J. S. University, Shikohabad

B.Tech

3rd Semester& 4thSemester
(Civil Engineering)

Scheme
&
Syllabus

[Effective from the session 2015-16]

STUDY AND EVALUATION SCHEME FOR
B.Tech (Civil Engineering).

SEMESTER - THIRD

S.No.	Subject Code	Name of Subject	Periods Per Week				Evaluation Scheme			Duration
			L	T	P	D	Sessional	End Exam	Total	
THEORY SUBJECT										
1	BTAS-31	Engg Mathematics-III	4	1	-	-	50	100	150	3
2	BTCE-31	Fluid Mechanics	4	1	-	-	50	100	150	3
3	BTME-31	Mechanics of Solids	4	1	-	-	50	100	150	3
4	BTCE-32	Building Materials & Construction	4	1	-	-	50	100	150	3
5	BTCE-33	Surveying – I	4	1	-	-	25	50	75	2
6	BTIP-31	Industrial Psychology	4	1	-	-	25	50	75	2
7	BTAC-31	Human Value & Professional Ethics*	2	-	-	-	25	50	75	2
PRACTICA/DRAWING SUBJECTS										
8	BTCE-31P	Fluid Mechanics Lab.	-	-	2	-	20	30	50	3
9	BTCE-32P	Buildg. Materials Lab	-	-	2	-	20	30	50	3
10	BTCE-34P	Building Planning & Drawing	-	-	2	-	20	30	50	3
11	BTCE-33P	Surveying-I Lab	-	-	2	-	20	30	50	3
12	BTGD-30	Games//Social and Cultural Activities + Discipline (25 + 25)							50	
								Grand Total	1000	

*Human values & Professional Ethics will be offered as a compulsory audit course for which passing marksare 30% in End Semester Examination and 40% in aggregate.

NOTE:- (1) Each period will be 50 minutes duration.

(2) Each session will be of 16 weeks.

(3) Effective teaching will be at least 14 weeks.

(4) Remaining periods will be utilised for revision etc.

B.Tech (Civil Engineering).

SEMESTER - FOURTH

S.No.	Subject Code	Name of Subject	Periods Per Week				Evaluation Scheme			
			L	T	P	D	Sessional	End Exam	Total	Duration
THEORY SUBJECT										
1	BTOE-41-BTOE-49	Science Based Open Elective	4	1	-	-	50	100	150	3
2	BTCE-41	Structural Analysis -I	4	1	-	-	50	100	150	3
3	BTCE-42	Geoinformatics	4	1	-	-	50	100	150	3
4	BTCE-43	Hydraulics & Hydraulic Machines	4	1	-	-	50	100	150	3
5	BTCE-44	Engineering Geology	4	1	-	-	25	50	75	2
6	BTIS-41	Industrial Sociology	4	1	-	-	25	50	75	2
7	BTAC-41	Cyber Security*	2	-	-	-	25	50	75	2
PRACTICA/DRAWING SUBJECTS										
8	BTCE-41P	Structural Analysis Lab.	-	-	2	-	20	30	50	3
9	BTCE-42P	Geoinformatics Lab	-	-	2	-	20	30	50	3
10	BTCE-43P	Hydraulics & MachineLab.	-	-	2	-	20	30	50	3
11	BTCE-45P	CBSNT Lab	-	-	2	-	20	30	50	3
12	BTGD-40	Games//Social and Cultural Activities + Discipline (25 + 25)							50	
								Grand Total	1000	

*Cyber Security will be offered as a compulsory audit course for which passing marksare 30% in End Semester Examination and 40% in aggregate.

List of Open Electives for B. Tech. Courses
SCIENCE BASED OPEN ELECTIVE

BTOE-041	Introduction to Soft Computing (Neural Networks, Fuzzy Logic and Genetic Algorithm)
BTOE-042	Nano Sciences
BTOE-043	Laser Systems and Applications
BTOE-044	Space Sciences
BTOE-045	Polymer Science & Technology
BTOE-046	Nuclear Science
BTOE-047	Material Science
BTOE-048	Discrete Mathematics
BTOE-049	Applied Linear Algebra

[BTAS-31]   Engg Mathematics-III

Unit – I: Function of Complex variable

Analytic function, C-R equations, Harmonic Functions, Cauchy's integral theorem, Cauchy'sintegral formula, Derivatives of analytic functions, Taylor's and Laurent's series, Singularities,Zeroes and Poles, Residue theorem, Evaluation of real integrals of the type

Unit – II: Integral Transforms

Fourier integral, Complex Fourier transform, Inverse Transforms, Convolution Theorems,Fourier sine and cosine transform, Applications of Fourier transform to simple one dimensionalheat transfer equations, wave equations and Laplace equationsZ- transform and its application to solve difference equations.

Unit – III: Statistical Techniques

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

Unit – IV: Numerical Techniques – I

Zeroes of transcendental and polynomial equations using Bisection method, Regula-falsi methodand Newton-Raphson method, Rate of convergence of above methods.

Interpolation: Finite differences, Newton's forward and backward interpolation, Lagrange's andNewton's divided difference formula for unequal intervals**.**

Unit – V: Numerical Techniques –II

Solution of system of linear equations, Matrix Decomposition methods, Jacobi method, Gauss-Seidal method.Numerical differentiation, Numerical integration, Trapezoidal rule, Simpson's one third andthree-eight rules,Solution of ordinary differential equations (first order,second order and simultaneous) byEuler's, Picard's and fourth-order Runge- Kutta methods.

Test Books:-

1. Peter V. O'Neil, Advance Engineering Mathematics Thomson (Cengage) Learning, 2007.

2. Jain, Iyenger Jain, Numerical Methods for Scientific and Engineering Computation, New Age International, New Delhi

Reference Books:-

1. R.K. Jain & S.R.K. Iyenger, Advance Engineering Mathematics, Narosa Publication House,.

2. Chandrika Prasad, Advanced Mathematics for Engineers, Prasad Mudralaya, 1996.

[BTCE-31] Fluid Mechanics

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 nonuniform, 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.
Dimensional analysis, Buckingham's Pi theorem, important dimensionless numbers and their significance,

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, venturi meter and bend meter, Hot-wire anemometer and LDA, notches and weirs, momentum equation and its application to pipe bends.
Similarity Laws: geometric, kinematics and dynamic similarity, undistorted and distorted model studies.

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, resistance to flow, minor losses, pipe in series and parallel, power transmission through a pipe, siphon, water hammer, three reservoir problems and pipe networks.

Unit - V
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, Drag and lift, drag on a sphere, a two dimensional cylinder, and an aerofoil, Magnus effect.
Introduction to compressible flow

References :
1. Fox & Donald, "Introduction to Fluid Mechanics" John Wiley &Sons Pvt Ltd,
2. Cengel&Cimbala, "Fluid Mechanics" TMH, New Delhi.

BTME-31]   Mechanics of Solids

UNIT-I
Compound stress and strains: Introduction, normal stress and strain, shear stress and strain, stresses oninclines sections, strain energy, impact loads and stresses, state of plane stress, principal stress and strain,maximum shear stress, Mohr's stress circle, three dimensional state of stress & strain, equilibriumequations, generalized Hook's law, theories of failure.

UNIT –II
Stresses in Beams: Pure Bending**,** normal stresses in beams, shear stresses in beams due to transverseand axial loads, composite beams.
Deflection of Beams: Equation of elastic curve, cantilever and simply supported beams, Macaulay'smethod, 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 andunder axial twist (respectively for circular and square cross sections) axial load and twisting momentacting 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 endedcolumns, effect of end conditions on column buckling, Ranking Gordon formulae, examples of columnsin mechanical equipments and machines.

UNIT-IV
Thin cylinders & spheres: Introduction, difference between thin walled and thick walled pressurevessels, 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 tensionor compression.
Unsymmetrical Bending: Properties of beam cross-section, slope of neutral axis, stress and deflection inunsymmetrical bending, determination of shear center and flexural axis (for symmetry about both axisand about one axis) for I-section and channel section.

Books and References :
1. Mechanics of Materials by Hibbeler, Pearson.
2. Mechanics of Materials by.Beer, Jhonston, DEwolf and Mazurek, TMH
3. Strength of Materials by Pytel and Singer, Harper Collins
4. Strength of Materials by Ryder, Macmillan.
5. Strength of Materials by Timoshenko and &Yσungs, East West Press.

[BTCE-32] Building Materials & Construction

Unit-1

Classificationof building materials: buildingmaterialsandtheirperformance,economicsofthebuildingmaterials.

Stones, Requirement of goodbuildingstone,characteristicsofbuildingstonesandtheirtesting.Commonbuildingstones.Methods ofpreservationofstones.

Bricks:Manufacturing processofclaybricks,classification of claybricks.Propertiesofclaybricks,testing methods for clay bricks.Problemsofefflorescence&limeburstinginbricks&tiles.

Gypsum:propertiesofgypsumplaster,buildingproducts madeofgypsumandtheiruses.

Lime:Manufactureoflime,classificationsoflimes,propertiesoflime.

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, Testingof concrete, Methods of Curing of concrete.

Pozzolona: Chemical composition and requirements foruses,NaturalandArtificialflyash,Surkhi(burntclaypozzolona),ricehuskandashpozzolona,propertiesandspecificationsforu seinconstruction.

Timber:Classificationandidentificationoftimber,FundamentalEngineeringProperties of timber,Defectsintimber,Factorsaffectingstrengthoftimber,Methodsofseasoningand preservationoftimber.Woodbasedproducts.

Asphalt,BitumenandTar:Terminology,specificationsanduses,Bituminousmaterials.

Unit– II

ChemistryofPlasticsmanufacturingprocess,classification,advantagesofplastics, Mechanical properties and use of plastic in construction.

Paintsvarnishesanddistempers, Common constituents, types and desirableproperties, Cement paints.

Ferrousmetals,Desirablecharacteristicsofreinforcingsteel.Principlesofcoldworking.Reinforcingstelemechanical and physicalPropertieschemicalcomposition.Briefdiscussiononpropertiesandusesof Aluminumandlead.

Glass:Ingredients,propertiestypesanduseinconstruction.

InsulatingMaterials:Thermalandsoundinsulatingmaterial,desirablepropertiesandtypes of insulating materials.

Unit – III

Componentsofbuilding,areaconsiderations,ConstructionPrincipleandMethodsforlayout,Dampproofing,antitermitetreatme nt in buildings, Verticalcirculation means:staircases and their types,designandconstruction.Differenttypesoffloors,andflooringmaterials(Groundfloorandupperfloors).Bricksandstonema sonaryconstruction.Cavitywallhollowblockconstruction.

Unit- IV

Doors,WindowsandVentilations,Constructiondetails,types of doors andwindowsand theirrelative advantages&disadvantages.Types of roofand rooftreatments,LintelsandChhajja,FunctionalefficiencyofBuildings.

Unit-V

NaturalVentilation,WaterSupplyandSanitaryfittings(Plumbing),Electricity.HeatingVentilation&Airconditioning,Mechani calLiftsandEscalators,FireFighting,Acoustics.Plasteringdifferenttypes,pointing,Distempering,Colourwashing,Paintingetc. Principles&Methodsofbuildingmaintenance

References
1.SKDuggal:BuildingMaterials,NewAgeInternational
2.P.C.Varghese:BuildingMaterials,PHI

[BTCE-33]   Surveying – I

Unit - I
Importance of surveying to engineers, plane and geodetic surveying, principles ofsurveying, classification of surveys, Accuracy and Errors.
Linear Measurements, Measurement of directions: Reference meridians, bearingand azimuths, Compass, Vernier theodolite, Measurements of horizontal and verticalangles, Horizontal Control, Electronic Theodolites and Total Station.

Unit – II
Methods of determining elevations, Direct levelling- basic terms and definitions,principle, booking and reduction of field notes, curvature and refraction correction,Automatic level, Digital Level, Vertical Control.
Contouring: methods and uses, Principles of stadia systems, subtense bar and tangential methods.

Unit – III
Principles of traversing by compass and theodolite, computations of traversecoordinates, Principles and classification of triangulation systems, strength offigures, satellite stations, triangulation field work.
Plane table surveying, equipments, methods, resection by three point problem.

Unit – IV
Elements of simple circular curves, theory and methods of setting out simple circularcurves, transition curves- types and their characteristics, ideal transition curve,equations of various transition curves, Introduction to vertical curves.

References
1. B. C. Punamia et al: Surveying Vol. I, II
2. A. M. Chandra: Plane Surveying, Higher Surveying

[BTCE-31P]   Fluid Mechanics Lab

Note: Ensure to conduct at least 10 experiments from the list:
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 todetermine the coefficient of velocity and the coefficient of contraction of theorifice mouth piece.
3. To calibrate an orifice meter and study the variation of the co-efficient ofdischarge with the Reynolds number.
4. To calibrate a Venturimeter and study the variation of the co-efficient ofdischarge with the Reynolds number.
5. To calibrate a bend meter and study the variation of the co-efficient of dischargewith the Reynolds number.
6. To draw a flow-net using Electrical Analogy Method.
7. To study the transition from laminar to turbulent flow and to determine thelower critical Reynolds number.
8. To study the velocity distribution in a pipe and also to compute the discharge byintegrating the velocity profile.
9. To study the variation of friction factor, 'f' for turbulent flow in commercial pipes.
10. To study the boundary layer velocity profile over a flat plate and to determinethe boundary layer thickness.
11. To determine Meta-centric height of a given ship model.
12. To determine the head loss for a sudden enlargement
13. To determine the head loss for a sudden Contraction.

[BTCE-32P]   Buildg. Materials Lab

Testing of various properties of following as per BIS specifications
I.**Cement**
1.Normal Consistency of cement.
2.Initial& final setting time of cement
3.Compressive strength of cement
4.Finenessofcementbyair permeability and Le-chatalier's apparatus.
5.Soundness of cement.
6.Tensilestrength
II.**Coarse Aggregate**
1.Crushing value of aggregate
2.Impactvalue of aggregate
3.water absorption of aggregate
4.SieveAnalysis of Aggregate
5.Specific gravity &bulk density
6.Grading of aggregates.
III**FineAggregate**:
1.Sieveanalysisofsand
2.Silt content of sand
3.Bulkingofsand
IV **Cement concrete**: Workability tests, compressive strength, Tensile strength
V **Reinforcing Steel :**Tensile and yield strength, Percentage elongation
VI Non destructive testing on concrete
VII Bricks:

1.Waterabsorption.
2.Dimension Tolerances
1Compressive strength
4.Efflorescence

[BTCE-34P]   Building Planning & Drawing

Drafting of following Using Any CAD software

1.Symbols used in Civil Engineering drawing , Types of Masonry Bonds

*2.*Doors, Windows and staircases.

*3.*Plumbing& Electrical fitting drawings

*4.*Comprehensive Planning and Drawings of Residential building (Layout, plan,

elevation& sectional elevation) elevation, plumbing & electrical fillings in out.

*5.*Preparation of Layout plans of different types of Civil Engg. Projects.Viz Primary

School, Intermediate college, Hospital building, Industrial Building etc.

[BTCE-33P]   Surveying-I Lab

1. To prepare conventional symbol chart based on the study of different types oftopographical maps.
2. To measure bearings of a closed traverse by prismatic compass and to adjust thetraverse by graphical method.
3. To find out reduced levels of given points using Auto/dumpy level.
4. To perform fly leveling with Auto/tilting level.
5. To study parts of a Vernier theodolite and measurement of horizontal and verticalangle.
6. To measure horizontal angle between two objects by repetition/reiteration method.
7. To determine the height of a vertical structure (e.g. chimney/ water tank etc.)using trigonometrical levelling by taking observations in single vertical plane.
8. To study various parts of Electronic Theodolite, Total Station and practice formeasurement of distance, horizontal and vertical angles.
9. To set out a simple circular curve by Rankine's method

[BTIP-31] Industrial Psychology

Unit-I

Introduction to Industrial Psychology – Definitions & Scope. Major influences on industrial Psychology- Scientific management and human relations schools Hawthorne Experiments

Unit-II

Individual in Workplace Motivation and Job satisfaction , stress management. Organizational culture, Leadership & group dynamics.

Unit-III

Work Environment & Engineering Psychology-fatigue. Boredom, accidents and safety.Job Analysis, Recruitment and Selection – Reliability & Validity of recruitment tests.

Unit –IV

Performance Management : Training & Development.

References :

1. Miner J.B. (1992) Industrial/Organizational Psychology. N Y : McGraw Hill.

2. Blum & Naylor (1982) Industrial Psychology. Its Theoretical & Social Foundations CBS Publication.

3. Aamodt, M.G. (2007) Industrial/Organizational Psychology : An Applied Approach (5th edition) Wadsworth/Thompson : Belmont, C.A

. 4. Aswathappa K. (2008). Human Resource Management (fifth edition) New Delhi : Tata McGraw Hill

[BTAC-31] Human Value & Professional Ethics

Module-1

Course introduction, Needs Basic guidelines

    1 Understand the need , basic , guidelines content for process value education.
    2. Self Exploration what is it? It content and process, Natural Acceptence and experiential Validation as the mechanism for self exploration.
    3 Continues happiness and Prosperity- A look at continues human Aspiration.
    4 Understanding Happiness and Prosperity correctly- A critical appraisal of the current senerio.

5 Method to fulfilled the human aspiration

Module -2
 Understanding Harmony in human Being (Harmony in Myself)
1. Understanding Harmony as a co – existence of the sentient I and the Material Body.
2. Understanding the need of self (I) and body sukh and suvidha.
3. Understanding the body of an instrument of I (being Doar, seer and enjoyer.
4. Understanding the Charactersticks and activities of (I)

Module -3

Understanding harmony in the Family and Society

1. Understanding harmony in the Family and basic unit of Human interaction.
2. Understanding values in human – Human relationship meaning of nayaya and program for the fulfillment of ensure abhay and tripti.
3. Understanding the meaning of Vishvas difference between intension and competence.
4. Understanding the Harmony in the society (society being an Extension of family - samadhan , Samriddi , Abhay,sahastitva and comprehension of Human goals.

Module -4

   Understanding the harmony in the Nature and existence – whole Existence as Co- existence.

1 Understanding the harmony in the Nature.
2 Interconnectedness and mutual fulfillment among the four order of Nature –recyclability ,andself regulation in nature.
3 Holistic prception of Harmony at all levels of existence.

Module – 5 Implication of the above Holistic understanding of Harmony on professional ethics.

1 Natural acceptance of human values.
2 Deffinativeness of ethical human conduct.
3 Basic for humanistic education. Humanstick constitution and human universal order.
4 Case studies of typical holistic technologies , Management model and Production system.
5 Strategy for transition from the presnt stage of universal order.
   A - At the level of individual : as socialy and ecologically responsible engineers technologist and manager.
   B- At the Level of Society as mutually enriching institution and organisations

BTCE-41 STRUCTUR ALANALYSIS–I

Unit–I :
Classification of Structures, Types of structural frameworks and Load transfer Mechanisms, stress resultants, degrees of freedom per node, Static and Kinematic Indeterminacy for beams, trusses and building frames. Classification of Pin jointed determinate trusses, Analysis of determinate plane and space trusses (compound and complex). Method of Substitution and Method of tension coefficient.

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

Unit – III
Arches, Types of Arches, Analysis of Arches, Linear arch, Eddy's theorem, Analysis of three hinged parabolic arch, spandrel braced arch, moving load & influence lines for three hinged arch.

Unit – IV
Strain Energy of deformable systems, Maxwell's reciprocal &Betti's theorem, Castigliano's first theorem, Calculations of deflections: Moment area method, unit load method& Conjugate beam methods for statically determinate beams ,truss and frames.

Unit–V
Unsymmetrical bending in beams, location of neutral axis, computation of stresses and deflection, Shear Centre its location for common structural sections. Bending of curved bars in plane of bending, stresses in bars of small & large initial curvatures.

References
1.Hibbler ," Structural Analysis ", Pearson Education
2.T S Thandavmorthy ," Analysis of Structures ", Oxford University Press
3.Wilbur and Norris, "Elementary Structural Analysis", Tata McGraw Hill.
4.Reddy,C.S., "Basic Structural Analysis", Tata McGraw Hill.
5.Jain,O.P.and Jain, B.K., "Theory & Analysisof Structures ". Vol.I & II Nem Chand.
6.Vazirani&Ratwani et al ," Analysis of Strcuctures " , Khanna Publishers
7.Coates,R.C.,Coutie,M.G. & Kong, F.K., "Structural Analysis", English Language BookSociety & Nelson, 1980.

BTCE- 42 GEOINFORMATICS

Unit - I
Aerial Photographs- Basic terms & Definitions, scales, relief displacements, Flight Planning, Stereoscopy, Characteristics of photographic images, Fundamentals of aerial photo-interpretation, Introduction to Digital Photogrammetry.

Unit - II
Remote Sensing: Physics of remote sensing, Remote sensing satellites and their data products, Sensors and orbital characteristics, Spectral reflectance curves, resolution and multi-concept, FCC

Unit - III
Satellite Image - Characteristics and formats, Image histogram, Introduction to Image rectification, Image Enhancement, Land use and land cover classification system, Unsupervised and Supervised Classification, Applications of remote sensing

Unit - IV
Basic concepts of geographic data, GIS and its components, Data models, Topology, Process in GIS: Data capture, data sources, data encoding, geospatial analysis, GIS Applications

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, GPS Applications

References
1. A M Chandra : Higher Surveying
2. B C Punamia : Higher Surveying
3. T M Lillesand et al: Remote Sensing & Image Interpretation
4. B. Bhatta: Remote Sensing & GIS
5. M Anjireddy : Remote Sensing & GIS , BS Publications
6. A. E Rabbany: Introduction to GPS
7. N K Agarwal : Essentials of GPS , Spatial Networks: Hyderabad.

[BTCE- 43] Hydraulics & Hydraulic Machines

Unit - I
Difference between open channel flow and pipe flow, geometrical parameters of a channel.
Continuity equation for steady and unsteady flow. Critical depth, concepts of specific energy and specific force, application of specific energy principle for interpretation of open channel phenomena, flow through vertical and horizontal contractions.

Unit – II
 Chezy's and Manning's equations for uniform flow in open channel, Velocity distribution, most efficient channel section, compound channels.

Unit - III
Equation of gradually varied flow and its limitations, flow classification and surface profiles, integration of varied flow equation by analytical, graphical and numerical methods, Flow in channels of non-linear alignment specifically for the case of a bend.

Unit - IV
Classical hydraulic jump, Evaluation of the jump elements in rectangular and nonrectangular channels on horizontal and sloping beds. Rotodynamic pumps, classification on different basis, basic equations, Velocity triangles, manometric head, efficiencies, cavitation in pumps, characteristics curves.

Unit - V
Open channel surge, celerity of the gravity wave, deep and shallow water waves, Rectangular free overfall. 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 Hill Publication
2. Subramanya, K., Flow through Open Channels, TMH, New Delhi
3. Ranga Raju, K.G., Flow through open channels, T.M.H. New Delhi
4. Rajesh Srivastava, Flow through Open Channels , Oxford University Press
5. Streeter, V.L.& White E.B., "Fluid Mechanics" McGraw Hill Publication

BTCE-41P STRUCTURALANALYSIS LAB

Following experiments to be performed

1. To determine Flexural Rigidity (EI) of a given beam
2. To verify Maxwell's Reciprocal theorem.
3. To find horizontal thrust in a three-hinged arch and to draw influence line diagrams for Horizontal Thrust end Bending moment.
4. To find horizontal thrust in a two hinged arch and to draw influence line diagrams for horizontal Thrust and bending moment.
5. To find deflection of curved members.
6. To find bar forces in a three members structural frames with pin jointed bar
7. To find Critical load in Struts with different end conditions.
8. To find deflections in Beam having unsymmetrical bending.

[BTCE- 42P] GEOINFORMATICS LAB

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).
6. Digitization of physical features on a map/image using GIS software.
7. Coordinates measurement using GPS.

[BTCE -43P] Hydraulics & Hydraulic Machines LAB

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 given flume.
2. To study the velocity distribution in an open channel and to determine the energy and momentum correction factors
3. To study the flow characteristics over a hump placed in an open channel.
4. To study the flow through a horizontal contraction in a rectangular channel.
5. To calibrate a broad-crested weir.
6. To study the characteristics of free hydraulic jump.
7. To study centrifugal pump and their characteristics
8. To study characteristics of Pelton Turbine.
9. To study characteristics Francis Turbine.
10. To study characteristics of Kaplan Turbine.
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 of disc

[BTCE- 45P] COMPUTER BASED STATISTICAL & NUMERICAL TECHNIQUES LAB

Write Programs in 'C' Language:
1. To Find out the root of the Algebraic and Transcendental equations using Bisection, Regulafalsi, Newton Raphson and Iterative Methods. Also give the rate of convergence of roots in tabular form for each of these methods.
2. To implement Newton's Forward and Backward Interpolation formula.
3. To implement Gauss Forward and Backward, Bessel's, Sterling's and Evertt's Interpolation formula
4. To implement Numerical Differentiations & Integration
5. To implement Least Square Method for curve fitting.
6. Computation of central tendencies, coefficient of variance and skewness
7. Linear correlation and regression

[BTIS-41] Industrial Sociology

Unit-I Industrial Sociology: Nature,Scope and Importance of Industrial Sociology. Social Relations in Industry, Social Organization in Industry- Bureaucracy,Scientific Management and Human Relations**.**

Unit-II Rise and Development of Industry: Early Industrialism – Types of Productive Systems – The Manorial or Feudal system. The Guild system, The domestic or putting-out system,and the Factory system. Characteristics of the factory system.Causes and Consequences of industrialization.Obstacles to and Limitations of Industrialization**.**

Unit-III Industrialization in India: Industrial Policy Resolutions – 1956.Science.Technology andInnovation Policy of India 2013.

Unit-IV Contemporary Issues: Grievances and Grievance handling Procedure. Industrial Disputes:causes,Strikes and Lockouts.Preventive Machinery of Industrial Disputes:Schemes of Workers Participation in Management- Works Committee,Collective Bargaining, Bi-partite & Tri-partite Agreement,Code of Discipline,Standing Orders. Labour courts & Industrial Tribunals.

References : 1. GISBERT PASCAL, Fundamentals of Industrial sociology, Tata McGraw Hill Publishing Co., New Delhi, 1972.

2. SCHNEIDER ENGNO V., Industrial Sociology 2nd Edition, McGraw Hill Publishing Co., New Delhi, 1979.

3. MAMORIA C.B. And MAMORIA S., Dynamics of Industrial Relations in India.

[BTAC-41] Cyber Security

UNIT-1

Introduction to information systems, Types of information Systems, Development of Information Systems, Introduction to information security, Need for Information security, Threats to Information Systems, Information Assurance, Cyber Security, and Security Risk Analysis.

UNIT-2

Application security (Database, E-mail and Internet), Data Security Considerations-Backups, Archival Storage and Disposal of Data, Security Technology-Firewall and VPNs, Intrusion Detection, Access Control. Security Threats - Viruses, Worms, Trojan Horse, Bombs, Trapdoors, Spoofs, E-mail viruses, Macro viruses, Malicious Software, Network and Denial of Services Attack, Security Threats to E-Commerce-Electronic Payment System, eCash,Credit/Debit Cards. Digital Signature, public KeyCryptography.

UNIT-3

Developing Secure Information Systems, Application Development Security, Information Security Governance & Risk Management, Security Architecture & Design Security Issues in Hardware, Data Storage & Downloadable Devices, Physical Security of IT Assets, Access Control,CCTV and intrusion Detection Systems, Backup Security Measures.

UNIT-4

Security Policies, Why Policies should be developed, WWW policies, Email Security policies, PolicyReview Process-Corporate policies-Sample Security Policies, Publishing and Notification Requirement ofthe Policies.Information Security Standards-ISO, IT Act, Copyright Act, Patent Law, IPR. Cyber Laws in India; ITAct 2000 Provisions,Intellectual Property Law: Copy Right Law, Software License, Semiconductor Lawand Patent Law.

References :

1. Charles P. Pfleeger, Shari LawerancePfleeger, "Analysing Computer Security ", Pearson Education India.

2. V.K. Pachghare, "Cryptography and information Security", PHI Learning Private Limited, Delhi India.

3.Dr. Surya Prakash Tripathi, RitendraGoyal, Praveen kumar Shukla ,"Introduction to Information Security and

Cyber Law" Willey Dreamtech Press.

SCIENCE BASED OPEN ELECTIVES
[BTOE-41] INTRODUCTION TO SOFT COMPUTING
(Neural Networks, Fuzzy Logic and Genetic Algorithm)

Unit-I : Neural Networks-1(Introduction & Architecture)
Neuron, Nerve structure and synapse, Artificial Neuron and its model, activation functions,Neural network architecture: single layer and multilayer feed forward networks, recurrent networks.Various learning techniques; perception and convergence rule, Auto-associative and hetro-associative memory.
Unit-II : Neural Networks-II (Back propogation networks)

Architecture: perceptron model, solution, single layer artificial neural network, multilayer perception model; back opogation learning methods, effect of learning rule co-efficient ;back propagation algorithm, factors affecting backpropagation training, applications.

Unit-III : Fuzzy Logic-I (Introduction)
Basic concepts of fuzzy logic, Fuzzy sets and Crisp sets, Fuzzy set theory and operations, Properties of fuzzy sets, Fuzzy and Crisp relations, Fuzzy to Crisp conversion.

Unit-IV : Fuzzy Logic –II (Fuzzy Membership, Rules)
Membership functions, interference in fuzzy logic, fuzzy if-then rules, Fuzzy implications and Fuzzy algorithms, Fuzzyfications&Defuzzificataions, Fuzzy Controller, Industrial applications.

Unit-V : Genetic Algorithm(GA)
Basic concepts, working principle, procedures of GA, flow chart of GA, Genetic representations, (encoding) Initialization and selection, Genetic operators, Mutation, Generational Cycle, applications.

Text Books:
1. S. Rajsekaran& G.A. VijayalakshmiPai, "Neural Networks,Fuzzy Logic and Genetic
Algorithm:Synthesis and Applications" Prentice Hall of India.
2. N.P.Padhy,"Artificial Intelligence and Intelligent Systems" Oxford University Press.

Reference Books:
3. SimanHaykin,"Neural Netowrks"Prentice Hall of India
4. Timothy J. Ross, "Fuzzy Logic with Engineering Applications" Wiley India.

[BTOE-42] NANO SCIENCES

UNIT -1 :
Introduction:
Difinition of Nano-Science and Nano Technology, Applications of Nano-Technology.

Introduction to Physics of Solid State:
Structure: 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-2
Quantum Theory For Nano Science:
Time dependent and time independent Schrodinger wave equations. Particle in a box, Potential step: Refelection and tunneling(Quantum leak). Penetration of Barrier, Potential box(Trapped particle in 3D:Nanodot), Electron trapped in 2D plane(Nano sheet), Quantum confinerment effect in nano materials.

Quantum Wells, Wires and Dots
Preparation of Quantum Nanostructure; Size and Dimensionality effect, Fermigas; Potential wells; Partial confinement; Excitons; Single electron Tunneling, Infrared etectors; Quantum dot laser Superconductivity.

Properties of Individual Nano particles
Metal Nano clusters: Magic Numbers; Theoretical Modelling of Nanopraticles; geometric structure; electronic structure; Reactivity; Fluctuations Magnetic Clusters; Bulle to Nano structure.
Semi conducting Nanoparticles: Optical Properties; Photofragmentation; Coulmbic explosion.
Rare Gas & Molecular Clusters: Inert gas clusters; Superfluid clusters molecular clusters.

UNIT-3
Growth Techniques of Nanomaterials:
Lithograpahic and Nonlithograpahic techniques, Sputtering and film deposition in glow discharge, DC sputtering technique(p-$CuAlO_2$ deposition). Thermal evaporation technique, E-beam evaporation, Chemical Vapour deposition(CVD), Synthesis of carbon nano-fibres and multi-walled carbon nanotubes, Pulsed Laser Deposition,

Molecular beam Epitoxy, Sol-Gel Techniuqe (No chemistry required), Synthesis of nanowires/rods, Electrodeposition, Chemical bath deposition, Ion beam deposition system, Vapor-Liquid–Solid (VLS) method of nanowires.

UNIT -4
Methods of Measuring Properties:
Structure: Crystallography, particle size determination, surface structure,
Microscopy: Scanning Prob Microscopy (SPM), Atomic Force Microscopy (AFM), Field Ion Microscopy, Scanning Electron Microscopy, Transmission Elecrtron Microscopy (TEM)
Spectroscopy: Infra red and Raman Spectroscopy, X-ray Spectroscopy, Magnetic resonance, Optical and Vibrational Spectroscopy, Luninscence.

UNIT-5
Buckey Ball:
Nano structuresofcarbon(fullerene):
Carbon nano-tubes: Fabrication , structure. electrical, mechanical, and vibrational properties and applications. Nano diamond, Boron Nitride Nano-tubes, single elecron transistors, Moelcular machine, Nano-Biometrics, Nano Robots.

Text/Reference Books:
1. C.P.Poole Jr F.J. Owens, "Introduction to Nanotechnology".
2. "Introduction to S.S. Physics" - (7th Edn.) Wiley 1996.

[BTOE-43] LASER SYSTEMS AND APPLICATIONS

UNIT-I & II
Introduction:
Review of elementary quantum physics, Schrodinger equation, concept of coherence, absorption, spontaneous emission and stimulated emission processes, relation between Einstein's A and B coefficients, population inversion, pumping, gain, optical cavities.

UNIT-III & IV
Lasers & Laser Systems:
Main components of Laser, principle of Laser action, introduction to general lasers and their types. Three & four level Lasers, CW & Pulsed Lasers, atomic, ionic, molecular, excimer, liquid and solid state Lasers and systems, short pulse generation and Measurement.

UNIT-V
Applications:
Laser applications in medicine and surgery, materials processing, optical communication, metrology and LIDAR and holography.

Text/ Reference Books:
1. K.R. Nambiar, "Laser Principles, Types and Application" New Age International.
2. S. A. Ahmad, "Laser concepts and Applications" New Age Internati

[BTOE-44] SPACE SCIENCES

1. Introduction:
Introduction to space science and applications, historical development
2. Solar System:
Nebular theory of formation of our Solar System.Solar wind and nuclear reaction as the source of energy.
Sun and Planets: Brief description about shape size, period of rotation about axis and period of revolution, distance of planets from sun, Bode's law, Kepler's Laws of planetary motion, Newton's deductions from Kepler's Laws, Newton's Law of gravitation, correction of Kepler's third law, determination of mass of earth, determination of mass of planets with respect to earth. Brief description of Asteroids, Satellites and Comets.
3. Stars:
Stellar spectra and structure, stellar evolution, nucleo-synthesis and formation of elements.

Classification of stars: Harvard classification system, Hertzsprung-Russel diagram, Luminosity of star, variable stars; composite stars (white dwarfs, Neutron stars, black hole, star clusters, supernova and binary stars); Chandrasekhar limit.

4. Galaxies:
Galaxies and their evolution and origin, active galaxies and quasars.

5. Creation of Universe:
Early history of the universe, Big-Bang and Hubble expansion model of the universe,cosmic microwave background radiation, dark matter and dark energy.

Text Books / Reference Books:
1. K. S. Krishnaswami, "Astrophysics: A modern Perspective" New Age International.
2. K. S. Krishnaswami, "Understanding cosmic Panorama" New Age International.

[BTOE-45] POLYMER SCIENCE AND TECHNOLOGY

UNIT –I & II
POLYMERS:
Introduction, chemistry of polymer synthesis, polymer reaction kinetics, physical properties and characterization of polymers, effect of structure on properties of polymers, organic polymers.Introduction to high performance polymers and composites and their processing.

UNIT –III & IV
POLYMERIZATION:
Introduction, step-growth polymerization, free radical chain growth polymerization, emulsion polymerization, ionic and cationic polymerization, chain statistics and rubber elasticity.

UNIT – UNIT –V & VI
PREPARATION AND APPLICATIONS:
Preparation, properties and technical applications of thermo-plastics (PVC, PVA), thermostats (PF, UF) and elastomers (SBR, GR-N), silicones.Application of polymers in space, ocean, electronics, medical, agriculture, automobile, sports and building construction.

[BTOE-46] NUCLEAR SCIENCE

UNIT-I
Nucleus and Its Basic Features:
Nuclear structure; nuclear forces and their properties, nuclear stability, nuclear radius and its meassurement, nuclear spin, nuclear magnetic and electrical moments.

UNIT-II
Nuclear Models:
Single particle model, liquid drop model and semi-emperical mass formula, nuclear potential and shell model, collective model.

UNIT-III
Nuclear Reaction:
Nuclear reaction and laws of conservation, types of nuclear reaction, mechanism of nuclear reaction, nuclear fission & binuclear fusion and their explanation by liquid drop model.

UNIT-IV
Nuclear Decay:
Decay constant, half life period and mean life, alpha decay, beta decay, gamma decay, interaction of nuclear radiation with matter.

Nuclear Instruments-I
Mass spectrograph,: General principle, Aston's Mass Spectrograph.

UNIT-V
Nuclear Instruments-II
Accelerators: Van de Graph Generator, Cyclotron, Synchrotron.

Detectors: G M Counter, Scintillation counter, cloud chamber, Bubble Chamber, production and detection of neutrons and Gamma-photon.

Application of Nuclear Techniques: Nuclear magnetic resonance, positron emission topography, radiotracer techniques and applications in material science and agriculture.

Text Books:

1. Tayal, "Nuclear Physics" Himalaya Publishing House.
2. S.N. Ghosal, "Nuclear Physics" S. Chand & Co.

Reference Books:

6. Roy & Nigam, "Nuclear Physics" John Wiley & sons.
7. W.E. Burcham, "Nuclear Physics" Longmans Publications.

[BTOE-47]   MATERIAL SCIENCE

UNIT-I

Introduction: Historical perspective, importance of materials, Brief review of modern & atomic concepts in Physics and Chemistry. Atomic models, Periodic table, Chemical bonding.

Crystallography and imperfections:

Concept of unit cell, space lattice, Bravais lattices, common crystal structures, Atomic packing factor and density. Miller indices.X-ray crystallography techniques, imperfections, Defects & Dislocations in solids. .

UNIT-II

Mechanical Properties and Testing: Stress strain diagram, Ductile and brittle materials, stress Vs strength, toughness, hardness, fracture, fatigue and creep. Testing, such as Strength testing, Hardness testing, Impact testing, Fatigue testing Creep testing, Non-destructive testing (NDT)

Micro Structural Exam: Microscope principle and methods, Preparation of samples and microstructure exam and grain size determination, comparative study of microstructure of various metals and alloys, such as Mild steel, CI, Brass.

Phase Diagram and Equilibrium Diagram: Uniary and Binary diagrams, Phase rules, Types of equilibrium diagrams: solid solution type, eutectic type and combination type, Iron-carbon equilibrium diagram.

UNIT-III

Ferrous materials: Iron and steel manufacture, furnaces, various types of carbon steels, alloy steels and cast irons, its properties and uses.

Heat Treatment: various types of heat treatment, such as Annealing, Normalizing, Quenching, Tempering and Case hardening. Time Temperature Transformation (TTT) diagrams.

Non-Ferrous metals and alloys: Non-ferrous metals, such as Cu, Al, Zn, Cr, Ni etc. and its applications. Various types of Brass, Bronze bearing materials their properties and uses. Aluminum alloys, such as Duralumin, Other advanced materials/alloys.

UNIT-IV

Magnetic properties: Concept of magnetism- Dia, para, ferro magnetic materials, Hysteresis, Soft and hard magnetic materials, Magnetic Storages.

Electric Properties: Energy band, concept of conductor, insulator and semi conductor. Intrinsic and extrinsic semi-conductors, P-n junction and transistors, Basic devices and their applications.diffusion of Solid

Super conductivity and its applications, Messier effect. Type I& II superconductors. High Temp. superconductors.

UNIT-V

Ceramics: Structure, types, properties and applications of ceramics. Mechanical/Electrical behaviour and processing of ceramics.

Plastics: Various types of polymers/plastics and their applications. Mechanical behaviour and processing of plastics, Future of plastics.

Other Materials: Brief description of other materials, such as optical and thermal materials, concrete, composite materials and their uses.

Other Materials: Brief description of other materials, such as optical and thermal materials, concrete, composite materials and their uses.

Performance of materials in service: Brief theoretical consideration of fracture, fatigue, and corrosion and its control.

Text / Reference Books:

1. W.D. Callisster Jr. "Material Science & Engineering Addition" - Wesly Publishing Co.
2. Van Vlash, "Elements of Material Science & Engineering", John Wiley & Sons

[BTOE-48] DISCRETE MATHEMATICS

UNIT-I
Set Theory: Definition of Sets, Venn Diagrams, complements, cartesian products, power sets, counting principle, cardinality and countability (Countable and Uncountable sets), proofs of some general identitites on sets, pigeonhole principle.
Relation: Definition, types of relation, composition of relations, domain and range of a relation, pictorial representation of relation, properties of relation, partial ordering relation.
Function: Definition and types of function, composition of functions, recursively defined functions.
UNIT-II
Propositional logic: Proposition logic, basic logic, logical connectives, truth tables, tautologies, contradiction , normal forms(conjunctive and disjunctive), modus ponens and modus tollens, validity, predicate logic, universal and existential quantification.
Notion of proof: proof by implication, converse, inverse, contrapositive, negation, and contradiction, direct proof, proof by using truth table, proof by counter example.
UNIT-III
Combinatories: Mathematical induction, recursive mathematical definitions, basics of counting, permutations, combinations, inclusion-exclusion, recurrence relations (n_{th} order recurrence relation with constant coefficients, Homogeneous recurrence relations, Inhomogeneous recurrence relation), generating function (closed form expression, properties of G.F., solution of recurrence relation using G.F, solution of combinatorial problem using G.F.)
Unit-IV
Algebraic Structure: Binary composition and its properties definition of algebraic structure; Groyas Semi group, Monoid Groups, Abelian Group, properties of groups, Permutation Groups, Sub Group, Cyclic Group, Rings and Fields (definition and standard results).
UNIT-V
Graphs:
Graph terminology, types of graph connected graphs, components of graph, Euler graph, Hamiltonian path and circuits, Graph coloring, Chromatic number.
Tree: Definition, types of tree(rooted, binary), properties of trees, binary search tree, tree traversing (preorder, inorder, postorder).
Finite Automata: Basic concepts of Automation theory, Deterministic finite Automation(DFA), transition function, transition table, Non Deterministic Finite Automata (NDFA), Mealy and Moore Machine, Minimization of finite Automation.
Text/Reference Books:
1. Kenneth H. Rosen, "Discrete Mathematics and its Applications", Mc.Graw Hill, 2002.
2. V. Krishnamurthy, "Combinatories:Theory and Applications", East-West Press.

[BTOE-49] APPLIED LINEAR ALGEBRA

UNIT-1
Fields, Vector-spaces, sub-spaces, linear-combination, linear-dependence and independence.Basis, dimensions and coordinates (each and every fact to be illustrated by suitable examples).
UNIT-2
Linear-transformation, definition and examples, matrix representation, similarity, range and kernel, rank-nullity theorem and its consequences.
UNIT-3
Singular and non singular linear transformations, sum and product of linear transformations, vector space of linear transformations, nilpotent linear transformations.
UNIT-4

Inner product spaces, definition and examples, orthogonality, Cauchy-Schwartz Inquality, Minkowski Inequality, polarization Identity, complete ortho normal set, Bessel's Inequality, Gram-Schmidt's orthogonalization process.

UNIT-5

Linear functional, definition and examples, vector space of linear functional, dual vector spaces, adjoint, self adjoint, unitary and normal operators, examples and properties, eigen values and eigen vectors, diagonalisation of linear operators, quadratic forms, principle axis theorem(without proof), some applications to engineering problems.

TEXT/REFERENCE BOOKS

1. Dym, H. Linear Algebra in action, University Press.2012
2. Halmos, P.R.: Finite Dimensional Vector Spaces (1990) Narosa.