & STAIRCASE

Floors - Types of floor - Details of concrete and Terrazzo floors - Roofs - Types of Roofs - Flat roofs – Sloping roofs - Roof coverings-AC sheets-GI sheets- Lintels -Classification of lintels- Arches - Classification of arches- Staircase – types of staircase

UNIT IV – FENESTRATIONS, VENTILATIONS & BUILDING AMENITIES

Types of doors and windows – materials (Wood, Plywood, Steel, and Fiber) – method of installations - Fixtures and fastening for doors and windows – plumbing – Ventilation - principles of acoustical design of buildings - Damp proofing- Methods of damp proofing for foundations, floors and roofs

UNIT V - GREEN BUILDING CONCEPTS

Green building – objectives - fundamental principles of green building and sustainable site design – water quality and conservation – Energy and Environment – Indoor environment quality – Materials and resources

Textbooks:

1. Building construction and Materials – Gurucharan Singh

2. Building Construction – Dr B.C Punmia

3. Building Construction – S. C. Rangwala

Subject Code	Subject Category	Subject Title	L	T	P	IM	EM	CR
14012207	PJ	Structural Analysis	3	1	0	30	70	3

UNIT-I Moment Distribution Method

Development of moment distribution method without member axis rotation – Applications to beams and frames – Development of moment distribution method with member axis rotation – Applications to beams with support settlement and frames with side sway – Modification of member stiffness

UNIT-II Slope Deflection Method

Derivation of slope-deflection equations without member axis rotation – Applications to beams and frames – Derivation of slope-deflection equations with member axis rotation – Applications to beams with support settlement and frames with side sway

Unit-III Iterative and Analogy Methods

Kani's method – Development of Kani's method – Application to frames with or without sway; Column analogy method – Application to indeterminate beams

Unit-IV Approximate Analysis of Indeterminate Structures

Approximate analysis for: Continuous beams with gravity loads – Portal frames with vertical loads – Multistory rigid frames for gravity loads – Unbraced frames for lateral loads; Portal and cantilever methods for multistory frames

Unit-V Influence Lines for Determinate Structures

Influence lines: Construction of influence lines – Muller-Breslau principle – Use of influence lines – Influence lines for simple beams – Live loads for highway and railway bridges – Absolute maximum moment – Maximum shear force

TEXTBOOKS

1. Theory of Structures – BC Punmia, AK Jain and AK Jain
2. Fundamentals of Structural Analysis – KM Leet and CM Uang

REFERENCES

1. Intermediate Structural Analysis – CK Wang
2. Structural Analysis – SS Bhavikatti

Subject Code	Subject Category	Subject Title	L	T	P	IM	EM	CR
14012208	PJ	Surveying Lab 2	0	0	3	50	50	2

LIST OF EXPERIMENTS

1. Operation of Theodolite: Measurement of Horizontal and Vertical angles.

2. Distance between two inaccessible points using horizontal angle observations by a theodolite.

3. Evaluation of Tacheometric Constants.

4. Find the distance and gradient between two inaccessible points using principle of stadia tacheometry.

5. Find the distance between two inaccessible ground points by using the principle of Tangential Tacheometry.

6. Height and Elevation of objects using the principle of Trigonometric leveling.

7. Setting out the curves by offsets from the chords produced.

8. Setting out curves by Rankine's Deflection angles.

9. Distance between two inaccessible points, calculation of area and remote height by using Total Station.

10. Traverse using Total Station.

Subject Code	Subject Category	Subject Title	L	T	P	IM	EM	CR
14012209	ED	Computer Aided Building Drawing Lab	0	0	3	50	50	2

LIST OF EXPERIMENTS

PART A (Drawing using AutoCAD or Equivalent)

1. Basic Commands

2. Operations with drawing entities – I

3. Operations with drawing entities – II

4. Drawing Management Concepts

5. Hatching, Blocks and Printing

6. Two Panelled Door

7. Developing Plan, Section and Elevation of a two room building.

8. Developing Plan, Section and Elevation of a Staircase.

9. Developing a roof truss.

PART B (Manual Drawing)

10. Developing Plan, Section and Elevation of a Two Room Building

11. Developing Plan, Section and Elevation of a Septic Tank.

Subject Code	Subject Category	Subject Title	L	T	P	IM	EM	CR
14013101	PJ	Matrix Methods of Structural Analysis	3	1	0	30	70	3

UNIT-I Matrix Flexibility Method for Beams

Flexibility matrix for beam element – Deformation matrix due to: Support movements – Applied loads – Compatibility conditions – Assembly of flexibility and deformation matrices – Boundary conditions – Solution of equations – Application to continuous beams

UNIT-II Matrix Stiffness Method for Beams

Stiffness matrix for beam element – Load matrix – Equilibrium conditions – Assembly of stiffness and load matrices – Boundary conditions – Solution of equations – Application to continuous beams

UNIT-III Introduction to Finite Element Method

Introduction – Mathematical basis for finite element method: Raleigh-Ritz method, Method of Weighted Residuals – Steps in finite element method

UNIT-IV One Dimensional Finite Element – Bar Element

Bar element – Derivation of element stiffness matrix in one, two and three dimensions – Local and global coordinates – Boundary conditions – Assembly of stiffness matrix – Solution of equations – Simple problems

Unit-V One Dimensional Finite Element – Beam Element

Beam element – Derivation of element stiffness matrix – Boundary conditions – Distributed loads – Assembly of stiffness matrix – Solution of equations – Simple problems

TEXTBOOKS

1. Structural Analysis: A Matrix Approach – SP Gupta
2. Finite Element Analysis – SS Bhavikatti

REFERENCES

1. Fundamentals of Finite Element Analysis – Hutton
2. A First Course in Finite Element Method – Logan

Subject Code	Subject Category	Subject Title	L	T	P	IM	EM	CR
14013102	PJ	Fluid Mechanics-2	3	1	0	30	70	3

Unit – I – Boundary Layer Theory
Boundary layer: Definition, Characterization of boundary layer growth over a thin flat plate – Boundary layer thickness, nominal, displacement, momentum and energy thickness – Momentum-Integral equation – Separation of boundary layer and control; Forces on Submerged Moving Bodies: Force of interaction between moving body and surrounding fluid, drag and lift components – Drag: types of drag force, factors affecting drag, drag force on thin flat plate – Lift: lift on airfoil, factors affecting lift on airfoil – Drag and lift coefficients for airfoils

Unit – II – Open Channels and Uniform Flow
Introduction – Differences between pipe flow and open channel flow – Types of flow in channels – Geometric elements of channel sections – Velocity distribution in channel section – Energy and

momentum correction factors – Uniform Flow: Chezy and Manning's formulae – Hydraulically efficient channel section: Rectangular, trapezoidal, triangular sections – Computation of uniform flow

Unit – III – Critical Flow in Open Channels
Specific energy – Critical flow – Critical depth – Froude number – Specific force – Critical flow computations – Applications: channel transitions and metering flumes

Unit – IV Non-uniform Flow in Open Channels
Gradually varied flow – Dynamic equation – Classification of channel bottom slopes – Classification and characteristics of surface profiles – Integration by Direct Step method; Rapidly varied flow – Hydraulic jump – Specific force – Types of hydraulic jump – Characteristics of jump in rectangular channels – Loss of energy in hydraulic jump

Unit –V – Dimensional Analysis and Similitude
Dimensional Analysis: Physical properties, base and derived – Units – Dimensions – Principle of dimensional homogeneity –Methods of dimensional analysis: Rayleigh's method, Buckingham Pi theorem; Similitude – Laws of similitude: Geometric, kinematic and dynamic similarities – Dimensionless numbers – Model and prototype relations – Distorted models

Textbooks
1. P.N. Modi &S.M. Seth, *Hydraulics and Fluid Mechanics including Hydraulic Machines*, Standard Book House, New Delhi.
2. K.Subramanya, *Flowin open channels,*Tata McGraw Hill Publishing Co.Ltd, New Delhi.
3. Dr.R.K.Bansal,*A TextbookofFluidMechanicandHydraulicMachinery,*LaxmiPublications (P)Ltd.

Reference Books:
1. Ven TeChow, *Open channel Hydraulics,* TataMc Graw Hill Publishing Co.Ltd, New Delhi

Subject Code	Subject Category	Subject Title	L	T	P	IM	EM	CR
14013103	PJ	Soil Mechanics	3	1	0	30	70	3

Unit – 1 Soil and its Index Properties
Soil formation – soil structure and clay mineralogy – Adsorbed water – Mass- volume relationship – Relative density
Moisture Content, Specific Gravity, In-situ Density, Grain size analysis – Sieve and Hydrometer methods – consistency limits and indices – Tests for field identification and classification of soils - I.S. Classification of soils

Unit – 2 Permeability and Seepage through Soils
Soil water – capillary rise – flow of water through soils – Darcy's law- permeability – Factors affecting – laboratory determination of coefficient of permeability – Field determination of permeability - Permeability of layered systems
Total, neutral and effective stresses – quick sand condition – Seepage through soils – Flownets: Characteristics and Uses.

Unit – 3 Stress Distribution in Soils
Boussinesq's equation - Vertical stress due to line load, strip load, and uniformly loaded circular area and Wester Gaard's theories for point loads and areas of different shapes – Pressure bulb concept - Newmark's influence chart – Approximate methods

Unit – 4 Compaction and Consolidation
Mechanism of compaction – factors affecting – effects of compaction on soil properties – Field compaction Equipment - compaction quality control
Pressure – void ratio curve – Compression index – Coefficient of Compressibility – Modulus of volume change – Consolidation process – Consolidation settlement - Terzaghi's theory of one dimensional

consolidation – coefficient of consolidation – Pre-consolidation pressure – Normally consolidated and over consolidated soils.

Unit – 5 Shear Strength of Soils
Mohr – Coulomb Failure theories – Types of laboratory strength tests – strength tests based on drainage conditions – Shear strength of sands – Critical Void Ratio – Liquefaction- shear strength of clays.

TEXT BOOKS:
1. Geotechnical Engineering: C Venkatramaiah
2. Soil Mechanics & Foundation Engineering: KR Arora
3. Soil Mechanics & Foundation Engineering: BC Punmia

REFERENCE BOOKS:
1. Soil Mechanics: TW Lambe & RV Whitman
2. Theory and Practice of Foundation Design: NN Som & SC Das
3. Soil Mechanics: R F Craig

Subject Code	Subject Category	Subject Title	L	T	P	IM	EM	CR
14013104	PJ	Introduction to Reinforced Concrete Design	3	1	0	30	70	3

UNIT-I Reinforced Concrete and Working Stress Method

Reinforced concrete: Plain and reinforced concrete – Structural systems – Reinforced concrete buildings – Behaviour of concrete: Uniaxial compression, Tension, Combined stresses, Shrinkage, Creep, Durability – Concrete mix designation – Permissible stresses in concrete – Reinforcing steel: Grades, Permissible stresses – Design codes: IS456-2000

Working stress method: Design philosophy – Assumptions – Analysis and design of singly and doubly reinforced rectangular beams for flexure and shear

UNIT-II Limit State Method of Design – Flexure

Limit State method: Design philosophy – Limit States of collapse, serviceability – Characteristic and design values – Partial safety factors – Analysis of structure

Limit State of Collapse-Flexure: Assumptions – Concrete stress block parameters – Moment of resistance of rectangular and flanged sections – Sections with and without compression reinforcement – Under, balanced and over-reinforced sections – Design of rectangular and flanged sections for flexure

UNIT-III Limit State Method of Design – Shear, Torsion, Bond

Limit State of Collapse-Shear: Behaviour of beams in shear – Modes of cracking – Shear transfer mechanisms – Shear failure modes – Design for shear: Nominal shear stress, Design shear strength, shear reinforcement, Code provisions

Limit State of Collapse-Torsion: Primary and secondary torsion – Combined flexure and torsion – Failure modes – Combined torsion and shear – IS Code provisions – Design of longitudinal reinforcement – Design of transverse reinforcement

Bond: Types of bond: flexural and anchorage bond – Bond failure and bond strength – Factors influencing bond strength – IS Code provisions for bond – Splicing

UNIT-IV Limit State of Collapse – Compression

Limit State of Collapse-Compression: Assumptions – Minimum eccentricity – Slenderness limits – Design of short columns: Axial compression – Axial load and uniaxial bending – Axial load and biaxial bending – Design using SP-16 – IS Code provisions for reinforcement and detailing

UNIT-V Limit State of Serviceability-Deflection and Cracking

Limit State of Serviceability-Deflection: Deflection of flexural members – Short and long term deflections – IS Code method for deflection calculation – Total deflection – Short term deflection – Deflection due to shrinkage – Deflection due to creep – Limits on deflection

Limit State of Serviceability-Cracking: Flexural and compression members – Factors influencing crack widths – IS Code method for crack width calculation – Limits on crack width

TEXTBOOKS

1. Reinforced Concrete Design – Pillai and Menon

REFERENCES

1. Fundamentals of Reinforced Concrete Design – ML Gambhir
2. Limit State Design of Reinforced Concrete – PC Varghese

Subject Code	Subject Category	Subject Title	L	T	P	IM	EM	CR
14013105	PJ	Hydraulic Machinery	3	1	0	30	70	3

Unit – I: Momentum Equations and Force of Jet on Vanes
Linear momentum equation and its application to find the force of jet on vanes – Vanes: stationary and moving, flat and curved, jet striking at centre and edge, series of flat and curved vanes – Velocity triangles: at inlet and outlet of vanes, calculation of work-done and efficiency; Moment of momentum equation, theory of turbo-machinery

Unit–II: Pelton, Francis and Kaplan Turbines
Hydraulic Turbines: general layout of hydro-electric power plants, classification of turbines; Pelton, Francis and Kaplan turbines: working principle, parts, work done, efficiency, setting, working proportions and design; Degree of reaction; Draft tube: principle, types, efficiency

Unit – III: Performance and Unit Quantities of Turbines
Performance of Turbines: efficiencies of turbines, operation under constant head and speed, main characteristic curves, operating characteristic curves, constant efficiency curves; Unit quantities: working under varying condition, unit speed, unit discharge, unit power, use of unit quantities; Specific speed: concept of homologous units, specific speed, selection of turbines – Cavitation

Unit– IV: Centrifugal Pumps
Centrifugal Pumps: working principle, types, parts, setting, work done – Performance: heads and efficiencies, main characteristic curves, operating characteristic curves, constant efficiency curves – Priming – Minimum starting speed – Multistage pumps – Specific speed – NPSH and cavitation

Unit–V: Reciprocating Pump and Miscellaneous Hydraulic Machines
Reciprocating pump: working principle, types, parts, setting, discharge, work done – Slip – Indicator diagram – Air vessels; Miscellaneous hydraulic machines: hydraulic press, hydraulic accumulator, hydraulic intensifier, hydraulic ram

Text Books:
1. P.N. Modi&S.M.Seth, *Hydraulics and Fluid Mechanics including Hydraulic Machines*, Standard Book House,NewDelhi.
2. R.K.Bansal, *A textbook of Fluid Mechanics and Hydraulic machinery*, Laxmi Publications(P) Ltd.

Reference Books:
1. JagadishLal, *Hydraulic Machines*, Metropolitan BookCompanyPvt.Ltd.
2. Nachleba, *Hydraulic Turbines,* Tata McGraw Hill Publishing Co. Ltd, New Delhi.

Subject Code	Subject Category	Subject Title	L	T	P	IM	EM	CR
14013106	PJ	Water Supply Engineering	3	1	0	30	70	3

UNIT – I

Need for protected water supply: Water borne, water carried and water related diseases, Significance of pollutants in water and their effects on human health; 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

UNIT – II

Water collection, conveyance and distribution : Intake works for collection of surface water – Conveyance of water – Gravity and pumping systems – Their design – Different materials used for conveying conduits and their suitability, systems of distribution – Distribution reservoirs – Distribution networks, design of distribution networks, Hardy-Cross method, pipe accessories; Valves, their location and suitability

UNIT – III

Water treatment: Conventional water treatment processes, units and their functions – Theory and design of units of aeration, coagulation and flocculation and clarification – Optimum dose of coagulant; Theory of filtration: Different types of filters and their design; Disinfection – disinfectants, mechanism of disinfection – Break point chlorination

UNIT – IV

Advanced treatment methods: Removal of fluorides, arsenic, hardness, iron and manganese, salinity, colour, organic chemicals and biological residues; Adsorption with activated carbon, ion exchange resins, membrane processes, chemical oxidation and softening

UNIT – V

Water quality assessment: Collection of representative water samples, Frequency of sampling, preservation and analysis of water for physical, chemical, biological and radiological characteristics; Properties of potable water, Water quality indices, water quality plots, diagrammatic representation of water quality, ionic concentration and piper diagrams

Text books:

1. Environmental Engineering by Howard S.Peavy, Donald R. Rowe and George Tchobanoglous, McGraw-hill International editions, NewYork

Reference Books:

1. Environmental Engineering by Davis Cornvel, McGraw- Hill book Co., New York. (2000)

Subject Code	Subject Category	Subject Title	L	T	P	IM	EM	CR
14013107	PJ	Fluid Mechanics and Hydraulic Machinery Lab	0	0	3	50	50	2

List of Experiments:

1. Verification of Bernoulli's Theorem
2. Calibration of Orifice and Mouthpiece
3. Calibration of a rectangular and triangular notches
4. Study of losses in pipes
5. Calibration of Venturimeter and Orificemeter

6. Study of Impact of jet on vanes.
7. Performance test on single stage centrifugal pump.
8. Performance test on reciprocating pump.
9. Performance and specific speed test on Pelton turbine
10. Performance and specific speed test on Francis turbine.
11. Study on Open channel flow

Subject Code	Subject Category	Subject Title	L	T	P	IM	EM	CR
14013108	PJ	Soil Mechanics Lab-1	0	0	3	50	50	2

1. Determination of Water Content
    a) Oven drying method
    b) Sand bath method
    c) Calcium carbide method
    d) Pycnometer method
    e) Torsion balance method
2. Determination of Specific Gravity
    a) Pycnometer method
    b) Density bottle method
3. Particle size distribution
    a) Sieve analysis
    b) Hydrometer method
4. Consistency Limits
    a) Liquid limit
    b) Plastic limit
    c) Shrinkage limit
5. Free swell index
6. Determination of In-situ density
    a) Core cutter method
    b) Sand replacement method
7. Determination of Relative Density for cohesionless soils

TEXT BOOKS:

1. Compendium of Soil Mechanics: SP 36
2. Soil Mechanics & Foundations: Muni Budhu
3. Soil Mechanics & Foundation Engineering: K R Arora
4. Soil Mechanics & Foundation Engineering: B C Punmia
5. Geo Technical Engineering: T G Sitharam
6. Soil Testing for Engineers: S Mittal & J P Shukla

Subject Code	Subject Category	Subject Title	L	T	P	IM	EM	CR
14013109	PJ	Engineering Geology Lab#	0	0	3	-	-	-

1. IDENTIFICATION MINERALS [A. ROCK FORMING MINERALS]
2. IDENTIFICATION MINERALS [B. ORE FORMING MINERALS]
3. IDENTIFICATION MINERALS [C. CLAY MINERALS]
4. IDENTIFICATION ROCKS [A. IGNEOUS ROCKS]

5. IDENTIFICATION ROCKS [B. SEDIMENTARY ROCKS]
6. IDENTIFICATION ROCKS [C. METAMORPHIC ROCKS]
7. SIMPLE DIP & STRIKE PROBLEMS
8. THICKNESS OF BEDS PROBLEMS
9. INTERPRETATION OF GEOLOGICAL MAPS [HORIZONTAL BEDS, INCLINED BEDS]
10. INTERPRETATION OF GEOLOGICAL MAPS [FOLD, FAULT BEDS]

Subject Code	Subject Category	Subject Title	L	T	P	IM	EM	CR
14013110	PJ	Industrial Training Seminar#	0	0	0	-	-	-

All students shall undergo practical/industrial training under the guidance of Faculty Advisor. Students shall prepare report on the training and submit the report in a seminar.

Subject Code	Subject Category	Subject Title	L	T	P	IM	EM	CR
14253201	HS	Managerial Economics and Financial Analysis	3	0	0	30	70	3

OBJECTIVES:

- To equip the budding engineering student with an understanding of concepts and tools of economic analysis.
- Provide knowledge of managerial economics through differential economics concepts, accounting concepts are necessary to analyze and solve complex problems relating financial related matters in bog industries.
- An understanding of professional and ethical responsibility and ability to communicate effectively.
- The broad education necessary to understand the impact of engineering solutions in a global and societal context.
- Recognition of the need for, and an ability to engage in life-long learning and to meet contemporary issues.

UNIT – I: INTRODUCTION TO MANAGERIAL ECONOMICS

Definition, Nature and Scope of Managerial Economics – relation with other disciplines – Demand analysis – Determinants, Law of Demand and its exceptions – Elasticity of Demand – Types and Measurement of Elasticity of Demand – Methods of Demand Forecasting.

UNIT – II: THEORY OF PRODUCTION AND COST ANALYSIS

Production Function – Isoquants and Isocost, MRTS, least cost combination of inputs, Cobb- Douglas production function, laws of returns, internal and external economies of scale.

Cost Analysis: Cost concepts and classification – Break –Even Analysis (BEA) – Determination of Break Even Point – Managerial significance and limitation of BEA.

UNIT – III: INTRODUCTION TO MARKET AND PRICING POLICIES

Markets structures: Types of competition, Features of perfect competition, Monopoly – Monopolistic competition. Price- Output determination under perfect competition and monopoly – Methods of pricing – cost plus pricing, marginal cost, limit pricing, skimming pricing, bundling pricing, sealed bid pricing and peak load pricing.

UNIT – IV: BUSINESS ORGINATIONS AND NEW ECONOMIC ENVIRONMENT

Characteristic features of business, features of sole proprietorship, partnership, Joint Stock Company and public enterprises – Changing business environment in post – liberalization scenario.

Capital: significance, Types, Method and sources and raising finance – Capital Budgeting Methods – Pay back Method, Accounting Rate of return (ARR) and Net Present Value Method (simple problems).

UNIT – V: FINANCIAL ACCOUNTING AND ANALYSIS

Double Entry Book keeping, Journal, Ledger, Trail Balance – Final Accounts (Trading, Profit and loss Account and Balance sheet with simple adjustments) – Analysis and interpretation of financial statements through Liquidity, Profitability and Capital structure Ratios.

TEXT BOOKS:

1. Aryasri: Managerial Economics and Financial Analysis, 4/e, TMH, 2009.
2. Varshney & Maheswari: Managerial Economics, sultan chand, 2009.

REFERENCES:

1. Premchand babu, Madan Mohan : Financial Accounting and Analysis, Himalaya,2009
2. Joseph G. Nellis and David parker: Principles of Business Economics, Pearson, 2/e, New Delhi.
3. M.Sugunatha Reddy: Managerial Economics and Financial Analysis, Research India Publication, New Delhi, 2013.

Subject Code	Subject Category	Subject Title	L	T	P	IM	EM	CR
14013202	PJ	Highway Engineering	3	1	0	30	70	3

UNIT I - HIGHWAY DEVELOPMENT AND PLANNING

Highway development in India-Necessity for Highway Planning-Different Road Development Plans-Classification of Roads, Road Patterns-Highway Alignment-Basic requirements, controlling factors-Engineering Surveys for Highway location-Drawings and Reports

UNIT II - HIGHWAY GEOMETRIC DESIGN

Importance of Geometric Design-Design controls and Criteria-Highway Cross Section Elements-Pavement Surface Characteristics-Camber-Width of Pavement-Kerbs-Road Margins- Formation Width-

Right of Way-Sight Distance Elements-Factors affecting sight distance-Different situations(problems included)-Design of Horizontal alignment-Design Speed, Super Elevation, Radius of Curve and Extra Widening-Design of Transition Curves-Design of Vertical Alignment-Gradient, types, grade compensation-Vertical Curves

UNIT III - PAVEMENT DESIGN

Types of Pavements-Components and their Functions-Design Principles of Flexible and Rigid Pavements-Factors affecting the Design of Pavements--Flexible Pavement Design Methods- CBR Method, IRC Method and Recommendations, Triaxial Method-Numerical Examples-Design of Rigid Pavements-Critical load positions-Westargaard's Stress Equations-Computing Radius sof Relative Stiffness and Equivalent Radius of Resisting Section-Stresses in Rigid Pavements-Design of Expansion and Contraction Joints in C.C Pavements-Design of Dowel Bars and Tie Bars

UNIT IV - HIGHWAY MATERIALS AND CONSTRUCTION PRACTICE

Desirable Properties and Testing of Highway Materials-Aggregate-Crushing, Abrasion, Impact Tests, Water absorption, Flakiness and Elongation indices-Bitumen-Penetration, Ductility, Viscosity, Binder content and Softening point Tests. Construction Practice-Water Bound Macadam Road, Bituminous Road and Cement Concrete Road [as per IRC and MORT&H specifications]-Highway Drainage

UNIT IV - HIGHWAY MAINTENANCE

Types of defects in Flexible pavements-Surface defects, Cracks, Deformation, Disintegration-Symptoms, Causes and Treatments-Failures in Rigid Pavements- Scaling, Shrinkage, Warping, Structural Cracks-Spalling of Joints and Mud Pumping-Special Repairs-Pavement Surface Evaluation-Pavement Surface Conditions and Structural Evaluation, Evaluation of Pavement Failure and Strengthening-Overlay Design by Benkelman Beam Method[Procedure only]

TEXT BOOKS

1. Highway Engineering by S.K. Khanna and C.E.G.Justo Nem Chand Publications, New Delhi.
2. Principles and Practice of Highway Engineering by L.R. Kadiyali, Khanna Technical Publications, New Delhi,2000.

REFERENCES

1. IRC Standards (IRC 37-2001& IRC 58-2001)
2. Brea of Indian Standards(BIS) Publications on Highway Materials
3. Specifications for Road and Bridges, MORT&H(India)

Subject Code	Subject Category	Subject Title	L	T	P	IM	EM	CR
14013203	PJ	Design of Steel Structures	3	1	0	30	70	3

UNIT- I DESIGN OF TENSION AND COMPRESSION MEMBERS

TENSION MEMBERS: Types of sections- Net effective section for angles and tees in tension- Lug angles-Tension splices.

COMPRESSION MEMBERS: Plain and built up compression members- assumptions regarding end conditions—Design of built up Columns with Battens and Lacings- Splicing of Column.

UNIT-II RIVETED & WELDED CONNECTIONS

WELDED CONNECTIONS: Introduction, Advantage &Disadvantages of welding-Strength of welds-butt & fillet welds, permissible stresses- IS Code requirements. Design of welds subjected to moment acting in the plane and at right angles to the plane of the joints, Beam to Beam & beam to Column connections.

RIVETED CONNECTIONS: Strength of rivet- Strength of lap and Butt joints- methods of failure and efficiency of a riveted joints-Design of riveted joints-Design of bracket connections (Beam to Column and beam to beam connections)

UNIT-III BEAMS

Allowable stresses, Design requirements as per IS Code, Design of simple and compound beams, curtailment of flange plates, Beam to Beam connections, check for deflections, shear,buckling,check for bearing, laterally unsupported beams.

UNIT- IV PLASTIC ANALYSIS

Introduction, Idealized stress, strain diagram, Shape factors for various sections- Moment Curvature relationship- Ultimate Moment- Plastic Hinge-Lower and Upper bound Theorems- Ultimate Strength of fixed and Continuous Beams, Frames.

UNIT-V GANTRY GIRDERS

Gantry girder impact factors-longitudinal forces, Design of gantry Girders.

Text Books:

1. Design of Steel Structure by Ramachandra Vol 1
2. Design of Steel Structure by Bhavikatti
3. Structural Design and Drawing by N.Krishna Raju, University presses Hyderabad
4. Limit State design of Steel Structure by S K Duggal ,Tata Mc Graw Hills New Delhi

References:

1. Comprehensive Design of Steel Structure by B C Punmia, Ashok Kumar Jain and Arun Kumar Jain
2. Structural Design in Steel by Sarwar Alam Raz, New Age International publishers New delhi
3. Design of Steel Structures by P. Dayaratnam,S Chand Publishers
4. Design of Steel Structures by M.Raghupati Tata Mc graw Hills.

Codes/Tables: IS Codes

1. IS 800-2007
2. IS 875-PART III
3. Steel Tables
4. Railway Design Standard codes are permitted into the examination hall.

Subject Code	Subject Category	Subject Title	L	T	P	IM	EM	CR
14013204	PJ	Wastewater and Solid Waste Engineering	3	1	0	30	70	3

Unit – 1
Collection and Conveyance of Sewage: Sanitation – systems of sanitation, water carriage system, sewerage, systems of sewerage, sources of wastewater – Estimation of quantity of municipal wastewater – Estimation of quantity of storm water. Different types of sewers, design flows through sanitary sewers, storm sewers and combined sewers. Hydraulic design of sewers – Sewer appurtenances

Unit – 2
Characteristics of sewage: physical, chemical and biological properties, BOD equation and factors affecting BOD rate of reaction; Primary treatment of sewage: Concept of wastewater treatment, primary, secondary and tertiary treatment – Conventional treatment process, flow diagrams of municipal waste water treatment plants – Functions of each unit – Principles and design of screens, grit chamber and primary setting tanks

Unit – 3
Secondary treatment of sewage: Principles of biological treatment, nutritional requirement of biological treatment systems, factors affecting biological treatment systems – Design, construction, operation and maintenance of activated sludge process, oxidation ditch, trickling filters and waste stabilization ponds – secondary clarifier sludge handling, sludge digestion and disposal methods; Septic tanks: design parameters and working principles

Unit-4
Solid wastes: sources, types, composition and properties of solid waste, Collection and on- site handling, separation and processing, disposal methods, land filling, methods of land filling, design of landfills, gas production , leachate and its control, incineration, pyrolysis, composting methods, merits and demerits, biomethanation.

Unit - 5:
Hazardous waste, definition, sources, hazardous wastes rules, and classification – biomedical wastes, chemical wastes, disposal methods, waste minimization, treatment methods – physic-chemical process, biological methods, stabilization and solidification, thermal methods, disposal methods land disposal

Text Books:

1. Environmental pollution control engineering by C.S. Rao (2006), New Age International (P) Limited publishers, New Delhi.
2. Manual of water supply and treatment, 3rd edition, CPHEEO, GOI, New Delhi.
3. Waste water engineering (Environmental Engineering -2) by B.C.Punmia, Ashok Kumar Jain, Arun Kumar Jain; Lakshmi Publications(P) LTD, Delhi.

Reference books:

1. Sewage disposal and air pollution engineering by S.K.Garg, Khanna Publications, New Delhi, 2010.
2. Waste water engineering by M.N.Rao and A. K. Dutt, Oxford & IBH Publishing Co.Ltd, 2000.
3. Environmental Engineering by Davis Cornvel, Mc Graw Hill Book Co., NewYork, 2000.
4. Waste water engineering by Met Calf & Eddy, Mc Graw Hill Book Co., NewYork, 2006.

Subject Code	Subject Category	Subject Title	L	T	P	IM	EM	CR
14013205	PJ	Hydrology	3	1	0	30	70	3

Unit – I: Precipitation
Hydrologic cycle, climate and water availability, water balance – Precipitation: mechanism, types and forms, measurement and recording, different types of rain gauges, network of rain gauges; Analysis of precipitation data: mean precipitation over an area, estimation of missing data, hyetograph, intensity-duration-frequency analysis, depth-area-duration curves

Unit – II: Abstractions from Precipitation
Evaporation, transpiration and evapo-transpiration: factors affecting, estimation and measurement-pan evaporation, Blaney-Criddle method, methods of controlling evaporation; Infiltration: factors affecting, measurement, infiltration indices, Horton's model; Runoff: runoff process and components, factors affecting, determination of runoff, runoff formulae, rainfall-runoff relationships, flow-duration curves

Unit – III: Stream Flow and Hydrograph Analysis
Stream flow: stream gauging, yield, flow-duration curves, flow mass curve – Flood hydrograph: features of flood hydrograph, separation of base flow – Unit hydrograph: theory, derivation from single and complex storm hydrographs, UH for various durations, application and limitations, S-hydrograph

Unit – IV: Flood Frequency Analysis
Design flood: methods of estimating design flood, empirical formulae, rational method – Flood frequency analysis – Methods of flood control – Flood routing through reservoir – Channel flow routing –

Muskingum method – Modified Pul's method – Flood forecasting and warning

Unit – V: Groundwater Hydrology
Groundwater occurrence: types of aquifers, aquifer properties-permeability and transmissibility; Well hydraulics: Darcy's law, steady radial flow to a well, Dupit's theory for confined and unconfined aquifers, tube well, open well, measurement of yield, pumping tests – Artificial recharge and methods

Text Books
1. P. Jaya Rami Reddy, *A Text book of Hydrology (3rd Edition*, 2011), Laxmi Publications, New Delhi.
2. K.Subramanya, *Engineering Hydrology*, Tata McGraw Hill PublishingCo.Ltd, New Delhi.

ReferenceBooks
1. Linsley,KohlerandPhaulus,*HydrologyforEngineers*,TataMcGrawHillPublishingCo.Ltd, New Delhi.
2. VijaySingh,*Engineering Hydrology*, John Wiley&Sons,Ltd.

Subject Code	Subject Category	Subject Title	L	T	P	IM	EM	CR
14013206	PJ	Concrete Technology	3	1	0	30	70	3

UNIT – I

Portland cement : Composition – Physical properties – Rapid hardening Portland cement - Portland Blast Furnance cement – Low heat Portland cement - Sulphate resisting Portland cement – White Portland Cement – Coloured Portland cement - High alumina cement – Supersulphate cement – Masonry cement – Expansive cements – Oil well cements.

Additives: Classifications – Accelerators - Retarders – Water Proofers – Pigments – Air entraining agents – Puzzolanas.

UNIT – II

Concrete aggregates : Classifications – Heavy aggregates – Normal weight aggregates – Strength and other mechanical properties – Moisture content and its effects – Deleterious substances – Alkali-Aggregate reaction – Thermal properties – Grading curves and Grading requirements – Gap-graded aggregate – Maximum aggregate size – Use of 'Plums' – Handling of aggregates.

Fresh concrete: Workability – Factors affecting workability – Measurements of workability – Comparison of tests – Effect of time and temperature – Segregation – Bleeding – Mixing of concrete – Concrete mixers – vibration of concrete – Types of vibrators – Ready mixed concrete – Pumped concrete.

UNIT – III

Elasticity, shrinkage and creep: Modulus of elasticity – Dynamic modulus – Poisson's ratio – Shrinkage and its effects – Creep of concrete – Factors affecting creep.

Durability: Permeability – Chemical attack of Concrete – Efflorescence – Air entrained concrete – measurements – effects – Thermal properties – Resistance of concrete to fire.

UNIT – IV

Hardened concrete: Compression tests – Effect of capping – Flexure test – Splitting test – Rebound Hammer test – Ultrasonic pulse test – Abrasion of Concrete.

Curing of concrete: Methods of curing – Maturity - Influence of temperature – Steam curing at atmospheric pressure – High pressure steam curing.

UNIT – V

Concrete mix design and qualitycontrol: Basic consideration – Factors in the choice of properties – Method of calculation by absolute volume method – Simple example of mix design – Design of high strength mixes – Design of air entrained concrete – ACI & IS methods of mix design.

TEXTBOOKS

1. M.S.Shetty – 'Concrete Technology'
2. A.M.Neville – 'Properties of Concrete'

REFERENCES:

3. A. R. Santha Kumar - 'Concrete Technology'
4. R.H.Elvery – 'Concrete Practice'
5. D.F. Orchard – 'Concrete Technology Vols. I & II
6. U.S. Burea of Reclamation – 'Concrete Manual'
7. W.H.Taylor – 'Concrete Technology & Practice'
8. P.K. Mehta – Concrete Technology

Subject Code	Subject Category	Subject Title	L	T	P	IM	EM	CR
14013207	PJ	Prestressed Concrete Design	3	1	0	30	70	3

UNIT – I

Introduction: Basic concepts of prestressing, historical development, advantages of prestressed concrete high strength concrete, high tensile steel.

Prestressing systems: Introduction, tensioning devices pretensioning and post tensioning systems, thermo-electric and chemical prestressing.

UNIT-II

Analysis of prestressed concrete sections: Basic assumption, analysis of prestress, resultant stress at a section, pressure line, concept of load balancing, stress in tendons and cracking moment.

Losses of prestress: Nature of losses of prestress, loss due to elastic deformation of concrete, shrinkage of concrete, creep, relaxation of stress in steel, friction and anchorage slip. Total losses allowed for in design.

UNIT-III

Design of prestressed concrete sections: Design of sections for Flexure, Axial tension, compression bending and for shear. Design of members for bond and the sections for bearing.

UNIT – IV

Design of pre-tensioned and post-tensioned members: Dimensioning of flexural members, Estimation of self weight of beams, Design of pretensioned and post-tensioned beams. Design of partially prestressed beams.

UNIT – V

Prestressed concrete slabs: Types of prestressed concrete floor slabs, design of prestressed concrete one way slabs, two way slabs, simple flat slabs.

TEXTBOOKS:

1. Prestressed Concrete by N.Krishna Raju.
2. Prestressed Concrete by Pandit and Gupta.

REFERENCE BOOKS:

1. Fundamentals of Prestressed Concrete by N.C.Sinha and S.K.Roy.
2. Modern Prestressed Concrete by James R.Libby

Subject Code	Subject Category	Subject Title	L	T	P	IM	EM	CR
14013208	PJ	Construction Planning and Management	3	1	0	30	70	3

UNIT - I

Introduction: Significance of construction management, Objectives and functions of construction management. Types of construction, Resources for construction industry. Stages of construction, Construction team. Engineering drawings

UNIT - II

Construction planning: Stage of planning, Scheduling, Preparation of material, Equipment, labour and finance schedules, Bar charts, Mile stone charts.

Network Techniques In Construction Management: Critical Path Method (CPM), Program Evaluation and Review Technique (PERT) – Network techniques breakdown structures. Classification of activities, Rules, for developing net works. Network development.Network analysis. Critical activities and critical path - Cost optimization

UNIT – III

Construction and equipment management: Equipment requirement in construction industry, heavy earth moving equipment Bulldozer Scrapers, loaders Excavator, shovels and Cranes; Compaction equipment; Grading equipment. Aggregate production equipment; Asphalt mixing plant; Asphalt laying equipment; Hauling equipment, Concrete mixing equipment; Material handling devices; Pneumatic equipment; Bridge construction equipment; Drilling and blasting equipment; Pumping and dewatering equipment.

UNIT – IV

Inspection and quality control: Need for inspection and quality control Principals of inspection. Enforcement of specifications Stages of inspection and quality control

Ethical audit: Introduction - Aspects of project realization - Ethical audit procedures - The decision makers - Variety of interests - Formulation of briefs - The audit statement- the audit reviews

UNIT – V

Safety and risk: Introduction – Safety and risk - Concept and importance of safety - Types of risk - Safety and engineers - Safety measures in construction works - Design for safety - Risk benefit analysis – Accidents.

Organizing construction: Principals of organization.Communication Leadership and human relations.Types of organization.Organization for a construction firm.Temporary services.Job layout.

TEXTBOOKS:

1. Construction Planning and Management by P.S. Gahlot and B.M Dhir
2. Construction Equipment and its Management by S.C. Sarma

REFERENCES

3. Engineering Ethics by M. Govinda Rajan, S. Natarajan and .S.Senthikumar
4. Construction Management and Accounts by J.L. Sharma
5. Construction Engineering and Management by S. Seetharaman
6. Construction Management and Accounts by Haripal Singh

Subject Code	Subject Category	Subject Title	L	T	P	IM	EM	CR
14013209	PJ	Environmental Engineering Lab	0	0	3	50	50	2

Course Objective:
The laboratory provides knowledge of estimating various parameters like PH, Chlorides, Sulphates,Nitrates in water. For effective water treatment, the determination of optimum dosage of coagulant and chloride demand are also included. The estimation status of Industrial effluents will also be taught in the laboratory by estimating BOD and COD of effluent.

LIST OF EXPERIMENTS:
1. Determination of pH and Turbidity
2. Determination of Conductivity and Total dissolved solids.
3. Determination of Alkalinity/Acidity.
4. Determination of Chlorides.
5. Determination and Estimation of total solids, organic solids and inorganic solids.
6. Determination of iron.
7. Determination of Dissolved Oxygen.
8. Determination of Nitrogen.
9. Determination of total Phosphorous.
10. Determination of B.O.D
11. Determination of C.O.D
12. Determination of Optimum coagulant dose.
13. Determination of Chlorine demand.
14. Presumptive coli form test.

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Text Books:
1. Chemistry for Environmental Engineering by Sawyer and Mc. Carty
2. Standard Methods for Analysis of water and Waste Water – APHA
3. Environmental Engineering Lab Manual by Dr.G.Kotaiah and Dr.N.Kumara Swamy, CharotarPublishers, Anand.

References:
Relevant IS Codes

Subject Code	Subject Category	Subject Title	L	T	P	IM	EM	CR
14013210	PJ	Concrete Technology Lab	0	0	3	50	50	2

LIST OF EXPERIMENTS

1. Normal Consistency of fineness of cement.

2. Initial setting time and final setting time of cement.

3. Specific gravity and soundness of cement.

4. Compressive strength of cement.

5. Workability test on concrete by compaction factor, slump and Vee-bee.

6. Young‟s modulus and compressive strength of concrete.

7. Specific Gravity and Water Absorption of Coarse aggregate.

8. Bulking of Fine aggregate.

9. Non-Destructive testing on concrete (for demonstration)

Subject Code	Subject Category	Subject Title	L	T	P	IM	EM	CR
14014101	PJ	Advanced Reinforced Concrete Design	3	1	0	30	70	3

UNIT-I Design of Slabs and Staircases

Slabs: Requirements for flexural reinforcement – Cover – Spacing of bars – Minimum and maximum areas of flexural reinforcement – requirements for deflection control – One-way slabs: Design using IS Code coefficients, Detailing – Two-way slabs: Two-way action, torsion in two-way slabs, wall supported and beam supported slabs – Methods of analysis – Design using IS Code coefficients – Design of Continuous slabs – Design of circular slabs –Detailing of slabs

Staircases: Geometrical configurations – Stair slab spanning transversely – Stair slab spanning longitudinally – Loads and load effects on stair slabs – Design of stair slab spanning transversely – Design of stair slab spanning longitudinally – Design of tread-riser type staircase

UNIT-II Design of Slender Columns

Behaviour of slender columns – Braced and unbraced slender columns – Second order structural analysis of slender column structures – IS Code provisions for slender columns – Strength reduction coefficient method – Additional moment method – Design of columns with axial tension and uniaxial bending

UNIT-III Design of Footings

Isolated Footings: Allowable soil pressure – Distribution of base pressure – Concentrically loaded footings – Eccentrically loaded footings – Overturning and sliding – General design considerations and Code requirements – Design of plain concrete footing – Design of rectangular reinforced concrete footing

Combined Footings: Distribution of soil pressure – Geometry of two-column combined footings – Design considerations in two-column footings – Design of two-column combined footings: Rectangular and trapezoidal footings

UNIT-IV: Design of Cantilever Retaining Walls

Types of retaining walls – Behaviour – Lateral earth pressure – Effect of surcharge – Effect of water table – Proportioning cantilever retaining walls – Stability requirements – Soil bearing pressure requirement – Design of cantilever retaining wall with horizontal and inclined backfill

UNIT-V: Design of Water Storage Tanks

Analysis using IS-3370 – Underground and over the ground supported tanks – Design of rectangular and circular water tanks with flexible and rigid joints between floor and wall

TEXTBOOKS

1. Reinforced Concrete Design – Pillai and Menon
2. Limit State Design of Reinforced Concrete – BC Punmia, AK Jain and AK Jain

REFERENCES

1. Fundamentals of Reinforced Concrete Design – ML Gambhir
2. Limit State Design of Reinforced Concrete – PC Varghese

Subject Code	Subject Category	Subject Title	L	T	P	IM	EM	CR
14014102	PJ	Traffic Engineering	3	1	0	30	70	3

UNIT I - TRAFFIC ENGINEERING ADMINISTRATION AND FUNCTIONS

Definition-Traffic Engineering-Functions-Organization of the Traffic Engineering Department-Importance of Traffic Engineering under Indian Conditions-Factors Governing the Traffic Management System-Road User Characteristics and Vehicle Characteristics

UNIT II - TRAFFIC SURVEYS

Basic Parameters of Traffic : Volume, Speed and Density-Definitions and their interrelation-Traffic Surveys-Volume Studies-Data Collection and Presentation-Speed Studies-Time Mean Speed and Space Mean Speed-Origin and Destination Studies-Data Collection-Survey Methods and Presentation-Parking Studies and Parking Characteristics.

UNIT III - TRAFFIC SAFETY

Road Accidents-Causes and Prevention-Road and its effect on Accidents-The Vehicle-The Driver-Weather and its Effect on Accidents-Speed in Relation of Safety-Collection of Accident Data-Condition Diagram and Collision Diagram-Traffic Management Measures and their Influence on Accident Prevention.

UNIT IV - TRAFFIC REGULATION AND MANAGEMENT

Road Traffic Signs-Types and Specifications-general Principles of Traffic Signing-Road Markings- Need for Road Markings-Types of Road Markings-Specifications- Signals-Advantages and Disadvantages of Traffic Signals-Signal Indications-Design of Traffic Signals-Webster Method-IRC Method-Numerical Problems.

UNIT V - INTERSECTION DESIGN

Types of Intersections- Conflicts at Intersections-Types of at-Grade Intersections-Channelization: Objectives – Traffic Islands and design Criteria-Types of Grade Separated Intersections- rotary Intersection – Concept of Rotary and Design Criteria- Advantages and Disadvantages of Rotary Intersection-Highway Capacity-Importance of Capacity Studies in Highway Transportation studies- Level of Service Concept in HCM Manual-Capacity of Rotary Intersection-U.K. Practice.

TEXTBOOKS

1. Highway Engineering by S.K. Khanna and C.E.G. Justo, Khanna Publishers, Roorkee, 2001.
2. Traffic Engineering and Transport Planning by Dr. L. R. Kadiyali, Khanna Publishers,New Delhi

Subject Code	Subject Category	Subject Title	L	T	P	IM	EM	CR
14014103	PJ	Irrigation and Hydraulics Structures	3	1	0	30	70	3

Unit–I: Irrigation and Water Requirement of Crops
Irrigation: Necessity, importance, benefits and ill effects of irrigation – Methods of irrigation – Quality of irrigation water – Duty and Delta, relationship between duty and delta, factors affecting duty and methods of improving duty – Irrigation efficiencies; – Crop water requirements: Soil-water-plant relationship, Field capacity – Depth and frequency of irrigation – Irrigation requirements of crops – Assessment of irrigation water – Consumptive use of water, factors affecting consumptive use, measurement – Command area

UNIT – II: Canals
Classification of canals – Canal alignment – Canal regimes, Kennedy and Lacey's theories – Design – Canal lining: types of lining – Design of lined canals – Canal regulators, escapes, falls – Canal cross drainage works – Aqueduct – Syphon aqueduct - Superpassage

UNIT – III: Diversion Head Works
Types of diversion head works; Diversion and Storage head works; weirs and barrages; Layouts of diversion head works; components; Causes and failure of hydraulic structures on permeable foundations; Blighs creep theory; Khosla's theory; Determination of uplift pressure, impervious floors using Blighs and Khoslas theory; Exit gradient– Design of vertical drop weir

UNIT – IV: Storage Head Works
Reservoir Planning: Site selection, zones of storage in a reservoir, storage capacity and yield, mass inflow curve and demand curve, Calculation of reservoir capacity for a specified yield from the mass inflow curve, determination of safe yield from a reservoir of a given capacity – Life of reservoir – Reservoir sediment control

UNIT-V: Dams and Spillways
Dams: Classification – Selection of type of dam – Site selection for dams; Gravity dams: Forces acting on gravity dam, modes of failure, stability, elementary and practical profiles, design of gravity dam; Earth dams: Types of earth dams, modes and causes of failure, criteria for safe design, dam sections, seepage analysis, downstream drainage systems, seepage control measures; Spillways : Requirements, components and types of spillways – Design principles of ogee spillway – Methods of energy dissipation below spillways – Scour protection below spillways, stilling basins and appurtenances, hydraulic design of energy dissipaters – Crest gates

Text Books
1. Dr.B.C. Punmia&B.B.Lal, *Irrigation and Waterpower Engineering,* Laxmi Publications(P)Ltd.
2. Dr.P.N. Modi, *Irrigation and water Resources Engineering*, Standard Book House

ReferenceBooks:
1. K.B.Khushalani&M.Khushalani, Irrigation Practice and Design, Oxford & IBH.
2. S.K. Garg, *Irrigation and Hydraulic structures,* Khanna Publishers

Subject Code	Subject Category	Subject Title	L	T	P	IM	EM	CR
14014104	PJ	Quantity Surveying and Valuation	3	1	0	30	70	3

Unit – I Specification
Specification of different items of works: Types - Standard specifications for different items of building construction – Earth work for foundations, mortars, foundation concrete, Reinforced concrete, Brick work, Stone masonry, Mosaic Flooring, Terrazo Flooring, RCC roof and AC roof and GI sheets, plastering, Painting, pointing and wood works.

Introduction to the Estimation of structures: Introduction, Different item of works- units of item of works- Types of Estimates-Methods of estimates.

Unit- II Rate Analysis
Rate Analysis of different item of works: Earthwork Excavation – Mortars of various proportions (cement and lime) – Concrete with various proportions (lime and Cement) – Brick Masonry – Stone Masonry – Pointing – Painting – Plastering – aluminum partitions – Wooden partitions – cement concrete flooring with 1:2:4 mix – ceramic and vitrified Tile flooring and Mosaic flooring.

Unit –III Quantities Estimation of Buildings and Bar Bending Schedule
Estimation of quantities in buildings: Load Bearing wall Structure with single room, Double Room and Multirooms – Framed structure with single room, double room and multirooms (Long wall –short wall method and Center line Methods)

Estimation of Bar Bending Schedule: Beams - Slabs – Staircases – Sun shade – Lintels – Portico

Unit- IV Quantities Estimation of Irrigation Structures and Road Works
Estimation of Quantities in Weir, canal, Road Bridge

Unit- V Contracts and Valuation
Contracts: Types of contracts, contract document, conditions of contracts, contract procedure, termination of contracts, specifications, important conditions of contract, arbitration and tenders.
Valuation: Introduction, technique of valuation, elements of valuation and factors affecting valuation, methods of valuation of land property and building property, Mortgage

TEXTBOOKS:
1. Text book of Estimating and Costing – B.N. Dutta
2. Estimating and Costing by G.S.Birdie
3. A.P.D.S.S. Standard data book Vol. II
4. A.P. Department Standard Specifications

REFERENCES
1. Professional Practice – by Roshan H. Namvati
2. Valuation by S.C. Rangwala

Subject Code	Subject Category	Subject Title	L	T	P	IM	EM	CR
14014105	PJ	Foundation Engineering	3	1	0	30	70	3

Unit – 1 Earth Pressure Theories and Retaining Walls
Active and passive earth pressures in cohesionless and cohesive soils (with and without surcharge, horizontal and inclined surfaces) - Rankine's theory of earth pressure – Earth pressures in layered soils – Coulomb's earth pressure theory – Culmann's and Rebhann's graphical method.
Types of retaining walls – Stability of gravity and cantilever retaining walls – Drainage in retaining

Unit – 2 Site Investigation & Sub-Soil Exploration
Site reconnaissance – Depth of exploration – Lateral extent of exploration – Test pits – Auger borings – Wash borings – Soil samplers – Penetration test – Standard penetration test (SPT) – Geophysical methods – Seismic refraction and electrical resistivity methods – Sub soil investigation reports - Plate load test – Pressure meter.

Unit – 3 Bearing capacity of shallow foundations
Types of foundations – Depth of foundation – Terzaghi's bearing capacity equation – Bearing capacity of strip, square, circular, rectangular footings – Meyerhof's theory – Skempton's method – Brinch Hansen's method – Effect of ground water table on bearing capacity – Bearing capacity from building codes – Tolerable settlements – Settlement analysis.

Unit – 4 Pile Foundations and Well Foundations
Types of piles – Load carrying capacity of piles based on Static pile formulae – Dynamic pile formulae – Pile Load tests - Load carrying capacity of pile groups in sands and clays – Settlement of pile groups - Negative skin friction.

Types – Different shapes of wells – Components of wells – Functions and design criteria – Sinking of wells – Tilts and Shifts – Allowable bearing pressure – Lateral stability - IRC Method.

Unit – 5 Earth Slope Stability
Infinite and finite earth slopes – Types and causes of failures – Factor of safety of infinite slopes – Stability analysis by Swedish arc method, Standard method of slices, Bishop's simplified method – Taylor's stability number- Stability of slopes of earth dams under different conditions.

TEXT BOOKS:
1. Soil Mechanics & Foundation Engineering: KR Arora
2. Soil Mechanics & Foundation Engineering: BC Punmia
3. Theory and Practice of Foundation Design: NN Som & SC Das

REFERENCE BOOKS:
1. Pile Design and Construction Practice: MJ Tomlinson
2. Pile Foundation Analysis & Design: HG Poulos & EH Davis
3. Foundation analysis & Design: JE Bowles

Subject Code	Subject Category	Subject Title	L	T	P	IM	EM	CR
14014106	PN	Introduction to Optimization Techniques	3	0	0	30	70	3

UNIT – I

Introduction to planning and optimization – Planning process – systems – Systems approach in Civil Engineering – Principles of modeling.

UNIT – II

Linear programming – Formulation of the problem – Graphical solution

UNIT – III

Solution Methods of Linear Programming Problems – Standard form of linear programming problems – Simplex method – Simple problems

UNIT – IV

Duality theory and its application – Sensitivity analysis

UNIT – V

Applications of linear programming in civil engineering – Transportation – Construction – Structural Design – Pipe network – Water resource planning

TEXTBOOKS:

1. Operation Research by S.S.Rao
2. Operation Research by Kranthiswamy

Subject Code	Subject Category	Subject Title	L	T	P	IM	EM	CR
14014107	PN	Introduction to Digital Image Processing	3	0	0	30	70	3

UNIT I - INTRODUCTION
Digital image representation – image models, image types, image quality – colour models- Image acquisition – image sampling and quantization – pixel relationships – satellite image processing

UNIT II - BASIC DIGITAL IMAGE PROCESSING
Fundamental steps in Digital Image Processing – grey level transformation – Histogram equalization – multi image operation – spatially dependant Transformation – templates and convolution – Transformation – Image enhancement techniques – image restoration

UNIT III - SEGMENTATION AND EDGE DETECTION
Introduction - Region operations – Basic Edge Detection – second order Detection– Pyramid Edge Detection – Crack Edge Detection – Edge Following –Thresholding – Morphological operations

UNIT IV - IMAGE COMPRESSION
Introduction – Principle of compression – Types of compression – Runlength Encoding – Huffman Coding – Modified Huffman Coding – Modified READ – LZW – Arithmetic Coding – JPEG – Other State-of-the-Art Image Compression – Image Compression Standard File Formats

UNIT V - PATTERN RECOGNITION
Introduction, System Component, Complexity of Pattern Recognition, Object Representation, Feature Detection, Recognition Strategies – Classification, Matching, Feature Indexing. Verification – Template matching, Morphological Approach, Symbolic, Analogical Methods. Digital Image Processing Software – MATLAB, EASI/PACE, ERDAS Imagine

TEXT BOOKS
1. Rafael C. Gonzalez, Richard.E, "*Digital Image Processing (3rd Edition")* Woods Prentice Hall, 2007
2. Anji Reddy.M, Hari Shankar.Y, "*Textbook of Digital Image Processing",* BS Publications, 2006

REFERENCES
1. Robert Shcowebgerdt , "*Remote sensing models & methods for image processing"*, III edition, 2004
2. W.G.Rees – "*Physical Principles of Remote Sensing"*, Cambridge University Press, 2nd edition, 2001
3. John A.Richards, Springer –"*Verlag, Remate Sensing Digital Image Analysis"* 1999
4. John R. Jensen, "*Introductory Digital Image Processing: A Remote Sensing Perspective"*, 2nd Edition, 1995
5. Thomas M Lillesand and Kiefer.R.W, "*Remote sensing and Imageinterpretation* "John Wiley & Publications 2000

Subject Code	Subject Category	Subject Title	L	T	P	IM	EM	CR
14014108	PN	Introduction to Database Concepts	3	0	0	30	70	3

UNIT I - Introduction to Database Management
Introduction to Database Management systems – History - Characteristics – Users- three-level architecture- Entity-- relationship data model

UNIT II - The Relational Data Model and Relational Algebra Data structures – Mapping E-R Model to Relational model – data manipulation – integrity – advantages – rules for fully relational systems – relational algebra – relational algebra queries

UNIT III - Structured Query Language and Normalization
SQL – Data definition – manipulation – views; SQL in procedural programming – data integrity and constraints – triggers – data control – database security; Normalization – Undesirable properties – single-valued normalization – desirable properties of decompositions – multivalued dependencies

UNIT IV - Storage Indexing and Transactions Management
Different types of memories – secondary storage – buffer management – file structures – heap files – sorted files – index and types – indexed sequential file – B-tree – B+ tree. Transaction management – concepts – examples – schedules – serializability – concurrency control – deadlocks – lock and multiple granularity – non-locking techniques

UNIT V - Database Backup, Recovery and Security
Database system failure – backup – recovery and concept of log – log-based recovery techniques – types of recovery – log-based immediate update recovery technique; Database Security – violations – identifications and authentication – authorization / access control – security of statistical databases – audit policy – internet applications and encryption

TEXT BOOK
1. Gupta.G.K, *"Database Management Systems*", Tata McGraw Hill, 2011

REFERENCES
2. Silberschatz, Korth.H and Sudarshan.S, *"Database System Concepts*", 6th Edition, McGraw-HillInternational, 2011
3. Hector Garcia-Molina, Jeffrey D.Ullman, Jennifer Widom, "*Database System: The Complete Book*, 1st Edition, Pearson 2002
4. Ramez Elmasri and Shamkant B.Navathe, *"Fundamentals of Database Systems"*, Fifth Edition, Pearson, 2008

Subject Code	Subject Category	Subject Title	L	T	P	IM	EM	CR
14254109	HS	Professional Ethics#	3	0	0	-	-	-

UNIT-I Engineering Ethics

Senses of Engineering Ethics – Variety of moral issues – Types of inquiry – Moral professions and professionalism – Professional ideals and virtues – Uses of ethical theories

UNIT-II Engineering as Social Experimentation

Engineering as experimentation – Engineers as responsible experimenters – Research ethics – Codes of ethics – Industrial standards – A balanced outlook on law – The Challenger Case Study

UNIT-III Engineers' Responsibility for Safety

Safety and risk – Assessment of safety and risk – Risk Benefit analysis – Reducing risk – The government regulator's approach to risk – Chernobyl and Bhopal case studies

UNIT-IV Responsibilities and Rights

Collegiality and loyality – Respect for authority – Collective bargaining – Confidentiality – Conflicts of interest – Occupational crime – Professional rights – Employee rights – Intellectual Property Rights - Discrimination

UNIT-V Global Issues

Multinational corporations – Business ethics – Environmental ethics – Computer ethics – Role in Technological development – Weapons development – Engineers as Managers – Consulting engineers – Engineers as expert witness and advisors – Honesty – Moral leadership – Sample code of conduct

TEXTBOOKS

1. Mike Martin and Roland Schinzinger – Ethics in Engineering – McGraw Hill
2. Charles E Harris, Michael S Pritchard and Michael J Rabins – Engineering Ethics-Concepts and Cases – Thompson Learning

Subject Code	Subject Category	Subject Title	L	T	P	IM	EM	CR
14014110	PJ	Highway Engineering Materials Lab	0	0	3	50	50	2

LIST OF EXPERIMENTS:

I. ROAD AGGREGATES:

1. Aggregate Crushing value

2. Aggregate Impact Test.

3. Specific Gravity and Water Absorption.

4. Attrition Test

5. Abrasion Test.

6. Shape tests

II. BITUMINOUS MATERIALS:

1. Penetration Test.

2. Ductility Test.

3. Softening Point Test.

4. Flash and fire point tests.

Subject Code	Subject Category	Subject Title	L	T	P	IM	EM	CR
14014111	PJ	Soil Mechanics Lab-2	0	0	3	50	50	2

1. Compaction Test
    a) Standard Proctor Compaction (Light Compaction)
    b) Modified Proctor Compaction (Heavy Compaction)
    c) Jodhpur Mini- Compactor Test
2. Determination of Shear Strength Parameters
    a) Direct Shear test
    b) Un-confined Compressive strength test
    c) Triaxial shear test
3. Determination of Permeability
    a) Constant Head method
    b) Variable Head method
4. California Bearing Ratio Test
5. North Dakota Cone Penetrometer test
6. Determination of Consolidation Properties

Chemical Analysis for Soils

1. Total Soluble Solids Content in Soils
2. Calcium Carbonate Content in Soils

TEXT BOOKS:

1. Compendium of Soil Mechanics: SP 36
2. Soil Mechanics & Foundations: Muni Budhu
3. Soil Mechanics & Foundation Engineering: K R Arora
4. Soil Mechanics & Foundation Engineering: B C Punmia
5. Geo Technical Engineering: T G Sitharam
6. Soil Testing for Engineers: S Mittal & J P Shukla

Subject Code	Subject Category	Subject Title	L	T	P	IM	EM	CR
14014201	PJ	Design and Drawing of Irrigation Structures	2	0	2	30	70	3

Unit – I

Design of Surplus Weir: Introduction– Estimation of flood discharge– Selection of type of work–Length of surplus Weir–Crest width–Base width–Abutments –Wings –Returns –Aprons.

Unit – II

Tank Sluice with Tower Head: Vent way design–Sluice barrel–R.C. Slab–Earth pressure– Stability analysis – Tower head design–Cistern.

Unit – III

Canal drop (Notch type): Trapezoidal notch–Length of drop wall between abutments –Profile of drop wall–Notch pier–Protective works.

Unit – IV

Canal regulator cum Road Bridge: Vent way design–Drowning ratio method–Roadway–Piers– Shutters–Abutments–WingWalls–Returnwalls–Solidapronforregulator–Revetments– Energy dissipation.

Unit – V

Under Tunnel: Design of barrel roof–Abutment pressure under Pier–Fixing maximum flood levels –Tail channel–Afflux over drop wall–Loss of head calculation–Depth of foundation sof returns– Wing walls and returns -Uplift–Creep lost in percolation.

Test Book

1. C. Satyanarayana Murthy, *Water Resources Engineering Principles and practice*, New Age International Publishers, New Delhi.

Subject Code	Subject Category	Subject Title	L	T	P	IM	EM	CR
14014202	PJ	Remote Sensing & GIS	3	1	0	30	70	3

UNIT – I

Introduction to Basic Concepts: Definition – physics of Remote Sensing – Electro Magnetic Radiation(EMR) – Interaction of EMR with atmosphere, Earth surface features – vegetation, soils, water – spectral reflectance curves – atmospheric windows

UNIT – II

Remote Sensing Systems: Platforms: Introduction – Types – Satellites and orbits, polar orbiting satellites - Spectral, radiometric and spatial resolutions, temporal resolution of satellites - Multispectral, thermal and hyper spectral sensing - Some remote sensing satellites and their features.

UNIT – III

Digital Image Processing - Image Restoration: Geometric corrections - Co-registration of Data, Ground Control Points (GCP) - Atmospheric corrections, Solar illumination corrections.

Digital Image Processing - Image Enhancement: Concept of color, Color composites Contrast stretching – linear and non-linear stretching - Filtering techniques, Edge enhancement

Digital Image Processing - Information Extraction: Multispectral classification, Ground truth collection - Supervised and unsupervised classification

UNIT – IV

Geographical Information Systems: Basic Principles – Definition – Components – Data Structures – Raster and Vector formats – Functioning of GIS – Data Input – Data Manipulation – Data Retrieval – Data Analysis – Data Display – Data Base Management Systems.

UNIT – V

Remote Sensing Applications: Water shed management, Irrigation Management, Drought Assessment, Environmental Monitoring, other applications.

Text Books:

1. Remote Sensing Principles and Image Interpretation – Lillesand & Keifer
2. Remote Sensing and GIS – Prof. Anji Reddy.
3. Principles of Geographic Infornation Systems – C.P. Lo

References:

1. Remote Sensing Principles and Interpretation – F.F. Sabins.
2. Digital Remote Sensing – Pritvish Nag & M. Kudrat.
3. Remote Sensing and its applications – LRA Narayan.
3. NPTEL Materials

Subject Code	Subject Category	Subject Title	L	T	P	IM	EM	CR
14014203	PJ	Basic Soil Dynamics and Machine Foundations	3	0	0	30	70	3

UNIT I - Theory Of Vibration

Vibration of elementary systems-vibratory motion-single degree freedom system-free and forced vibration with and without damping. Principles of vibration measuring instruments

UNIT II - Waves and Wave Propagation

Wave propagation in an elastic homogeneous isotropic medium-Rayleigh, shear and compression waves-waves in elastic half space (no theoretical treatment or derivation)

UNIT III - Dynamic Properties of Soils

Elastic properties of soils-coefficient of elastic uniform and non-uniform compression and shear-effect of vibration-dissipative properties of soils-determination of dynamic properties of soil - codal provisions – IS 5249: 1992

UNIT IV - Design Procedures for Simple Machine Foundations

Design criteria – dynamic loads – simple design procedures for foundations of reciprocating and impact type machines (Treated single degree freedom only)

UNIT V - Vibration Isolation and Screening

Vibration isolation technique - foundation isolation- isolation by location-isolation by barriers active and passive isolation methods

TEXT BOOKS

1. Swamisaran, "Soil Dynamics and Machine Foundations", Galgotia Publications Pvt. Ltd. 2010.
2. Prakash .S, and Puri,V.K., "Foundation for Machines", McGraw Hill Publishing Company, Newyork, 1988.

REFERENCES

1. Kameswara Rao, "Dynamics Soil Tests and Applications", Wheeler Publishing, New Delhi, 2003.
2. Kamaswara Rao, "Vibration Analysis and Foundation Dynamics", Wheeler Publishing, New Delhi, 1998.
3. IS 2974 Code (Part I to IV) of Practice for "Design and Construction of Machine Foundations", Bureau of Indian Standards, New Delhi.
4. IS 5249 Code of Practice for "Method of test for determination of dynamic properties of soil" Bureau of Indian Standards, New Delhi.
5. Moore .P.J, "Analysis and Design of Foundation for Vibration", Oxford and IBH, 2005

Subject Code	Subject Category	Subject Title	L	T	P	IM	EM	CR
14014204	PJ	Bridge Engineering	3	1	0	30	70	3

UNIT I

INTRODUCTION:Importance of site investigation in Bridge design – Highway Bridge loading standards – Impact factor – Railway Bridge loading standards (B.G. ML Bridge) various loads in bridges.
BOX CULVERT: General aspects. Design loads, Design of Box culvert subjected to RC class AA tracked vehicle only.
BRIDGE BEARINGS:
General features – Types of Bearings – Design principles of steel Rocker & Roller Bearings – Design of a steel Rocker Bearing – Design of Elastometric pad Bearing.

UNIT II

DECK SLAB BRIDGE:
Introduction – Effective width method of Analysis Design of deck slab bridge (Simply supported) subjected to class AA Tracked Vehicle only.

UNIT III

BEAM & SLAB BRIDGE (T-BEAM BRIDGE)
General features – Design of interior panel of slab – Pigeauds method – Design of a T-beam bridge subjected to class AA tracked vehicle only.

UNIT IV

PLATE GIRDER BRIDGE:
Introduction – elements of a plate girder and their design. Design of a Deck type welded plate girder – Bridge of single line B.G.
COMPOSITE BRIDGES:
Introduction – Advantages – Design of Composite Bridges consisting of RCC slabs over steel girders‟ including shear connectors

UNIT V

PIERS & ABUTMENTS:
General features – Bed Block – Materials piers & Abutments Types of piers – Forces acting on piers – Stability analysis of piers – General features of Abutments – forces acting on abutments – Stability analysis of abutments – Types of wing walls – Approaches – Types of Bridge foundations (excluding Design).

Text Books:

1. Bridge Engineering by Ponnu Swamy, TATA Mcgraw Hill Company, New Delhi.
2. Design of Bridges by N.Krishnam Raju, Oxford & IBH, Publishing Company Pvt.ltd., Delhi.
3. Relevant – IRC & Railway bridge Codes.

Reference Books:

1. Design of Steel structures, by B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi

Publications, New Delhi.
2. Design of Bridges Structure by D.J.Victor
3. Design of Steel structures by Ramachandra.
4. Design of R.C.C. structures B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi Publications, New Delhi.
5. Design of Bridges Structure by T.R.Jagadish & M.A.Jayaram Prentice Hall of India Pvt., Delhi.

Subject Code	Subject Category	Subject Title	L	T	P	IM	EM	CR
14014205	PJ	Repair and Rehabilitation of Structures	3	1	0	30	70	3

UNIT I - GENERAL ASPECTS
Performance of construction materials and components in services for strength permeability, thermal properties and cracking effects due to climate, temperature, chemicals, wear and erosion, Design and construction errors, Effects of cover thickness

UNIT II - MAINTENANCE AND DIAGNOSIS OF FAILURE
Definitions : Maintenance, Repair and rehabilitation, Facets of Maintenance, Importance of Maintenance, Preventive measures based on various aspects of inspection- Assessment procedure for evaluating a damaged structure. Diagnosis of construction failures

UNIT III - DAMAGES AND THEIR REMEDIES
Corrosion damage of reinforced concrete, methods of corrosion protection, corrosion inhibitors, corrosion resistant steels, coatings, cathodic protection, rust eliminators. Causes of deterioration of concrete, steel, masonry and timber structures, surface deterioration, efflorescence, causes, prevention and protection

UNIT IV - MATERIALS AND TECHNIQUES OF REPAIR
Special concrete and mortar, concrete chemicals, expansive cement, polymer concrete sulphur infiltrated concrete, Ferro cement, fiber reinforced concrete. Methods of repair in concrete, steel, masonry and timber structures. Gunite and shotcrete, expoxy injection

UNIT V - STRENGTHENING AND DEMOLITION ASPECT
Strengthening of existing structures - repairs to overcome low member strength, deflection, cracking, chemical disruption, weathering, wear, fire, leakage, marine exposure, coatings for set concrete and steel reinforcement, use of non-destructive testing techniques for evaluation, load testing of structure – Demolition of structures using engineered and non-engineered techniques - case studies

TEXT BOOKS
1. Shetty .M.S,"Concrete, Technology, Theory and Practice", S.Chand and Company, New Delhi 2005.
2. Raiker .R.N, "Learning from Failures, Deficiencies in Design, Construction and Service", - R&D Centre (SDCPL), Raikar Bhavan, Bombay 1987

REFERENCES
1. "Repair & Rehabilitation", Compilation from The Indian Concrete Journal,– ACC – RCD Publication 2001.
2. Campbell-Allen, D, Harold Roper, "Concrete Structures Materials Maintenance and Repair"Longman Scientific and Technical UK 1991.
3. Allen .R.T, and Edwards .S.C, Shaw .D.N, "Repair of Concrete Structures",Chapman and Hall, 2005

Subject Code	Subject Category	Subject Title	L	T	P	IM	EM	CR
14014206	PJ	Railways, Docks and Harbour Engineering	3	1	0	30	70	3

UNIT I - INTRODUCTION TO RAILWAY ENGINEERING

Permanent way Components-Cross Section of Permanent Way-Functions of various Components like Rails, Sleepers and Ballast-Rail Fastenings- Creep of Rails-Theories related to Creep-Adzing of Sleepers-Sleeper Density-Geometric Design of Rail Way Track-Gradients-Grade Compensation- Degree of Curve - Cant and Negative Super Elevation-Cant Deficiency.

UNIT - II - GEOMETRIC DESIGN OF RAILWAY TRACK

Gradients-Grade Compensation-Cant and Negative Super elevation-Cant Deficiency-Degree of Curve-Crossings and Turn outs. Stations and Yards -Introduction –Purposes of rail way stations-Selection of a site for a railway station-Types of railway stations-Definition of a yard-Types of Yards-Tunneling-Definition-Types of tunneling-Drainage in Tunnels-Ventilation of tunnels-Lining of tunnels-Underground railways-Tube railways-Maintenance of railway tunnels.

UNIT-III - HISTORICAL DEVELOPMENT OF PORTS, HARBOURS AND DOCKS

Introduction-Early Period of Travellers-Mediterranean Harbours-Cretan Harbours-Phasor Harbours-Phonician Harbours-Greek Harbours-Roman Harbours-Eighteenth Century Harbours- Historical Development of Bombay Port.

UNIT-IV - HARBOURS, DOCKS AND BREAK WATER

Introduction-Natural Harbours-Artificial Harbours-Size of Harbours-Open Berths-Docks-Shape of Docks and Basins-Design and Construction of Basin or Dock Walls-Dock Entrances and Entrance Locks-Classification of Breakwaters-Upright Wall Breakwater-Mound with Super Structure Water Breaker-Mound Breakwaters.

UNIT-V - DREDGING AND MAITENANCE

Introduction-Types of Dredgers-Bucket or Ladder Dredger-Sand Pump or Hydraulic Dredger or Cutter Dredger-Grab Dredger-Rock Dredger-Dipper Dredger-Hopper Barge-Maintenance of Buildings-Protection of Timber Piles-Maintenance of Lock Gates and Caissons-Maintenance Fresh Water, Hydraulic and Electric Mains-Soundings-Organization of Maintenance.

TEXT BOOKS

1. A Text Book of Railway Engineering by S.C. Saxena and S.P.Arora Dhanpat Rai Publications, New Delhi.
2. Docks and Harbour Engineering-Text book of Transport Engineering Vol.II by V.N.Vazirani and S.P. Chandola, Khanna Publishers, New Delhi

Subject Code	Subject Category	Subject Title	L	T	P	IM	EM	CR
14014207	PJ	Hydropower Engineering	3	0	0	30	70	3

UNIT – I

INTRODUCTION: Sources of Energy – Hydro-power – Estimation of Water power potential.

ELECTRICAL LOAD ON HYDRO – TURBINES : General – Load curve – Load factor – Capacity factor – Utilization factor – Diversity factor – Load duration curve – Firm power – Secondary power – Prediction of load.

UNIT – II

Hydro-power plants: Low and High Head Plants- Classification of Hydel Plants – Run-of-River Plants – General Arrangement of Run – of-River Plants – Valley dam plants – Diversion canal plants. High Head diversion plants – Storage and pondage.

Pumped Storage Power Plants: Basic features – Advantages of pumped storage plants – Types of pumped storage plants – Relative merits of two-unit and three-unit arrangement – Reversible pump-turbines-Problem of operation – Topography, Reservoirs and water conveyance – Power house – Efficiency.

UNIT – III

Water conveyance: Classification of penstocks – Design criteria – Economical diameter – Anchor blocks – Conduit valves – Bends and Manifolds.

Water Hammer – Resonance in Penstocks – Channel surges – Surge tanks. Intakes – Types – Losses – Air Entrainment – Inlet Aeration – Canales – fore bay – Tunnels.

UNIT – IV

Turbines – Hydraulic features – Turbine size – Constructional Features – Layout arrangements – Hydraulics of Turbines – Draft tubes – Cavitation – Governing – Model Testing.

UNIT – V

Power house planning: Surface Power Station – Power House Structure – Powerhouse dimensions – Lighting and ventilation – Variations in design of powerhouse.

Underground Power Station: Location –Types – Advantages –Components – Types of layout – Structural Design of power Houses.

Textbooks:

1. Water Power Engineering by M.M. Dandekar and K.N. Sharma.
2. A Text Book of Water Power Engineering by R.K. Sharma and T.K.Sharma.

Subject Code	Subject Category	Subject Title	L	T	P	IM	EM	CR
14014208	PJ	Disaster Management and Mitigation	3	0	0	30	70	3

UNIT I - Introduction to Disaster
Meaning, Nature, Importance of Hazard, Risk, Vulnerability and Disaster-Dimensions and Scope of Disaster Management - India's Key Hazards –Vulnerabilities - National disaster management framework - Disaster Management Cycle

UNIT II - Natural Disaster
Natural Disasters- Meaning and nature of natural disaster-their types and effects; Floods, drought, cyclone, earthquakes, landslides, avalanches, volcanic eruptions, Heat and cold waves, Climatic change: global warming, Sea level rise, ozone depletion

UNIT III - Anthropogenic Disaster
Man Made Disasters- Nuclear disasters, chemical disasters, biological disasters, building fire, coal fire, forest fire, oil fire, air pollution, water pollution, deforestation and industrial waste water pollution.

UNIT IV - Approaches in Disaster Management
Pre- disaster stage (preparedness) - Preparing hazard zonation maps, Predictability/ forecasting & warning - Preparing disaster preparedness plan - Land use zoning - Preparedness through Information, education. Emergency Stage - Rescue training for search & operation - Immediate relief – Assessment surveys. Post Disaster stage – Rehabilitation - Social Aspect - Economic Aspect and Environmental Aspect

UNIT V - Disaster Mitigation
Meteorological observatory - Seismological observatory - Hydrology Laboratory and Industrial Safety inspectorate; Technology in Disaster Management - Emergency Management Systems (EMS) in the Disaster Management Cycle - Remote Sensing and Geographic Information Systems(GIS) in Disaster Management

TEXT BOOK

1. Sharma.S.R, *"Disaster Management*", A P H Publishers, 2011

REFERENCES

1. Venu Gopal Rao.K, *"Geoinformatics for Disaster Management"*, Manglam Publishers and Distributors, 2010.
2. Singh.R.B, "*Natural Hazards and Disaster Management: Vulnerability and Mitigation"*, Rawat Publications, 2006
3. Gupta.H.K, *"Disaster Management"*, University Press, India, 2003
4. Gupta.M.C, *"Manuals on Natural Disaster management in India"*, National Centre for Disaster Management, IIPA, New Delhi, 2001