OBJECTIVES: The objective of this course is to fulfill the needs of engineers to understand applications of Numerical Analysis, Transform Calculus and Statistical techniques in order to acquire mathematical knowledge and to solving wide range of practical problems appearing in different sections of science and engineering. More precisely, the objectives are:

- To introduce effective mathematical tools for the Numerical Solutions algebraic and transcendental equations.
- To enable young technocrats to acquire mathematical knowledge to understand Laplace transformation, Inverse Laplace transformation and Fourier Transform which are used in various branches of engineering.
- To acquaint the student with mathematical tools available in Statistics needed in various field of science and engineering.


Textbooks/References:

UNIT-I

Stones, Brick, Mortar and Concrete:

Stones: Occurrence, Classification of Rocks, varieties, Characteristics and their testing, uses, quarrying and dressing of stones, Deterioration of Stones, Retardation of Decay of Stones, Preservation of Stones, Artificial Stones.

Brick: Manufacturing, characteristics, Classification and uses, Improved brick from inferior soils, Hand molding brick table, Clay-fly ash brick table

Concrete: Ingredients, Grades of Concrete, Concrete Production, Special Concrete

UNIT-II

Timber, Glass, Steel and Aluminium:

Timber: Important timbers, their engineering properties and uses, defects in timber, seasoning and treatment, need for wood substitutes, Plywood, Particle Board, Fibre Board, Applications of wood and wood products, Plaster Boards, Adhesives, types of Gypsum Board and their uses

Glass: What is glass, Nature of Glass, Structure of Glass, Macro Molecular Structure, Main Oxides in Glass, Thermal and Optical Properties, Effect of Coating,

Steel: Physical Properties of Structural Steel, Grades of Steel

Aluminium: Properties, Forms, Uses, Advantages

UNIT-III

Flooring, Roofing, Plumbing and Sanitary Material:

Flooring and Roofing tiles, Types of Flooring – Marble, Kota stone, wood etc. Type of Roofing, P.V.C. materials, CI, GI, Asbestos pipe, Stone ware pipes

UNIT-IV

Paints, Enamels and Varnishes:

UNIT-V

Miscellaneous Construction Materials:

Bitumen, Tar and Asphalt their characteristics and uses, Ultra Poly Vinyl chloride Pipes, Thermal and sound insulating materials, and water proofing materials.

References Books:

5. M S Shetty, Concrete Technology, S. Chand Technical.
UNIT-I
Surveying & Levelling:
Basic Definitions of Surveying, Principles, Classification of surveying, Methods of Linear Measurement Ranging, Accessories for linear measurement, Chain Surveying, Compass Surveying, Plane Table Surveying, Correction and Errors Definition of Levelling, types of levelling operations, Principles, Problems, Computation of Area and Volumes

Unit-II
Theodolite Traversing:
Types, Temporary Adjustment, latitude & Departure, plotting & Adjustment, Omitted Measurements EDM, Trigonometric Levelling

Unit-III
Tacheometry:
Tachometric systems and principles, stadia system, uses of analytic lens, tangential system, subtense system, instrument constant, field work reduction, direct-reading tacheometer, use of tacheometry for traversing and contouring.

Unit-IV
Curves:
Classification and use; elements of circular curves, calculations, setting out curves by offsets and by theodolites, compound curves, reverse curves, transition curves, vertical curves, setting out.

Unit-V
Hydrographic Survey:
Soundings, methods of observations, computations and plotting. Principles of photographic surveying: aerial photography, tilt and height distortions, Setting out works

REFERENCES
5. Gopi A, Satikumar R- Advance surveying, Pearson
7. R.Agors, Advance Surveying, Khanna Publisher
8. Chandra AM, Higher Surveying, New Age International, new Dwli
10. Venkatramaiah, Surveying, University Press, Mumbai

List of Experiments
1. Theodolite traversing
2. Profile leveling, contouring & cross sectioning
3. Determination of tachometric constants & uses of tachometer in various field wo
4. Curve setting by different methods.
UNIT-I
Drawing of Building Elements- Drawing of various elements of buildings like various types of footing, open foundation, raft, grillage, pile and well foundation, Drawing of frames of doors, window, various types of door, window and ventilator, lintels and arches, stairs and staircase, trusses, flooring, roofs etc.

UNIT-II
Building Planning- Classification of buildings, Provisions of National Building Codes and Rules, Building bye-laws, open area, Setbacks, FAR terminology, Design and drawing of Building, Design concepts and philosophies, Preparing sketch plans and working drawings of various types of buildings like residential building, institutional buildings and commercial buildings, site plans, presentation techniques, pictorial drawings, perspective and rendering, model making, introduction to computer aided design and drafting, Applying of principle of architectural composition (i.e. unity, contrast, etc.), Principles of planning, orientation in detailed drawings.

UNIT-III
Building Services- Introduction of Building Services like water supply, sewerage and drainage systems, sanitary fittings and fixtures, plumbing systems, principles of internal & external drainage systems, principles of electrification of buildings, intelligent buildings, elevators & escalators their standards and uses, air-conditioning systems, fire-fighting systems, buildings safety and security systems, ventilation and lightening and staircases, fire safety, thermal insulation, acoustics of buildings.

UNIT-IV
Principles of architectural design- Definition of architecture, factors influencing architectural development, characteristics features of style, historic examples, creative principles.
Principles of architectural composition– Unity, balance, proportion, scale, rhythm, harmony, Accentuation and contrast.
Organising principles in architecture– Symmetry, hierarchy, axis, linear, concentric, radial, and asymmetric grouping, primary and secondary masses, Role of colour, texture, shapes/ forms in architecture.
Architectural space and mass, visual and emotional effects of geometric forms, space activity and tolerance space. Forms related to materials and structural systems.
UNIT-V
Perspective Drawing and Town Planning- Elements of perspective drawing involving simple problems, one point and two point perspectives, energy efficient buildings. Concepts of master plan, structure plan, detailed town planning scheme and action plan, estimating future needs - planning standards for different land use, allocation for commerce, industries, public amenities, open areas etc., planning standards for density distributions, density zones, planning standards for traffic network, standard of roads and paths, provision for urban growth, growth models, plan implementation, town planning legislation and municipal acts, planning of control development schemes, urban financing, land acquisition, slum clearance schemes, pollution control aspects

References Books:
1. Shah, Kale & Patki; Building Design and Drawing; TMH
2. Malik & Meo; Building Design and Drawing
3. W B Mckay; Orient Blackswan Building Construction Vol 1 -4, Pearson
5. Layal JS, Dongre A, Building Design and Drawing, Satya Prakashan
6. Ghose D.N., Civil Engineering Design and Drawing, CBS publisher
10. Lewis Keeble, Principles and Practice of Town and Country Planning.

List of Experiments
1. Sketches of various building components.
2. Drawing of various building components containing doors, windows ventilators, lintels and arches stairs foundations etc.
3. Drawings for services and interiors of buildings.
4. Drawings containing detailed planning of one/two bed room residential building (common to all student)
5. Drawing of residential and institutional building (Each student performs a different drawing).
6. Use of Auto CAD for preparation of drawings.
UNIT I
Simple Stress and Strains: Concept of Elastic body stress and Strain, Hooke’s law, Various types of stress and strains, Elastic constants, Stresses in compound bars, composite and tapering bars, Temperature stresses. Complex Stress and Strains- Two dimensional and three dimensional stress system. Normal and tangential stresses, Principal Planes, Principal Stresses and Strains, Mohr’s circle of stresses.

UNIT II
Bending and Shearing Stresses: Theory of simple bending, Concept of pure bending and bending stress, Equation of bending, Neutral axis, Section-Modulus, Differential equation of the elastic curve, Determination of bending stresses in simply supported, Cantilever and Overhanging beams subjected to point load and uniformly distributed loading, Bending stress distribution across a section of beam, Shearing Stress and shear stress distribution across a section in Beams.

UNIT III
Determination of Slope and Deflection of beams by Double Integration Method, Macaulay’s Method, Area Moment Method, Conjugate Beam Method, and Strain Energy Method, Castiglione’s Method, and Unit Load Method.

UNIT IV
Columns and Struts: Theory of columns, Slenderness ratio, Direct and bending stresses in short columns, Kern of a section. Buckling and stability, Euler’s buckling/crippling load for columns with different end conditions, Rankin’s formula, Eccentric loads and the Secant formula- Imperfections in columns. Thin Pressure Vessels: cylinders and spheres. Stress due to internal pressure, Change in diameter and volume. Theories of failure.

UNIT V
Torsion of Shafts: Concept of pure torsion, Torsion equation, Determination of shear stress and angle of twist of shafts of circular section, Torsion of solid and hollow circular shafts, Analyses of problems based on combined Bending and Torsion. Unsymmetrical Bending: Principal moment of Inertia, Product of Inertia, Bending of a beam in a plane which is not a plane of symmetry. Shear center; Curved beams: Pure bending of curved beams of rectangular, circular and trapezoidal sections, Stress distribution and position of neutral axis.

Reference books:
2. S.S Bhavikaati, Strength of Materials, Vikas Publisher, new Delhi
5. R. Subramaniam, Strength of Materials, Oxford University Press.
7. Mubeen A , Mechanics of solids , Pearsons
9. Debrath Nag, Strength of Material, Wiley
13. Chandramouli, Strength of Materials, PHI learning

List of Practical
1. Study of Universal testing machine
2. To determine the compressive and tensile strength of materials.
3. To determine the Brinell hardness of materials.
4. To determine the Rockwell hardness of materials
5. To determine the toughness of the materials.
6. To determine the stiffness of the spring.
7. To determine the deflection of beam by the use of deflection-beam apparatus.
Course Objective- To understand study the various aspects of civil engineering practices in ancient and historical structures.

Course Contents –
1. General Study of ancient monuments e.g. Forts, Bridges, Buildings and various other civil engineering related structures.
2. Environmental practices adopted in construction of historical structure during ancient/medieval period.
3. Construction techniques and materials used in historical structures.
4. Various planning aspects adopted in historical structures.
5. Visit of various historical structures and museums to understand history of civil engineering practices.

List of Practicals:-
1. Detailed study report on various aspects e.g. environmental practices, constructions techniques and materials, planning etc. of any one important ancient structure alongwith relevant sketches/drawings etc. and its presentation before departmental committee.