3rd Semester
CIVIL ENGINEERING

Third Semester   CIVIL Engineering

Sl. No.	Course No.	Subject	L	T	P	TA	CT	Total	ESE	Subject Total	Credit
			Periods			**Evaluation Scheme**					
			L	T	P	**Sessional Exam**			ESE	Subject Total	Credit
						TA	CT	Total			
Theory											
1	MA 301	Mathematics-III.	3	1		30	20	50	100	150	4
2	CE 312	Theory of Structures-I.	3	1		30	20	50	100	150	4
3	CE 313	Engineering Surveying.	3	1		30	20	50	100	150	4
4	CE 314	Basic Fluid Mechanics.	3	1		30	20	50	100	150	4
5	CE 315	Construction Practices and Building Drawing.	3	1		30	20	50	100	150	4
6	EE 316 & ME 317	Electrical and Mechanical Engineering.	3	1		30	20	50	100	150	4
Practicals/Drawing/Design											
7	CE 313 L	Engineering Surveying.			3	30	20	50		50	2
8	CE 314 L	Basic Fluid Mechanics.			3	30	20	50		50	2
9	CE 315 L	Construction Practices and Building Drawing.			3	30	20	50		50	2
10	EE 316 L & ME 317 L	Electrical and Mechanical Engineering.			3	30	20	50		50	2
11	CE 318	General Proficiency							50	50	2
Total			18	6	12						

Total Marks: 1150   **Total Periods: 36**   **Total Credits: 34**

MA 301: MATHEMATICS-III (Common to all Branches)
Theory-100 marks.
Sessional- 50 marks.
Time- 3 Hrs.

Unit-I: Linear Algebra: **40 Marks.**

Some Special types of matrices such as symmetric and skew-symmetric, hermitian and skew-hermitian, idempotent, nilpotent, involuntary, orthogonal, unitary and their properties; Triangular and echelon form, pivot elements; Trace, Differentiation and integration of matrices; Inverse of a matrix, Theorems on inverse, elementary operations and elementary matrices, equivalent matrices, computation of inverse by elementary transformations, reduction of matrices to triangular from and normal from; partitioning, inverse by partitioning, rank of a matrix, evaluation of rank, Theorems on rank.

Vector spaces and subspaces, linear independence, basis and dimension, row space, column space, null space, row rank, column rank, equality of row rank, column rank and rank of a matrix.

Solution of a system of non-homogeneous linear equations, solution of a system of homogeneous linear equations, Consistency of a system of linear equations.

Orthogonally: Inner product, orthogonal vectors, orthogonal metrics and Gram-Schmidt orthogonalization.

Eigen values and Eigen vectors and their properties, Cayler-Hamilton's theorem, Reduction of a matrix to diagonal from, necessary and sufficient condition for diagonalization.

Unit-II: Statistics: **40 Marks.**
Probability, probability distributions and characteristics: Dispersion skewness and kurtosis, random experiments and sample space, definitions of probability, Laws of probability, Baye's theorem, random variable, Probability distribution of a discrete random variable, Mean and Variance of a discrete random variable, Probability distribution of a continuous random variable, Expectation and moments, Binomial distribution, Poisson distribution, Normal distribution.
Elementary sampling theory: Sampling with and without replacement, Sampling distribution of mean, proportion, sum and difference. Central limit theorem and its significance.
Statistical estimation theory: Biased and un-biased estimates, efficient estimate, point & interval estimate. Confidence limits for the estimates of mean, proportion, difference and sum.
Statistical decision theory: Statistical hypothesis, Null hypothesis, Test of significance involving normal distribution.

Unit-III: Laplace transformation: **20 Marks.**
Laplace transformation of elementary functions, inverse Laplace transform, Linearity, Laplace transforms of derivatives and integrals, shifting Theorems, Laplace transform of unit step function, Direc-delta function, Differentiation and integration of transforms, convolution, Application to differential equations.

Text/Reference:
1. Advanced Engineering Mathematics.   : Peter V O' Neil. : Wiley Eastern Ltd.
2. Advanced Engineering Mathematics.   : Jain & Iyenger. : Narosa.
3. Higher Engineering Mathematics.   : B. S. Grewal.   : Laxmi Publication.
4. Linear Algebra & its applications.   : Gilbert Strang.   : Thomson Books.
5. Probability & Statistics.   : Murray R. Spiegel.   : Schaum's outline series,
                                                                                        Mc Graw Hill.

CE 312: THEORY OF STRUCTURES-I
Theory-100 marks.
Sessional- 50 marks.
Time- 3 Hrs.

1. **Bending Moment and shear force diagrams for statically determinate beams:**

   Analytical and graphical methods, maximum bending moment and shear force, point of contraflexure.

2. **Analysis of statically determinate structures:**

   Trusses, frames, cables and 3-hinged arches, method of joints, section and graphical method.

3. **Work and Energy Principle:**

   Strain Energy Expression, Principle of virtual work, Maxwell's Reciprocal Theorem, Maxwell-Betti's Theorem, Unit load method.

4. **Slope and Deflection:**

   Relation between Curvature, slope and deflection. Deflection of statically determinate beams-Castigliane's theorem 1, Macaulay's method, moment area method, Deflection of statically determinate perfect frame.

5. **Columns:**

   Empirical formula, Rankine's formula, Concentric and eccentric load. Columns with initial curvature. Equivalent eccentricity, Beam column.

6. **Indeterminacy of structures:**

   Static and kinematic indeterminacy. Analysis of truss with single degree of indeterminacy. Lack of fit, change of temperature.

CE 313:ENGINEERING SURVEYING
Theory-100 marks.
Sessional- 50 marks.
Practical- 50 marks.
Time- 3 Hrs.

Leveling: Classification- Profile & Cross-section, Fly leveling, Reciprocal leveling, Trigonometric leveling, Procise leveling. Errors in leveling and accuracy.

Plane Table Surveying: Equipments & accessories, Methods of locating details- Radiation, Intersection and Resection. Advantages & Disadvantages.

Theodolite: Measurement of horizontalangle- method of repetition and reiteration, various types of theodolites-$20^{//}$ vernier, Micro-optic and Electronic. Introduction to Total station.

Traversing by Theodolite- closed traverse, computation of independent coordinates-gale's Traverse Table.

Tacheometry: Basic systems of tacheometric measurement, Principles of stadia and Tangential method with staff vertical, derivation of formulae and numerical problems.

Horizontal and Vertical Curves: Characteristics of different types- Elements of Circular and Transition curves, Methods of setting out of simple circular and combined curves.

Contouring: Characteristics of contours, Various method.

Computation of Area and Volume: Units and conversion factor, Area by Mid-ordinate, Average-ordinate, Trapezoidal and Simpson's Rule, Formulae for circulation of Cross-Sectional Area, Formulae for calculation of volume. Numerical problems.

Field Astronomy: Definition of terms- Astronomical coordinate systems- Astronomical triangle- Star at elongation, Star at culmination, Star at horizon, Circumpolar stars, Determination of azimuth, latitude and longitude. Napier's rules of Circular parts.

CE 313 L: ENGINEERING SURVEYING (PRACTICAL)
Practical- 50 marks.
Time- 3 Hrs.

To range a line more than one chain length and recording the details in a field book.

Closed compass traversing to plot the existing layout of a building/ built-up area.

Profile and Cross-sectional leveling with Dumps/Level.

Fly leveling with tilling level.

Trigonometric leveling.

Plane table traversing.

Three-pt-problem.

Direct Contouring using Indian Tangent Clinometer.

Indirect contouring by the method of grids.

Measurement of horizontal and vertical angles with theodolite.

CE 314:BASIC FLUID MECHANICS

Theory-100 marks.
Sessional- 50 marks.
Practical- 50 marks.
Time- 3 Hrs.

Introduction:
Fluid- definition, types, physical properties.

Fluid Statics:
Hydrostatic law, pressure, density, height relationship, manometer, pressure on plane, curved and submerged surfaces, Centre of pressure, Buoyancy, Equilibrium of floating bodies, metacentre. Fluid mass subjected to accelerations.

Fluid Kinematics:
Types and states of motion- steady and unsteady, uniform and nonuniform, laminar and turbulent flow, compressible and incompressible flows, one, two & three dimensional flows, streamlines, streak lines and path lines, stream tube, stream function and velocity potential, flow net and its drawing, Free and forced vortexes.

Fluid Dynamics:
Continuity equation, Euler's equation, Bernoulis equation- application. Total energy. Momentum equation, Energy equation.

Flow Through Openings:
Orifices, Mouthpieces, Co-efficient of contraction, velocity and discharge, Nozzles, Flow under sluice gate.

Notches and Weirs:
Rectangular, triangular and trapezoidal notches and weirs, Franci's formula with end contraction, suppressed weir, Cippoletic weir, submerged weir, broad crested weir.

Flow Through Pipes:
Loss of head due to friction, bend and elbows, sudden enlargement, sudden centraction, obsoletion and at entrance. Darcy Weisbach formula, coefficient of friction, flow through compound pipes. Siphon.

Flow Measurement:
Venturi meter, orifice meter, Nozzle meter, pitot tube, current meter.

Dimensional and Model Analysis:
Rayleigh's method, Buckingham's pi-theorem, important dimensionless peremeter and their significance. Application of dimensional analysis to fluid flow problems. Geometric, Kinematics and dynamic similarities, scale ratio, velocity, force, discharge speed and power of prototype, Distorted model.

Flow in Open Channels:
Channel section- Wetted perimeter, hydraulic radius, slope; Chezy's and Manning's formula, Economic section.

CE 314L: BASIC FLUID MECHANICS

1. Determination of coefficient of triangular notch.

2. Determination of friction factor in pipe flow cases.

3. Verification of Bernoulli's theorem.

4. Determination of coefficient of Orifice.

5. Reynold's experiment for laminar and turbulent flow.

CE 315 CONSTRUCTION PRACTICES AND BUILDING DRAWING
Theory-100 marks.
Sessional- 50 marks.
Practical- 50 marks.
Time- 3 Hrs.

1. **Planning:** Survey-Layout-Investigation for different types of building orientation of building surface water drainage system, water supply, electrification, sewage disposal- road alignment, preparation of schemes etc.
2. **Functional requirement of a building:** Basic requirements – strength and stability, comfort and convenience resistance to moisture penetration, fire safety (NSC classification) thermal insulation, day lighting and ventilation, sound insulation, security against burglary, protection against vermins or termites.
3. **Building components:** Their basic requirements, foundation, plinth, floor, super structure, walls, apiers, beams, columns, lintels, doors, windows, ventilations, shedes, shades, celling, roofs, steps, stairs, finishes and utility fixtures.
4. **Foundation:** Classification-types, places of use, isolated, wall footing, combined footing, grillage foundation, raft foundation, pile foundation, type and application, basements buoyancy raft, caissons, cylinders, shafts.
   Construction- setting out excavation, timbering, Shorring and bracing, dewatering.
5. **Masonary works:** Brick masonary and stone masonary construction, cavity walls partition walls types of bonds, reinforced brick masonary.
6. **Temporary supporting structures:** Shuttering and scaffolding, for footing, column, beam, slab etc.
7. **Cement concrete works:** Plain cement concrete, reinforced cement concrete steel work in R.C.C.
8. **Flooring:** Requirements, types of flooring method of lying skid resistance floor, industrial floor, NEO construction practices.
9. **Staircases:** Types of stairs, material, orientation simple geometric calculations, rams, elevators, escalators, lift.
10. **Roofs:** Types of roof, selection of roofs.
11. **Doors, windows, ventilators:** Types, materials specification, modular concept, construction practices.
12. **Prefabrication:** Standardization, mechanization industrialization modular co-oration, joins, comparison with Insitu construction.
13. **Plant and equipments:** Concrete mixer, vibrator, pump sets.

CE 315L: CONSTRUCTION PRACTICES AND BUILDING DRAWING
Marks- 50.
Time- 4 Hrs.

BUILDING DRAWING PRACTICAL: -

1. **Introduction: -** Purpose of drawing, Requirements, Different types, Symbols for materials, installation & fixtures.
2. **Building Components: -** Foundation, Masonary, Trusses, Stairs.
3. **Building Drawing: -** Plan, Elevation and Section of- Single Storeyed, Multi Storeyed (flat roof & sloped roof) buildings.
4. **Introduction to use Softwares: -** (Auto-cad, 3D-Max, 3D-Home Architect) in Building Drawing.

EE 316: ELECTRICAL ENGINEERING
Theory- 50 marks.
Sessional- 25 marks.
Time- 3 Hrs.

1. Introduction to basic electric machines: working principles of rotating electric machines (motors and generator) and transformer. Types of motors and their application.
2. House Wiring: Details of wiring for different types of buildings, estimation and valuation.
3. Introduction to transducers, their classification and uses.
4. Introduction to Oscilloscope and Transistor amplifier.

ME 317: MECHANICAL ENGINEERING
Theory- 50 marks.
Sessional- 50 marks.
Time- 3 Hrs.

Unit 1: - 10 hours (Only a treatment in outline is required for each topic and no coverage in depth is required- no mathematical problems).

Energy: - Definition, types, sources- traditional and non-traditional, application, merits and demerits of each type of non-conventional energy. - 2 hrs.

Utilization Conventional Energy: - Power Plants.

- Steam power plants: layout, components with block diagram- 1 hr.
- Diagrammatic description of boiler and its mounting & accessories- 1 hr.
- Diagrammatic description of turbine, condenser with working principles- 1 hr.
- I.C. engines: principle & working of petrol & diesel engine & Comparison- 1 hr.
- Principles of gas turbine & nuclear plants- 1 hr.
- Principles and working of a refrigerators and air conditioner- 1 hr.
- Lift mechanism- 1 hr.

Unit 2: 9 hours (Brief description, principles, relevant formula without deduction, simple mathematical problems)

Mechanical power transmission systems:

- Gears – types, velocity ratio, simple problems – 2hrs.

- Belt and rope drive; types, equation for torque h.p. transmitted width of belts, simple problems – 2 hrs.

Essential components:

- Governor & flywheel – description, simple problems- 2 hrs.
- Mechanical unbalance –2hrs.
- Mechanical aspects of a pomp – 1hr.

Unit 3:5 hours (principles with diagrams only)

Production processes:

- Casting: moulding, advantages & disadvantages defects – 2hrs.
- Forging: types principles – 1hr.
- Welding; types advantages & disadvantages, applications – 2hr.

Textbooks:

Unit 1& 2: - Basic mechanical Engineering – By T.S. Rajan – Wiley Eastern.

Unit 3: - Theory of machine – by Jagadish Lal – metropolitan Books Ltd. New Delhi.

Laboratory: - Lab demonstration of

a. Boiler – mounting & accessories.
b. I.C. Engines, Steam Engines.
c. Refrigerators & air conditioner.
d. Governor, gear, belt & rope drive, flywheels.
e. Pump.
f. Covered in W.P. I & II.