VIth SEMESTER B.E.CIVIL

Course code: CE601-DESIGN OF STEEL STRUCTURES

Course scheme					Evaluation scheme (Theory)				
lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper hr	MSE	IE	ESE	Total
3	1	3	0	3	4	10	10	80	100

UNITS	TOPICS	Hrs
UNIT-I	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. Design of axially loaded members : (a) Tension members, (b)Compression members Design of roof truss: Load assessment for DL, LL and WL.	10
UNIT II.	Design of simple and builtup beams: Laterally restrained and unrestrained, (symmetrical as well as unsymmetrical section).Curtailment of flange plates. Introduction to plastic analysis of simply supported beam, plastic hinges, mechanism shape factors, plastic moments of resistance.	10
UNIT III.	Design of welded and rivetted plate girder,design of various stiffners, design of gantry girder. lattice girder.	**10**
UNIT IV	Design of single rolled steel column section subjected to axial load and uniaxial and biaxial moment Design of axially loaded built up columns. Laced and battened columns for various types of load	**07**

UNIT V	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.
		05

	Design of column bases, slab base, gusseted base and grillage foundation base subjected to eccentric loading	08

Course Code: CE 606: STEEL STRUCTURES

Course scheme				Evaluation scheme (LABORATORY)		
Lecture	Tutorial	Practical	Credits	TW	POE	Total
		3	2	25	25	50

TERM WORK

Minimum two design assignments based on theory syllabus along with the detailed structural drawings on A2 size sheets.

Practical Examination shall be based on the above Practical work.

STRUCTURAL ANALYSIS-II

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

UNITS	TOPICS	Hrs
UNIT-I	Kani's Method applied to symmetrical and unsymmetrical frames with sway (Up to single bay Two story).	08
UNIT-II	Moment distribution method applied to sway frames, frame with inclined leg, gable frames. 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).	12
UNIT-III	Column Analogy method, Applications to beams, Calculations of Stiffness factors and carry Over factors for non-prismatic member, Analysis of non-prismatic fixed beams.	06
UNIT-IV	a) Introduction to Flexibility Method of structural analysis,compatibility equations. Hand solution of simple beam problems. Analysis of redundant frames and trusses upto two DOR. b)Moment distribution applied to frames with sway (upto single storey two bay)	12
UNIT-V	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. Theory of photoelasticity applicable to beams. Study of various types of strain gauges, Analyses of strains by strain Guage.	12

TEXT BOOK / REFRENCES

1. **THEORY OF STRUCTURE – B.C.PUNMIYA AND A.K.JAIN , LAXMI PUBLICATION**
2. **THEORY OF STRUCTURE – S. RAMAMRUTHAM , DHANPATHI RAI PUBLICATION**
3. **THEORY OF ELASTICITY- S.P. TIMOSHANKO AND J.N. GOODIER , McGraw HILL PUBLICATION**
4. **THEORY OF ELASTICITY – DR. SADHU SINGH , KHANNA PUBLICATION**
5. **MATRIX METHOD OF STRUCTURAL ANALYSIS- GERE AND WEARER , CBS PUBLICATION.**

Course Code: CE607: Structural Analysis II

Course scheme				Evaluation scheme (laboratory)		
Lecture	Tutorial	Practical	Credits	TW	POE	Total
		3	2	25	25	50

Minimum 10 of the following

Sr.No	Name of Practical
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.

CE-603 : **FLUID MECANICS-II**

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

UNITS	TOPICS	Hrs
UNIT-I	**LAMINAR FLOW:** Steady uniform laminar flow in circular pipes; Velocity and shear stress distribution; Hagen-poiseuille equation. **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 **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 .	10
UNIT-II	**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.	10
UNIT-III	**FLOW THROUGH OPEN CHANNEL:** **GENERAL :** Types of channel and their geometrical properties; types of flow in open Channel **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 **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. Applications Of Specific Enery. Gradual Transitions Of Channels **GRADUALLY VARIED FLOW** Dyanamic equation for GVF; Classification and characteristics of surface profiles; Direct step method of computing profile length **RAPIDLY VARIED FLOW** Defination of hydraulic jump; Equation of hydraulic jump in horizontal rectangulatr channel; Length & height of jump; Energy loss in jump;	12

UNIT-IV	**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. **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.	08
UNIT-V	**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.	10

The first row of the table continues from the previous page with the text "Classification of jump." above the UNIT-IV row.

Text Books:

☐ Hydraulic & Fluid Mechanics- Dr Modi & Dr Seth- Standard book house.

☐ Fluid Mechanics- Streeter & Wylie-McGraw Hill publications.

☐ Fluid Mechanics- Dr. A.K.Jain- Khanna publishers

Reference Books:

☐ Fluid Mechanics through problems- Garde

☐ Theory and applications of Fluid Mechanics- K. Subramanya

☐ Foundation of Fluid Mechanics- Yuan

☐ Flow through open channel- K.G.Rangaraju.

☐ Fluid Mechanics by H. Chaudhary.

Course Code: CE608: Fluid Mechanics- II

Course scheme				Evaluation scheme (LABORATORY)		
Lecture	Tutorial	Practical	Credits	TW	POE	Total
-	-	3	2	25	25	50

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.

Course scheme					Evaluation scheme (Theory)				
lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper hour	MSE	IE	ESE	Total
3	1	3	0	3	3	10	10	80	100

UNITS	TOPICS	Hrs
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.	10
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, NT plot method , friction circle method.	08
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 , tensile cracks effect.	10
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. limmitation and plate load test.	12

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.	10

REFERENCES:-
GEOTECHNICAL ENGINEERING –P. Purshottam Raj, Tata MacGraw Hill
GEOTECHNICAL ENGINEERING – Arora
GEOTECHNICAL ENGINEERING – B.C.Punmia

Course Code: CE605: Computer Application in Civil Engineering

Course scheme				Duration of paper	Evaluation scheme(Theory)			
Lecture	Tutorial	Practical	Credits		MSE	IE	ESE	Total
3	1	-	3	3 Hr	10	10	80	100

UNITS	TOPICS	Hrs
Unit I:	C-Fundamentals, CHARACTER SET, Data types constants and variables, Operators and Expressions, Library functions, Data input and output, Interactive programming preparing and running a complete simple programme.	10
Unit II:	Control statements, while and do-while statement, for and nested for statement, conditional statements such as if, if-else, switch, comma operator and program preparing using all such statements	10
Unit III:	Fuctions, different types of functions, storage class, Arrays (one dimensional and two dimensional) and interactive computer program development, pointers, structures and unions, file handling in C.	08
Unit IV:	Fudamentals of Numerical methods, Interpolation and Extrapolation.Numerical Integration techniques (Simpson's method, Trapezoidal method, Newton Gauss quadrature method), Interactive Computer Program Development. Linear algebraic equation solution techniques, Interactive Computer Program Development.	12
Unit V:	Initial & two point boundary value problems,Eulers method, Runga- Kutta, Milnes method and Interactive Computer program development. Solution of non linear equations (Newton Raphon schemes) and Interactive Computer program development	10

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Textbook/References:

1. Let Us C- Yashwant Kanetkar- BPB Publications.
2. Programming with C- Byron Gottfried- McGraw Hill Professional.
3. Numerical Methods- E Balaguruswamy-Tata McGraw-Hill Publishing Company Limited.
4. Numerical methods for Engineers- Santosh K Gupta- New Age International Publication.

   (**Note:** Minimum two questions will be set from each unit for University examination paper)

Course Code: CE609: Computer Application in Civil Engineering

Course scheme				Evaluation scheme(Laboratory)		
Lecture	Tutorial	Practical	Credits	TW	POE	Total
-	-	3	2	25	25	50

I.   Total 12 programmes with output using C language, having application in following Civil Engg subjects (Minimum one programme on each subject).

Engg Mechanics, SOM, Hydraulics, Water resources Engg, Surveying, Design of RCC Structures, Design of steel structures, Fluid Mechanics, Estimating and Costing, Irrigation Engg, Environmental Engg, Transportation Engineering.

II.   Minimum 04 (Four) programmes with output using C language on Numerical methods.

III.   One assignment on DATABASE MANAGEMENT SYSTEM for any one complete Civil Engg Projects.