# BE-401
# ENGINEERING MATHEMATICS – II

## Unit 1

**Concept of Probability :** Probability Mass function, Probability density function. Discrete Distribution: Binomial, Poisson's, Continuous Distribution: Normal Distribution, Exponential Distribution,Testing of Hypothesis |:Students t-test, Fisher's z-test, Chi-Square Method.

**Unit 2**

**Functions of complex variables :** Analytic functions, Harmonic Conjugate, Cauchy-Riemann Equations, Line Integral, Cauchy's Theorem, Cauchy's Integral Formula, Singular Points, Poles & Residues, Residue Theorem , Application of Residues theorem for evaluation of real integrals.

**Unit 3**

**Introduction of Fourier series:** Fourier series for Discontinuous functions, Fourier series for even and odd function, Half range series Fourier Transform: Definition and properties of Fourier. Fourier transform, Sine and Cosine transform.

**Unit 4**

**Laplace Transform:** Introduction of Laplace Transform, Laplace Transform of elementary functions,properties of Laplace Transform, Change of scale property, second shifting property, Laplace transformof the derivative, Inverse Laplace transform & its properties, Convolution theorem, Applications of L.T. to solve the ordinary differential equations.

**Unit 5**

**Vector Calculus:** Differentiation of vectors, scalar and vector point function, geometrical meaning ofGradient, unit normal vector and directional derivative, physical interpretation of divergence and Curl. Line integral, surface integral and volume integral, Green's, Stoke's and Gauss divergence theorem.

**References:**

1)Higher Engineering Mathematics by B.S. Grewal, Khanna Publication.
2)Engineering mathematics volume II & III by D.K. Jain
3)Engineering mathematics volume II by D.C.Agrawal

# CE-402
# CONCRETE TECHNOLOGY

**Unit 1** : Introduction : classification of concrete , properties of concrete , grade of concrete , advantages and disadvantages of concrete concept of concrete ,Portland cement ,types of cement ,cement classification ,storage of cement ,classification of aggregate , testing of aggregate , quality of mixing water , curing water.

**Unit 2**: Properties of concrete: introduction, properties of fresh concrete, compaction of concrete, curing of concrete, properties of hardened concrete, strength characteristics, shrinkage, creeping of concrete, durability of concrete, fire resistance, micro cracking of concrete.

**Unit 3**: Quality control of concrete and production: Introduction, field control, advantages of quality concrete, measure of variability, batching of materials, mixing of concrete material, transportation of concrete, ready mix concrete, placing of concrete, finishing and repair of concrete, formwork, hot and cold weather condition, testing of concrete.

**Unit 4:** concrete mix design: method of concrete mix design, trial and adjustment method of mix design, mix design according of Indian standard (IS), rapid method of mix design, concrete mix with surkhi and other material.

**Unit 5**: Special concrete: Light weight concrete, ultra-light weight concrete, mass concrete, vaccum concrete, roller compacted concrete, waste material based concrete, high density concrete, nuclear concrete, self- compacting concrete, aerated concrete.

**Reference books:**

1 Ml Gambhir - Concrete Technology- Tmh
2 A.M. Nobille-Concrete Technology- Elbs London
3 Varshney Rs-Concrete Technology-Oxford & Ibh
4 Sinhasn- R/F Concrete Technology-Tmh
5 Mohan Rai & M.P.Singh –Advances In Building Material & Construction
6 Jackson N- Civil Engineering Materials

# CE-403
# SURVEYING

**Unit 1**: Fundamental concept and horizontal measurement: Introduction, definition, surveying, classification of survey, principle of survey, practice of surveying, surveying character of work, types of errors, chain surveying, chain, tapes, accessories for chaining, line ranger, cross staff, optical square, prism square, running survey lines, linear measurement with chain.

**Unit 2**: Compass surveying and theodolite: Introduction, definition, types of compass, temporary adjustment of compass, designation of bearing, reduced bearing, force bearing and back bearing, calculation of included angle from bearing, calculation of bearing from included angle, introduction of theodolite, classification, adjustment of theodolite, theodolite as a level, optical theodolite, electronic theodolite, measurement of vertical and horizontal angles.

**Unit 3:** Curves: classification and use, element of circular curves, calculation, setting out curves by offsets and by theodolite, compound curve, reverse curve, transition curves, cubic spiral and lemniscate, vertical curves, setting out.

**Unit 4**: Total station surveying: Introduction, features of total- station, setting up and orienting of total station, on – board software, electronic data recording, summary of total station characteristics, field procedures for total station in topographic survey.

**Unit 5:** hydrographic surveying: sounding method of observation, computation and plotting, principles of photographic surveying, aerial photography , tilt and height distortions, remote sensing, contouring, image processing system.

**Reference Books:**

1.Duggal, Surveying volume 1and 2,TMH
2. Dr B .C . Punmia , vol.1and2
3.K.R.Arora,Surveying vol 1and 2
4.Basak,Surveying and leveling ,TMH

**List Of Experiments:**

**1.**Theodolite Traversing
2.Compass Surveying
3.Total Station Surveying
4.Curve Setting By Different Method

# CE-404
# CONSTRUCTION MATERIALS AND TECHNIQUES

**Unit 1.** Construction Materials: Cement, Classification of cement, stones description, timber ,seasoning and treatment of timber, engineering uses of timber ,brick and tiles ,manufacturing ,characteristics ,classification and uses steel uses ,advantage and disadvantage.

**Unit 2.** Advantage construction materials : Concrete Introduction ,uses ,advantage and disadvantage.
Mortar , Introduction uses ,advantage and disadvantage, metals, ferrous metals and non-ferrous metals and alloy's , Glass ,Plastics.
Construction techniques

**Unit 3** Foundation-Type of soil ,bearing capacity , soil slablisation and improvement of bearing capacity , settlement and safe limits .Pile foundation , under reamed piles , raft foundation , grillage foundation , well foundation , well foundation , spread foundation , wall footings, hyperbolic parabolied footing , brick arch foundation, simple methods of foundation design , damp proof courses, repairs techniques for foundations.

**Unit-4**
**Masonry and Walls :** Brick masonry, Bonds, Jointing, Stone masonry, casting and laying, masonry construction, Brick cavity walls, code provisions regarding load bearing and non load bearing walls. Common defects in construction and their effect on strength and performance of walls, designed Brick masonry, precast stone masonry block, Hollow concrete block, plastering and pointing, white and color washing, distempering, dampness and its protection, Design of hollow block masonry walls. Doors, Windows and Ventilators: Types
based on material etc., size location, fittings, construction sunshades, sills and jambs, RCC doors/windows frames. Stairs types, rule of proportionality etc., Repairs techniques for masonry, walls, doors & windows.

**Unit-5**
**Floors and Roofs :** Types, minimum thickness, construction, floor finishes, Flat roofs, RCC jack arch, reinforced brick concrete, solid slab and timber roofs, pitched roofs, false ceiling, roof coverings, Channel unit, cored unit, Waffle unit, Plank and Joist, Brick panel, L-Panel, Ferrocement roofing units, water proofing .Services : Water supply & Drainage, Electrification, Fire protection, thermal insulation, Air Conditioning, Acoustics & Sound insulation, Repairs to damaged & cracked buildings, techniques and materials for low cost housing., Repairs techniques for floors & roofs.

**References**:
1. Mohan Rai & M.P. Jai Singh; Advance in Building Materials & Construction,.
2. S.C. Rangwala; Engineering Materials
3. Sushil Kumar; Building Construction,
4. B.C. Punmia; Building Construction ,.
5. Building Construction, Metchell
6. Construction Technology, Chudley R.
7. Civil Engineering Materials, N. Jackson.

8. Engineering Materials, Surendra Singh.

**List of Experiments**:

1. Tests on Bricks
2. Tests on Aggregates
3. Tests on Cement
4. Determination of compressive strength of concrete with different cement grades.
5. Determination of workability of concrete by slump test
6. Determination of workability by compacting factor apparatus.
7. Determination of workability by Vee Bee consistometer.
8. Nondestructive testing of concrete by Rebound hammer test
9. Nondestructive testing of concrete by ultrasonic Method.
10. Test for the effect of admixtures on the concrete compressive strength
11. Testing of microconcrete
12. Design of concrete mix.

# CE - 405
# FLUID MECHANICS

**Unit 1- PROPERTIES OF FLUID**
Fluid and continuum,Physical properties of fluids.Newtonian and non-Newtonian fluids. Pressure transducers, Pascal's law,pressure variation in a fluid at rest,Hydrostatic law,Manometer,Hydrostatic force on submerged body, Buoyancy and Flotation.

**Unit 2- FLUID KINEMATICS**
Langragian and Eulerian approach, Type of fluid flow.Continuity equation, acceleration of a fluid particle, motion of fluid particle along curved path, Normal and tangential acceleration, Rotation and Vorticity, circulation, stream and potential function, flow net.Liquid in relative equilibrium.

**Unit 3- FLUID DYNAMICS**
Euler's equation of motion along a streamline,Impulse momentum equation, Momentum of Momentum equation, Kinetic energy and momentum correction factor, forces on fixed and moving vanes and applications. Fluid Measurements, Velocity measurement, flow measurement.

**Unit 4- LAMINAR FLOW**
Reynolds's experiment, Hagen-Poiseuille Equation, flow of viscous fluids between two parallel plates, Drop of pressure head.Effect of turbulence, Expression for loss of head due to friction in pipes**.**Loss of energy in pipes, Hydraulic gradient and total energy line, pipe in series and parallel, equivalent pipe power transmission through pipe, water hammer in pipes.

**Unit 5-DIMENSIONAL ANALYSIS**
Methods of dimensional analysis, Rayleigh's method, Buckingham's theorem.Model analysis:Dimensionless number and their significance, model laws,Type of models, scale effect in model, limitation of hydraulic similitude.

**REFERENCE BOOKS**

1. Fluid Mechanics- Yunush A. Cengel, John M. Cimbala- TMH, Delhi
2. Fluid Mechanics and Fluid Power Engineering – D.S. Kumar– Kataria & Sons – New Delhi
3. A text of Fluid Mechanics – R. K. Rajput – S. Chand & Company Ltd., Delhi\
4. Fluid Mechanics & Hydraulics Machines-R.K.Bansal-Laxmi Publications, Delhi
5. Engineering Fluid Mechanics –K.L. Kumar, Eurasia Publication House, Delhi
6. Mechanics of Fluid – B.S. Massey – English Language Book Society (U.K.)
7. Introduction to Fluid Mechanics and Fluid Machines – S.K. Som and G. Biswas- TMH, Delhi

**LIST OF EXPERIMENTS**

**Note:** Ensure to conduct at least 10 experiments from the list:

1. To determine the meta-centric height of a ship model.
2. To verify Impulse Momentum Principle.
3. To calibrate a Venturimeter and study the variation of coefficient of discharge

4. To calibrate an orifice-meter.
5. Flow measurement using Pitot tube.
6. To determine the hydraulic coefficients ($C_c$, $C_d$ and $C_v$) of an orifice.
7. To determine the coefficient of discharge of a mouth piece.
8. To study the variation of friction factor for pipe flow.
9. To determine the head loss for a sudden enlargement.
10. To determine the head loss for a sudden Contraction.
11. To determine of head loss in various pipe fittings.
12. To study of Reynolds experiment for demonstration of stream lines & turbulent flow
13. To study the characteristics of a centrifugal pump

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## CE-406
## Programming in C++

**Unit-1**
C++ basics, loops and decisions, structures and functions, object and classes, object arrays, constructor and destructor functions.

**Unit-2**
Operator and function overloading, pointers, pointers to base and derived classes inheritance, public and Private inheritance, multiple inheritance.

**Unit-3**
Polymorphism, virtual functions, abstract base classes and pure virtual function, friend function, early and late binding.

**Unit-4**
C++ I/O system, formatted I/O, creating insertors and extractors, file I/O basis, creating disk files and file manipulations using seekg(), seekp(), tellg() and tellp() functions, exception handling: try, catch and throw.

**Unit-5**
UML concepts, object-oriented paradigm and visual modeling, UML diagrams, UML specifications, object model, object oriented design, identifying classes and object, object diagrams.

**BOOKS**

1. Lafore R. "Object Oriented Programming in C++", Galgotia Pub.
2. Lee "UML & C++ a practical guide to Object Oriented Developmented i.Pearson.
3. Schildt "C++ the complete reference 4ed,2003.
4. Hans Erit Eriksson "UML 2 toolkit" Wiley.
5. Balagurusawmy "Object Orienter Programming with C++".
6. B.G., Boach "Object Oriented Analysis & Design with Applications", Addision Wesly.

## CE - 407
## Self Study (Internal Assessment)

**Objective of Self Study: This** is to induce the student to explore and read technical aspects of his area of interest/hobby or new topics suggested by faculty.

Evaluation will be done by assigned faculty based on report/seminar presentation and viva.