

NAGPUR UNIVERSITY
Scheme of Teaching & Examination of B.E. (Civil Engineering)

III Semester

Sub Code	Name of Subject	Teaching Scheme (Clock hours/week)				Assessment of Marks for Theory				Assessment of Marks for Practical				Duration of Paper in Hrs.
		L	T	P/D	Total	Paper	CA	Total	Min for Passing	Practical	CA	Total	Min for Passing	
3CE01 3ST01	Mathematics-III	3	1	-	4	80	20	100	40	-	-	-	-	3
3CE02 3ST02	Strength of Materials	3	1	2	6	80	20	100	40	25	25	50	25	3
3CE03	Fluid Mechanics - I	3	1	2	6	80	20	100	40	25	25	50	25	3
3CE04	Geotechnical Engg. - I	3	1	2	6	80	20	100	40	25	25	50	25	3
3CE05 3ST05	Engineering Geology	3	1	2	6	80	20	100	40	25	25	50	25	3
3CE06 3ST06	Computer Programming	3	1	-	4	40	10	50	20	-	-	-	-	3
Total Credits : 18 + (6*8)/2=25		18	6	8	32	440	110	550		100	100	200		

Total Marks : 550 + 200 = 750

IV Semester

Sub Code	Name of Subject	Teaching Scheme (Clock hours/week)				Assessment of Marks for Theory				Assessment of Marks for Practical				Duration of Paper in Hrs.
		L	T	P/D	Total	Paper	CA	Total	Min for Passing	Practical	CA	Total	Min for Passing	
4CE01 4ST01	Structural Analysis-I	3	1	-	4	80	20	100	40	-	-	-	-	3
4CE02 4ST02	Building Construction & Material	3	1	-	4	80	20	100	40	-	-	-	-	3
4CE03	Environmental Engg-I	3	1	2	6	80	20	100	40	25	25	50	25	3
4CE04 4ST04	Concrete Technology	3	1	2	6	80	20	100	40	25	25	50	25	3
4CE05 4ST05	Surveying-I	3	1	4	8	80	20	100	40	25	25	50	25	3
4CE06 4ST06	Hydrology and Water Resources	3	1	-	4	80	20	100	40	-	-	-	-	3
4CE07 4ST07	Computer Aided Drafting	-	-	3	3	-	-	-	-	-	G	-	C	-
Total Credits : 18 + (6*11)/2=26.5		18	6	11	35	480	120	600		75	75	150		

Total Marks : 600 + 150 = 750

Note : CAD practical shall contain minimum five sketches drawn with AUTOCAD/MSWORD or any other package related with Civil Engineering. Grades A, B and C may be assigned depending upon the report.


H.O.D.
Department of Civil Engineering
T.G.P.C.E.T.Nagpur.

215-11
Lectures
Tutorials
Practicals
Projects

NAGPUR UNIVERSITY
Scheme of Teaching & Examination of B.E. (Civil Engineering)

Sub Code	Name of Subject	Teaching Scheme (Clock hours/week)				Assessment of Marks for Theory				Assessment of Marks for Practical				Duration of Paper in Hrs.
		L	T	P/D	Total	Paper	CA	Total	Min for Passing	Practical	CA	Total	Min for Passing	
SCE01 SST01	Steel Structures	3	1	2	6	80	20	100	40	25	25	50	25	4
SCE02	Environmental Engg-II	3	1	-	4	80	20	100	40	-	-	-	-	3
SCE03	Surveying -II	3	1	2	6	80	20	100	40	25	25	50	25	3
SCE04 SST04	Transportation Engineering-I	3	1	2	6	80	20	100	40	25	25	50	25	3
SCE05 SST05	Building Design and Drawing	1	-	4	5	80	20	100	40	25	25	50	25	4
SCE06 SST06	Project Management	3	1	-	4	80	20	100	40	-	-	-	-	3
SCE07	Site Visits	-	-	3	3	-	-	-	-	-	G	-	C	-
557021		16	5	13	34	180	120	600	-	100	100	200	-	
Total Credits : 16 + (5+13)/2 = 25		Total Marks : 600 + 200 = 800												

Note : Site visits shall contain minimum five site visits supported by reports to Internal Examiner for evaluations purpose. Grade A,B and C may be assigned depending upon the report

Sub Code	Name of Subject	Teaching Scheme (Clock hours/week)				Assessment of Marks for Theory				Assessment of Marks for Practical				Duration of Paper in Hrs.
		L	T	P/D	Total	Paper	CA	Total	Min for Passing	Practical	CA	Total	Min for Passing	
6CE01 6ST01	Structural Analysis-II	3	1	2	6	80	20	100	40	25	25	50	25	3
6CE02 6ST02	RCC Structures	3	1	2	6	80	20	100	40	25	25	50	25	4
6CE03	Geotechnical Engg-II	3	1	-	4	80	20	100	40	-	-	-	-	3
6CE04	Fluid Mechanics-II	3	1	2	6	80	20	100	40	25	25	50	25	3
6CE05 6ST05	Computer Application in Civil Engineering	3	1	4	8	80	20	100	40	25	25	50	25	3
6CE06 6ST06	Technical Writing	-	-	3	3	-	-	-	-	-	G	-	C	-
		16	5	13	34	400	100	500	-	100	100	200	-	
Total Credits : 13 + (5+13)/2 = 19		Total Marks : 500 + 200 = 700												

Note : 1. Professional Training of 3 to 4 weeks duration inbetween VI and VII semester (in summer).

Note : 2. Technical Writing shall contain minimum one report writing about any topic with MSWORLD or any other package related with Civil Engineering. Grades A,B and C may be assigned depending upon the report

NAGPUR UNIVERSITY
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VII Semester

Sub Code	Name of Subject	Teaching Scheme (Clock hours/week)				Assessment of Marks for Theory				Assessment of Marks for Practical				Duration of Paper in Hrs.
		L	T	P/D	Total	Paper	CA	Total	Min for Passing	Practical	CA	Total	Min for Passing	
7CE01 7ST01	Structural Analysis-III	4	1	2	7	80	20	100	40	25	25	50	25	4
7CE02 7ST02	Advanced Concrete Structures	3	1	4	8	80	20	100	40	50	50	100	50	4
7CE03	Irrigation Engineering	3	1	2	6	80	20	100	40	25	25	50	25	3
7CE04	Maintenance & Rehabilitation of Civil Engineering Structures	3	1	-	4	80	20	100	40	-	-	-	-	3
7CE05	Elective - I	3	1	-	4	80	20	100	40	-	-	-	-	3
7CE06	Industrial Case Study	-	-	2	2	-	-	-	-	25	25	50	25	-
7CE07	Project & Seminar	-	-	3	3	-	-	-	-	-	50	50	25	-
Total Credits : 18 + (5+13)/2 = 25		16	5	13	34	400	100	500	200	125	175	300	-	

Total Marks : 500 + 300 = 800

VIII Semester

Sub Code	Name of Subject	Teaching Scheme (Clock hours/week)				Assessment of Marks for Theory				Assessment of Marks for Practical				Duration of Paper in Hrs.
		L	T	P/D	Total	Paper	CA	Total	Min for Passing	Practical	CA	Total	Min for Passing	
8CE01 8ST01	Estimating & Costing	3	1	4	8	80	20	100	40	50	50	100	50	4
8CE02 8ST02	Transportation Engineering-II	3	1	-	4	80	20	100	40	-	-	-	-	3
8CE03	Elective-II	4	1	-	5	80	20	100	40	-	-	-	-	3
8CE04	Elective-III	3	1	2	6	80	20	100	40	25	25	50	25	3
8CE05	Project	-	-	6	6	-	-	-	-	75	75	150	75	-
Total Credits : 13 + (4+12)/2 = 21		13	4	12	29	320	80	400	160	150	150	300	-	

Total Credits : 25+26.5+25+24+25+21=146.5

Total Marks : 400 + 300 = 700

Champanik

[Signature]

Applied Mathematics III

3CEOI/3ST01

Unit-I

Fourier series: Periodic function and their Fourier expansion, even and odd functions, change of interval, half range expansion. (6)

Unit –II

Partial Differential Equation: Partial Differential Equation of first order first degree i.e. Lagrange's form: Linear homogeneous p.d.e of nth order with constant coefficient method of separation of variables. Applications to simple problems of vibration of strings & beams, elementary concept of double Fourier series & their applications to simple problems of vibration of rectangular membrane. (8)

Unit-III

Calculus of Variations: Maxima & Minima of functional, variation & its properties Euler's equation, functional dependent on first and second order derivatives. The Rayleigh-Ritz method, simple applications.

(6)

Unit-IV

Matrices : Inverse of matrix by adjoint method & its use in solving simultaneous equations, rank of a matrix, consistency of system of equation, Inverse of matrix by partitioning method. Linear dependence , Linear & orthogonal transformations-Characteristics equations, Eigen values and Eigen vectors. Reduction to diagonal form, Cayley - Hamilton Theorem (without proof) statement & verification, Sylvester's theorem, Quadric form transformation of co-ordinates, transformation of forces and couples association of matrices with linear differential equation of second order with constant coefficient.

(10)

Unit-V

Numerical Methods : Errors in numerical calculations, Errors in series approximation. Rounding of errors solutions of algebraic and transcendental equations. Iteration method, Bisection method, False position method, Newton-Raphson method and their convergence, Solution of System of linear equations, Gauss elimination method, Gauss Jordan method; Gauss Seidel method, Grouts method & relaxation method. Numerical solution of ordinary differential equation by Taylor's series method, Picard's method, Runge Kutta methods, Euler modified method; Milne's Predictor corrector method.

(10)

Unit-VI

Introduction to optimization techniques, Linear programming - simplex method.

(5)

STRENGTH OF MATERIALS

Unit –I

Mechanical Properties and Uniaxial Problems :

Types of force distribution , concept of stress and strain . stress strain behavior of ductile and brittle material in uniaxial state of stress. Elastic , Plastic and Strain Hardened zones stress – strain relations, elastic constants , relation between elastic constant.

Uniaxial loading and deformation of simple case of statically indeterminate problems under – axial loading, temperature change etc.

Thin walled pressure vessel cylindrical and spherical subjected to internal pressure.

Unit-II

Axial Force, Shear Forces and Bending Moment Diagram

Concept of free body diagrams, types of loads, determinate of axial forces , share forces and bending moment at a section. Axial forces and bending moment at a section . Axial force. SF and BM diagrams in beam and simple frames , differential relations between shear force and bending moments. Relation between load and shear force.

Unit-III

Stresses In Beams

Bending Stresses in simple beams , assumptions and derivation of simple bending theory relation between bending moment bending stress and curvature homogeneous and composite beams. Shear Stresses in simple beams, shear flow and shear stress distribution ., shear stress in composite beams. Combined effect of BM and axial force.

Unit-IV

Torsion of Shafts

Torsion of circular sections, assumptions and derivation of relations between torsional , moment share stress and angle of twist. Torsional stress in solid and circular sections, torsional in thin walled hollow sections closely coiled helical springs . Leaf Springs.

Unit-V

Deflection of Beams

Derivation of differential equation of moment curvature relation , differential equation relating deflection moment, shear and load. Deflecting of simple beams by integration .

Unit- VI

State of Stress In Two Dimensions

State of Stress In Two Dimensions differential equation of equilibrium , transformation of stresses , principle stresses , maximum shear stresses , Mohrs circle , combined bending torsion, combined effect of torsion and Shear. Shear flow in thin walled sections , concept of share centre of thin walled sections , Unsymmetrical bending.

3CE03 FLUID MECHANICS – I

Unit – I

1. Fluid and Their Properties :

Definition of fluid, Difference between solids, liquids & gas a fluid properties mass density, specific weight and specific gravity, viscosity, Newton's law of viscosity, coefficients of dynamic and kinematic viscosity, rheological Diagram, Ideal and real fluids. Compressibility and bulk modulus. Surface tension capillarity. Pressure inside a bulb and cylindrical jet vapor pressure and cavitation. Effect of pressure and temperature on fluid properties

2. Fluid Pressure and Its Measurements.

Fluid Pressure, Law of Fluid pressure, variation of fluid pressure with depth, pressure and head Atmospheric pressure and vacuum, gauge and absolute pressure, pressure measurement open and differential manometers.

Unit-II

3. Hydrostatics :

Total Hydrostatics pressure on planes and curved surfaces. Centre of pressure. Fluids in relative equilibrium: Fluid masses subjected to horizontal vertical and inclined acceleration.

4. Buoyancy And Floatation :

Buoyancy force and centre of Buoyancy. Archimedes principle. Metacentre, its determination by analytical and experimental methods. Stability of floating bodies and three states of equilibrium.

Unit – III

Fundamental of Fluid Flow- I Kinematics of Flow:

Velocity, its variation with space and time. Steady, Unsteady, Uniform, Non uniform. One, Two & Three dimensional, rotational, irrotational flow. Acceleration of fluid particles Normal and tangential acceleration.

Stream Line, path line, streak line, Lagrangian & Eulerian approaches in fluid flow description.

Equation of continuity in Cartesian co-ordinates stream functions, velocity potential and potential, flow nets, circulation, vorticity, source and sink. Free and forced vortices.

Unit – IV

5. Fundamental of Fluid Flow- II : Kinematics of Flow:

Factors influencing motion, Euler's equations of motion, Navier-Stokes, Reynolds Equations, Bernoulli's equation. Assumptions, derivation, limitation, kinetic energy correction factor.

Momentum equation, impact of jets. Force plates pipe bends and closed conduits, momentum.

Venturimeter. Orifice meter and flow nozzles.

6. Fluid measurement – I

Velocity measurement: pitot tube. Pitot – static tube and Prandtl tube. Discharge measurement: Venturimeter, orifice meter and flow nozzles.

Unit – V

7. Fluid measurement – II

Orifice and Mouth pieces: orifice: definition Types: Rectangular triangular and trapezoidal, End contraction. Co-efficient of discharge and its determination. Large orifices and submerged orifices.

Time for emptying tanks by orifices Mouthpieces: Definition and utility, External and Mouthpieces, Running free and running full pressure at vena contracta, Coefficients of discharge.

Unit – VI

8. Fluid measurement and

Notches & weirs: Definition types: Rectangular triangular and trapezoidal end contraction co-efficient of discharge and its determination. Error in measurement of head Velocity of approach and its effects Cippolletti. Broad-crested and submerged weirs.

Unit – VI

9. Dimensional Analysis And Theory of Models :

Dimensional Analysis: Definition and use fundamentals and derived dimension, dimensional analysis by Rayleigh's and Buckingham Pi Methods. Similitude Geometric, Kinematic and Dynamic similarities.

Predominant forces, Force ratio, Dimensionless numbers and their significance.

10. Behaviour of Real Fluids : Viscous Flow

Laminar and Turbulent flows, Reynolds apparatus critical velocity , Reynolds number . Simple problems on determination of Laminar and Turbulent significances .

3CEO4

GEOTECHNICAL ENGG-I

Unit –I

1.Introduction:

Formation of Soil , residual and transported soil, soil, solids generally used in practice such as sand , gravel, organic oilt, clay , Bentonite , Hard pan Cellche, peat ; loss , black cotton soil etc.

2.Phase of Soil.Variou soil weight & volume enter – relationship . Density indes , methods of determining in situ density.

Unit – II

Index Prosperities & Their determination

Water content specific gravity sieves analysis particle size distribution curve , Sedimentation analysis Differential and free swell value.

1.Classification of Soil.

Criteria of classification particle size classification . Textural classification Unified & I.S. Classification system field identification Expansive solid their identification and related problem.

Unit –III

1.Permeability :

Darks law & its validity , Discharge & seepage velocity , factors affecting permeability Determination of co- efficient of permeability by Laboratory & methods , permeability of atratified soil.

5. Seepage:

Seepage pressure , quick condition , flow nets , laplace equation , method to draw flow nets characteristics & uses of flow nets characteristics & use of flow nets , Preliminary problems of discharge estimation or homogeneous soils, Effectively Neural and total stresses in soil mass.

Unit – IV

6.Stress Distribution :

Stress Distribution in soil Mass Boussinesque , point Load , Uniformly loaded rectangular & circular areas , Newmarks charts.

Unit- V

7.Consolidation :

Compression of laterally confined soil Terzaghis I-D Consolidation theory (Formation of Differential equation) determination of coefficient of consolidation , degree of consolidation . Determination of preconsolidation pressure , Settlement , rate of settlement.

8.Compaction :

Mechanics of compaction factors affecting compaction standard and modified proctot Tests field compaction equipment quality control.

Unit- VI.

9.Shear Strength :

Introduction Mohrs diagram, Mohr columbs theory, Measurement of shear strength by direct shear test , triaxial test unconfined compression test vane share test sensitivity .

10. Mechanical Soil Stabilization :

Blending of soils , P.I. Concept.

ENGINEERING GEOLOGY

3STO5

Unit – I

1. Indian Geology.

Principle of stratigraphy & the geologic time scale. Physiographic & tectonic divisions of India , Introduction to the stereography of India.

2. Geomorphology :

Geomorphology process , External and internal agents, Geological action of wind glaciers, running water and oceans and the resulting landforms. Geomorphic forms and their consideration in Engineering Structure.

Unit- II

1. Structural Geology :

Determination of rocks , old sprats of fold , nomenclature & classification , effects on outcrops, identification joints Definitions nomenclature and classification . Faults Terminology nomenclature & classification . Effect on outcrops . Recognition of faults , outliner & liner . Problems on dip, strike thickness and depth of rock strata.

Unit- III

1. Mineralogy :

Definition & classification of minerals Isomorphism, Polymorphism and pseudoorphism. General chemical and physical characters of the following mineral groups , Silica , Feldspar, Olivine, Pyroxene , Amphibole Mica , Peilpathod and clave.

5. Petrology :

Rock cycle Igneous Rocks + Magma and formation of igneous rocks Textures and structures. Forms and tabular classification of igneous rock. Seimentary rocks :

Soil types , Erosion , Transportation and deposition of sediments . Sedimentary , Environments , Classifications of sedimentary rocks . Metamorphic rocks : Definition & agents of metamorphism Types of metamorphism rocks zone & grades metamorphism , metamorphism anataxis.

Unit –IV

6. Engineering Geology.

1. Application of geology to Civil Engineering Projects Engineering Properties of rocks. Engineering consideration of structures of rocks . Rock as construction building stone , road metal Ballets.

2. Surface and sub –surface geotechnical investigation Geological mapping sampling , drilling , photo geology geophysical methods.

3. Application of Geology to the location , design and construction of dams and hydraulic structures , bridged, tunnels and buildings.

Unit –V

7. General Geology

Definition and scopes of Geology Earth in relation to the Universe gross features and internal structures of the earth, Introduction to continental drift and plate tectonics. Isostasy and diastrophism.

1. Volcanoes and their products.

2. Earthquake Engineering : Earthquake waves , gausses and effects magnitude and intensity earthquakes zones of India , asomic structures.

Unit –VI

(iii) Geohydrology : Hydrologic cycle : occurrence and distribution of ground water , water table and water table maps,. Acqucludes, acquifuges and aoguitards confined and unconfined ground water , spring and gaymeres I, Oprtamce and grpidm water stidoes om Civil Engineering Works.

(iv) Stability of slopes and landslides causes of landslides and their preventions.

(iv) Environmental Aspects of geology :

COMPUTER PROGRAMMING PROGRAMMING IN FORTRAN – 95
3 CE06 / 3ST06

Unit -I Introduction

Introduction to computer flowchart, Fortran character, set coding format, constants and variables, hierarchy of arithmetic operations. Arithmetic expressions and statements, relational and logical operators and expressions, Built - in- functions. Input/output : Format Statements

Unit -II Control Statements :

Type Declaration, Subscripted variables, Dimensions, Double Precision, GOTO , IF, Do statements , PAUSE, STOP and END Statements

Unit-III : Advanced Topics:

Functions & Subroutines , RETURN, COMMON STATEMENTS, BLOCK DATA SUBPROGRAMS.

Unit - IV

Advanced topics such as MODULES TYPES, INTERFACE, and POINTERS. File handling.

STRUCTURAL ANALYSIS – I\
4 CEO / 4 STO1

Unit- I

Analysis of fixed and continuous beams by theorem of three moments effect of sinking of support

Unit - II

Analysis of continuous beam and simple portals (Non way) using Moment Distribution methods.

Unit - III

Rolling loads on simply supported beams with concentrated and uniformly distributed loads, maximum, B.M. and S.F.

Unit – IV

Strain energy method as applied to the analysis of redundant frames and redundant trusses up to two degrees . Determination of deflection of trusses . Williot Mohr diagram . Castiglione's theorems, Maxwell's reciprocal theorem . Betti's theorem.

Unit – V

Buckling of columns and beams columns , Euler's and Rankine's formula.
Analysis of Two- Hinged arches . S.F. and normal thrust , parabolic arches

Unit –VI

Slope deflection method as applied to indeterminate beams & continuous beams portal frames , frame with inclined legs up to 3 degrees of freedom.

Building CONSTRUCTION & MATERIALS

4CEO2-

Unit – I

1. Foundations :

Necessity and types of foundations. Details shallows foundations, Bearing Capacity of soils and its assessments . Preumptive bearing capacity values from codes. Loads on foundations , Causes of failures of foundations and remedial measures . foundation on black cotton soils Setting out foundation trenches , excavation timbering of foundation trenches . Load bearing and framed structures.

Unit – II

1. Brick Work :

Qualities of good bricks , Classification of brick tests on brick as per as codes. Terms used in brickwork commonly used types of bonds in brickwork such as header , stretcher . OnGLISH and flamish bonds, principles of constructions. Reinforced brickwork , brick knogging Parapets , Coppings , sills and corbels , brief introduction to cavity walls , load bearing and partition walls. Masonry construction using cement concrete blocks and clay blocks. Precast construction : introduction to method and materials. Precast elements likes poles , cover, Jallies, step corbets. Truss elements etc.

Unit – III

1. Stone Work :

Stones , Cuttings, & Working, sullections of stones types of stone machinery , Principles of constructions joints in machinery . Lifting Heavy stones, common building stone in india.

1. Arches and lentils :

Terminology in contraction , types chajjas and canopies, pre cast Lintels & archis.

1. Damp Profing :

Causes and effect of dampness . Various methods of damp proofing . Damp proofing in plinth protection , New technology of Damp Proofing in plinth protection . New Techniques of Damp Proofing , Epoxy etc.

Unit – IV

1. Floor and roofs :

Floors :

General principles , types and method of construction upper floor finisheem quality and testing floor tiles., synthetic & Cremic Tiles.

Roofs :

Flat and pitches roofs, coverings, types and their constructional futures . Thermal Insulation.

Unit – V

1. Stairs :

Types of stairs , functional design of stairs.

1. Doors and Windows :

Purpose materials of construction and types.

Unit –VI

1. Plastering and pointing :

Necessity , types and methods

1. Temporary Timbering :

Centering and farm work shoring, underpinning and scaffolding.

1. Painting.

White washing , color washing and distempering new materials & Technology

ENVIRONMENTAL ENGINEERING – I
4CE03

Unit – I

- 1.Introduction , Importance and necessary of water supply scheme .
- 2.Water Demand : Types of demand , empirical formula, factors after per capita demand , Variation in demand , Design Period and pollution forecasting methods and examples.
- 3.Source of water rain water , Group water springs, infiltration galleries . Dug wells , Surface Water Stream , lake, River. Impounding reservoirs, ponds.
- 4.Intake structures : Location type river , Lake , Canal reservoir etc.

Unit – II

- 1.Conveyance of water : Types of pipes joints, fittings.
- 2.Hydraulic design aspects : Friction Manning, Has back and problem .
- 3.Rising main pump : Classification working merits and demerits selections of pump.

Unit – III

8. Water quality : General idea of water borne diseases, Physical, Chemical & bacteriological characteristic of water , Standards of Drinking Water.
9. Water treatment : Objective of treatment unit operation and processes ,treatment flow sheet of conventional water treatment plant.
- 10.Areation: Purpose, types of aerators.
11. Coagulation and Flocculation : Definition , Principles , Types of coagulants and reactions, coagulant doses , Type of Maxing and flocculation devices.

Unit – IV

- 1.Sedimentation : Principles , types of setting basin , inlet and outlet arrangement.
- 13.Clariflocculators : Principles and operations.
- 14 Filtration : Mechanism & filtration , types of filters- RSF, SSF, Pressure filters , elements of filters UDS, operation and design aspect filter sand specification – ES , UC, Operational problems in filtration.

Unit – V

- 15.Desinfection : purpose mechanism, criteria for good disinfectant various Disinfectants , their characteristics , disinfection by chlorination different from of chlorine
- 16.Destributin system : Requirement for a good distribution system , methods of distribution system and lay outs of DS, appurtenance in water distribution system.
- 17.Storage reservoirs for treated water : Types , Capacity of reservoir , mass curve.

Unit – VI

18. Municipal solid waste management : Generation sources , composition Quality , Methods of Collection, Transportation, treatment and disposal Recycle , Reuse Examples on simple hydraulic design of pipes, estimation of population and water quality , plain sedimentation tanks, cascade aerators, filters, pumps dose of chlorine.

CONCRETE TECHNOLOGY 4CE04

Unit –I

1. Main Constituent of cement Hydration of cement, water required , physical properties and testing of cement. Effect of fineness , Initial final and falls setting of cement, Soundness test, hardening and compressive strength , Grades and different types of cement . Ordinary Portland cement , Rapid Hardening Cement , G.G. Blast furnace slag cement Low heat Portland cement , Portland pozzolana cement , Portland flyash cement . Sulphate resisting cement.

2. Aggregates : Sources of Aggregates , classificatory and nomenclature , coarse and fine aggregate, normal weight (light and heavy weight aggregates) . Aggregate characteristics and their significance in strength , workability , placement and compaction of concrete. Sampling , particle Shape and texture , bond of aggregate , size and grading of aggregate strength of aggregates. Mechanical properties and test specific gravity , bulk density , porosity absorption of aggregates, moisture content of aggregate, bulking of sand abrasion test , impact value. Deleterious substance in aggregates , organic impurities clays and other fine material etc.

Soundness of aggregate, Crushed sand . Alkali aggregates reaction, introduction of IS : 383 Water – Water quality for mixing and curing, acceptable water, pH value , Sea water chloride content. Provisions in IS : 456.

Unit –II

3. Fresh concrete : Batching, Mechanical mixture , automatic batching and mixing plants. Efficiency of mixing. Workability Measurement – Slump cone Test, compacting factor test , flow table , Vee- Bee consistometer . Factor affecting workability , setting time. Significance of w/c ratio. Segregation , bleeding , voids permeability , Hot weather concreting, conveyance of concrete , Flacing of concrete . Compaction vibrators . curing of concrete significance , methods of curing , temperature effect on curing & strength gain , IS code or curing Maturity of concrete , Framework for concrete- IS code.

Unit –III

4. Strength of concrete gain of strength , w-c ratio. Factor affecting compressive strength w-c ratio . type of cement , air entrainment aggregate , mixing water , admixture, curing conditions. Tensile and flexural strength , Relation between compressive and tensile strength , Failure mode in concrete cracking in compression. Impact strength fatigue strength . Shear strength , bond between concrete & reinforcement . Modulus of elasticity , Polson's ratio.

5. Testing of hardness concrete . Compression test – cube strength and cylinder strength, their relation , effect of aspect ratio on strength . Flexural strength of concrete . Determination of tensile strength. Indirect tensile test . Splitting test. Abrasion resistance . Accelerated test.

6. Non. –Destructive test – significance , rebound hammer. Ultrasonic pulse velocity test.

Unit –IV

Mix design – Process. Statistical relation between mean and characteristic strength , variance , Standard deviation . Factor affecting mix properties . Grading of aggregate, aggregate / Cement ratio etc. Degree of quality control. Design mix by road note- no. 4 (BS) ACI method.

Unit –V

7. Additives & Admixture . Types of admixture . Natural products - Diatomaceous earth. Clinker clay of shales. Volcanic glasses . By- products – pozzolones . Fly ash silica fume. Rice husk ash, metakaoline , G.G.> blast furnace slag admixtures – air entraining , water reducing , accelerators , retarders , plasticizers & super plasticizers , permeability reducing, grouting agents, surface hardness.

8. Shrinkage early volume changes , drying shrinkage , mechanism of shrinkage , factor affecting shrinkage . Influence of curing and storage conditions ation shrinkage conditions. Differential shrinkage , carbonation Shrinkage, Creep – Factor influence . Relation between creep & time, nature of creep , effect of creep.

Unit –VI

Durability of concrete – significance water as an agent of determination , permeability of concrete , air sulphate attack & control sea water attack. Efflorescence.

Resistance of crosion , abrasion and cavitation. Process of resulting of ste.

SURVEYING – I
4CE05

UNIT - I:

- Chain end Compass Traversing (8)
- a) Chain Traversing: Classification, Principle of Survey, Chain and tape survey, errors corrections, obstacles in chaining, cross staff survey, construction, use and testing of optical square, line ranger.
- b) Compass Traversing: Prismatic and Surveyor's Compass, true and magnetic bearing, local attraction dip and magnetic inclination, compass traversing adjustment of traverse.

UNIT - II:

- Leveling and Contouring (8)
- a) LEVELLING different types of Levels, Study of Dumpy Level, temporary adjustment, principle of levelling, reduction of levels, classification of levelling, Profile Levelling, Longitudinal Section And Cross Sections, Reciprocal Levelling Corrections for Curvature and Refraction, distance to the visible horizon. (6)
- b) Contouring : Definition, characteristics, users, methods of locating contours, interpretation of contours. (2)

UNIT – III

- Adjustment of Dumpy Level & Trigonometrical Levelling
- a) Adjustment of Dumpy Level: principle axes of Dumpy level, relationship, testing and adjustment of bubble axis and line of collimation, sensitivity of bubble tube. (5)
- b) Trigonometrical Levelling: Indirect levelling, elevation of point with base of an object accessible and inaccessible. (3)

UNIT – IV

- THEODOLITE TRAVERSING : (10)
- a) Theodolite : Introduction, Type of Theodolite ; Temporary adjustment, Principle Axes and relationship, permanent adjustment, Measurement of Horizontal & vertical angles, Magnetic Bearings, prolonging a line, lining in. (7)
- b) Traverse Computation : Consecutive and independent coordinates, adjustment of closed traverse, Gale * 0 traverse table, area calculation by coordinates, (3)

UNIT- V

- Plane Table Surveying & Computation of Area & Volume (8)
- a) Plane Table Surveying: Equipments, Advantages and Disadvantages, Orientation, methods of plane tabling, two point and three point problems in plane tabling. (4)
- b) Computation of area and volume: Trapezoidal and Simpsons Rule, Planimeter, use theory, zero circle. (4)

UNIT- VI

- Hydrographic Surveying, Underground Surveying and Surveying Equipments.: (8)
- a) Hydrographic Surveying; Shore Line Survey, River Survey, Soundings, equipments, methods of locating soundings, three point problems. (4)
- b) Underground Surveying: Correlation of underground and surface survey, transferring the levels underground. (2)
- c) Surveying Equipments : Box Sextant, Abney Level, Optical Theodolite. (2)

Hydraulics and Water Resources:
4CE06

Unit -I

1..Introduction : Hydrology , Definition, Engineering Hydrology, and its importance development of Hydrology and allied Sciences , Hydrological cycle, Hydrological Equation and brief description and its component. The earth and its atmosphere . Importance of temperature . Humidity and wind in Hydrological Studies.

2. Precipitation : Definition and classification.

Artificial rains , type of precipitation , orographic , conventional and cyclonic , Factors affecting precipitation with references to physiographic divisions of India.

Gauges selection of site Density and adequacy of rain gauge station. Optimum number of rain gauge , Reading measurement of rain fall, mass curves, Supplementary rainfall data missing records , intensity – Duration – Frequency and Depth – Area – Duration Analysis.

Unit –II

1.Infiltration : Definition , Mechanism, Factors affecting infiltration , Infiltration indices , measurement application on problems.

2.Evaporation and Transpiration : Definition , Mechanism ,Factors affecting evaporation , Evaporation Estimation by pans, Water energy budget energy budget and empirical formula , Control of evaporation , Transpiration , Factors Affecting , Its measurement and control . Evaporation and its measurement .

Unit –III

1.Run Off : Source and component of run – off .Classification of streams. Factors affecting the run off process. Estimation Methods Measurement of discharge of a stream by area – slope and Area- velocity methods.

6.Hydrographical : Flood Hydrographical Definition , Typical flood , Hydrograph and its components . Base

Unit –IV

7. Statistical Methods : Statistic in hydrological analysis, probability and probability distributions, average measures of dispersion , co-relation . analysis of time series , frequency analysis.

1.Floods : causes and effects , factors affecting peak flows and estimation of peak flows, Low flow, Basin flood, Flood routing and flood forecasting Economic planning for flood control.

2.Geohydrology : Introduction , Occurrence and distribution of Groundwater, water table and water table maps, aquifer, aquiclude, aquiclude and aquifuge. Groundwater exploration , electrical resistivity method, confined and Unconfined aquifers , Porosity, Permeability , Specific Yield , Specific retention, Darcy's law . Introduction to Hydraulics of Wells, Open wells safe , Yield test.

3.Ground water quality , Geomorphic and geological control on groundwater storage and movement . Groundwater provinces of India.

Unit –VI

1.Groundwater recharge : Concepts of Recharge selection of recharge sites , Recharging methods, spreading method, induced recharge method, recharge well method Sub- surface dams. Waste water recharged , Recharge by urban storm on – off . Recharge through rain water harvesting .

12.Project planning for water resources : Multipurpose projects their basin water

transfer and inter state river disputes. Water sources planning through planning through watershed management . Economic Planning for domestic and industrial water supply.

COMPUTER AIDED DRAFTING. 4ST07 / 4CE07

Minimum 4 drawing for submission be prepared , based on building plans or Civil Engineering work.

Specifying distances and coordinators , Polar coordinates , relative Cartesian coordinates, Interpreting cursor modes and understanding prompts, choosing command options, selecting objects, editing with grips.

Setting up work area , Measurement system , scale factors modes as drafting tools. Symbols, Blocks Layers , Templates , Copying objects, editing lines , changing length of objects. Geometric constructions- Lines and points parallel lines perpendicular lines, breaking lines, dividing lines, fillets, chamfers, circles, tangent, arcs, curves through points , breaking polylines , similar shapes, arrays of lines or circles , Polygons, solid shape ellipse.

Hatch patterns boundary. Adding text , Text formatting style size of text and scale of drawing Dimension style , Unit height, location, arrow style.

Polylines , Editing, creating spline curve, dividing in segments, Filling in solid areas.

Printing & plotting drawing output devices paper size orientation, control on scale and location.

STEEL STRUCTURES

5CE01 \ 5ST01

SECTION-A

(3L+1T+2O)

UNIT I

- 1 . 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. (8)
2. Design of axially loaded members; (a) Tension members, (b) Compression members. (9)
3. Design of roof truss: Load assessment for DL: LL and WL (6)

UNIT II

4. Design of simple and builtup beams: Laterally restrained and unrestrained, (symmetrical as well as unsymmetrical section). Curtailment of flange plates. (10)

SECTION-B

UNIT III

- 5.Design of welded plate girder, concept of gantry girder. (8)
6. Design of single rolled steel section column subjected to axial load and biaxial moment including base design. (8)
7. Design of axially loaded built up columns. Laced and battened (Column bases slab base gusseted base moment resistant bases) (9)

UNIT IV

8. 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) (6)
 - B) Design of connection: Beam to beam, beam to column; framed connection. (9)

ENVIRONMENTAL ENGINEERING – II

5CE02

(3L+1T)

SECTION-A

Unit -I

1. General Aspects of Environmental Engineering - System of collection and conveyance of sewage - separate and combined systems, patterns of sewage collection systems. Quantity of storm water and sanitary waste water sewer: Types, Shapes, Hydraulic Design (Capacity, Size, Grade, etc.) (8)

Unit - II

2. Construction of sewer - Shoring, Trenching and laying to grade. Sewer materials Sewer Appurtenances - manhole street inlets, storm water overflows, inverted syphons, flushing and ventilation. House plumbing systems -sanitary fitting and appliances, traps, anti-syphonage, inspection chambers and intercepting traps. Sewage pumping - location of pumping station and types of pumps. Sewer testing and maintenance. (8)

Unit - III

3. Physical and chemical characteristics of wastewater, significance of BOD, COD, BOD rate constant, Sewage treatment flow sheet, site selection for sewage treatment plant Preliminary and primary treatment - Screens, Grit chambers, Primary settling tank (including simple design) (8)

SECTION-B

Unit - IV

4. Secondary treatment - Principle of Biological Treatment Activated sludge process, trickling filter, Methods of disposal - disposal on land and in water stream, Sewage farming, self purification of stream. Sludge digestion, sludge drying beds. (8)

Unit-V

5. Rural sanitation -Pit privy, aqua privy, bio-gas recovery. Septic tank including soak pit, (including design problem) Sullage collection and disposal. (5)

6. Industrial Waste Water Treatment - Significance of Industrial Waste Water Treatment, important physical and chemical parameters, unit operations and treatment processes flow equalization, neutralization, adsorption, chemical and biological treatment etc.) (5)

Unit VI

7. Introduction to air pollution Sources of air pollution and its classification Hi -effects of air pollutants on man, animal & materials Meteorological parameters Methods of air pollution control. (8)

SURVEYING – II

5CE03

(3L+1T+2P)

SECTION-A

UNIT I

Tacheometric Surveying (8)

Classification , principal of stadia method, theory of Analiatic lens, distance and elevation formulae, tangential method, errors in stadia surveying.

UNIT II

Simple , Compound, Reverse Curves, Vertical Curves. (8)

a) Simple Curves: Elements of simple curves, methods of curve ranging, obstacles in setting out curves. (4)

b) Compound Curves: Elements of compound Curves, setting out the curve. (1)

c) Reverse Curves: Elements of reverse Curves, setting out the curve.

d) Vertical Curves: Elements of vertical curves, types, tangent correction, location of highest or lowest point. (2)

UNIT III

Transition Curves (8)

Elements of transition curves, superelevation, length of transition curve, Ideal transition curve, characteristics of transition curve , setting out the transition curve.

SECTION-B

UNIT IV

Geodetic Surveying and Triangulation Adjustment(10)

a) Geodetic Surveying: Classification of triangulation survey, intervisibility of stations, field work, reduction to centre, base line measurement .corrections.(7)

b) Triangulation Adjustment: Definitions.weighted observations, laws of weights, station adjustment, figure adjustment triangle only) (3) .

UNIT V

Photographic Surveying (8)

Basic definitions, terrestrial and aerial photography.tilt and height displacements.heights from parallax measurements, flight planning, study of phototheodolite and stereoscope.

UNIT VI

Astronomy, Remote Sensing ,GIS & GPS (8)

a. Astronomy: Elements of spherical trigonometry , Napier's rule of circular parts.celestiai sphere, astronomical terms. (2)

b. Remote Sensing: Introduction, definitions, Remote sensing systems, advantages over conventional systeraenergy interaction in the atmosphere, Indian remote sensing satellite series and their characteristics (3)

c. GIS & GPS: Components of geographical information system (GIS),advantages, function of GIS, Raster and vector data, advantages and disadvantages, global positioning system.(GPS),Introduction, definitions.GPS receivers, antenna, advantages of GPS. (3)

Transportation Engineering -(Highways & Bridges)

5CE04

(3L+1T+2P)

SECTION-A

Highways:

Unit -I:

1 .Development & Planning: Road transport Characteristics, Classification of roads, development plants, network patterns, data collection & surveys, principles of alignment, evaluation of plan proposals, Traffic Engineering: 3E's of, traffic characteristics, Surveys, Intersection-types, layouts, design principles, Urban traffic, parking, lighting, Accidents. Traffic control Devices-marking, Signs, Signals, Regulations Motor Vehicle Act & Rule. (5)

Unit - II:

3 .Geometric Design:

Road, road user & road vehicle characteristics, Factors affecting design standards. Cross Section elements, stopping & overtaking sight distance overtaking zones. Horizontal alignment-Curves, design of super elevation , widening, 'transition curves, vertical alignments, Design of summit & Valley Curves,I,R.C. standards for Geometric Design, Geometries of Hill Roads. (7)

4. Pavement Design:

Types of pavements & characteristic, Design parameters, Axle & Wheel load, tyre pressure, ESWL for dual Wheels, repetitions, Group Index & CBR method of flexible pavement design. Analysis of load & temperature stresses of rigid pavement, joints (5)

Unit-III

5. Materials

Subgrade Soil -AASHO Classification, group Index, Subgrade soil Stabilization. CBR, aggregates Physical and mechanical properties & tests-Bituminous materials classification sources properties and tests. Cutback & Emulsions, IRC/IS Standards, Introduction to Geotextiles.(5)

6. Construction & Maintenance

IRC, MOST specifications for quality & quantity of materials, techniques, tools and plant, for the Earthwork, sub base, base and wearing/ surfacing course of flexible pavements with gravel, WEM, stabilized Bituminous & Concrete as Construction material, Drainage, shoulders, road-structure maintenance & repairs, Choice of construction. (5)

SECTION-B

Bridges

Unit-IV

7.General:

Components, classification and identification, Data Collection site selection. Economic Span. (3)

8. Hydrology:

Estimation of flood, discharge, water way .scour depth. depth of foundation, Afflux, clearance and free board. (5)

Unit- V

9. Loads, Forces, Stresses:

IRC Specification & code of practices, Critical combinations. (4)

10. Sub-Structure:

(A) Types of foundations & their choice, estimation of BC of foundation strata, Open, Pile and well foundation.pneumatic Caissons, cofferdams. (6)

(B) Abutment, Piers & Wingwalls Their types general design principles (empirical),Choice. (2)

Unit-VI

11. Super Structure:

Different structural forms culverts.causeways, minor and major bridges, suitability and choice precast post tensioned and segments! construction. Launching, operation systems, Bearings, Architecture. (4)

12. Rating and Maintenance:

Methods & Techniques of rating of existing bridges Inspection, Repairs, maintenance, corrosion-causes and prevention, Aesthetics. (4)

BUILDING DESIGN & DRAWING

5CE05/ SST05

(1L+4D)

UNIT I

1. Introduction:

Importance of Building drawing as Engineer's construction & costing.

UNIT-II

Language in

2. Method of Drawing:

Selection of scales for various drawings, Thickness of lines, Dimensioning, Combined First angle and Third angle method of projection, Abbreviations and conventional representations as per IS 1962.

(i) Free hand dimensioned sketches of various building elements, importance in Civil Engineering.

(ii - a) Developing working drawings to scale as per IS. 962 from the given sketch design and general specifications for terraced and pitched roofs.

(ii - b) Developing submission drawings to scale with location site and block plan complete

UNIT-III

3. Designing of Buildings :

Introduction : Site requirements, requirements of owner and Building byelaws. Climate and design consideration, orientation, recommendations of CBR1, Roorki and general principles of planning with emphasis on functional planning. Graph paper design (line plans) based on various requirements for residential, public, education and industrial buildings.

UNIT-IV

4. Two point perspective of Residential building neglecting small elements of building such as plinth offset, chajja projections etc.

PROJECT MANAGEMENT

5CE06 / 5ST06

(3L+1T)

SECTION - A

I. ENGINEERING ECONOMICS:

UNIT-I

1. Nature and scope of Economics and relationship with Engineering.[3]
2. Demand analysis : Law of demand, Elasticity of Demand, Demand Forecasting [4]
3. Production : Meaning and Factors of Production, Law of return, economics of scale location of Industries [5]

UNIT - II

4. Cost analysis : Fixed and variable cost, Prime and supplementary costs, Average and marginal cost, methods of allocation of overhead costs[5]
5. Money and banking : Functions of money, functions of Commercial and central Banks, Foreign investments. [3]
6. Various types of Markets and price determination under these market conditions, scope of Privatisation in India. [4]

SECTION - B

II. Project Planning and Management

UNIT-III

1. Introduction : Project Management, Types of Projects, Various phases of Project, Project proposal, Components of planning, Objectives of planning, factors effecting planning, organisational setup, establishment of premises and site organisation programme. [12]
2. Job Planning :- Bar diagrams and bar charts, C.P.M., activity identification computation of activity time, network preparation and analysis. Logical and other constraints, project duration, floats and stacks. Ladder construction. P.E.R.T. : Event identification, event time, network preparation and analysis, precedence network, network and cost interaction. Optimisation of project cost. Cost slope concept and simple compression calculation. [5]

UNIT - IV

3. Resource Planning, Resource Allocation, Resource leveling, Resourcebased Network. [3]
4. System approach, system formation, effectiveness and control, general principles of quality control measurements and achievements. [3]
5. Planning for safety: construction hazards, safety in construction, industry and at work site. National safety council, Safety organisation, accidents, its cost, cause, types and preventions, losses, during natural calamities, floods and fire, and methods to reduce them. [3]

UNIT-V

6. Management Information System: System approach to management, Management and systems. Inference Techniques - Use of various statistical methods and tests, graphical representation.
7. Material Management : Functions, objectives, purchasing, procedures, records, stock taking, inventory control, ABC analysis, storing.[3]
8. Equipment management: Classification of Construction equipments, factors effecting selection, Operation and Maintenance cost, Depreciation and Replacement cost,Economic life,down time cost,cost of owning equipment. [3]

UNIT-VI

9. Equipments of Major Projects :- Excavating machines such as : Power shovels, Drag Line, Bulldozer, Scraper, Drilling and Blasting Equipments, Material Transporting and handling equipment such as Cranes, Hoists, conveyer belts, dumpers, cableways, rail system (Size, performance and limitations) [5]
10. Concrete equipments : Different types of mixers Vibrators, batch mixing plants, transportation of concrete, concrete pumps and placers. Guniting and its equipment. [4]

VI Semester B.E.(Civil) .

Structural Analysis- II

6CE01 / 6STOI

(3L + IT + 2P)

SECTION-A

UNIT-I

1. Kani's Method applied to symmetrical and unsymmetrical frames with sway (Up to single bay Two storey) -

UNIT-II

2. Approximate method of 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

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

SECTION-B

UNIT-IV

4 a) Introduction to Flexibility Method of structural analysis, influence coefficients, 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 two bay)

UNIT V

5. 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 law, plane stress and plane strain problems.

UNIT-VI

6.Theory of photoelasticity applicable to beams. Study of various types of strain gauges , Analysis of strains by strain Guages.

RCC STRUCTURES

6C02/6ST03

3(L)+1(T)+2(D)

SECTION A

(Four questions of 10 marks are to be answered out Six questions of 10 marks each to be set on Units I to IV)

Unit-I

1. Introduction to the Working Stress Method of RCC design. Basic concepts in design for flexure, assumptions, design constants. Analysis of the rectangular section. Balanced, under-reinforced and over-reinforced sections. Drawbacks and limitations of Working stress method. (3)
2. Prestressed Concrete : Properties of high grade materials, concepts of prestressed concrete, methods of prestressing, losses in prestressing. Various systems for prestressing with particular reference to Freyssinet, Magnel Blaton and Gifford Udall systems. Analysis of rectangular, T and I section. (3)

Unit-II

3. Introduction to Limit State Design: Concept of probabilistic design and limit state design. Characteristic values, partial safety factors/stress strain relationship stress block parameters, failure criteria, types and properties of reinforcement, limit state of Serviceability and limit state of collapse. Other limit states. Review of IS - 456- 2000. (2)
4. Limit state of collapse in flexure: Analysis and design of singly reinforced rectangular section. Balanced failure mode, primary tension failure mode and primary compression failure mode,(2)

Unit-III

5. Limit state of Collapse in Flexure: Analysis & Design of the Tee & L-beam section. (3)
6. Limit state of collapse in compression: Analysis & design of short axially loaded column. Columns subjected to uniaxial bending, use of interaction curves.(3)

Unit-IV

7. Limit state of Collapse in Shear & Bond: Design of beam for shear, shear span, post cracking resistance, shear mechanism approach, shear failure modes and collapse loads, interaction of shear, flexure and axial force, Check for bond.(3)
8. Limit state of Serviceability:
 - (i) Causes and control of cracking: Crack in plastic concrete at early age, Cracks due to temperature and shrinkage, restraint induced cracks, Cracks due to loading. Needs for crackwidth control,
 - (ii) Moment- curvature relationship, deflection control of beams and one way slabs, (no numerical calculations)(2)

SECTION B

(Two questions of 20 marks are to be answered out of Three questions of 20 marks each to be set on Units V and VI)

Unit-V (with WSM)

9. Design of circular water tank with roof slab/ dome resting on ground by Approximate methods/ IS code method.(4)
10. Design of rectangular water tank with one-way roof slab resting on ground by approximate method/ IS code method.(4)
- 12 Design of prestressed slab/ rectangular beam. (2)

Unit- VI (with LSM)

13. Design of one-way, simply supported, single span and cantilever slabs, and continuous slab/ beam with IS coefficients. (4)
13. Design of rectangular pad / slopped footing for axial load.(3)
- 15 .Design of Dog-legged and Open Well Staircases (4)

GEOTECHNICAL ENGINEERING-II

6CE03

(3L+1T)

SECTION-A

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. (6)

Unit-II:

STABILITY OF SLOPES:

Causes and types of slope failure, stability analysis of infinite slopes and finite slopes (4) center of critical slip circle, slices method for homogeneous $c-\phi$ soil slopes with pore pressure consideration. Taylor's stability numbers & stability charts, methods of improving stability of slopes, types, selection and design of graded filters. (7)

Unit-III:

LATERAL EARTH PRESSURE:

Earth pressure at rest, active & passive pressure, General & local states of plastic equilibrium in soil. Rankine's and Coulomb's theories for earth pressure. Effects of surcharge, submergence. Rebhann's criteria for active earth pressure. Graphical construction by Poncelet and Cutman for simple cases of wall-soil system for active pressure condition. (8)

SECTION-B

UNIT-IV:

GROUND IMPROVEMENT:

Methods of soil stabilization use of admixtures (lime, cement, flyash) in stabilization. Basic concepts of reinforced earth, use of geosynthetic materials Salient features, function and applications of various geosynthetic materials. Vibroflotation, sand drain installation, pre-loading.

(5)

UNIT-V

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 water table on bearing capacity, correction factors for shape and depth of footings. Bearing capacity estimation from N-value, factors affecting bearing capacity, presumptive bearing capacity. Settlement of shallow foundation: causes of settlement, elastic and consolidation settlement, differential settlement, control of excessive settlement. Proportioning the footings for equal settlement. Plate load test: Procedure, interpretation for bearing capacity and settlement prediction.

(8)

UNIT-VI

PILE FOUNDATION:

Classification of piles, constructional features of cast-in-situ & 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 formulae, 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.

FLUID MECHANICS-11

6CE-04

(3L+1T+2P)

SECTION-A

UNIT-I

1. LAMINAR FLOW: (03)
Steady uniform laminar flow in circular pipes; Velocity and shear stress distribution; Hagen-Poiseuille equation.
2. BOUNDARY LAYER THEORY: (04)
Nominal thickness, displacement thickness, momentum thickness of the boundary layer: Boundary layer along a long thin plate and its characteristics, Laminar boundary layer; turbulent boundary layer; laminar sublayer: Separation of boundary layer on plane and curved surfaces.
3. REAL, INCOMPRESSIBLE FLUID FLOW AROUND IMMERSSED BODIES: (04)
In general definition of drag and lift; Flow past plates, cylinders and spheres; drag on sphere, cylinder and flat plate.

UNIT-II

4. FLOW THROUGH PIPES; (10)
Hydraulically smooth and rough pipes; Frictional resistance to flow of fluid in smooth and rough pipes; Nikurade's experiment; Moody's chart; Darcy-Weisbach & Hazen-William's equation for frictional head loss; Hydraulic gradient and energy gradient: Pipes in series and parallel; 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

5. FLOW THROUGH OPEN CHANNEL:
 - (A) GENERAL: (01)
Types of channel and their geometrical properties; Types of flow in open channel
 - (B) UNIFORM FLOW: (05)
Chezy's and Manning's equations; Hydraulically most efficient rectangular, triangular and trapezoidal sections; Computations of normal depth of flow Conveyance of channel, section factor for uniform flow, normal slope and normal discharge.
 - (C) CRITICAL FLOW: (04)
Specific energy and its diagram; alternate depths; Computations of critical depth, section factor for critical flow, critical slope; normal critical slope; Specific force and its diagram; Conditions of critical flow.

SECTION-B

UNIT-IV

- (A) APPLICATIONS OF SPECIFIC ENERGY, GRADUAL TRANSITIONS OF CHANNELS. (02)
- (B) GRADUALLY VARIED FLOW: (05)
Dynamic equation for GVF; Classification and characteristics of surface profiles; Direct Step method of computing profile length.
- (C) RAPIDLY VARIED FLOW: (03)
Definition of hydraulic jump; Equation of hydraulic jump in horizontal rectangular channel; Length & height of jump; Energy loss in jump; Classifications of jump.

UNIT-V

6. HYDRAULIC MODELS: (05)
Difference between model and prototype; Similitude- type of similarities; Model laws-Reynolds model law and Froude model law; Types of model- distorted, undistorted; Froude's method of determining resistance to partially submerged objects like ship.
7. FLUID MACHINERY:
 - (A) Impact of Jet stationary and moving curved vanes. (02)
 - (B) TURBINES: (03)
Definition: Gross and net heads; different efficiencies; Classification of turbines; component parts and working principles; selection of turbines on the basis of head and specific speed.

UNIT-VI

8. Centrifugal and Reciprocating Pumps

(A) CENTRIFUGAL PUMP:

(06)

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

(B) RECIPROCATING PUMPS:

(03)

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

COMPUTER APPLICATION IN CIVIL ENGINEERING

6CE05/ 6ST06

(3L+1T + 4P)

SECTION-A

UNIT-1

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

U1VIT-III

Advance Topics

Functions, storage class, Arrays, Pointers, structures and Unions, Data files, File Handling, Link list.

SECTION-B

UNIT-IV

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

UNIT-V

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

UNIT-VI

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

TECHNICAL WRITING

6CE06

(3P)

1. Reading strategies : Practice in various reading techniques, skimming, scanning , eye reading etc. Active and passive reading and interpreting charts and diagrams - Need and role of reading in technical/Industrial organization.
2. Return Communication ; Introduction to technical writing - Discourse writing ; Definition ,Description . Instructions - Summary writing - cohesive paragraphs.
3. Business Communication : Business correspondence - format , tone and message of business letters - prospective / point of view in purposive writing - sales letters,
4. Listening & language developments : Barriers to listening : Physical and psychological - steps to overcome them - listening with a propose - active listening and anticipating the speaker - precise in note - taking - steps to improve speaker's contribution.
5. Successful speaking techniques : How to improve self - expression - Need for clear thinking - The speech process - Fluency and Accuracy in speech - Developing persuasive speaking skills - Goal oriented group discussion - Formal and public speaking practice.

VII Semester B.E.(Civil) .

7CE01/7ST01

Structural Analysis-111

(4L + 1 T + 2 P)

SECTION-A

UNIT-I

1.Basic concept, Degree of Freedoms, Basic concept of Direct Stiffness Method, Formulation of elemental/local stiffness matrix and global stiffness matrix for truss member, Transformation Matrix, member load vector, Assembly of Structure stiffness matrix , load vector and solution.

UNIT-II

1.Formulation of elemental/local stiffness matrix and global stiffness matrix for Beam members (without axial deformation) for continuous beams, Assembly of Structure stiffness matrix, load vector and solution , Member loads due to uniformly Distributed Loads, concentrated loads.

UNIT-III

1.Formulation of elemental/local stiffness matrix and global stiffness matrix for Frame member (With axial deformation), Transformation Matrix, Assembly of Structure stiffness matrix, load vector and solution, Member loads due to uniformly Distributed Loads, concentrated loads.

SECTION-B

UNIT-IV

1.Storing of structure stiffness matrix, full storage, banded storage and skyline storage, Introduction to solution techniques, Band minimization etc., Computer implementation of generation of elemental, global and structural stiffness matrix, load vectors, assembly procedure, solution techniques (Algorithm Development expected only.)

UNIT-V

1.Introduction to Finite Element Method: Basic concepts, discretisation of structure, Rayleigh Rite method for Bar (Prismatic/non prismatic) elements, Displacement based BAR (Prismatic/non prismatic) and Beam elements(Prismatic), Load vectors for body forces.

UNIT-V

1.Discretisation of continuum structure. Three node triangular element (CST) for plane stress and plane strain problems., Load vectors for body forces.

ADVANCED CONCRETE STRUCTURES

7CE02/7ST02

(3L+1T+4P/D)

SECTION A

(Three question of 13/14 marks are to be answered out of Five questions of 13 marks-one question of 14 marks - to be set on Units I to III)

Unit-I

- Limit state of collapse in flexure : Analysis and design of doubly reinforced rectangular, Tee and L-sections. (4)
- Limit state of collapse in torsion : Concept of interaction of torsion, shear and flexure. Analysis and design of rectangular section for torsion, shear and flexure. (3)
- Limit state of serviceability : Deflection calculations for beams and one-way slabs. (3)

Unit-II

- Analysis and design of columns subjected to biaxial moments. Design of long columns.(3)
- Design of stepped column subjected to uniaxial bending. (3)
- Design of Isolated footing , for uniaxial and Biaxial bending. (4)

Unit-III

- Moment redistribution :Analysis and Design of fixed beam, propped cantilever, two-span symmetric continuous beam. (5)
- Yield line theory of analysis of rectangular and circular slabs, simply supported and fixed at ends. (5)

SECTION B

Two question of 20 marks are to be answered out of Three questions of 20 marks each to be set on Units IV and V)

Unit-I (withLSM)

- Analysis and design of portal frames (single bay single storey) hinged or fixed at base. Design of hinge and design of foundation. (5)
- Design of combined footing (10)
- Rectangular footing.
- Strap beam footing.
- Trapezoidal footing.
- Raft footing,

Unit-V (with LSM)

- Design of RCC Two way slab with various end conditions using with IS Code coeff. (5)
- Design of R.C.C. Cantilever and counterfort Retaining wall (10)

IRRIGATION ENGINEERING

7CE03

(3L+1T+2P)

SECTION-A

UNIT-1

1. GENERAL: (03)

Necessity and importance of Irrigation Engineering; Benefits & ill effects of Irrigation; Classification of Irrigation; General principles of flow, lift, perennial, inundation Irrigation systems; Comparative study of sprinkler and drip Irrigation systems.

2. WATER REQUIREMENT OF CROPS: (07)

Suitability of soils for Irrigation ; Standards of irrigation water; PET-R method of crop water requirements; Depth and frequency of irrigation; definitions of field capacity, wilting point, available moisture, duty, delta, GCA, CCA, kor depth, base period, outlet factor, capacity factor, time factor, root zone depth: Relation between duty and delta; Factors affecting duty; Principal crops in India; Crop rotation; Methods of assessment of irrigation water.

UNIT-II

3. RESERVOIR PLANNING: (06)

Selection of site for Reservoirs; Engineering surveys, Geological and Hydrological Investigations; Fixing of LWL, FTL, TBL, HFL; Different storage zones in reservoir; Determination of storage capacity by mass curve method; Reservoir sedimentation; Life estimation of reservoir by Brune's method; Organisation & Administration of Irrigation projects.

4. DAMS:

(A) GENERAL: (01)

Classification of dams as per use, hydraulic design and materials; Factors governing selection of type of dams. UNIT-III

(B) GRAVITY DAM: (06)

Definition; forces acting on gravity dam; stability requirements; Theoretical & practical profile of gravity dam; Low & High dam; Galleries.

(C) EARTHEN DAMS: (06)

Types of earthen dam; Description of component parts of earthen dams - foundation, cut off trench, rock toe, hearting, central impervious core, pitching and chipping, turfing; Seepage through body of earthen dam and drainage arrangements; Failure Of earthen dams; Plotting of phreatic line for homogeneous earthen dams with horizontal filters ; Stability of foundation against shear.

SECTION-B

UNIT-IV

5 SPILLWAYS: (05)

Types of spillway with their working operations; General principle of design of ogee spillway; Spillway gates - vertical lift, radial, rolling and drum; Energy dissipation methods d./s of spillways.

6. DIVERSION HEAD WORKS: (07)

Component parts of diversion headworks - Fish ladder, guide wall, divide wall, silt excluder and silt ejector; Causes of failure of weirs on permeable foundation; Bligh's Creep theory; dr. Khosla's theory for design of weirs on permeable foundations.

UNIT-V

CANALS:

GENERAL: (02)

Types of canal; Alignments of canal; Cross section of Irrigation canals; Balancing depth; Schedule of area statistics; Losses in canals

(B) CANALS IN ALLUVIAL SOILS: (05)

Kennedy's silt theory - Design procedure, silt supporting capacity, drawbacks; Lacey's silt theory - Definition of initial final and permanent regime channels, Lacey's Regime equation, channel design procedure, drawbacks; Garret's diagram for channel design.

(C) LINED CANALS: (03)

Design procedure; Types of lining; relative merits and demerits of canal lining; Economics of canal lining.

UNIT-VI

8. CANAL STRUCTURES:

(A) CANAL REGULATION WORKS: (03)

Only theoretical aspects of location, objects, classification components and schematic section of Head Regulator, Cross regulators, canal escapes, Canal falls and canal outlets.

B) CROSS DRAINAGE WORKS : (02)

nly theoretical aspects of location , objects, classification, components and schematic section of aqueducts, siphon aqueducts, super passege, canal siphon, inlets outlets and level crossings.

9. WATER LOGGING AND LAND DRAINAGE: (03)

Causes, effects, preventive measures of water logging, Types of drains, Layout of tile drains system; low of ground water to drains.

10. RIVER TRAINING WORKS: (02)

Defination; Classification; theoretical aspects of river training works like as Guide banks, Groynes and Spurs, Bank protection.

MAINTENANCE AND REHABILITATION OF CIVIL ENGINEERING STRUCTURES (3L+1T)

7CE04

SECTION-A

UNIT-I

1. INTRODUCTION :- -

Deterioration of structures. Definition of maintenance, Need for maintenance of different Civil Engineering structures. Maintenance characteristics that influence maintenance needs. A study of the cause of neglect and poor maintenance of structure. Measure of maintenance. [3]

2. CLASSIFICATION OF MAINTENANCE WORK :-

Servicing, rectification, replacement, planned, unplanned, preventive, corrective, predictable and avoidable maintenance works. Renovation and Rehabilitation.[3]

3. COMMON MAINTENANCE PROBLEMS:-

Relating to various Civil Engineering Structures and systems. Technology of maintenance. Area prone to frequent maintenance. Causes that aggravate maintenance work like high rise buildings. Special construction methods, new materials, difficult accessibility, Environment etc. [4]

UNIT-II

4. FACTORS AFFECTING INCIDENCE AND MAGNITUDE OF MAINTENANCE WORK :-

Over loading, movement of grounds, temperature variations, moisture leakages and dampness, chemical actions and corrosion, growth of trees, earthquake, flood and fire, riots and vandalism. Design defects. Defects in construction and use of materials, choice of materials for durability and maintainability. Design, expose and other factors effecting durability, precautions to increase durability.

[5]

5. Inspection, Identification and diagnosis of Common defects and failures with possible causes in buildings, Roads, Bridges, Railway Tracks, Canals and C.D.Works, Tunnels and Special Structures like Service Reservoirs, Silos, bunkers, Off-Shore, Water Supply, Sewerage, Storm water Drains, Electrical and Mechanical Systems, Elevators, Escalators etc. [5]

UNIT-III

6. PREVENTIVE MAINTENANCE :-

General - Site selection, choice of structural systems and materials, specifications & detailing. Buildings Special attention to foundations, wells, roofs, terraces, floors, doors and windows, plinth, compound walls, expansion points stair cases to improve maintainability. Pumping and sanitary works. Termite control. External finishes. Roads Stabilization techniques, compaction and drainage, shoulders, slope protection, joints in C.C. Pavements, Routine and service maintenance, recycling. Bridges and C.D. Works Repairs, strengthening and rehabilitation. Reliability rating of existing structures and systems. Service life and expected Road carrying capacity. Service and Stability requirements. Future service requirements, loads, fatigue, creep. [10]

SECTION-B

UNIT-IV

7. MATERIALS AND TECHNIQUES FOR MAINTENANCE :-

Materials for repairs like cement, cement grouts, epoxy grouts, mortars and coatings, polymer concrete composites, sealants, membrane overlays, fiber reinforcement concrete, Resin based compounds, emulsions and paints, geotextiles. Techniques like stiffening, linings, guniting, protection systems, prestressing, Post-tensioning and base isolation technology. Temporary supporting systems for Structures like timbering, shoring etc. [5]

ECONOMICS OF MAINTENANCE :-

The burden of maintenance work, complexity of the work and the conflicting interests involved. Various economic factors that affect maintenance work. Initial an user costs. Impact of inflation on maintenance. Life of structures : Structural life and economic life. Basics of life cycle costing Techniques. [5]

UNIT-V

9. MAINTENANCE PLANNING :-

The deeper significance of maintenance as opposed to cosmetic treatments. Broad action plan, planning, Budgeting and controlling the cost of maintenance work. Policy formulation, standards of maintenance, Budgeting and budgetary control. Controlling Cost. Planned maintenance. Inspection

cycles and condition surveys. Investigations for assessing condition of structures including non-destructive evaluation techniques like proof load test, photogrammetric analysis, astatic and optoelectric motion analysis, borescopes, fiber-optic probes, chain-dragging, acoustic emission and ultrasonic techniques, infrared thermography, high-speed non-contact sensors, sonar and sound penetrating radar techniques. Reliability rating. Programming maintenance. Maintenance cost records. Maintenance manuals, their function. contents and types. Difficulties in the way of planned maintenance. [10]

UNIT-VI

10. MAINTENANCE ORIENTED DESIGNS >

Design and its relation to maintenance. Relation ship between initial, maintenance and running costs. Cost appraisal techniques. Consideration of maintenance at design stage. Design needs. Importance of feed back. Feed back systems. Information gathering, the design data communication. Interaction amongst designers, contractors. Uses maintenance and researchers. Maintainability, role of design professional. [4]

11. MAINTENANCE MANAGEMENT :-

Need for data. Data relationship of the data base system to management process. Cost data bases and management. Uses of data base. Problems in data collection and use. Setting criteria from data collected, operational assessment. [3]

12. RESEARCH INTO MAINTENANCE :-

Importance of research. Areas of research including materials, techniques, field equipment and tools for investigation, repairs and monitoring non-destructive evaluation techniques. [3]

Elective-1 OBJECT ORIENTED PROGRAMMING IN C++

7CE05

(3 L+1T)

SECTION-A

UNIT-1

1.Program Design

Introduction to Problem Definition, Modular Program Design, Program Composition, Comments, Statements, Flow Control, Functions, Modules, Dynamic Memory Management, Program evaluation and testing, Program documentation, Object Oriented Formulations Data Types intrinsic Types, User Defined Data Types, Abstract Data Types.

UNIT-II

2.Object Oriented Programming Concepts

Introduction, Encapsulation, Inheritance, and Polymorphism, Object Oriented Numerical Calculations, Operator Overloading Features of Programming Languages : Comments, Statements and Expressions, Flow Control, Explicit Loops, Implied Loops, Conditionals, Subprograms, Functions, Global Variables, Exception Controls. Interface Prototype. Characters and Strings, User Defined Data Types, Overloading Operators, User Defined Operators, Pointers and Targets, Pointer Type Declaration, Pointer Assignment, Using Pointers in Expressions Pointers and Linked Lists , Accessing External Source Files and Functions, Procedural Applications .

UNIT-III

3.Object Oriented Methods : Inheritance and Polymorphism

Introduction,, Example Applications of Inheritance, Polymorphism

SECTION-B

UNIT-IV

4.OOP Data Structures

Data Structures , Stacks , Queues, Linked Lists, Linked Lists, File, Direct (Random) Access Files

UNIT-V

5. Arrays and Matrices

Subscripted Variables: Arrays , Initializing Array Elements , Intrinsic Array Functions, User Defined Operators, Computation with Matrices, multi-file programmes

UNIT-VI

6.Advanced Topics :

Templates, Virtual functions, Exceptions

Elective – I Traffic Engineering

7CE05

SECTION-A

Unit -I

1. General Road, Road user & Road Vehicle Characteristics Traffic on Indian Roads.
2. Traffic Surveys:
Speed, journey time and delay studies, methods of measurement of spot speed headways gaps volume/ capacity surveys speed, volume-density interrelations, measurements of running and journey speeds Origin-Destination surveys necessity, survey methods sample size, data analysis & Presentation, Highway capacity, level of service concepts. (10)

Unit -II

3. Traffic Events:
Statistical methods for interpretation Regression application of Binomial, Normal Poission distributions, iscrete and continuous distribution to traffic flow, Test of significance - Chisquare & 'T' test.(4)

Unit-III

4. Road Geometry's:
Hierarchy of urban roads and their standards Diverging, merging crossing weaving manourver's, conflict points, types of road junctions channelization of traffic flow, traffic rotary design Grade separated inter-sections, Drive ways, design of pedestrian facilities Design criteria for separate cycle track, Exclusive Bus lane. (12)

SECTION-B

Unit - IV

5. Traffic Control:
Traffic signs, road markings, traffic signals, design of signalized intersections & signaling systems, queing Theory, Traffic control aids, and street furniture.(10)

Unit-V

6. Traffic Safety:
Driver error, vehicle & road surface Laws and enforcement traffic accident conditions in India Collection and interpretation of accident data and recording in Std. from skidding sped and weather effects on accidents, Analysis of Accidents. Pedestration cyclists & auto vehicle drivers safety. Traffic regulation 3R and 5E"s of traffic management (8)

7. Enforcement and Education:

Motor Vehicle act and Rules, Education, Need and Methods, Air pollution & Noise Pollution by Traffic.

(2)

Unit-VI

8. Parking:
Parking surveys, on and off street parking & parking systems, parking demand, design of off-street parking lot, underground & Multistoried parking.(4)

9. Urban Traffic:

Urban transportation problems and Analysis of characteristics of mixed traffic flow, head and administrative set up of traffic colls at various levels, co-ordination with other transport modes, traffic organisation. General principles of urban transport planning in context to India cities (specially metropolitan). (8)

ELECTIVE –I ADVANCED HYDRAULICS

7CE05

(3L+ IT)

SECTION-A

UNIT-I

- 1.Computation of uniform flow. Computation of critical flow.(04)
- 2.Theory of gradually varied flow. Analysis of surface profile of gradually varied flow. (05)

UNIT-II

- 3 .Computation of gradually varied flow, Bresse's method, Chew's method, Direct step method, standard step method. (10)

UNIT-III

- 4.Theory of Hydraulic jump, Location of hydraulic jump, application of hydraulic jump in design of hydraulic jump type stilling basin with horizontal apron (10)

SECTION-B

UNIT-IV

- 5.Equation of unsteady flow in a pipe line for incompressible fluid. Time of flow establishment, Rigid water column theory of water hammer and computation of water hammer pressures.(10)

UNIT-V

- 6.Equation describing water hammer phenomena when compressibility of fluid and elasticity of pipe is considered, computation of water hammer pressure of frictionless flow in horizontal pipe, for sudden and slow closer of valve, Application of allievi's method and charts approximate pressures. Water hammer pressures in pumping systems. Method characteristics. (08)
7. Computation of water hammer pressures in branched pipe system and in surge tank system. Various devices, used for protection from water hammer pressures.(03)

UNIT-VI

- 8.Function of surge tank and different type of surge tanks. Equations governing the flow in the simple surge tank system. Analysis of flow in a simple surge tank system. Computation of maximum surges in a simple surge tank, study of problem of hydraulic stability in a simple surge tank system.(10).

ELECTIVE-I:SOIL DYNAMICS

7CE05

(3L+1T)

SECTION-A

UNIT-1:

1.Elastic properties of soils, applicability of Hooke's law to soils, elastic constants of soil and their determination. Coefficient of elastic uniform compression and shear; cyclic plate load test.(6)

UNIT-II:

2.Theory of vibration, degree of freedom, theory of free & forced vibrations, natural frequency, resonance, effect of soil inertia on forced vertical vibration of foundation, methods/approaches of determining dynamic characteristics of soil-foundation systems -empirical method, Pauw method, Balkrishna-Nagraj approach, Richert's elastic half space approach. (9)

UNIT-III:

3.Strength & deformation characteristics of soil under dynamic loads, liquefaction in soil,

SECTION-B

UNIT-IV:

4. Residual soil settlement under dynamic loads, damping property of soil, effects of vibration on internal friction, cohesion, viscosity, porosity & permeability; vibroviscous soil resistance. (6)

UNIT-V

5. Earthquakes, earthquake effects on soil-foundation system ,types of waves & their characteristics .response spectrums, seismic forces and damage potential indices. (4)

6.Propagation of elastic waves in isotropic material, application to dynamic problems energy transmission from machine foundation in elastic half space.(4)

UNIT-VI:

7.Machine foundation: Special features, resonant frequency of block foundation, permissible amplitudes. Analysis & design of single engine reciprocating machine foundation, methods of decreasing vibrations of foundation. (7)

ELECTIVE - I: AIR POLLUTION AND SOLID WASTE MANAGEMENT

7CE05

SECTION – A

Unit-I

1. Introduction to air pollution : Definition, air pollution episodes, atmosphere and its zones. (4)
2. Classification and sources of air pollutants (2)
3. Effects of air pollutants on man, plants animal & materials(3)

Unit-II

4. Meteorology and air pollution : Primary and secondary parameters, atmospheric stability, plume behaviour. (5)
5. Air sampling and measurement: ambient air sampling and stack sampling, collection of particulate and gaseous pollutants, methods of estimation.(6)

Unit-III

6. Air pollution control methods and equipments: Principle of control methods for particulates and gaseous pollutants, gravity settlers, electrostatic precipitators, bag filters cyclones, wet scrubbers(6)
7. Automobile exhaust: Pollution due to diesel and petrol engines, exhaust treatment and abatement. (3)
8. Noise Pollution: Sources, ill effects, control measures (1)

SECTION – B

Unit IV

9. Introduction to solid waste management. (2)
10. Sources, quantity and quality: Sources of solid waste, classification and components, physical and chemical characteristics, per capita contribution, sampling and analysis. (8)

UnitV

11. Collection and transportation of solid waste: method of collection, equipment used for collection and transportation, transfer stations.(7)
12. Solid waste processing: methods of processing, choice of methods, merits and demerits of various methods. (3)

UNIT-VI

13. Composting of waste: method of composting, factors affecting composting (4)
14. Sanitary land filling: site requirements, methods, leachate management.(4)
15. Incineration: Principles of incineration, types of incinerators, advantages and disadvantages.(2)

Elective - I: ADVANCED RCC DESIGN

7C05

(3L+1T)

SECTION A

Unit - I

1. Design of overhead circular service reservoirs. Analysis of staging by cantilever method. Analysis and design for earthquake as per relevant IS codes. Design of foundation- Annular raft, Full raft(10)

Unit-II

2. Design of highway bridges with IRC loading and equivalent UDL Slab type, Two/Three girder type

SECTION B

Unit-III

3. Design of building frames upto two bay/two storey, including design of foundation. (10)

Unit-IV

4. Design of cylindrical shells by beam theory, advantages, assumptions, ranges of validity and beam analysis. Design of shells with or without edge beams. (10)

