

# EN010 401 Engineering Mathematics III

(Common to all branches)

## Teaching scheme

Credits: 4

2 hours lecture and 2 hour tutorial per week

**Objectives:** *Apply standard methods of mathematical & statistical analysis*

### Module 1\_ (12 hours)

**Fourier series:** Dirichlet conditions – Fourier series with period  $2\pi$  and  $2l$  – Half range sine and cosine series – Harmonic Analysis – r.m.s Value.

### Module 2 (12 hours)

**Fourier Transform :** Statement of Fourier integral theorem – Fourier transforms – derivative of transforms- convolution theorem (no proof) – Parsevals identity.

### Module 3 (12 hours)

**Partial differential equations :** Formation by eliminating arbitrary constants and arbitrary functions – solution of Lagrange's equation – Charpits method –solution of Homogeneous partial differential equations with constant coefficients.

### Module 4 (12 hours)

**Probability distribution :** Concept of random variable , probability distribution – Bernoulli's trial – Discrete distribution – Binomial distribution – its mean and variance- fitting of Binominal distribution – Poisson distribution as a limiting case of Binominal distribution – its mean and variance – fitting of Poisson distribution – continuous distribution- Uniform distribution – exponential distribution – its mean and variance – Normal distribution – Standard normal curve- its properties.

### Module 5 (12 hours)

**Testing of hypothesis :** Populations and Samples – Hypothesis – level of significance – type I and type II error – Large samples tests – test of significance for single proportion, difference of proportion, single mean, difference of mean – chi –square test for variance- F test for equality of variances for small samples.

## References

1. Bali& Iyengar – A text books of Engg. Mathematics – Laxmi Publications Ltd.
2. M.K. Venkataraman – Engg. Mathematics vol II 3<sup>rd</sup> year part A & B – National Publishing Co.
3. I.N. Sneddon – Elements of partial differential equations – Mc Graw Hill
4. B.V. Ramana – Higher Engg. Mathematics – Mc Graw Hill
5. Richard A Johnson – Miller Fread's probability & Statistics for Engineers- Pearson/ PHI
6. T. Veerarajan – Engg. Mathematics – Mc Graw Hill
7. G. Haribaskaran – Probability, Queueing theory and reliability Engg. – Laxmi Publications
8. V. Sundarapandian - probability ,Statistics and Queueing theory – PHI
9. H.C.Taneja – Advanced Engg. Mathematics Vol II – I.K.International
10. A.K.Mukhopadhyay-Mathematical Methods For Engineers and Physicists-I.K.International

## CE010 402 CONSTRUCTION ENGINEERING AND MANAGEMENT

### Teaching scheme:

3 hour lecture and 1 hour tutorial per week

**Credits: 4**

### Objective:

*Imparting fundamental knowledge in network scheduling techniques, details of execution of works, principles of functional planning of buildings, mechanization in construction, project cost analysis and industrial relations*

### Module 1 (12 Hours)

**Fresh concrete** – Workability-factors affecting-measurement of workability-different tests for workability-segregation-bleeding-process of manufacture of concrete-batching-mixing-transportation-compaction-curing methods-admixtures in concrete-special concretes

**Joints** – Construction joints – expansion joints – contraction joints – sliding joints – joints in water retaining structures etc.

Scaffolding and Formwork (elementary concepts only).

**Flooring** – different types – Mosaic – marble – granite – roofing – pitched and flat roofs – domes and folded plate roofs

**Damp prevention** – Causes – Material used – Damp proofing of floors – walls – roofs.

**Finished works** – plastering, painting – white washing – distempering – application of Snowcem – Concrete repairs-construction and constructed facilities.

### Module 2 (12 Hours)

**Functional planning of buildings** – general principles of site plan – principles of functional planning – orientation of buildings – shading principles.

Modern construction materials – Intelligent buildings – building automation.

Construction management –

**Mechanisation in construction** – earth moving, handling, pneumatic and hoisting equipment – pile driving equipment – Earthwork computation – mass diagram – soil compaction & stabilization – owning and operating works of construction equipment.

### Module 3 (12 Hours)

**Introduction to job planning and Management:** Bar charts and mile stone charts - work breakdown structure - C P M and PERT networks - Network and time estimates - Earliest expected time - Forward pass and backward pass - Time estimates - related problems.

### Module 4 (12 Hours)

**Project costs analysis:** Cost Vs Time curve - optimum duration- related problems - updating, resource allocation - resource smoothing – resource leveling - Network compression - Compression limited by crashing - float- parallel critical paths - crashed critical paths – most economical solution.

### **Module 5 (12 Hours)**

**Industrial Relations:** Payment of wages Act - Minimum wages Act - Employees State Insurance Act –Workers participation in management – labour welfare and social security – Industrial safety and welfare provision – role of state in labour welfare – role of labour welfare officers social security principles and practice.

### **References**

1. M. S. Shetty, Concrete technology, S.Chand & Co.
2. S. P.Arora, Building construction, Dhanpat Rai & Sons, New Delhi.
3. Dr.Mahesh Varma, Construction Equipment and its Planning and Application, Metropolitan Book Company.
4. R.L.Peurifoy, W.B.Ledbetter, Construction Planning, Equipment, and methods, Tata Mc Graw Hill.
5. Chitkara, Construction Project Management Planning scheduling and control Mc GrawHill
6. B.L.Gupta, Amit Gupta, Construction Management and Accounts, Standard publishers and Distributors.
- 7 James.D.Steevens, Techniques for Construction Network Sheduling, McGraw Hill.
8. S.C.Sharma, Management of Systems, Khanna Publishers.
9. L. S. Srinath, PERT and CPM Principles and Applications, East – West Press.
10. Subir K. Sarkar,Subhajit Sarasswati ,Construction Technolgy, Oxford University press.
11. A.R. Santhakumar, Concrete Technology, Oxford university Press.

## CE010 403: MECHANICS OF SOLIDS- II

**Teaching scheme:**

2 hour lecture and 2 hour tutorial per week

**Credits: 4**

### **Objectives:**

- *To understand the basic strength and energy theorems of Structural Mechanics and its applications*
- *To study deformations of bodies caused by externally applied forces and the internal effects produced due to moving loads.*

### **Module 1 (12 hours)**

**Deflection of determinate beams:** Differential equation of the elastic curve- slope & deflection of beams by Double integration method (concept only)-Macaulay's method - Conjugate beam method  
Deflection due to shear (concept only).

### **Module 2 (12 hours)**

**Energy Theorems:** Strain energy due to axial load( gradual, sudden & impact), bending, shear and torsion-principle of super position- Betti' s theorem -Maxwell' s reciprocal theorem-principle of virtual work(deformable bodies)-Castigliano' s first theorem-deflection of statically determinate beams & pin jointed frames by strain energy, virtual work and unit load methods

### **Module 3 (12 hours)**

**Moving loads and influence lines:** effect of moving loads-influence lines for reaction, shear force and bending moment for determinate beams  
Absolute maximum bending moment (basic concept only).

### **Module 4 (12 hours)**

**Arches:** Theoretical arch-Eddy' s theorem- analysis of three hinged arches –support reactions-normal thrust-radial shear  
**Cables and suspension bridges:** General cable theorem-analysis of cables under concentrated and uniformly distributed loads-anchor cables  
Suspension bridges with stiffening girders(basic concepts only).

### **Module 5 (12 hours)**

**Theories of Elastic Failure:** Maximum principal stress theory-maximum shear stress theory - maximum principal strain theory – Mohr' s theory. Principle of stationary and minimum potential energy, Castigliano' s theorems (theory only)  
Unsymmetrical bending: Product of inertia-principal axes (basic concepts only)

### **References:**

- 1.Devdas Menon, Structural Analysis, Vol.1, Narosa, Chennai.
2. Bhavikatti S.S , Structural Analysis Vol. I, Vikas Publishing House (P) Ltd.
3. Reddy C.S., Basic Structural Analysis, Tata McGraw Hill Publishing Co.1996.
4. C. K. Wang, Intermediate Structural Analysis, Tata McGraw Hill Education Private Ltd.
5. Smith J.C. Structural Analysis, Macmillian Pub.Co.1985.

6. Rajesekharan & Sankarasubramanian, G., Computational Structural Mechanics, Prentice Hall of India, 2001.
7. Wang C.K. & Solomon C.G., Introductory Structural Analysis, McGraw Hill, 1968.
8. Sadhu Sindh, Strength of Materials, Khanna Publishers, 1988.
9. Seeli F.B. & Smith J.P., Advanced Mechanics of Materials, John Wiley & Sons, 1993.
10. Norris & Wilbur, Elementary Structural Analysis, McGraw Hill.
11. Junarker S.R., Mechanics of Structures, Vol. II, Charorbar Book Stall.
12. Timoshenko S.P, Young D.H., Theory of structures, McGraw Hill
13. Thadani B.N, Desai J.P, Structural mechanics, Weinall Book Corporation.
14. Punmia B.C., Strength of materials and theory of structures, Vol. II, Laxmi publications.

# CE010 404 OPEN CHANNEL FLOW AND HYDRAULIC MACHINES

**Teaching scheme:**

3 hour lecture and 1 hour tutorial per week

**Credits: 4**

**Objectives:**

- *The problems that man encountered in the field of water supply, irrigation, navigation and water power resulted in the development of fluid mechanics*
- *It enables us to understand the interesting phenomenon in nature and it empowers us to design and to create variety of fluid flow equipment for the benefit of mankind*

**Module 1 (12 Hours)**

**Flow in open Channel** – Types of flow, – Velocity distribution in open channels, Uniform flow in open channels– Chezy's , Manning's and Kutter's formula, Most economical cross sections – computation of uniform flow- conveyance - Normal depth. Energy in open channel flow- specific energy. Momentum in open channel flow-specific force , Critical flow and its computation-critical flow in rectangular channels Application of specific energy and discharge diagrams to channel transitions,

**Module 2 (12 Hours)**

**Measurement of flow in open channels**-mean velocity-pitot tube,current meter,floats.

Discharge in flumes and rivers

**Gradually varied flow**- Dynamic Equation for gradually varied flow- in wide rectangular channels-different forms of the dynamic equation, channel bottom slopes-Study of surface profiles and its Characteristics in prismatic channels, backwater computation by direct step method.

**Module 3 (10 Hours)**

**Rapidly varied flow**, hydraulic jump – initial and sequent depths, non-dimensional equation, Practical application of hydraulic jump, Types of jump in horizontal floor, Basic characteristics of the jump, Energy loss, efficiency, height of jump, jump as energy dissipater, stilling basins, Location of hydraulic jump.

**Module 4 (14 Hours)**

**Hydraulic Machines** – Impulse momentum principle, Impact of jet, Force of jet on stationary and moving plates –

**Turbines** – Classification, velocity triangle for Pelton, Francis, Kaplan turbines, Specific speed, selection of turbines, draft tube – types,

**Module 5 (12 Hours)**

**Centrifugal Pumps** – Types, Velocity triangle for pumps-Work done- Head of pump, Losses and efficiency, Minimum starting speed, Specific speed, Multistage pump, Pumps in parallel.

**Positive displacement pumps** – working principle, types of reciprocating pumps, work done- effect of acceleration and frictional resistance, slip and coefficient of discharge. Indicator diagram, separation in suction and delivery pipes. Air vessel – rate of flow into and from air vessel.

## References

1. Ven Te Chow, Open Channel Hydraulics, Mc Graw Hill Ltd.
2. K. Subrahmanya, Flow in open channel vol.1, Tata McGraw Hill, New Delhi
3. Dr. P. N. Modi & Dr. S. M. Seth, Hydraulics & Fluid Mechanics, Standard Book House, Delhi.
4. Jagadheesh Lal, Hydraulic Machines, Metropolitan Book Co., New Delhi.
5. Dr. R.K Bansal, A Text book of Fluid mechanics and Hydraulic machines, Laxmi Publications
6. K.G Rangaraju, Flow through open channel Tata Mc Graw Hill
7. Shivkumar, "Fluid Mechanics & Fluid Machines Basic concepts & Principles; Ane Books Pvt. Ltd

## CE010 405 SURVEYING - II

### Teaching Scheme

Credits : 4

3 hour lecture and 1hour tutorial per week

### Objective

*To impart knowledge in triangulation, aerial photogrammetry and modern Electro Magnetic Distance Measurement instruments.*

### Module 1 (12 hours)

**Triangulation:** triangulation figures – classification of triangulation systems – selection of triangulation stations – intervisibility and heights of stations – station marks – signals and towers – base line – choice – measurement of base lines – instrument- extension of base- satellite stations – need, reduction to centre.

### Module 2 (12 hours)

**Theory of errors and triangulation Adjustments:** Kinds of error – laws of weights – principles of least squares – determination of most probable value of quantities – probable error – distribution of error to the field measurements – normal equation – Method of correlatives – Adjustment of simple triangulation figures.

### Module 3 (10 hours)

**Hydrographic surveying** –Equipment – Methods of locating soundings – reduction and plotting of soundings – use of sextants and station pointer.

**Electro Magnetic Distance Measurement (EDM):** - Principle of EDM – Types of EDM instruments – Distomat – Total Station – principles – procedure and surveying using Total Station – data retrieval and processing.

### Module 4 (12 hours)

**Terrestrial photogrammetry** – General principles – photo theodolite – horizontal position of a point from photogrammetric measurements – elevation of a point – determination of focal length of lens. Aerial photogrammetry – aerial camera – scale of vertical photograph – relief displacement on a vertical photograph – principle of parallax – stereoscopic pairs – flight planning – radial line method – flying height and overlaps – remote sensing – concepts of remote sensing – ideal remote sensing system.

### Module 5 (14 hours)

**Geodesy** – shape of earth – effects of curvature – spherical excess – convergence of meridians.

**Field Astronomy:** - Definitions – celestial sphere – astronomical triangle - co-ordinate systems. Determination of time, azimuth, latitude and longitude.

### References:

1. T. P. Kanetkar and Kulkarni, Surveying and leveling Vol. II, A.V.G. Publications, Pune.



2. B. C. Punmia, Surveying and leveling Vol. II, Laxmi Publications (P) LTD, New Delhi.
3. Thoms M. Lillerand, Remote sensing and image interpretation, John Wiley & Sons, Inc. New York.
4. Dr. K.R. Arora, Surveying Vol. II, Standard Book House, New Delhi.
5. Alak De, Plane Surveying, S.Chand &Co.
6. S. K. Duggal – Surveying Vol I & II Tata Mc Graw Hill Ltd, 2006.
7. R. Sathikumar, Satheesh Gopi and N. Madhu, Advanced Surveying: Total Station, GIS and remote Sensing, Pearson Education, India

## CE010 406 CIVIL ENGINEERING DRAWING

### Teaching scheme

4 hours drawing per week

Credit -4

### Objectives:

*To create awareness among students regarding the principles of building drawing and equip them to prepare plan , section, elevation , site plan and service plan of buildings as per Kerala Building Rules.*

### PART A

Detailed drawing of panelled door with wooden frame. (1 sheet).

Reinforced concrete staircase (1 sheet).

Roof truss using standard steel sections (1 sheet).

Roof lines (1 sheet).

Detailing of Mangalore pattern tiled roofing (1 Sheet).

### PART B

Working drawings – Preparation of plan, section and elevation from line sketches (single and double storied buildings)(8 sheets).

Preparation of line sketches and working drawings of single storied RCC residential buildings, as per area and functional requirements. ( 2 sheets)

Preparation of site plan as per Kerala Building Rules. (1sheet)

Plumbing services-

Layout of water supply and sanitary connections for residential buildings.(1 sheet)

### Mark distribution

**Part A - 30 marks.**

**Part B - 70 marks.**

### References:-

1. Balagopal & T. S. Prabhu, Building drawing & detailing, Spades Publishers and distributors, Calicut.
2. Shah & Kale, Building Drawing, Tata Mc Graw Hill, New Delhi.
3. B.P.Varma, Civil Engineering drawing and House Planning, Khanna Publishers, Delhi.
4. Gurucharan Singh, Subhash Chander Sharma, Civil Engineering drawing, Standard Publishers distributors, Delhi.
5. National Building code, Kerala building byelaws.

## CE010 407 SURVEYING PRACTICAL II

### Teaching Scheme

3 hours practical per week

**Credits: 2**

### Objective

• *To give a practical knowledge in different aspects of Theodolite Surveying & Tacheometry*

### List of exercises

1. Determination of tacheometric constants
2. Heights and distances by stadia tacheometry(2classes)
3. Heights and distances by tangential tacheometry(2classes)
4. Three point problem.
5. Setting out of simple curves - angular method
6. Theodolite traversing
7. Setting out of building plans
8. Study of Total station
9. Total station – Horizontal and vertical angles, Horizontal distance, Level difference.

### References :

1. Dr. B. C. Punmia, Surveying Vol. I & II, Laxmi Publications (P) LTD, New Delhi.
2. T.P. Kanetkar & Kulkarni, Surveying and leveling Vol. I&II A.V.G.Publications, Pune.
3. Dr. K. R. Arora, Surveying Vol. I, Standard Book House New Delhi.
- 4.. S. K. Duggal , Surveying Vol I& II, Tata Mc Graw Hill.

## CE010 408(ME) HYDRAULICS LABORATORY

### Teaching scheme

3 hours practical per week

Credits: 2

### Objectives

*To impart practical knowledge in heat engines and hydraulics laboratories*

#### PART-A (FLOW)

1. Study of taps, valves, pipe fittings, gauges, pitot tubes, watermeters and current meters.
2. Determination of metacentric height and radius of gyration of floating bodies.
3. Hydraulic coefficients of orifices and mouthpieces under constant head method and time of emptying method.
4. Calibration of venturimeter, orifice meter and watermeter.
5. Calibration of rectangular and triangular notches.
6. Determination of Darcy's and Chezy's constant for pipe flow.
7. Determination of Chezy's constant and Mannings number for open channel flow.
8. Determination of discharge coefficient for plug-sluices.

#### PART –B (MACHINERY)

1. Study of reciprocating pump and components-single cylinder and multicylinder, self priming pumps and centrifugal pumps.
2. Study of impulse and reaction turbines.
3. Performance characteristics of self priming pump.
4. Performance characteristics of centrifugal pump.
5. Performance characteristics of reciprocating pump
6. Performance characteristics of Pelton wheel.
7. Performance characteristics of Francis Turbine.
8. Performance characteristics of Kaplan Turbine.

### References

1. Hydraulic Machines-Jagadishlal