Faculty of Engineering & Technology
P.K.University
Shivpuri (MP)

Department of Civil Engineering

Evaluation Scheme & Syllabus for

B.Tech. Second Year (III & IV Sem)

(Effective from session 2025-26)

EVALUATION SCHEME

STUDY AND EVALUATION SCHEME FOR B.TECH IN CIVIL ENGINEERING
YEAR2nd/SEMESTER-III

SUBJECT CODE	SUBJECTS NAME	STUDYS CHEME Periods/Week L	T	P	Credits	INTERNAL ASSESSMENT Th	Pr	Tot	EXTERNAL ASSESSMENT Th	Pr	Tot	Total Marks of Internal & External
UENGICE301	Engineering Mathematics-III	3	1	0	4	30	-	30	70	-	70	100
UFLUICE302	Fluid Mechanics	3	0	0	3	30	-	30	70	-	70	100
UBUILCE303	Building Material & Construction	3	0	0	3	30	-	30	70	-	70	100
UMECHCE304	Mechanics of Solid	3	0	0	3	30	-	30	70	-	70	100
USURVCE05	Surveying	3	0	0	3	30	-	30	70	-	70	100
UENVICE306	Environment & Ecology	3	0	0	3	30	-	30	70	-	70	100
UFLUICE307	Fluid Mechanics Lab	0	0	2	1	-	25	25	-	25	25	50
UBUILCE308	Building Material & Construction Lab	0	0	2	1	-	25	25	-	25	25	50
USURVCE309	Surveying Lab	0	0	2	1	-	25	25	-	25	25	50
UCOMPCE310	Computer Based Statistical & Numerical Techniques Lab	0	0	2	1	-	25	25	-	25	25	50
Total		18	1	08	23	180	100	280	420	100	520	800

UENGICE301
ENGINEERING MATHEMATICS-III

L	T	P
3	1	0

UNIT I

Numerical Techniques – I: Zeroes of transcendental and polynomial equations, Bisection method, Regula-falsi method, Newton-Raphson method, Rate of convergence of above methods.
Interpolation: Finite differences, Newton's forward and backward interpolation. Lagrange's and Newton's divided difference formula for unequalintervals**.**

UNIT II

Numerical Techniques –II: Solution of system of linear equations, Matrix Decomposition methods, Jacobi method, Gauss- Seidal method.
Numerical differentiation & Integration: Trapezoidal rule, Simpson's one third and three-eight rules, Solution of ordinary differential equations (first order, second order and simultaneous) by Euler's, Picard's and fourth-order Runge- Kutta methods.

UNIT III

Statistical Techniques: Moments, Moment generating functions, Skewness, Kurtosis, Curve fitting, Method of least squares, Fitting of straight lines, Polynomials, Exponential curves, Correlation, Linear, non – linear and multiple regression analysis, Binomial, Poisson and Normal distributions. Tests of significations: Chi-square test, t-test.

UNIT IV

Function of Complex variable: Analytic function, C-R equations, Harmonic Functions, Cauchy's integral theorem, Cauchy's integral formula, Derivatives of analytic functions, Taylor's and Laurent's series, Singularities, Zeroes and Poles, Residuetheorem.

UNIT V

Integral Transforms: Fourier integral, Complex Fourier transform, Inverse Transforms, Convolution Theorems, Fourier sine and cosine transform, Applications of Fourier transform to simple one dimensional heat transfer equations, wave equations and Laplace equations, Z-Transform and its application to solve difference equation.

Text Books:

1. R.K. Jain &S.R.K. Iyenger, Advance Engineering Mathematics, Narosa PublicationHouse..
2. Jain, Iyenger Jain, Numerical Methods for Scientific and Engineering Computation, New Age International, New Delhi
3. J.N. Kapur, Mathematical Statistics, S. Chand & companyLtd.

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II Year III Semester

UFLUICE302
FLUID MECHANICS

L	T	P
3	0	0

UNIT I
Fluid and continuum, Physical properties of fluids, Rheology of fluids. Pressure-density-height relationship, manometers, pressure transducers, pressure on plane and curved surfaces, centre of pressure, buoyancy, stability of immersed and floating bodies, fluid masses subjected to linear acceleration and uniform rotation about an axis.

UNIT II
Types of fluid flows: Continuum & free molecular flows. Steady and unsteady, uniform and non- uniform, laminar and turbulent flows, rotational and irrotational flows, compressible and incompressible flows, subsonic, sonic and supersonic flows, sub-critical, critical and supercritical flows, one, two and three dimensional flows, streamlines, continuity equation for 3D and 1D flows, circulation, stream function and velocity potential.

UNIT III
Potential Flow: source, sink, doublet and half-body. Equation of motion along a streamline and its integration, Bernoulli's equation and its applications- Pitot tube, orifice meter, venturimeter and bend meter, notches and weirs, momentum equation and its application to pipe bends. resistance to flow, Minor losses in pipe in series and parallel, power transmission through a pipe, siphon, water hammer, three reservoir problems and pipe networks.

UNIT IV

Equation of motion for laminar flow through pipes, Stokes' law, transition from laminar to turbulent flow, turbulent flow, types of turbulent flow, isotropic, homogenous turbulence, scale and intensity of turbulence, measurement of turbulence, eddy viscosity, mixing length concept and velocity distribution in turbulent flow over smooth and rough surfaces, Boundary layer thickness, boundary layer over a flat plate, laminar boundary layer, application of momentum equation, turbulent boundary layer, laminar sub-layer, separation and its control.

UNIT V
Drag and lift, drag on a sphere, a two dimensional cylinder, and an aerofoil, Magnus effect. Similarity Laws: geometric, kinematics and dynamic similarity, undistorted and distorted model studies, Dimensional analysis, Buckingham's Pi theorem, important dimensionless numbers and their significance.

References:
1. Hibbler, "Fluid Mechanicsin SI Units" 1/e Pearson Education,Noida.
2. Fox & Donald, "Introduction to Fluid Mechanics" John Wiley &Sons PvtLtd,
3. Cengel&Cimbala, "Fluid Mechanics" TMH, NewDelhi.
4. Katz, "Introductory Fluid Mechanics" Cambridge UniversityPress
5. Pnueli&Gutfinger, "Fluid Mechanics" Cambridge UniversityPress
6. Modi& Seth "Hydraulics & Fluid Mechanics" StandardPublications.
7. Gupta, "Fluid Mechanics & Hydraulic Machines" Pearson Education,Noida

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II Year III Semester

UFLUICE307
FLUID MECHANICS LAB

L	T	P
0	0	2

LIST OF PRACTICAL

1. To verify the momentum equation using the experimental set-up on impact ofjet.
2. To determine the coefficient of discharge of an orifice of a given shape. Also to determine the coefficient of velocity and the coefficient of contraction of the orifice mouthpiece.
3. To calibrate an orifice meter and study the variation of the co-efficient of discharge with the Reynoldsnumber.
4. To calibrate a Venturimeter and study the variation of the co-efficient of discharge with the Reynoldsnumber.
5. To calibrate a bend meter and study the variation of the co-efficient of discharge with the Reynoldsnumber.
6. To draw a flow-net using Electrical AnalogyMethod.
7. To study the transition from laminar to turbulent flow and to determine the lower critical Reynoldsnumber.
8. To study the velocity distribution in a pipe and also to compute the discharge by integrating the velocityprofile.
9. To study the variation of friction factor, 'f' for turbulent flow in commercialpipes.
10. To study the boundary layer velocity profile over a flat plate and to determine the boundary layerthicknes

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II Year III Semester

UBUILCE303
BUILDING MATERIALS & CONSTRUCTION

L	T	P
3	0	0

UNIT I
Scope of Study of building Materials: building materials and their performance, economics of the building materials. **Stones:** Requirement of good building stone, characteristics of building stone sand their testing. Common building stones.Methods of preservation of stones.**Bricks**: Manufacturing process of clay bricks, classification of clay bricks. Properties of clay bricks, testing methods for clay bricks.Problems of efflorescence & lime bursting in bricks & tiles.**Gypsum**: properties of gypsum plaster, building products made of gypsum and their uses. **Lime**: Manufacture of lime, classifications of limes, properties of lime. **Cement**: Raw materials used, Process of Manufacturing, Chemical composition, compounds formed and their effect on strength, Types of cement, Testing of cement properties, Uses of cement. **Cement Concrete**: Constituent materials and their properties, Grades of concrete, Factors affecting strength, Properties of concrete at fresh and hardened stage, Testing of concrete, Methods of Curing of concrete. **Pozzolona**: Chemical composition and requirements for uses, Natural and Artificial flyash, Surkhi(burnt clay pozzolona), rice husk and ash pozzolona, properties and specifications for use in construction. **Timber**: Classification and identification of timber, Fundamental Engineering Properties of timber, Defects in timber, Factor saffecting strength of timber, Methods of seasoning and preservation of timber. Wood based products. **Asphalt:** Bitumen and Tar: Terminology, specifications and uses, Bituminous materials.

UNIT II
Plastics: classification, advantages of plastics, Mechanical properties and use of plastic in construction. **Paint svarnishes and distempers:** Common constituents, types and desirable properties, Cement paints. **Ferrous metals:** Desirable characteristics of reinforcing steel. Principles of cold working.Reinforcingstelemechanical and physical Properties chemical composition.Brief discussion on properties and uses of Aluminum and lead.**Glass**: Ingredients, properties types and use in construction. **Insulating Materials**: Thermal and sound insulating material, desirable properties and types.

UNITIII
Buildings: Components of building, area considerations, Construction Principle and Methods for layout, Damp proofing, ant termite treatment in buildings, Vertical circulation means: stair cases and their types, design and construction. Different types of floors, and flooring materials (Ground floor and upper floors). Bricks and stone masonry construction. Cavity wall & hollow blockconstruction.

UNITIV
Doors and Windows: Construction details, types of doors and windows and their relative advantages & disadvantages. Types of roof and roof treatments, Lintel sand Chhajja, Principles of building Planning.

UNIT V
Natural Ventilation, Water Supply and Sanitary fittings (Plumbing), Electric Fittings.Heating Ventilation & Air conditioning (HVAC), Mechanical Lifts and Escalators, Fire Fighting and Fire Protection of Buildings.Acoustics. Plastering and its types, pointing, Distempering, Colour washing, Painting etc. Principles & Methods of building maintenance.

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II Year III Semester

UBUILCE308
BUILDING MATERIALS LAB

L	T	P
0	0	2

Testing of various properties of following materials as per BIS specifications

I. Cement

1. Normal Consistency ofcement.
2. Initial & final setting time ofcement
3. Compressive strength ofcement
4. Fineness of cement by air permeability and Le-chatalier'sapparatus.
5. Soundness ofcement.
6. Tensilestrength

II. CoarseAggregate

1. Water absorption ofaggregate
2. Sieve Analysis ofAggregate
3. Specific gravity &bulkdensity
4. Grading ofaggregates.

III FineAggregate:

1. Sieve analysis ofsand
2. Silt content ofsand
3. Bulking ofsand

IV Bricks:

1. Waterabsorption.
2. Compressive strength
3. Efflorescence
4. Efflorescence

References:

1. SK Duggal, "Building Materials" New AgeInternational
2. Purushothama Raj, "Building Construction Materials & Techniques" PearsonEdu.
4. Rangwala, "Building Materials" Charotar Publishing House.

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II Year III Semester

UMECHCE304
MECHANICS OF SOLIDS

L	T	P
3	0	0

UNITI

Compound stress and strains: Introduction, normal stress and strain, shear stress and strain, stresses on inclines sections, strain energy, impact loads and stresses, state of plane stress, principal stress and strain, maximum shear stress, Mohr's stress circle, three dimensional states of stress & strain, equilibrium equations, generalized Hook's law, theories of failure. Thermal Stress.

UNIT II

Stresses in Beams: Pure Bending**,** normal stresses in beams, shear stresses in beams due to transverse and axial loads, composite beams.**Deflection of Beams:** Equation of elastic curve, cantilever and simply supported beams, Macaulay's method, area moment method, fixed and continuous beams.

Torsion: Torsion combined bending & torsion of solid & hollow shafts, torsion of thin walled tubes.

UNIT III

Helical and Leaf Springs: Deflection of springs by energy method, helical springs under axial load and under axial twist (respectively for circular and square cross sections) axial load and twisting moment acting simultaneously both for open and closed coiled springs, laminated springs.

Columns and Struts: Buckling and stability, slenderness ratio, combined bending and direct stress, middle third and middle quarter rules, struts with different end conditions, Euler's theory for pin ended columns, effect of end conditions on column buckling, Ranking Gordon formulae, examples of columns in mechanical equipment's and machines.

UNIT IV

Thin cylinders & spheres: Introduction, difference between thin walled and thick walled pressure vessels, thin walled spheres and cylinders, hoop and axial stresses and strain, volumetric strain.

Thick cylinders:

Radial, axial and circumferential stresses in thick cylinders subjected to internal or external pressures, compound cylinders, stresses in rotating shaft and cylinders, stresses due to interference fits.

UNIT V

Curved Beams: Bending of beams with large initial curvature, position of neutral axis for rectangular, trapezoidal and circular cross sections, stress in crane hooks, stress in circular rings subjected to tension or compression.

Unsymmetrical Bending: Properties of beam cross-section, slope of neutral axis, stress and deflection in unsymmetrical bending, determination of shear center and flexural axis (for symmetry about both axis and about one axis) for I-section and channel section.

Books and References:

1. Strength of Material by Rattan, MCGRAW HILLINDIA
2. Mechanics of material by Gere, CengageLearning
3. Mechanics of Materials by Beer, Jhonston, DEwolf and Mazurek, MCGRAW HILLINDIA
4. Strength of Materials by Pytel and Singer, HarperCollins
5 . Strength of Materials by Jindal, PearsonEducation.

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II Year III Semester

USURVCE 305
SURVEYING

L	T	P
3	0	0

UNIT I

Surveying: definition, divisions, classification and principles of surveying. Scales: plain, vernier, diagonal, plan and map. Accuracy and errors: definitions, sources and kinds of errors, application of probability for computation of errors, laws of weights.

UNIT II

Linear measurement: chain and tape surveying, types of chain and tape, ranging, obstacles and tape correction. Compass surveying: Measurement of directions, Reference meridians, bearing and azimuths, local attraction. Theodolite survey: Vernier theodolite, Measurements of horizontal and vertical angles, Horizontal Control,working of Electronic Theodolites.

UNIT III

Leveling: Methods of determining elevations, Direct levelling- basic terms and definitions, principle, booking and reduction of field notes, curvature and refraction correction, use of Automatic level, Digital Level, Vertical Control. Contouring: contours, contour interval, horizontal equivalent, characteristics, methods and interpolation, use to prepare profiles. Tachometry: Principles of stadia systems, subtense bar and tangential methods.

UNIT IV

Traversing and triangulation: Principles of traversing by compass and theodolite, computations of traverse coordinates, omitted measurements, Principles and classification of triangulation systems, strength of figures, satellite stations, and triangulation field work. Introduction to modern surveying Instruments /Techniques like total station.

UNIT V

Elements of simple circular curves, theory and methods of setting out simple circular curves, transition curves- types and their characteristics, ideal transition curve, equations of various transition curves, Introduction to vertical curves. Survey Layout for culverts, canals, bridges, road/railway alignment and buildings.

References:

1. Schofield, "Engineering Surveying" 6/e, CRC Press Taylor & FrancisGroup.
2. BC Punamia et al: Surveying Vol. I, II, LaxmiPublicatio
3. Bannister, "Surveying" 7/e, Pearson Education,Noida.
4. AM Chandra: Plane Surveying, Higher Surveying, NarosaPub.
5. AK Dey Plain Survey, SChand
6. SK Duggal: Surveying Vol. I,II.
7. R Subramanian : Surveying & Leveling , Oxford UniversityPress
8. C Venkatramaih : Text Book of Surveying , UniversityPress
9. Charles D. Ghilani, Elementary Surveying PearsonEducation

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II Year III Semester

USURVCE309
SURVEYING LAB

L	T	P
0	0	2

1. To prepare conventional symbol chart based on the study of different types of topographicalmaps.

2. To measure bearings of a closed traverse by prismatic compass and to adjust the traverse by graphicalmethod.

3. To find out reduced levels of given points using Auto/dumpylevel.

4. To perform fly leveling with Auto/tiltinglevel.

5. To study parts of a Vernier theodolite and measurement of horizontal and verticalangle.

6. To measure horizontal angle between two objects by repetition/reiterationmethod.

7. To determine the height of a vertical structure (e.g. chimney/ water tank etc.) using trigonometrical leveling by taking observations in single verticalplane.

8. To study various parts of Electronic Theodolite, Total Station and practice for measurementof distance, horizontal and verticalangles.

9. To set out a simple circular curve by Rankine'smethod.

10. To plot contour map of givenarea

UENVICE306

ENVIRONMENT & ECOLOGY

L	T	P
3	0	0

UNIT-I Definition, Scope & Importance, Need for Public Awareness• Environment definition, Eco system - Balanced ecosystem, Human activities - Food, Shelter, Economic and social Security.Effects or human activities on environment· Agriculture, Housing, Industry, Mining and Transportation activities, Bask$ of Environmental Impact Assessment. Sustainable Development.

UNIT-II Natural Resources Water Resources· Availability and Quality aspects.Water borne diseases, Water Induced diseases, Fluoride problem in drinking water. Mineral Resources, Forest Wealth, Material Carbon ,Nitrogen and Sulphur Cycles.

Energy - Different types of energy, Electromagnetic radiation. Conventional and Non- Conventional sources - Hydro Electric, Fossil Fuel based Nuclear, Solar, Biomass and Bio.gas. Hydrogen gas and alternative future source of Energy.

UNIT-III Environmental Pollution and their effects.Water pollution, Land pollution. Noise pollution, Public Health aspects, Air Pollution, Solid waste management, e-waste management Current Environmental Issues of Importance: Population Growth, Climate Change and Global warming-Effects, Urbanization, Automobile pollution. Acid Rain Ozone Layer depletion, Animal Husbandry,

UNIT-IV Environment-ill Protection- Role of Government, Legal aspects, initiatives by Non-, governmental organizations (NGO), Environmental Education,

Text books:

l. Environmental Studies -Benny Joseph- Tata McgrawHiU-200S
2. Environmental Studies- Dr. D.l. Manjunath, PearsonEducation-2006.

UCOMPCE310

COMPUTER BASED STATISTICAL & NUMERICAL TECHNIQUES LAB

L	T	P
0	0	2

Write computer program in C/C++/visual basic for mathematical and engineering solutions.

1. Write a code for finding out the root of the algebraic and transcendental equations using Newton-Raphson's iterative method.
2. Write a computer program for inversion of matrix.
3. Write a computer program for Eigen value solution of matrix.
4. Write a computer program for RungeKutta fourth order method (RK4) to solve ordinary differential equation.
5. Write a computer program to find the engineering properties of I and channel sections.
6. Write a computer program to solve simultaneous linear equations.
7. Write the program to implement the Gauss forward interpolation formula and back ward interpolation formula.
8. Write code for one dimensional heat equation and one dimensional fluid flow problem (boundary value problem).

B.TECH –CIVIL ENGINEERING 4TH SEMESTER

Study And Evaluation Scheme For B.Tech In Civil Engineering											
YEAR2nd/SEMESTER-4TH											
SUBJECT CODE	SUBJECTS NAME	STUDY SCHEE Periods/Week			Credits	MARKS IN EVALUATION SCHEME						Total Marks of Internal & External
						INTERNAL ASSESSMENT			EXTERNAL ASSESSMENT			
		L	T	P		Th	Pr	Tot	Th	Pr	Tot	
UNANOCE401	NANO SCIENCE	3	0	0	3	30	-	30	70	-	70	100
USTRUCE402	STRUCTURAL ANALYSIS	3	1	0	4	30	-	30	70	-	70	100
UGEOICE403	GEO-INFORMATICS	3	0	0	3	30	-	30	70	-	70	100
UHYDRCE404	HYDRAULICS & HYDRAULICS MACHINES	3	1	0	4	30	-	30	70	-	70	100
UDATACE405	DATA STRUCTURE	3	0	0	3	30	-	30	70	-	70	100
UUNIVCE406	UNIVERSAL HUMAN VALUE & PROFESSIONAL ETHICS	3	0	0	3	30	-	30	70	-	70	100
USTRUCE407	STRUCTURAL ANALYSIS LAB	0	0	2	1	-	25	25	-	25	25	50
UGEOICE408	GEO-INFORMATICS LAB	0	0	2	1	-	25	25	-	25	25	50
UHYDRCE409	HYDRAULICS & HYDRAULICS MACHINES LAB	0	0	2	1	-	25	25	-	25	25	50
Total		18	2	6	23	180	75	280	420	75	495	750

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UNANOCE401
NANO SCIENCE

L	T	P
3	0	0

UNIT I

Introduction: Definition of Nano-Science and Nano Technology, Applications of Nano-Technology.

Quantum Theory for Nano Science: Particle in a box, Potential step: Reflection and tunneling (Quantum leak). Penetration of Barrier, Potential box (Traped particle in 3D: Nanodot).

Physics of Solid State Structures: Size dependence of properties, crystal structures, face centered cubic nanoparticles; Tetrehedrally bounded semiconductor structures; lattice vibrations.

Energy Bands: Insulators, semiconductor and conductors; Reciprocal space; Energy bands and gaps of semiconductors; effective masses; Fermi Surfaces.

Localized Particles: Acceptors and deep taps; mobility; Excitons.

UNIT II

Quantum Nanostructure: Preparation of quantum wells, Wires and Dots, Size and Dimensionality effect, Fermi gas; Potential wells; Partial confinement; Single electron Tunneling, Infrared detectors; Quantum dot laser superconductivity.

Properties of Individual Nano Particles: Metal nano clusters; Magic numbers; Theoretical modeling of nano particles; geometric structure; electronic structure; Reactivity, Fluctuations, Magnetic clusters; Bulk to nanostructure, semiconducting nanoparticles, Optical Properties, Photo fragmentation, Coulombic Explosion. Rare Gas & Molecular clusters; Inert gas clusters; Superfluid clusters; Molecular clusters.

UNIT III

Growth Techniques of Nanomaterials: Litho and Nonlithograpahic techniques, RF Plasma, Chemical methods, Thermolysis, Pulsed laser method, Self-assembly, E-beam evaporation, Chemical Vapour Deposition, Pulsed Laser Deposition.

UNIT IV

Methods of Measuring Properties: Structure: X-ray Diffraction Technique, Particle size determination, surface structure. Microscopy: Scanning Probe Microscopy (SPM), Atomic Force Microscopy (AFM), Field Ion Microscopy, Scanning Electron Microscopy, Transmission Electron Microscopy(TEM). Spectroscopy: Infra red and Raman Spectroscopy, X-ray Spectroscopy, Magnetic resonance, Optical and Vibrational Spectroscopy, Luminescence.

UNIT V

Carbon Nano Materials: Bucky Ball and Carbon Nano- Tubes: Nano structures of carbon (fullerene), Fabrication, Structure. Electrical, Mechanical and Vibrational properties and applications.Nano Diamond, Boron Nitride Nano-tubes, Single Electron Transistors, Molecular Machine, Nano-Biometrics, Nano Robots.

Text/Reference Books:
1. CP Poole Jr, FJ Owens, "Introduction to Nanotechnology".

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USTRUCE402
STRUCTURAL ANALYSIS

L	T	P
3	1	0

UNIT I
Classification of Structures, Types of structural frameworks and Load transfer Mechanisms, stress resultants, degrees of freedom, Static and Kinematic Indeterminacy for beams, trusses and building frames. Analysis of cables with concentrated and continuous loadings, Effect of Temperature upon length of cable.

UNIT II
Classification of Pin jointed determinate trusses, Analysis of determinate plane trusses (compound and complex). Method of Substitution, Method of tension coefficient for analysis of plane trusses.

UNIT III
Strain Energy of deformable systems, Maxwell's reciprocal & Betti's theorem, Castigliano's theorems, Calculations of deflections: Strain Energy Method, unit load method &for statically determinate beams, frames and trusses. Deflection of determinate beams by Conjugate beam method.

UNIT IV
Rolling loads and influence line diagrams for determinate beams and trusses, Absolute maximum bending moment and shear force. Muller-Breslau's principal & its applications for determinate structures.

UNIT V
Arches, Types of Arches, Analysis of three hinged parabolic and circular Arches. Linear arch, Eddy's theorem, spandrel braced arch, moving load & influence lines for three hinged parabolicarch.

References
1. Hibbler, "Structural Analysis", Pearson Education
2. Mau, "Introduction to Structural Analysis" CRC Press Taylor &Francis Group.
3. Ghali, " Structural Analysis: A Unified Classical and Matrix Approach" 5/e, CRC Press Taylor &Francis Group.
4. DS PrakashRao "Structural Analysis: A Unified Approach" Universities Press.
5. S Ramamurtham "Theory of Structure" Dhanpat Rai.
6. Devdas Menon "Advanced Structural Analysis "Narosa

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UGEOICE403
GEO INFORMATICS

L	T	P
3	0	0

UNIT I Photogrammetric Survey, basic principles, elevation of a point, determination of focal length of lens, aerial camera, scale of a vertical photograph, relief displacement of a vertical photograph, height of object from relief displacement, scale of a tilted photograph, tilt distortion, relief displacement of a tilted photograph, combined effects of tilt and relief, flight planning for aerial photography, selection of altitude, interval between exposures, crab and drift, stereoscope parallax, parallax in aerial stereoscopic views, parallax equations. Photogrammetry – analog, analytical and digital photogrammetry.

UNIT II Remote Sensing, Introduction, concepts and physical basis of Remote Sensing, Electromagnetic spectrum, radiation laws, atmospheric effects, image characteristics. Remote sensing systems; sources of remote sensing information, spectral quantities spectral signatures and characteristics spectral reflectance curves for rocks, soil, vegetation and water. Introduction to Aerial and space borne platforms.Optical, thermal and microwave sensors and their resolution, salient features of some of operating Remote Sensingsatellites.

UNIT III Digital image processing: introduction, image rectification and restoration, image enhancement, image transformation, manipulation, image classification, fusion. Applications of remote sensing to civil engineering.

UNIT IV GIS system: Definition terminology and data types, basic components of GIS software, data models, data acquisition, both raster based and vector based data input and data processing and management including topology, overlaying and integration and finally data product and report generation. GIS applications in civil engineering.

UNIT V Global Navigation Satellite System (GNSS), GPS, GLONASS, GALILEO, GPS: Space segment, Control segment, User segment, GPS satellite signals, Datum, coordinate system and map projection, Static, Kinematic and Differential GPS, GPSApplications.

References:
1. SateeshGopi, R Sathkumar& N Madhu "Advanced Surveying GIS & Remote Sensing" PearsonEducation.
2. Kang Tshung Chang "Introduction of Geographic Information Systems"TMH.
3. Campbell, "Introduction to Remote Sensing" 3/e, CRC Press Taylor &FrancisGroup.
4. B C Punamia: Higher Surveying LaxmiPublication
5. R. Agor, "Advanced Surveying" KhannaPublishers.

UHYDRCE404: HYDRAULICS & HYDRAULIC MACHINES

L	T	P
3	1	0

UNIT I

Introduction : Basic concepts of free surface flows, velocity and pressure distribution, Mass, energy and momentum principle for prismatic and non-prismatic channels critical, sub-critcal and super-critical type of flows. Critical depth, concepts of specific energy and specific force.Chezy's and Manning's equations for uniform flow in open channel, Velocity distribution, most efficient channel section, compound sections.

UNIT II

Energy-Depth relationship: Application of specific energy principle for interpretation of open channel phenomena, flow through vertical and horizontal contractions. Equation of gradually varied flow and its limitations, flow classification and surface profiles, integration of varied flow equation by analytical, graphical and numerical methods.

UNIT III

Rapidly varied flow: hydraulic jump, Evaluation of the jump elements in rectangular and non-rectangular channels on horizontal and sloping beds. Open channel surge, celerity of the gravity wave, deep and shallow water waves, Rectangular free overfall.

UNIT IV

Impulse momentum equation- Impact of Jets-plane and curved- stationary and moving plates.**Pumps:** Positive displacement pumps - reciprocating pumps - operating principles -slip - indicator diagram - separation- air vessels. centrifugal pumps - operation - velocity triangles - performance curves - Cavitation - Multi staging - Selection of pumps.

UNIT V

Rotodynamic Machines, Pelton Turbine, equations for jet and rotor size, efficiency, spear valve, reaction turbines, Francis and Kaplan type, Head on reaction turbine, unit quantities, similarity laws and specific speed, cavitation, characteristic curves.

References:
1. Chow,V.T. "Open Channel hydraulics" McGraw HillPublication
2. Subramanya, K., Flow through Open Channels, TMH, NewDelhi
3. RangaRaju, K.G., Flow through open channels, T.M.H. NewDelhi
4. Rajesh Srivastava, Flow through Open Channels , Oxford UniversityPress
5. Streeter, V.L.& White E.B., "Fluid Mechanics" McGraw HillPublication
6. Modi& Seth "Hydraulics & Fluid Mechanics" StandardPublications.
7. RKBansal "Fluid Mechanics and Hydraulic Machines" LaxmiPublication
8. AK Jain "Fluid Mechanics" KhannaPublication.
9. Houghtalen, "Fundamentals of Hydraulics Engineering Systems" 4/e Pearson Education,Noida.

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II Year IV Semester

UDATACE405: DATA STRUCTURES

L	T	P
3	0	0

UNIT I

Introduction: Basic Terminology, Elementary Data Organization, Algorithm, Efficiency of an Algorithm, Time and Space Complexity, Asymptotic notations: Big-Oh, Time-Space trade-off.

Abstract Data Types (ADT), Arrays: Definition, Single and Multidimensional Arrays, Representation of Arrays: Row Major Order, and Column Major Order, Application of arrays, Sparse Matrices and their representations.

Linked lists: Array Implementation and Dynamic Implementation of Singly Linked Lists, Doubly Linked List, Circularly Linked List, Operations on a Linked List. Insertion, Deletion, Traversal, Polynomial Representation and Addition, Generalized Linked List.

UNIT II

Stacks: Abstract Data Type, Primitive Stack operations: Push & Pop, Array and Linked Implementation of Stack in C, Application of stack: Prefix and Postfix Expressions, Evaluation of postfix expression, Recursion, Tower of Hanoi Problem, Simulating Recursion, Principles of recursion, Tail recursion, Removal of recursion Queues, Operations on Queue: Create, Add, Delete, Full and Empty, Circular queues, Array and linked implementation of queues in C, Dequeue and Priority Queue.

UNIT III

Trees: Basic terminology, Binary Trees, Binary Tree Representation: Array Representation and Dynamic Representation, Complete Binary Tree, Algebraic Expressions, Extended Binary Trees, Array and Linked Representation of Binary trees, Tree Traversal algorithms: Inorder, Preorder and Postorder, Threaded Binary trees, Traversing Threaded Binary trees, Huffman algorithm.

UNIT IV

Graphs: Terminology, Sequential and linked Representations of Graphs: Adjacency Matrices, Adjacency List, Adjacency Multi list, Graph Traversal : Depth First Search and Breadth First Search, Connected Component, Spanning Trees, Minimum Cost Spanning Trees: Prims and Kruskal algorithm. Transitive Closure and Shortest Path algorithm: Warshal Algorithm and Dijikstra Algorithm, Introduction to Activity Networks.

UNIT V

Searching: Sequential search, Binary Search, Comparison and Analysis Internal Sorting: Insertion Sort, Selection, Bubble Sort, Quick Sort, Two Way Merge Sort, Heap Sort, Radix Sort, Practical consideration for Internal Sorting.

Search Trees: Binary Search Trees (BST), Insertion and Deletion in BST, Complexity of Search Algorithm, AVL trees, Introduction to m-way Search Trees, B Trees & B+ Trees .

Hashing: Hash Function, Collision Resolution Strategies.

Storage Management: Garbage Collection and Compaction.

References:

1. Aaron M. Tenenbaum, YedidyahLangsam and Moshe J. Augenstein, "Data Structures Using C and C++", PHI Learning Private Limited, Delhi India
2. Horowitz and Sahani, "Fundamentals of Data Structures", Galgotia Publications Pvt Ltd Delhi India.

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UNIVERSAL HUMAN VALUE & PROFF. ETHICS

UNIT 1:

Course Introduction - Need, Basic Guidelines, Content and Process for Value Education

1. Understanding the need, basic guidelines, content and process for Value Education

2. Self Exploration–what is it? - its content and process; „Natural Acceptance" and Experiential Validation- as the mechanism for self exploration

3. Continuous Happiness and Prosperity- A look at basic Human Aspirations

4. Right understanding, Relationship and Physical Facilities- the basic requirements for fulfillment of aspirations of every human being with their correct priority

5. Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario

6. Method to fulfill the above human aspirations: understanding and living in harmony at various levels

UNIT 2:

Understanding Harmony in the Human Being - Harmony in Myself!

7. Understanding human being as a co-existence of the sentient „I" and the material „Body"

8. Understanding the needs of Self („I") and „Body" - Sukh and Suvidha

9. Understanding the Body as an instrument of „I" (I being the doer, seer and enjoyer)

10. Understanding the characteristics and activities of „I" and harmony in „I"

11. Understanding the harmony of I with the Body: Sanyam and Swasthya; correct appraisal of Physical needs, meaning of Prosperity in detail

12. Programs to ensure Sanyam and Swasthya - Practice Exercises and Case Studies will be taken up in Practice Sessions.

UNIT 3:

Understanding Harmony in the Family and Society- Harmony in HumanHuman Relationship

13. Understanding Harmony in the family – the basic unit of human interaction

14. Understanding values in human-human relationship; meaning of Nyaya and program for its fulfillment to ensure Ubhay-tripti; Trust (Vishwas) and Respect (Samman) as the foundational values of relationship

15. Understanding the meaning of Vishwas; Difference between intention and competence

16. Understanding the meaning of Samman, Difference between respect and differentiation; the other salient values in relationship

17. Understanding the harmony in the society (society being an extension of family): Samadhan, Samridhi, Abhay, Sah-astitva as comprehensive Human Goals

18. Visualizing a universal harmonious order in society- Undivided Society (Akhand Samaj), Universal Order (Sarvabhaum Vyawastha)- from family to world family! - Practice Exercises and Case Studies will be taken up in Practice Sessions.

UNIT 4:

Understanding Harmony in the Nature and Existence - Whole existence as Co-existence

19. Understanding the harmony in the Nature

20. Interconnectedness and mutual fulfillment among the four orders of naturerecyclability and self-regulation in nature

21. Understanding Existence as Co-existence (Sah-astitva) of mutually interacting units in all-pervasive space

22. Holistic perception of harmony at all levels of existence - Practice Exercises and Case Studies will be taken up in Practice Sessions.

UNIT 5:

Implications of the above Holistic Understanding of Harmony on Professional Ethics

23.Natural acceptance of human values

24.Definitiveness of Ethical Human Conduct

25.Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order

26.Competence in professional ethics:

a) Ability to utilize the professional competence for augmenting universal human order

b) Ability to identify the scope and characteristics of people-friendly and ecofriendly production systems,

c) Ability to identify and develop appropriate technologies and management patterns for above production systems.

27. Case studies of typical holistic technologies, management models and production systems

28.Strategy for transition from the present state to Universal Human Order:

 a) At the level of individual: as socially and ecologically responsible engineers, technologists and managers

 b) At the level of society: as mutually enriching institutions and organizations

Books and References:

1.R.R Gaur, R Sangal, G P Bagaria, A foundation course in Human Values and professional Ethics, Excel books, New Delhi, 2010, ISBN 978-8-174-46781-2

2. B L Bajpai, 2004, Indian Ethos and Modern Management, New Royal Book Co., Lucknow, Reprinted 2008.

3. PL Dhar, RR Gaur, 1990, Science and Humanism, Commonwealth Purblishers.

Department of Civil Engineering
(Faculty of Engineering & Technology)
P.K. University, Shivpuri (MP)
II Year IV Semester

USTRUCE407
STRUCTURAL ANALYSIS LAB

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1. To determine Flexural Rigidity (EI) of a givenbeam
2. To verify Maxwell's Reciprocaltheorem.
3. To find horizontal thrust in a three-hinged arch and to draw influence line diagrams for Horizontal Thrust end Bendingmoment.
4. To find horizontal thrust in a two hinged arch and to draw influence line diagrams for horizontal Thrust and bendingmoment.
5. To find deflection of curved members.
6. To find bar forces in a three members structural frames with pin jointedbar
7. To find Critical load in Struts with different end conditions.
8. To find deflections in Beam having unsymmetricalbending.

Department of Civil Engineering
(Faculty of Engineering & Technology)
P.K. University, Shivpuri (MP)
II Year IV Semester

UGEOICE408
GEO INFORMATICS LAB

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1. Demonstration and working on Electronic Total Station. Measurement of distances, horizontal & vertical angles and coordinates.
2. Measurement of area of a land parcel using Total Station.
3. To layout a precise traverse in a given area and to compute the adjusted coordinates of survey stations.
4. Demonstration and working with Mirror stereoscopes, Parallax bar and Aerial photographs.
5. Visual Interpretation of standard FCC (False colour composite).

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Department of Civil Engineering
(Faculty of Engineering & Technology)
P.K. University, Shivpuri (MP)
II Year IV Semester

UHYDRCE 409: HYDRAULIC MACHINES LAB

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Note: Ensure to conduct at least 10 experiments from the list:
1. To determine the Manning's coefficient of roughness 'n' for the bed of a givenflume.
2. To study the velocity distribution in an open channel and to determine the energy and momentum correctionfactors
3. To study the flow characteristics over a hump placed in an openchannel.
4. To study the flow through a horizontal contraction in a rectangularchannel.
5. To calibrate a broad-crestedweir.
6. To study the characteristics of free hydraulicjump.
7. To study centrifugal pump and theircharacteristics
8. To study characteristics of PeltonTurbine.
9. To study characteristics FrancisTurbine.
10. To study characteristics of KaplanTurbine.
11. To study the free overfall phenomenon in an open channel and to determine the end depth
12. To determine coefficient of discharge for given rectangular notch.
13. To determine coefficient