B-TECH CIVIL ENGINEERING
IV SEMESTER

Code	Subjects
	Theory
CE310	**Mathematics-IV**
CE311	**Concrete Technology**
CE312	**Engineering Geology**
CE313	**Mechanics of Solids-II**
CE314	**Hydraulics and Hydraulic Machinery**
CE315	**Surveying-II**
	Practical
CE316	**Survey Lab-II**
CE317	**Material Testing Lab-II**
CE318	**Engineering Geology Lab**
CE319	**Physical Education**

CE 310 MATHEMATICS-IV

Unit – I

Partial Differential Equations: Formation of PDE by elimination of arbitrary constants and arbitrary functions - General, singular, particular and complete integrals - Lagrange's linear first order equation - Higher order differential equations with constant coefficients.

Unit – II

Solution of partial differential equation by the method of separation of variables - Boundary value problems - Fourier series solutions - Transverse vibration of an elastic string.

Unit – III

Fourier series solution for one dimensional heat flow equation - Fourier series solutions for two dimensional heat flow equations under steady state conditions (Cartesian and polar forms).

Unit - IV

Applied Statistics: Curve fitting by the method of least squares- fitting of straight lines, second degree parabolas and more general curves. Test of significance: Large sample test for single proportion, difference of proportions, single mean, difference of means, and difference of standard deviations.

Unit - V

Small samples: Test for single mean, difference of means and correlation coefficients, test for ratio of variances - Chi-square test for goodness of fit and independence of attributes.

Text Books

1. Venkataraman M.K., Engineering Mathematics, Vol II & III, The National Publishing Company, Madras (2007).

2. Gupta C . and V.K.Kapoor, Fundamentals of Mathematical Statistics, Sultan Chand and Sons, New Delhi (2008).

Reference Books

1. Bali N.P. & Manish Goel, A Text Book of Engineering Mathematics, Laxmi Publications,

2. New Delhi 2008.

3. Erwin Kreyszig, Advanced Engineering Mathematics, Wiley Eastern Ltd. (2005).

4. Grewal B.S., Higher Engineering Mathematics, Khanna Publishers, Delhi (2008).

CE 11 CONCRETE TECHNOLOGY

Unit – I

Portland cement – chemical composition – hydration of Portland cement – heat of hydration – hardening of cement paste – types of Portland cement – special hydraulic cements.

Unit – II

Aggregates – natural and mineral aggregates – characteristics of aggregate and their significance – testing of aggregates – admixtures for concrete – concrete at early ages – workability of concrete – early volume changes – setting time.

Unit – III

Concrete – introduction – components of concrete – types – properties of hardened concrete and their significance, structure of the hardened concrete - Compressive strength of concrete and factors affecting it – elastic behaviour of concrete – drying shrinkage and creep.

Unit – IV

Durability of concrete – significance – causes of concrete deterioration – alkali-aggregate reaction – deterioration by chemical actions – concrete in marine environment.

Unit – V

Concept of proportioning concrete mixes – mix design – IS code method – ACI method. Testing, evaluation and control of concrete quality.

Text Books

1. Mehta, K.P., Concrete – microstructure, properties and materials, TMH, 2008.

2. Shetty,M.S. , Concrete Technology, Chand & Co., New Delhi,2006.

Reference Books

1. Gambhir,M.L., Concrete Technology, Tata McGraw Hill Co., New Delhi,2002

2. Neville,A.M. , Properties of Concrete, Longman, Indian reprint 2000.

3. Neville,A.M.& Brooks J.J., Concrete Technology, Pearson Education, Indian reprint 2002.

4. 4.Krishnaraju,N., Design of Concrete Mixes, CBS Publishers , New Delhi,2002.

5. IS : 10262-1982, Recommended Guidelines for Concrete Mix Design, BIS, NewDelhi.

CE 312 ENGINEERING GEOLOGY

Unit-I

General Geology: Scope of geology in Civil Engineering - the earth, its structure and environment - physiographic, stratigraphic and tectonic divisions of India - geomorphological (surface) processes – weathering – types , weathered products, assessment of degree of weathering , Fluvial processes, glaciation, wind action, and their significance in Civil Engineering – earthquake, its causes, classification, earthquake zones of India, Geological considerations for construction of buildings.

Unit-II

Mineralogy: Physical properties of minerals – classification - study of important rock forming minerals – Quartz family, feldspar family, Augite, Hornblend, Mica family, calcite, Iron oxide minerals, Augite, Hornblend, and Clay minerals and their behaviour and significance in the field of Civil Engineering .

Unit-III

Petrology: Classification of rock - mode of formation - distinction between igneous, sedimentary and metamorphic rocks - Physical and Mechanical properties of rocks-. Study of important rocks - granite, syenite, diorite, gabbro, pegmatite, dolerite , basalt , sand stone, limestone, shale, breccia , conglomerate , gneiss, quartzite, marble, slate, schist, phyllite and conglomerate - role of petrology in the field of construction.

Unit-IV

Structural Geology and Geophysical methods: Attitude of beds - out crops, study of structures such as folds, faults, joints, unconformities in lier and out lier their brief classification and their bearing on engineering construction – principles of geophysical methods, electrical resistivity method , seismic method and its applications in civil engineering

Unit-V

Geology and construction: Role of geology in site investigation , Geotechnical classification of rock, geological considerations in open excavation, tunnels and dam site, reservoir site, buildings, road cuttings, study of air photographs and satellite images and interpretation for civil engineering projects, landslides its causes, classification and preventive measures, groundwater-types of aquifers , properties of geological formations affecting groundwater and its role as a geological hazard.

Text Books

1. Parbin Singh, "Engineering and General Geology ", Katson Publications House, 2001.

2. Venkata Reddy,D.," Engineering Geology for Civil Engineers", Oxford & IBH , 1995

Reference Books

1. Leggot, R.F.," Geology and Engineers ", McGraw Hill , New York.2002

2. Blyth, F.G.M., " A Geology for Engineers", Arnold, Londo,(2003.

3. Bell.F.G, " Fundamentals of Engineering Geology" Butterworth, 1983.

CE 313 MECHANICS OF SOLIDS-II

Unit – I

Deflection of beams – Macaulay's method, moment area method -conjugate beam Methods.

Unit – II

Strain energy due to axial, bending, shear and torsional forces – Impact loads. Principle of virtual displacement – principle of minimum potential energy –Castigliano's Theorems – Maxwell – Betti's theorem.

Unit – III

Deflection of trusses and frames – strain energy and dummy/unit load methods.

Unit – IV

Analysis of continuous beams using generalized theorem of three moments – shear force and bending moment diagrams. Unsymmetrical bending – principal moments of inertia – stresses due to unsymmetrical bending.

Unit – V

Complex strains – linear strains for tri-axial state of stress – principle strains in terms of stress – Mohr's strain circle – relationship between Mohr's strain and stress circles – Rosette analysis. Theories of failure – Brittle and Ductile materials.

Text Books

1. Bhavikatti. S. S., Strength of Materials, Vikas Publishing House (P) Ltd., New Delhi, Second Edition, 2002.

2. Bhavikatti. S. S., Structural Analysis – I, Vikas Publishing House (P) Ltd., New Delhi, Second Edition, 2002.

3. Punmia. B. C., Jain, A. K., and Jain, A. K., Strength of Materials and Theory of Structures, Vols. I & II, XI Edition, Laxmi Publications (P) Ltd, New Delhi, 2002.

CE 314 HYDRAULICS AND HYDRAULIC MACHINERY

Unit – I

Open Channel flow: Types of flow, Types of Channel, Velocity distribution, Chezy, Manning and Basin formulae, for uniform flow, Most economical section , critical flow ,Specific energy, specific force. Computation of uniform flow and critical flow.

Unit-II

Open channel flow: Non-Uniform flow, Dynamic equation for Gradually varied flow, computation for length of backwater curve, Rapidly Varied flow - hydraulic jump, types, uses. Surges in open channels.

Unit-III

Basics of Turbo machinery : Impulse momentum equation, Hydrodynamic forces of jets on vanes, velocity Triangles, Angular momentum principle, application to radial flow turbines.

Unit-IV

Turbines: Classification, impulse and reaction turbines, characteristic curves, draft tubes, governing of turbines, specific speed, unit quantities concept, similarity, cavitation,

Unit-V

Pumps: Centrifugal pumps - classification, work done, minimum starting speed, losses and efficiencies, specific speed, multistage pumps, specific speed, characteristic curves, NPSH, Cavitation in pumps. Reciprocating pumps - types, effects of acceleration and frictional resistance, separation, Air vessels, work saved by fitting air vessels.

Text Books

1. Modi, P.N., and Seth, S.M., Hydraulics, Fluid Mechanics and Hydraulic Machines, Standard Book Home, New Delhi, 2005.

2. Rajput,R.K., Text Book of Fluid Mechanics and Hydraulic Machinery, S.Chand & Company, Ltd., New Delhi, 2005.

Reference Books

1. Douglas, J.F., Gasiorek, J.M and Swaffield, J.A., Fluid Mechanics 4th Edn. Pearson
Education India, 2002.

2. Das M.M Fluid Mechanics and Turbimachines , Prentice Hall of India (P) Ltd New Delhi, 2008.

3. Arore, K.R Fluid Mechanics, Hydraulic and Hydraulic Machines , Standard Publishers and Distributors , New Delhi , 2005

CE 315 SURVEYING-II

Unit-I

Theodolites description and uses- temporary and permanent adjustments of Theodolite – horizontal angles – vertical angles – Trignometrical Levelling – Base of the Object Accessible – Inaccessible :for instruments at same and different plane of observation

Unit-II

Tacheometric surveying –Principle of stadia measurement –Basic systems of tacheometric measurement - Determination of Tacheometric measurements – subtense bar – Errors in tacheometry

Unit-III

Setting out curves: Horizontal curves – Elements of a circular curve and notations –Designation of a curve – Setting out a simple circular curve – Compound curve – Reverse curve – Transition – vertical curve .

Unit-IV

Horizontal and vertical control, triangulation - Classification of triangulation system, network, signals, satellite stations - base line measurement - corrections, extension of base- Theory of error and adjustments - true and most probable value, residual error, weighted observation, principle of least square, normal equations, correlatives, adjustment of simple triangulation figure, station and figure adjustment

Unit-V

Hydrographic surveying – shore line measurement, soundings – tides and tide gauge – Mine surveying- Equipment for Mine survey- station and station markers – measurement of distance and difference in elevation- Introduction to– EDM and total station – Remote sensing – GIS

Text Books

1. Punmia,B.C., Surveying, Vol I & II, Laxmi Publications, 1998.

2. Duggal, S.K., Surveying, Vol.I & II, TMH Publications, 2000.

Reference Books

1. Kanetkar, T.P., and Kulkarni,S.V., Surveying and Levelling, Part I & Part II , United book Corporation, Pune. 1998.

2. Shahani, P.B., Text book of Surveying, Vol.I & II, Oxford & IBH Publications, 1998.

3. Lillesand,T.M.,and Kiefer R.W., Remote sensing and Image Interpretation, John Wiley and Sons, Inc, New York,1997.

4. Paul.R. Wolf Elements of Photogrammetry with air photo interpretation, McGraw –Hill, International Book Company, Japan, 1993.

5. Rueger,J.M. Electronic Distance Measurement, Springer – Verlag, Berlin,1990.

CE 316 SURVEY LAB-II

(A) List of Field Work

1. Study of Theodolite, Measurement of horizontal angle (Repetition and reiteration), Measurement of Vertical angle.

2. Theodolite closed traverse, plotting and adjustment.

3. Heights and Distances (Base of the object accessible & inaccessible)

4. Heights and Distances - Instrument station in the same vertical plane

5. Heights and Distances (Base of the object in accessible - Instrument station not in the same vertical plane)

6. Determination of tacheometric constant

7. Tacheometric survey - Distance and Elevation by stadia method.

8. Tacheometric survey - Distance and Elevation by tangential method.

9. Tacheometric survey - Contouring and plotting

10. Use of Subtense bar.

11. Setting out for building.

12 .Setting out curves

(B) List of Demonsation Only

1. Interpretation of Aerial Photographs- Demonstration

2. EDM, Total Station and GPS- Demonstration

CE 317 MATERIAL TESTING LAB-II

1) Tests on Cements

Specific Gravity, Fineness, Standard Consistency, Soundness, Setting times, Compressive strength of mortar cubes.

II) Tests on Aggregates- Gradation, Modulus, Bulking of Sand, water absorption

III) Tests on Concrete

(i) Fresh Concrete: Workability Tests, Setting time, Mix Design by IS guide lines.

(ii) Hardened Concrete: Compressive and Tensile strengths, effect of w-c ratio on strength of concrete, ultimate strength of beams

IV) Non-destructive tests (demonstration only) Rebound hammer test and Ultrasonic pulse velocity test on concrete specimens.

V) Tests on Bricks and Tiles Water absorption, compressive strength and flexural strength.

CE 318 ENGINEERING GEOLOGY LAB

1. Minerology : Megascopic study of important silicate, and non-silicate minerals.

2. Petrology : Megascopic study of important igneous, sedimentary and metamorphic rocks.

3. Structural Geology : Elementary problems in dip and strike, construction and interpretation of geological sections.

4. Geophysical methods : Electrical resistivity method (not recommended for examination).

5. Aerial photographs : Interpretation of Aerial photographs. (not recommended for examination)

CE 319 PHYSICAL EDUCATION

Physical Education is compulsory for all the Undergraduate students

1. The activities will include games and sports / extension lectures.

2. Two Hrs. / Week will be allocated for physical education in the third and fourth semesters. The student participation shall be for a minimum period of 45 hours in both the semesters put together.

3. These activities will be monitored by the Director of Physical Education.

4. Pass /Fail will be determined on the basis of participation, attendance, and performance. If a candidate Fails, he/she has to repeat the course in the subsequent years

5. Pass in this course is mandatory for the award of degree.