

# **SIR PADAMPAT SINGHANIA UNIVERSITY, UDAIPUR**

## **COURSE CONTENTS**

**Second year (IIIrd Semester) BATCH-2009**

**L T P Cr.**

**3 0 2 5**

**Course Code: CE-201**

**Course Name: Surveying**

### **1. INTRODUCTION:**

Definition, Object, Classification, Principle of Survey, Plans and Maps, Scales.

### **2. LINEAR MEASUREMENTS:**

Different methods, Chaining, Offsets, Taping, ranging, Selection of survey stations, Define Term : Location sketch or Reference sketch , well condition and ill condition triangles, Reconnaissance survey and index map, Base Line, Tie Line, Check Line, Range Line, Obstacles, conventional symbols , Recording the field book.

### **3. COMPASS SURVEY:**

Types of Compass, Measurements of angles, temporary and permanent adjustment, Closed Traverses and Open Traverses, bearings, W.C.B. and R.B., Meridians, Local Attraction, declination and its variation, Dip of needle, Chain and Compass survey field work.

### **4. LEVELLING AND CONTOURING:**

Object and Use, Definitions, leveling, Different types levels, Adjustment of level, types of leveling operations, Reading the leveling staff, Calculations of Reduced level, curvature correction, refraction correction, level book, reciprocal leveling, Contouring.

### **5. THEODOLITE SURVEY:**

Introduction, use, types of theodolite, Definitions, temporary and permanent adjustment of theodolite, field operations with theodolite, theodolite traversing, latitude and departure, Gale's traverse table, omitted measurements in theodolite traversing, errors in theodolite traversing.

### **6. PLANE TABLE SURVEY:**

Principles, Accessories, Advantages and dis-advantages of plane table survey, Suitability, Orientation of Plane Table, Procedure, methods of Plane Tabling , errors and pre caution, Plane table traversing.

## **7. COMPUTATION OF AREA AND VOLUME:**

Determination of Area by different methods, Planimeter, Different Level sections, Determination of by Volume by different methods.

## **8. CURVES:**

Introduction, classification of curves, simple, compound and transition curves, methods of setting the curves, vertical curves.

## **9. HYDROGRAPHIC SURVEYS:**

Introduction, controls in hydrographic surveying, shore line survey, soundings, reduction in soundings, methods of locating and plotting of soundings.

## **10. Introduction to G.I.S., G.P.S. AND R.S.:**

Overviews, Definitions, uses and applications,

**PRACTICAL WORK:** Practical work shall be based on sub-topics.

### **TERM WORK:**

(1) Imperial size drawing on:

(A) Chain and compass Survey

(B) Levelling and Contouring (Traverse survey)

(C) Plane Table Survey. Support Faculty :

### **Reference Books:**

- 1) Surveying Vol.1 and Vol.2 By B.C. Punnamia**
- 2) Surveying and Levelling By Kanitkar and Kulkarni**
- 3) Surveying Vol.1 and Vol.2 By Dr. K.R. Arrora**
- 4) Basic surveying by W. Whyte and R. Paul**
- 5) Surveying By S.K. Duggal**

# **SIR PADAMPAT SINGHANIA UNIVERSITY, UDAIPUR**

## **COURSE CONTENTS**

**Second year (I<sup>ST</sup> Semester) BATCH-2009**

**L T P Cr.**

**3 1 0 4**

**Course Code: CE-202**

**Course Name: Structure Analysis-I**

### **1. REVIEW OF SHEAR FORCE AND BENDING MOMENT:**

Definition: shear force, Bending moment, Relation between load intensity, S.F. and B.M., S.F. and B.M. diagrams for cantilever beams, simply supported beams and overhanging beams.

### **2. FUNDAMENTALS:**

Types of statically determinate & indeterminate structures, static and kinematics indeterminacy, stability of structures, types of loading, force-displacement relationship, principle of superposition, Maxwell's reciprocal theorems.

### **3. ANALYSIS OF FORCES IN STATICALLY DETERMINATE STRUCTURES:**

Computation of internal forces in statically determinate structures such as compound truss, portals, cables, grids, beams curved in plan, Three hinge arch - segmental and parabolic shapes. Forces and end actions in cables, unstiffened three hinged parabolic and cantenary type suspension bridge.

### **4. ANALYSIS OF DISPLACEMENTS IN STATICALLY DETERMINATE STRUCTURES:**

Differential equation of elastic curve, relation between moment, slope and deflection, Macauli's method, moment area method, conjugate beam method applied to beams including varying moment of inertia, Joint displacement of determinate plane truss using unit load method.

## **5. INFLUENCE LINES:**

For statically determinate beams, I.L.D for support reaction, shear and moment for u.d.l, several point loads, criteria for maximum effects, influence lines for statically determinate trusses, forces in members for u.d.l and point loads, criteria for maximum effect.

## **6. Work and Energy Principles:**

Principles of virtual work, Potential energy, Castigliano's theorem, Complementary energy theorem, Reciprocal theorem and applications.

## **Term Work:**

Analytical solutions problems based on the above syllabus. Practical examinations shall consist of oral based on term work and above course.

## **Reference Books:**

- 1. Junarkar S.B. & Shah H.J.; Mechanics of Structures Vol-I; Charotar publishing house, Anand**
- 2. Structural Analysis by L.S. Negi & R.S. Jangid, Tata McGraw Hill Book Publication.**
- 3. Theory of Structure –Vol. 1 and Vol.2 By S.P.Gupta and G.S. Pandit, Tata McGraw Hill Book Publication.**
- 4. Wang C. K.; Intermediate Structural Analysis; Tata McGraw Hill book Company, New Delhi.**
- 5. Popov E.P.; Engineering Mechanics of Solids; Prentice Hall of India, New Delhi.**
- 6. Gere & Timoshenko; Mechanics of Materials; CBS Publishers & Distributors, Delhi**
- 7. Hibbler R C; Structural Analysis; Pearson Education**

# SIR PADAMPAT SINGHANIA UNIVERSITY, UDAIPUR

## COURSE CONTENTS

Second year (I<sup>ST</sup> Semester) BATCH-2009

L T P Cr.

3 1 0 4

**Course Code: MA-201**

**Course Name: Advanced Engineering Mathematics-III**

**Objective: The aim of this paper is to impart further knowledge of Mathematics which will be useful in understanding the application of Mathematics in various discipline of Engineering & Technology.**

### **Unit I Finite differences and Interpolation:**

Finite differences , various differences operators and their relationships, Factorial notation. Forward, Backward and Divided Differences .Newton's forward and backward interpolation formulae, Lagrange's interpolation Formulae for unequal intervals. Central differences: Gauss, Bessel and Sterling's formula.

### **Unit II Numerical integration and Differentiation:**

Numerical differentiation formulae , Maximum and minimum values of a Tabulated function. Numerical integration: Trapezoidal rule, Weddle's rule, Simpson's 1/3 & 3/8 rule. Numerical Solutions of ordinary differential equations: Picard's method, Euler's methods, Taylor's series method, Runge-Kutta methods, Milne's Predictor and Corrector Methods.

### **Unit III Special functions:**

Bessel's equation and Legendre's Polynomials. Legendre and Bessel's differential equations, Legendre polynomial, Recurrence relation, Rodrigue's formula, Orthogonality and generating relations of Legendre polynomial. Bessel function; recurrence relations, Generating and orthogonality relations of Bessel functions.

#### **Unit IV Complex Variables :**

Analytic functions, Cauchy-Riemann equations, Conjugate functions, Construction of analytic functions; Derivatives of an analytic function, Complex integration; Cauchy's integral formula and Cauchy's inequality. Poles, zero & residue, Taylor's and Laurent's series; Singularities; Power series.

#### **Unit V Statistics:**

Elementary theory of Probability, Probability Distribution Function, Random variable, Mathematical expectations; Moment generating functions; Discrete and continuous distribution functions; Binomial Poisson and Normal distributions. Curve fitting method of least squares, fitting of Straight lines, Polynomials, exponential curve etc. Line of regression and correlation.

#### **References Books:**

- 1) **Rajaraman V, "Computer Oriented Numerical Methods", Pearson Education.**
- 2) **S S Sastri, Introductory Methods of Numerical Analysis", Pearson Education.**
- 3) **Jain ,Iyengar and Jain, "Numerical Methods for Scientific and Engineering Computations" New Age Int.**
- 4) **Grewal B S, " Numerical methods in Engineering and Science", Khanna Publisher**
- 5) **S.C. Gupta and V.K. Kapoor , Mathematical Statistics , Sultan Chand Lt.**

# SIR PADAMPAT SINGHANIA UNIVERSITY, UDAIPUR

## COURSE CONTENTS

Second year (I<sup>ST</sup> Semester) BATCH-2009

**L T P Cr.**

**3 1 1 5**

**Course Code: MA-202**

**Course Name: Fluid mechanics**

### **1.INTRODUCTION :**

2

Properties of fluids, capillarity and surface tension., Continuum principles, Cavitations concept.

### **2.FLUID STATICS :**

5

Manometry , Fluid force on planes and curved surfaces, submerged and floating bodies , stability of submerged and floating bodies, Buoyancy.

### **3.KINEMATICS OF FLUID:**

5

streamlines, streak lines, path lines – equation of Continuity, stream function, velocity potential function, flow net, Vortex Flow.

### **4.FLUID DYNAMICS:**

4

System and control volume approach, Euler's equations of motion, Bernoulli's equation, Navier Stokes equations, Reynold transport equations, momentum equation, Two dimensional ideal fluid motion.

### **5.FLOW MEASUREMENTS:**

4

Pitot tube, venturimeter, orifice meter, flow nozzle meter, Current meter, flow through orifice, notches-weirs and mouth pieces.

### **6.HYDROSTATIC FORCES ON SURFACES:**

2

Total pressure, Meta centre, Meta centric height.

## **7. FLOW THROUGH PIPES:**

5

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, water hammer.

## **8. DIMENSIONAL AND MODEL ANALYSIS:**

3

Method of dimensional analysis, types of similarities, similitude and model testing, Dimensionless numbers.

## **9. BOUNDARY LAYER THEORY:**

4

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.

### **Reference Books:**

- (1) Fluid mechanics by Dr. D.S. Kumar
- (2) Fluid mechanics and Hydraulic Machines By Dr. P.N. Modi and Sheth
- (3) Fluid mechanics by Dr. A.K. Jain
- (4) Engineering Fluid mechanics by R.J. Garde and A.C. Mirajgaokar
- (5) Fluid Mechanics by V.L. Streeter and E.B. Wylie
- (6) Fluid Mechanics by R.K. Bansal
- (7) Fluid Mechanics by Jagdish Lal

### **Laboratory Work:**

Verification of Bernoulli's Theorem.

Calibration of Venturimeter. Calibration of orifice meter. Calibration of rotameter, Calibration of notches. Verification of momentum equation.

Determination of  $C_c$ ,  $C_v$ , and  $C_d$  of an orifice.

Determination of friction factor for pipes of different materials. Determination of loss coefficients for pipe fittings.

Determination of centre of pressure of a vertically immersed surface.

Visualization of laminar and turbulent flow. Demonstration of free vortex, forced vortex.

To check the stability of a ship model under loaded conditions

# SIR PADAMPAT SINGHANIA UNIVERSITY, UDAIPUR

## COURSE CONTENTS

Second year (I<sup>ST</sup> Semester) BATCH-2009

**L T P Cr.**

**3 0 1 4**

**Course Code: MA-201**

**Course Name: Structure and properties of materials**

### **1. INTRODUCTION:**

Material Science and Engineering, Materials and classifications, advance materials, materials of future. **1**

### **2. ATOMIC STRUCTURE AND INTER-ATOMIC BONDING (SELF STUDY):**

Atomic structure, Bonding forces and energies, Primary and Secondary bonding. **1**

### **3. CRYSTAL STRUCTURE:**

Crystal structures and Systems, Unit Cells, Metallic Crystal Structures, Crystallographic directions and Planes, Millar Indices, Density Computations. Crystalline, noncrystalline materials, liquid crystals, quasi crystals, Determination of crystal structure using X-rays **4**

### **4. IMPERFECTIONS IN CRYSTALS:**

Point defects, Dislocations, dislocation energy, Interfacial Defects, Bulk defects, **3**

### **5. DIFFUSION:**

Mechanisms, steady state and non steady state Diffusion, factors influencing diffusion. **2**

### **6. MECHANICAL PROPERTIES OF METALS:**

Elastic properties, Plastic Properties, Creep, Fracture, Anelasticity. **2**

### **7. MULTIPHASE STRUCTURES, PHASE TRANSFORMATIONS:**

Unary, Binary, Equilibrium Phase Diagrams, Eutectic, Eutectoid Peritectic and Peritectoid Reactions, Iron Carbon Diagram, Heat Treatment of Steels. **7**

### **8. DISLOCATION AND STRENGTHENING MECHANISM:**

Dislocation and plastic deformation: characteristics of dislocation, Slip systems, Deformation by Twinning, Strengthening by grain size, solid solution, strain hardening. Recovery, Recrystallization, grain growth **6**

### **9. CERAMICS:**

Different ceramics, Structure, properties **3**

**10. ELECTRIC AND ELECTRONIC MATERIALS:**

Electrical Conduction, Classification of semiconductor materials, Materials and Technology for integrated circuits, Photonic materials, super conductivity and special super-conducting materials, Ferrites. Quartz crystal, Dielectric materials. Piezoelectric and Ferro-electric materials, Electromechanical materials, Mechanism of polarization, Its measurement **6**

**11. MAGNETIC PROPERTIES FOR APPLICATIONS;**

Diamagnetism, Paramagnetism, ferromagnetism, Antiferromagnetism, Ferrimagnetism, Soft and hard magnetic materials magnetic storage. **3**

**12. OPTICAL PROPERTIES:**

Optical properties of Metals and Nonmetals, Luminescence, photoconductivity, Optical Fibers in communications. **3**

**Reference Books:**

- 1 Material science and Engineering by William D. Callister, Jr.
- 2 Material Science by Van Villack,
- 3 Material Science by Raghavan V

**Laboratory Work:**

1. Study of Engineering Materials and crystals structures. Study of models BCC, FCC, HCP and stacking sequence, tetrahedral and octahedral voids.
2. To calculate the effective number of atoms, co-ordination number, packing factors,  $c/a$  ratio for HCP structure.
3. Study of brittle and ductile fracture.
4. To prepare metallic samples for metallographic examination and to study the principle and construction of the Metallurgical Microscope.
5. Study of the following Micro structures: Hypo, Hyper and Eutectoid Steel, Grey, White, Nodular and Malleable Cast Iron.
6. Annealing of Steel - Effect of annealing temperatures and time on hardness.
7. Study of Microstructure and hardness of steel at different rates of cooling. Microstructure examination of white cast iron.
8. Hardening of steel, effect of quenching medium on hardness.
9. Effect of Carbon percentage on the hardness of Steel.
10. Study of various crystal structures and dislocations through models.
11. Study of Iron-Carbon Equilibrium Diagram and sketch the various structures present at room temperature.

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## **COURSE CONTENTS**

**Second year (I<sup>ST</sup> Semester) BATCH-2009**

**L T P Cr.**

**0 2 0 2**

**Course Code: HU-201**

**Course Name: Business and technical communication-I**

### **AIM:**

The course focuses on developing interpersonal skills and helps in developing independent study and learning strategies.

### **1. EFFECTIVE BUSINESS CORRESPONDENCE:**

Types of Business Messages and Processes of writing them. Listening, Negotiation and Conflict resolution by working on the AIDA formula (Attention, Interest, Desire and Action).

### **2. INTERNAL COMMUNICATION:**

Memo and Memo Letters, Business Letters.

### **3. TECHNICAL PROPOSALS:**

Types of Proposals, Solicited and Unsolicited Proposals, Business Proposals, Research Proposals, Tender or Bid.

### **LITERATURE**

#### **RECOMMENDED READING**

1. Duan. P, Gu. W, & Ma. Y. 2001, English for Technical Communication [M]. Beijing: Science Press.
2. Pickett, N. A., & Laster, A. A. (1980). Technical English [M]. New York: Harper & Row Publishers.
3. McMurrey. Power Tools for Technical Communication, current edition. Heinle.
4. Meenakshi Raman and Sangeeta Raman, Technical Communication, Oxford University Press.