VI SEMESTER B.E.CIVIL

5BECE001 DESIGN OF STEEL STRUCTURES

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
3	1	3	4	3	3	10	10	80	100

UNIT-I

01 Steel as a structural material, various grades of structural steel properties, various rolled steel sections (including cold formed sections, structural pipe (tube) sections) and their properties. Introduction to I. S. 800, 808, 816, 875 etc.

02 Design of axially loaded members :

(a) Tension members, (b)Compression members

03 Design of roof truss : Load assessment for DL ,LL and WL.

UNIT II.

04 Design of simple and builtup beams : Laterally restrained and unrestrained, (symmetrical as well as unsymmetrical section).Curtailment offlange plates.

SECTION – B

UNIT III.

05 Design of welded plate girder, concept of gantry girder.

06 Design of single rolled steel section column subjected to axial load and

biaxial moment including base design.

07 Design of axially loaded built up columns. Laced and battened (Column bases slab base gusseted base moment resistant bases).

UNIT IV

08. Structural Fasteners :

A. Behaviour of bolted and welded connections (types, Designations, properties, permissible stresses), failure of bolted and welded joints. Strength of bolt and strength of weld. Efficiency of joints. Design of simple bolted and welded connections. Moment resistant bolted and welded connection. (bending and torsion)
B. Design of connection : Beam to beam, beam to column :framed connection.

Term work :-

Minimum two design assignments based on above topics along with the

detailed structural drawings on A2 size sheets.

6BECE002: STRUCTURAL ANALYSIS-II

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
3	1	3	4	3	3	10	10	80	100

Unit-I

01. Kani's Method applied to symmetrical and unsymmetrical frames with sway (Up to single bay Two story).

UNIT-II

02. Approximate method Structural analysis for multi-storeyed frames with lateral loads(Portal and Cantilever method), Approximate methods for vertical loads i.e. Substitute frame method etc. (Max three bay three storey).

UNIT-III

03. Column Analogy method, Applications to beams, Calculations of Stiffness factors and carry Over factors for non-prismatic method, Analysis of non-prismatic fixed beams

UNIT-IV

04. a) Introduction to Flexibility Method of structural analysis, influence coeffcients, Choice of base determinate structure and redundant forces, compatibility equations. Hand solution of simple beam problems.
b)Moment distribution applied to frames with sway (upto single storey

tow bay)

UNIT-V

05. Strain energy method applied to simple composite structures (Simple problems),Introduction to basic theory of elasticity, Concept of stress, strains, strain displacement Relationship, equation of equilibrium, boundary conditions, generalized Hooks low, plane Stress and plane strain problems.

UNIT-VI

06. Theory of photoelasticity applicable to beams. Study of various types of strain gauges, Analyses of strains by strain Guage.

LIST OF PRACTICALS

Minimum 10 of the following

1. To find the slope and deflection of the continuous beams.
2. To find the value of flexural rigidity (EI) for a given beam & compare it with theoretical value
3. To determine the moment required to produce a given rotation at one end of the beam when the other end is (I) pinned (2) fixed.
4. To study the behavior of different types of struts and to calculate the Euler's buckling load for each case
5. To verify the Maxwell's reciprocal theorem for beam.
6. To measure the strain in the cantilever beam with the help of acoustic strain gauge.
7. Study the various types of strain gauges.
8. Plotting the influence lines by making use of Muller Breslau principle.
9. Determination of deflection of trusses by Willot-Mohr's diagram.
10. Determination of material fringe value.
11. Determination of stress in beams by photoelastic method
12. To find horizontal thrust and to draw the influence line for horizontal thrust for two hinged arch .
13. To calculate horizontal deflection at roller end in two hinged arch.
14. To measure the strain in the cantilever beam with the help of electrical resistance strain gauge.
15. To determine horizontal thrust for indeterminate portal frame
16. Study of Polariscope.

6BECE004 : GEOTECHNICAL ENGINEERING-II

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
2	1	0	3	2	3	10	10	80	100

Unit-I :

GEOTECHNICAL EXPLORATION:

Importance and objectives of field exploration, principal methods of Subsurface exploration, open pits & shafts, types of boring, number, location and Depth of boring for different structures, type of soil samples & samplers. Principles of design of samplers, collection & shipment of samples, boring and Sampling record. Standard penetration test, corrections to N-Values & correlation For obtaining design soil parameters.

GROUND IMPROVEMENT:

Method of soil stabilization use of admixtures (lime, cement, flash) in stabilization. Basic of reinforced earth, use of geosynthetic materials Salient features, Function and applications of various geosynthetic matarials. vibroflotation, sand drain Installation.pre-loading.

Unit-II:

STABILITY OF SLOPES:

Causes and types of slope failure, stability analysis of infinite slopes and finite slopes,ϕcenter of critical slip circle, slices method for homogeneous c-ϕ soil slopes with pore pressure consideration. Taylor's stability numbers & stability-charts, method of improving stability of slopes, types, selection and design of graded filters.

Unit-III:

LATERAL EARTH PRESSURE:

Earth pressure at rest, active & passive pressure, General & local states of plastic equilibrium in soil. Rankine's and Couomb's theories for earth pressure. Effects of surcharge, submergence. Rebhann's criteria for active earth pressure. Graphical construction by Poncelet and Culman for simple cases of wall-soil systems for active pressure condition.

UNIT-IV:

SHALLOW FOUNDATIONS:

Bearing capacity of soils: Terzaghi"s theory,its validity and limitations,Bearing capacity factors types of shear failure in foundation soil, effect of waterTable on bearing capacity, correction factors for shape and depth of footing. Bearing capacity estimation from N-value, factors for affecting bearing capacity presumptive bearing capacity.

Settlement of shallow foundation: causes of excessive settlement elastic and consolidation Settlement, differential settlement, control of excessive settlement proportioning The footing for equal settlement. Plate load test procedure, interpretation for Bearing capacity and settlement prediction.

UNIT- V

PILE FOUNDATION:

Classification of piles, constructional features of cast-in-situ and pre cast Concrete piles. Pile driving methods effect of pile driving on ground Load Transfer mechanism of axially loaded piles. Pile capacity by static formula & Dynamic formula, pile load test and interpretation of data group action in piles, Spacing of piles in groups, group efficiency, overlapping of stresses. Settlement of pile group by simple approach, negative skin friction and its effect on pile capacity general feature of under reamed piles._

6BECE-003 : FLUID MECANICS-II

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
3	1	3	4	3	3	10	10	80	100

UNIT-I

01. LAMINAR FLOW:

Steady uniform laminar flow in circular pipes; Velocity and shear stress distribution; Hagen-poiseuille equation.

02. BOUNDARY LAYER THEORY:

Nominal thickness, displacement thickness, momentum thickness of the

Boundary layer: Boundary layer along a long thin its characteristics; Laminar boundary layer; turbulent boundary layer; laminar sub layer: Separation of boundary layer on plane and curved surfaces

03. REAL, INCOMPRESSIBLE FLUID FLOW AROUND IMMERSED BODIES :

In general definition of drag and lift; flow past plates cylinders and

Spheres; drag on sphere, cylinder and flat plate..

UNIT-II

04. FLOW THROUGH PIPES:

Hydraulically smooth and rough pipes , Frictional resistance to flow of fluid in smooth and rough pepes; Nikurade's experiment; Moody's chart; Darcy-Weisbach & Hazen-william's equation for frictional head loss; Hydraulic gradient ad energy gradient Pipes in series and paralles; Branched pipes; Siphon; transmission of power through pipes; Hardy-cross method of pipe networks; Waterhammer pressure head due to sudden closure of valve.

UNIT-III

05. FLOW THROUGH OPEN CHANNEL:

(A) GENERAL :

Types of channel and their geometrical properties; types of flow in open

Channel

(B) UNIFORM FLOW

Chezy's and Manning's equations; Hydrazulically most effcient rectangular , triangular and trapeziodal sections; Computations of normal depth of flow conveyance of channel section factor for uniform flow, normal slope and normal discharge

(C)CRITICAL FLOW

Specific energy and it's diagram; alternate depths; Computations of critical depth, section factor for critical flow critical slope normal critical slope; Specific force and it's diagram; conditions of critical flow.

UNIT-IV

(A) APPLICATIONS OF SPECIFIC ENERY. GRADUAL TRANSITIONS OF CHANNELS
(B) GRADUALLY VARIED FLOW

Dyanamic equation for GVF; Classification and characteristics of surface profiles; Direct step method of computing profile length

(C) RAPIDLY VARIED FLOW

Defination of hydraulic jump; Equation of hydraulic jump in horizontal rectangulatr channel; Length & height of jump; Energy loss in jump; Classification of jump.

UNIT-V

06. HYDRAULIC MODELS

Difference between model and prototype; Similitude-type of similarities; Model laws-Reynolds model law and Froude model law; types of model distored, undistorted; Froude method of determining resistance to partially submerged objects like ship.

07. FLUID MACHINERY:

(A) Impact of jet stationary and moving curved vanes.
(B) TURBINES:

Definition Gross and net heads; different efficiencies; Classification of turbines; component part and working principles; of turbines on the basis of head and specific speed.

UNIT-VI

08 Centrifugal and Reciprocating Pumps

(A) CENTRIFUGAL PUMP:

Component parts; Working principle; Static ad manometric heads; different efficiencies; Specific speed; Theoretical aspects of multistage pump, pump in parallel Priming devices; Trouble & remedies; Main & operating characteristics curves. Selecting on basis of operating characteristics.

(B)RECIPROCATING PUMPS:

Components parts, Working principle, Work done of single & double acting pumps; Negative slip, Air vessels- Working principle and necessity.

VI SEMESTER SUBJECT : FLUID MECHANICS - II

SR. NO. NAME OF EXPERIMENTS (Minimum 10 Exp.)

1. Determination of Darcy-Weisbach friction factors for the given pipes.
2. Determination of Chezy's constant for an open channel.
3. Development of Specific Energy Diagram for Rectangular Channel.
4. Study of G.V.F. profile. To determine type of the surface profile and length of the surface profile.
5. Study of Hydraulic Jump in a horizontal Rectangular Notch.
6. Study and performance of Francis turbine at constant head.
7. Study and performance of Pelton Wheel Turbine.
8. Study and performance of single stage centrifugal pump and draw characteristic curve.
9. Study and performance of reciprocating pump at a variable speed and find its efficiency.
10. Design problem on pipe network analysis.
11. Study of flow around immersed bodies.

6BECE005 COMPUTER APPLICATION IN CIVIL ENGINEERING

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
3	1	3	4	2	3	10	10	80	100

UNIT-I

Introduction

C-Fundamentals, CHARACTER SET data type constants and variables, Declaration of constants & variables, Expression, statements, symbolic constants. Operator and Expression, Arithmetic operator Unary operator, Relational and Logical operator, Assignment operators, the conditional operator, Library functions. Data Input & output Interactive programming preparing & running a complete simple program UNIT-II Control Statements Control statement, the WHILE statement, do-while, for nested loop, if-else, switch break, continue, goto statement, comma operator.

UNIT-II

Control statement

Control statement , the WHILE statements, do-while, for nested loop, if-else, switch break, continue, goto statement, comma operator.

UNIT-III

Advance Topic

Functions, storage class, Arrays,Pointers, structures and Unions, Data

files, File Handling, Link list.

UNIT-IV

01. Fundamental of Numerical Methods Interpolation & extrapolation. Numerical Integration (Simpson's method, Trapezoidal method, Newton Gauss quadrature method), Interactive Computer Program Development

UNIT-V

02. Solution of linear Algebraic Equations, Gauss elimination, Cholesky method), solution errors Interactive Computer Program Development

UNIT-VI

03. Solution of non Linear Equations (Newton Raphson schemes), Initial & Two point boundary value problem Euler's Runge-kutta, Milne's etc, Interactive Computer Program Development.

6BECE006 PROGRAMME ELECTIVE – II

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
3	0	0	3	2	3	10	10	80	100

01 Operation Research
02 Advanced Engineering Geology
03 Engineering Economics

01 Operation Research

Course Contents

UNIT-I

Introduction to Operations Research

Introduction, Use of Operations Research in Civil Engineering and Managerial Decision making process, Structure of the Mathematical Model, Limitations of Operations Research, Identification of civil engineering systems and their methods of analysis, Introduction to Optimization Techniques and their application in Engineering Planning, Design and Construction, Multivariable optimization with and without constraints, Objective function and constraints

UNIT-II

Linear Programming

Introduction, Linear Programming Problem, Requirements of LPP, Mathematical Formulation of LPP, Graphical method, Simplex Method Penalty Cost Method or Big M-method, Two Phase Method, duality, Sensitivity Analysis, Civil engineering applications.

UNIT-III

Transportation Problem

Formulation, solution, finding basic feasible solutions – Northwest corner rule, least cost method and Vogel's approximation method. Optimality test: the stepping stone method and MODI method (Introductory Treatment only).

UNIT-IV

Integer, Dynamic and Non-Linear programming

Integer programming Introduction, Types of Integer Programming Problems, Gomory's cutting plane Algorithm, Branch and Bound Technique

Dynamic programming Multi stage decision processes, Principle of optimality, Recursive equation, Application of D.P., Introduction to Non-Linear programming: Single variable unconstrained optimization –Local & Global optima, Uni-modal Function- Sequential Search Techniques

UNIT-V

Simulation

Introduction, Methodology of Simulation, Basic Concepts, Simulation Procedure, Application of Simulation Monte-Carlo Method: Introduction, Monte- Carlo Simulation, Applications of Simulation, Advantages of Simulation, Limitations of

Simulation.

UNIT-VI

Queuing Theory and Game Theory

Queuing Theory, Simulation, Sequencing model, Competitive games, rectangular game, saddle point, minimax, maximin method of optimal strategies, value of the game. Solution of games with saddle points,

References:

· Taha, H.A. "Operations Research - An Introduction", Prentice Hall, (7th Edition), 2002.

· Ravindran, A, Phillips, D. T and Solberg, J. J. "Operations Research: Principles and Practice", John Willey and Sons, 2nd Edition, 2009.

· Hiller, F. S. and Liebermann, G. J. "Introduction to Operations Research", Tata McGraw Hill, 2002.

· S. D. Sharma, Operations Research, KedarNath Ram Nath-Meerut.

· KantiSwarup, P. K. Gupta and Man Mohan, Operations Research, Sultan Chand & Sons

02 Advanced Engineering Geology

Course Contents

UNIT-I

Stratigraphy and Indian geology: geological time scale, physiographic divisions of India and their geological, geomorphologic and tectonic characteristics, study of important geological formations of India namely: Vindhyan, Gondwana, and Deccan traps with respect to: distribution, lithology, tectonics, economic importance etc. significance of these studies in civil engineering

UNIT-II

Sub-surface exploration: Steps in geological studies of project site, engineering consideration of structural features, exploratory drilling, preservation of cores, core logging, graphical representation of core log, limitations of exploratory drilling method, numerical problems on core drilling, introduction to geological map

Sub-surface water: Runoff, fly off and percolation of surface water, juvenile, connate and meteoric water, water table, zones of subsurface water, perched water table, aquifer theory

UNIT-III

Engineering geology of Deccan traps: Types of basalts and associated volcanic rocks, engineering characteristics, infillings of gas cavities, compact and amygdaloidal basalt as construction material, effect of jointing, hydrothermal alteration and weathering on engineering behaviour, tail channel erosion problem in Deccan trap region, suitability for tunnelling, problems due to columnar basalt, dykes, red bole, tachylitic basalt, volcanic breccias and fractures, laterites: origin, occurrence and engineering aspects, ground water bearing capacity of rocks of Deccan trap region, percolation tanks

UNIT-IV

Geology of soil formations: Soil genesis, geological classification of soils, residual and transported soils, soil components, characteristics of soils derived from different types of rocks, nature of alluvium and sand from rivers of Deccan trap region, scarcity of sand

UNIT-V

Geophysics: Various methods: magnetic, gravitational and electrical resistivity methods, applications of electrical resistivity method using Wennerconfiguration in civil engineering problems such as: finding thickness of over burden and depth of hard rock, locating the spot for ground water well, seepage of water finding,

Rock mechanics: General principles, engineering properties of rocks and their dependence upon geological characters, in-built stresses in rocks, measurements of these stresses

UNIT-VI

Plate tectonics, seismic zones of world, seismic activity of Deccan trap region, various theories on the origin of the seismic activity of Deccan trap region, prediction of earthquake, earthquake resistant constructions, numerical problems based on seismic data, cause and prediction and preventive measurement of landslide in Deccan trap region.

Text Books

· Gupte R. B., "A Text Book of Engineering Geology", Pune VidyarthiGrihaPrakashan, Pune.

· Gokhale K.V.G.K. and Rao D. M., "Experiments in Engineering Geology", TMN, New-Delhi.

· Mukerjee P. K., "A Text Book of Geology", The World Press Pvt. Ltd., Calcutta.

· Prabin Singh, "Engineering and General Geology", S. K. Katariya and sons, Delhi.

Reference Books

· Tyrrell G. W., "Principles of Petrology", B. I. Publication Pvt. Ltd., New Delhi.

· Holmes A., "Principles of Physical Geology", ELBS Chapman &Hall,London.

· Billings M. P., "Structural Geology", Prentice Hall of India Private Ltd., New Delhi.

· Farmer L. W., "Engineering Properties of Rocks", Champman& Hall, London.

· Reddy, "Engineering Geology for Civil Engineering", Oxfard& IBH Publishing Co. N. Delhi.

· SathyaNarayanswamiB. S., "Engineering Geology", DhanpatRai& Co.(P) Ltd, Delhi

03 Economics for Engineers

UNIT-I

Economic Decisions Making – Overview, Problems, Role, Decision making process. 2. Engineering Costs & Estimation – Fixed, Variable, Marginal & Average Costs, Sunk Costs, Opportunity Costs, Recurring And Nonrecurring Costs, Incremental Costs, Cash Costs vs Book Costs, Life-Cycle Costs; Types Of Estimate, Estimating Models - Per-Unit Model, Segmenting Model, Cost Indexes, Power-Sizing Model, Improvement & Learning Curve, Benefits.

UNIT-II

Cash Flow, Interest and Equivalence: Cash Flow – Diagrams, Categories & Computation, Time Value of Money, Debt repayment, Nominal & Effective Interest. 4. Cash Flow & Rate Of Return Analysis – Calculations, Treatment of Salvage Value, Annual Cash Flow Analysis, Analysis Periods; Internal Rate Of Return, Calculating Rate of Return, Incremental Analysis; Best Alternative Choosing An Analysis

Method, Future Worth Analysis, Benefit-Cost Ratio Analysis, Sensitivity And Breakeven Analysis. Economic Analysis In The Public Sector - Quantifying And Valuing Benefits & drawbacks.

UNIT-III

Inflation And Price Change – Definition, Effects, Causes, Price Change with Indexes, Types of Index, Composite vs Commodity Indexes, Use of Price Indexes In Engineering Economic Analysis, Cash Flows that inflate at different Rates. 6. Present Worth Analysis: End-Of-Year Convention, Viewpoint Of Economic Analysis Studies, Borrowed Money Viewpoint, Effect Of Inflation & Deflation, Taxes, Economic Criteria, Applying Present Worth Techniques, Multiple Alternatives. 7. Uncertainty In Future Events - Estimates and Their Use in Economic Analysis, Range Of Estimates, Probability, Joint Probability Distributions, Expected Value, Economic Decision Trees, Risk, Risk vs Return, Simulation, Real Options.

UNIT-IV

Depreciation - Basic Aspects, Deterioration & Obsolescence, Depreciation And Expenses, Types Of Property, Depreciation Calculation Fundamentals, Depreciation And Capital Allowance Methods, Straight-Line Depreciation Declining Balance Depreciation, Common Elements Of Tax Regulations For Depreciation And Capital Allowances. 9. Replacement Analysis - Replacement Analysis Decision Map, Minimum Cost Life of a New Asset, Marginal Cost, Minimum Cost Life Problems. 10. Accounting – Function, Balance Sheet, Income Statement, Financial Ratios Capital Transactions, Cost Accounting, Direct and Indirect Costs, Indirect Cost Allocation.