

UNIVERSITY OF DELHI

Syllabus **of** **B.E. Civil Engineering** **at** **Delhi College of Engineering**

Semester I
Semester II
Semester III
Semester IV
Semester V
Semester VI
Semester VII
Semester VIII



Syllabus applicable for students seeking admissions to the B.E.
(Civil Engineering Course)

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FACULTY OF TECHNOLOGY

UNIVERSITY OF DELHI

NEW SCHEME OF EXAMINATION

1. There shall be the following four year Degree Courses under the Faculty of Technology :—

- (i) Bachelor of Engineering (Electrical)
- (ii) Bachelor of Engineering (Electronics and Communication)
- (iii) Bachelor of Engineering (Mechanical)
- (iv) Bachelor of Engineering (Civil)
- (v) Bachelor of Engineering (Production and Industrial)
- (vi) Bachelor of Engineering (Polymer Science and Chemical Technology)
- (vii) Bachelor of Engineering (Computer)
- (viii) Bachelor of Engineering (Instrumentation and Control)

2. In addition to the conditions laid down in Ordinance T, a candidate seeking admission to any of the above Courses of study for the Bachelor's Degree should satisfy the following conditions.

- (a) Educational Qualifications—

A candidate passing any one of the following examinations and securing 60 per cent or more marks in the aggregate of Physics, Chemistry and Mathematics shall be eligible for admission to the first Semester of Bachelor of Engineering Course provided he/she has passed in each subject separately—

- (i) Senior School Certificate Examination (12 Year Course of the Central Board of Secondary Education (C.B.S.E.), New Delhi.
- (ii) Indian School Certificate Examination (12-Year Course) of the Council for Indian School Certificate Examination, New Delhi.
- (iii) B.Sc. (Gen.) Group 'A' final Examination of the University of Delhi or equivalent examination.

- (iv) B.Sc. (Hons.) Examination in Physics, Chemistry and Mathematics of the University of Delhi with Combination of Physics, Chemistry, Mathematics and equal weightage to the subsidiary subjects or equivalent examination.
- (v) Any other examination recognized as equivalent to the Senior School Certificate Examination of the C.B.S.E. by the University of Delhi.

A Candidate must additionally have passed English as a subject of study either at the 10th class level or 12th class level (core or elective).

Note— There shall be no direct admission to any level of the Courses above the 1st Semester.

3. Under each B.E. Degree Course certain subjects are offered which can be classified as Theory/Practical/Drawing/Design/Project/Practical Training. Further classification is based on the relationship of the subjects with the degree courses admitted to, namely Humanities Social Science/Basic Sciences/Allied Engineering, Departmental, Core etc.

In addition to the above, a subject could be classified as a compulsory one or as one of the pre-requisite for another subject. The committee of Courses and studies of the concerned Department shall do this classification.

4. A student who joins the first semester will be automatically, deemed to have registered for the subjects which are listed under the first Semester of the SUGGESTED SCHEME OF LEARNING. Every student is required to register for the subjects to be taught in the second and subsequent semesters. This process of registration shall start just before the start of next semester. The student will also indicate during registration of subject/subjects of earlier Semester(s) in which he/she desires to appear, if otherwise eligible. Such a student will be allowed to appear in the End Semester Examination and his/her marks of mid terms activities will remain unaltered.

Since attendance is compulsory, a student will be permitted to register for course/courses which he can attend. The number of theory subjects permitted will not be more than five. The total duration of contact periods should not ordinarily exceed thirty hours per week.

5. B.E. Degree shall be awarded if a student has earned a minimum of 220 credits as specified in each degree programme subject to break up and compulsory credit as mentioned there in. However, a student may register in subjects leading to a maximum of 240 credits in the entire course.

A student should keep a watch on this progress and register in those papers in which he must earn the credit to satisfy the above requirement of the particular degree.

If a student earns more than a specified minimum credit for degree the best marks in the minimum credits (satisfying the above conditions) will be considered for the purpose of classification of result.

6. EVALUATION AND REVIEW –

The Committee of Courses and studies in each department shall specify the following for the degree course –

- (a) Suggested Scheme of Learning –
- (b) Minimum credits needed for the degree course and break up in terms of classification of courses i.e.
 - (i) Humanities and Social Sciences
 - (ii) Basic Sciences
 - (iii) Allied Engineering
 - (iv) Departmental Core
 - (v) Practical Training
 - (vi) Unspecified/Electives and
 - (vii) Major Project

The Committee of Course and Studies in each department shall appoint one or more Evaluation-cum-Review Committees each dealing with a group of subjects. This E.R.C. consist of the teachers who are likely to teach subjects in the group.

The E.R.C. has the following functions –

- (i) To recommend appointment of paper setters/examiners of various examinations at the start of each Semester.
- (ii) To get prepared quizzes, assignments, test papers etc. for the mid-term and the end semester examination and to

get them evaluated. Normally each concerned teacher, who is also a member of E.R.C., will do this job for his class. However, in exceptional circumstances any part of the work will be entrusted to some other member of the E.R.C.

- (iii) The mode of evaluation of the mid-term activities whose weightage shall be 30% and the end of term examination whose weightage shall be 70%. (The mid-term activities will be of one mid term test of 20% weightage which will be supplemented by assignments, quizzes etc. for a theory course with weightage of 10%). For a Practical Course, 30% weightage be given for internal evaluation and 70% for End Semester Examination. At the end of the Semester, the E.R.C. Chairman will send to the University the consolidated marks for the mid-term activities and the End Semester in separate column for tabulation and for declaration of result.
- (iv) To consider the individual representation of students about evaluation and take the remedial action if needed. After scrutinizing the E.R.C. may alter the marks awarded upward/downward. The decision of the ERC shall be final. The candidate shall apply for the same on a prescribed proforma alongwith the evaluation fee prescribed by the University from time to time only for the End Semester Examination with in seven days from the date of declaration of result.
- (v) to moderate the quiz/assignment/test papers given by each concerned teacher in his class with a view to maintain uniformity of standards and course coverage amongst various classes and to attain stipulated level of learning.
- (vi) To review and moderate the mid term and end of term results of each class with a view to maintain uniformity of standards and after finalisation, to submit the same for classification of the results.
- (vii) to lay guide-lines for teaching a subject.

7. CLASSIFICATION OF RESULT –

A student has to secure 40% or more marks in a subject evaluation to earn the credits assigned to the subject. A student after having secured

the minimum credit as needed for the degree course will be eligible for the award of degree. The final result will be evaluated as below—

Each subject will carry 100 marks.

$$\text{Average Marks} = \frac{\Sigma (\text{Credits} \times \text{Marks Secured})}{\Sigma (\text{Credits})}$$

*(See clause 5 for best grades in the minimum credits).

The final result will be classified based on the average marks as follows—

First Class with Distinction 75% or more

First Class 60% or more but less than 75%

Second Class 50% or more but less than 60%

Pass Class 40% or more but less than 50%

8. A student has to put in a minimum of 75% attendance separately in each subject for which he has registered. A relaxation up to a maximum of 25% may be given on the production of satisfactory evidence that—
- (a) The student was busy in authorized activities.
 - (b) The student was ill.

Note—

- (i) A student should submit the evidence to the above fact within three working days of resuming the studies. Certificates submitted later will not be considered.
- (ii) No relaxation in attendance beyond 25% is permitted in any case.
- (iii) The registration of a student stands cancelled if his attendance requirements are not satisfied in the subject.

The duration of the course is not less than 8 Semesters and the span is not more than 14 semesters.

A student who earns 15 credits or less at the end of the first semester will receive a warning for his/her poor performance, if he fails to earn at least 25 credits at the end of second semester, he has to leave the course and institution.

In case a student has not earned a minimum of 100 credits at the end of eight semester, his admission to the course and the institution

stands cancelled. The admission stands cancelled at the end of 14th Semesters in any case.

10. The Institution/University may cancel the registration of all the subjects in a given semester if—

- (i) The student has not cleared the dues to the institution/hostel.
- (ii) A punishment is awarded leading to the cancellation.

At discretion of the institution the result may be withheld even if the registration of the student stands.

11. There shall be a Central Advisory Committee consisting of the following—

- (a) Dean, Faculty of Technology, (Chairman of the Committee)
- (b) Heads, of the Institutions
- (c) Heads of the Departments in the Faculty of Technology.

This Committee shall have the following functions—

- (i) Lay guidelines for the process of registration.
- (ii) Give an interpretation of the rules in case of difference of opinion which shall be binding on all.

12. Under very exceptional conditions minor relaxations in rules may be allowed and implemented by the Central Advisory Committee. However, same relaxation in rules can not be granted in a subsequent semester. In case the conditions warrant such a relaxation again, the rules shall have to be amended.

GENERAL NOTES—

1. For all Theory Papers (Code—TH) there is one mid-semester test of 30 marks (20 + 10 Assignments) and an end-semester exam of 3 hours duration for 70 marks. The total marks for the Theory Papers is thus 100.
2. For all Practical Papers (Code—PR) there is semester assessment of 30 marks and an end-semester exam of 3/4 hours duration for 70 marks. The total marks for the Practical Paper is thus 100.
3. For all valuation of Sessional (Code—VS) there is semester assessment of 100 marks. There is no end-semester exam for these courses.

4. At VII and VIII Semester level there is assessment of Practical Training Reports by a duly constituted Board. The report is to be submitted by the student after eight weeks of Industrial Training undergone during summer/winter breaks. The total marks associated with each Practical Training Report is 100 marks of which 30 marks are awarded by the Department on the basis of supervision of Industrial Training.
5. At VIII Semester level there is assessment of Project Report by a duly constituted Board. The Report is to be submitted by the student of the Project work performed at the VII and VIII Semester levels. The total marks associated with the Project Report is 100 marks of which 30 marks are awarded by the Department on the basis of guidance of Project Work.
6. The total credits in all scheme of examinations to B.E. Courses upto VIII Semester will be 232 and the denominator for calculation of average marks for final result will be 220.
7. The Project and the Practical Training at VII and VIII Semester are mandatory.
8. Candidates securing 228 to 232 credits are declared to have passed B.E. Final examination.
9. Candidates securing 221 to 227 credits are declared to have passed B.E. Final examination, provided they skip/fail in not more than 4 credits in CORE.
10. Candidates securing exactly 220 credits are declared to have passed B.E. Final Examination, provided they skip/fail in not more than 4 credits in CORE, not more than 4 credits in ALLIED ENGINEERING, and not more than 4 credits in APPLIED SCIENCES AND HUMANITIES.

Suggested Scheme For B.E. Civil Engineering

1	CE	5	4	Credits & Type
TH1	COE101		Humanities	4 H
TH2	COE102		Mathematics I	4 H
TH3	COE103		Physics I	4 H
TH4	COE104		Chemistry	4 H
TH5	COE105		Manufacturing Processes	4 A

PR1	CE106	Engineering Drawing I	3 C
PR2	CE107	Physics I	2 H
PR3	CE108	Chemistry	2 H
PR4	CE109	Workshop I	2 A
			29
2CE	4 4		
TH1	CE111	Eng. Economics and Accountancy	4 H
TH2	CE112	Mathematics II	4 H
TH3	CE113	Physics II	4 H
TH4	CE114	Engineering Statics	4 C
PR1	CE115	Physics	2 H
PR2	CE116	Engineering Statics	2 C
PR3	CE117	Workshop Practice II	2 A
PR4	CE118	Engineering Drawing II	3 C
			25
3CE	5 4		
TH1	CE201	Determinate Structural Analysis	4 C
TH2	CE202	Mathematics III	4 H
TH3	CE203	Engineering Dynamics	4 A
TH4	CE204	Engineering Geology	4 C
TH5	CE205	Fluid Mechanics	4 C
PR1	CE206	Strength of Materials	2 C
PR2	CE207	Fluid Mechanics	2 C
PR3	CE208	Building Drg and Estimating	3 C
PR4	CE209	Engineering Geology	2 C
			29
4 C E	5 5 1		
TH1	CE211	Soil Mechanics	4 C
TH2	CE212	Electrical Technology	4 A
TH3	CE213	Building Material and Const	4 C
TH4	CE214	Surveying I	4 C

TH5	CE215	Design of Structural Elements	4 C
PR1	CE216	Soil Mechanics	2 C
PR2	CE217	Electrical Technology	2 A
PR3	CE218	Materials Lab	2 C
PR4	CE219	Surveying I	2 C
PR5	CE220	Design of Structural Elements	3 C
VS1	CE221	Workshop Training	2 A
		(Duration: 4 weeks in winter break)	

33

SCE	5 3 1		Credits
TH1	CE301	Structural Engineering	4 C
TH2	CE302	Geotechnical Engineering	4 C
TH3	CE303	Hydrology	4 C
TH4	CE304	Surveying II	4 C
TH5	CE305	Electronics	4 A
PR1	CE306	Structures	2 C
PR2	CE307	Surveying II	2 C
PR3	CE308	Electronics	2 C
VS1	CE309	Technical Communication	1 H
			27

6CE	5 4 1		
TH1	CE311	Design of Concrete Structures	4 C
TH2	CE312	Hydraulics and Hydraulic Machines	4 C
TH3	CE313	Indeterminate Struct. Analysis	4 C
TH4	CE314	Environmental Engineering	4 C
TH5	CE315	Construction Technology	4 C
PR1	CE316	Structural Design	3 C
PR2	CE317	Hydraulics and Hydraulic Machines	2 C
PR3	CE318	Concrete Technology	2 C
PR4	CE319	Computer Programming	2 C

VS1	CE320	Survey Camp (Duration 3 weeks in winter break)	2 C
			29
7CE	3 4 1		
TH1	CE401	Transportation Engineering	4 C
TH2	CE402	Design of Steel Structures	4 C
TH3	CE403	Irrigation Engineering	4 C
TH4	CE404	Design of Environ Engg. Works	4 C
TH5	CE405	Works Management and Specification	4 C
PR1	CE406	Transportation Engineering	2 C
PR2	CE407	Irrigation Engineering	2 C
PR3	CE408	Environmental Engineering	2 C
PR4	CE409	Practical Training	4 M
			30
8CE	3 3 1		
TH1	CE411	Effective I	4 C
TH2	CE412	Effective II	4 C
TH3	CE413	Des of Prestress Conc and Timb STR	4 C
PR1	CE414	Project	8 M
PR2	CE415	Planning of Civil Works	3 C
PR3	CE416	Practical Training	4 M
VS1	CE417	Technical Communication (Group discussion and public speaking)	1 H
			28
		Total	232

ELECTIVE CE-411

1. Advanced Structural Analysis
2. Bridge Engineering
3. Advanced Building Construction
4. Advanced Mathematics
5. Advance Geotechnical Engg.
6. Water Resources Engineering
7. Environmental Pollution &
Control
8. Traffic Engineering.

ELECTIVE CE-412

1. Advanced Structural
Design
2. Stress Analysis
3. Building Maintenance
4. Numerical Analysis
5. Advanced Engineering
Geology
6. Advanced Mechanics of
Fluid & Sediment
Motion
7. Environmental Sani-
tation
8. Materials Science
9. Earthquake Technology.

FACULTY OF SCIENCE

TECHNOLOGY

B.E. (Civil Engineering) I Year I Semester Exams. Theory

L T P

3 1 0

Paper-I-CE 101—Humanities (Common for CE/EC/EE/ME)

(a) Text : Essay; Short Stories and One Act Plays :

Editors : R. K. Kaushik & S. C. Bhatia
published by Oxford Univ. Press.

The following chapters are prescribed for study :—

- (i) Essay : 1. Nehru the Democrat by M. Chalapathi Rau
2. Bores by E. V. Lucas
3. Freedom by George Bernard Shaw
4. What I Require from Life by J. B. S. Hadamard
5. Student Mobs by J. B. Priestley
- (ii) Short Stories : 1. The Fortune—Teller by Karel
2. Grief by Anton Chekov
3. The Doll's House by Katherine Mansfield
- (iii) One Act Plays : 1. A Marriage Proposal by Anton Chekov
2. The Boy Come Home by A. A. Milne

(B) English Language Practice :

Applied Grammar : Common Errors, Use of words, synonyms and Antonyms, Formation of Words—Prefixes and Suffixes, Presentation of Technical information; Technical description of (i) Simple objects, tools and appliances (ii) Processes and operation (iii) Scientific principles.

Composition : Comprehension, Dialogues—Conversational and Colloquial idioms.

Spoken English : Practice in self-expression, talks, Lecturettes and speeches.

B.E. (Civil Engineering) I year I Semester Examination

Theory Paper II-CE-102-Mathematics I (Common for CE/EC/EE/ME)

L T P

3 1 0

Algebra : Partial fractions; Hyperbolic and inverse hyperbolic functions; De Moivre's Theorem and its applications, Relations, between circular and hyperbolic function; Positive term infinite series and their convergence (Comparison and Ratio tests), Alternating series.

Differential Calculus : Derivatives of hyperbolic functions; Successive differentiation and Leibnitz's theorem; Taylor's and Meclaurin's series; Maxima and minima of functions of one variable; Curvature and radius of curvature, points of inflexion.

Integral Calculus :- Integration by partial fractions; integraion of forms \sqrt{R} , $\frac{1}{R}$, $\frac{1}{\sqrt{R}}$, where $R = ax^2 + bx + c$; Properties of definite Integrals;

Reduction formulae; Application of integration to areas, lengths of arcs, Surface and volume of solids of revolution; Trapezoidal and Simpson's rules.

B.E. (Civil Engineering) I Year I Semester Examination L T P

Theory Paper-III CE-103 Physics—I (Common for CE/EC/EE/ME) 3 1 0

Relativity : Absolute and inertial frames of reference, Newtonian and Galilean relativity, Galilean Transformation, Michelson Morley experiment and its implications, Einstains Theory of relativity, Lorentz transformations, Einstsins Law of Addition of velocities. Einstains mass energy relation.

Inverse square law of Forces : Fundamental interections. Electro-magnetic and Gravitational ineractions. Force and potentials Central Forces.

Invariance & Symmetry Principle : Invariance of a physical quantity laws of conservation of momentum, enery and charge, concept of symmetry and its implications.

Waves & Oscillations : Free damped and forced oscillary motions.
Resonant vibrations with applications, sharpness of resonance,
quality factor.

Formation of waves in strings, sound air, acoustic waves,
acoustic impedance, transmission through partitions, ultrasonics
and its applications.

Interference of Light : Wave theory of light superposition principle,
Double slit experiment, Biprism and Newton's rings. Theory
of interference in thin films, Interference, filters, Michelson's
interferometer.

Diffraction of Light : Fresnel and Fraunhofer class of diffraction.
Diffraction at straight edge, Cornu's spiral, Fraunhofer
diffraction at a single slit and its extension for number of slits;
Diffraction gratings, Resolving power of optical instruments,
telescope, prism and grating.

Polarization of Light : Elementary aspects of e.m. theory of light,
polarization, reflection and transmission, Brewster law, polariza-
tion due to pile of plates and double refraction Elliptically
and circularly polarized light, Nicol prism Quarter and half
wave plates.

Polarimeters : Half shade & Bi-quartz.

Optical Instruments : Cardinal points of a co-axial lens system
Defects in the images, spherical and chromatic aberration
Nodal slide assembly, Eye Pieces.

B.E. (Civil Engineering) 1 Year I Semester
Examination.

L T P

Theory Paper-IV CE-104 Chemistry (Common for
CE/EC/EE/ME)

3 1 0

Chemical Kinetics : Rate constant; order and molecularity of
a reaction; 1st, 2nd & 3rd order reactions, Methods determin-
ing the order of reactions; Activation energy, Effect of catalyst
on reaction rate, Industrial applications of catalysts.

Electro-Chemistry : Transport number; Galvanic Cells; E.M.E.
and its measurement; Nernst equation of electrode potential;
Reference and Indicator electrodes; pH measurements; solar
energy.

Phase-Rule : Phase diagrams and phase transformation in Pb-Ag Cu-Ni systems.

Thermal method of analysis : Elementary discussion of thermogravimetric analysis, differential thermal analysis and differential scanning calorimetry.

Metal & Non-Metals Elements : S & P block elements; bonding in complexes; molecular explanations for magnetic properties and colour Extraction and technical applications of titanium, vanadium, Zirconium, Tungsten and Uranium.

Alloys : Classification and necessity for making alloys; composition properties and uses of following alloys: Brass, Bronze, Gun metal Duralumin; Effect of alloying elements like C, Ni, Cr, Mn, Si, V, Mo, W & Co on the properties of steel.

Electronics Effects : Inductive effect, conjugation and resonance and their effect on physical and chemical properties of molecules; carbanion and carbonium ions and free radicals.

Organic polymers : Polymerisation; Effect of polymer structure on properties; Production, properties and technical applications of some important thermoplastics and thermosetting resins, Natural rubber and elastomers (SBR, GR-I, GR-P, polyurethane and silicone); Molecular weights.

Oils, fats, wax and Detergents : Production and Physico-chemical properties of fatty acids and glycerides; Manufacture of edible fats, soap, Glycerin, waxes, essential oils, perfumes and cosmetics.

B.E. (Civil Engg.) I Year I semester examinations. L T P

Theory Paper V-CF-15 Manufacturing Processes. 3 0 0

Materials : Composition, proportion and uses of wrought iron, pig iron, cast iron, malleable iron, S.G. iron, carbon and alloy steels, copper, aluminium, lead, brass, duralumin, bearing metals, high temperature metals, cutting tool materials.

Casting process : Principles of metal casting; pattern materials, types and allowance; study of moulding sand, including tools materials; classification of moulding; description diecasting, permanent mould casting, centrifugal casting, investment casting.

Smithy and forging: basic operations e. g. up setting, fulloring, flattening drawing swaging, tools and appliances, drop forging; press forging.

Metal Joining : Welding principles; Classification of welding techniques; Oxy-acetylene Gas welding; equipment and field of application, Arc-welding, Metal Arc, Carbon arc, Submerged arc and atomic hydrogen arc welding, Electric resistance welding, spot, Seem, Butt, Butt Seem, and percussion welding, Flux; Composition, properties and Function, Electrodes

Types of Joints and edge preparation.

Brazing and Soldering.

Sheet Metal Work: Common processes, tool and equipment; metal used for sheets; standard specification for sheets.

Bench work and fitting : Fitting sawing, Chipping, thread cutting (die), tapping, study of hand tools, marking and marking tools.

B.E.(Civil Engg.) I year I semester examination practical

Paper I-CE 106L Engineering Drawing-I. L T P

0 0 3

Introduction : Instruments and their uses; lettering; construction and uses of various scales; dimensioning as per I.S. 696-1972.

Engineering Curves: parabola; hyperbola; ellipse, cycloids; involute spiral; helix and loci of points of simple moving mechanisms (4 bars chain)

Projections : Straight Lines; planes and solids; development of surfaces of right and oblique solids; section of solids; inter-penetration and intersection of solids; isometric and oblique parallel projection of solids.

B.E.(Civil Engineering) I year I Semester Examination Practical

Paper II CE-107L-Physics L T P

0 0 2

Based on course work corresponding to CE-103 Physics-I.

B.E.(Civil Engineering) I year I Semester Examination Practical

Paper-III CE-108L-Chemistry L T P

0 0 3

Based on course work corresponding to CE-104 Chemistry

B.E.(Civil Engg.) I year I Semester Examination	Practical
Paper IV-CE 109L-workshop Practice-I	L T P
	0 0 3

Based on course work corresponding to CE-105-Manufacturing Process.

B.E. (Civil Engg.) I year II Semester Examination	
Theory Paper I-CE-111 Engineering Economics & Accountancy	L T P
	3 2 0

Firms & business decisions, cost of production, consumers' demand markets and industries; general equilibrium, economic efficiency.

Micro V/s Macro-economics; concept of growth and instability, national output and income determinants of gross national product, three trends in modern economics.

Money & Credit, banks & Credit creation, public control, of money supply & level of interest rates, concept of real interest rate, Money prices & inflation; economic growth & business cycles, limits to economic growth & money & goals of economic policy, monetary policy in practice.

Inter-industry analysis, international trade & gains from international trade, free trade & protection, rate of exchange. Balance of payments. Direct & indirect taxes, shifting & incidence of taxation public expenditure, deficit financing, fiscal policy and economic activity. Principles of planning, Planning and industrialization in India.

Principles of double entry system, bank reconciliation statement, single entry system, Joint Venture and consignment account, partnership account, Levelised cost, price discounting procedure.

B.E. (Civil Engg.) I Year II Semester Examination	
Theory Paper II-CE-112-Mathematics II	L T P
	3 1 0

Diferential Calculus : Partial differentiation, Total diferentiation; Taylor's series for functions of two variables; Maxima and minima of functions for two or more variables.

Matrices : Inverse of a matrix; Rank of a matrix, Consistency and solution of simultaneous equations, Linear transformations, Vector spaces, Characteristic equations, Eigenvalues and Eigenvectors' Caley-Hamilton theorem.

Integral Calculus : Double and triple integration, change of order of integration, Volumes of simple solids.

Differential equations : Linear differential equations of first order and first degree (Leibnitz and Bernoulli's forms), General linear differential equations with constant coefficients, Operator D , Complimentary function; particular integral, Simultaneous linear differential equations, Solution of differential equations in power series, Frobenius method.

Laplace Transformation : Laplace transformation, Inverse Laplace-transformation. Application to linear differential equations with constant coefficient.

B.E. (CIVIL ENGINEERING) I Year II Semester Examination
Theory Paper III CE-113 PHYSICS-II

L T P

3 1 0

Kinetic Theory of Matter : Maxwell-Boltzman law, Mean free path Van der waal Equation, Joule-Thomson effect. Surface tension and Viscosity.

Thermodynamics : Concept of work, thermodynamical processes and Equilibrium, 1st law, Thermodynamics.

Reversible and Irreversible processes, Carnot's engine, Carnot's theorem, 2nd law of thermodynamics, Entropy, Computation of entropy for steam and perfect gases, Clausius - Clapeyron's equation.

Heat Transfer : Mode of transfer of heat, heat flow in one and three dimensions, Fourier equation, for rectilinear flow of heat in one-dimensions, Earth's crust's thermal conductivity, Measurement of thermal conductivity for good and bad conductors.

Electromagnetics : Gauss's theorem and its application, Capacity and dielectrics, Ampere's circuital theorem, Lorentz force and current carrying conductor in magnetic field, Moving coil and

Ballistic galvanometer, Faraday and Lenz's laws of electromagnetic induction, Growth and decay of currents in R-L and C-R circuits.

Sonics and Ultrasonics : Piezoelectric effect, Magnetostrictive effect, productions, properties and applications of Ultrasonics, Elementary architectural acoustics.

Nuclear Physics : Structure of nucleus, Binding energy, Particle detector and Accelerators, Artificial radioactivity, Fission and Fusion, Atomic reactors.

B. E. (Civil Engineering) I year II Semester Examination Theory Paper IV-CE 114—Engineering Statics

L T P

4 1 0

Introduction : Vector and scalar quantities, cartesian coordinates, unit vectors and direction cosines, fundamental units of measurement, concept and laws of mechanics, concept of rigid bodies.

Equation of Equilibrium : Equilibrium, supports, free body diagrams, Principle of superposition and St. Venant's principle; measurements of forces, action and reaction, tension and thrust and shear force system; resultant, resolution and equilibrium of forces in two and three dimensions; moment of force about a point and about a given axis, principle of moments, couple, condition of equilibrium in two and three dimensions; stability of equilibrium, applications to equilibrium of particles and rigid bodies including simple beams and framed structures, Lamis' Theorem.

Equivalent Force System : Composition and resolution of coplanar concurrent and non-concurrent non-parallel forces, parallel forces and couples, parallelogram, triangle and polygon of forces.

Trusses : Bow's notation, Maxwell's diagram, funicular polygon and graphic statics.

Properties of Surfaces : Centroids and centre of gravity of lines, areas and volumes, composite sections and bodies. Theorems of Pappus and Guldinus, moments of inertia of area and mass, product moment of inertia, polar moment of inertia, principal axes and

moment of inertia about these axes, parallel and perpendicular axes theorems, Simpson's and trapezoidal rules and their applications.

Friction : Laws of solid friction, equilibrium involving friction; motion on rough inclined planes, wedge and block, simple and compound screw jack, bearings, mechanical advantage and efficiency of machine

Introduction to Variational Mechanics : Principles of virtual work and minimum potential energy and their applications.

Concept of Stress and Strain : Isotropy, generalized Hooke's law, stress tensors, stress at a point, stress in non-prismatic and compound bars due to self load, applied load and temperature changes; introduction to theory of elasticity and its applications, difference between gradual sudden and impact loading; strain and complementary energy,

Introduction to Structural Mechanics : Classification of structural components, support conditions and members of a truss, analysis of simple pin-jointed frames by graphical method, method of joints and method of sections for vertical as well as inclined loadings, method.

B.E. (Civil Engineering) I Year II Semester Examination

Theory Paper IV—CE—114—Engineering Statics (Contd.)

Tension coefficients and analysis of simple space frames, bending moments and shear forces: B.M. and S.F. diagrams for cantiliver, simply supported and overhanging beams.

**B.E. (Civil Engineering) I Year II Semester Examination
Practical**

Paper I CE—115L Physics L T P
0 0 2

Based on Course work corresponding to CE—115L Physics—II

**B.E. (Civil Engineering) I Year II Semester Practical
Paper II—CE—116L Engineering Statics**

L T P
0 0 2

Based on course work corresponding to CE 116L Engineering Statics,

B.E (Civil Engg.) I Year II Semester Examination Practical
Paper—CE—117L—Workshop Practice II

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0 0 3

Based on course work corresponding to CE 105—Manufacturing Processes.

B.E. (Civil Engg.) I Year II Semester Examination Practical
Paper IV—CE 118L—Engineering Drawing II

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0 0 5

Introduction : Conventional representation of common features and materials as per I.S. 696-1972.

Screw Threads : Projections and forms of screw threads and their conventional representation as per I.S. 696-1972.

Free hand Sketching and scale Drawings : Components like cotter joint; knuckle joint; rivets and riveted joints; pipe fittings and joints; turn-buckle; shaft couplings; flange coupling; oldham's coupling muff coupling; universal coupling; bolt; nuts and keys; flywheels; pulleys; bush bearings; ball bearings.

Isometric views from Orthographic projections of Machine Components, Assembly Drawing from Components, half and quarter sections.

B.E. (Civil Engineering) II Year III Semester Examination
Theory Paper I—CE 201—Determinate Structural Analysis

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3 1 6

Stresses : Concepts of various types of stresses, factor of safety, load factors, ultimate stresses and working stresses, temperature stresses, bars of varying cross-sectional and composite sections. Statically indeterminate cases of tension and compression. Lateral strain, Poisson's ratio, relationships between E, G, K and I; shear stresses and strains.

Compound Stresses : Principal stresses and principal strains, principal planes, maximum shearing stress. Mohr's stress circles, Strain rosettes and Mohr's strain circles.

Beams and Loads : Classification; B.M. and S.F. and axial thrust diagrams for beams and frames subjected to couple and inclined loads, relationship between rate of loading, shear force and bending moment.

Theory of Simple Bending : Assumptions made and limitations of simple theory of bending, section modulus, strength of beam sections, beams of uniform strength, beams of composite section; shearing stresses in beams, shear stress distribution in beam of homogeneous materials, principal stresses and principal planes at a point in a beam.

Slope and Deflection of Beams : Differential equations of deflected shape of beam, boundary conditions in beams; double integration method, Macaulay's method, moment area method, conjugate beam method and dummy load method of finding deflection of beams, Mohr's theorems for slope and deflections, deflections of beams due to shear stresses.

Strain Energy : Strain energy due to direct, bending, shear and torsional stresses; strength theories; Maxwell's law of reciprocal deflections Betti's law and Castigliano's first theorem and their applications.

Method of Consistent Deformations : Carriage springs, analysis of propped cantilevers.

B.E. (Civil) Engineering) II Year III Semester Examination
Theory paper II-CE 202 Mathematics III.

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3 1 0

Differential Equations : Bessel's equation, Bessel functions of first kind, Recurrence relations; Legendre's equation, Legendre's polynomials, Rodrigue's formula.

Fourier Series : Fourier series, Euler's formulae, Even and odd functions; Functions having arbitrary period; Half-range expansions; Harmonic analysis.

Vector Analysis : Review of vector algebra; Triple product; Differentiation of vectors; Operators grad, div and curl.

geometrical and physical significance; Integration of vectors, work done in vector fields, Green's, Stoke's and Gauss divergence theorem.

Functions of Complex Variables : Analytic functions, Harmonic conjugate, Conformal transformation of functions (simple problems), Cauchy's integral theorem, Cauchy's integral formula, Residues, Residue theorem.

B.E. (Civil Engineering) II Year III Semester Examination
Theory paper III CE 203-Engineering Dynamics

L T P

3 1 0

Particle Dynamics : Normal and tangential accelerations, inertia forces, D'Alembert's principle (Dynamic equilibrium concept); impulse and momentum, work and energy.

Vibrations : Single degree of freedom system, free vibration with and without viscous damping, forced vibration-harmonic excitation, simple cases of random excitation, dynamic load factor.

Measurements : Principles of velocity and acceleration measurements.

Mechanisms & Drives ; Four bar mechanism, velocity and acceleration diagrams; power transmitted by belt and rope drives, centrifugal tension in belts, simple and epicyclic gear trains.

B.E. (Civil Engineering) II Year III Semester Examinations
Theory paper IV-CE 204 Engineering Geology

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3 0 0

Introduction : Definition & Scope of geology, branches of geology, importance of geology in engineering, origin of earth, age of earth, interior of earth, earth movement.

Materials of Crust :

Crystals : Definition, terminology, crystallographic axes, study of various systems.

Minerals : Physical properties, optical properties, rock and ore forming minerals, important mineral families.

Rocks : Rock cycle, physical properties and petrological characters of igneous, metamorphic and sedimentary rocks, their texture, mode of occurrence and classification.

Geological Agencies

Weathering : Types of weathering and factors which influence weathering, resulting features and importance in engineering.

Erosion : By running water, by winds, by glaciers, by lakes and their engineering importance. Physiographic features of India.

Structural Geology : Attitude of bed; dip, strike true and apparent dip.

Faults : Definitions, classification, recognition in field and causes, fault in relation to engineering operations.

Folds : Definition classification and causes, folds in relation to engineering operation.

Joints : Definition and classification, engineering importance.

Stratigraphy : Definition, principle of correlation, fossils, geological time scale, important systems of Indian stratigraphy.

Engineering Geology : Rocks as engineering material, building stones, ground water, earth quakes.. land slides-causes and their prevention, land subsidence-causes and prevention; geological investigation for dam and reservoir, bridges, highways and buildings, site selection and criteria for tunnels, formation and genetic classification of soils, soil erosion, preventive measures, soil groups of India.

B.E. (CIVIL ENGINEERING) II Year III Semester Examination Theory paper V-CE 205 Fluid Mechanics

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3 1 0

Introduction : Comparison of fluids and solids, relevant fluid properties in M.K.S. and SI systems, Ideal and real fluids particle concept, history of development of fluid mechanics, types of flow.

Fluid statics : Fluid pressure and its measurement, types of manometers, evaluation of pressure force on dams, lock gates, curved surfaces, hydrostatic paradox, principles of equilibrium, buoyancy.

Kinematics : Translation, rotation and deformation, rotational and irrotational flow, free and forced vortex-stream line, pathline and streak line, Equation of continuity in cartesian and natural co-ordinates, stream function and velocity potential function, flownets.

Dynamics : Transport equation, local and convective derivative, Euler's equation of motion, Bernoulli's equation—its limitation-applications in orifice, notch, weir, venturimeter, Pilot tube, siphon etc; hydraulic gradient and energy gradient lines.

Viscous Flow : Navier-Stoke's equation-general study, Hagen-Poiseuille equation.

Turbulent Flow : Laminar and turbulent flow, critical Reynold's number, general description of turbulent flow and its importance.

Boundary Layer : Concept and development of boundary layer, laminar and turbulent boundary layers, critical Reynold's number, boundary layer thicknesses, skin friction, drag, and lift; pressure distribution around a cylinder; momentum principle applied to control volumes, Boundary layer separation and control, flow past immersed bodies.

Flow Through Pipes : Darcy-Weisbach equation, major and minor losses, Nikuradse's study of friction, smooth and rough pipes, Moody's chart; problems in pipes in parallel and series, reservoir junctions.

B. E (CIVIL ENGINEERING) II YEAR III SEMESTER EXAMINATION Practical Paper I-CE 206-Strength of Materials.

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Based on course work indicated below :—

THEORIES OF FAILURE : Tension and shear failures. C and σ -M rise curves. Bridgeman's high pressure experiments.

DEFORMATION : Mild steel, aluminium and cast iron, elastic and plastic deformations, yielding, atomic slip, strain hardening and plastic instability, brittle fracture and Griffith's theory.

TORSION : mild steel and duralumin.

BENDING : Wooden and mild steel beams, bending test on carriage spring.

COMPRESSION Tests along and perpendicular to grains for wooden specimens.

SHEAR : Double shear and punching shear.

IMPACT : Tensile and bending impacts, ductile and brittle transition effect of strain rate, temperature and notch.

HARDNESS : Brinell and Rockwell hardness, importance of penetration tests.

Closed coil helical Spring.

B. E. (CIVIL ENGINEERING) II YEAR III Semester Examination practical paper II-CE-207L-Fluid Mechanics.

L T P

0 0 2

Based on course work corresponding to CE 205-Fluid Mechanics.

B. E. (CIVIL ENGINEERING) II Year III Semester Examination Practical Paper III-CE 208L Building Drawing & Estimating.

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Plan, elevation and sectional views of a small building and details of its different components.

Estimation of quantities of earth work, concrete, masonry, wood work, steel work, R. C. C. etc. for different parts of a building.

Analysis of Rates of important items of building construction.

Complete estimate from working drawings for a single storey domestic building with a flat/pitched roof.

B. E. (CIVIL ENGINEERING) II year III Semester Examination Practical Paper IV-CE 209L-Engineering Geology.

L T P

0 0 2

Based on course work corresponding to CE-204-Engineering Geology.

B. E. (CIVIL ENGINEERING) II Year IV Semester Examination Theory paper I-CE 211 Soil Mechanics.

L T P

3 0 0

Introduction : Origin, formation, varieties of soils, their distribution in India.

Phase Diagrams & Relationships : Grain size characteristics.

Atterberg limits, other simple properties, clay minerals, classification and identification of soils.

Soil Water : Effective and neutral stresses, permeability, laboratory and field tests, field compaction and control.

Seepage Analysis : Flownets for typical soil structures, uplift pressures, mechanics of piping, methods of dewatering, filter material.

Stress Distribution in Soil mass : Settlement analysis : One dimensional consolidation-theory, consolidation test and analysis, compaction laboratory tests, field compaction and control.

Shear Strength : Mohr-Coulomb failure theory, shear strength tests, determination of shear strength parameters for different drainage and stress conditions, strength characteristics of sands, silts and clays.

Earth Pressures : Classical theories, curved rupture surfaces, analytical and graphical methods.

Stability of slopes : Infinite slopes, slice method, friction circle method, stability number.

Flexible Pavements : Principles of design.

B. E. Civil Engineering II Year IV Semester Examination Theory paper II CE 212 Electrical Technology

L T P

3 1 0

Units : S I Units in Electrical Engineering

Resistance : Factors affecting resistance of conductors, variation of resistance with temperature, temperature coefficient of resistance, ohm's law.

D.C. circuits : Kirchoff's laws, superposition theorem, Thevenin's theorem, Star-delta transformations.

D.C. machines : Brief consturctional details, principle and characteristics of d.c. generators and motors, starting and Speed control of d.c. motors.

A.C. circuits : Introduction to A.C. quantities, Peak, average and effective values of A.C. voltages and currents, A.C. Series circuits, concept of impedance, phasor diagram, Power and power factor, Parallel circuits, introduction and application of 'J' operater, three phase balanced system.

Transformers : Brief constructional details, e.m.f. equation, derivation of equivalent circuits, phasor diagrams, calculation of voltage regulation, losses and efficiency.

Induction motors : Brief constructional details, working principles, Torque-speed characteristics, starters.

Measuring Instruments : Principle of operation of moving coil and moving iron instruments, voltmeters and ammeters, Introduction to watt. mater, energy-meter and megger.

Power System : Elementry ideas of transmission and distribution systems, service mains.

Wiring : Introduction to domestic and Industrial wiring, importance of Earthing and various methods of Earthing.

B.E. (Civil Engineering) II Year IV Semester Examination
Theory Paper III-CD-213 Building Materials & Construction

L T P

4 1 0

PART-1 (2-1-0)

(1 hr tutorial 2 in alternate week).

Building Materials :

Physical & Chemical properties, classification, standard tests, uses and manufacture of the following :

Silicate based materials : e.g.-Bricks, tiles, stones, puzzolonas etc.

Lime, Cement and plaster of Paris :

Ceramics, Refractories, Glasses, Abrasives and Adhesives ;

Timber and Allied Products: Bituminous materials, Paints and Varnishes.

Insulation materials, Explosives and composite materials crystal Growth and Structure.

PART-II (2-1/2-0)

(One hour tutorial in alternate work)

Building Construction :

Different types of foundations.

Brick Masonry, Stone Masonry, Design of Masonry walls in building Lintels and arches. Doors, Windows. Floors, flat and pitched roof. Stair cases.

Dampness in Buildings, its causes, effects and prevention. Plastering and pointing. White and colour washing, Distempering and pointing.

Acoustics and Sound proofing. Fire Resistant Construction. Ventilation—Natural and artificial. House services and Drainage.

Note : Part I will be taught by Chemistry Department and Part II by Civil Engineering Department. Answers for Part I & II must be written in separate answer books.

B.E. (Civil Engineering) II Year IV Semester Examination
Theory paper IV CE 214 Surveying I

L T P

3 1 0

Introduction : Object and scope of surveying, classification of surveying, principles of surveying, surveying instruments,

Basic Surveying Techniques :

Chain Surveying : Instruments for chain surveying corrections to measured length, measurement of offsets, limiting length of offsets, field work of chain

surveying, booking of field notes, conventional symbols, obstacles in chain surveying, errors in chain surveying and their corrections.

Compass Surveying : Instruments in compass surveying, systems of recording the bearings, determination of meridian, compasses, traversing and graphical method of adjustment.

Plane Table Surveying : Plane table and its accessories, methods of plane tabling, two point and three point problems by different methods.

Minor Instruments used in surveying

Levelling: Introduction, types of levelling, levelling instruments, operation and adjustments of the levels, ordinary levelling, errors of levelling. sensitivity of bubble tube, the effect of earth's curvature and atmospheric refraction in levelling : precise levelling modern levelling instruments; contouring; characteristics and uses of contours, modern method of depicting relief on a map.

Areas, Volumes and Earth work computations; Different methods of determination of areas from plan, areas of irregular boundaries, areas from field notes by latitude and departure methods, instrumental method of determining area, area of cross section: determination of earth workvolumes.

Theodolite Traversing; Transit theodolite, modern precision theodolites, operation and adjustments of theodolites, horizontal angle by the methods of repetition and reiteration, permanent adjustments of theodolite, theodolite traversing, traverse computations, sources of error, checks in a traverse, closing error and its adjustments, omitted measurements.

B.E. (Civil Engg.) II Year IV Semester Examination

Theory paper V-CE 215 Design of Structural Elements

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3 0 0

(a) Concrete Technology :

Cement : Types, Composition, Properties, Uses and specifications. Tests on cement-normal consistency, initial setting, final setting, tensile and compressive strengths, unsoundness, fineness, heat of hydration.

Aggregates : Classification, properties, porosity and absorption, bulking of sand, sieve analysis ; grading curves, fineness modulus, impurities and tests on aggregates.

Lime and Cement Mortars :

Concrete : Properties, workability-Slump Test, Compaction-factor test and Vee-Bee consistometer test ; bleeding, shrinkage and creep, mixing and placing of concrete, compressive and tensile strengths, effects of water-cement ratio, compaction, age, curing temperature on strength of concrete, Modulus of elasticity, Poisson's ratio.

Design of concrete mixes : Proportioning of aggregates, ACI and other methods of mix design.

(d) Reinforced Cement Concrete :

Reinforced concrete elements : Design of singly, doubly reinforced rectangular, T- & L- Beams; shear and bond; one-way and two-way slabs; Design of axially loaded columns and footings.

(c) Steel

Steel elements : General principles, working stresses, design of rivetted and welded connections, brackets and frames connections. Simple tension and compression members.

(Note : Parts (a), (b) & (c) should have approximately equal weightage in teaching schedule).

B E. (Civil Engg.) II Year IV Semester Examination Practical

L T P

Paper I—CE 216L—Soil Mechanics Practicals

0 0 2

Based on course work corresponding to CE 211—Soil Mechanics.

B.E. (Civil Engg.) II Yr. IV Semester Examination	L T P
Practical Paper II CE—217—Electrical Technology	0 0 2

Based on course work corresponding to CE—212 Electrical Technology.

B.E. (Civil Engg.) II Year IV Semester Examination Practical	L T P
Paper III—CE 218L—Materials Lab.	0 0 2

1. Testing of Burnt Clay building bricks as per IS: 3495 Part—I to VI, 1976.
2. Testing of building limes as per IS: 6932 Part I to X, 1973.
3. Testing of Pozzolonic Materials as per IS: 1727, 1967.
4. Testing of stones as per IS: 1121 Part I to IV, 1974.
5. Analysis of cement for silica lime, Al_2O_3 & Fe_2O_3
6. Testing of asbestos cement products as per IS: 5913, 1970.
7. Estimation of calcium Vol. in Soil extract.
8. Estimation of phosphates in a given soil extract.

Note : Experiments 1,3,4 and 6 will be conducted by Civil Engg. Deptt. and experiments 2,5,7 & 8 by Chemistry Deptt.

B.E. (Civil Engg.) II Year IV Semester Practical	L T P
Paper IV—CE 219L—Surveying—I	0 0 2

Based on course work corresponding to CE—214 Surveying I

B.E. (Civil Engg.) II Year IV Semester Practical	L T P
Paper—V CE 220L Design of Structural Elements	0 0 2

Based on courses work corresponding to CE .15-Design of Structural Elements.

B.E. (Civil Engg) II Year IV Semester Examination Practical
(Sessional Work)

Paper—I—CE 221L—Workshop Training) held after Third Semester

B.E. (Civil Engg) III Year V Semester Examination L T P

Theory Paper I—CE—301 Structural Engineering 4 1 0

Torsion : Torsion of circular shafts, Torsion equation, simple statically indeterminate problems of pure torsion, Combined bending and torsion, closed coil and open coil helical springs.

Columns and Struts : Column and struts of uniform section' crippling load, Euler theory and concept of equivalent length, Rankine's formula and other empirical formulae, Secant formula.

Combined direct and Bending Stresses : Middle third rule, core of a section, Stresses due to wind, water and earth pressure in masonry structures, retaining walls, dams, chimneys and walls etc.

Deflection : Deflection of pin jointed perfect frames, analytical and graphical methods, effect of temperature changes and lack of fit.

Frames and Trusses : Compound and complex frames, bridge trusses, Wichert truss and frames with subdivided panels.

Thick Cylinders : Thin cylindrical and spherical shells. Thick cylinder and compound cylinders.

Three Hinged Arches : Linear arch, Eddy's theorem, circular, parabolic and braced arches. Concept of radial shear force and axial thrust; reaction locus.

Rolling Loads : Rolling loads on beams, different types of rolling loads. Concept of equivalent uniformly distributed load, Absolute maximum B.M. and S.F.

Influence Lines : Influence lines for reaction, S.F., B.M. and deflection of determinate beams. I.L.D. for forces in determinate frames. Counter bracing. I.L.D. for three hinged arches and compound beams etc.

Indeterminate Structures : Indeterminacy, Choice of unknowns, Castigliano's Second theorem and its applications, Analysis of Redundant pin jointed frames having one or two redundant members; effect of temperature change and lack of fit.

Two Hinged Arches : Analysis, effect of yielding of supports, rib shortening and temperature changes; tied arches.

Mechanical Behaviour of Metallic Material : Fatigue, elevated temperature and creep.

B. E. (Civil Engg.) III year V Semester Examination Theory

Paper-II-CE 302-Geotechnical Engineering

L T P

3 1 0

Soil Exploration : Planning, direct, semi-direct and indirect methods, sampling, testing, soil profiles.

Foundation Excavation : Stability of open and braced cuts—concept of arching phenomenon, analysis of sheet pile walls and anchored bulkheads, heaving of bottoms of excavation.

Shallow Foundation : Terzaghi's theory of bearing capacity, field tests, consideration of settlements, proportioning of footings for equal settlements, improving bearing capacity, design criteria for raft foundation.

Deep foundation : Types of piles, methods of estimating pile capacity, cyclic pile load test, group action, negative skin friction; caissons, methods of construction, design consideration, drilled caissons.

Embankment Dams : Different types and criteria for their safe design, stability analysis for different conditions, seepage control.

Rock Mechanics : Classification of rocks—Physical properties, laboratory and in-situ tests for measuring stress-strain characteristics and rock stresses, percolation and uplift pressures, stability of cuts and slopes.

Techniques of Improving Ground : Stabilisation, different methods and principles, vibrofloatation and method of sandwick.

B. E. (Civil Engg.) III year V Semester Examination Theory

Paper III—CE 303—Hydrology

L T P

3 1 0

Introduction : Importance of Hydrologic design in Engineering development, hydrologic cycle.

Precipitation : Types, measurements, rain gauges, errors in measurement, check for consistency, missing data. Areal mean,

mass curves, intensity—duration-frequency curves, depth-area-duration curves, rainfall distribution in India.

Evaporation & Transpiration : Process and their measurements.

Infiltration : Infiltration process, infiltration indices, Horton's equation.

Run-off and its Computation : Factors affecting runoff, runoff distribution, computation of run-off by empirical formula and curves.

Hydrograph and its components, unit hydrograph, distribution graphs, S-curves, transposition of storms, instantaneous unit hydrograph; introduction to mathematical models, stream gauging, stage-discharge relation.

Floods : Computation of peak floods by empirical formulae, by rational method and by unit hydrograph method; Introduction to statistical distribution, analysis of variance and covariance, regression and correlation analysis; frequency analysis of floods and droughts; introduction to synthetic hydrology; flood routing principles, reservoir routing.

Ground Water : Sources of ground water, flow through porous media, characteristics of wells and their yield under steady and unsteady conditions, mutual interference of wells, exploration of ground water; Budgeting recharging ground water.

B. E. (Civil Engg.) III Year V Semester Examination L T P

Paper IV-CE 304-Surveying—II 4 1 0

Tacheometric Surveying : Importance of tacheometry, different stadia systems, determination of tacheometric constants, anallatic lens, determination of horizontal distances and elevations of points, tacheometric tables, tangential tacheometry, field work, errors in tacheometry, special instruments; horizontal subtense measurement, effect of angular error on horizontal distance.

Trigonometric Levelling :

Curves : Characteristics of curves, elements and various methods of setting out of circular curves, transition curves, and vertical curves.

Triangulation : Triangulation networks, strength of figure grades of triangulation, selection of stations, baseline measurements and corrections, field work of triangulation, computations and adjustments of a level net, satellite stations.

Theory of Errors : Definitions, adjustments of random errors, curves of probability, method of least squares, errors in related quantities, laws of weight, Determination of most probable value by normal equations and method of correlates, most probable error.

Setting out Works : Setting out of buildings, culvert, pipelines and sewers; underground tunnels and centre line of dams, bridge surveys.

Route Surveying : Reconnaissance, preliminary and location surveys for road, railway, canal and pipe alignments; longitudinal and cross-sections; computation of earthwork and mass haul curve.

Elements of Aerial Photogrametry and Astronomy :

B. E. (Civil Engg.) III Year V Semester Examination	L T P
Theory Paper V-CE 305-Electronics	3 1 2

Introduction to vacuum tubes : Semiconductor characteristics of PN junction diode, zener diode and transistor in CE and CB configurations, FET.

Transistor biasing and stabilization, stability factor, comparison of different biasing circuits.

CE, CB, CC amplifiers, FET amplifiers, calculations of gain, input impedance and output impedance, frequency response and gain-bandwidth product of RC coupled amplifier, power amplifiers, feedback amplifiers.

Introduction to oscillators and multivibrators, study of wave forms at different points in multivibrators.

Elements of rectifiers, filters and regulators, Half wave and full wave rectifiers, comparison of different filtering circuits - Operational amplifiers their characteristics and applications e.g., differentiator, integrator, summer etc.

Introduction digital circuits, different logic gates, Boolean algebra, Basic block diagrams of counters and shift registers.

Principles of modulation and demodulation AM, FM and PM, Block diagrams of AM, FM transmitters and receivers. Basic instruments, VTVM, CRO etc.

B.E. (Civil Engg.) III Yr. V Semester Practical	L T P
Paper I-CE 306 L-STRUCTURES LABORATORY	0 0 3

Based on course work indicated below :

Model analysis; use of Begg's deformer.

Analysis of elastically coupled beams.

Unsymmetrical bending of beams.

Strain gauge theory and strain rosettes.

Design of under-reinforced and over-reinforced beams and their testing.

B.E. (Civil Engg.) III Year V Semester Practical	L T P
Paper II-CE 307 L-Surveying-II	0 0 2

Based on course work corresponding to CE 304 Surveying-II

B.E (Civil Engg) III Year V Semester Exam. Practical	L T P
Paper-III CE-308L—Electronics	0 0 2

Based on the course of corresponding to CE-305-Electronics

B E. (Civil Engg.) III Year V Semester Exam. Practical	L T P
(Sessional Work)	0 1 0

Paper-I CE-309L—Technical Communication
(Report Writing)

Technical Communication : Elements of Communication-
Report Writing : Investigation Report, Press Report, Feasibility
Report, Project Report, Information Report, Committee Report,
Survey Report etc.

B E. (Civil Engg.) III Year VI Semester Examination	L T P
Theory Paper I-CE-311-Design of Concrete Structures :	4 0 0

Reinforced Concrete Structures : Design of continuous beams and slabs. Design of eccentrically loaded columns and footings, combined footing and raft foundation. Design for torsion. Design of staircases, Cantilever and counterfort retaining walls; Design of rectangular, Circular and Intze Tanks.

Portal frames, box culverts, piles and piles caps, Bunkers and Silos.

Limit State Design : General principles and load factors. Ultimate load design; balanced, over-reinforced and under-reinforced modes of failure.

B.E. (Civil Engg.) III Year VI Semester Examination

Theory PaperII-CE 312 Hydraulics and Hydraulic Machines	L T P 3 1 0
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Introduction : Properties of free surface flows, types of flow in open channel; open-channel flow geometry; velocity and pressure distribution, continuity equation.

Energy Principle : Energy in open channel, specific energy principles, specific energy diagram, alternate depths, different states of flows, application of energy principle in practical problems like transition, concept of choke

Momentum Principle : Concept of specific force, specific force diagram, conjugate depths; application of momentum principle to practical problems like hydraulic jump, jump characteristics.

Critical Flow & Flow meters : Computation of critical flow in different channel sections; control section, critical flow meters, weir and flumes.

Uniform Flow : Properties and development of uniform flow, resistance to open channel flow; boundary layer development, smooth and rough channel, uniform flow formulae; efficient hydraulic section; computation of uniform flow.

Gradually Varied Flow : Dynamic equation, different types of flow profiles, methods of computation

Dimensional Analysis : Dimensions and units, non-dimensional numbers, Buckingham Pi-Theorem and its application; principles of similitude and its application to practical problems; model study

Hydraulic Machines : Absolute and relative velocities, dynamic force on curved vanes and bends, moment of momentum principle; Hydraulic turbines and their classifications; Pelton wheel and Francis Turbine, Velocity triangles, work done, efficiency, specific speed and unit quantities, centrifugal pump, velocity triangle, different heads and efficiency, unit quantities; reciprocating pump, use of air vessel.

B. E. (Civil Engg.) III Year VI Semester Examination L T P

Theory Paper III-CE-313-Indeterminate Structural Analysis 3 1 0

SUSPENSION BRIDGES AND CABLES : Bridges with two and three hinged stiffening girders.

FIXED AND CONTINUOUS BEAMS : Analysis; theorem of three moments, effect of sinking of supports.

INFLUENCE LINES : Müller-Breslau Principle and I. L. diagram for various functions of indeterminate structures like continuous beams, frames and arches.

INDETERMINATE STRUCTURES : Classification of methods of analysis, prismatic and non-prismatic members; slope deflection, moment distribution, column analogy, elastic centre, influence coefficient methods. Approximate methods. Multistoreyed frame analysis, two-cycle method, Kani's method, short-out methods in moment distribution.

Analysis of secondary stresses in pin jointed frames, concepts of unsymmetrical bending, curved beams, shear-centre and beams on elastic foundation.

B. E. (Civil Engg.) III Year VI Semester Examination L T P

Theory Paper IV-CE 314-Environmental Engineering. 3 1 0

Demand and Quality of Water : Demand for water, factors affecting demand fluctuations, prediction of future population, fire requirements.

Examination of Water : Physical, chemical, microscopic and bacteriological examination of Water.

Sources of Water : Water cycle in nature, losses and yield of water, different sources of water and their characteristics, rainfall-runoff relations with respect to a small catchment, its occurrence, distribution, estimation of runoff. Intakes.

Conveyance : Pipes and conduits for water, rising main, types and capacity of pumps, pipe joints, specials, fittings and valves, hydrants.

Purification of Water : Different types of impurities present in natural water and their effect on water quality; plain sedimenta-

tion with coagulation, flocculators and clariflocculators; theory of filtration, capacity and function of different types of filters; methods of disinfection, types of disinfectants and their applications; softening of water, methods of removing iron, tastes and odours of water; miscellaneous treatments.

Distribution of water : Distribution systems, distribution networks, distribution reservoirs, purpose, capacity and types, fittings of the distribution system and meters, service reservoirs, detection and prevention of waste, water charging methods.

Sewage : Quantities of storm water and dry weather flow of sewage, capacity of sewers, self cleansing and non-scouring velocities, calculations of sizes and grades, forms and cross sections of sewers, materials used in construction, systems of drainage, separate, combined and partially combined systems, construction of sewers, shoring trench maintenance and cleansing.

Sewer Appurtenances : Manholes, street inlets, gullies, pumping stations, storm water overflows, inverted syphons, flushing and ventilation of sewers, flushing tanks.

Characteristics of Sewage :

Sewage Treatment and Disposal : Aims and methods of sewage disposal. Disposal of sewage on land and in water, stream pollution and self purification, sewage farming, oxidation ponds: need for sewage treatment, degree of treatment required, preliminary treatment, screens, detritus tanks, grit chambers and skimming tanks; primary treatment, septic and Imhoff tanks, secondary treatment, trickling filters and activated sludge process, sludge digestion sludge drying, lagooning, burial and incineration, oxidation ditches.

House Plumbing : Sanitary fittings and appliances and their testing, traps and pipes and their testing, Syphonage, pipes ventilating and their testing, inspection chambers, intercepting traps, and disconnecting chambers.

Sanitation of Buildings: Sanitation of public and residential building, method and removal of waste matters.

Rural Sanitation: Basic principles of healthy housing, aqua earth pit and chemical privies, camp sanitation, principles of environmental sanitation.

B.E. (Civil Engg.) III Year VI Semester Examination Theory

L T P

Paper V-CE 315-Construction Technology

3 0 0

Excavation and Transporting of Earth and Rock: Earth moving principles, material, power requirement, grade and speed; earthmoving equipment, bulldozers, scrapers, loaders and wagons, compacting equipment, motor graders; excavators, shovel, hoe, drag-line, clamshell; off highway haulers-their work capacity, hourly work, operating methods and safety consideration, manufacturers in India, prices and specification.

Hoisting and Conveying Equipment: Gin pole, sheer leg, cranes, pulley block and tackles, belt conveyors, and ropeway, description and operation details.

Concrete Equipment: Specification and uses of plants for batching, mixing, transporting, placing, compacting and curing of concrete.

Drilling, and Blasting Rock : different types of drills and methods of drilling, drilling pattern, analysis of a drilling project; blasting-different kinds of blasting materials and their properties, operation techniques of blasting and their safety measures, Use of explosives.

Selection of Construction Equipment: Cost of operation of construction equipment and their economic life.

Coffor Dams : Types and construction details, dewatering, cofferdam.

Form Work : Formwork for different concrete structures.

Scaffolding, Shoring and underpinning.

Construction safety.

B.E. (Civil Engg.) III Year VI Semester Exam. Practical

L T P

Paper I-CE 316L-Structural Design

0 0 3

Based on course work corresponding to CE 311-Design of Concrete Structures.

B.E. (Civil Engg.) III Year VI Semester Exam. Practical L T P
 Paper II-CE 317L-Hydraulics & Hydraulic Machines 0 0 2
 Based on course work corresponding to CE-312-Hydraulics and
 Hydraulic Machines.

B.E. (Civil Engg.) III Year V; Semester Practical L T P
 Paper III-CE 318L-Concrete Technology Laboratory 0 0 2
 Based on Course Work indicated below :

CEMENT : Normal consistency, initial setting and final setting times, soundness, tensile and compressive strengths and specific gravity etc.

AGGREGATE : Fineness modulus, combined unit weight, sieve analysis for grading, crushing strength, impact strength of and bulking sand etc.

CONCRETE : Workability tests—slump, Vee-Bee and compaction factor tests; compressive, tensile and flexural strengths; design of concrete mixes.

Testing of R.C.C. beams.

B.E. (Civil Engg.)—VI Semester Exams Practical L T P
 Paper IV CE-319L-Computer Programming 0 2 2

Computer languages; basic concepts of Fortran language; arithmetic expressions; simple input and output statements; flow charts; loop instructions; format statements-I, F, E, X, H, T field specifications; transfer of control statements—GO TO, arithmetic IF, logical IF, Do statement; subscripted variables. Date and Type statements; The statement function; Function Subprogram; Subroutine Sub-program; Common and Equivalence statement; Logical operations.

Writing of programs to compute simple problems like evaluation of functions, summation of series, solution of equations by Newton-Raphson method, calculation of statistical characteristics, evaluation of definite integrals, simple operations on matrices, solution of ordinary differential equations etc.

B.E. (Civil Engg.) III Year VI Semester Practical (Sessional Work)

Paper I-CE 320L-Survey Camp held after V Semester.

B.E. (Civil Engg.) IV Year VII Semester Examination L T P
 Theory Paper I-CE 401-Transportation Engineering 4 1 0

Railways : History of railways in India; alignment, survey and project-reports; geometric design-cross sections, gradients, curve ; creep ; of rails tractive effort and tract resistance, plate laying and track maintenance, railway station yards and equipment, signals and interlocking; modernisation of track for high speed.

Roads : History of roads and road construction, road planning, surveys and project estimates, geometric design of highways; soil stabilised roads, flexible pavements and bituminous road, rigid pavements; introduction to traffic engineering, traffic surveys, parking, intersection signs, signals and markings, road accidents; highway maintenance.

Tunnelling : Advantages and economics of tunneling, tunnelling surveys; design of tunnels; method of tunnelling in soft strata, methods of tunnelling in rocks tunnel support and lining, tunnel ventilation, dust prevention and lighting.

Air Ports: Developments of air transport in India, International Civil Aviation Organisation (ICAD). Classification and standards; location, planning and design of runways; flexible and rigid runway pavements; aprons and taxi track; planning requirement and facilities for air port terminal area; typical layout of airport; marking and lightening of airport.

Docks & Harbours: Historical development of ports, harbours and docks; tides winds and waves; types of harbours, types of docks; break waters classification and types; Jetties and wharves.

B.E. (Civil Engg.) IV Year VII Semester Examination L T P
 Theory Paper II—CE 402—Design of Steel Structures 4 1 0

Tension and Compression Members : Design of lug angles, design of built-up compression members subjected to axial and bending moments; battens and lacings; design of roof trusses

Column Bases Gussetted slab-base and base connections.

Beams and Plate Girders : Design of beams, built-up beams and plate girders; economical section; stiffeners, curtailment of flange plates. Splicing of web and flanges. Design of crane girders.

Bridges : General considerations for road and railway bridges.

Various loads and forces considered in design. Design of bearings for bridges.

Plastic Design : Principles of plastic analysis, plastic modulus, shape factor, plastic hinge, and redistribution of moments.

Design of continuous beams and portal frames.

B.E. (Civil Engg) IV Year VII Semester Examination L T P

Theory Paper—III—CE—403—Irrigation Engineering 3 1 0

Irrigation principles and practices : Necessity and extent of irrigation in India, Principal Indian crops and their seasons, basic soil-water-plant relation, consumptive use, depth and frequency of irrigation, method of application, irrigation efficiency. Common irrigation practice in India, Irrigation management

Storage Works : Major Indian river valley projects, classification of dams, selection of type and site, design criteria for earth and rockfill dams and their construction details; seepage and foundation treatment in earthen dam; forces on gravity dam, stability criteria and two-dimensional design of concrete gravity dam; foundation treatment, joints and galleries.

Diversion Works : Types of diversion works, different parts and their function; principles of design of major components, silt exclusion, determination of uplift in weir over permeable foundation by Bligh's and Khosla's theory, by flownet, safety against exit gradient and piping failure.

Spillways and Energy Dissipation : Different types of spillways, spillway capacity, design principles of Ogee-type spillway, coefficient of discharge for spillway; different methods of energy dissipation, hydraulic jump characteristics, design principle of jump-type and bucket type energy dissipators.

Irrigation Canals and Canal Structures : Classification of land, crop pattern and crop ratio, intensity of irrigation, gross and net duty, determination of canal capacity, canal alignment, ridge and contour canals, balancing depth, fixing F.S.L. of canal, design of canal section by Lacey's and Kennedy's regime theories, and by tractive force theory; design of lined canals, lining materials and drainage; brief description, necessity and functions of various canal structures e.g. falls, regulators, cross-drainage works, outlets, slit ejectors, escapes and service reservoirs.

Lift Irrigation : Methods of lifting ground and surface water, construction and maintenance of wells.

Drainage and Reclamation : Seepage in canals, waterlogging, salinity and alkalinity, reclamation of land, design principles of surface and sub-surface drainage, planning for conjunctive use of surface and sub-surface water.

Flood Control & River Training Works : Floods in major Indian river basins, flood damage; causes & remedial measures, principle of sediment transport; necessity, principles and methods of river training; description and design outline of important river training works e.g. spurs and groyens, embankment, guide bundhs.

B.E. (Civil Engg.) IV Year VII Semester Examination L T P
 Theory Paper IV—CE 404—Design of Environmental 2 2 0
 Engineering Works
 Design of Intake Structures

Design of small plants such as infiltration wells and galleries etc.

Design and arrangements of water purification plants—screens, aerators; plain sedimentation, mixing, coagulation and flocculation tanks : rapid and slow sand filters with all major components, softening unit; Arrangement of various units—conventional, others.

Design of storm and sanitary sewers—hydraulic elements, computation of flow rates in pipe : calculation of sizes and grades, cross sections of sewers.

Design and arrangement of sewage treatment plants—Detritus tank, grit chamber, skimming tanks, primary units, trickling filter,

activated sludge units, sludge digestion tank, sludge drying beds. Layouts of various units, package treatment plants.

Design of septic tanks and Imhoff tanks.

Design of small plants such as oxidation ponds, oxidation ditches etc.

Design of house plumbing systems.

Design of distribution system for water, distribution Reservoir, optimization of pipe design.

B. E. (Civil Engg.) IV Year VII Semester Examination L T P
Theory Paper V--CE 405-Works Management & Specifications 3 0 0

Construction Management : Management defined.

Planning Plant layout and construction logic of projects, Bar-chart planning; C.P.M./PERT planning. Schedules for labour, materials and equipment. Limitations of planning efforts, measure for making planning effective.

Organisation—types, principles. organisation chart for a construction project.

Staffing recruitment, training and evaluation of managers.

Direction motivation, communication, leadership.

Control—Progress control, cost control, quality control, operations research.

Public Works Administration : P.W.D. organisation set-up, outline of P.W.D. system of accounts. Classes of works in P.W.D. Estimates, sub-head, sub-works, administrative approval, technical sanction, possession of funds, expenditure sanction; Various methods of executing works; Types of contracts, notice inviting tenders, Contract document, disputes and arbitration.

Works Accounts : Muster roll, measurement book, cash book, imprest, temporary advance, work diary expenditure returns, classification of stores, stock, receipt and issue of stores, authority of issue, filling the indent, materials at site account, road metal, tools and plant receipt and issue, surplus and shortage.

Specifications : General and detailed specifications for important civil engineering works.

Construction Labour : Trade Unions, trade union act, labour welfare, payment of wages act, minimum wages act, workmen's Compensation act, contract labour act.

Technical Report Writing : Types, procedures and methods.

B.E. (Civil Engg.) IV Year VIth Semester Exam. L T P

Practical Paper I-CE 406L-Transportation Engg. 0 0 2

Based on course work corresponding to CE 401-Transportation Engg.

B.E. (Civil Engg.) IV Year VII Semester Exam. Practical L T P

Paper II-CE 407L-Irrigation Engineering. 0 0 2

Based on course work corresponding to CE 403-Irrigation Engg.

B.E. (Civil Engg.) IV Year VII Semester Exam. L T P

Practical Paper III-CE 408 L-Environmental Engg. 0 0 2

Based on course work corresponding to CE 314-Environmental Engg.

B.E. (Civil Engg.) IV Year VII Semester Examination

Practical Paper IV-CE-409L-Practical Training held after VI Semester. L T P

Project : (For Syllabus see CE-414L) 0 0 3

(No examination)

B.E. (Civil Engg.) IV Year VIII Semester Examination L T P

Theory Paper I/II-CE 411/412-Advanced Engg. Geology 4 0 2

Geologic structure as a tool to geomorphic concepts, features, drainage patterns, Importance of various rock types in Civil Engineering. Mechanics of fold, faults and joints. Detailed geological and related consideration in the Engineering Projects like dams, reservoirs, tunnels, highway, foundation etc. Earthquake proof construction, ground water problems related to various engineering projects. Soil formation, genetic classification soil erosion, preventive measure, general study of soil groups of India. Study of case histo-

ries of various Engineering projects. Study of proposed sites to establish feasibility of construction of proposed structure.

- (2) B.E. (Civil Engg.) IV Year VIII Semester Examination L T P
Theory Paper-I/II-CE 411/412-Advanced Mechanics of Fluid and Sediment Motion. 4 0 2

Basic potential flow and their superimposition. Navier-Stoke's equation and its approx. solution. Introduction to turbulence, Reynold's stresses. Boundary-layer characteristics and solution, Resistance equation and universal velocity profile, element of pipe network design, Introduction to water hammer.

Mechanics of sediment motion, bed load and suspended load, total load, resistance of alluvial channel, silting and scouring, Regime theories.

- (3) B.E. (Civil Engg.) IV Year VIII Semester Examination LTP
Theory Paper I/II-CE-411/412-Advanced Structural Analysis. 4 0 2

Kinematic and Static Indeterminacy, Stiffness and flexibility matrices—Application to structural problems.

Beams curved in plan and elevation.

Beams on elastic foundations.

Group relaxation method, kani's method for complex multi-storeyed frames.

Introduction to Finite Element method.

Analysis of fixed arches (Concepts only).

- (4) B.E. (Civil Engg.)₁ IV Year VIII Semester Examination LTP
Theory Paper I/II-CE 411/412-Advanced Structural Design 402
YIELD LINE THEORY OF SLABS: Theorems of upper bound and lower bound.

Method of virtual work for design. Design of slabs.

LIMIT STATE DESIGN: R.C.C. beams. Ultimate load design of R.C.C. columns subjected to axial loads and bending moments.

SHELLS AND FOLDED PLATES: Cylindrical shells. Analysis and design of folded plates by Simpson's and Whitney's methods.

- (5) B.E.(Civil Engg.) IV Year VIII Semester Examination L T P
Theory Paper I/II-CE 411/412-Bridge Engineering 4 0 2

Selection of site, alignment, economic span, waterway, scour depth and afflux. Depth of foundations, Design of wells, piers and abutments.

Classification of bridges based on materials and types of construction Erection of Bridges.

I.R.C. classification of loads, codes of practice for R.C.C. and Steel bridges. Concept of concentrated loads on slabs. Methods of loads distribution on longitudinal girders.

Design of components for the following type of bridges :

Slab, T-Beam and Balanced cantilever R.C.C. bridges.

Introduction to suspension bridges and cable stayed bridges.

Trussed steel bridges and counter bracings.

- (6) B.E. (Civil Engg.) IV Year VIII Semester Examination
Theory L T P
Paper I/II-CE 411/412 Building maintenance. 4 0 2

Nature and importance of Building Maintenance.

Building Maintenance problems and their solution : Maintenance of building surrounding, wall claddings, brick work, stone work, structural frames, Dampness penetration, water proofing of leaking basements; maintenance of floors, stairs, roofs, plaster work, external renderings, internal finishing lazing. Maintenance of wooden journey, corrosion of metals, maintenance of plumbing, electrical installations, lifts, refuse collection, drainage, safety, security, fire precautions, cleaning, sound insulation, thermo insulation, vibration, Alterations and improvements, specifications, measurement, pricing financing of maintenance work

Execution of Maintenance Work : Choice between direct and contract labour, programming, organising and training for

maintenance work. Maintenance incentive scheme. Supervision of Maintenance works.

Practicals (year work) ; Based on course work in theory.

- (7) B. E. (Civil Engg.) IV Year VIII Semester Examination L T P
Theory Paper I/II-CE 411/412-Environment Pollution & 4 0 2
Control

Principles involved in the protection of the Environment, sanitation of dwelling houses, land pollution and its control.

Air borne diseases and their control, sources of pollution, occupational health.

River pollution and control of water pollution.

Environmental considerations of ventilation, air conditioning and illumination.

Sample collection and sampling devices; mathematical modelling.

Industrial wastes, it's classification and characteristics.

- (8) B. E. (Civil Engg.) IT Year VIII Semester Examination L T P
Theory

Paper I/II CE 411/412-Environmental Sanitation 4 0 2

Environment, it's effects on public health; refuse collection and disposal.

Sanitation of swimming pools and bathing places;

Sanitation of public places of assembly and other public buildings;

Sanitation of camps and fairs.

Sanitation problems attributed to natural calamities such as floods, fires, cyclones etc.

Diseases of industrial origin and its control.

Rural sanitation.

- (9) B. E. (Civil Engg.) IV Year VIII Semester Examination L T P
 Paper I/II-CE 411/412-Numerical Analysis. 4 0 2

Errors in arithmetic operations, simple expressions and functions, solution of linear algebraic equation; Gauss-Seidel iterative method, Grout's method.

Roots of non-linear algebraic and transcendental equations direct iteration, regula falsi, Newton-Raphson methods.

Finite differences : Forward and central, Interpolation and polynomial approximation : Newton's Stirling's Bessel's and Lagrange's formulae, numerical differentiation, numerical integration : trapezoidal, Simpson's rule.

Solution of ordinary differential equation : initial value problems of first and second order : Taylor's Runge-Kutta and Milne's predictor-corrector methods, initial value problems for the nth order differential equations.

- (10) B. E. (Civil Engg.) IV Year VIII Semester Examination
 Theory L T P
 4 0 2

Paper I/III-CE 411/412--Advanced Mathematics

Partial Differential Equations

Partial Differential Equations; Lagranges' Equation, Standard forms, Charpit's method. Second Order Linear Equations. Boundary Value Problems, Method of separation of variables; Wave Equation, Heat Conduction, Equation, Laplace Equation.

Integral Transforms

Laplace Transforms : Review of Laplace Transforms, Laplace Transform of Periodic, Unit Step and Impulse Functions, Application to Partial Differential Equations.

Fourier Transforms : Fourier, Sine and Cosine Transforms; Inversion formulae. Evaluation of Integrals, Application to Partial Differential Equation.

Probability and Statistics

Random variable, Probability, Binomial, Poisson and Normal Distributions. Confidence Interval: Testing of Hypothesis.

(11) B.E. (Civil Engineering) IV Year VIII Semester Examination
Theory L T P
4 0 2

Paper I/II—CE 411/412—Stress Analysis

Theory of Electricity: Stress tensor, equation of equilibrium, equations of compatibility, boundary condition.

Airy's stress function. Typical applications.

Torsion of non-circular prismatic bars. Membrane analogy.

Photoelasticity: Stress-optic laws. Polariscopes. Model materials. Photoelastic data recording. Applications of two-dimensional analysis. Secondary principal stresses. Stress-freezing. Applications of three-dimensional analysis. Nisida technique for solving torsion problems.

B.E. (Civil Engg.) IV Year VIII Semester Examination

Theory L T P

(12) Paper I/II—CE411/412-Traffic Engg. 4 0 2

Roadusers and their characteristics, vehicle and vehicular characteristics, road characteristics.

Traffic census or traffic surveys, traffic volume, study, cycle variation in traffic volumes, 30th highest hourly volume, traffic projection factor.

Origin and destination studies, roadway capacity studies.

Parking stall, parking areas, parking lots and parking garages.

Road accident studies, traffic regulations, traffic control, devices investigation.

Clover leaf, by-pass, ribbon-development.

Street and highway lighting.

(13) B.E. (Civil) Engg.) IV Year VIII Semester Examination Theory
L T P

Paper I/II-CE 411/412-Water Resources Engineering. 4 0 2

Evaluation, Planning and Development of Water Resources; Application and Management of Water Resources in the areas e.g. Irrigation, Hydropower, Navigation; Water power development. Reservoir operation.

- (14) B.E. (Civil Engg.) IV Year VIII Semester Examination Theory
Paper I/II-CE 411/412-Advanced Building Construction.

L T P

Law Cost Housing

4 0 2

Materials techniques and processes which result in—Economy in cost of construction, saving of scarce materials like steel and cement, saving in time of construction of buildings.

Prefabricated Construction :

Philosophy, detailing and construction techniques of prefabricated components of buildings.

Construction skills :

Developing skill in activities such as bar bending and assembling of reinforcement. Assembly of related form work and concreting. Manufacturing of prefabricated components on a commercial basis-Study of improved productivity techniques.

Management Techniques for Housing Project and High Rise Buildings :

Planning, execution, monitoring and construction of Building.

- (15) B.E. (Civil Engineering) IV Year VIII Semester Examination
Theory

L T P

Paper I/II-CE 411/412-Materials Science

4 0 2

Potential energy (linear) elasticity. Processes of atomic slip. Frank-Read sources. Carbon atmosphere, Avalanche of dislocations (yielding), "Jog" formation (strain hardening), Plastic instability. Ductile fracture.

Entropy (nonlinear) elasticity. Amorphous and network polymers. Viscoelastic process.

Atomic diffusion at high temperature (creep). Intergranular and intragranular fracture. Creep-resistant alloys.

Silicate glass, Brittle fracture.

Ductile—brittle transition.

Brittle fibre-brittle matrix lamina, Parallel and series models, Halpin-Tsai formulation.

- (16) B.E (Civil Engg.) IV Year VIII Semester Examination L T P
Theory Paper I/II-CE 411-412-Advance Geotechnical Engg.
4 0 2

Failure Envelopes : Mohr-Coulomb, Tresca, Van-Mises, considerations for cohesive and cohesionless soils.

Special Soils : Sensitive clays, loessic soils. Bouldary soils, Expansive soils etc.

Geo-exploration techniques : Methods of soundings, field vane shear test, pressure meter for determination of modulus of elasticity.

Geotechnical Instrumentation : Pressure cells, pore pressure measuring devices, settlement indicators, instruments to measure lateral movements etc.

Soil Dynamics : Behaviour of soils under dynamic loads, Design of simple machine foundations.

Deep Foundations : Design of pile groups, Analysis and design of caissons.

Underground Structures : Shafts, tunnels and conduits-their design considerations.

Rock Mechanics : Foundation on rocks, Tunnels in different rocks.

Structural Design Considerations : Footings, Rafts and rigid pavements,

- (17) B.E. (Civil Engg.) IV Semester Exam. L T P
Theory Paper I/II C E 411-412 Earthquake Technology 402

Introduction of Engineering seismology, Seismic Zoning Map Vibration Analysis of Structures, Response Spectra, Modal Analysis, Dynamic Properties of Materials, Design Philosophy and Design Principles.

Details of Earthquake Resistant design and construction of buildings and other structures like water tanks, chimneys, dams etc. as per Indian Codal Provisions.

Introduction to otherdynamic loads like Wind, Blast and machine loads.

References :

1. Krishna Jai, Chandrasekaran A.R. and Chandra B. Elements of Earthquake Engineering.
2. Manual of Non Engineered Earthquake Resistant construction, published by International Association of Earthquake Engineering and reproduced by Indian Society of Earthquake Technology.
3. IS : 1893 - 1994
4. IS : 4326 - 1993
5. IS : 13827 - 1993
6. IS : 13828 - 1993
7. IS : 13935 - 1993
8. IS : 13920 - 1993

B.E.(Civil Engg.) IV Year VIII Semester Examination

Theory Paper III-CE 413-Design of prestressed concrete and Timber structures.

L T P

4 0 2

Prestressed Concrete : Principles, methods and systems of prestressing, high tensile steel and high strength concrete, losses of prestress. Single line of prestressing.

Flexural, shear and torsional resistance of prestressed concrete sections.

Pretensioned and post-tensioned members. transfer of prestress. anchorage zone block and stresses in this zone.

Design of poles and railway sleepers.

Design of prestressed concrete sections.

Design of pretensioned and post-tensioned flexural members.

Timber : Introduction, permissible stresses. Design of tension members, beams and columns, Built-up sections.

Frame, bolted and nailed joints. Ring connections.

B.E. (Civil Engg.) IV year VII & VIII Semester Examination

L T P

VII. Sem. 0 0 3

Practical Paper I-CE 414L-Project

VIII. Sem. 0 0 6

Planning, investigation, analysis, design and preparation of project report for civil Engineering works from one of the following disciplines :—

- (i) Structural Engineering
- (ii) Water Resources Engineering
- (iii) Environmental Engineering
- (iv) Construction Technology
- (v) Transportation Systems Engineering.

B.E. (Civil Engg.) IV year VIII Semester Examination L T P
 Practical Paper II-CE 415E-Planning of Civil Works. 0 1 3
 Principles of planning and layout of buildings; National building code, other building bye-laws, land use.

Layout of Civil Engineering complexes such as Housing, Schools, hospitals, auditorium, swimming pool, shopping centre, centre, commercial and administrative buildings.

Planning of Water Resources project, cost benefit analysis; planning of a single purpose irrigation, water power and flood project Systems approach to water resources planning of dual purpose project Introduction to linear and dynamic programming in Planning of projects; Introduction to decision Theory-decision tree.

Planning of rural and urban water supply Schemes; Introduction to pipe network analysis for water distribution systems.

B.E.(Civil Engg.) IV year VIII Semester Examination
 Practical Paper III-CE-416:—Practical Training held after VII Semester.

B.E.(Civil Engg.) IV year VIII Semester Examination L T P
 (Sessional Work) 0 1 0
 Practical Paper -I-CE-417L-Technical Communication
 (Group discussion & Public speaking)

Elements and practice of speech making : Spoken at seminars- Group Discussions—Elements of Speaking in Group and in Public- Public speaking at seminars, Panel discussion, Letteures etc.