

**Course structure**  
**B. Tech. Second year (Civil Engineering)**  
**Year II, Semester III**

S. No.	Course Code	NAME OF THE SUBJECT	PERIODS			Credit
			L	T	P	
1	EAS-301	Engg. Mathematics-III	3	1	0	4
2	ECE-301	Fluid Mechanics	3	1	0	4
3	ECE-302	Building Materials & Construction	3	1	0	4
4	EME-302	Strength of Materials	3	1	0	4
5	EHU-301	Industrial Sociology	2	0	0	2
6	ECE-303	Geoinformatics- 1	2	1	0	3
7	AUC-001	Cyber Security	2	0	0	-
8	ECE-351	Fluid Mechanics Lab	0	0	3	1
9	ECE-352	Building Materials Lab	0	0	3	1
10	ECE-353	Geoinformatics Lab – 1	0	0	2	1
11	ECE-354	Building Planning & Drawing Lab	0	0	2	1
	GP-301	GP				--
		Total	18	5	10	25

\*\*Cyber Security will be offered as a compulsory audit course as directed by the UGC.

**Semester IV**

S. No.	Course Code	NAME OF THE SUBJECT	PERIODS			Credit
			L	T	P	
1	EOE-041 to EOE-048	Science based Elective*	3	1	0	4
2	ECE-401	Structural Analysis -1	3	1	0	4
3	ECE-402	Geoinformatics – 2	3	1	0	4
4	ECE-403	Hydraulics & Hydraulic Machines	3	1	0	4
5	EHU-401	Industrial Psychology	2	0	0	2
6	ECE-404	Engineering Geology	2	1	0	3
7	AUC-002	Human Values & Professional Ethics	2	0	0	-
8	ECE-451	Structural Analysis Lab	0	0	3	1
9	ECE-452	Geoinformatics Lab – 2	0	0	3	1
10	ECE-453	Hydraulics & Hydraulic Machines Lab	0	0	2	1
11	ECE-454	Computer Based Numerical & Statistical Techniques Lab	0	0	2	1
12	GP-401	GP				--
		Total	18	5	10	25

## **\*SCIENCE BASED OPEN ELECTIVE**

EOE-031: Introduction to Soft Computing (Neural Networks, Fuzzy Logic and Genetic

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

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### **EAS-301: ENGINEERING MATHEMATICS-III**

#### **Unit-I: 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, Residue theorem, Evaluation of real integrals of the type

$$\int_0^{2\pi} f(\cos\theta, \sin\theta)d\theta \text{ and } \int_{-\infty}^{\infty} f(x)dx.$$

**Unit-II: Integral Transformation-** 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 equations.

**Unit-III: Statistical Techniques** - Moments, Moment generating functions, **Central Tendency, depression** Skewness, Kurtosis, Curve fitting, Method of leastsquares, Fitting of straight lines, Polynomials, Exponential curves, Correlation, Linear, non-linear and multiple regression analysis, **Problems, Bayes Theorem, random Variables** Binomial, Poisson and Normal distributions, Tests of significations: Chi-square test, t-test.

#### **Unit-IV: Numerical Techniques-I**

Zeroes of transcendental and polynomial equations using Bisection method, Regula-falsi method and 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 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 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.

**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
3. J.N. Kapur, Mathematical Statistics, S. Chand & company Ltd.
4. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers

**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.
3. S.S. Sastry, Introductory Methods of Numerical Analysis, PHI Learning Private Limited, New Delhi
4. E. Balagurusamy, Numerical Methods, Tata McGraw-Hill Publishing Company Limited, New Delhi
5. T. Veerajan & T. Ramchandrandran, Theory & Problems in Numerical Methods, TMH, New Delhi

## **ECE - 301: 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 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. 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 sublayer, separation and its control, Drag and lift, drag on a sphere, a two dimensional cylinder, and an aerofoil, Magnus effect. Introduction to compressible flow.

### Text and Reference Books:

1. Introduction to Fluid Mechanics by Fox & Donald, John Wiley & Sons.
2. Fluid Mechanics by Cengel&Cimbala, TMH.
3. Fluid Mechanics by White, F.M., TMH.

## ECE - 302: BUILDING MATERIALS & CONSTRUCTION

### Unit - I

Classification of building materials, building materials and their performance, economics of the building materials.

**Stone:** Requirement of good building stone, characteristics of building stones and their testing. Common building stones. Methods of preservation of stones.

**Brick:** 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.

**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, Factors affecting 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

**Plastic:** Chemistry of Plastics manufacturing process, classification, advantages of plastics, Mechanical properties and use of plastic in construction.

**Paints, varnishes and distempers:** Common constituents, types and desirable properties, Cement paints.

**Ferrous metals:** Desirable characteristics of reinforcing steel. Principles of cold working. Reinforcing steel mechanical 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 of insulating materials.

### Unit - III

Components of building, area considerations, Construction Principle and Methods for layout, Damp proofing, anti termite treatment in buildings, Vertical circulation means: Staircases 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 block construction.

### Unit - IV

Doors, Windows and Ventilations, Construction details, types of doors and windows and their relative advantages & disadvantages. Types of roof and roof treatments, Lintels and Chhajja.  
Functional efficiency of Buildings.

### **Unit - V**

Natural Ventilation, Water Supply and Sanitary fittings (Plumbing), Electrical fittings.

Heating, Ventilation & Airconditioning, Mechanical Lifts and Escalators, Fire Fighting arrangements, Acoustics.

Plastering: Different types, pointing.

Distempering, Colour washing, Painting etc.

Principles & Methods of building maintenance.

### **Text and Reference Books:**

1. Building Materials by Duggal, S.K., New Age International.
2. Building Materials by Varghese, P.C., PHI.
3. A Text Book of Building Construction by Punmia, B.C., Luxmi Publications, Delhi.
4. Manual of tropical housing and building by Koenisberger, O.H., Orient Longman.
5. A Text Book of Building Construction by Arora, S.P., Dhanpat Rai & Sons.

## **EME-302: STRENGTH OF MATERIALS**

### **Unit - I**

**Compound stress and strains:** Introduction, normal stress and strain, shear stress and strain, stresses on oblique plane, strain energy, impact loads and stresses, state of plane stress, principal stress and strain, maximum shear stress, Mohr's stress circle, three dimensional stress & strain, equilibrium equations, generalized Hooke's law, theories of failure .

### **Unit - II**

**Stresses in Beams:** Introduction to 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, Rankine Gordon formulae, examples of columns in mechanical equipments 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**

**Bending of 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.

### **Text and Reference Books:**

1. Mechanics of Materials by Hibbeler, Pearson.
2. Mechanics of Materials by Beer, Johnston, Dewolf and Mazurek, TMH
3. Strength of Materials by Ryder, Macmillan.

## **ECE - 303: GEOINFORMATICS - 1**

### **Unit - I**

Importance of surveying to engineers, plane and geodetic surveying, principles of surveying, classification of surveys, Accuracy and Errors.

Linear Measurements, Measurement of directions: Reference meridians, bearing and azimuths, Compass, Vernier theodolite, Measurements of horizontal and vertical angles, 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 traverse coordinates, Principles and classification of triangulation systems, strength of figures, 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 circular curves, transition curves- types and their characteristics, ideal transition curve, equations of various transition curves, Introduction to vertical curves.

### **Text and Reference Books:**

1. Surveying Vol. I by Punamia, B.C.
2. Surveying Vol. II by Punamia, B.C.
3. Plane Surveying by Chandra, A.M.
4. Higher Surveying by Chandra, A.M.
5. Surveying Vol. I by Duggal, S.K.
6. Surveying Vol. I by Duggal, S.K.
7. Surveying & Leveling by Subramanian, R., Oxford University Press.
8. Text Book of Surveying by Venkatramaih, C., University Press.
9. Engineering Surveying by Schofield, W. and Breach, Mark

# **EHU-301 : Industrial Sociology**

## **Unit-I**

Industrial Sociology :Nature and Scope of Industrial Sociology- Development of Industrial Sociology. **Work Stress & its Management**

## **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.

## **Unit-III**

Industrialization in India.Industrial Poling Resolutions – 1956.

## **Unit-IV**

Contemporary Issues :Grievances and Grievance handling Procedure.

Industrial Disputes : courses, strikes & lockouts, Industrial Relations Machinery Bi-partite & Tri-partite Agreement, Labour courts & Industrial Tribunals, Code of Discipline, Standing order.

## **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.
4. Sinha G.P. and P.R.N. Sinha, Industrial Relations and Labour Legislations, New Delhi, Oxford and IBH Publishing Co., 1977.

## **AUC 001: 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, e-Cash, Credit/Debit Cards. Digital Signature, public Key Cryptography.

### **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, Policy Review Process-Corporate policies-Sample Security Policies, Publishing and Notification Requirement of the Policies. Information Security Standards-ISO, IT Act, Copyright Act, Patent Law, IPR. Cyber Laws in India; IT Act 2000 Provisions, Intellectual Property Law: Copy Right Law, Software License, Semiconductor Law and Patent Law.

#### **References :**

1. Charles P. Pfleeger, Shari LawrancePfleeger, "Analysing Computer Security ", Pearson Education India.
2. V.K. Pachghare, "Cryptography and information Security", PHI Learning Private Limited, Delhi India.
3. Dr. Surya PrakashTripathi, RitendraGoyal, Praveen kumarShukla ,"Introduction to Information Security and Cyber Law" Willey Dreamtech Press.
4. Schou, Shoemaker, " Information Assurance for the Enterprise", Tata McGraw Hill.
5. CHANDER, HARISH," Cyber Laws And It Protection " , PHI Learning Private Limited ,Delhi ,India



## **ECE - 351: FLUID MECHANICS LAB**

1. To verify the momentum equation on impact of jet using the experimental set-up.
2. To determine the coefficient of discharge of an orifice. Also to determine the coefficient of velocity and the coefficient of contraction of the orifice mouth piece.
3. To calibrate an orifice meter and study the variation of the co-efficient of discharge with the Reynolds number.
4. To calibrate a venturimeter and study the variation of the co-efficient of discharge with the Reynolds number.
5. To calibrate a bend meter and study the variation of the co-efficient of discharge with 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 the lower critical Reynolds number.
8. To study the velocity distribution in a pipe and compute the discharge by integrating 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 determine the boundary layer thickness.
11. To determine meta-centric height of a given ship model.
12. To determine the head loss for a sudden enlargement and contraction.

## **ECE - 352: BUILDING MATERIALS LAB**

To test properties of following building materials as per BIS specifications:

### ***I. Cement***

1. Normal consistency.
2. Initial & final setting time.
3. Compressive strength.
4. Fineness by air permeability and Le-chatalier's apparatus.
5. Soundness.
6. Tensile strength

### ***II. Coarse Aggregate***

1. Crushing value.
2. Impact value.
3. Water absorption.
4. Sieve analysis.
5. Specific gravity & bulk density.
6. Grading.

### ***III. Fine Aggregate (sand)***

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

### ***IV. Cement Concrete***

1. Workability
2. Compressive strength
3. Tensile strength

### **V. Reinforcing Steel**

1. Tensile and yield strength
2. Percentage elongation

### **VI. Non Destructive Testing on concrete**

### **VII. Bricks**

1. Water absorption.
2. Dimension Tolerance.
3. Compressive strength.
4. Efflorescence

## **ECE - 353: GEOINFORMATICS I- LAB**

1. To prepare conventional symbol chart based on the study of different types of topographical maps.
2. To measure bearings of a closed traverse by prismatic/surveyor compass and to adjust the traverse 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 Electronic Theodolite and measurement of horizontal and vertical angles.
6. To determine the height of a vertical structure (e.g. chimney/ water tank etc.) using trigonometricallevelling by taking observations in single vertical plane.
7. To set out a simple circular curve by Rankine's method.

## **ECE - 354: BUILDING PLANNING & DRAWING LAB**

Drafting of following using any CAD software:

1. Symbols used in civil engineering drawing, Masonry bonds.
2. Doors, windows and staircases.
3. Building services (Plumbing & Electrical fitting) drawings.
4. Comprehensive planning and drawings of residential building (including layout plan, elevation, sectional elevation, building services).
5. Preparation of layout plans of different types of Projects, such as: Primary school, Commercial building, Hospital building, Industrial building etc.

# ECE - 401: STRUCTURAL ANALYSIS - 1

## 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, 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 and its location for common structural sections.

Bending of curved bars in plane of bending, stresses in bars of small & large initial curvatures.

## Text and Reference Books:

1. Structural Analysis by Hibbler, Pearson Education.
2. Analysis of Structures by Thandavmorthy, T.S., Oxford University Press.
3. Elementary Structural Analysis by Wilbur and Norris, TMH.
4. Basic Structural Analysis by Reddy, C.S., TMH.
5. Theory & Analysis of Structures by Jain, O.P. and Jain, B.K., Vol. I & II, NemChand.
6. Analysis of Structures by Vazirani & Ratwani, Khanna Publishers.
7. Structural Analysis by Coates, R.C., Coutie, M.G. & Kong, F.K., English Language Book Society & Nelson, 1980.

# ECE - 402: GEOINFORMATICS - 2

## 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.

### **Text and Reference Books:**

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

## **ECE - 403: 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 non-rectangular 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.

### **Text and Reference Books:**

1. Open Channel hydraulics by Chow, V.T., McGraw Hill Publication.
2. Flow through Open Channels by Subramanya, K., TMH, New Delhi.
3. Flow through open channels by RangaRaju, K.G., TMH, New Delhi.
4. Flow through Open Channels by Srivastava, Rajesh, Oxford University Press.
5. Fluid Mechanics by Streeter, V.L. & White E.B., McGraw Hill Publication

## **ECE - 404: ENGINEERING GEOLOGY**

### **Unit - I**

**Minerals:** Their physical and detailed study of certain rock forming minerals.

**Rocks:** Their origin, structure, Texture and classification of igneous sedimentary and metamorphic rocks and their suitability as Engg. materials.

### **Unit - II**

Stratification, Lamination bedding. Outcrop-its relation to topography, dip and strike of bed, overlap, outlier and inlier.

**Rock deformation:** Folds, Faults, joints unconformity and their classification, causes and relation to engineering behaviour of rock masses.

### **Unit - III**

**Earthquake:** Definition, its causes, classification, seismic zones of India and Geological consideration for construction of building, projects in seismic areas.

**Landslide:** Definition, its causes, classification and preventive measures.

### **Unit - IV**

**Underground water:** Origin, Aquifer, Aquicludes, Artesian Wells, underground provinces of India and its role as geological hazard.

Building stones, Engineering properties of rocks, Alkali aggregate reaction, Grouting, Pozzolonic materials.

### **Unit - V**

Geological investigations for site selection of Dams and reservoirs tunnels, bridges and Highways.

Principles of Geophysical explorations methods for subsurface structures.

### **Text and Reference Books:**

1. Fundamentals of Engineering Geology by Waltham, T., SPON Press.
2. Geology of Engineers by Treteth, J.M., Princeton, Von. Nostrand.
3. Text Book of Engineering Geology by Gokhale, K.V.G.K., B S Publication.
4. Engg. and General Geology by Singh, P., Katson Publishing House.
5. A Geology for Engineers by Blyth, F.G.M., Arnold, London.
6. Geology for Engineers by Arora, D.S., Mohindra Capital Publishers, Chandigarh.
7. Fundamentals of Engineering Geology by Bell, F.G., B S Publication.
8. Geology and Engineering by Leggot, R.F., McGraw Hill, New York.
9. A text Book of Geology by Mukerjee, P.K., Calcutta Word Publishers.
10. Engineering Geology by Sathyanarayanswami, B.S., DhanpatRai& Co.

# **EHU-401: 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 (5<sup>th</sup> edition) Wadsworth/Thompson : Belmont, C.A.
4. Aswathappa K. (2008). Human Resource Management (fifth edition) New Delhi : Tata McGraw Hill

## **ECE - 451: STRUCTURAL ANALYSIS LAB**

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.

## **ECE - 452: GEOINFORMATICS LAB – 2 LAB**

1. To measure distances, horizontal & vertical angles and coordinates by Total Station.
2. To measure 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.

### **ECE - 453: HYDRAULICS & HYDRAULIC MACHINES LAB**

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 Pelton, Francis and Kaplan Turbines.
9. To study the free overfall phenomenon in an open channel and to determine the end depth.
10. To determine coefficient of discharge for given rectangular notch.
11. To determine coefficient of disc.

### **ECE - 454: COMPUTER BASED NUMERICAL & STATISTICAL TECHNIQUES LAB**

Write Programs in 'C' Language:

1. To Find out the root of the Algebraic and Transcendental equations using Bisection, Regula-falsi, 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.