

GOA UNIVERSITY
SCHEME OF INSTRUCTION AND EXAMINATION

REVISED COURSE IN 2007-08

SE (CIVIL) SEM III

Sub cod e	Name of the Subjects	Scheme of Instruction Hrs/Week			Scheme of Examination					
		L	T	P	Th. Dur (Hrs)	Marks				
						Th.	S	O	P	Total
3.1	Applied Mathematics	3	1	-	3	100	25	-	-	125
3.2	Managerial Economics	3	1	-	3	100	25	-	-	125
3.3	Building Construction	3	1	-	3	100	25	-	-	125
3.4	Strength of Materials	3	1	-	3	100	25	-	-	125
3.5	Concrete Technology	3	1	-	3	100	25	-	-	125
3.6	Fluid Mechanics -I	3	1	-	3	100	25	-	-	125
	Practicals for subject 3.3	-	-	2	-	-	-	-	25	25
	Practicals for subject 3.4	-	-	2	-	-	-	-	25	25
	Practicals for subject 3.5			2					25	25
	Practicals for subject 3.6			2					25	25
	TOTAL	18	06	08	-	600	150	-	100	850

NOMENCLATURE

L – Lectures

T-Tutorials

P-Practicals.

Th. Dur. – Duration of Theory Paper

Th – Theory

S – Sessional,

P- Practical,

O – Oral.

NOTE: 1.

2

otherwise

12 lectures per module –unless otherwise specified

At least 8 experiments to be conducted based on the syllabus unless specified

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APPLIED ENGINEERING MATHEMATICS-III

Sub code	Name of the Subjects	Scheme Of Instruction Hrs/Week			Scheme Of Examination				
		L	T	P	Th. Dur (Hrs)	Marks			
3.	Applied Engg. Mathematics	3	1	-	3	Th	S	O	P
						100	25		Total
									125

MODULE - I

I. Matrices: Types of matrices, Determinant, adjoint, inverse of a matrix, Elementary transformations, Elementary matrices, Rank of matrix, Reduction to normal form, Canonical form, Rank using elementary transformation, Linear independence and dependence of vectors, System of the form $AX = 0$, and $AX = B$, and their solutions, Eigen values, Eigen vectors with properties, Cayley-Hamilton theorem with its applications, minimal polynomial, Diagonalization.

MODULE - II

II. Laplace Transforms: Definition, Existence conditions, properties, inverse Laplace transforms, Laplace transform of periodic functions, Convolution theorem, Laplace transform of Dirac-Delta function, Applications of Laplace transforms in solving linear differential equations with initial conditions and system of linear simultaneous differential equations.

MODULE - III

III. Fourier Series: Periodic functions, Trigonometric series, Euler's formulae, Dirichlet's condition, Even and odd functions, Half Range Series, Parseval's identity.

IV. Partial differential equations: Derivation and solution of one dimensional wave equation using separation of variable method. Derivation and solution of one dimensional heat equation using separation of variable method.

MODULE - IV

V. Probability & Probability Distributions: Sample space, Events, Addition and Multiplication theorem, compliment of events, Conditional Probability, Baye's theorem, Random variables: Discrete & continuous. Probability Distributions: Binomial distribution, Poisson distribution, Normal distribution. Correlation and Regression.

Text Books and References

1. Grewal B. S. : Higher Engineering Mathematics, Khanna Publications
2. Veerarajan: Engineering Mathematics for sem. III, Tata McGraw Hill Publication
3. Erwing Kreysig: Advanced Engineering Mathematics, New International Limited
4. Kandasamy P. : Engineering Mathematics-Vol III, S. Chand & Co., New Delhi
5. R.M. Baphana : Applied Mathematics-III, Technova Publication
6. P. N. Wartikar & J. N. Wartikar: Applied Mathematics, Vol- III & Vol-IV

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3.2 MANAGERIAL ECONOMICS

Sub code	Name of the Subjects	Scheme Of Instruction Hrs/Week			Scheme Of Examination				
		L	T	P	Th. Dur (Hrs)	Marks			
						Th.	S	O	P
3.2	Managerial Economics	3	1	-	3	100	25	-	-
									Total
									125

MODEL-1

Demand and supply analysis
Determinants of demand and supply, Demand schedule and derivation of demand curve, Law of demand and supply, Concept of market equilibrium, Price, Income and Cross Elasticity of demand, Demand forecasting, Rationale and Methods of demand forecasting

MODEL-2

II. National Income terms
GDP, Real vs. Nominal GDP, NNP, GNP, Per Capita Income, Disposable income

II. Price index :
Construction of price index, Consumer, Wholesale and Labour Price index, Inflation : Causes, Theories, Measures to control inflation

MODEL-3

V. Cost concepts and classification
Fixed and variable costs, Direct material costs, labour and overhead costs, Cost and output relationship - cost functions - linear and quadratic cost functions - cubic cost function - Cost output relationship

V. Financial statements -
Balance sheet, Income statement, Profit and Loss account

MODEL-4

VI. Pricing and output decisions
Perfect competition, Monopoly, Monopolistic competition, Oligopoly

VII. Depreciation
Causes, Methods of calculating depreciation.

VIII. Break-even analysis
Break even chart - break-even volume, break even revenue, safety margin

Text books and References

- Text books :
- 1) Managerial Economics by R.L. Varshney and K.L. Maheshwari (Sultan Chand and Sons)
- Reference books :
- 1) Economics by Samuelson and Nordhaus (Tata McGraw Hill)
 - 2) Managerial Economics by Petersen and Lewis (Tata McGraw Hill)

3.3 BUILDING CONSTRUCTION

Sub ject	Name of the Subjects	Scheme Of Instruction Hrs/Week			Scheme Of Examination					
		L	T	P	Th. Dur (Hrs)	Marks				
						Th.	S	O	P	Total
3.3	Building Construction	3	1	2	3	100	25	-	25	150

MODULE- I

1. Surface Investigation & Foundations: Objectives, Types of soils, Method of boring, trial pits, types of augers, plateload test
Sub-Structure and Super-structure ; Necessity, Types-spread footing, RCC -Column Footing, Steel Grillage Foundation, Combined footing, Strap Footing, Raft Foundation, Setting out
Foundation Trenches

I. Masonry:

Stone Masonry: Technical Terms, lifting Appliances, Joints, Quarrying, Dressing, Bonding, Pointing, Types of Stone Masonry

Brick Masonry: Technical Terms, Classification, Bonding, Joints, Pointing, Cavity walls, Reinforced brick work, Partition walls., Laterite masonry, Introduction to Flyash Bricks

Block masonry: Materials, Brief description, Types of blocks used, Tests on blocks, Hollow concrete blocks

Design of Load bearing walls - Basic concepts.

MODULE- II

III. Lintels and Arches

Lintels - Technical terms, Purpose, Necessity, Types, Materials used

Arches- Technical terms, Types, Materials used, Construction

IV. Formwork

Formwork - Materials, Construction, Methods of removal, Period of removal, Basic Principles of Design of Formwork.

Scaffolding - Definition, Component parts, Types of scaffolds

V. Plastering and Pointing, Painting

Objectives, requirements of good plastering, Types of mortars, Methods, Types of plaster finishes Defects, Rectification methods

Pointing -Preparation of surface for pointing, Types, Defects, Rectification

Paints: Constituents of paints, Types of paints, Preparation of surface, External and internal painting-requirements, method of applications, Effect of Environmental agents on painted surfaces., Special paints for coastal areas

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MODULE -III

VI. Floors: Introduction, Essential requirements of floors, materials, Types of ground floors and upper floors, common floor finishes, criteria for selection, Industrial floorings, Special flooring, Advanced materials for flooring

VII. Roofs and Roof Coverings : Introduction, Technical terms, Classification, Types, Flat Roof, Pitched Roofs, AC sheet roofing, Types of Trusses - Timber and Steel, Types of Roof Coverings, Rain Water Drainage, R.C.C Modern Roofs - Shells, Folded Plates, False Ceilings, Advanced materials of roofing

Stairs and Staircases - Lay out and design details of different types of timber- Masonry, steel and concrete stairs - Precast concrete stairs - Elevators - Types - Traction - Hydraulic operation - Passenger, service & goods elevators - Dump waiters - Design considerations of passenger elevators - Handling capacity - Arrangement of lifts - Positioning - Escalators: features, operation & arrangement - Ramps

VIII. Waterproofing: Damp proof course, Types of Waterproofing, Application techniques, Chemicals used

MODULE- IV

IX. Plumbing- Definition, Technical terms, Common Plumbing Fixtures, A typical plumbing system for a building, Advanced plumbing materials

X. Joints in structures- Types of joints, Joints in liquid retaining structures, Requirements, Advanced materials used in jointing, Codal provisions, Repairs and rectification, Sealants.

XI. Special Constructions/ Treatments- Termite Proofing, Sound Insulation, Thermal Insulation, Fire protection, Low cost housing techniques, Pre-cast Construction

XII. Ventilation and air conditioning: Ventilation requirements - Natural and mechanical ventilation - Air movement - Cross ventilation - Effect of orientation - Air conditioning - Heat exchange of building - Conduction- convection- Radiation and evaporation - Calculation of air conditioning load - Summer and winter air conditioning - Parts and operation of A/C plant - Filters - Ducts - Humidity control

Text Books:

Building Construction – Sushil Kumar

Building Construction – Rangawala S. C.

Reference Books :

Building Construction – Y. S. Sane

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3.1 STRENGTH OF MATERIALS

Sub code	Name of the Subjects	Scheme Of Instruction Hrs/Week			Scheme Of Examination				
		L	T	P	Th. Dur (Hrs)	Marks			
						Th.	S	O	P
34	Strength of Materials	3	1	1	3	100	25	20	25
									Total
									150

MODULE - I

I. Simple stresses and strains (07)
 Classification of materials. Simple stresses and strains, types of stresses and strains, Elastic limit, Hooke's Law, stress-strain curve for mild steel in tension, Factor of safety, Poisson's ratio, Deformation of a body under self weight, Bars of varying cross-section, composite bars, Temperature stresses and strains, temperature stresses in bars of varying section, temperature stresses in composite sections, Elastic constants, Relation between moduli of complementary shear stresses.

II. Compound stresses

(06)
 Introduction, Principal planes and principal stresses, like/unlike stresses, Elements subjected to direct stresses on two mutually perpendicular planes, Elements subjected to general two dimensional stress system, Mohr's circle construction for like stresses/ unlike stresses, two direct perpendicular stresses and simple shear stress.

MODULE - II

III. Shear force and Bending Moment

(05)
 Definition, sign conventions, relation between Shear force and Bending moment and rate of loading @ a cross section of a beam, SFD and BMD's for determinate beams subjected to different types of loads, loading/ BMD from given SFD's.

IV. Bending stresses/ Shear stresses in beams

(08)
 Assumptions, Flexure formula for beams, section modulus, Moment of resistance, Flitched beams, Beams of uniform strength, Shear stresses in beams, variation of shear stress across the depth of cross-section for plane sections like rectangular, circular, I section, Tee sections etc.

Combined direct and bending stresses - Introduction, load acting eccentrically w.r.t one or both the axes, limit of eccentricity, core/ kernel sections, wind pressure on chimneys, coefficient of wind resistance, Earth pressure and water pressure on retaining walls.

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MODULE - III

V. (a) Analysis of pin-jointed plane frames

(05)

Definition, Types of pin-jointed frames, Method of joints and sections

(b) Springs - Types of springs, closely coiled helical springs subjected to axial load, stiffness of a spring, closely coiled helical spring subjected to axial twist, springs in series and parallel.

VI. Columns and Struts

(05)

Introduction, classification of Columns, End conditions, Effective length of a Column, Assumption in Euler's Theory, Euler's formula for columns, limitation of Euler's formula, Rankine's formula for columns, Johnson's formula, straight line formula, Long columns subjected to Eccentric loading, Prof. Perry's formula.

MODULE IV

VII. Deflection of Beams

(08)

Introduction, Elastic curve, relation between slope, deflection and radius of curvature, sign conventions, Determination of slope & Deflection using Double Integration method, Macaulay's methods, Mohr's theorems (Moment Area method), Conjugate beam methods, Propped cantilevers.

VIII. Thin and thick cylinders/ Spheres

(04)

Introduction, Thin cylindrical shell, Determination of hoop stress and longitudinal stresses, change in volume of a thin cylindrical shell due to internal pressure, wire wound cylinders, Lamé's theory for thick cylinders, Assumptions, derivation, longitudinal and shear stresses.

Laboratory Work of at least Eight experiments of the following.

- 1) Tension Test on Steel bars.
- 2) Compression Test on Concrete Cubes /Bricks/Stone etc.
- 3) Shear Test on Steel bar.
- 4) Flexure Test on Timber/ Tile.
- 5) Charpy Impact Test.
- 6) Hardness Tests.
- 7) Spring Test.
- 8) Verification of Maxwell's Theorem,
- 9) Verification of Principle of Superposition.
- 10) Torsion Test.

Text Books

Strength of Materials -- Ramamurtham

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3.5 CONCRETE TECHNOLOGY

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		L	T	P	Th. Dur (Hrs)	Marks				
						Th.	S	O	P	Total
3.5	Concrete Technology	3	1	2	3	100	25	-	25	150

MODULE - I

I. Introduction

Definition of concrete, brief introduction to properties of concrete, advantages of concrete, uses of concrete in comparison to other building materials

II. Ingredients of Concrete

Cement: physical properties of cement; different types of cements

Aggregates: Classification of aggregates according to size and shape, Characteristics of aggregates: Particle size and shape, surface texture, specific gravity of aggregate; bulk density, water absorption, surface moisture, bulking of sand, deleterious materials, soundness. Grading of aggregates: coarse aggregate, fine aggregate; All-in- Aggregate; fineness modulus; interpretation of grading charts. Water: Quality requirements as per IS: 456-2000

III. Proportioning for Normal Concrete

Objectives of mix design, introduction to various grades as per IS: 456-2000; proportioning for normal mix as prescribed by IS: 456-2000. Adjustment on site for: Bulking of fine aggregate, water absorption of aggregate, workability. Difference between normal and controlled concrete

MODULE - II

IV. Properties of Concrete

Properties in plastic state, Workability, Segregation, Bleeding and Harshness Properties in hardened state: Strength, Durability, Impermeability, Dimensional changes; Measurement of workability: slump test, compacting factor and Vee Bee Consistometer; recommended slumps for placement in various conditions As per IS: 456-2000 and SPECIFICATIONS-23-1982

V. Water Cement Ratio

Principle of water-cement ratio law/Duff Abram's Water-cement ratio law: Limitations of water-cement law Workability: Definition, phenomenon of workability, concept of internal friction, segregation and harshness; factors affecting workability

MODULE - III

VI. Admixtures

Introduction to admixtures their uses and applications as per IS: 456-2000; Chemical admixtures viz., Plasticizers, Accelerators and Retarders, Water-reducing admixtures, Air-entraining admixtures Mineral admixtures, Fly ash, Silica fumes, Rice husk ash, Meta Kaolin. New generation admixtures.

VII. Concretes

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Concreting under special conditions, cold weather concreting, under water concreting, hot weather concreting, fiber reinforced concrete, fly ash concrete, silica fume concrete, polymer concrete. Self compacting concrete

MODULE - IV

VIII. Conducting Operations

Storing of Cement: Storing of cement in a warehouse, Storing of cement at site, Effect of storage on strength of cement, Determination of warehouse capacity for storage of Cement, Storing of Aggregate: Storing of aggregate on site, 9. Batching: Batching of Cement, Volume, using gauge box (farma) selection of proper gauge, Batching of aggregate by: box, Weight, spring balances and by batching machines
Measurement of water,

IX. Mixing

Hand mixing, Machine mixing - types of mixers, capacities of mixers, choosing appropriate size of mixers, operation of mixers, Maintenance and care of machines. Transportation of concrete: Transportation of concrete using pans, wheel barrows, transit mixers, chutes, belt conveyors, pumps, tower crane and hoists etc

X. Compaction

Hand compaction, machine compaction - types of vibrators, internal screed vibrators and form vibrators, Selection of suitable vibrators for different situations Finishing concrete slabs - screeding, floating and troweling

XI. Curing

Objective of curing, methods of curing like ponding, membrane Curing, steam curing etc. Jointing: Location of construction joints, treatment of construction joints, Expansion joints in buildings - their importance and location Defects in concrete: Identification of and methods of repair.

XII. Defects, Repairs and remedies to concrete

a) Non-destructive tests on building elements and materials to evaluate the condition of the building and study of most commonly used tests. Main defects and their causes in various building elements

Foundations, basements and DPC

Walls

Column and Beams

Roof and Terraces

Joinery

Decorative and protective finishes

NOTE: ** A field visit may be planned to explain and show the relevant things

Laboratory Work of at least Eight experiments of the following.

- i) To determine the physical properties of Cement as per BIS Codes
- ii) To determine flakiness and elongation index of coarse aggregates
- iii) Method to determine silt in fine aggregate
- iv) Determination of specific gravity and water absorption of aggregates
- v) Determination of bulk density and voids of aggregates

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3.6 FLUID MECHANICS - I

Scheme of Instruction			Scheme of Examination					Module	Hours
I	T	P	Theor.	Int. Asst.	Orals	Pract	Total		
3	1	2	100	25	-	25	150	I	12
								II	12
								III	12
								IV	12

MODULE - I

I. Fluid - Definition - Types of fluids - Fluids as a continuum - Fluid properties - Density - Specific gravity - Surface tension and capillarity - Vapour pressure - Viscosity and compressibility - Classification of fluids - Fluid statics - Fluid pressure - Absolute and gauge pressure - Measurement of pressure - Fluid static force on immersed surfaces - Buoyant forces - Stability of floating and submerged bodies - Hydraulic press, cranes, lifts - Fluid kinetics - Methods of describing fluid motion - Lagrangian and Eulerian approaches - Types of motion - Rotational and irrotational flows - Vorticity and circulation - Velocity and acceleration - **Local and convective acceleration** - Potential flows - Velocity potential and stream function - Laplace equation - Flownets - Uses and limitations - Methods of analysis of flownet

MODULE - II

II. Fluid Dynamics - Forces influencing fluid motion - Types of forces - Body and surface forces - Energy and Head - Equations of fluid dynamics - Euler equation and application - Integration of Euler equation to get Bernoulli's equation - Momentum equation - Fluids subjected to uniform horizontal and vertical acceleration - Vortex motion - Free and forced vortex - Application of Bernoulli's equation in measurement of flows - Stagnation pressure - Pitot tube, Prandtl tube, venturi meter, orifice plate - Flow nozzles, orifices, mouthpieces, notches and weirs

MODULE - III

III. Pipe Flow - Transition from laminar flow to turbulent flow - Problems in pipe flow - Losses in pipe flow - Major and minor losses - Losses in transition - Losses in fittings and valves - Friction loss in pipe - Coefficient of friction - Commercial pipes in use - Different arrangements of pipes - Pipes open to atmosphere - Pipe connecting reservoirs - Branching pipes - Pipes in parallel and series - Equivalent lengths - Syphons - Pipe net work - Laminar flow in pipes

MODULE - IV

IV. Dimensional Analysis - Scope of dimensional analysis - Dimensions - Dimensional homogeneity - Dimensional groups - Dimensional analysis using Buckingham's π theorem method - Examples of drag on immersed bodies - Pipe flow - Flow over weirs and orifices - Model testing - Similitude - Special model laws - Froude, Reynold, Weber, Cauchy and Mach laws - Problem solution using Froude and Reynold laws

Term work

The term work shall include 8 experiments based on the above Syllabus

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Text Books:

- Hydraulics & Fluid Mechanics by Modi & Seth
- Fluid Mechanics and Hydraulic Machines by R.K. Rajput

Reference Books:

1. Fluid Mechanics and hydraulic Machines by Dr. R.K. Bansal
2. Principles of Fluid Mechanics by M.K. Natarajan.
3. Fluid Mechanics by Dr. R.K. Bansal
4. Civil engineering Handbook Vol 3 by V.N. Vazirani & Chandola
5. Flow in Open Channels K Subramanya