ACHARYA NAGARJUNA UNIVERSITY: NAGARJUNA NAGAR
Four - Year B. Tech. DEGREE COURSE
(Semester System)
ACADEMIC REGULATIONS

1. **Minimum Qualifications for Admission:**
   A candidate seeking admission into First Year of B. Tech. Degree Course should have passed either Intermediate examination conducted by the Board of Intermediate Education of Andhra Pradesh with Mathematics, Physics and Chemistry as optional subjects or any equivalent examination recognized by the Nagarjuna University or Diploma in Engineering in the relevant branch conducted by the Board of Technical Education of Andhra Pradesh or equivalent Diploma recognized by Nagarjuna University. The selection is based on the rank secured by the candidate in the EAMCET / ECET (FDH) examination conducted by A.P. State Council of Higher Education.
   The candidate shall also satisfy any other eligibility requirements stipulated by the Nagarjuna University and / or the Government of Andhra Pradesh from time to time.

2. **Branches of Study:**

   1. The B. Tech. Course is offered in the following branches of study at one or more of the affiliated colleges:

      a. Bio-Technology

      b. Chemical Engineering

      c. Civil Engineering

      d. Computer Science & Engineering

      e. Electrical & Electronics Engineering

      f. Electronics & Communication Engineering

      g. Electronics & Instrumentation Engineering

      h. Instrumentation Engineering

      i. Industrial & Production Engineering

      j. Information Technology

      k. Mechanical Engineering

      l. Production Engineering

      m. Electronics & Computer Engineering

   2. The first year of study is common to all branches except for Bio-Technology and Chemical Engineering

3. **Duration of the Course and Medium of Instruction:**
   The duration of the Course is four academic years consisting of two semesters in each academic year except for the first year. The medium of instruction and examination is English.

4. **Minimum Instruction Days:**
   The first year shall consist of a minimum number of 150 instruction days and each semester of 2nd, 3rd and 4th years shall consist of 75 days of instruction excluding the days allotted for tests, examinations and preparation holidays.

5. **Evaluation:**

   1. The performance of the students in each year / semester shall be, evaluated subject-wise. The distribution of marks between sessional work (based on internal assessment) and University Examination will be as follows:

Nature of the subject	Sessional Marks	University exam. Marks
Theory subjects	30	70
Design and / or Drawing	30	70
Practicals	25	50
Project work	50	100 (Viva Voce)

   2.

      1. In the First Year there shall be three Mid Term Examinations and three Assignment Tests in theory subjects, conducted at approximately equal intervals in the academic year. Assignment; questions shall be given at least one week in advance and the students shall answer only two of these, to be specified by the concerned teacher just before the commencement of the Assignment Test. The Sessional marks shall be awarded based on the best two performances in each of the Sessional and Assignment Test, 60% of the sessional marks being allotted for Sessional Tests (Mid Term exams) and the balance 40% for Assignment Tests.

         For Drawing subject (Engineering Graphics), there shall be only three sessional tests for which 40% marks shall be awarded based on day-to-day classwork and the remaining 60% marks based on the best two performances in the three Sessional tests.

      2. In each of the Semesters of 2nd, 3rd and 4th years, there shall be two Mid Term examinations and two Assignment Tests in theory subject. The Sessional marks shall be awarded based on the best one out of the two Mid Term examinations and best one out of the two Assignment Tests. 60% of the Sessional marks shall be allotted for Mid Term examinations and the balance 40% marks for the Assignment Tests.

For Design and / or Drawing subjects, there shall be only two Mid Term examinations in each semester with no Assignment Tests. In the case of such subjects, 40% weightage shall be given for day-to-day class work and the remaining 60% weightage shall be given to Mid Term examinations taking into account the best performance in one out of two Mid Term examinations.

In each of the Semesters of 2nd, 3rd and 4th years, there shall be two Mid Term examinations and two Assignment Tests in every theory subject. The Sessional marks shall be awarded giving a weightage of 14 marks out of 18 earmarks for mid term examination (75% approx.) to the mid term, examination in which the student scores more marks and the remaining 4 marks (25% approx) for the mid term examination in which the student scores less marks. Similarly, a weightage of 5 marks (75% approx) out of 7 marks earmarked for assignment tests shall be given for the assignment test in which the student scores more marks and remaining 2 marks (25% approx) shall be given for the Assignment test in which the student scores less marks. This regulation comes into force for the batch of students admitted from the academic year 2004-2005.

3.   In the case of practical subjects, the sessional marks shall be awarded based on the day-to-day laboratory classwork including submission of record (15 marks) and laboratory examinations & Quiz / Vivavoce (10 marks).

In the case of Project work, the sessional marks shall be awarded based on the weekly progress and based on the performance in a minimum of two Seminars and the Project Report submitted at the end of the semester. The allotment of marks for Seminars and for day-to-day class work shall be 25 and 25.

NOTE: A student who is absent for any test, for any reason whatsoever, shall be deemed to have scored zero marks in that test and no make-up test shall be conducted.

The evaluation for University practical Examination shall have a weightage of 25 marks for experiments, 15 marks for viva-voce examination and 10 marks for record. This regulation comes into effect w.e.f. academic year 2007-2007.

3. A student shall secure a minimum of 50% aggregate sessional marks to become eligible to appear for the year-end / semester- end University examination.

6. **Laboratory / Practical Classes:**
   In the first year, a minimum of 14 out of 20 experiments / exercises specified in the syllabi for laboratory course shall be conducted by the students, who shall complete these in all respects and get the Record certified by the concerned Head of the Department for the

student to be eligible to face the University Examination in that Practical subject. Similarly, in each Semester of 2nd, 3rd and 4th years, a minimum of 10 out of 12 experiments / exercises specified in the syllabi for laboratory course shall be conducted by the students, who shall complete these in all respects and get the Record certified by the concerned Head of the Department.

7. **Attendance Regulations:**

   1. Regular course of study means a minimum average attendance of 75% in all the subjects computed by totaling the number of hours / periods of lectures, design and / or drawing, Practicals and project work as the case may be, held in every subject as the denominator and the total number of hours / periods attended by; the student in all the subjects, as the numerator.

   2. Condonation of shortage in attendance may be recommended on genuine medical grounds, provided the student puts in at least 65% attendance as calculated in 7.1 above and provided the principal is satisfied with the genuineness of the reasons and the conduct of the student.

   3. A student who could not satisfy the attendance requirements, as given above, in any year / semester, shall have to repeat that year/ semester.
      A weightage in sessional marks upto a maximum of 5 marks out of 30 marks in each theory subject shall be given for those students who put in a minimum of 75% attendance in the respective theory in a graded manner as indicated below:-

Attendance Percentage	**Marks Awarded**
Attendance of 75% and above but less than 80%	1 mark
Attendance of 80% and above but less than 85%	2 marks
Attendance of 85% and above but less than 90%	3 marks
Attendance of 90% and above but less than 95%	4 marks
Attendance of 95% and above	5 marks

8. **Detention:**
   A student who fails to satisfy either the minimum attendance requirements as stipulated in Clause-7, or the requirement of minimum aggregate sessional marks as stipulated in Clause 5.3, shall be detained. Such a student shall have to repeat the same year / semester as the case may be subsequently and satisfy the above requirements afresh to become eligible to appear for the. ,it year-end / semester-end University examination.

9. **University Examination:**

   1. For each theory, design and / or drawing subject, there shall be a comprehensive University Examination of three hours duration at the end of First year / each Semester of 2nd, 3rd and 4th years except where stated otherwise in the detailed

Scheme of Instruction.

Question paper setting shall be entrusted to external examiners from the panels approved by the respective Boards of Studies.

2. For each Practical subject, the University examination shall be conducted by one internal and one external examiners appointed by the Principal of the concerned college and the University respectively, the duration being that approved in the detailed Schemes of Instruction & Examination.

3. Viva-voce Examination in Project Work shall be conducted by one internal examiner and one external examiner to be appointed by the University.

4. The University shall conduct a special Supplementary examination for First Year B.Tech., so as to enable a II year B.Tech. student having First year backlog subjects to have three chances to pass all First Year B. Tech. examinations and to become eligible for promotion to III Year B. Tech. Course.

10. **Conditions for Pass:**
   A candidate shall be declared to have passed the University Examination in individual subjects if he / she secures a minimum of 40% marks in theory and design and / or drawing subjects, and 50% marks in Practical subjects (including Project Viva-voce).

11. **Conditions for Promotion:**

   1. A student shall be eligible for promotion to II/IV B. Tech. Course if he / she satisfies the minimum requirements of attendance and sessional marks as stipulated in Clauses 5 and?, irrespective of the number of backlog subjects.

   2. A student shall be eligible for promotion to III/IV B. Tech. Course if he / she has passed all the subjects of 1/ IV B. Tech., in addition to satisfying the minimum requirements of attendance and sessional marks stipulated in Clauses 5 and ? in II/IV B. Tech.

   3. A student shall be eligible for promotion to IV / IV B. Tech. Course if he / she has satisfied the minimum requirements of attendance and sessional marks stipulated in Clauses 5 and? in III/IV B.Tech. and has passed all the subjects of II/IV B. Tech.

12. **Eligibility for Award of B. Tech. Degree:**

The B.Tech. Degree shall be conferred on a candidate who has satisfied the following requirements.

1. The candidate must have, after admission to B. Tech. Degree' Course of the University, pursued the course of study for not less than four academic years in anyone of the affiliated Engineering Colleges.

2. The candidate must have satisfied the conditions for pass in all the subjects of all the years as stipulated in clause 10.

13. **Award of Class:**

A candidate who becomes eligible for the award of B. Tech. Degree as stipulated in Clause 12 shall be placed in one of the following Classes.

Division	Percentage Aggregate*
First Class with Distinction	70% aggregate or more.
First Class	60% aggregate or more but less than 70%.
Second Class	50% aggregate or more but less than 60%
Pass Class	All other candidates eligible for the award of the Degree

14. *"Aggregate", for this purpose, shall mean aggregate of the marks obtained in the University Examinations and Sessional marks put together in all the four years.

15. **Improvement of Class:**

1. A candidate, after becoming eligible for the award of the Degree, may reappear for the University Examination in any of the theory subjects as and when conducted, for the purpose of improving the aggregate and the class. But this reappearance shall be within a period of two academic years after becoming eligible for the award! of the Degree.

   However, this facility shall not be availed of by a candidate who has taken the Original Degree Certificate. Candidates shall not be permitted to reappear either for Sessional Examination or for University Examinations in Practical subjects (including Project Viva-voce) for the purpose of improvement.

2. The Sessional marks and the University Examination marks shall be shown separately on the Marks Sheet.

3. A single Marks Statement shall be issued to the candidate after incorporating the marks secured in subsequent improvements.

4. A consolidated Marks Statement shall be issued to the candidate indicating the aggregate percentage of marks of all the four years along with the Provisional Certificate.

16. **Award of Rank:**
   The rank shall be awarded based on the following:

   1. Ranks shall be awarded in each branch of study for the top ten percent of the students appearing for the Regular University Examinations or the top ten students whichever is higher.

   2. Only such candidates who pass the Final year examination at the end of the fourth academic year after admission as regular final year students along with the others in their batch and become eligible for the award of the Degree shall be eligible for the award of rank. Candidates who lose one or more years for any reason whatsoever are not eligible for the award of rank.

   3. For the purpose of awarding rank in each branch, the aggregate of marks - University Examination and Sessional marks put together - in all the four years, secured at the first attempt only shall be considered.
   Students who might have attempted to improve their marks by appearing at subsequent examinations even after passing any subject shall also be eligible for the award of rank based on their first attempt marks.

   4. Award of prizes, scholarships, or any other Honours shall be based on the rank secured by a candidate, consistent with the desire of the Donor, wherever applicable.

17. **Supplementary Examinations:**
   In addition to the Regular University Examinations held at the end of each academic year I each semester, Supplementary University Examinations will be conducted during the academic year. Such of the candidates taking the Regular / Supplementary .University examinations as Supplementary candidates may have to take more than one University Examination per day.

18. **Transitory Regulations:**

   1. Candidates who studied the four-year B. Tech. Degree Course under New Regulations (NR) / Revised Regulations (RR) but who got detained in any year for want of attendance / minimum aggregate sessional marks may join the appropriate year / semester in the Semester system applicable for the batch and be governed by the Regulations of that batch from then on.

2. University Examinations according to NR / RR shall be conducted in subjects of each year five times after the conduct of the last set of regular examinations under those Regulations.

3. Candidates who have gone through the entire course of four academic years and have satisfied the attendance and minimum aggregate sessional marks in each year under NR / RR, but who have yet to pass some subjects even after the five chances stated in Clause 17.2, shall appear for the equivalent subjects in the Semester system, specified by the University / Board of Studies concerned.

19. **Amendments to Regulations:**
   The University may, from time to time, revise, amend or change the Regulations, Schemes of Examinations and Syllabi.

ACHARYA NAGARJUNA UNIVERSITY : NAGARJUNA NAGAR

SCHEME OF EXAMINATION AND INSTRUCTION FOR 1/4 B.TECH.
w.e.f 2007-2008 (Semester System)

I/IV B.TECH (ALL BRANCHES) - ANNUAL PATTERN (For I B.Tech. only)
(except Chemical Engg. and Biotechnology)

Department: **Civil Engineering**

Code No	Subject	Periods per week		Maximum Marks		Total Marks
		L/T	D/P	Session al	Unive rsity	
BT/CE/Ch.E/CSE/ECE/EEE/EI/IT/ME - 101	Mathematics – I	3	-	30	70	100
BT/CE/Ch.E/CSE/ECE/EEE/EI/IT/ME - 102	Mathematics – II	3	-	30	70	100
BT/CE/Ch.E/CSE/ECE/EEE/EI/IT/ME - 103	Physics	3	-	30	70	100
CE/CSE/ECE/EEE/EI/IT/ME – 104	Chemistry	3	-	30	70	100
BT/CE/Ch.E/CSE/ECE/EEE/EI/IT/ME - 105	Technical English Communication Skills	3	-	30	70	100
BT/CE/Ch.E/CSE/ECE/EEE/EI/IT/ME - 106	Computer Programming	3	-	30	70	100
CE/CSE/ECE/EEE/EI/IT/ME – 107	Engineering Mechanics	3+1	-	30	70	100
BT/CE/Ch.E/CSE/ECE/EEE/EI/IT/ME - 108	Engineering Graphics**	2+4	-	30	70	100
BT/CE/Ch.E/CSE/ECE/EEE/EI/IT/ME - 151	Physics Lab	-	3	25	50	75
BT/CE/Ch.E/CSE/ECE/EEE/EI/IT/ME - 152	Chemistry Lab*	-	3/2	25	50	75
BT/CE/Ch.E/CSE/ECE/EEE/EI/IT/ME - 153	Workshop Practice*	-	3/2	25	50	75
BT/CE/Ch.E/CSE/ECE/EEE/EI/IT/ME - 154	Computer Programming Lab	-	3	25	50	75
	TOTAL	**23+5**	**9**	**340**	**760**	**1100**

ACHARYA NAGARJUNA UNIVERSITY : NAGARJUNA NAGAR

SCHEME FOR ELECTRICAL & ELECTRONICS ENGINEERING
w.e.f 2007-2008 (Semester System)

II/IV B.TECH (CE)   SEMESTER - I

Code No	Subject	Periods per week		Maximum Marks		Total Marks
		L/T	D/P	Sessional	University	
CE 211	Mathematics - III	4	-	30	70	100
CE 212	Building Materials, Planning & Construction	4	-	30	70	100
CE 213	Surveying - I	4	-	30	70	100
CE 214	Solid Mechanics - I	4	-	30	70	100
CE 215	Fluid Mechanics	4	-	30	70	100
CE 216	Engineering Geology	4	-	30	70	100
CE 251	Engineering Geology Laboratory	-	3	25	50	75
CE 252	Surveying Field Work - I	-	3	25	50	75
CE 253	Building Drawing	-	3	25	50	75
	TOTAL	**24**	**9**	**255**	**570**	**825**

ACHARYA NAGARJUNA UNIVERSITY : NAGARJUNA NAGAR

SCHEME FOR ELECTRICAL & ELECTRONICS ENGINEERING
w.e.f 2007-2008 (Semester System)

II/IV B.TECH (CE)   SEMESTER - II

Code No	Subject	Periods per week		Maximum Marks		Total Marks
		L/T	D/P	Sessional	University	
CE 221	Concrete Technology	4	-	30	70	100
CE 222	Environmental Studies	4	-	30	70	100
CE 223	Surveying - II	4	-	30	70	100
CE 224	Solid Mechanics - II	4	-	30	70	100
CE 225	Hydraulics & Hydraulic Machines	4	-	30	70	100
CE 226	Elements of Electrical and Mechanical Engineering	4	-	30	70	100
CE 261	Hydraulics & Hydraulic Machines Laboratory	-	3	25	50	75
CE 262	Material Testing Laboratory	-	3	25	50	75
CE 263	Communication Skills Laboratory	-	3	25	50	75
	TOTAL	**24**	**9**	**255**	**570**	**825**

ACHARYA NAGARJUNA UNIVERSITY : NAGARJUNA NAGAR

SCHEME FOR ELECTRICAL & ELECTRONICS ENGINEERING
w.e.f 2007-2008 (Semester System)

III/IV B.TECH (CE)   SEMESTER - I

Code No	Subject	Periods per week		Maximum Marks		Total Marks
		L/T	D/P	Sessional	University	
CE 311	Environmental Engineering - I	4	-	30	70	100
CE 312	Structural Analysis - I	4	-	30	70	100
CE 313	Water Resources Engineering - I	4	-	30	70	100
CE 314	Design of Concrete Structures - I	4	-	30	70	100
CE 315	Design of Steel Structures - I	4	-	30	70	100
CE 316	Geotechnical Engineering - I	4	-	30	70	100
CE 351	Environmental Engineering Laboratory	-	3	25	50	75
CE 352	Geotechnical Engineering Laboratory	-	3	25	50	75
CE 353	Computer Applications in Civil Engineering Laboratory	-	3	25	50	75
	TOTAL	**24**	**9**	**255**	**570**	**825**

SCHEME FOR ELECTRICAL & ELECTRONICS ENGINEERING
w.e.f 2007-2008 (Semester System)

III/IV B.TECH (CE)   SEMESTER - II

Code No	Subject	Periods per week		Maximum Marks		Total Marks
		L/T	D/P	Session al	Unive rsity	
CE 321	Professional Ethics and Human Values	3	-	30	70	100
CE 322	Structural Analysis - II	4	-	30	70	100
CE 323	Water Resources Engineering - II	4	-	30	70	100
CE 324	Design of Concrete Structures - II	4	-	30	70	100
CE 325	Design of Steel Structures - II	4	-	30	70	100
CE 326	Geotechnical Engineering - II	4	-	30	70	100
CE327	Environmental Engineering - II	4	-	30	70	100
CE 361	Surveying Field Work - II	-	3	25	50	75
CE 362	Computer Aided Analysis and Design in Civil Engineering	-	3	25	50	75
	TOTAL	**27**	**6**	**260**	**590**	**850**

ACHARYA NAGARJUNA UNIVERSITY : NAGARJUNA NAGAR

SCHEME FOR ELECTRICAL & ELECTRONICS ENGINEERING
w.e.f 2007-2008 (Semester System)

IV/IV B.TECH (CE)   SEMESTER - I

Code No	Subject	Periods per week		Maximum Marks		Total Marks
		L/T	D/P	Sessional	University	
CE 411	Transportation Engineering - I	4	-	30	70	100
CE 412	Structural Analysis - III	4	-	30	70	100
CE 413	Water Resources Engineering – III (Design & Drawing)	4	-	30	70	100
CE 414	Estimation and Quantity Surveying	4	-	30	70	100
CE 415	Earthquake Resistant Design of Structures	4	-	30	70	100
CE 416	Elective - I	4	-	30	70	100
CE 451	Term Paper	-	3	25	50	75
CE 452	Computer Aided Detailing of Structures	-	3	25	50	75
CE 453	Transportation Engineering Laboratory	-	3	25	50	75
	TOTAL	24	9	255	570	825

Elective – I

CE 416/1   Pressed Concrete
CE 416/2   Remote Sensing and GIS
CE 416/3   Water Resources Systems Analysis
CE 416/4   Advanced Foundation Engineering

ACHARYA NAGARJUNA UNIVERSITY : NAGARJUNA NAGAR

SCHEME FOR ELECTRICAL & ELECTRONICS ENGINEERING
w.e.f 2007-2008 (Semester System)

IV/IV B.TECH (CE)   SEMESTER - II

Code No	Subject	Periods per week		Maximum Marks		Total Marks
		L/T	D/P	Sessional	University	
CE 421	Transportation Engineering - II	4	-	30	70	100
CE 422	Construction Management	4	-	30	70	100
CE 423	Elective - II	4	-	30	70	100
CE 424	Elective - III	4	-	30	70	100
CE 461	Quantity Estimation and Project Management	-	3	25	50	75
	TOTAL	**12**	**3**	**145**	**330**	**475**

Elective – II

CE 423/1   Bridge Engineering
CE 423/2   Finite Element Methods in Civil Engineering
CE 423/3   Ground Improvement Techniques
CE 423/4   Environmental Impact Assessment and Management

Elective – III

CE 424/1   Advanced Reinforced Concrete Design
CE 424/2   Pavement Analysis and Design
CE 424/3   Advanced Environmental Engineering
CE 424/4   Ground Water Development and Management

CODE: BT/CE/Ch.E/CSE/ECE/EEE/EI/IT/ME – 101

MATHEMATICS - I

(Common to all Branches)

Lectures   : 3 Periods/Week   Sessional marks
        : 30
University Exam. : 3 Hours   University exam. marks:
        70

UNIT-I

Ordinary differential equations-Introduction, Linear and Bernoulli's equations, Exact equations, equations reducible to exact equations, Orthogonal trajectories, Linear Differential equations: Definition, Theorem, Operator D, Rules for finding the complementary function, Inverse operator, Rules for finding the particular integral, Working procedure to solve the equation, Newton's law of cooling, Heat flow, Rate of Decay of Radio-Active Materials.

UNIT-II

Linear dependence of solutions, Method of variation of parameters, Equations reducible to linear equations, Cauchy's homogeneous linear equation, Legendre's linear equation Simultaneous linear equations with constant coefficients, Statistics: Method of least squares, Correlation, co-efficient of correlation (direct method only), lines of regression.

UNIT-III

Laplace Transforms : Introduction, Transforms of elementary functions, Properties of Laplace Transforms, existence conditions, Transforms of derivatives, Integrals, multiplication by t^n, division by t, Evaluation of integrals by Laplace Transforms, Inverse transforms, convolution theorem, Application to Differential equations with constant coefficients, transforms of unit step function, unit impulse function, periodic function. Convolution Theorem, Application to ordinary differential equations

UNIT-IV

 Introduction and Euler's formulae, Conditions for a Fourier expansion, Functions having points of discontinuity, Change of interval, Even and Odd functions, Half range series Typical wave forms and Parseval's formulae, Complex form of the Fourier series Practical harmonic analysis

NOTE
Two questions of 14 marks each will be given from each unit out of which one is to be answered. Fourteen questions of one mark each will be given from entire syllabus which is a compulsory question.

TEXT BOOK
1. Higher Engineering Mathematics by B.S. Grewal, Khanna publishers,   39th edition.

REFERENCE BOOKS
1. Advanced Engineering Mathematics by kreyszig.
2. A textbook of Engineering Mathematics by N.P. Bali

CODE: BT/CE/Ch.E/CSE/ECE/EEE/EI/IT/ME – 102

MATHEMATICS - II
(Common to all Branches)

Lectures   : 3 Periods/Week   Sessional marks
          : 30
University Exam. : 3 Hours   University exam. marks:
          70

UNIT-I

Matrices
     Rank of a matrix, vectors, Elementary transformations, Solution of linear system of equations, Consistency of linear system of equations, System of linear homogeneous equations, Linear transformations, Characteristic equations, Properties of eigen values, Cayley- Hamilton theorem (without proof), Reduction to diagonal form reduction of Quadratic forms to canonical form, Nature of a quadratic form, Complex matrices.

UNIT-II

Differential Calculus
     Rolle's Theorem(without proof), Lagrange's Mean value theorem (without proof), Taylor's theorem (without proof), Maclaurin's series, Maxima and Minima of functions of two variables, Lagrange's method of undetermined multipliers.

UNIT-III

Multiple Integrals and Vector Calculus
     Double integrals, Change of order of integration , Double integrals in polar coordinates, Area enclosed by plane curves, Evaluation of triple integrals, Volume of solids, Change of variables.
Vector Calculus:
Scalar and vector point functions, Del applied to scalar point functions. Gradient

UNIT-IV

Vector Calculus
     Del applied to vector point functions, Physical interpretation of divergence, Del applied twice to point functions, Del applied to products of point functions, Integration of vectors, Line integral, Surfaces, Green's theorem in the plane (without proof),   Stoke' s theorem (without proof) , Volume integral, Gauss divergence Theorem (without proof), Cylindrical Coordinates, Spherical polar coordinates.

NOTE
Two questions of 14 marks each will be given from each unit out of which one is to be answered. Fourteen questions of one mark each will be given from entire syllabus which is a compulsory question.

TEXT BOOK
1. Higher Engineering Mathematics by B.S.Grewal Khanna publishers,39th edition.

REFERENCE BOOKS
1. A textbook of Engineering Mathematics by N.P. Bali
2. Advanced Engineering Mathematics by Erwin Keyszing John willy and sons.
3. Differential Calculus by Shanti Nayaran

PHYSICS
(Common to all Branches)

Lectures   : 3 Periods/Week   Sessional marks
           : 30
University Exam. : 3 Hours   University exam. marks:
           70

UNIT – I

Ultrasonics & Optics

      Ultrasonics- Production of Ultrasonics by Magnetostriction & Piezoelectric oscillator methods, Detection of Ultrasonics by Kundt's tube and acoustic grating method, applications of Ultrasonics in engineering & medicine. Lissajous' figures for time periods with Ratios 1:1 and 1:2, applications of Lissajous' figures.
Optics
      Superposition principle, Stokes principle (Phase change on reflection) -Interference in thin films due to reflected light(cosine law) -Michelson's interferometer principle, construction, working and applications (Determination of wave length of monochromatic source & for resolution of two closely lying wavelengths).
Diffraction
      Fraunhoffer diffraction due to a single slit, Plane diffraction grating, resolving power of a grating using Rayleigh's criterion. *Polarization*: double refraction, Nicol prism, quarter wave plate, Production and detection of circular and elliptical polarizations (qualitative), Optical activity, Electro-optic and Magneto-optic effects (Kerr & Faraday effects) .

UNIT –II

Electicity & Electromagnetism:
      Gauss's law in electricity (statement and proof) and its applications: Coulomb's law from Gauss law, line of charge, non-conducting infinite sheet, Charged non-conducting sphere.
Circulating charges and Cyclotron principle& working, Hall effect, Biot-Savart's law- B for a long wire and circular loop, Faraday's law of induction- Lenz's law- induced electric fields ,Gauss' law for magnetism ,Inductance, Energy storage in a magnetic field, Electromagnetic oscillations(quantitative),Displacement current, Maxwell's equations (Qualitative treatment),Electromagnetic waves equation and velocity, A.C. Circuit containing series LCR circuit (Resonance condition).

UNIT –III

Modern Physics

      Planck's theory of black body radiation, Dual nature of light, Compton effect, Matter waves

- de Broglie's concept of matter waves - Davisson and Germer experiment - Heisenberg's

uncertainty principle and applications(non existence of electron in nucleus, finite width of spectral

lines). One dimensional time independent Schrodinger's wave equation - Physical significance of

wave function - Particle in a box(one dimension)- Radio Isotopes-applications in medicine and

industry, Qualitative treatment (without derivation) of Fermi -Dirac distribution function and

Fermi-energy level concept in semiconductors.

UNIT – IV
(Advanced Physics)

Lasers

Spontaneous emission -stimulated emission – Population inversion – Solid State (Ruby) laser – Gas (He-Ne) laser – Semiconductor(Ga-As) laser – Applications of lasers. Holography Principle, Recording , reproduction and applications.

Optical fibers

Structure of optical fiber, types of optical fibers, Numerical aperture – fiber optics in communication and its advantages

Super conductivity

First experiment, critical parameters(T_C,H_C,I_C) Meissner effect, types of superconductors, Applications of Superconductors.

Optoelectronic devices

Qualitative treatments of -- Photo diode, LED , LCD and Solar cell and its applications. Nano Technology (Basic concepts only) and its applications.

NOTE

Two questions of 14 marks each will be given from each unit out of which one is to be answered. Fourteen questions of one mark each will be given from entire syllabus which is a compulsory question.

TEXT BOOK
 1. Physics Part I and II – Halliday and Resinick.
 2. Engineering physics – Gaur & Gupta

REFERENCE BOOKS
 1   Physics for engineers – M.R.Srinivasan.
 2   Engineering physics – M.Arumugam.
 3   Modern Engineering Physics - A.S Vasudeva

CHEMISTRY
(Common to all branches except Chemical Engineering and Bio-Tech)

Lectures   : 3 Periods/Week   Sessional marks : 30

University Exam. : 3 Hours   University exam. marks: 70

UNIT-I

Water Technology

Drinking Water quality parameter, WHO guidelines, Hardness units and determination by EDTA method, water treatment for drinking purpose, sedimentation, coagulation, filtration, various methods of chlorination, breakpoint chlorination.

Water treatment for industrial purpose

Boiler troubles, scales, sludges, caustic embrittlement and boiler corrosion- causes and prevention, Lime Soda process, softening by ion exchange process (related problems), Desalination of brakish water by electro dialysis and reverse osmosis.

Composites

Classification and Properties of composite materials, Mechanism of reinforcement in composites.

UNIT-II

Polymers

Monomer functionality, degree of polymerization, classification of polymerization- addition, condensation and co polymerization, mechanism of free radical polymerization.

Classification of plastics

Thermoplastic and thermosetting resins, chemistry of synthesis of bekalite, urea formaldehyde and polyesters. Compounding of plastics. Conducting polymers, polytiophene, mechanism of conduction, examples and applications, polymers as optical fibers- Application of polymers in biomedical devices and electronics.

Natural Rubber

Drawbacks of natural rubber- Vulcanisation.

Synthetic rubbers

Buna-S and Buna-N and polyurethane rubber

Materials used in information Technology

Liquid crystals, cellulose acetate, ZnO, CdS, Silicon, Germanium

UNIT-III

Phase Rule

Statement and explanation of the terms involved, one component water system, condensed phase rule- construction of phase diagram by thermal analysis, simple eutectic system (Pb-Ag system only).

Electrochemical Energy Systems

Types of electrochemical energy systems, electrochemistry of primary batteries (Weston Cadmium Standard cell), Secondary cells(Lead Acid cell, Ni-Cd cell), Lithium batteries and their advantages.

Fuels

Classification of fuels, calorific value- determination. Coal- Ranking and analysis, carbonization of coal, coal-tar products, metallurgical coke, classification of petroleum- fractional distillations, cracking, reforming, composition and uses of petrol- diesel, coal gas, natural gas, producer gas, LPG- Bio gas.

UNIT-IV
Corrosion and its control

Introduction, electrochemical theory of corrosion, corrosion due to dissimilar metals, galvanic series, corrosion due to differential aeration cells, Types of corrosion: Pitting, and temperature.

Protection methods: Cathodic protection, (Impressed current and sacrificial anode) anodic protection, corrosion inhibitors- types and mechanism of inhibition, metallic coatings by electroplating.

Lubricants

Role of lubricants in reducing wear and friction, Mechanism and types of lubrication. Classification, properties and selection of lubricants, Additives

NOTE

Two questions of 14 marks each will be given from each unit out of which one is to be answered. Fourteen questions of one mark each will be given from entire syllabus which is a compulsory question.

TEXT BOOK
1. Engineering Chemistry, P.C. Jain, Dhanpat Rai and Sons, New Delhi
2. A Text Book of Engineering Chemistry, S.S. Dara, 10th Edition, S.Chand and Co.
3. Essentials of Physical Chemistry, B.S.Bahl and G.D. Tuli
4. Principles of Polymer Science, P.Bahadur and N.V. Sastry, Narora Publishing House

CODE: BT/Ch.E – 104

INORGANIC & PHYSICAL CHEMISTRY
(Only for Biotechnology and Chemical Engineering branches)

Lectures   : 3 Periods/Week   Sessional marks   : 30
University Exam. : 3 Hours   University exam. marks: 70

PART – A (INORGANIC CHEMISTRY)
UNIT- I

Mole concept, oxidation numbers, balancing of equations, stoichiometry (Mass-mass, Mass volume, Volume – Volume); Chemical bonding- ionic and covalent bonding; Molecular orbital and valence bond approaches for diatomic molecules; VSEPR theory; Hybridization and shapes of molecules; Resonance, dipole moment, structure parameters such as bond length, angle & energy; Hydrogen bonding, Vander waal's interactions; Ionic solids, Ionic radii, lattice energy (Born-Haber cycle); Metal- ligand bonding and importance;

Planck's Quantum theory, Wave particle duality, Uncertainty principle, Quantum mechanical model of hydrogen atom, Periodic Table and properties- Ionization energy, Electron negativity, Atomic size; Coordination complexes- nomenclature, crystal field theory, color, geometry and magnetic properties.

UNIT- II

Chemistry of representative s and p- block elements- electronic configuration, general properties and oxidation states; Oxides, Halides and Hydrides of Alkali, Alkaline earth metals, Boron- Aluminium, Carbon-Silicon, Nitrogen- Phosphorus, Sulphur;

d block elements- electronic configuration, general characteristics and oxidation states;

Inner transition elements- General discussion, Oxidation states and Lanthanide contractions.

PART –B (PHYSICAL CHEMISTRY)
UNIT- III

Thermodynamics

First law, Reverisble and Inrreversible processes, internal energy, enthalpy, Kirchoff's equation, heat of Reaction, Hess's law, heat of formation; Second law, entropy, free energy and work function. Gibb's-helmholtz equation, Clausius-Clapeyron equation, free energy change and equilibrium constant, Trouton's rule, Third law of thermodynamics.

Phase and Chemical Equilibria

Phase rule, phase diagram of water, two component systems with a simple eutectic-Pb,Ag system, Construction of phase diagram by thermal analysis.

Colligative properties

Raoult's law, elevation of boiling point, depression of freezing point, osmotic pressure (no thermodynamic derivations) elementary treatment of vapour pressure ; Chemical Equilibria : Reversible reactions, law of mass action, Lechatelier principle,   Effect of temperature on equilibrium-van't Hoff equation; **Ionic Equilibria**

Solubility, solubility product, common ion effect; Hydrolysis of salts, pH, buffer and their application in chemical analysis, equilibrium constants (K_c, K_p, K_x) for homogeneous reactions.

UNIT- IV

Galvanic cells

Thermodynamics of galvanic cells, half cell potentials, e.m.f. of cells, Nernst equation, Commercial applications of galvanic cells;

Electrolytes

Conductance, effect of concentration, Kohlrausch law.

Kinetics of chemical reactions

Rate constant, order of reaction, molecularity, activation energy; Zero, First and Second order kinetics and elementary enzyme reactions.

Catalysis

Characteristics of catalyst, promoter, negative catalyst, catalytic poison, heterogeneous catalysis, intermediate compound formation theory, activated complex theory, acid, base and enzyme catalysis.

NOTE

Two questions of 14 marks each will be given from each unit out of which one is to be answered. Fourteen questions of one mark each will be given from entire syllabus which is a compulsory question.

TEXT BOOK

1. A new concise Inorganic chemistry, III edition - J.D.Lee, ELBS and Van Nostrand Reinhold Co. Ltd.; London.
2. Physical Chemistry – III Edition - P.W.Atkins, Oxford University Press.
3. University General Chemistry - C.N.R.Rao, MacMillan India.
4. Elements of Physical Chemistry – II edition - Samuel Glastone and David Lewsis; MacMillan & Co., London.
5. Principles of Chemistry - Paul Ander & Anthony J.Sonnessa, Collier-MacMillan Ltd., London.

CODE: BT/CE/Ch.E/CSE/ECE/EEE/EI/IT/ME - 105

TECHNICAL ENGLISH COMMUNICATION SKILLS

Lectures   : 3 Periods/Week   Sessional marks   : 30

University Exam. : 3 Hours   University exam. marks: 70

Course objectives

The areas of technical communication assay to make learners linguistically aware and communicatively competent. Special attention has been paid to the contemporary tests on language and industrial needs keeping in mind the current societal demands.

UNIT-I

General Communication Skills

This area exposes the learners to some standard varieties of linguistic communication.
1. Guided composition
    a) Paragraph writing
    b) Essay writing
    c) Confusable words
2. Reading comprehension
3. Letter writing

UNIT-II

Technical Communication Skills

This area falls under English for specific purposes (ESP) which trains the learners in basic technical communication.
1. Report writing
2. Corporate information
3. Technical words

UNIT-III

Vocabulary and Basic Language Skills

This unit offers the learners some basic aspects of language like vocabulary, structure and usage which are common to many contemporary tests.
1. Basic word list – A list of 500 words.
2. Idioms and phrases and their use.
3. Correction of sentences.
4. Analogies
5. One word substitutes
6. Antonyms & Synonyms

TEXT BOOK

1. Developing Language Skills: 1. (Foundation Books)
2. Objective English for Competitive Examinations (Third edition)

                                        - Hari Mohan Prasad
                                         Uma Rani Sinha
                                         (Tata McGraw Hill)

REFERENCE BOOKS

01. Effective Technical Communication - M.Ashraf Rizvi (Tata McGraw Hill)
02. English for Engineers - Prepared by Regional Institute of English, South India, Bangalore (Foundation Books)
03. Cambridge Preparation Guide for TOEFL.
04. Dictionary of Technical Terms - F.S.Cripsin (Oxford IBH)
05. Cambridge Advanced Learner's Dictionary
06. Cambridge Idioms Dictionary
07. Basic Correspondence & Report writing - -Sharma (Tata McGraw Hill)
08. Business Correspondence and Report Writing - - R.C.Sharma, Krishna Mohan   (Tata McGraw Hill)
09. Dictionary of Misspelled and Easily Confused Words - -David Downing, Deborah K.Williams (Tata McGraw Hill)

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CODE: BT/CE/Ch.E/CSE/ECE/EEE/EI/IT/ME - 106

COMPUTER PROGRAMMING WITH C

(Common to all Branches)

Lectures : 3 Periods/Week   Sessional marks : 30
University Exam. : 3 Hours   University exam. marks: 70

UNIT – I

Introduction

ComputerFundamentals:Computer&it'sComponents,Hardware/Software**,**Algorithm,Characterstics of algorithm, Flowchart ,Symbols are used in flowchart, history of C,Basic structure of C ,C language features.

C Tokens

Character set, Variables, Keywords, Data types and sizes, Type qualifiers, Numeric Constants and their forms of representation, Character Constants, String Constants, Declarations and Initialization of variables.

Operators & Expressions

Arithmetic operators, and expressions, Type-conversion rules, Coercion, Assignment operators and expressions, Increment and decrement operator, Conditional operator, Statements, Preprocessor directives, Input/ Output functions and other library functions. Relational operators and expressions. Boolean operators and expressions.

Programming Exercises for Unit I

C-Expressions for algebraic expressions, Evaluation of arithmetic and boolean expressions. Syntactic errors in a given program, Output of a given program, Values of variables at the end of execution of a program fragment, Filling the blanks in *a* given program, Computation of values using scientific and Engineering formulae, Finding the largest of three given numbers.

UNIT – II

Conditional Statements

Blocks, If-Else statement, Else-lf statement and Switch statement.

Iterative Statements

While loop, For loop, Do-While loop, Break, and continue.

Arrays

One - dimensional and character arrays, Two-dimensional numeric arrays.

Programming Exercises for Unit – II

Computation of discount on different types of products with different ranges of discount Finding the type of triangle formed by the given sides, Computation of income-tax, Computation of Electricity bill, Conversion of lower case character to its upper case, Finding the class of an input character; Sum of the digits of a given number, Image of a given number, To find whether a given number is-prime; Fibonacci; abundant; perfect,Strong,Amstrong; deficient, Prime factors of a given number, Merging of lists, Transpose of a matrix, Product and sum of matrices, String processing-length of a string; comparison of strings; reversing a string; copying a string, Sorting of names using arrays, Graphics patterns, To print prime numbers and Fibonacci numbers in a given range, and Amicable numbers.

UNIT – III

Functions

Function Definition, types of User Defined Functions, Parameter passing mechanisms, and simple recursion.

Scope & extent

Scope rules, Storage Classes, Multi-file compilation.

Pointers

Pointers Arithmetic, Character array of pointers, Dynamic memory allocation, array of Pointer, Pointer to arrays.

Programming Exercises for Unit - III

Recursive Functions: factorial, GCD(Greatest Common Divisior),Fibonacci; To evaluate the pointer arithmetic expressions; An interactive program to perform Pointers & Functions - Insertion sort, Bubble sort, Linear search Binary search, Computation of Statistical parameters of a given list of numbers, Counting the number of characters, words and lines in a given text, Table of values of f (x,y) varying x and y; Using Storage Classes to implement the multifile compilation; implement the string operations using Dynamic memory allocation functions;

UNIT – IV

Structures

Structures, Array of structures, structures within structures, Pointer to structures, self referential structures, Unions.

Files

File Handling functions, File error handling functions, Command-line arguments.

Programming Exercises for Unit – IV

Operations on complex numbers, operations on rational number (p/q form), Matrix operations with size of the matrix as a structure; Frequency count of keywords in an input program, Sorting a list of birth records on name and date of birth using File handling functions, Student marks processing, Library records processing - sorting on name, author, Copy one file to another.

NOTE

Two questions of 14 marks each will be given from each unit out of which one is to be answered. Fourteen questions of one mark each will be given from entire syllabus which is a compulsory question.

TEXT BOOK
1. Programming with C (Schaum's Outlines) by Byron Gottfried, Tata Mcgraw-Hill.

REFERENCE BOOKS
1. The C programming language by Kernighan B W and Ritchie O M,Prentice Hall.
2. Programming with C by K R Venugopal & Sudeep R Prasad, TMH.
3. 'C' Programming by K.Balaguruswamy,BPB
4. C Complete Reference ,Herbert Sheildt,TMH

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CODE: CE/CSE/ECE/EEE/EI/IT/ME – 107
ENGINEERING MECHANICS
(Common to all branches except Chemical Engg. & Biotechnology branches)

Lectures / Tutorials   : 3 / 1 Periods/Week   Sessional marks: 30

University Exam. : 3 Hours   University exam. marks: 70

UNIT – I
Concurrent Forces In A Plane
Principles of statics – composition and resolution of forces – equilibrium of concurrent forces in a plane – method of projections – Method of moments.
Parallel Forces In A Plane
Couple – general case of parallel forces in a plane – center of parallel forces and centre of gravity – Centroids of composite plane figures and curves.

UNIT – II
General Case Of Forces In A Plane
Composition of forces in a plane – Equilibrium of forces in a plane – Plane trusses: methods of joints.
Friction
Static, kinetic, and limiting friction – angle of friction: Applications of static friction.
Principle Of Virtual Work
Equilibrium of Ideal systems

,   UNIT – III
Rectilinear Translation
Kinematics of rectilinear motion – principles of dynamics – differential equation of rectilinear motion – motion of a particle acted upon by a constant force – D'Alemberts principle – momentum and impulse – work and energy – ideal systems: conservation of energy – direct central impact
Moments Of Inertia Of Plane Figures
Moment of inertia of a plane figure with respect to an axis in its plane – Moment of Inertia with respect to an axis perpendicular to the plane of the figure – Parallel axis theorem.

UNIT – IV
Curvilinear Translation
Kinematics of curvilinear motion – Differential equations of curvilinear motion – D'Alembert's principle in curvilinear motion – Work and Energy.
Moments Of Inertia Of Material Bodies
        Moment of inertia of a rigid body – Moment of inertia of a lamina – Moments of inertia of three – dimensional bodies.
Rotation Of A Rigid Body About A Fixed Axis
        Kinematics of rotation – Equation of motion for a rigid body rotating about a fixed axis

NOTE
Two questions of 14 marks each will be given from each unit out of which one is to be answered. Fourteen questions of one mark each will be given from entire syllabus which is a compulsory question.

TEXT BOOK
1. Engineering mechanics by S. Timoshenko and D. H. Young – Mc Graw-Hill International edition (For concepts and symbolic problems)
2. Engineering mechanics statics and dynamics by A. K. Tayal – Umesh publication, Delhi (For numerical problems using S.I. system of units)
REFERENCE BOOKS
1. Vector mechanics for engineers statics and dynamics by Beer and Johnston, Tata Mc Graw-Hill publishing company, New Delhi
2. Engineering mechanics statics and dynamics by J. L. Meriam and L. Kraige

CODE: BT/CE/Ch.E/CSE/ECE/EEE/EI/IT/ME -108
ENGINEERING GRAPHICS
(Common to all branches)

Lectures	: 2+4 Periods / week	Sessional Marks	: 30
University Exam.	*: 3 hrs.*	*University Exam. Marks*	*: 70*

NOTE : 1) Unit VI not to be included in the university theory examination. This unit is only for internal assessment

2) University Examination Question paper consists of FIVE questions, TWO questions from each unit with internal choice.

(To be taught & examined in First angle projection)

UNIT I

General
    Use of Drawing instruments, Lettering .-Single stroke letters, Dimensioning- Representation of various type lines. Geometrical Constructions. Representative fraction.
        (3+9)

Curves
    Curves used in Engineering practice - conic sections - general construction methods for ellipse, parabola and hyperbola. cycloidal curves - cycloid, epicycloid and hypocycloid; involute of circle and Archemedian spiral.   (9+15)

UNIT II

Method Of Projections
        Principles of projection - First angle and third angle projection of points. Projection of straight lines. Traces of lines.
(6+12)

Projections Of Planes
        Projections of planes, projections on auxiliary planes.(4+8)

UNIT III

Projections Of Solids
    Projections of Cubes, Prisms, Pyramids, Cylinders and Cones with varying positions.
    (4+8)

Sections Of Solids
        Sections of Cubes, Prisms, Pyramids, cylinders and Cones. true shapes of sections. (Limited to the Section Planes perpendicular to one of the Principal Planes).
(6+12)

UNIT IV

Development Of Surfaces
Lateral development of cut sections of Cubes, Prisms,Pyramids,Cylinders and Cones.
                                                                                                (4+8)

Isometric Projections
    Isometric Projection and conversion of Orthographic Projections into isometric views. (Treatment is limited to simple objects only).
        (4+8)

UNIT V

Orthographic Projections
    Conversion of pictorial views into Orthographic views. (Treatment is limited to simple castings).
        (6+12)

<div align="center">**UNIT VI (Demonstration only)**</div>

Computer Aided Drafting(Using Any Standard Package)

Setting up a drawing: starting , main menu (New, Open, Save, Save As etc.), Opening screen, error correction on screen, units, co-ordinate system, limits, grid, snap, ortho.

Tool bars

Draw tool bar, object snap tool bar, modify tool bar, dimension tool Bar

Practice Of 2d Drawings

Exercises of Orthographic views for simple solids using all commands in   various tool bars. (4+8)

TEXT BOOK
1. Engineering Drawing by N.D. Bhatt & V.M. Panchal. (Charotar Publishing House, Anand).
2. AutoCAD 14 for Engineering Drawing Made Easy(Features AutoCAD 2000) by P.Nageswara Rao

REFERENCE BOOKS
1. Engineering Drawing by Prof.K.L.Narayana & Prof. R.K.Kannaiah.
2. Engineering Graphics with AutoCAD 2002 by James D. Bethune

CODE: BT/CE/Ch.E/CSE/ECE/EEE/EI/IT/ME - 151

LABORATORY

PHYSICS LAB
(Common to all Branches)

Practicals   : 3 Periods/Week   Sessional marks: 25

University exam.: 3 Hrs.   University Exam. marks : 50

1. **Compound Pendulum** - Measurement of g-value.

2. **Sonometer** - Determination of unknown frequency of tuning fork and verification of laws of transverse vibrations of a stretched string

3. **C.R.O** - Measurement of voltage, frequency and phase difference of an A.C. signal.

4. **Torsional Pendulum** - Determination of Rigidity modulus/damping coefficient.

5. **Newton's Rings** - Measurement of wavelength/Radius of curvature.

6. **Dispersive Power** - Determination of Dispersive power of prism.

7. **Diffraction Grating -** Determination of wavelength.

8. **Air Wedge** - Measurement of thickness of given wire.

9. **Field along the axis of a current carrying circular coil.** - Variation of intensity of magnetic field along the axis of circular coil.

10. **L.C.R** - Resonance Characteristics.

11. **Sensitive Galvanometer** - Figure of Merit.

12. **Hall Effect** - Measurement of Hall potential and Carrier concentration

13. **Carey Foster's bridge** - Measurement of temperature coefficient of resistance.

14. **Platinum resistance thermometer** - Measurement of room temperature.

15. **GM Counter** - Characteristics.

16. **Photo Tube** - Characteristics of photo tube/determination of planks constant.

17. Determination of **band gap of semiconductors**.

18. Optical Measurements with **laser**.

19. **Solar Cell** - Characteristics and Fill Factor determinations.

20. **Fiber Optics** - Numerical Aperture Calculations.

CODE: BT/CE/Ch.E/CSE/ECE/EEE/EI/IT/ME – 152
LABORATORY

CHEMISTRY LABORATORY

(Common to all Branches)

Practicals   : 3 Periods/Week   Sessional marks: 25

University exam.: 3 Hrs.   University Exam. marks : 50

LIST OF EXPERIMENTS

Note: Minimum of twelve experiments have to be conducted out of the list of experiments given below.

1. Estimation of total alkalinity of water sample
    a. Standardization of HCl solution b. Estimation of alkalinity

2. Determination of purity of washing soda

3. Estimation of Chlorides in water sample:
    a. Standardization of $AgNO_3$ solution b. Estimation of Chlorides

4. Determination of Total Hardness of water sample:
    a. Standardization of EDTA solution b. Determination of Total Hardness

5. Estimation of Mohr's salt-permanganometry
    a. Standardization of $KMnO_4$ solution b. Estimation of Mohr's salt

6. Estimation of Mohr's salt –Dichrometry
    a. Standardization of $K_2Cr_2O_7$ solution b. Estimation of Mohr's salt

7. Analysis of soil sample:
    a. Estimation of Ca and Mg   b. Estimation of Organic matter

8. Determination of available chlorine in bleaching powder-Iodometry
    a. Standardization of Hypo solution b. Determination of Available chlorine

9. Determination of Iodine in Iodized salt

10. Determination of Iron (Ferrous and Ferric) in an iron ore by Permanganometry

11. Determination of Zn using Potassium ferrocyanide

12. Preparation of Phenol-formaldehyde resign

13. Conductometric titration of an acid vs. base

14. pH metric tritrations of an acid vs base

Demonstration Experiments

15. Potentiometric titrations: Ferrous vs Dichromate

16. Spectrophotometry: Estimation of Mn/Fe

BT/CE/Ch.E/CSE/ECE/EEE/EI/IT/ME – 153
LABORATORY

WORKSHOP PRACTICE
(*Common to all branches*)

Practicals   : 3 Periods/Week   Sessional marks:
25

University exam.: 3 Hrs.   University Exam. marks :
50

1. Carpentry

To make the following jobs with hand tools

- a)   Lap joint
- b)   Lap Tee joint
- c)   Dove tail joint
- d)   Mortise & Tenon joint
- e)   Gross-Lap joint

2. Welding *using electric arc welding process / gas welding.*

The following joints to be welded.

a)Lap joint
- b)   Tee joint

c)Edge joint
- d)   Butt joint

e)Corner joint

3. Sheet metal operations with hand tools.

- a)   Saw edge
- b)   wired edge
- c)   lap seam
- d)   grooved seam
- f)   funnel

4. House wiring

- a)   To control one lamp by aspt switch
- b)   To control two lamps by aspt switch
- c)   To assemble a fluorescent lamp fitting
- d)   Stair case wiring
- f)   Go down wiring

BT/CE/Ch.E/CSE/ECE/EEE/EI/IT/ME – 154
LABORATORY

COMPUTER PROGRAMMING LAB
(Common to all Branches)

Practicals   : 3 Periods/Week   Sessional marks:
25
University exam.: 3 Hrs.   University Exam. marks :
50

List of programs (to be recorded)
1. A program for electricity bill taking different categories of users, different slabs in each category. (Using nested if else statement).

Domestic level Consumption As follows:	
Consumption Units	**Rate of Charges(Rs.)**
0 - 200	0.50 per unit
201 - 400	100 plus 0.65 per unit
401 - 600	230 plus 0.80 per unit
601 and above	390 plus 1.00 per unit
Street level Consumption As follows:	
Consumption Units	**Rate of Charges(Rs.)**
0 - 50	0.50 per unit
100 – 200	50 plus 0.6 per unit
201 - 300	100 plus 0.70 per unit
301 and above	200 plus 1.00 per unit

2. Write a C program to evaluate the fllowing(using loops):

    a. $1 + x^2/2! + x^4 / 4!+$ upto ten terms

    b. $x + x^3/3! + x^5/5!+$ upto 7 digit accuracy

    c. $1+x+x^2/2! +x^3/3!+$………upto n terms

    d. Sum of $1 + 2+ 3 +$………………..$+n$

3. A menu driven program to check the number is:
    i) Prime or not
    ii) Perfect or Abundant or deficient
    iii) Armstrong or not
    iv) Strong or not
    v) Fibonacci or not

4. A menu driven program to display statistical parameters (using one –dimensional array)
    i) Mean ii) Mode iii) Median iv) Variance v) Standard deviation

5.   A menu driven program with options (**using one -Dimensional array)**
    (i) To insert an element into array
    (ii) To delete an element
    (iii) To print elements
    (iv) To print elements in reverse order
    (v) To remove duplicates
6. A menu driven program with options (using two dimensional array)
    (i)   To compute A+B

(ii) To compute A x B
(iii) To find transpose of matrix A
(iv) To Check A=B
Where A and B are matrices. Conditions related to size to be tested

7. A menu driven program with options (using Two-dimensional Character arrays)
   (i) To insert a student name
   (ii) To delete a name
   (iii) To sort names in alphabetical order
   (iv) To print list of names
   (v) To print names having maximum length, min. length

8. A menu driven program (using pointers)
         a. Linear search b. Binary search   c. Fibonacci search

9. A menu driven program with options (**using Dynamic memory allocation**)
         a. Bubble sort   b. Insertion sort c. Selection sort

10. A menu driven program with options (**using Character array of pointers**)
    (i) To insert a student name
    (ii) To delete a name
    (iii) To sort names in alphabetical order
    (iv) To print list of names
    (v) To print names having maximum length, min. length

11. Write a program to perform the following operations on Rational numbers (**using
    Structures & pointers):**
         i)   Read a Rational number
         ii)   Addition of two Rational numbers
         iii)   Subtraction of two Rational numbers
         iv)   Multiplication of two Rational numbers
         v)   Division of two Rational numbers
         vi)   Display a Rational number

12. A Bookshop maintains the inventory of books that are being sold at the shop. The   list includes details such as author, title, price,publisher and stock position.   Whenever   a customer wants a book the sales person inputs the title and the author and the system searches the list and displays whether it is available or not. If it is not an appropriate message is displayed, if it is then the system displays the book details and request for the number of copies are required ,if the requested copies are available the total cost of the requested copies is displayed otherwise the message "required copies not in stock" is displayed. **Write a program for the above in structures with suitable functions.**

13. Create a student data file (roll no., name, date of birth, rank) and code a program with   options (**use pointers & structures**)
    (i) Listing names, dob sorted on names
    (ii) Listing names, dob sorted on dob
    (iii) Listing names, dob sorted on names, dob

14. a) Write a C program To copy the one file contents to the another file (**using commandline arguments)**

   b) Write a C Program to count the frequencies of words in a given file.

CODE: CE 211

MATHEMATICS – III

Lectures   : 4 Periods/Week   Sessional marks
          : 30
University Exam. : 3 Hours   University exam.marks 70

UNIT-I
Partial Differential Equations

Partial Differential Equations - Introduction, Formation of Partial Differential Equations, Solutions of   Partial Differential Equation, Equations solvable by direct Integration, Linear Equations of the first Order, Non-Linear Equations of the first Order, Charpit's Method, Homogeneous Linear Equations with Constant Coefficients, Rules for Finding The Complementary Function, Rules for Finding The Particular Integral, Non-Homogeneous Linear Equations.
(Sections: 17.1 to 17.10, 17.12 of [1])

UNIT-II

Beta Gamma Functions , Error Function. Integral Transforms:

Introduction, Definition, Fourier Integrals-Fourier sine and cosine integrals, Complex form of the Fourier Integral, Fourier Transforms, Properties of Fourier Transforms, Finite Fourier sine and cosine transforms, Convolution theorem(without proof), Parseval's Identity for Fourier Transforms(without proof), Fourier Transforms of the derivatives of a function.
(Sections: 7.14 to 7.16, 7.18, 22.1 to 22.7, 22.9 of [1])

UNIT-III

Solutions of Algebraic and Transcendental Equations : Introduction, Newton- Raphson Method - Solutions of Simultaneous Linear Equations: Direct Methods of Solution- Crout's triangularisation Method(LU – decomposition method), Iterative Methods of Solution - Gauss-Seidel Iteration Method.

Finite Differences and Difference Equations: Introduction, Finite Differences operators, Symbolic relations, Differences of a polynomial-Newton's forward and backward difference interpolation Formulae-Central Difference Interpolation Formulae, Gauss's Forward and Stirling's formulae, Interpolation with Unequal- Intervals-Lagrange's Interpolation , inverse interpolation. Difference Equations: Introduction, Formation, Linear difference equations - Rules for Finding the Complementary Function, Rules for Finding the Particular Integral.
(Sections: 27.1, 27.2(3), 27.4, 27.5(3), 27.6(2), 28.1 to 28.5, 28.6(1),28.6(3),28.8(1), 28.9, 29.1 to 29.6 of [1])

UNIT-IV

Numerical Differentiation: Finding First and Second order Differentials using Newton's formulae , Numerical Integration : Trapezoidal rule , Simpson's one-third rule, Numerical Solution of Ordinary and Partial Differential Equations - Euler's Method, Picard's Method, Runge- Kutta Method of fourth order (for first order equations , Simultaneous equations) Classification of Partial Differential Equation second order, Solutions of Laplace's and Poisson's Equations by iteration methods.
(Sections: 28.10(1), 28.10(2), 28.12(2), 28.12(3), 30.1, 30.2, 30.4, 30.7, 30.9(iii), 30.11, 31.1, 31.2, 31.3, 31.5, 31.6 of [1])

NOTE
Two questions of 14 marks each will be given from each unit out of which one is to be answered. Fourteen questions of one mark each will be given from entire syllabus which is a compulsory question.

TEXT BOOK
1. Higher Engineering Mathematics by B.S.Grewal Khanna publishers,39th edition.
REFERENCE BOOKS

2. A textbook of Engineering Mathematics by N.P. Bali
3. Advanced Engineering Mathematics by Erwin Keyszing John Wiley and sons.

CODE: CE 212

BUILDING MATERIALS, PLANNING & CONSTRUCTION

Lectures   : 4 Periods/Week   Sessional marks
          : 30
University Exam. : 3 Hours   University exam. marks:
          70

UNIT – I

1. Stones
    Qualities of a good building stone, Common building stones of India.

2. Bricks
    General; Composition of good brick earth; Harmful ingredients in brick earth; Manufacture of

    bricks by clamp burning and kiln (only Hoffmans kiln) burning, Qualities of good bricks; Tests for

    bricks; Classification of bricks; Size and weight of bricks

3. Lime

    General; Some definitions; Sources of lime; Constituents of limestones; Classification of limes;

    Properties of fat lime and hydraulic lime;

4. Timber
    Definition; Structure of a tree; Qualities of good timber; Decay of timber; Preservation of timber;

    Advantages of timber construction; Uses of timber;

UNIT –II

5. Stone & Brick Masonry
    Technical terms; Types of bonds in brickwork and their suitability. Classification of stone masonry
6. Walls
    Classification of walls.
7. Floors
    Technical terms; Types of ground floors
8. Roofs
    Technical terms; Classification of roofs; Steel sloping roofs; Roof covering materials; Types of flat

    roofs;

UNIT –III

9. Staircases
    Technical terms; Types of stair-cases, design considerations.
10. Dampness And Damp Proofing
    Causes of dampness; Methods of preventing dampness; Damp proofing materials and their

classification; Methods of providing DPC under different situations.

11. Acoustics Of Buildings
Important Technical terms; Factors to be considered in Acoustics of building; Sound absorbing materials; Sound insulation.

12. Scaffolding, Shoring, Under Pinning And Form Work
Types of scaffolding; Types of shoring; Methods of underpinning; Types of formwork; Centering.

UNIT –IV

13. An Approach To Planning
Site planning; Space requirement–Establishing areas for different units, Furniture requirements, Roominess, Flexibility, Sanitation, Lighting, Ventilation, Space for equipment for air–conditioning, Space for machinery etc.; Flow diagram and line plan–Grouping, Circulation, Orientation, Aspect and prospect, Privacy, Elegance and economy; Climatic considerations; Architectural composition–Unity, Mass composition, Contrast, Proportion, Scale, Accentuation and rhythm, Materials for the exterior and Expression; Colour.

14. Building Rules And Bye–Laws
Zoning regulations; Regulations regarding layouts or sub-divisions; Building regulations; Rules for special type of buildings; Calculation of plinth, floor and carpet area; Floor space index.

15. Building Elements
Conventional signs; Guidelines for staircase planning; Guidelines for selecting doors and windows; Terms used in the construction of door and window; Specifications for the drawing of door and window

NOTE
Two questions of 14 marks each will be given from each unit out of which one is to be answered. Fourteen questions of one mark each will be given from entire syllabus which is a compulsory question.

TEXT BOOKS

1. Engineering Materials by S. C. Rangwala; Charotar Publishing House, Anad.
2. Building construction by B. C. Punmia et all; Laxmi Publications, New Delhi.
3. Planning and Designing Buildings by Yashwant S. Sane, Allies Book Stall.

REFERENCE
1. Building Drawing by M.G. Shah, C.M. Kale and S.Y. Patki, Tata McGrqw-Hill, New Delhi.

CODE:CE 213

SURVEYING-I

Lectures / Tutorials   : 4 / 1 Periods/Week   Sessional marks: 30
University Exam. : 3 Hours   University exam. marks: 70

UNIT_I

1.   Surveying & Measurements
Surveying – History; Definition; Classification; Principles of surveying; Plan and map;
Measurements – Basic Measurements and methods; Scale – Scales used for Maps and plans.
2.   Chain Surveying*(Linear Measurements)*
Different methods; Ranging out; Chaining a line on a flat ground; Chaining on an uneven or a sloping ground; Chain & Tape corrections; Degree of accuracy.
Principles of chain surveying; Basic definitions; Well-Conditioned Triangle; Instruments used in chain survey; Field book, Field work; Offsets, Cross Staff survey; Obstacles in chain survey;

UNIT – II

3.   Compass And Theodolite Surveying(Angle Measurements)
Compass: Types, Bearings and Angles; Prismatic compass; Magnetic Dip and   Declination; Local attraction; Chain and Compass traversing(Free or Loose needle method); Field work; Plotting of a compass traverse; Errors in Compass surveying; Limits of accuracy.
4.   **Theodolite**
Vernier Thedolite: Basic definitions; Fundamental lines and desired relations; Temporary adjustments; Measurement of a horizontal angle; Repetition and Reiteration methods of horizontal angle measurement. Measurement of vertical angle; Sources of errors in Theodolite survey.

UNIT – III

5.   Simple Leveling
Basic definitions; Curvature and Refraction; Different methods of leveling; Classification of direct leveling methods; Levels –Dumpy level, Tilting level, Auto level; Sensitivity of a Level tube; Leveling staff; Level field book; Profile leveling; Cross sectioning; Reciprocal leveling; Sources of errors in leveling; Degree of Precision.
6.   **Plane Table Surveying**
Plane table and its accessories; setting up; Plane tabling methods, Resection by trial and error method. Errors in plane tabling;

UNIT – IV

7.   **Contouring**
Methods of representing Relief; Contouring; contour interval; Characteristics of contours; Methods of locating contours; Direct and indirect methods contouring; Interpolation and sketching of contours; Location of a contour gradient – Ceylon Ghat Tracer; Uses of contour maps; Contouring in plane table survey – Indian Pattern Tangent Clinometer.
8.   Errors In Surveying
Accuracy; Precision; Sources of errors; Types of errors and their propagation;
Measures of precision; weights of measurements;

NOTE
Two questions of 14 marks each will be given from each unit out of which one is to be answered. Fourteen questions of one mark each will be given from entire syllabus which is a compulsory question.

TEXT BOOK:

1. Surveying Vol. 1 by Dr. K. R. Arora; Standard Book House;
2. Plane Surveying by AM Chandra, New Age International (P) Ltd.

CODE: CE214

SOLID MECHANICS – I

Lectures / Tutorials   : 4 / 1 Periods/Week   Sessional marks: 30

University Exam. : 3 Hours   University exam. marks: 70

UNIT-I

1. **Stress**
   Introduction; Method of sections; Definition of stress; Normal stresses in axially loaded bars; Stresses ion inclined sections in axially loaded bars; Shear stresses ; Analysis for normal and shear stresses; allowable stress and factor of safety.

2. **Strain**
   Introduction; Normal strain; Stress-strain relationships; Hooke's law; Poisson's ratio; Thermal strain and deformation; Deformation of axially loaded bars; statically indeterminate axially loaded bars; Stress-strain relationship for shear

3. **Generalized Hooke's law and Pressure vessels**
   Generalized Hooke's law for isotropic materials; Relationship between Modulus of elasticity and Modulus of rigidity; Dilatation and Bulk modulus; Thin-walled pressure vessels – Cylindrical and spherical vessels

UNIT-II

4. **Internal forces in beams**
   Introduction; Diagrammatic conventions for supports and loads; Calculation of beam reactions; Application of method of sections; Shear force in beams; Bending moment in beams; Shear force and bending moment diagrams; Differential equations of equilibrium for a beam element

UNIT-III

5. **Normal stresses in beams**
   Introduction; Basic assumptions; The elastic flexure formula ; application of flexure formula; Unsymmetric bending – Bending about both principal axes of a beam with symmetric cross section.

UNIT-IV

6. **Shear stresses in beams**
   Introduction; Shear flow; The shear stress formula for beams; Shear stress in beam flanges; Shear centre

7. **Torsion**
   Introduction; Application of the method of sections; Torsion of circular elastic bars – Basic assumptions, the torsion formula, Design of circular bars in torsion for strength, Angle of twist of circular bars

NOTE

Two questions of 14 marks each will be given from each unit out of which one is to be answered. Fourteen questions of one mark each will be given from entire syllabus which is a compulsory question.

TEXT BOOKS
1.Engineering mechanics of solids by E.P.Popov, Prentice Hall of India, 2005.

REFERENCE
1. Elements of strength of materials by S.P.Timoshenko and D.H.Young, Affiliated East-West Press Pvt.Ltd., 2005.
2. Strength of materials by S. S. Bhavikatti, Vikas Publishing House Pvt. Ltd., 1998.
3. Strength of materials by R. K. Bansal, Lakshmi Publications (P) Ltd., 2007

FLUID MECHANICS

Lectures / Tutorials   : 4 / 1 Periods/Week   Sessional marks:
            30
University Exam. : 3 Hours   University exam. marks: 70

UNIT – I

1. **Introduction**
    Dimensions and units – Physical properties of fluids specific gravity, viscosity, surface tension, vapor pressure and their influences on fluid motion
2. **Fluid Statics**
Variation of static pressure; Absolute and gauge pressure; Pressure measurement by mechanical gauges and manometers; Pressure on plane surfaces and curved surfaces.

3. **Buoyancy**
Buoyancy; Stability of submerged bodies and floating bodies; Metacentre and metacentric height.

UNIT – II

4. **Fluid Kinematics**
    Methods of describing fluid motion; Classification of flows; Steady, unsteady, uniform and non-uniform flows; Laminar and turbulent flows; Three, two and one dimensional flows; Irrotational and rotational flows; Streamline; Pathline; Streakline; Equation for acceleration; Convective accalaration; Local acceleration; Continuity equation; Velocity potential and stream function; Flownet; Vortex flow – free vortex and forced vortex flow.
5. **Fluid Dynamics**
        Euler's equation of motion; Bernoulli's equation; Energy correction factor; Momentum principle; Applications of momentum equation- Force exerted on a pipe bend.
6. **Flow Measurement In Pipes**
    Discharge through venturi meter; Discharge through orifice meter; Discharge through flow nozzle;

Measurement of velocity by Pitot tube.

UNIT – III

7. **Flow Through Orifices And Mouthpieces**
    Flow through orifices; Determination of coefficients for an orifice; Flow through large rectangular orifice; Flow through submerged orifice; Classification of mouthpieces; Flow through external and internal cylindrical mouthpiece.
8. **Flow Over Notches & Weirs**
    Flow through rectangular, triangular and trapezoidal notches and weirs; End contractions; Velocity of approach; Broad crested weir.
9. **Boundary Layer Theory**
    Boundary layer – concepts, Prandtl's contribution, Characteristics of boundary layer along a thin flat plate, laminar and turbulent Boundary layers, separation of BL.

UNIT – IV

10. **Analysis Of Pipe Flow**
     Laws of Fluid friction – Darcy's equation, Minor losses – pipes in series – pipes in parallel – Total energy line and hydraulic gradient line, Hydraulic power transmission through a pipe; Siphon; Water

hammer.

11. Laminar Flow

Reynold's experiment; Characteristics of laminar flow; Steady laminar flow through a circular pipe (Hazen poiseuille equation).

12. Turbulent Flow In Pipes

Characteristics of turbulent flow, Prandtl's mixing length theory, Hydro dynamically smooth and rough boundaries, Velocity distribution, Friction factor for pipe flow, Variation of friction factor with Reynolds number- Moody's chart.

NOTE

Two questions of 14 marks each will be given from each unit out of which one is to be answered. Fourteen questions of one mark each will be given from entire syllabus which is a compulsory question.

TEXT BOOK

1. Hydraulics and Fluid Mechanics by P. N. Modi & S. N. Seth; Standard book house; New Delhi.

REFERENCE BOOKS

1. Fluid Mechanics by A. K Jain, Khanna Publishers
2. Fluid Mechanics and Hydraulic Machines by R. K. Bansal; Laxmi Publications; New Delhi.
3. Fluid Mechanics by Streeter and wyile, Mcgrawhill Publications
4. Fluid Mechanics by S K Som & G Biswas (TMH)
5. Fluid Mechanics by John F. Douglas, Janusz M Gasiorek, John A. Swaffield, Pearson Education Publishers
6. Fluid Mechanics, Hydraulics& Hydraulic Machines by K R Arora, Standard Publishers

CODE:CE 216

ENGINEERING GEOLOGY

Lectures   : 4 Periods/Week   Sessional marks   : 30
University Exam. : 3 Hours   University exam. marks: 70

UNIT-I

1. Introduction
    Branches of geology, Importance of geology in Civil engineering.

2. Physical Geology
    Geological processes; Weathering - Process, Types, Civil engineering importance of the process of erosion.

3. Mineralogy
    Definition of mineral; Significance of different physical properties in mineral identification; Study of physical properties, structure and chemical composition of following common rock forming and economic minerals: Feldspar, Quartz, Olivine, Augite, Hornblende, Muscovite, Biotite, Asbestos, Apatite , Kyanite, Garnet, Beryl, Talc, Calcite, Dolomite, Pyrite, Hematite, Magnetite, Galena, Graphite, Magnesite , Bauxite and Clay minerals

UNIT- II

4.Petrology
    Introduction; Civil engineering importance of petrology; Rock cycle, Geological Classification of rocks

5.Igneous Rocks
    Forms, Structures and textures of igneous rocks. Megascopic description and civil engineering uses of Granite, Basalt, Dolerite, Pegmatite and Charnockite

6. Sedimentary Rocks
    Formation; Structures and textures of sedimentary rocks. Megascopic description and civil engineering uses of Laterite, Conglomerate, Sand stone, Lime stone and Shale

7. Metamorphic Rocks
    Types of metamorphism; Structures and textures of metamorphic rocks. Megascopic Description and Civil engineering uses of Gneiss, Schist, Quartzite, Marble and slate

8. Engineering Properties Of Rocks
    Different Engineering property tests for rocks - Tests for rocks used for Foundation sites and Building stones.

UNIT-III

9. Structural Geology
    Introduction; Causes for development of structures; Out crop, Strike and dip; Folds; Faults; Joints; Unconformities.

 10. Importance Of Geological Structures
    Effects of folds, faults, joints, unconformities and their civil engineering importance.

 11.   Earthquakes
    Classification and causes; Intensity and magnitude and their measuring scales; Effects of earthquakes; Seismic belts; Civil Engineering considerations in seismic areas; Seismic zones of India.

12. Mass Wasting
    Classification; Causes and effects; Preventive measures.

UNIT- IV

13. Geophysical Investigations
    Geophysical methods of investigation -Civil engineering importance of geophysical   methods; Electrical resistivity method; Seismic refraction method, Gravity method, Geo-radar

14. Dams
    Geological considerations for the selection of dam sites; Stages of investigation; Case histories of some dam failures; Geology of some Indian dam sites.

15. Tunnels

Effects of tunneling; Geological considerations for tunneling; Over break; Geology of some tunnel sites;

16. **Improvement In Properties Of Rock Mass**

Materials and Methods of Grouting, Principles and mechanism of Rock bolting

NOTE

Two questions of 14 marks each will be given from each unit out of which one is to be answered. Fourteen questions of one mark each will be given from entire syllabus which is a compulsory question.

TEXT BOOK

1. A text Book of Engineering Geology by N. Chennakesavulu; Macmillan India Ltd., Delhi.

REFERENCE BOOKS

1. Engineering Geology For Civil Engineers by D. Venkata Reddy; Oxford & IBM Publishing Company Pvt. Ltd., New Delhi.
2. Engineering and General Geology by Parbin Singh; S. K. Kataria & Sons, New Delhi.
3. Rock Mechanics for Engineers by Dr.B.P.Varma, Khana Publishers, Delhi-6.
4. Engineering Geology an environmental approach by P H rahn, PHI
5. Principles of Petrology by G W Tyrrell, B.I Publications Delhi-1
6. Principles of Engineering Geology by K M Bangar, Standard Publishers and Distributers

CODE : CE251
LABORATORY

ENGINEERING GEOLOGY LABORATORY

Practicals   : 3 Periods/Week   Sessional marks: 25

University exam.: 3 Hrs.   University Exam. marks : 50

Note: A minimum of twelve (12No) shall be done and recorded

1   Study of Survey of India Topographical Maps

2. Study of Satellite Imageries

3. Study of Minerals by their Physical Properties

4. Identification and Textural Study of Rocks

5. Joint Data Analysis

6. Determination of Porosity in Rocks

7. Determination of Compressive Strength of Rocks

8. Determination of Slake and Durability of Rocks

9. Study of Structural Problems

10..Study of Geological Maps and their Cross-section

11.Electrical Resistivity Method

12. Seismic Hammer Sounding Method

13. Study of Structural Models

14, Study of Tunnel Models

SURVEYING FIELD WORK - I

Practicals   : 3 Periods/Week   Sessional marks: 25

University exam.: 3 Hrs.   University Exam. marks : 50

Note: A minimum of twelve (12No) shall be done and recorded

I)   Chain & Compass Survey

1. Chaining of a line using Chain/Tape/Tachometer and Recording of details along the chain line.

2. Measurement of area – Cross staff survey.

3. Traversing by compass and graphical adjustment.

4. Determination of distance between two inaccessible points.

II)   Simple Levelling

5. Measurement of elevation difference between two points using any leveling Instrument (Fly Leveling)

6. Elevation difference between two points by Reciprocal leveling method.

7. Profile Leveling – Plotting of Profile.

8. Contouring of a small area by method of Blocks/Tacheometric Survey.

III)   Plane Table Survey

9. Determination of the distance between two inaccessible points.

10. Plotting of a building by plane table Traversing

11. Resection by Trial and Error method.

IV)   Theodolite

12. Measurement of horizontal and vertical angles.

13. Determination of distance between two inaccessible points.

CODE : CE253
LABORATORY

BUILDING DRAWING

Practicals   : 3 Periods/Week   Sessional marks: 25

University exam.: 3 Hrs.   University Exam. marks : 50

UNIT - I
(on drawing sheet using drafting tools on A1sheet)

1. Conventional signs

2. Plan, Section and Elevation of a single storied residential building -2No

UNIT – II
(Using CAD softwares)

1. Learning Basic commands of CAD software

2. Drawing conventional signs

3. Drawing basic building components like door, windows, foundations, Pitched roof like king post truss – 4No

4. Using Blocks and W blocking

5. Using layers in drawing

UNIT - III
(Using CAD softwares)

6. Drawing Plan of a single storied residential building -2No

7. Drawing Plan of a Two storied residential building using layers

8. Generating Plan, section and Elevation of a single storied residential building

9. Generating Plan, section and Elevation of a Two storied residential building

CODE: CE 221

CONCRETE TECHNOLOGY

Lectures   : 4 Periods/Week   Sessional marks : 30
University Exam. : 3 Hours   University exam. marks: 70

UNIT-I

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

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

3. Testing, Handling And Uses Of Cement
 Fineness of cement using sieve test and air-permeability method, Normal consistency and setting times using vicat apparatus, soundness test using Le-chatlier apparatus, Grades of cement as per IS specifications, physical and chemical requirements of OPC for different grades of cement, storage of cement in sheds and silos, Transportation of cement, Safety while handling cement, Uses of cement.

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

UNIT-II

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

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

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

UNIT-III

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

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

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

11. Durability Of Concrete

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

UNIT-IV

12. Introduction To Special Concretes And Concreting Methods

a) Fibre reinforced concrete; Fibres used, factors effecting properties, aspect ratio of fibres, orientation of fibres, workability, mixing, applications, current development in FRC.
b) No-fines concrete: mix proportion, drying shrinkage, Thermal conductivity, applications.
c) Ferrocement: Casting techniques, hand plastering, semi-mechanized process, Centrifuging, guniting, applications.
d) Light-weight concrete: Natural and artificial light-weight aggregates, properties of common light-weight concretes.
e) High performance concrete.

13. Proportioning Of Concrete Mixes

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

NOTE

Two questions of 14 marks each will be given from each unit out of which one is to be answered. Fourteen questions of one mark each will be given from entire syllabus which is a compulsory question.

TEXT BOOK

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

REFERENCE BOOKS

1. Properties of concrete by A.M.Neville, Longman Publishers

2. Concrete technology by M.L.Gambhir, Tata McGraw-Hill Publishing company Ltd., New Delhi

CODE:CE222

ENVIRONMENTAL STUDIES
(Common for all branches)

Lectures   : 4 Periods/Week   Sessional marks
           : 30
University Exam. : 3 Hours   University exam. marks:
           70

UNIT – I

1. Introduction

   Definition, Scope and Importance

2. Ecosystems

   Introduction, types, characteristic features, structure and functions of Ecosystems-Forest, Grassland, Desert, Aquatic (lakes, rivers and estuaries)

3. Natural Resources
a) Land resources
   Land as a resource, Common property resources, land degradation, soil erosion and desertification and Effects of modern agriculture, fertilizer- pesticide problems
b) Forest Resources
   Use and over-exploitation, Mining and dams; their effects on forests and tribal people.
c) Water Resources
   Use and over-utilization of surface and ground water, floods and drought, Water logging and salinity, Dams – benefits and costs, Conflicts over water.
d) Energy resources
   Energy needs, Renewable and non-renewable energy sources, Use of alternate energy sources.

UNIT – II
3.Biodiversity and its Conservation
   Value of biodiversity- consumptive and productive use, social, ethical, aesthetic and option values. Bio-geographical classification of India-India as a mega-diversity habitat. Threats to bio-diversity – Hot spots, habitat loss, poaching of wildlife, loss of species, seeds, etc. Conservation of biodiversity - In-situ and Ex-situ conservation
4.Environmental Pollution
   Causes, effects and control measures of Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Solid waste management, composting and vermiculture, Urban and industrial wastes, recycling and re-use.

UNIT –III
5.Sustainability
   Theory and practice, Equitable use of resources for sustainable life styles.
   Rain water harvesting, cloud seeding and watershed management, Water scarcity and ground water depletion
   Controversies on major dams- Resettlement and rehabilitation of people, problems and concerns. Nature of thermal pollution and nuclear hazards, Global warming, Acid rain, Ozone depletion. Green revolution.
   Population growth and environment.
   Environmental Impact Assessment.

UNIT – IV

6. Environmental acts

Water (Prevention and Control of pollution) act, Air (Prevention and Control of pollution) act, Environmental protection act, Wild life protection act, Forest Conservation act.

7. International Conventions

Stockholm Conference 1972 and Earth Summit 1992

8. Case Studies

Chipko movement, Narmada Bachao Andolan, Silent Valley Project, Madhura Refinery and Taj Mahal, Chernobyl Nuclear Diaster, Tehri Dam, Ralegaon Siddhi (Anne Hazare), Florosis and Bhopal Tragedy.

Field work

Visit to a local area to document environmental assets – river/ forest/ grassland / hill /mountain.
Study of local environment-common plants, insects, birds.
Study of simple ecosystems – pond, river, hill, slopes etc.
Visits to industries, water treatment plants, effluent treatment plants

NOTE

Two questions of 14 marks each will be given from each unit out of which one is to be answered. Fourteen questions of one mark each will be given from entire syllabus which is a compulsory question.

TEXT BOOK

1. Environmental Studies**,** by Benny Joseph,, The Tata McGraw-Hill Publishing Company Limited, New Delhi.

REFERENCE BOOKS

1. Text book of environmental studies, Erach Bharucha, UGC.

2. Environmental Studies by Anubha Kaushik and C. P. Kaushik.

3. A Basic course in Environmental Studies by S. Deswal and A. Deswal, Dhanapath Rai & Co.

4. Essentials of environmental studies, Kurian Joseph and R.Nagendram, Pearson Education Pt Ltd, Delhi.

5. Environmental Studies, R.Rajagopalan, Oxford university press.

6. Environmental Pollution Control Engineering, C. S. Rao, Wiley Eastern Ltd., New Age International Ltd.,

7. Introduction to Environmental Science, Anjaneyulu Y, B S Publications

8. Principles of Environmental Studies, Manoharachary C and Jayarama Reddy P, B S Publications

SURVEYING – II

Lectures / Tutorials : 4 / 1 Periods/Week   Sessional marks: 30

University Exam. : 3 Hours   University exam. marks: 70

UNIT – 1

1. Electronic Distance Measurements

Basic concepts, Classification of Electronic Radiation, Basic principle of Electronic Distance Measurement, Computing the distance from the phase differences, Electronic Total Station- Types, measurement, recording, traversing, data retrieval. Instrumental errors in EDM.

2. Theodolite Traverse

Selection of traverse stations; Fieldwork of traversing; linear measurements; Angular measurements (both bearings and angles); Sources of errors in theodolite traversing; Field checks in traversing; Traverse Computations – Gale's traverse table; Methods of adjustments; Omitted measurements.

UNIT – II

3. **Areas**

Introduction; Simpson's rule; Boundaries with offsets at irregular intervals; Meridian methods; Coordinate method; Planimeter – Area of Zero circle.

4. **Volumes**

Area of cross sections – two level section only; Trapezoidal rule; Prismoidal formula; Volume from spot levels; volume from contour plan; Capacity of a reservoir.

UNIT – III

5. **Tacheometric Surveying**

Advantages of tacheometric surveying; Basic systems of tacheometric measurements; Determination of constants K and C; Inclined sight with staff vertical; Inclined sight with staff normal to the line of sight.

6. **Trigonometric Levelling**

Introduction; Axis signal correction; Difference in elevation by single observation and reciprocal observations.

7. Setting Out Works

Control station; Horizontal control; Reference grid; Vertical control; Positioning of a structure; Setting out a foundation: Setting out with a theodolite; Graded stakes; setting out a sewer; Setting out a culvert.

UNIT – IV

8. **Circular Curves**

Basic definitions; Designation of a curve; Relationship between radius and degree of curve; Elements of a simple circular curve; Location of the tangent points; selection of peg interval; Methods of setting out; Problems in setting out curves; Setting out compound curves setting out reverse curves.

9. Triangulation

Principles of triangulation; Uses of triangulation survey; Classification of triangulation; Signals and towers, Satellite station; Base line & Extension of the base line.

NOTE

Two questions of 14 marks each will be given from each unit out of which one is to be answered. Fourteen questions of one mark each will be given from entire syllabus which is a compulsory question.

TEXT BOOKS

1. Surveying Vol I & II by K R Arora, Standard Book house.
2. Fundamentals of Surveying by S K Roy, Prentice- Hall of India Private Ltd.
3. Surveying Vol-II by B.C. Punmia ,Laxmi Publications.

CODE: CE224

SOLID MECHANICS – II

Lectures / Tutorials   : 4 / 1 Periods/Week   Sessional marks: 30
University Exam. : 3 Hours   University exam. marks: 70

Unit-I

1. Compound stresses

Introduction; Superposition and its limitation; Superposition of normal stresses; Eccentrically loaded short columns; Core or kernel of a section; Superposition of shear stresses; Stresses in closely coiled helical springs; Deflection of closely coiled helical springs

Unit -II

2. Analysis of Plane-Stress

Introduction; The basic problem; Equations for transformation of plane-stress; Principal planes and Principal stresses ; Maximum shear stresses ; Mohr's circle of stress ; Construction of Mohr's circle

3. Work and Strain Energy

Introduction; Elastic strain energy for uni-axial stress; elastic strain energy in pure bending; Strain energy of beams in shear; Strain energy of circular shafts in torsion; Work and strain energy method; Determination of displacements by work and strain energy method

Unit-III

4. Failure Theories

Introduction; maximum normal stress theory; maximum shearing stress theory; maximum strain energy theory; maximum distortion energy theory; comparison of theories.

5. Buckling of columns

Introduction; Examples of instability; Criteria for stable equilibrium; Euler load for column with pinned ends; Euler loads for columns with different end restraints; Limitations of the Euler's formulae; Generalized Euler buckling load formulae; Eccentric loads and the secant formula

Unit –IV

6. Deflection of statically determinate beams

Introduction; strain-curvature and Moment-Curvature relation; Governing differential equation for deflection of elastic beams; Alternative differential equations of elastic beams; solution of beam deflection problem by Direct integration; Introduction to moment area method; Derivation of Moment area theorems; conjugate-beam method; slope and deflection of beams using moment area method and conjugate-beam method.

NOTE

Two questions of 14 marks each will be given from each unit out of which one is to be answered. Fourteen questions of one mark each will be given from entire syllabus which is a compulsory question.

TEXT BOOK

1. Engineering mechanics of solids by E.P.Popov, Prentice Hall of India, 2005.

REFERENCES

1. Elements of strength of materials by S.P.Timoshenko and D.H.Young, Affiliated East-West Press Pvt.Ltd., 2005.
2. Strength of materials by S. S. Bhavikatti, Vikas Publishing House Pvt. Ltd., 1998.
3. Strength of materials by R. K. Bansal, Lakshmi Publications (P) Ltd., 2007

CODE: CE 225

HYDRAULICS& HYDRAULIC MACHINES

Lectures / Tutorials   : 4 / 1 Periods/Week   Sessional marks: 30

University Exam. : 3 Hours   University exam. marks: 70

UNIT – 1

1. **Open Channel Flow-Uniform Flow**
        Introduction, Classification of flows, Types of channels; Chezy, Manning's, Bazin, Kutter's Equations; Hydraulically efficient channel sections - Rectangular, Trapezoidal and Circular channels; Velocity distribution; Energy and momentum correction factors; Pressure distribution

2. **Open Channel Flow- Non – Uniform Flow**
        Concept of specific energy; Specific energy curves; Critical flow; Critical flow in a rectangular channel; Critical slope; Different slope conditions; Channel transitions- Reduction in width of channels, hump; Momentum principle applied to open channel flow; Specific force; Specific force curve. Surges in open channels.

UNIT - II

3. **Open Channel Flow- Gradually Varied Flow**
        Dynamic equation; Surface Profiles; Computation of surface profiles by single step & multi step methods; Back water Curves and Draw down curves; Examples of various types of water surface profiles; Control section.

4. **Open Channel Flow- Rapidly Varied Flow**
        Hydraulic jump; Elements and characteristics of hydraulic jump; Types of hydraulic jumps; Location and applications of hydraulic jump; Energy loss in a hydraulic jump.

UNIT – III

5. **Momentum Principles**
        Action of jets on stationary and moving flat plates and curved vanes; Angular momentum principle;

Torque and head transferred in rotodynamic machines.

6. **Hydraulic Turbines**
        Classification; Impulse; Reaction; Radial, Axial, mixed and tangential flow turbines; Pelton, Francis and Kaplan turbines; Runner profiles; Velocity triangles; Head and efficiency; Draft tube theory; Similarity laws; Concept of specific speed and unit quantities; Selection of Turbines; Operational characteristics; Governing of turbines.

UNIT – 4

7. **Centrifugal Pumps**
        Manometric head; Losses and efficiencies; Work done; Working Principle; Priming; Velocity triangles; Performance and characteristic curves; Multistage and double suction pumps; Cavitation effects; Similarity Considerations.

8. **Dimensional Analysis And Similitude**

        Dimensional homogenity; Rayleigh's method; Buckingham – Pi theorem; Geometric, Kinematic and dynamic similarities; Reynold's, Froude, Euler, Mach and Weber numbers; Model laws Partially submerged objects; Scale effect; Distorted models.

NOTE

Two questions of 14 marks each will be given from each unit out of which one is to be answered. Fourteen questions of one mark each will be given from entire syllabus which is a compulsory question.

TEXT BOOKS

1. Hydraulics & Fluid Mechanics by P. N. Modi & S. N. Seth; Standard Book house, New Delhi

REFERENCE BOOKS

1. Fluid Mechanics by A. K. Jain; Khanna Publishers, Delhi
2. Open channel flow by K. Subramanya, TMH Publishers
3. Fluid Mechanics & Hydraulic Machines by Dr. R. K. Bansal; Laxmi Publications, New Delhi.

CODE: CE 226

ELEMENTS OF ELECTRICAL AND MECHANICAL ENGINEERING

Lectures   : 4 Periods/Week   Sessional marks : 30
University Exam. : 3 Hours   University exam. marks: 70

Part A : ELECTRICAL ENGINEERING

UNIT – I

1. **Introduction**
        Direct current; Alternating current; Half wave & full wave rectifiers; Comparison between DC and AC supply; Advantages of alternating current.
2. **Electrical Machines**
        DC generators & motors – Principle, Parts, Types and Applications; Transformers– Principle, Classification and Applications.

UNIT – II

3. **Electrical Machines (Contd.)**
         Construction and basic Principle of operation of alternators, 3 phase and single phase induction motors and their applications.
4. **Lightning Phenomenon**
        What is lightning ?; Charge formation in cloud – Wilson's theory, Simpson's theory; Different forms taken by lightning; Mechanism of forked lightning ; Protection of structures against lightning using lightning rods

Part B : MECHANICAL   ENGINEERING

UNIT – III

5. **Transmission Of Power**
        Belt drives; Velocity ratio; Slip; Ratio of Tensions; Power transmitted; Creep.
6. **Principles Of Manufacturing Processes**
        Elementary concepts of Rolling, Drawing Casting, Turning, Drilling, Milling, Welding and Soldering

UNIT – IV

7. **Thermal Prime Movers**
         Principles and operation of Boilers , Steam turbines , Gas turbines and I. C. Engines.
8. **Compressors**
        Application and operation of single stage and multi-stage reciprocating Air Compressors.

NOTE
1.Part A
        Two questions of 14 marks each will be given from each unit of Part A out of which one is to be answered. Seven questions of one mark each will be given from entire Part A syllabus which is a compulsory question.
2.Part B
        Two question of 14 marks each will be given from each unit of Part B out of which one is to answered. Seven questions of one mark each will be given from entire Part B syllabus which is compulsory question.

3.In the University examination , Part A and Part B should be answered on separate booklets.

 TEXT BOOKS

1. Engineering Basics (Electrical, Electronics & Computer Engineering) by   T. Thyagarajan, K. P. Sendur Chelvi and T. R. Rangaswamy, New Age International (P) Ltd., New Delhi.
2. An Introduction to High Voltage Engineering by Subir Roy, Prentice-Hall of India , 2006.
3. Elements of Mechnical Engineering by Mathur, Mehta & Tewari; Jain   Brothers, New Delhi.

CODE : CE261
LABORATORY

HYDRAULICS & HYDRAULIC MACHINES LABORATORY

Practicals   : 3 Periods/Week   Sessional marks: 25

University exam.: 3 Hrs.   University Exam. marks : 50

Note: A minimum of twelve (12No) shall be done and recorded

1. Verification of Bernoulli's theorem.

2. Venturimeter   : Determination of Coefficient of discharge.

3. Orificemeter   : Determination of Coefficient of discharge.

4. Orifices : Determination of Coefficient of discharge by steady and unsteady flow methods.

5. Mouthpieces : Determination of Coefficient of discharge by steady and unsteady flow methods.

6. Characterization of laminar and turbulent flows by Reynold's apparatus.

7. Determination of friction factor of Pipes.

8. Determination of loss of head in pipes due to bends, sudden contractions and sudden expansion.

9. Determination of Coefficient of discharge for rectangular and V – notches.

10. Determination of Manning's and Chezy's coefficients in open channel.

11. Measurement of force due to impact of jets on vanes of different types.

12. Performance studies on Pelton turbine.

13. Performance studies on Francis turbine/Kaplan turbine.

14. Performance studies on single stage centrifugal pump.

15. Performance studies on Reciprocating pump.

CODE : CE262
LABORATORY

MATERIAL TESTING LABORATORY

Practicals   : 3 Periods/Week   Sessional marks:
25
University exam.: 3 Hrs.   University Exam. marks :
50

Note: A minimum of twelve (12No) shall be done and recorded

1. To study the stress-strain characteristics of HYSD bars by UTM.

2. To find young's modulus of the given material (steel or wood) by conducting bending test on simply supported beam.

3. To find modulus of rigidity by conducting torsion test on solid circular shaft.

4. To find the hardness of the given material by Brinnel's or Vickers hardness tester.

5. To find impact resistance of the given material by conducting Charpy test on Impact testing machine.

6. To determine the ultimate shear strength of steel rod in single and double shear.

7. To determine the modulus of rigidity of the spring.

8. Normal consistency and fineness of cement.

9. Initial setting and final setting time of cement.

10. Specific gravity and soundness of cement.

11. Compressive strength of Cement.

12. Slump cone test to determine workability of concrete.

13. Compaction factor or Vee-Bee consistometer test to determine the workability of concrete.

14. To determine the compressive strength and split tensile strength of concrete.

15. Specific gravity of fine and coarse aggregates.

16. Bulking of fine aggregate.

17. To determine the fineness modulus of fine aggregate and coarse aggregate.

18. Non-destructive testing on concrete (for demonstration) and concrete mix design (IS method-For demonstration).

CODE : CE263
LABORATORY

COMMUNICATION SKILLS LABORATORY
(*Common to All Branches*)

Practicals : 3 Periods/Week   Sessional marks: 25
University exam.: 3 Hrs.   University Exam. marks : 50

Note: A minimum of twelve (12No) shall be done and recorded

Unit - I
1. Introduction to Communication
    1.1 Elements of Communication;1.2 Theories of Communication; 1.3 Barriers to Communication;1.4 Successful Communication; 1.5 Types of Communication

Unit - II
2. Introduction to Skills
    2.1 Listening Skills; 2.2 Speaking Skills; 2.3 Reading Skills; 2.4 Writing Skills; 2.5 Study Skills; 2.6 People Skills; 2.7 Soft Skills; 2.8 Linguistic Skills; 2.9 Communication Skills

Unit – III
3. Accent Training
    3.1 Phonetics; 3.2 Intonation 3.3 British English;   3.4 American English;   3.5 Indian English; 3.6 International English

Unit – IV
4. Career English
    4.1 Resumes 4.2 Letters 4.3 Reports 4.4 Technical Write-up 4.5 Writing with a purpose

Unit: -V
5. Conversational English
    5.1 Conversational Styles 5.2 Face-to-Face Interaction 5.3 Telephonic Interaction 5.4 Group Interaction 5.5 Body Language

Unit –VI
6. Performance
    6.1 Elocution; 6.2 Debates;   6.3 Group Discussion;   6.4 Presentation;   6.5 Brainstorming;   6.6 Interpretation; 6.7 Extempore

Course Credits   **Internals**
    Lab Observation Book :   05
    & Attendance
    Theory (Viva)   :   10
    Practical   :   10
    Total   :   **25**

RECOMMENDED SOFTWARES

Digital Language Lab Networking Software
    1. HiClass-SW
    2. Renet
English Language - Listening, Speaking, Reading, Writing Skills:
1. Alania Series - English Mastery
   Levels A, B (Set of 2 CDs)
2.   English Discoveries (Set of 12CDs)
3. Rosetta Stone English Suite (Levels
   1,2& 3)
English Grammar
1.   New English Grammar in Use
   Cambridge

2. Live Action English Interactive
3. Tense Buster 2001
4. Tense Buster 5 levels
5. New Churchill House Grammar

Pronunciation
1. Euro Talk: Phonetics
2. Multimedia Pronunciation Power
3. Pronunciation Power 1 & 2

Vocabulary
1. Word Flash
2. 1000 key English Words
3. VOCA
4. V Tutor
5. Error Terror
6. Word Invaders
7. Crossword Challenge
8. Beat the Clock

Dictionaries
1. Cambridge Advanced Learner's
2. Oxford Genie & Advanced
3. Webster's New World & Miriam
4. American Heritage
5. Reader's Digest

Encyclopedias
1. Encarta
2. Britannica
3. DK

Teacher-ware
1. Author Plus Tool Kit
2. Exercise Generator
3. Media Master
4. Power Glide

Study Skill
1. Cambridge Study Skills
2. Read Up, Speed Up

Writing
1. Easy Writer
2. Creative Writing
3. Newspaper Editor
4. Report Writer

Professional English
1. Telephonic in English
2. Business Roles
3. Mind Game 5 levels
4. Business Goals
5. Globe Arena
6. Business Territory
7. Issues in English 1&2

English For ETS
From leading brands like Cambridge, Longman, REA, ARCO, VISU, Power prep, KAPLAN, Princeton, Barron's,
Cliff s, etc.
TOEFL Mastery
IELTS
GRE
GMAT
SAT

CODE: CE 311

ENVIRONMENTAL ENGINEERING – I

Lectures   : 4 Periods/Week   Sessional marks
       : 30
University Exam. : 3 Hours   University exam. marks:
       70

UNIT - I

1. **Introduction To Water Supply Engineering**
    Need for protected water supplies; Objectives of water supply systems; Water borne diseases; Role of

    Environmental Engineers.

2. **Quantity Of Water**
    Estimating requirements; Design period; Per capita consumption; Factors affecting per capita
    consumption; Fire demand; Fluctuations in demand; Prediction of population.

3. **Sources & Intake Works**
    Classification of sources of water supply; Choice of source; Suitability with regard to quality and

    quantity; Lake, river, reservoir and canal intakes.

UNIT - II

4. **Transportation And Pumping Of Water**
    Types of conduits; Capacity and design; Materials for pipes, Laying and Jointing of pipes; Leakages;

    Classification of pumps; Efficiency and choice of pumps.

5. **Quality Of Water**
    Impurities in water; Routine water analysis - physical, chemical and bacteriological tests; BIS

    Standards for drinking water.

6. **Purification Of Water**

    Methods of purification of water; Sequence of treatment.
7. **Plain Sedimentation And Coagulation**
    Theory of sedimentation; Stoke's law; Sedimentation tanks; Design aspects; Principle of coagulation;
    Chemicals used for coagulation; Units of coagulation plant; Optimum dose of coagulant.

UNIT - III

8. **Filtration Of Water**
              Theory of filtration; Filter materials; Slow sand and rapid sand filters; Construction
    operation and design; Under drainage system design in rapid sand filters; Troubles in   rapid sand filters;
    Pressure filters.
9. **Disinfection Of Water**
          Different methods of disinfection; Chlorination; Types of chlorination
10. **Miscellaneous Treatment Methods**
          Water softening; Methods of removing temporary hardness; Methods of removing   permanent

hardness; Removal of colour, odour and taste from water; Defluoridation.

<center>UNIT – IV</center>

11. Distribution System

General requirements; Classification; Methods of supply; Available pressure in the distribution system; Layouts of distribution networks; Distribution reservoirs; Functions; Types; Capacity of balancing tank; Analysis of distribution system; Methods of analysis.

12. Pipe Appurtenances

Appurtenances in the distribution system; Service connection, Sluice valves; Check valve; Air valve; Drain valve; Hydrants; Meters.

*Field visit to water treatment facility covering all treatment units

NOTE
Two questions of 14 marks each will be given from each unit out of which one is to be answered. Fourteen questions of one mark each will be given from entire syllabus which is a compulsory question.

TEXT BOOKS

1. Elements of public health engineering by K. N. Duggal; S. Chand & Company Ltd., New Delhi.
2. Environmental Engineering Vol. I - Water supply engineering by S. K. Garg; Khanna Publishers, Delhi.

REFERENCE BOOKS

1. Water Supply and Sanitary Engineering Vol. 1 by Gurucharan Singh; Standard Publishers Distributors, Delhi.
2. Water Supply and Sanitary Engineering by G.S. Birde; Dhanpat rai and sons, Delhi.
3. Manual on Water Supply & Treatment; CPH and EEO, Ministry of Urban Development; Govt. of India, New Delhi.

CODE: CE 312

STRUCTURAL ANALYSIS – I

Lectures / Tutorials   : 4 / 1 Periods/Week   Sessional marks: 30

University Exam. : 3 Hours   University exam. marks: 70

UNIT – I

1. **Displacements Of Determinate Structures Using Energy Methods**
   Maxwell's reciprocal theorem; Maxwell – Betti's generalised reciprocal theorem; Castigliano's theorems; Application of Castigliano's theorem for calculating deflection of beams, frames and trusses; Virtual work method for deflections.

UNIT – II

2. **Influence Lines For Statically Determinate Structures**
   Moving loads and influence lines; Influence lines for beam reactions; Influence lines for

   shearing force; Influence lines for bending moment; Calculation of maximum shear force and bending

   moment at a section for rolling loads; Calculation of absolute maximum bending moment; Influence

   lines for simple trusses.

UNIT – III

3. **Propped Cantilevers**
   Analysis of propped cantilever by method of consistent deformations.
4. **Fixed Beams**
   Fixed moments for a fixed beam of uniform section for different types of loading; Effect of sinking of

   support; Effect of rotation of a support; Bending moment diagram for fixed beams.

5. **Clapeyron's Theorem Of Three Moments**
   Analysis of continuous beam by Clapeyron's theorem of three moments.

UNIT – IV

6. **Strain Energy Method**
    Strain energy method for analysis of continuous beams and rigid joined plane frames up to second
    degree redundancy.

7. **Redundant Pin Jointed Frames**
    Analysis of pin jointed frames up to second degree redundancy; Forces in indeterminate pin jointed

   frames due to temperature variation and lack of fit; Composite structure.

NOTE
Two questions of 14 marks each will be given from each unit out of which one is to be answered. Fourteen questions of one mark each will be given from entire syllabus which is a compulsory question.

TEXT BOOK

1. Analysis of Structures vols. 1 & 2 by Vazirani & Ratwani; Khanna Publishers; Delhi.

REFERENCES

1. Indeterminate structural analysis by C. K. Wang, McGraw-Hill Publications
2. Mechanics of structures – II by Junnarkar & Shah, Charotar Publishing House
3. Structural analysis by R. C. Hibbeler, Pearson Education
4. Basic Structural Analysis by C. S. Reddy, Tata McGraw-Hill

CODE: CE 313

WATER RESOURCES ENGINEERING – I

Lectures : 4 Periods/Week   Sessional marks
       : 30
University Exam. : 3 Hours   University exam. marks:
       70

UNIT – I

1. **Hydrology**

     Hydrologic cycle; Precipitation types; Rain gauges; Computation of average rain fall over a basin; Abstraction from rainfall-evaporation, factors affecting evaporation, measurement of evaporation-Infiltration, factors affecting infiltration, measurement of infiltration, infiltration indices; Run off; Factors affecting run off; Computation of run-off; Design Flood, Estimation of maximum rate of run-off, Flood frequency analysis by Gumbel's method

2. **Hydrographs**

     Hydrograph analysis; Unit hydrograph; Construction of UH for an isolated storm, Application of UH to the construction of a flood hydrograph resulting from rainfall of unit duration; Application of UH to construction of a flood hydrograph resulting from two or more periods of rainfall; Construction of unit hydrograph of different unit duration from a unit hydrograph of some given unit duration by superposition method and S-curve method.

UNIT – II

3. **Ground Water – Well Irrigation**

     Introduction; Aquifer; Aquiclude; Aquifuge; Specific yield; Specific retention; Divisions of sub–surface water; Water table; Types of aquifers; Well hydraulics; Steady radial flow to a well–Dupuit's theory for confined and unconfined aquifers; Tube wells - Open wells; Yield of an open well–Constant level pumping test, Recuperation test.

4. **Introduction To Irrigation**

     Definition; Necessity; Scope of irrigation science; Benefits of irrigation; Ill-effects of irrigation; Types of irrigation.

5. **Methods Of Irrigation**

     Methods of applying water to crops; Uncontrolled or wild flooding; Free flooding; Contour laterals; Border strip method; Check flooding; Basin flooding; Zig zag method; Furrow method; Contour Farming; Sub-surface irrigation; Sprinkler irrigation; Drip irrigation.

UNIT – III

6. **Water Requirement Of Crops**

     Functions of irrigation water; Classes and availability of soil water; Saturation capacity; Field capacity; Wilting point; Available moisture and readily available moisture; Moisture equivalent; Soil – moisture deficiency; Limiting soil moisture conditions; Depth and frequency of irrigation; Duty and Delta; Base period; Relation between Duty and Delta; Factors affecting duty; Methods of improving duty; Gross command area; Culturable command area; Culturable cultivated and uncultivated area; Kor depth and Kor period; Consumptive use of water (Evapo – Transpiration); Direct measurement of consumptive use; Irrigation efficiencies – Water conveyance efficiency, Water application efficiency, Water distribution efficiency and Consumptive use efficiency; Determination of irrigation requirements of crops; crop rotation, Assessment of Irrigation water.

7. **Irrigation Channels – Silt Theories & Design Procedure**

Classification; Canal alignment; Inundation canals; Cross–section of an irrigation channel; Balancing depth; Borrow pit; Spoil bank; Land width; Silt theories–Kennedy's theory, Lacey's regime theory; Kennedy's method of channel design; Use of Garret's diagram in channel design; Lacey's theory applied to channel design; Use of Lacey's regime diagrams; Drawbacks in Kennedy's theory; Defects in Lacey's theory; Comparison of Kennedy's theory and Lacey's theory.

UNIT – 4

8. **Water Logging And Canal Lining**
   Water logging; Effects of water logging; Causes of water logging; Remedial measures; Saline and alkaline soils and their reclamation; Losses in canal; Lining of irrigation channels – necessity, advantages and disadvantages; Types of lining; Design of lined canal.

9. **Diversion Head Works**

   Component parts of a Diversion Head work; Weirs and barrages- Types of weirs; Causes of failure of weirs and their remedies; Design of weirs on permeable foundations–Bligh's creep theory, Khosla's theory; Silt control at head works;

NOTE
Two questions of 14 marks each will be given from each unit out of which one is to be answered. Fourteen questions of one mark each will be given from entire syllabus which is a compulsory question.

TEXT BOOKS:

1. Irrigation and water power Engineering by Dr. B.C. Punmia & Dr. Pande B.B. Lal; Laxmi Publications Pvt. Ltd., New Delhi.
2. Irrigation Engineering and Hydraulic structures by S. K. Garg; Khanna Publishers, Delhi.

REFERENCE BOOK:
1. Irrigation, Water Resources & Water Power Engineering by Dr. P.N. Modi; Standard Book House, New Delhi.
2. Irrigation, water power and water resources Engineering by K R Arora, Standard Publishers, New Delhi
3. Engineering Hydrology by K. Subramanya, TMH Publishers
4. Engineering Hydrology by P. Jayarami Reddy, Laxmi Publications

CODE: CE 314

DESIGN OF CONCRETE STRUCTURES-I

Lectures / Tutorials   : 4 / 1 Periods/Week   Sessional marks: 30

University Exam. : 3 Hours   University exam. marks: 70

UNIT – I

1. **Introduction**

    Objectives of structural design – stability, strength and serviceability; Design codes and handbooks; Design philosophies – working stress method, ultimate load method and limit states method.

2. **Design For Flexure (Working State Method)**

    Assumptions; Permissible stresses in concrete and steel; Balanced design; Transformed area method; Analysis and design for flexure of singly reinforced, doubly reinforced and flanged sections.

UNIT-II

3. **Design For Flexure (Limit State Method)**

    Assumptions; Limit states; Partial safety factors; Modes of failure; Maximum depth of neutral axis; Analysis and design for flexure of singly reinforced, doubly reinforced and flanged sections; Comparison of limit state method with working stress method.

UNIT-III

4. **Shear And Development Length**

    Shear in a homogeneous beam; Shear in R.C. beams; Diagonal tension and diagonal compression; Design for shear by working stress method and limit state method; Development length; Pull out test; Anchorage bond; Flexural bond, Check for development length by working stress method and limit state method

5. **Deflection And Cracking**

    Span/Effective depth ratio; Calculation of short-term deflection and long term deflection; Cracking; Bar spacing controls.

UNIT-IV

6. **Design By Limit State Method**

    Singly reinforced, doubly reinforced and flanged beams; simply supported One-way slab, Dog – legged staircase.

UNIT-V

7. **Design By Working Stress Method**

    Rectangular Water Tanks: Introduction, under ground rectangular water tanks, rectangular water tanks resting on ground.

NOTE

    Two questions of 14 marks each will be given from each unit, out of which one is to be answered.

TEXT BOOKS

1. For Working Stress Method: Reinforced concrete by H. J. Shah, charotar publishing house

2. For Limit State Method: Reinforced Concrete (limit state design) by Ashok K. Jain; Nem Chand & Bros., Roorkee

REFERENCES

1. Reinforced concrete design by Pillai and Menon, Tata Mc Graw- Hill

2. Limit state theory & Design of reinforced concrete by Dr. S. R. Karve and Dr.V.L.Shah; Pune Vidyarthi Griha Prakashan, Pune.

CODE: CE 315

DESIGN OF STEEL STRUCTURES – I

Lectures / Tutorials   : 4 / 1 Periods/Week   Sessional marks: 30

University Exam. : 3 Hours   University exam. marks: 70

UNIT – I

1. **Introduction**
    Types of steels; Constructional steels; Mechanical properties; Design concepts; Fatigue behavior; Brittle fracture; Corrosion; Hot rolled sections; Cold-formed or light gauge sections
2. **Introduction To Welded Connections**
    Welding processes; Advantages of welding; Welds; Types of welded joints; Weld specifications; Allowable stresses; Weld symbols and notation; Lap, butt and truss joints.
3. **Introduction To Riveted Connections**
    Riveting; Rivet dimensions; Assumptions; Types of riveted joints; Definitions; Failure of a riveted joint; Rivet value; Allowable stresses for rivets; Efficiency of joint; Grouping of rivets

UNIT – II

4. **Introduction To Bolted Connections**
    Bolts; Black bolts; Failure modes of a joint; Pitch requirements of bolts; Allowable stresses; High strength bolts; Lap and butt joints, Truss joint connections
5. **Tension Members**
    Introduction; Types of sections; Net area; Net effective area for angles and Tees; Design of tension members including those with tubular cross section

UNIT - III

6. **Compression Members**
    Introduction; Effective length of a column; Allowable stresses; Types of sections; Built-up columns(using welding); Local buckling; Design of compression members including those with tubular cross section; Column splice (using welding) , Column bases (using welding)– Slab base , Gusseted base.

UNIT – IV

7. **Beams**
    Introduction; Laterally supported beams; Built-up beams (using welding); lateral buckling of beams; Design of laterally supported and unsupported beams; Secondary design considerations; Grillage beams
8. **Beam – Columns**
    Introduction; Behavior of beam columns; interaction formulae; design of beam – columns.

UNIT – V

9. **Welded And Bolted Connections**
    Bracket connections; Simple beam end connections – Framed connection, Seat connection, Stiffened seat connection; Moment resistant beam end connections.

NOTE
 Two questions of 14 marks each will be given from each unit, out of which one is to be answered.

TEXT BOOKS
1. Design of Steel Structures by M. Raghupati, Tata McGraw-Hill, Publishing Company Ltd., First Edition, 1995.

2. Design of Steel structures by A.S.Arya and J.L.Ajmani, Nem Chand & Bros, Roorkee, Fifth Edition, 1996.

3. Design of steel structures by P. Dayaratnam, Wheeler Publishing, 1996.

CODE: CE 316

GEOTECHNICAL ENGINEERING – I

Lectures   : 4 Periods/Week   Sessional marks   : 30
University Exam. : 3 Hours   University exam. marks: 70

UNIT – 1

1. **Introduction**
       Soil formation and soil types; Regional soil deposits of India
2. **Basic Definitions And Relations**
        Phase diagrams; Simple definitions; some important relationships;
    Index Properties; Grain size distribution ; Atterberg Limits ; Significance of other   Soil Aggregate properties

UNIT – II

3. **Soil Classification**
       Introduction; Particle size classification as per IS-code; Unified soil classification system; Indian standard soil classification system
4. **Permeability**
       Capillary rise; Darcy's law and its Validity; Determination of coefficient of permeability - constant and variable head methods, indirect methods, Factors affecting permeability; Permeability of stratified soil deposits.
5. **Seepage Through Soils**
       Principle of effective stress; physical meaning of effective stress; Types of head, seepage forces and quicksand condition;

UNIT – III

6. **Compaction Of Soils**
       Introduction; Laboratory tests; Factors affecting compaction; Structure and engineering behaviour of compacted cohesive soils; Compaction in the field; Compaction specifications and field control.
7. **Vertical Stresses Below Applied Loads**
       Introduction; Boussinesq's equation; vertical stress distribution diagrams; vertical stress beneath loaded areas; Newmark's influence chart; Approximate stress distribution methods for loaded areas; Westergaard's equation

UNIT – IV

8. **Compressibility Of Soil And Consolidation**
       Introduction; Compressibility; Time-rate of consolidation; Consolidation test; Computation of settlement; extrapolation of field consolidation curve; Settlement analysis.
9. **Shear Strength Of Soils**
       Introduction; Stress at a point- Mohr Circle of stress; Mohr–coulomb Failure   Criterion; Measurement of Shear Strength; Shear strength of Clayey soils; Shear Strength of Sands; Drainage conditions and Strength parameters.

NOTE

Two questions of 14 marks each will be given from each unit out of which one is to be answered. Fourteen questions of one mark each will be given from entire syllabus which is a compulsory question.

TEXT BOOK
1.   Basic and Applied Soil Mechanics – Gopal Ranjan and A.S.R.Rao, New Age International Publishers

REFERENCES
1.   Foundation Analysis & Design by Bowles, J.E., McGraw- Hill Book Co.
2.   A Text book of Soil Mechanics and Foundation Engineering – B.C.Punmia Laxmi Publications
3.   A Text book of Soil Mechanics and Foundation Engineering – K.R.Arora, Standard Publishers & Distributors, New Delhi
4.   A Text book of Soil Mechanics and Foundation Engineering – P.Purushotthama Raj, Pearson Education

CODE : CE351
LABORATORY

ENVIRONMENTAL ENGINEERING LABORATORY

Practicals   : 3 Periods/Week   Sessional marks: 25

University exam.: 3 Hrs.   University Exam. marks : 50

Note: A minimum of twelve (12No) shall be done and recorded

1. Determination of total, suspended and dissolved solids in water / sewage sample.

2. Determination of fixed and volatile solids in water / sewage sample.

3. Determination of Settleable Solids.

4. Determination of turbidity of water / sewage sample.

5. Determination of pH value of water / sewage sample.

6. Determination of optimum dose of coagulant.

7. Determination of residual chlorine.

8. Determination of temporary and permanent hardness of water sample.

9. Determination of chloride concentration of water / sewage sample.

10. Determination of acidity of water sample.

11. Determination of alkalinity of water sample.

12. Determination of fluorides in water sample.

13. Determination of Dissolved Oxygen of water / sewage sample.

14. Determination of Biochemical Oxygen Demand (BOD) of waste water.

15. Determination of Chemical Oxygen Demand (COD) of waste water.

CODE : CE352
LABORATORY

GEOTECHNICAL ENGINEERING LABORATORY

Practicals   : 3 Periods/Week   Sessional marks:
25
University exam.: 3 Hrs.   University Exam. marks :
50

Note: A minimum of twelve (12No) shall be done and recorded

1. Determination of water content by oven drying method.

2. Determination of specific gravity by

    (a) Density bottle method

    (b) Pycnometer method.

3. Gradation analysis

    a) Mechanical Sieve analysis

    b) Hydrometer analysis.

4. Determination of Atterberg limits

5. Determination of free swell index

6. Determination of field unit weight by

    a) Core cutter method.

    b) Sand replacement method.

7. Determination of permeability by

    a) Constant head permeameter.

    b) Variable head permeameter.

8. Direct shear test.

9. Vane shear test.

10. Unconfined compression test

11. IS - Light compaction test

12. IS - Heavy compaction test

13. Triaxial shear test.

14. Consolidation test.

CODE : CE353
LABORATORY

COMPUTER APPLICATIONS IN CIVIL ENGINEERING LABORATORY

Practicals   : 3 Periods/Week   Sessional marks: 25

University exam.: 3 Hrs.   University Exam. marks : 50

Note: A minimum of twelve (12No) shall be done and recorded

Students are required to write and execute programmes to solve the following problems. Programmes shall be in C or C^{++} language or MATLAB/JAVA. *or* MS-Office Softwares

UNIT -I

(Write any SIX programmes)   *8 lab classes*

1. Design of Reinforced Beam for flexure by limit state method.

2. Design of T- Beam for flexure by limit state method.

3. Design of Reinforced beam for Shear by limit state method.

4. Design of R.C.C. section subjected to Bending moment, Shear force and Torsional   moment.

5. Design of simply supported one-way slab.

6. Design of steel tension member

7. Design of steel compression member

8. Design of slab base for a steel column

9. Design of laterally supported steel beam

10. Design of beam to column framed connection using bolts

UNIT -II

(Write any THREE programmes)   *3 lab classes*

11. Classification of soil by Indian standard classification system.

12. Stresses due to applied loads both Boussinesq and Westerguard analysis

   a) Concentrated loadb) circular loaded area c) Rectangular loaded area

13. Determination of permeability coefficient by constant head and falling permeability tests.

14. Determination of index properties of soil**.**

UNIT - III

(Write any THREE programmes)   *3 lab classes*

15. Design of an open channel

16. Analysis of water distribution networks (Hardy cross method).

17. Determination of the height of the building when base is accessible.

18. Determination of included angles from the given bearing and check for local attraction.

CODE: CE 321

PROFESSIONAL ETHICS AND HUMAN VALUES

Lectures   : 3 Periods/Week   Sessional marks
          : 30
University Exam. : 3 Hours   University exam. marks:
          70

UNIT – I

Human Values
      Morals, Values And Ethics – Integrity – Work Ethics – Service Learning – Civic Virtue- Respect For Others – Living Peacefully – Caring – Sharing – Honesty – Courage – Valuing Time – Co-Operation – Commitment – Empathy – Self-Confidence – Character - Spirituality.

(12)

UNIT – II

Engineering Ethics
      Senses Of Engineering Ethics – Variety Of Moral Issued – Types Of Inquiry – Moral Dilemmas – Moral Autonomy – Kohlberg's Theory – Gillian's Theory – Consensus And Controversy – Professions And Professionalism- Professional Ideals And Virtues - Theories About Right Action – Self-Interest – Customs And Religion – Uses Of Ethical Theories.

(12)

UNIT – III

Engineering As Social Experimentation
      Engineering As Experimentation – Engineers As Responsible Experimenters – Codes Of Ethics – Balanced Outlook On Law .
Safety, Responsibilities And Rights
      Safety And Risk – Assessment Of Safety And Risk – Risk Benefit Analysis And Reducing Risk.
      Collegiality And Loyalty – Respect For Authority – Collective Bargaining – Confidentiality – Conflicts Of Interest – Occupational Crime – Professional Rights – Employee Rights – Intellectual Property Rights (IPR) – Discrimination.

(12)

UNIT – IV

Global Issues
      Multinational Corporations – Environmental Ethics – Computer Ethics – Weapons Development – Engineers As Managers – Consulting Engineers – Engineers As Expert Witnesses And Advisors – Moral Leadership Sample Code Of Ethics Like ASME, ASCE, IEEE, Institution Of Engineers (India), Indian Institute Of Materials Management, Institution Of Electronics And Telecommunication Engineers (IETE), India Etc.,

(9)

NOTE
Two questions of 14 marks each will be given from each unit out of which one is to be answered. Fourteen questions of one mark each will be given from entire syllabus which is a compulsory question.

TEXT BOOK
1. Mike martin and Ronald Schinzinger, "Ethics in Engineering" McGraw-Hill, New York 1996
2. Govindarajan M, Natarajan S, Senthil Kumar V.S., "Engineering Ethics", PHI, New Delhi, 2004

REFERENCE BOOKS

1. Charles D,Fleddermann, "Engineering Ethics", Pearson / PHI, New Jersey 2004 (Indian Reprint)
2. Charles E Harris, Michael S.Protchard and Michael J Rabins, "Engineering Ethics – Concepts and Cases" Wadsworth Thompson Learning, United States, 2000 (Indian Reprint now available)
3. John R Boatright, "Ethics and the conduct of business" Pearson, New Delhi, 2003.
4. Edmund G.Seebauer and Robert L Barry, "Fundamentals of Ethics for Scientists and Engineers" Oxford University Press, Oxford, 2001.

CODE: CE322

STRUCTURAL ANALYSIS – II

Lectures / Tutorials   : 4 / 1 Periods/Week   Sessional marks: 30

University Exam. : 3 Hours   University exam. marks: 70

UNIT – I

1. **Slope Deflection Method**

   Slope - deflection equations; Principles of the method; Applications of the method to the analysis of

   continuous beams and portal frames (Single bay, single storey with vertical legs only) without and with

   sidesway.

UNIT – II

2. **Moment Distribution Method**

   Principles of the method; Application of the method to analysis of continuous beams and portal

   frames (Single bay, single storey with vertical legs only) without and with side sway.

UNIT – III

3. **Multi Storey Frames (Approximate Methods)**
   Substitute frame method for gravity loads; Portal method and cantilever method for lateral loads.

4. **Kani's Method**

   Principles of the method; Application to continuous beams and portal frames (single bay, single

   storey with vertical legs only) without and with side-sway.

UNIT – IV

5. **Arches**

   Eddy's Theorem; Analysis of three hinged and two hinged Parabolic and Circular arches for Static

   and moving loads.

6. **Cables**

   Analysis of cables under uniformly distributed and concentrated loads; Shape of the cable under self

   weight; Effect of temperature changes in suspension cables; Anchor cables.

NOTE
Two questions of 14 marks each will be given from each unit out of which one is to be answered. Fourteen questions of one mark each will be given from entire syllabus which is a compulsory question.

TEXT BOOK

1. Analysis of Structures vols. 1 & 2 by Vazirani & Ratwani; Khanna Publishers; Delhi.

REFERENCES

1. Indeterminate structural analysis by C. K. Wang, McGraw-Hill Publications

2. Mechanics of structures – II by Junnarkar & Shah, Charotar Publishing House

3. Structural analysis by R. C. Hibbeler, Pearson Education.

4. Basic Structural Analysis by C. S. Reddy, Tata McGraw-Hill

CODE: CE 323

WATER RESOURCES ENGINEERING – II

Lectures   : 4 Periods/Week   Sessional marks
             : 30
University Exam. : 3 Hours   University exam. marks:
       70

UNIT – I

1. Stream Gauging
        Necessity; Selection of gauging sites; Discharge measurement- Area-Velocity method; Slope-Area method; Tracer method, Electromagnetic induction method, ultrasonic method; Measurement of depth – Sounding rod, Echo-sounder; Measurement of velocity; Floats – Surface floats, Sub–surface float or Double float, Velocity rod or Rod float; Pitot tube; Current meter; Measurement of stage-Staff gauge, wire gauge, water stage recorder, bubble gauge recorder; stage-discharge curve.

2. Canal outlets and regulation works:
        Types of outlets; Non–modular outlets; Semi-module outlets; Rigid modules; Canal falls; Necessity and location of falls; Development of falls; Classification of falls; Canal regulators; Off-take alignment; Head regulators and cross-regulators; Canal escape (Designs not included).

3. Cross Drainage Works
        Introduction; Types of cross - drainage works; Selection of suitable type of cross - drainage work; Classification of Aqueducts and Syphon Aqueducts; Selection of a suitable type.

UNIT – II

4. Reservoir Planning
        Introduction; Investigations for reservoir planning; Selection of site for a reservoir; 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; Sediment flow in streams; Reservoir sedimentation; Life of reservoir; Reservoir sediment control; Multipurpose reservoir flood routing; Methods of flood routing-Graphical Method (Inflow – storage discharge curves method), Trial and error method; Channel routing by Muskingum method

5. Dams In General
        Introduction; Classification; Gravity dams, Arch dams, Buttress dams, Steel dams, Timber dams, Earth dams and rock fill dams; Physical factors governing selection of type of dam and selection of site for a dam.

UNIT – III

6.Gravity Dams
        Introduction; Forces acting on a gravity dam; Combination of loading for design; Modes of failure and criteria for stability requirements; Stability analysis; Elementary

        Profile of a gravity dam; Practical profile of a gravity dam; Limiting height of a gravity dam; High and low gravity dams; Design of gravity dams–single step method;

        Galleries; Joints; Keys and water seals; Stability analysis of non–overflow section of Gravity dam.

UNIT – IV

7. Earth Dams

Introduction; Types of earth dams; Causes of failure of earth dams; Criteria for safe design of earth dams; Section of an earth dam; Design to suit available materials; Seepage control measures; Slope protection.

8.Spillways

Introduction; Types of spillways; Profile of ogee spillway; Energy dissipation below spillways for relative positions of jump height curve and tail water curve; Stilling basins; Indian standards on criteria for design of hydraulic jump type stilling basins with horizontal and slopping aprons; Spillway crest gates-Types and description only.

9. Water Power Engineering

Introduction; Hydropower - Advantages & disadvantages; Estimation of hydro-power; Flow duration curve; Power duration curve; Load curve; Load factor; Capacity factor; Utilization factor; Diversity factor; Load duration curve; Firm Power; Secondary power; Types of hydel schemes; Forebay; Intake structures; Penstocks; Surge tank; Tail race; Turbines; Selection of suitable type of turbine.

NOTE

Two questions of 14 marks each will be given from each unit out of which one is to be answered. Fourteen questions of one mark each will be given from entire syllabus which is a compulsory question.

TEXT BOOKS

1. Irrigation and Water Power Engineering by Dr. B.C.Punmia & Dr. Pande B.B. Lal; Laxmi Publications pvt. Ltd., New Delhi.

2. Irrigation Engineering and Hydraulic Structure by S. K. Garg; Khanna Publishers, Delhi.

REFERENCE BOOKS

1. Irrigation, Water Resources and Waterpower Engineering by Dr. P.N. Modi; Standard Book House, New Delhi.

2. Irrigation, Waterpower and Water Resources Engineering- K R Arora, Standard Publisheres, New Delhi

3. Water Power Engineering by M.M. Dandekar and K. K. Sharma; Vikas Publishing House Pvt. Ltd., New Delhi.

CODE: CE 324

DESIGN OF CONCRETE STRUCTURES-II

Lectures / Tutorials   : 4 / 1 Periods/Week   Sessional marks: 30

University Exam. : 3 Hours   University exam. marks: 70

UNIT – I

1. Columns (Working Stress Method)
     General requirements; Short columns; Long columns; Design of axially loaded Columns; Design of axially loaded circular columns with helical reinforcement; Eccentrically loaded columns; Uncracked section; Cracked section for uniaxial Bending.

2. Continuous Slab (Limit State Method)
     Design of continuous one-way slab

3. Continuous Beam (Limit State Method)
     Design of continuous beam

UNIT-II

4. Two Way Slabs (Limit State Method)
     Design and detailing of two way slabs

5. Flat Slabs (Limit State Method)
     Design and detailing of flat slabs by direct design method.

UNIT-III

6. COLUMNS (LIMIT STATE METHOD)
     Assumptions; Design of axially loaded columns; Design of axially loaded Circular columns with helical reinforcement; Interaction diagrams; Design of short Columns and slender columns of rectangular section in the following cases
       (a) Axial compression and uni-axial bending.
       (b) Axial compression and bi-axial bending (Using SP-16 Charts)

UNIT-IV

7. Retaining Walls (Limit State Method)
     Types of retaining walls, Forces on retaining walls; Stability requirements;
     Design and detailing of cantilever type retaining wall.

UNIT-V

8. Foundations (Limit State Method)
     Design and detailing of
       (a) Isolated column footings,
       (b) Combined footings
       (c) Pile and pile cap design

NOTE
  Two questions of 14 marks each will be given from each unit, out of which one is to be answered.

TEXT BOOKS

1. For Working Stress Method: Reinforced concrete by H. J. Shah, charotar publishing house

2. For Limit State Method: Reinforced Concrete (limit state design) by Ashok K. Jain; Nem Chand & Bros., Roorkee

REFERENCES

1. Reinforced concrete design by Pillai and Menon, Tata Mc Graw- Hill

2. Limit state theory & Design of reinforced concrete by Dr. S. R. Karve and Dr.V.L.Shah; Pune Vidyarthi Griha Prakashan, Pune.

CODE: CE 325

DESIGN OF STEEL STRUCTURES – II

Lectures / Tutorials   : 4 / 1 Periods/Week   Sessional marks: 30

University Exam. : 3 Hours   University exam. marks: 70

UNIT – I
1. Plate Girder
   Introduction; Effective depth; Stability of flanges and webs; Shear stress in stiffened web; Web and flange dimensions; Stiffeners and their connections(using welding); Web splice (using bolts); Detailed design of welded plate girder.

UNIT – II
2. Gantry Girder
   Introduction; Loads on Gantry girders; Fatigue effects; Design of gantry girder (using welding).

3. Steel – Concrete Composite Construction
   Design principles; shear connectors; composite beam design

UNIT – III
4. Steel Water Tanks
   IS Code specifications; Design of rectangular tank using pressed steel plates; Design of staging for a rectangular tank (using welding/bolting).

UNIT – IV

5. Roof Trusses
   Types of trusses for different spans; Components of a roof truss; Live loads and wind loads on trusses as per I.S.Codes; Design of purlins including tubular sections; Design of members of a roof truss including tubular sections; Design of connections using welding / bolting; Design of end bearings

UNIT – V

6. Plate-Girder Bridges
   Introduction; Provisions of Railway Bridge Rules and Steel Bridge Code; Railway broad gauge loading; Permissible stresses; Fatigue effects; Design principles of Plate girder bridges; Detailed design of railway riveted Plate girder bridge; design of bearings.

NOTE:
   Two questions of 14 marks each will be given from each unit, out of which one is to be answered.

TEXT BOOKS
1. Design of Steel Structures by M. Raghupati, Tata McGraw-Hill Publishing Company Ltd., First Edition, 1995.
2. Design of Steel Structures by Anand S. Arya & J.L. Ajmani, Nemchand & Bros, Roorkee, Fifth Edition, 1996.
3. Design of Steel Structures by P. Dayaratnam, Wheeler Publishing, 1996.

GEOTECHNICAL ENGINEERING – II

Lectures   : 4 Periods/Week   Sessional marks
        : 30
University Exam. : 3 Hours   University exam. marks:
        70

UNIT – I

1. **Sub–Soil Investigation And Sampling**
        Introduction; Methods of exploration; Methods of Boring; Soil Samples; Soil samplers and Sampling; Number and disposition of trial pits and borings; Depth of exploration; Ground water observations; Field tests vis-à-vis Laboratory tests; Plate load test; Penetrometer tests; Geophysical methods; Borehole logs; Site investigation report;

2. **Lateral Earth Pressure & Retaining Walls**
        Introduction; Effect of wall movement on Earth Pressure; Earth Pressure at rest; Rankine's theory of Earth pressure; Coulomb's theory of earth pressure; Culmann's graphical method for active earth pressure; Design considerations for retaining walls;

UNIT - II

3. **Stability Of Slopes**
        Introduction; Infinite slopes and translational slides; Definitions of factor of safety; Finite slopes-forms of slip surface; Total stress and Effective stress methods of analysis; $\phi_u=0$ Analysis (Total Stress Analysis) ; $c\text{-}\phi$ Analysis- Method of slices; Location of most Critical Circle; Stability of Earth Dam Slopes; Friction Circle Method; Taylor's Stability Number;

4. **Shallow Foundations**
        Concept of foundations; Types of foundations and their applicability; General requirements of foundations; Location and Depth of foundation.

UNIT -III

5. **Bearing Capacity Of Shallow Foundation**
        Terminology relating to bearing capacity; Bearing Capacity of Shallow Foundations – Terzaghi's Bearing Capacity theory; Skempton's Bearing Capacity Analysis for Clay soils; IS-Code Recommendations for Bearing Capacity; Influence of water table on bearing capacity;

6. **Settlement Analysis**
        Settlement of Shallow foundation – types; Methods to reduce differential settlements; Allowable Bearing Pressure; Immediate settlemtent –Terzaghi's   Method; Allowable Bearing pressure of Granular Soils based on Standard Penetration Test Value – Terzaghi and IS methods;

UNIT – IV

7. **Pile Foundations**
        Introduction; Uses of Piles; Types of Piles;Cast- in-situ Pile construction; Selection of Pile type; Pile driving; Pile load carrying capacity in compression – Static Pile Load formula, Load tests, Dynamic Pile formulae; Correlations with Penetration test data; Group action of Piles – load carrying capacity and settlement; Negative skin friction;

8. **Well Foundations**
        Types of wells; Components of well foundation; Shapes of wells; Forces acting on well foundation; Construction and Sinking of wells;

9. **Foundations In Expansive Soils**
        Identification of expansive soil; Field conditions that favour swelling; consequences of swelling; Different alternative foundation practices in swelling soils; Construction practice of UR piles in swelling soils

NOTE

Two questions of 14 marks each will be given from each unit out of which one is to be answered. Fourteen questions of one mark each will be given from entire syllabus which is a compulsory question.

TEXT BOOK

1. Basic and Applied Soil Mechanics – Gopal Ranjan and A.S.R.Rao, New Age International Publishers

REFERENCES

1. Foundation Engineering by B. J. Kasmalkar; Pune Vidyarthi Griha Prakashan, Pune

2. Foundation Analysis & Design by Bowles, J.E., McGraw- Hill Book Company.

3. Foundations of Expansive Soils, F.H. Chen. Elsevier Publications.

4. Geotechnical Engineering by SK Gulati & Manoj Datta, Tata McGraw- Hill Publishing Company Limited.

5. Principles of Foundation Engineering(1999), B.M. Das., PWS Publishing Company, 4th edition, Singapore

6. Geotechnical Engineering, - Codutu, Pearson Education

CODE: CE 327

ENVIRONMENTAL ENGINEERING – II

Lectures   : 4 Periods/Week   Sessional marks : 30

University Exam. : 3 Hours   University exam. marks: 70

UNIT – 1

1. **Introduction To Sanitary Engineering**
   Sanitation; Conservancy and water carriage system; Sewerage systems; Relative merits.

2. **Sanitary Sewage And Storm Sewage**
   Quantity of sanitary sewage; Factors affecting sanitary sewage; Determination of quantity of sanitary sewage; Factors affecting storm water sewage; Determination of quantity of storm water sewage.

3. **Sewers, Sewer Appurtenances, Sewage Pumping**
   Types of sewers; Design of sewers; Construction; Testing; Maintenance of sewers; Sewer appurtenances – Man holes, Drop man holes, Lamp holes, Flushing tanks, Inverted syphons; Street inlets; Catch basins; Storm water regulators; Sewage pumping; Types of pumps.

UNIT – II

4. **Quality And Characteristics Of Sewage**
   Characteristics of sewage; Decomposition of sewage; Carbon, nitrogen and sulphur cycles of decomposition; BOD; COD; Physical and chemical analysis of sewage.

5. **Primary Treatment Of Sewage**
   Screens; Grit chamber; Grease traps; Skimming tanks; Sedimentation tanks.

6. **Septic Tank**
   Septic tank design; Septic tank effluent disposal, soak pits, leaching cess pools;

7. **House Plumbing**
   House drainage - Sanitary fittings, Traps; Plumbing system of drainage – Single stack, One pipe and Two pipe systems; Principles governing design of building drainage.

UNIT – III

8. **Secondary Treatemnt Of Sewage**
   Trickling filters; Principles of action; Filter types; Recirculation; Final settling tanks; Operational problems and remedies; Activated sludge process; Principle of action; Activated sludge process *vs* Trickling filter process; Features of operation;

   Organic loading parameters; Methods of aeration; Diffused air system; Mechanical aeration;

Combined system; Sludge bulking; Sludge volume index.

9. Sewage Disposal

Objects; Methods; Disposal by dilution; Disposal by irrigation; Sewage sickness; Reuse of treated

sewage; Ground water recharge.

UNIT – IV

10. Sludge Treatement And Disposal

Characteristics of sewage sludge; Anaerobic sludge digestion process; Stages of sludge digestion;

Factors affecting sludge digestion; Sludge digestion tank; High rate digestion; Sludge thickening; Sludge

conditioning; Methods of dewatering the sludge; Methods of sludge disposal.

11. Urban Solid Waste Management

Sources; Quantities and characteristics; Classification; Collection and transportation; Recovery and reuse; Treatment methods such as compositing, incineration, sanitary landfill and pyrolysis.

NOTE
Two questions of 14 marks each will be given from each unit out of which one is to be answered. Fourteen questions of one mark each will be given from entire syllabus which is a compulsory question.

TEXT BOOKS

1. Elements of public health engineering by K. N. Duggal; S. Chand & Company Ltd., New Delhi.
2. Environmental Engineering vol. II – Sewage disposal and air pollution engineering by S. K. Garg; Khanna Publishers, Delhi.
3. Environmental pollution control engineering by C. S. Rao; Wiley Eastern Limited, New Delhi.

REFERENCE BOOKS

1. Wastewater Engineering Treatment, Disposal & Reuse by Met Calf & Eddy; Tata Mc. Graw – Hill publishing Co. Ltd., New Delhi.
2. Water & Wastewater Technology by Mark J. Hammer; John Wiley & Sons.
3. Environmental Engineering by Peavy and Rowe, McGrawhill, Newyork.
4. Manual on Sewerage & Sewage treatment; CPH and EEO, Ministry of Works and Housing; Govt. of India; New Delhi.

CODE : CE361
LABORATORY

SURVEYING FIELD WORK - II

Practicals   : 3 Periods/Week   Sessional marks: 25
University exam.: 3 Hrs.   University Exam. marks : 50

1. **Total Station**

    1. Study of Instrument – Determination of Distances, Directions and Elevations

    2. Determination of Boundaries of a Field and computation of area.

    3. Determination of Heights of objects.

2. **Setting Curves & Works**

    4. Setting of simple curve using tape or/and theodolite.

    5. Setting of a simple curve using Total Station.

    6. Setting out for Building.

    Survey Camp is to be conducted for a minimum period of seven days Using Total Station to train in one of the following areas:

        i. Preparation of a contour Plan/ Map.

        ii. Earth work Computations for a high way / canal projects

        iii. Marking of a Sewer line/ Water supply line.

        iv. Any type of Execution works.

NOTE

    50% Weight- age of total marks of this laboratory is to be given for total survey camp work including for Report submission by each batch.

CODE : CE362
LABORATORY

COMPUTER AIDED ANALYSIS AND DESIGN IN CIVIL ENGINEERING

Practicals   : 3 Periods/Week   Sessional marks: 25

University exam.: 3 Hrs.   University Exam. marks : 50

Note: A minimum of twelve (12No) shall be done and recorded

Students are required to analyze and design the following structures using software package like STAAD Pro/STRUDS/GTSTRUDL/STRAP etc.

UNIT – I

(At least SIX of the following)   *4 lab classes*

1. Analysis and design of simply supported continuous beam.

2. Analysis and design of fixed end supported continuous beam.

3. Analysis of single storey unsymmetrical portal frame

4. Analysis and design of plane frame subjected to gravity loading.

5. Analysis and design of plane frame subjected to gravity loads and lateral load (wind load)

6. Analysis and design of plane roof truss (DL+LL).

7. Analysis and design of plane roof truss (DL+WL).

UNIT - II

(At least FIVE of the following)   *4 lab classes*

1. Design of one-way slab.

2. Design of two way slab

3. Design of Cantilever Retaining wall.

4. Design of Counterfort Retaining wall

5. Design of Isolated footing.

6. Design of Pile foundation.

UNIT -III

(At least one of the following)   *4 lab classes*

1. Analysis and design of two-storied R.C.C.Framed building.

2. Analysis and design of Industrial steel building.

CODE: CE 411

TRANSPORTATION ENGINEERING – I

Lectures   : 4 Periods/Week   Sessional marks   : 30
University Exam. : 3 Hours   University exam. marks: 70

UNIT – 1

1. **Highway Development And Planning**
   Brief Introduction; necessity of highway planning suveys preparation of master plan highway planning in India.

2. **Highway alignment**
          Factors controlling alignment; Engineering surveys, Drawing & report.

UNIT – II

3. **Highway Geometric Design**
   Highway cross section elements; Sight distance; Design of horizontal alignment; Design of vertical alignment.

4. **Highway materials**
   Sub grade soils- CBR tests; Stone aggregates; Bitumen materials; Paving mixes.

UNIT – III

5. **Design Of Highway Pavements**
          Design factors; Design of flexible pavements – IRC method, IRC recommendations; Design of Rigid pavements - Westergard's stress equation for wheel loads and temperatures stress; IRC recommendations.

6. **Highway construction and maintenance:**
    Construction of water bound macadam roads; Bituminous pavements and cement concrete pavements; Construction of joints in cement concrete pavements; Maintenance of highways- Water bound macadam roads, Bituminous pavements, Cement concrete pavements.

UNIT - IV

7. **Highway Draingage**
    Importance of highway drainage; Requirements; Surface drainage; Sub–surface drainage; Road construction in water logged areas and black cotton soils.

8. **Traffic engineering:**
    Introduction; Traffic characteristics- Road user, vehicular & travel pattern; Traffic operation- signal design; Types of intersections; Design of rotary intersection;

NOTE

Two questions of 14 marks each will be given from each unit out of which one is to be answered. Fourteen questions of one mark each will be given from entire syllabus which is a compulsory question.

TEXT BOOK

1. Highway Engineering by S. K. Khanna & C. E. G. Justo; Nemchand & Brothers, Roorkee.

REFERENCE BOOKS

1. Principles of Transportation Engineering by Partha Chakroborty & Animesh Das, Prentice Hall of India, New Delhi.
2. Principles of Transportation Engineering and highway engineering by G. Venkatappa Rao, Tata Mc Graw-hill publishing company limited New Delhi.

CODE: CE 412

STRUCTURAL ANALYSIS – III

Lectures / Tutorials   : 4 / 1 Periods/Week   Sessional marks: 30

University Exam. : 3 Hours   University exam. marks: 70

UNIT – I

1. **Curved Beams**
      Analysis for internal forces – circular beams supported on equally spaced columns – semicircular

beams on three equally spaced supports.

2. **Influence Lines For Indeterminate Structures**
Muller - Breslau Principle with applications to continuous beams and framed structures to obtain the general shape of the influence lines; Influence lines for reactions, shear force at a point and bending moment at a section of a)Beam with fixed ends b) 2 - span continuous beam.

UNIT – II

3. **Plastic Behaviour Of Structures**
      Idealized stress - strain curve for mild steel; Ultimate load carrying capacity of members carrying

axial forces; Moment - Curvature relationship for flexural members; Evaluation of fully plastic moment;

 Shape factor; Collapse load factor; Upper and lower bound theorems; Collapse load analysis of

 indeterminate beams and single bay, single storied portal frames.

UNIT – III

4. **Flexibility And Stiffness Matrices**
      Flexibility and stiffness; Flexibility matrix; Stiffness matrix; Relationship between flexibility matrix

and stiffness matrix.

5. **Flexibility Method (Matrix Approach)**
      Analysis of continuous beams and rigid jointed plane frames (Single bay, single storey with vertical

legs only) by flexibility method with matrix approach.

UNIT – IV

6. **Stiffness Method (Matrix Approach)**
   Analysis of continuous beams, rigid jointed plane frames (Single bay, single storey with vertical legs

   only) and pin jointed plane frames by stiffness method with matrix approach.

NOTE
Two questions of 14 marks each will be given from each unit out of which one is to be answered. Fourteen questions of one mark each will be given from entire syllabus which is a compulsory question.

TEXT BOOKS

1. For units 1 & 2: Structural Analysis, Vol. II by V. N. Vazirani & M. M. Ratwani; Khanna Publishers, Delhi.
2. For units 3 & 4 : Structural Analysis – A matrix approach by G. S. Pandit & S. P. Gupta; Tata Mc. Graw – Hill Publishing Co. Ltd., New Delhi.
3. For Unit 2: Limit Analysis of Structures by Manicka & Selvam

REFERENCE

1. Matrix analysis of framed structures by Weaver & Gere
2. Structural Analysis by Negi & Jangid

CODE: CE 413

WATER RESOURCES ENGINEERING–III

DESIGN & DRAWING

Lectures / Tutorials   : 4 / 1 Periods/Week   Sessional marks: 30
University Exam. : 3 Hours   University exam. marks: 70

Design & Drawing Of The Following

UNIT – I

1. Irrigation canal.
2. Canal drop – Notch type.
3. Canal regulator.
4. Vertical drop weir on permeable foundations.

UNIT – II

5. Direct sluice.
6. Surplus weir of a tank.
7. Syphon Aqueduct (Type – III Aqueduct).
8. Profile of a Ogee spillway.

NOTE
   Two questions of 35 marks each will be given from each unit out of which one is to be answered.

TEXT BOOKS
1. Design of Minor Irrigation and Canal Structures by C. Satyanarayana Murthy; Wiley Eastern Ltd., New Delhi.
2. Irrigation and Water Power Engineering by Dr. B.C.Punmia & Dr.Pande B.B. Lal; Laxmi Publications pvt. Ltd., New Delhi.

CODE: CE 414

ESTIMATION AND QUANTITY SURVEYING

Lectures   : 4 Periods/Week   Sessional marks   : 30
University Exam. : 3 Hours   University exam. marks: 70

UNIT – I

1. **Procedure Of Estimating**
     Methods of estimating; Main items of work; Deduction for openings; Degree of accuracy; Units of measurement.
2. **Methods of building estimates**
     Individual wall method; Centre line method; Arch masonry calculation; Estimate of steps.
3. **Estimate Of Buildings**
     Estimate of residential building; Estimate of a building from line plan.

UNIT – II

Estimate of rcc works
     Standard hooks and cranks; Estimate of RCC slab; RCC beam; RCC T–beam slab and RCC column with foundation.
5. **Road Estimating**
     Estimate of earthwork; Estimate of pitching of slopes; Estimate of earthwork of road from longitudinal sections; Estimate of earthwork in hill roads.
6. **Canal estimate**

     Earthwork in canals–different cases; Estimate of earthwork in irrigation channels.

UNIT – III

7. **Specifications**
     Purpose and method of writing specifications; General specifications. Detailed Specifications for Brick work; R.C.C; Plastering; Mosaic Flooring; R.R.Stone Masonary.
8. **Analysis Of Rates**
     Task or out – turn work; Labour and materials required for different works; Rates of materials and labour; Preparing analysis of rates for the following items of work:
     i) Concrete ii) RCC Works iii) Brick work in foundation and super structure   iv) Plastering v) CC flooring vi) White washing.

UNIT – IV

9. **PWD Accounts And Procedure Of Works**
     Organization of Engineering department; Work charged establishment; Contract; Tender; Tender notice; Tender Schedule; Earnest money; Security money; Measurement book; Administrative approval; Technical sanction; Plinth area; Floor Area; Carpet area; Approximate Estimate; Plinth area estimate;

Revised Estimate; Supplementary estimate.

10. Valuation

Cost; Price & value; Methods of valuation; Out goings; Depreciation; Methods for estimating cost depreciation; Valuation of building.

11. Miscellaneous Topics

Gross income; Net income; Scrap value; Salvage value; Obsolescence; Annuity; Capitalized value; Years purchase; Life of structures; Sinking fund; Standard rent; Process of fixing standard rent; Mortgage.

NOTE

Two questions of 14 marks each will be given from each unit out of which one is to be answered. Fourteen questions of one mark each will be given from entire syllabus which is a compulsory question.

TEXT BOOKS

1. Estimating & Costing in Civil Engineering by B.N. Dutta; U. B. S. Publishers & Distributors, New Delhi.
2. Valuation of Real properties by S. C. Rangwala; Charotar Publishing House, Anand.

CODE: CE415

EARTHQUAKE RESISTANT DESIGN OF STRUCTURES

Lectures / Tutorials   : 4 / 1 Periods/Week   Sessional marks: 30

University Exam. : 3 Hours   University exam. marks: 70

Note
1. The scope of the syllabus shall be as per content in the prescribed books only.

UNIT-I

1.Elements of structural dynamics   (15)
Sources of vibrations; Types of vibrations; Degrees of freedom; Spring action and damping; Free vibration of undamped system having single degree of freedom; Free vibration of viscous damped system having single degree of freedom; Forced vibration of a viscous damped single degree freedom system subjected to harmonic excitation; Earthquake excitation (Base excitation) of a single degree freedom system.

UNIT-II

2) Elements of Earth Quake Ground motion   (9)
Earthquake size- Intensity and magnitude; Seismic Zoning-Introduction; Strong Motion Earthquakes - Introduction; Response spectrum (elastic); Local site effect (Effect of type of soil).

3) Elements of Geotechnical   Earthquake Engineering   (6)   Liquefaction   – Definition and types, Effect of liquefaction on built environment, Evaluation of liquefaction susceptibility, Liquefaction hazard mitigation

Seismic slope stability – Introduction, Pseudo-static analysis, Sliding block methods

UNIT III

4) Analysis of single storey and single bay RCC Plane Frame (Columns vertical) :   (As per IS:1893(part-I)-2002)   (15)
Calculation of lateral force due to earthquake using equivalent static method ; Analysis for different load combinations; Design forces and moments in beam and columns.

UNIT-IV

5) **Design of single storey and single bay RCC plane frames (Columns vertical)**
    (As per IS:456-2000 and IS13920-1993)   (9)
Design of column; Design of beam; Design of footing ; Detailing of entire frame

6) Masonry Structures   (6)
House types and damages, cause and location of damage, Understanding the knowledge hidden in your existing houses, Making houses earthquake resistant, Earthquake resistant features, Retrofitting-some examples, Technology choice, summary of earthquake resistant features, improving housing designs.

NOTE
Two questions of 14 marks each will be given from each unit out of which one is to be answered. Fourteen questions of one mark each will be given from entire syllabus which is a compulsory question.

TEXT BOOKS
1)Elements of Earthquake Engineering by Jai Krishna, A.R.Chandrasekaran and Brijesh   Chandra, Second Edition(1994), South Asian Publishers, New Delhi. (For Chapters 1 and 2)
2) Geotechnical Engineering   - S.K.Gulati & Manoj Datta, Tata McGraw-Hill   Publishing Company Ltd. (For Chapter 3)
3)Earthquake Resistant Design of Structures by Pankaj Agarwal, Manish Shrikhande , First edition(2006), Prentice Hall of India Private Ltd., New Delhi . (for Chapters 1,2,4 and 5)
4) Earthquakes and Buildings – A.S.Arya, A.Revi, Pawan Jain (For Chapter-6)

CODES
IS:1893(part-I)-2002 -
IS13920-1993 -
IS:456-2000 -
SP16 -

REFERENCE BOOK
1) Dynamics of Structures by A.K.Chopra, Second edition (2001), Prentice Hall India Private Ltd

CODE: CE 416 /1   **ELECTIVE – I**

PRESTRESSED CONCRETE

Lectures / Tutorials   : 4 / 1 Periods/Week   Sessional marks: 30
University Exam. : 3 Hours   University exam. marks: 70

UNIT – I

1. **Introduction**
   Basic concepts of prestressing; Historical development; Need for High strength steel and High strength concrete; Advantages of prestressed concrete.

Materials For Prestressed Concrete
   High strength concrete; High tensile steel.

Prestressing Systems
   Tensioning devices; Hoyer's long line system of pretensioning; Post tensioning systems; Detailed study of Freyssinet system , Lee-McCall System and Gifford – Udall system;

Analysis Of Prestress And Bending Stresses
   Basic assumptions; Analysis of prestress; Resultant stresses at a section; Pressure (Thrust) line and internal resisting couple; Concept of Load balancing; Stresses in tendons; Cracking moment.

UNIT – II

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

6. Deflections Of Prestressed Concrete Members
   Importance of control of deflections; Factors influencing deflections; Short term deflections of uncracked members

UNIT – III

7. **Elastic Design Of Prestressed Concrete Sections For Flexure**
   Permissible compressive stresses in concrete as per IS 1343; Design of rectangular and I – sections of TYPE 1, TYPE 2 (Elastic Design only).

UNIT – IV

8. **Shear Resistance**
   Shear and Principal Stresses; Ultimate shear resistance of prestressed concrete members; Design of shear reinforcement.

9. **Transfer Of Prestress In Pre–Tensioned Members & Flexural Bond Stresses**
   Transmission of prestressing force by bond; Transmission length; Bond stresses; Transverse tensile stresses; End zone reinforcement; Flexural bond stresses in pre –tensioned and post – tensioned grouted beams.

10. **Anchorage Zone Stresses In Post-Tensioned Members**
    Stress distribution in end block; Investigations on anchorage zone stresses by Guyons method (forces evenly distributed case) and IS code method; Anchorage zone reinforcements; Design of anchorage and end block.

NOTE
Two questions of 14 marks each will be given from each unit out of which one is to be answered. Fourteen questions of one mark each will be given from entire syllabus which is a compulsory question.

TEXT BOOKS

Prestressed Concrete by N. Krishna Raju; Tata Mc Graw - Hill Publishing Company Limited, New Delhi.

REFERENCE BOOKS

1. Design of Prestressed Concrete Structures by T.Y. Lin & Ned H. Burns; John Wiley & Sons.
2. Prestressed Concrete by P.Dayaratnam.   Oxford & IBH
3. Prestressed Concrete by N.Raja Gopalan. PHI

REMOTE SENSING AND GIS

Lectures / Tutorials : 4 / 1 Periods/Week   Sessional marks: 30

University Exam. : 3 Hours   University exam. marks: 70

UNIT-I

1. Basic Concepts

      Definitions; Introduction to RS; Necessity and Importance; and Application and Scope.

2. Electromagnetic Radiation

      Introduction; Solar Radiation; Electromagnetic Spectrum; Interaction of EMR with the atmosphere; Atmospheric Windows; Scattering and Transmission; Specular and Diffuse surfaces; Reflectance and Absorption in RS.

3. Sensors

      Spectral Constraints; Spectral hands for Sensors; Multispcctral Instruments; Photon, Infrared and Thermal Detectors; Photo multipliers; Charge Coupled Devices; MliItispectral Line Scanners; Photographic Systems; Sensors for Ultra-violet Region; Visible Region; Infra-red Region; Microwave region. Classification of Sensors - Multispectral Scanner (MSS); Thematic Mapped™; Hlectro-optical Sensors; Linear Array; Push-broom Sensors; Thermal Scanners; Passive Microwave Scaltcrometers; RADAR; SLAR; and SAR. Application of Laser: Gamma- radiation; Microwave in RS.

4. Data Acquisition Platforms

      Remote Sensing Platforms; Multiconcept in acquiring RS Data; Characteristics of Space Platforms; and Airborne platforms

5. Data Formats for Digital Satellite Imagery

      Band Sequential Format; Band Interleaved by Line Format; Run-length, Encoding Format.

6. Data Products

      Computer compatible tapes; Hard Copy Oul-put; Generation of B/W and FC'Cs; Generally Supported Scales of the Data Products; Information about Annotation of the Products.

UNIT- II

7. Digital Image Processing

      Introduction to Image Analysis; Ground truth; Conversion of Data into Information. Initial Statistical Extraction; Universal and Multivariate Statistics; Histogram and its Significance in RS. Digital Data Processing; Inlroduction : Missing Scan lines; Destripping Methods; Geometric Correction and Registration; Atmospheric Corrections; Illumination and Vie\v angle Effects; Enhancement Techniques; Human visual system; Linear, Histogram Equalization - Gaussian and other Contrast Enhancements: Pseudo colour Enhancement; Edge Enhancement; Image Transformation - Arithmetic Operations; Empirically Based Image Transforms; Principle Component Analysis; Descriminant Analysis; Hue. Saturation and Intensity Transfer; Fourier Transform; Fast Fourier Transform; Vegetation Indices; Filtering Techniques- Introduction: Low Pass Filters; High Pass Filters; Edge Detection; Frequency Domain Kilters; Point and Neighhor-liood Operation; Image Processing Display Systems; Software for Image Processing; Definition of a Gray Level Image.

8. Analysis and Interpretation Techniques

      Introduction; Visual Analysis and Interpretation; Digital Analysis and Image Processing; [mage Classification; Morphological Approaches for Boolean Images and Grey Level Images: Introduction; Concepts of Rrosion, Dilation, Opening. Closing, Edge Detection; Classification, Geometrical, Unsupervised, Supervised; Training Simple Selection. Parallelepiped Classifier. Centroid Classifier, Maximum Likelihood Method, Hybrid Methods, Decision-Tree Classifier; Incorporation of non-spectral features like texture; Use of External Data; Contextual Information; Feature-Sub feature Study; Classification Accuracy.

9. Application of Remote Sensing in the Appraisal and Management of Natural Resources

      Digital Analysis of Satellite Data for Integration, Assessment and Management of Natural Resources such as -Classification of Landforms, Soil, Land use, Forest and Vegetation. Range ofBiomass Estimation. Water Resources Evaluation, River morphology. Reservoir Sedimentation, Rainfall - Runoff. Glacier Inventory, Draught Assessment, Crop Acreage . Forest Coverage, Irrigation System Performance Evaluation, Dam site Investigation, Flood Mapping, Management and Damage Assessment, Mapping of

Potential Groundwater Zones, Coastal Management and Ocean Parameters. Town and Urban Planning, Planning Transportation Routes, Mapping of Waste Lands - Type , Extent, Distribution, Development.

10. Role of RS in the Detection of Temporal Changes

Inlroduction; Change Detection - Nature of Change Detection, Change Detection Algorithms, Image Differencing, Image Rationing Classification Comparisons, Pre-processing to improve Change Detection, Concepts of Parallel Processing and Advanced Techniques in Image Processing with Parallel Computing. Changes in - Morphology of Landforms, Drainage Systems. Water bodies, Saline areas. Land use. Forest Cover.

UNIT - III
GEOGRAPHIC INFORMATION SYSTEM

11. Fundamental Concepts of GIS

Introduction, Various Definitions of GIS. Ordinary' Mapping to Geographic Information Systems; GIS Architecture (CIS Subsystems); Components of a G1S; The Four Ms; GiS Workdow; Fundamental Operations of GIS; Levels of' Use of a GIS; Objective of GIS; The Theoretical Framework of a GIS; Accuracy in a GIS; Data Exploration; Thematic Layering; Levels of Measurement in CIS; Categories of GIS; Topology.

12. GIS Data Models

Introduction; GIS Data Types; Spatial Data Models; Vector Data Model; Raster Data Model; Image Data; Vector GIS and Raster GIS —Advantages and Disadvantages;   Attribute Data Models; Digital Elevation Model; DEM and Geographical Information Systems; Applications of DEM; Data Structure for Continuous Surface Model.

13. Data Acquisition

Data Acquisition in GIS ; Analog Maps; Aerial Photographs; Satellite Imagery; Ground Survey; Global Positioning System; Reports and Publications; Digitizers (for Vector Data Input); Scanners (for Raster Data Input); Digital Mapping by Aerial P hologram merry; Remote Sensing with Satellite Imagery-Rasterisation; Vectorisation;   Advanced Technologies for Primary Data Acquisition; Digital Mapping by Aerial Photogrammetry; Digital Data Acquisition; Data Processing; Digitizing Issues; Functions of GIS; Spatial Data Relationships; Topology; Comparison of Analog Map Vs Digital Map.

14. GIS Spatial Analysis

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

15. Application of GIS

Introduction; Some Applications of GIS; GIS Application Areas and User Segments; Custom CIS Software Application; Important GIS User Interface Issues; Geographic Visualization; Geographic Query Languages; Guidelines for the Preparation of a GIS: Application of GIS for Land Use and Housing Management; Application of GIS in the Assessment of Physical Transformation of an Urban Area; Land use/Land cover in water resources. Surface water mapping and inventory. Rainfall - Runoff relations and runoff potential indices of watersheds, Flood and Drought impact assessment and monitoring. Watershed management for sustainable development and Watershed characteristics

UNIT – IV

SATELLITE POSITIONING SYSTEM

16. The Science of Navigation

Navigation Definition; Navigation-System Overview; Coordinate frames, Sensors, Mechanization equations. Navigation-error sources, Error analysis and correction; Types of Inertia! Systems; Positioning Systems; Complementary Filters.

17. Coordinate Frames and Transformations

Coordinate Frame Definitions; ECEF coordinate systems; Points and Vectors; Vector Transformations; Rotating Reference Frames.

18. Systems Concept

Continuous-Time Systems; Discrete Time Systems; State-Space Analysis; Systems with Random Inputs.

19. Discrete Linear and Nonlinear Kalman Filtering Techniques

Weighted Least Squares (WLS); Kalman Filter; Performance Analysis; Implementation Issues; Numeric Issues; Suboplimal Filtering,

20. Inertia! Navigation

Accelerometers; INS Mechanization Equations; INS Error Equations; INS Augmented Error State Equations; The Earth Geoid and Gravity Model; Single-channel error models; Initialization Techniques; Lever-arm compensation.

21. The Global Positioning System

GPS System Overview; The Mathematics of the GPS; Solution of the Pscudorange F,quations; GPS Error Sources; Geometric Dilution of Precision; Two-Frequency Receivers; Carrier-Phase Observables; Differential GPS; DGPS Implementation Protocol

NOTE

Two questions of 14 marks each will be given from each unit out of which one is to be answered. Fourteen questions of one mark each will be given from entire syllabus which is a compulsory question

TEXT BOOKS

1. Remote Sensing and Geographic Information System, M. Ami Reddy, JN'I'U. Hyderabad. 2001, B.S. Publications. Bank Street, Hyderabad.
2. Remote Sensing and its applications by LRA Karayana, University Press 1999

REFERENCE BOOKS

1. Principles of Remote Sensing, A.N.Patel and Surendra Singh, Scientific Publishers (India), Jodhpur.

2. Remote Sensing and Image Interpretation, T.M.Lillesand and R.W.Kiefer, John Willey and Sons, 1987, Sold at Universal Bookshop, New Delhi-29

3. Manual of Remote Sensing Vol I & II, Robert B. Reeves et al, American Society of Photogrammetry, Falls * Church, 2'"1 Edn 1983.

4. Remote Sensing Principles and Interpretation, F.F. Sabins Jr., W.H. Freeman & Co., San Francisco, 1978

5. Remote Sensing Optics & Optical Systems, Philip N, Stater. Addison Wesley Publishing Co.. Ma, USA.

6. Applied Remote Sensing, C.P. Lo. Longman Inc., New York.

7. Remote Sensing ; Digital Image Analysis, Richards, Sold at Universal Bookshop, New Delhi-29

8. 22, Introductory digital Image Processing: A Remote Sensing Perspective, John RJensen. Printice Hall, 1986

9. Introduction to Satellite Remote Sensing, FI.C.Misra, Sold at: The Managing Director GIS India, Shantinivas, 6-3-1149/2/AI, B.S.Makhta,Begumpet.Hyderabad-16 10. GIS by Kang - tsung chang. TMH Publications & Co..

WATER RESOURCES SYSTEMS ANALYSIS

Lectures / Tutorials   : 4 / 1 Periods/Week   Sessional marks: 30
University Exam. : 3 Hours   University exam. marks: 70

UNIT 1

1. Concept Of System And System Analysis

Introduction, Definition of a system, Types of systems, Systems approach to water resources planning and Management

2. Optimization

Definition, role of optimization models, objective function and constraints, Types of optimization techniques

UNIT II

3. Linear Programming –I

General formulation of Linear Programming models, Graphical Method, Simplex method. Application of Linear Programming in Water Resources.

UNIT III

4. Linear Programming –II

Revised Simplex method, The Dual problem, Sensitivity Analysis, Post optimality Analysis

5. Dynamic Programming

Introduction; Characteristics of a DP problem; Belman's principle of optimality; Forward and Backward recursive dynamic programming, Application of DP to water resources problems.

UNIT IV

6. Simulation

Definition, Concepts of a simulation model, steps in simulation, Application of simulation techniques in water Resources.

7. Water Resources Management

Planning of reservoir system, optimal operation of single reservoir system, allocation of water resources, optimal cropping pattern, Conjuctive use of surface and sub surface water resources.

NOTE

Two questions of 14 marks each will be given from each unit out of which one is to be answered. Fourteen questions of one mark each will be given from entire syllabus which is a compulsory question.

TEXT BOOK

1.Water Resources Systems: S Vedula and PP Majumdar, McGraw Hill Publishers

REFERENCE BOOKS

1.Optimal design of water distribution networks : PP Bahve, Narosa Publishing House

2.Engineering Optimization by SS Rao

ADVANCED FOUNDATION ENGINEERING

Lectures / Tutorials   : 4 / 1 Periods/Week   Sessional marks:
        30
University Exam. : 3 Hours   University exam. marks: 70

UNIT-I

1. **Bearing Capacity Of Shallow Foundations Subjected To Special Loading And Ground Conditions**:
        Effect of eccentric loading, inclined load, inclination of base of foundation, sloping ground;
   Bearing Capacity of stratified soils; Meyerhof analysis, Vesic's analysis and Hansen's analysis.
Settlement Analysis:
        Contact pressure, sources of settlement, uniform settlement, differential settlement, construction
   practices to avoid differential settlement, immediate settlement in sands and clays- Terzaghi and Janbu's
   methods for clays , Schmertmann and Hartman method for cohesionless soils; consolidation settlement.

UNIT-II

3. **Three Dimensional Consolidation**
        3D Consolidation equation; Solution; Vertical sand drain analysis and design
4. **Cantilever Sheet Piles And Anchored Bulkheads & Braced Cuts And Coffer Dams**
        Earth pressure diagram, determination of depth of embedment in sands and clays; Types of
   bracing system, types of coffer dams

UNIT-III

Machine Foundations
         Introduction; Terminology, Design criteria for machine foundation; single degree freedom
   system, free and forced vibration; Methods of analysis of block foundation; Dynamic subsoil
   investigation; Damping; Design and construction of foundation for reciprocating and impact type
   machines; Active and Passive isolation
6 . Caissons And Well Foundations
        Types of caissons, different shapes of well, components of well, functions of wells, sinking of
   wells, lateral stability by Terzaghi analysis

UNIT-IV

7. Foundations In Expansive Soils
        Problems associated with expansive soils, Swelling potential, percent swell, swell pressure-
   factors affecting, methods of measurement of swell pressure ; Prediction of heave, factors affecting
   heave, methods of prediction of heave; IS Classification of expansive soils, Under- reamed pile
   foundations, Sand cushion method, CNS layer method, granular pile-anchor technique, lime stabilization
   of expansive soils, Moisture control in expansive clays- Horizontal and vertical moisture barriers, sub-
   surface drainage and surface drainage, pre-wetting and ponding.

NOTE
*Two questions of 14 marks each will be given from each unit out of which one is to be answered. Fourteen
questions of one mark each will be given from entire syllabus which is a compulsory question.*

TEXT BOOK

1. Principles of Foundation Engineering(1999), B.M. Das., PWS Publishing Company, 4th edition, Singapore
2. Hand book of Machine foundations – Srnivasulu and Vaidyanathan.

REFERENCES

1. Foundation Analysis & Design by Bowles, J.E., McGraw- Hill Book Company.
2. Basic and Applied Soil Mechanics by Gopal Ranjan and ASR Rao, Wiley Eastern Limited, New Delhi.
3. Foundations of Expansive Soils, F.H. Chen. Elsevier Publications.
4. Geotechnical Engineering by SK Gulati & Manoj Datta, Tata McGraw- Hill Publishing Company
        Limited.
        Soil dynamics and machine foundations – Swami Saran,

CODE : CE451
LABORATORY

TERM PAPER
(Common to all branches)

Practicals : 3 Periods/Week   Sessional marks: 25

University exam.: 3 Hrs.   University Exam. marks : 50

Description

      The Term Paper is a precursor to the project work done in the 2nd semester of the final year B.Tech Programme. The paper may be of 8-10 (A4 size) in length and follows **the standard IEEE/Technical Journal Format.**

Purpose

      The Term Paper helps to supplement the final year Project Work of the B.Tech students. It helps to identify their Reserch area/topic and complete the groundwork and preliminary research required for it comfortably. It trains the students to make use of Research Tools and Material available both in print and digital formats.

Procedure

      The topic of Term Paper is chosen from the B.Tech curriculum. Based on the topic, a hypothesis is to be made by the **team of students**, under the guide. The hypothesis may be a null hypothesis also. The team students are then required to collect literature and support information for their term paper from Standard Reference Books, Journals, and Magazines - both printed and online. Each student should refer to a minimum of 5 reference sources outside their prescribed text books. The students also present their papers with the help of Power Point slides / OHP.

The Term Paper contains
  - The Aim and Objective of the study
  - The need for Rationale behind the study
  - Identify the work already done in the field
  - Hypothesis and Discussion
  - Conclusion
  - Appendix with support data (Illlustrations, Tables, Graphs, etc.)

Page Limit : minimum of eight pages

Last date of submission of the Draft : One week after the 1st Mid Term Exams

Last date of submitting the Term Paper : One week before commencement of 2nd Mid Term Exams
Date of Seminar : During the Lab Internal Exam.

Method of Evolution :   1. Day to day work   - 5 marks
                               2. Seminar - I   - 5 marks
                               3. Term Paper Report   - 5 marks
                               4. Seminar - II   - 10 marks
                                       Total   25 marks

CODE : CE452
LABORATORY

COMPUTER AIDED DETAILING OF STRUCTURES

Practicals   : 3 Periods/Week   Sessional marks: 25

University exam.: 3 Hrs.   University Exam. marks : 50

Students are required to detail different structural elements using software packages like Auto CAD/Micro station/Rivet etc.,

UNIT – I

(At least SEVEN of the following)   *4 lab classes*

1. Detailing of continuous beam with both ends fixed
2. Detailing of continuous beam with one end overhang.
3. Detailing of pile cap
4. Detailing of isolated footing.
5. Detailing of two way and one way slab.
6. Detailing of Flat slab interior panel.
7. Detailing of cantilever Retaining wall.
8. Typical detailing of R.C.C footing with steel column.

UNIT – II

(At least THREE of the following)   *4 lab classes*

1. Detailing of beam to column framed connection (using bolts).
2. Detailing of beam to column moment resistant connection (using bolts).
3. Detailing of welded plate girder.
4. Detailing of welded column base

UNIT – III

(At least ONE of the following)   *4 lab classes*

1. Typical detailing of different elements in Two-storied R.C.C.Framed Building

2. Typical detailing of Industrial steel building.

CODE : CE453
LABORATORY

TRANSPORTATION ENGINEERING LABORATORY

Practicals   : 3 Periods/Week   Sessional marks: 25
University exam.: 3 Hrs.   University Exam. marks : 50

Note: A minimum of twelve (12No) shall be done and recorded

A. Tests On Aggregates

1. Aggregate Crushing value test.

2. Aggregate impact value test.

3. Los Angele's abrasion test.

4. Deval's attrition value test.

5. Shape test a) Flakiness index test b) Elongation index test c) Angularity number test. .

6. Specific gravity Test.

B. Tests On Bituminous Materials

7. Penetration test.

8. Softening point test.

9. Flash and fire point test.

10. Ductility test.

11. Viscosity test.

12. Bitumen Extractions Test.

13. Specific gravity of Bitumen.

C. Test On Bituminous Mixes

14. Marshall stability test.

D. Test On Soil Subgrade

15. California bearing ratio test.

CODE: CE 421

TRANSPORTATION ENGINEERING – II

Lectures : 4 Periods/Week   Sessional marks : 30
University Exam. : 3 Hours   University exam. marks: 70

UNIT - I

RAILWAY ENGINEERING

1. **Introduction**
   Role of railways in transportation; Comparison of railway and highway transportation; Development of railway systems with particular reference to India; Classification of railways.

2. **Railway Track**
   Permanent way: Gauges in Railway track, Railway track cross – sections; Coning of wheels.

3. **Rails & Rail Joints**
   Functions of rails; Requirements of rails; Types of rails sections; Standard rail sections; Length of rails; Rail failures; Wear on rails.

   Requirements of an ideal joint; Types of rail joints; Welding of rails.

4. **Sleepers**
   Functions of sleepers; Requirements of sleepers; Classification of Sleepers – Timber sleepers, Metal sleepers & Concrete sleepers; Comparison of different types of sleepers.

5. **Fish Plates**
   Fish plates, section of fish plates, failure of fish plates.

6. **Ballast**
   Functions and requirements of ballast; Types of ballast; Renewal of ballast.

UNIT – II

7. **Geometric Design Of Track**
   Necessity; Gradients & Gradient Compensation; Elements of horizontal alignment; Super elevation; Cant deficiency and cant excess; Negative Super elevation; Length of Transition Curve, Length of vertical curve.

8. **Points And Crossings**
   Functions of components of turnout; Crossings.

9. **Stations And Yards**
   Site selection for railway station; Requirements of railway station; Classifications; Station yards; Level crossing.

10. **Signalling**
    Objects of signaling; Classification of signals; Controlling- absolute block system. Standards of inter locking

UNIT – III

AIRPORT PLANNING AND DESIGN

11. Introduction
    Development of air transportation system with particular reference to India; Aeroplane components; Air–craft characteristics.

12. Airport planning and layout
    Selection of site; Apron; Hanger; Typical airport layouts; Airport marking; Airport lighting; Drainage systems.

13. Airport Obstruction
    Zoning laws; Classification of obstructions; Imaginary surfaces; Approach zone; Turning zone.

14. Runway Design
    Runway orientation; Basic runway length; Corrections for elevation; Temperature and gradient; Runway geometric design.

15. Specifications For Structural Design Of Airport Pavements
    Design factors methods for flexible and rigid pavements; LCN system of pavement design.

UNIT – IV

DOCKS AND HARBOUR ENGINEERING

16. Introduction
    Types of water transportation; Economics and advantages of water transportation.

17. Planning And Design Of Port Facilities
    General layout and design considerations; Pier and wharf structures; Fender systems; Transit sheds and Apron; Container ports; Docks; Dredging; Light Houses.

NOTE
Two questions of 14 marks each will be given from each unit out of which one is to be answered. Fourteen questions of one mark each will be given from entire syllabus which is a compulsory question.

TEXT BOOKS

UNIT I & II: Railway Engineering by S.C.Saxena and S.Arora Dhanpat Rai & sons.
UNITIII & IV: Airport Planning and Design by S. K. Khanna & M. G. Arora; Nemchand & Bros, Roorkee.

REFERENCE BOOKS

1. Railway Engineering by M.M.Agarwal; Prabha & Co, New Delhi.
2. Airport Engineering by G.V.Rao; Tata Mc Graw Hill, New Delhi.

CODE: CE 422

CONSTRUCTION MANAGEMENT

Lectures   : 4 Periods/Week   Sessional marks
        : 30
University Exam. : 3 Hours   University exam. marks:
      70

UNIT – I

1. **Introduction**
        Construction projects; Project management; Main causes of project failure.
2. **Planning And Scheduling**
     Steps involved in planning; Objectives; Principles; Advantages; Limitations; Stages of planning;

   Scheduling, Preparation of construction schedules; Methods of scheduling; Bar charts; Mile stone charts;

   Controlling; Job layout; Factors affecting job layout; Project work break down; Activities involved;

   Assessing activity duration.

UNIT – II

3. **Project Management Through Networks**
        Objectives of network techniques; Fundamentals of network analysis; Events; Activities; Dummies;

   Types of networks; Choice of network type; Advantages of network techniques over conventional

   techniques.

4. **Program Evaluation And Review Technique (PERT)**
     Introduction; Time estimates; Earliest expected time; Latest allowable occurrence time; Slack;

   Critical path; Probability of completion time for a project.

5. **Critical Path Method (CPM)**
        Introduction; Difference between CPM and PERT; Earliest event time; Latest event time; Activity
   time; Float; Critical activities and critical path.
6. **Cost Control**
     Direct cost; Indirect cost; Total project cost; Optimization of cost through networks; Steps involved

    in optimization of cost.

UNIT – III

7. **Resource Management (Manpower)**
   Introduction; Resource smoothing; Resource levelling; Establishing workers productivity.

8. **Resource Management (Materials)**

   Objectives of material management; Costs; Functions of material management department; ABC

classification of materials; Inventory of materials; Material procurement; Stores management.

9. **Resource Management (Machinery)**

   Classification of construction equipment; Earth moving equipment; Excavation equipment; Hauling

equipment, Earth compaction equipment; Hoisting equipment; Concreting plant and equipment; Time

and motion study; Selection of equipment– Task consideration, Cost consideration; Factors affecting the

selection; Factors affecting cost owning and operating the equipment; Equipment maintenance.

UNIT – IV

10. *Quality Control*

   Importance of quality; Elements of quality; Organization for quality control; Quality assurance

 techniques; Documentation; Quality control circles; Total quality management; ISO – 9000.

11. **Safety Management**

   Accident prevention programme; Immediate attention in case of accident; Approaches to improve

safety in construction; Safety benefits to employers, employees and customers; Prevention of fires in

construction industries; Fault free analysis; Safety information system; Safety budgeting.

12. **Management Information System In Construction**

   Communication tools; Management of information with computer; Project management information

system concept; Computer as a decision making tool; Decision making by data base enquiry system;

Knowledge based expert system in construction.

13. **Project Economics**

   Modern school of thoughts; Business cycle; Capital; Assets; Money; Bond; Equity; Real assets;

Marginal productivity of capital; Annuity; Profit; Discounted cash flow analysis; Payback period; Return

on investment; Benefit cost ratio.

NOTE
*Two questions of 14 marks each will be given from each unit out of which one is to be answered. Fourteen
questions of one mark each will be given from entire syllabus which is a compulsory question.*
TEXT BOOKS

1. Construction Engineering and Management by Dr. S. Seetharaman; Umesh Publications, Nai Sarark,
   Delhi.
2. Fundamentals of PERT/CPM and Project Management by S. K. Bhattacharjee; Khanna Publishers, Nai
   Sarak; Delhi.

REFERENCE BOOKS

1. Construction Management & Planning by B. Sengupta & H. Guha; Tata Mc Graw – Hill Publishing Co. Ltd., New Delhi.
2. Construction Planning, Equipment & Methods by Peurifoy R. L.; Mc Graw – Hill International Book Company.
3. PERT & CPM Principles and applications by L. S. Srinath; Affiliated East West Press.

BRIDGE ENGINEERING

Lectures / Tutorials   : 4 / 1 Periods/Week   Sessional marks:
          30
University Exam. : 3 Hours   University exam. marks: 70

(Working stress method is to be adopted for all designs)

UNIT – 1
1. **Introduction & Investigation For Bridges**
   Components of a Bridge; Classification; Standard Specifications; Need for Investigation; Selection of Bridge Site; Preliminary Data to be Collected; Preliminary Drawings; Determination of Design Discharge; Economical Span; Location of Piers and Abutments; Vertical clearance above HFL; Scour depth; Traffic Projection; Choice of Bridge type; Importance of Proper Investigation.

UNIT – II
2. **Concrete Bridges**
   Various types of bridges; I. R. C. Specifications for road bridges.
3. **Culverts**
   Design of R. C. slab culvert.

UNIT – III
4. **T – Beam Bridge**
   Pigeaud's method for computation of slab moments; Courbon's method for computation of moments in girders; Design of simply supported T – beam bridge.

UNIT – IV

5. **Sub Structure For Bridges**
   Pier and abutment caps; Materials for piers and abutments; Design of pier; Design of abutment; Backfill behind abutment; Approach slab.

UNIT – V
6. **Bearings For Bridges**
   Importance of bearings; Bearings for slab bridges; Bearings for girder bridges; Expansion bearings; Fixed bearings; Design of elastomeric pad bearing.
7. **Foundations For Bridges**
   Scour at abutments and piers; Grip length; Types of foundations; Design of well foundation.

NOTE
   Two questions of 14 marks each will be given from each unit, out of which one is to be answered.

TEXT BOOK
1. Essentials of Bridge Engineering by Dr. Johnson Victor; Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.

FINITE ELEMENT METHODS IN CIVIL ENGINEERING

Lectures / Tutorials : 4 / 1 Periods/Week   Sessional marks: 30
University Exam. : 3 Hours   University exam. marks: 70

Unit -I
1. Basic Principles
        Equilibrium equations; Linear strain-displacement relations; Linear constitutive relations– Plane stress and plane strain; Potential energy; Principle of stationary potential energy

2. Properties of elements in one- and two- dimensions
        Types of elements ; Displacement models; Relation between nodal degrees of   freedom and generalized coordinates; Convergence requirements –Compatibility   requirement, Geometric invariance, Natural coordinate systems; Shape functions for   for bar, beam and constant strain triangle elements; Element strains and stresses

Unit -II

3. Element stiffness matrix and nodal load vector
        Derivation of expressions for element stiffness matrix and element nodal load vector   using Principle of stationary potential energy ; Evaluation of stiffness matrices and nodal load vectors for bar, beam and constant strain triangle elements

Unit -III

3. Direct Stiffness method and Solution Technique
        Assemblage of elements–Obtaining Global stiffness matrix and Global load vector;   Governing equilibrium equation for static problems; Application of boundary conditions; Solution to resulting simultaneous equations using Gauss elimination method
4. Solution to one- and two- dimensional problems
        Solution to plane-truss , plane-frame , plane-stress and plane-strain problems

Unit -IV

5. Soil and Rock Mechanics
        Application of the finite element method in soil and rock mechanics – Loading, Non- uniform material properties, Tension in soils and rocks; Constitutive laws; Elastic- plastic behaviour
6. **Inviscid and incompressible fluid flows**
        Finite element equations using Galerkin's Approach ; Introduction; Potential function   formulation; Finite element solution using Galerkin's Approach; Stream function formulation

NOTE
Two questions of 14 marks each will be given from each unit out of which one is to be answered. Fourteen questions of one mark each will be given from entire syllabus which is a compulsory question.

TEXT BOOKS
1. Finite element analysis by C.S.Krishnamurthy, Tata McGraw-Hill Publishing Company Ltd., 1994.
2. Introduction to the finite element method by C.S. Desai and J.F.Abel, CBS Publishers and distributors, 1987.
3. The finite element method in engineering by S. S.Rao, Butterworth-Heinemann, New Delhi, 1999.

GROUND IMPROVEMENT TECHNIQUES

Lectures / Tutorials   : 4 / 1 Periods/Week   Sessional marks:
        30
University Exam. : 3 Hours   University exam. marks: 70

UNIT-I

1. **Introduction**
    Need for engineered ground improvement, classification of ground modification techniques; suitability, feasibility and desirability of ground improvement technique; objectives of improving soil.
2. **In-situ densification methods in granular soils**
    Introduction, Vibration at the ground surface, impact at the ground surface, vibration at depth, impact at depth.

UNIT-II

3. **In-situ densification methods in cohesive soils**
    Introduction, preloading, sand drains, sand wicks, band drains, stone and lime columns.
4. **Reinforced earth**
    Principles, components of reinforced earth, governing design of reinforced earth walls, design principles of reinforced earth walls.

UNIT-III

5. **Geotextiles**
    Introduction, types of geotextiles, functions and their applications, tests for geotextiles, geogrids and its functions.
6. **Mechanical Stabilization**
    Soil aggregate mixtures, properties and proportioning techniques, soft aggregate stabilization, compaction, field compaction control.

UNIT-IV

7. **Cement Stabilization**
    Mechanism, factors affecting and properties, use of additives, design of soil cement mixtures, construction techniques.
8. **Lime and Bituminous Stabilization**
    Type of admixtures, mechanism, factors affecting, design of mixtures, construction methods.

NOTE

Two questions of 14 marks each will be given from each unit out of which one is to be answered. Fourteen questions of one mark each will be given from entire syllabus which is a compulsory question.

TEXT BOOK

1. Hausmann M.R(1990) Engineering Principles of ground modification, McGraw-Hill International edition.

REFERENCES

1. Ground improvement Techniques, P.Purushothama Raju, Laxmi Publications Pvt. Ltd., New Delhi.
2. Robert M. Koerner, Designing with Geosynthatics, Prentice Hall New Jercy, USA.
3. Construction and Geotechnical methods in Foundation Engineering, R.M.Koerner, McGraw-Hill Book Company.
4. Current Practices in Geotechnical Engineering Vol.-I, Alam Singh and Joshi, International Book Traders, New Delhi.

ENVIRONMENTAL IMPACT ASSESSMENT AND MANAGEMENT

Lectures / Tutorials   : 4 / 1 Periods/Week   Sessional marks:
        30
University Exam. : 3 Hours   University exam. marks: 70

UNIT – I
Chapter 1
        Basic concepts of EIA: Initial Environmental Examination; Elements of EIA; Factors affecting EIA; Impact evaluation and analysis; Preparation of Environmental Base map; Classification of Environmental parameters.
Chapter 2
        EIA Methodologies; Introduction; criteria for the selection of EIA Methodology; EIA Methods: Ad-hoc methods, Matrix methods, Network method, Environmental media quality index method; Overlay methods; Cost/benefit Analysis.

UNIT – II
Chapter 3
        Impact of Developmental Activities and Land Use: Introduction and Methodology for the assessment of soil and ground water; Delineation of study area; Identification of activities.
Chapter 4
        Procurement of relevant soil quality; Impact prediction; Assessment of Impact significance; Identification and Incorporation of mitigation measures.
Chapter 5
        EIA in surface water, Air and Biological Environment: Methodology for the assessment of Impacts on surface water environment; Air pollution sources; Generalized approach for assessment of Air pollution Impact.

UNIT – III
Chapter 6
        Assessment of Impact of Development activities on vegetation and wildlife; Environmental Impact of Deforestation; Causes and effects of deforestation.
Chapter 7
        Environmental Audit and Environmental legislation: Objectives of Environmental Audit; Types of Environmental Audit; audit protocol; stages of Environmental Audit; On-site activities; Evaluation of Audit data and preparation of Audit report.

UNIT – IV
Chapter 8
        Post Audit activities; The Environmental Pollution Act, The Water Act; The Air (Prevention and Control of Pollution) Act; Mota Act; Wild life Act.
Chapter 9
        Case Studies and preparation of Environmental Impact Assessment statement for various industries.

NOTE
Two questions of 14 marks each will be given from each unit out of which one is to be answered. Fourteen questions of one mark each will be given from entire syllabus which is a compulsory question.

TEXT BOOKS
1. Environmental Impact Assessment Methodologies by Y. Anjaneyulu; B.S. Publication, Sultan Bazar, Hyderabad.
2. Environmental Science and Engineering by J. Glynn and Gary W. Hein Ke, Prentice Hall Publishers.
REFERENCE BOOKS
1. Environmental Science and Engineering by Suresh K. Dhameja, S.K. Kataria & Sons Publications, New Delhi.
2.   Environmental Pollution and Control by Dr. H.S. Bhatia, Galgotia Publications Pvt. Ltd. Delhi

ADVANCED REINFORCED CONCRETE DESIGN

Lectures / Tutorials   : 4 / 1 Periods/Week   Sessional marks:
       30
University Exam. : 3 Hours   University exam. marks: 70

UNIT – I

1. **Grid Floors**
       Introduction, Analysis and Design of Grid Floors
2. **Raft Foundation**
       Introduction**,** Analysis and Design of Raft Foundation using grid beams

UNIT – II

3. **Circular water tanks:**
       Introduction, Underground circular water tanks, on ground circular water tanks
4 **Desing Of Concrete Corbels**

UNIT – III

5. **Elevated water tanks**:
       Introduction, Analysis & Design of INTZ Tanks including staging

UNIT – IV

6. **Bunkers And Silos**
       Design of rectangular and circular bunkers; design of silos
UNIT – V
7. **Yieldline Theory**
        Introduction; assumptions; analysis by virtual work method; analysis by equilibrium method; analysis and design of simply supported square, rectangular and circular slabs.
8. **Introduction To Deep Beams**
        Parmeters influencing design; IS code provisions; design of simply supported and continuous deep beams.

NOTE:
     Two questions of 14 marks each will be given from each unit, out of which one is to be answered.
TEXT BOOK
1.Advanced Reinforced Concrete Design, by N.Krishna Raju CBS publishers

REFERENCE BOOKS
1. Reinforced Concrete Volume II by H.J Shah, Charotar

2.   Advanced Reinforced Concrete Design by Varghese,PHI

3. Advanced Reinforced Concrete Design (vol-II) by S. S. Bhavikatti, New age international

CODE: CE 424 /2   **ELECTIVEIII**

PAVEMENT ANALYSIS AND DESIGN

Lectures / Tutorials   : 4 / 1 Periods/Week   Sessional marks: 30

University Exam. : 3 Hours   University exam. marks: 70

UNIT-1

Types of pavement-factors affecting design of pavements-wheel loads-type pressure-   contact pressure, Material characteristics-Environmental and other factors.

Stresses in rigid pavement- layered systems concept-one layer system-   Boussinesq Two layer system – Burmister.

UNIT-II

Stress in rigid pavement-relative stiffness of slab, modulus of sub-grade reaction-   stresses due to warping, stresses due to loads, stresses due to friction. Pavement design: IRC method of flexible pavement design.

UNIT-III

IRC method of rigid pavement design –joints-Dowel & Tie bar.
Highway material tests-Bitumenous material tests.

UNIT-IV

Highway construction –Gravel, WBM, Bituminous pavements types- cement concrete roads.
Failure in Rigid & Flexible pavements, Highway maintenance-Routine-periodic- special repairs.

NOTE

Two questions of 14 marks each will be given from each unit out of which one is to be answered. Fourteen questions of one mark each will be given from entire syllabus which is a compulsory question.

TEXT BOOKS
1.   Highway Engineering-S.K.Khanna & C.J.Justo, Nemchand & Bros.,7ᵗʰ Edition (2000).
2.   Principles and Practices of highway Engineering – Dr.L.R.Kadiyali & Dr.N.B.Lal – Khanna publishers- (2003).

REFERENCE
1.Principles of Pavement Design-Yoder & Wit Zorac- John Willey & Sons.

INDIAN STANDARD CODES
1.   IRC Code for Flexible pavement-IRC-37-2001.
2.   IRC Code for Rigid pavement-IRC-58-2002.

ADVANCED ENVIRONMENTAL ENGINEERING

Lectures / Tutorials   : 4 / 1 Periods/Week   Sessional marks: 30
University Exam. : 3 Hours   University exam. marks: 70

UNIT – I

1. Stream Sanitation
        Introduction; Self-purification in streams; factors affecting self-purification; Dissolved Oxygen Balance in streams; Streeter-Phelps's Dissolved Oxygen Model; Zones of Self-purification; Impact of pollutants on stream waters and usage of stream water with special reference to flora and fauna.
2. Low Cost Wastewater Treatment Systems
        Introduction; Stabilization ponds (including design aspects); Aerated lagoons; Oxidation ditch; Extended aeration process.

UNIT – II

3. **Industrial Wastewater Treatment**
        Introduction to Industrial Wastewater treatments.
        Sugar Plant: Quantity of liquid waste; Characteristics of liquid waste; Methods of its treatment and disposal.
        Dairy Industry: Quantity of liquid waste; Characteristics of liquid waste; Methods of its treatment and disposal.
        Pulp and Paper Industry: Quantity of liquid waste; Characteristics of liquid waste; Methods of its treatment and disposal.

UNIT – III

4. New Concepts In Biological Waste Treatment
        Introduction; Nitrogen removal by biological nitrification and de-nitrification; Phosphate removal from the activated sludge process; Rotating Disc Biological Contactor; Anaerobic filters; U-Tube aeration systems.
5. Sources And Classification Of Air Pollution
        Stationary and mobile sources; Primary and secondary pollutants; Natural contaminants; Particulate matter; Aerosols; Gaseous pollutants.
6. Effects Of Air Pollution
        Global Effects: Global warming; Ozone depletion; Acid rains; Effects of air pollutants on human health; Effects on plants; Economical effects.

UNIT – IV

7. Meteorology And Air Pollution
        Atmospheric stability and temperature inversions; Maximum Mixing Depth; Wind direction and speed; Plume behaviour; Gaussian Dispersion Model; Plume rise; Wind rose.
8. Control Of Air Pollution
        Objectives; Types of collection equipment: Settling chamber; Inertial separators; Cyclones; Filters; Electrostatic Precipitators; Scrubbers.
9. Noise Pollution
        Introduction; Levels of noise; Noise rating systems; Measurement of noise; Sources of noise and their noise levels; Acceptable noise levels; Effects of noise; Control of noise.

NOTE
Two questions of 14 marks each will be given from each unit out of which one is to be answered. Fourteen questions of one mark each will be given from entire syllabus which is a compulsory question.

TEXT BOOKS

1. Wastewater Treatment by M.N. Rao and A.K. Datta; Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.

2. Wastewater Engineering, Treatment, Disposal and Reuse by Metcalf & Eddy Inc.; Tata Mc Graw – Hill Publishing Co. Ltd., New Delhi.

3. Air Pollution by M.N. Rao and H.V.N. Rao; Tata Mc Graw – Hill Publishing Co. Ltd., New Delhi.

REFERENCES

1. Environmental Pollution Control Engineering by C.S. Rao; Wiley Eastern Ltd., New Delhi.

2. Water Supply and Wastewater Disposal by G.M. Fair et all; John Wiley & Sons.

3. Sewage Disposal and Air Pollution Engineering by S.K. Garg; Khanna Publications, Delhi.

4. Sewage and Sewage Treatment by S.K. Kshirasagar; Roorkee Publishing House, Roorkee.

GROUND WATER DEVELOPMENT AND MANAGEMENT

Lectures / Tutorials   : 4 / 1 Periods/Week   Sessional marks:
        30
University Exam. : 3 Hours   University exam. marks: 70

UNIT – I

1. Introduction
        Ground Water Occurrence: Ground water hydrologic cycle, origin of ground water, rock properties effecting ground water, vertical distribution of ground water, zone of aeration and zone of saturation, geologic formation as Aquifers, types of aquifers, porosity, Specific yield and Specific retention.

2. Ground Water Movement
        Permeability, Darcy's law, storage coefficient. Transmissivity, differential equation governing ground water flow in three dimensions derivation, Ground water flow contours their applications.

UNIT – II

3. Analysis Of Pumping Test Data
        i.) Steady flow groundwater flow towards a well in confined and unconfined aquifers – Dupit's and Theim's equations, Assumptions, Formation constants, yield of an open well interface and well tests.
        ii) Unsteady flow towards a well – Non equilibrium equations – Theis solution – Jocob and Chow's simplifications, Leaky aquifers.

UNIT – III

4. Surface And Subsurface Investigation
        Surface methods of exploration – Electrical resistivity and Seismic refraction methods. Subsurface methods – Geophysical logging and resistivity logging. Aerial Photogrammetry applications along with Case Studies in Subsurface Investigation.

5. Artificial Recharge Of Ground Water
        Concept of artificial recharge – recharge methods, relative merits. Applications of GIS and Remote Sensing in Artificial Recharge of Ground water along with Case studies.

UNIT – IV

        Saline Water Intrusion in aquifer: Occurrence of saline water intrusions, Ghyben-Herzberg relation, Shape of interface, control of seawater intrusion.
        Groundwater Basin Management: Concepts of conjunction use, Case studies.

NOTE
        Two questions of 14 marks each will be given from each unit out of which one is to be answered. Fourteen questions of one mark each will be given from entire syllabus which is a compulsory question.

TEXT BOOKS

1.   Groundwater by H.M. Raghunath, Wiley Eastern Ltd.

2.   Ground water Hydrology by David Keith Todd, John Wiley & Son, New York

REFERENCES

1.   Groundwater by Bawvr, John Wiley & sons.

2.   Groundwater Syatem Planning & Managemnet – R. Willes & W.W.G. Yeh, Printice Hall.

CODE : CE461
LABORATORY

<div align="center">

QUANTITY ESTIMATION & PROJECT MANAGEMENT
</div>

Practicals   : 3 Periods/Week   Sessional marks: 25

University exam.: 3 Hrs.   University Exam. marks : 50

Note: A minimum of twelve (12No) shall be done and recorded

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UNIT - I
</div>

Quantity Surveying

 *(At least **SIX** of the following using softwares like MS Excel/ Qty./Road Estimate/Super Rate analysis etc.)*

1. Quantity estimation of a single storey residential building (different items).

2. Cost estimation of a single storey residential building.

3. Quantity estimation of a B.T.Road(different items).

4. Cost estimation of a B.T.Road.

5. Quantity estimation of a Canal (different items).

6. Cost estimation of a Canal.

7. Find out the labour requirement and preparing the Rate Analysis for different items of   work.

        a) C.C   b) R.C.C   c) Brick work   d) Flooring

<div align="center">

UNIT - II
</div>

Project Management

 *(Any **THREE** of the following using softwares like MS Project / Primavera etc.)*

1. Preparing the Project management report for a single storey residential building/Road/Canal by using the Bar Chart/Mile stone chart.

2. Preparing the Project management report for a single storey residential building by using the network technique (PERT/CPM).

3. Preparing the Project management report for a B.T.Road by using the network technique (PERT/CPM).

4. Preparing the Project management report for a Canal by using the network technique (PERT/CPM).

5.

<div align="center">

UNIT – III
</div>

*(At least **THREE** of the following by using sof wares like MS Excel)*

2. Quantity estimation of RCC roof slab and preparing schedule of bars

3. Quantity estimation of RCC beam and preparing schedule of bars

4. Quantity estimation of RCC Column with foundation footing and preparing schedule of bars

5. Quantity estimation of RCC retaining wall and preparing schedule of bars

SURVEYING – I

Lectures / Tutorials   : 4 / 1 Periods/Week   Sessional marks: 30

University Exam. : 3 Hours   University exam. marks: 70

UNIT – I

9. **Surveying & Measurements**

Surveying – History; Definition; Classification; Principles of surveying; Plan and map; Measurements – Basic Measurements and methods; Scale – Scales used for Maps and plans.

10. **Chain Surveying**(*Linear Measurements*)

Different methods; Ranging out; Chaining a line on a flat ground; Chaining on an uneven or a sloping ground; Chain & Tape corrections; Degree of accuracy.

Principles of chain surveying; Basic definitions; Well-Conditioned Triangle; Instruments used in chain survey; Field book, Field work; Offsets, Cross Staff survey; Obstacles in chain survey;

UNIT – II

11. **Compass And Theodolite Surveying**(**Angle Measurements**)

Compass: Types, Bearings and Angles; Prismatic compass; Magnetic Dip and   Declination; Local attraction; Chain and Compass traversing(Free or Loose needle method); Field work; Plotting of a compass traverse; Errors in Compass surveying; Limits of accuracy.

12. **Theodolite**

Vernier Thedolite: Basic definitions; Fundamental lines and desired relations; Temporary adjustments; Measurement of a horizontal angle; Repetition and Reiteration methods of horizontal angle measurement. Measurement of vertical angle; Sources of errors in Theodolite survey.

UNIT – III

13. **Simple Leveling**

Basic definitions; Curvature and Refraction; Different methods of leveling; Classification of direct leveling methods; Levels –Dumpy level, Tilting level, Auto level; Sensitivity of a Level tube; Leveling staff; Level field book; Profile leveling; Cross sectioning; Reciprocal leveling; Sources of errors in leveling; Degree of Precision.

14. **Plane Table Surveying**

Plane table and its accessories; setting up; Plane tabling methods, Resection by trial and error method. Errors in plane tabling;

UNIT – IV

15. **Contouring**

Methods of representing Relief; Contouring; contour interval; Characteristics of contours; Methods of locating contours; Direct and indirect methods contouring; Interpolation and sketching of contours; Location of a contour gradient – Ceylon Ghat Tracer; Uses of contour maps; Contouring in plane table survey – Indian Pattern Tangent Clinometer.

16. Errors In Surveying

Accuracy; Precision; Sources of errors; Types of errors and their propagation; Measures of precision; weights of measurements;

NOTE

Two questions of 14 marks each will be given from each unit out of which one is to be answered. Fourteen questions of one mark each will be given from entire syllabus which is a compulsory question.

TEXT BOOK:

1. Surveying Vol. 1 by Dr. K. R. Arora; Standard Book House;
2. Plane Surveying by AM Chandra, New Age International (P) Ltd.

CODE: CE214

SOLID MECHANICS – I

Lectures / Tutorials   : 4 / 1 Periods/Week   Sessional marks: 30
University Exam. : 3 Hours   University exam. marks: 70

UNIT-I
9. Stress

Introduction; Method of sections; Definition of stress; Normal stresses in axially loaded bars; Stresses ion inclined sections in axially loaded bars; Shear stresses ; Analysis for normal and shear stresses; allowable stress and factor of safety.

10. Strain

Introduction; Normal strain; Stress-strain relationships; Hooke's law; Poisson's ratio; Thermal strain and deformation; Deformation of axially loaded bars; statically indeterminate axially loaded bars; Stress-strain relationship for shear

11. Generalized Hooke's law and Pressure vessels

Generalized Hooke's law for isotropic materials; Relationship between Modulus of elasticity and Modulus of rigidity; Dilatation and Bulk modulus; Thin-walled pressure vessels **–** Cylindrical and spherical vessels

UNIT-II
12. Internal forces in beams

Introduction; Diagrammatic conventions for supports and loads; Calculation of beam reactions; Application of method of sections; Shear force in beams; Bending moment in beams; Shear force and bending moment diagrams; Differential equations of equilibrium for a beam element

UNIT-III
13. Normal stresses in beams

Introduction; Basic assumptions; The elastic flexure formula ; application of flexure formula; Unsymmetric bending **–** Bending about both principal axes of a beam with symmetric cross section.

UNIT-IV
14. Shear stresses in beams

Introduction; Shear flow; The shear stress formula for beams; Shear stress in beam flanges; Shear centre

15. Torsion

Introduction; Application of the method of sections; Torsion of circular elastic bars **–** Basic assumptions, the torsion formula, Design of circular bars in torsion for strength, Angle of twist of circular bars

NOTE

Two questions of 14 marks each will be given from each unit out of which one is to be answered. Fourteen

questions of one mark each will be given from entire syllabus which is a compulsory question.

TEXT BOOKS

2. Engineering mechanics of solids by E.P.Popov, Prentice Hall of India, 2005.

REFERENCE

1. Elements of strength of materials by S.P.Timoshenko and D.H.Young, Affiliated East-West Press Pvt.Ltd., 2005.
2. Strength of materials by S. S. Bhavikatti, Vikas Publishing House Pvt. Ltd., 1998.

Strength of materials by R. K. Bansal, Lakshmi Publications (P) Ltd., 2007