

B.Tech. II - I Sem.

Th	Tu	C
3	1	3

(13A54301) MATHEMATICS – II

Course Objective:

- This course aims at providing the student with the concepts of Matrices, Fourier series, Fourier transforms and partial differential equations which find the applications in engineering.
- Our emphasis will be more on the logical and problem solving development in the Numerical methods and its applications.

Learning Outcome:

- The student becomes familiar with the application of Mathematical techniques like Fourier series and Fourier transforms.
- The student gains the knowledge to tackle the engineering problems using the concepts of Partial differential equations and Numerical methods.

UNIT I

Rank – Echelon form, normal form – Consistency of System of Linear equations. Linear transformations

Complex Matrices:- Hermitian, Skew-Hermitian and Unitary matrices and their properties. Eigen Values, Eigen vectors for both real and complex matrices. Cayley – Hamilton Theorem and its applications – Diagonalization of matrix. Calculation of powers of matrix. Quadratic forms – Reduction of quadratic form to canonical form and their nature.

UNIT II

Solution of Algebraic and Transcendental Equations: Introduction – The Method of False Position – Newton-Raphson Method.

Interpolation:-Introduction – Newton’s forward and backward interpolation formulae – Lagrange’s Interpolation formula.

Curve fitting: Fitting a straight line – Second degree curve – Exponential curve-Power curve by method of least squares.

UNIT III

Numerical Differentiation and Integration – Trapezoidal rule – Simpson’s 1/3 Rule – Simpson’s 3/8 Rule.

Numerical solution of Ordinary Differential equations: Solution by Taylor’s series-Picard’s Method of successive Approximations-Euler’s Method-Runge-Kutta Method – Predictor-Corrector Method – Milne’s Method.

UNIT IV

Fourier Series: Determination of Fourier coefficients – Fourier series – Even and odd functions – Fourier series in an arbitrary interval – Even and odd period, continuation – Half-range Fourier sine and cosine expansions.

Fourier integral theorem – Fourier sine and cosine integrals. Fourier transforms – Fourier sine and cosine transforms – Properties – Inverse transforms – Finite Fourier transforms.

UNIT V

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions – Method of separation of variables – Solutions of one dimensional wave equation, heat equation and two-dimensional Laplace’s equation under initial and boundary conditions.

Text Books:

1. *Higher Engineering Mathematics*, B.S.Grewal, Khanna publishers.
2. *Introductory Methods of Numerical Analysis*, S.S. Sastry, PHI publisher.

Reference Books:

1. *Engineering Mathematics, Volume - II*, E. Rukmangadachari & E. Keshava Reddy, Pearson Publisher.
2. *Engineering Mathematics, Volume - II*, by G.S.S.Raju, CENGAGE publisher.
3. *Mathematical Methods* by T.K.V. Iyengar, S. Chand publication.
4. *Higher Engineering Mathematics*, by B.V.Ramana, Mc Graw Hill publishers.
5. *Advanced Engineering Mathematics*, by Erwin Kreyszig, Wiley India.

NUMUUA

B.Tech. II - I Sem.

Th	Tu	C
3	1	3

**(13A99301) ELECTRICAL & MECHANICAL TECHNOLOGY
PART – A ELECTRICAL TECHNOLOGY**

Course Objective:

- In this course the different types of DC generators and motors, Transformers, 3 Phase AC Machines which are widely used in industry are covered and their performance aspects will be studied.

UNIT I DC MACHINES

D.C.GENERATOR: Principles of Operation –Constructional Details-Expression for Generated Emf-Types of Generators-Losses in D.C.Generator – Characteristics of D.C.Generators-Applications of D.C.Generators.

D.C. MOTOR: Principles of Operation –Constructional Details-Back EMF-Types of Motors-Armature Torque of a D.C. Motor - Characteristics of D.C.Motors -Applications of D.C.Motors-3 Point Starter-Speed Control of Shunt Motors

UNIT II TRANSFORMERS

Principles of Operation- Constructional Details- Types of Transformers- Emf Equation of a Transformer –Voltage Transformation Ratio-Equivalent Circuit- Equivalent Resistance- Equivalent Reactance-Losses in the Transformer-Copper Loss, Iron Loss-Transformer Tests-Open Circuit, Short Circuit Test-Efficiency of a Transformer –Regulation of Transformer

UNIT III 3 PHASE AC MACHINES

INDUCTION MACHINES: Introduction to 3-Phase Induction Motor- Principle of Operation-Constructional Details-Slip, Frequency of Rotor Current-Expression for Torque -Torque-Slip Characteristics- Applications of 3 Phase Induction Motors.

ALTERNATORS: Principle of Operation-Constructional Details-EMF Equation-Voltage Regulation by Synchronous Impedance Method.

Text Books:

1. *Basic Electrical Engineering* by D P KOTHARI & I J NAGRATH, Tata McGraw Hill, Second Edition, 2007.
2. *Electrical Circuit Theory and Technology* by JOHN BIRD, Routledge publisher, 4th Edition, 2011.

Reference Books:

1. *Electrical & Electronic Technology* by Edward Hughes, 10th Edition, Pearson, 2008

PART – B MECHANICAL TECHNOLOGY

UNIT I

Classification of IC Engines. Description and working of I.C. Engines - 4 stroke and 2 stroke engines – comparison - Reciprocating Air Compressors – description and working of single stage and multistage reciprocating air compressors – inter cooling.

UNIT II

Block diagram of a vapor compression refrigeration system. Names of common refrigerants. Basic principles of air-conditioning. Room and General air conditioning systems. Ducting – Different types of ventilation system.

UNIT III

Transmission of power, Belt, Rope, Chain and gear drive-simple problems. Earth moving machinery and Mechanical handling equipment – bull dozers – power showels – Excavators – concrete mixer – Belt and bucket conveyers.

Text Books:

1. *Electrical Technology, B.L. Theraja, S.Chand Publishers.*
2. *Introduction to Electrical Engineering, M.S. Naidu & S. Kamakshaiyah, TMH*
3. *Mechanical Technology, Khurmi.*
4. *Mechanical Technology, Kondandaraman C.P.*
5. *Construction Planning, Equipment and methods – Purify.*

AMTUA

B.Tech. II - I Sem.

Th	Tu	C
3	1	3

(13A01301) STRENGTH OF MATERIALS - I

Course Objective:

- *The subject provides the knowledge of simple stress strains flexural stresses in members, shear stresses and deflection in beams so that the concepts can be applied to the Engineering problems.*

UNIT I

SIMPLE STRESSES AND STRAINS : Deformable bodies - Elasticity and plasticity – Types of stresses and strains – Hooke’s law – stress – strain diagram for mild steel – Working stress – Factor of safety – Lateral strain, Poisson’s ratio and volumetric strain – Elastic moduli and the relationship between them – Bars of varying section – composite bars – Temperature stresses. Strain energy – Resilience – Gradual, sudden, impact and shock loadings – simple applications.

UNIT II

SHEAR FORCE AND BENDING MOMENT: Definition of beam – Types of beams – Concept of shear force and bending moment – S.F and B.M diagrams for cantilever, simply supported and overhanging beams subjected to point loads, uniformly distributed load uniformly varying loads and combination of these loads – Point of contra flexure – Relation between S.F., B.M and rate of loading at a section of a beam.

UNIT III

FLEXURAL STRESSES: Theory of simple bending – Assumptions – Derivation of bending equation: $M/I = f/y = E/R$ – Neutral axis – Determination of bending stresses – Section modulus of rectangular and circular sections (Solid and Hollow), I,T,Angle and Channel sections – Design of simple beam sections.

SHEAR STRESSES: Derivation of formula – Shear stress distribution across various beam sections like rectangular, circular, triangular, I, T and angle sections.

UNIT IV

DEFLECTION OF BEAMS: Bending into a circular arc – slope, deflection and radius of curvature – Differential equation for the elastic line of a beam – Double integration and Macaulay’s methods.

Determination of slope and deflection for cantilever and simply supported beams subjected to point loads, U.D.L. uniformly varying load-Mohr’s theorems – Moment area method – application to simple cases including overhanging beams-deflections of propped cantilevers for simple loading cases.

UNIT V

CONJUGATE BEAM METHOD: Introduction – Concept of conjugate beam method. Difference between a real beam and a conjugate beam. Deflections of determinate beams with constant and different moments of inertia.

DIRECT AND BENDING STRESSES : Stresses under the combined action of direct loading and bending moment, core of a section – determination of stresses in the case of chimneys, retaining walls and dams – conditions for stability – stresses due to direct loading and bending moment about both axis.

Text Books:

1. *Mechanics of Materials – Dr.B.C.Punmia, Ashok Kumar Jain, Arun Kumar Jain, Lakshmi Publications.*
2. *Strength of Materials by R.K Rajput, S.Chand & Company Ltd.*
3. *Strength of Materials by B.S.Basavarajaiah, Universities Press, Hyderabad.*

Reference Books:

1. *Strength of Materials* by Jindal , Pearson publications
2. *Strength of Materials* by Dr.R.K.Bansal, Lakshmi Publications.
3. *Strength of Materials* by S.S.Bhavikatti, Vikas Publishing House Pvt. Ltd.
4. *Strength of materials* by A.R.Basu, Dhanpathi Rai & Co, New Delhi.
5. *Strength of materials* by Sadhu Singh, Khanna Publications, NewDelhi.
6. *Strength of materials* by Surendar Singh, CBS Publications.
7. *Strength of Materials* by – Timoshenko

AMTUA

(13A01302) SURVEYING - I

Course Objective:

- To ensure that the student develops knowledge of the basic and conventional surveying instruments, principles behind them, working of the instruments, plotting of the area from the field measurements, determination of the area and the theory behind curves.

UNIT I

BASIC CONCEPTS: Surveying – History; Definition; primary divisions, Classification, Principles of surveying Plan and map; Basic Measurements; Instruments and Basic methods; units of measurement, Scales used for Maps and plans, Duties of a surveyor. Errors: Accuracy and Precision Sources and types of errors, theory of Probability, Rounding of numbers.

CHAIN SURVEYING: Instruments for chaining, Ranging out, chaining a line on a flat ground; Chaining on an uneven or a sloping ground; Chain & Tape corrections; Degree of accuracy. Principles of chain surveying; Basic definitions; Well-Conditioned Triangle, Field book, Field work; Offsets, Cross Staff survey; obstacles in chain survey-problems, Conventional signs.

UNIT II

COMPASS SURVEY: Introduction, Bearings and angles, Designation of bearings, Conversion of bearings from one system to the other, fore bearing and back bearing, , Calculation of bearing from angles, Theory of Magnetic compass (i.e. Prismatic compass), Temporary adjustments of compass-Magnetic Declination, Local attraction-Related Problems-Errors in compass survey.

PLANE TABLE SURVEYING: Introduction, Accessories, Working operations, Methods of plane tabling, Three point problem-Mechanical method -Graphical method, Two point problem, Errors in plane tabling.

UNIT III

LEVELLING: Introduction, basic definitions, methods of leveling, leveling instruments: dumpy level, levelling staff, Temporary adjustments of dumpy level, theory of simple and differential leveling, Level field book, Classification of direct leveling methods, Reciprocal leveling, Profile leveling and Cross sectioning, Curvature and Refraction, Difficulties in leveling, errors in leveling, Degree of Precision.

CONTOURING: Introduction, contour interval, Characteristics of contours Methods of locating contours - Direct and indirect methods; Interpolation and sketching of contours, Contour gradient-Uses of contour maps.

UNIT IV

THEODOLITE: Vernier Theodolite: Basic definitions; Fundamental lines and desired relations; Temporary adjustments; Measurement of a horizontal angle; Repetition and Reiteration methods of horizontal angle measurement. Measurement of vertical angle; Sources of errors in Theodolite survey.

TRAVERSE SURVEYING: Introduction, Selection and marking of traverse stations, methods of traversing, traversing by free needle and fast needle method, traversing by direct observation of angles, checks in closed traverse, closing error, methods of balancing the traverse, Gale’s traverse table, Omitted measurements.

UNIT V

COMPUTATION OF AREAS AND VOLUMES: methods of determining areas, areas by sub-division into triangles, areas from offsets to a base line: regular and irregular intervals, area by double meridian distances, area by co-ordinates. embankments and cutting for a level section, two level sections, three level section and multi level section, volume of earth work from contour plan, capacity of a reservoir , volume of barrow pits.

MINOR INSTRUMENTS: uses and working of the minor instruments: hand level, line ranger, optical square, abney level, clinometers, pantagraph, sextant and planimeter.

Text Books:

1. *Surveying (Vol – 1,2 &3)*, by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain – Laxmi Publications (P) Ltd., New Delhi
2. *Text book of surveying* by C.Venkataramaiah, Universities Press.
3. *Advanced Surveying* by Satheesh Gopi, R.Shanta Kumar and N.Madhu, Pearson education.

Reference Books:

1. Duggal S.K, “*Surveying (Vol – 1 & 2)*”, Tata McGraw Hill Publishing Co.Ltd. New Delhi, 2004.
2. Arora K R “*Surveying (Vol-1 & 2)*”, Standard Book House, Delhi, 2004
3. Chandra AM, “*Plane Surveying*”, New age International PVt.Ltd., Publishers, New Delhi, 2002.
4. *Surveying and Levelling* by Kanetkar T.P., and Kulkarni, Vols. I and II, United Book Corporation, Pune, 1994
5. *Surveying and leveling* by R.Subramaniah, Oxford university press, New Delhi.
6. *Surveying* by Mimi Das Saikia, PHI Publications.

JNTU

B.Tech. II - I Sem.

Th	Tu	C
3	1	3

(13A01303) FLUID MECHANICS

Course Objective:

- *This subject introduces the basic concepts of fluids, their behavioural properties, analyzing the fluid flows using primary equations. This subject further deals with various flow measuring devices and concepts of boundary layer flows.*

UNIT I

INTRODUCTION: Dimensions and units – physical properties of fluids, specific gravity, viscosity, surface tension and capillarity, vapor pressure and their influences on fluid motion. Newtonian and non Newtonian fluids. Fluid Pressure at a Point; Pascal’s law, Hydrostatic law, Atmospheric, Absolute and gauge pressure; Hydrostatic paradox, Pressure measurement manometers; Simple, differential and Micro Manometers

HYDROSTATIC FORCES ON SURFACES: Total Pressure and Centre of Pressure: on Horizontal Plane Surface; Vertical Plane Surface; Inclined Plane Surface and Curved Surfaces.

UNIT II

BUOYANCY: Buoyancy; Buoyant Force and Centre of Buoyancy, Stability of submerged bodies and floating bodies; Metacentre and metacentric height, analytical method for metacentric height.

KINEMATICS OF FLUID MOTION: Methods of describing fluid motion; Classification of flow; Steady, unsteady, uniform and non-uniform flows; Laminar and turbulent flows; Three, two and one dimensional flows; Irrotational and rotational flows; Streamline; Pathline; Streakline; Equation for acceleration; Convective acceleration; Local acceleration; Continuity equation; Velocity potential and stream function; Flownet; Vortex flow – free vortex and forced vertex flow.

UNIT III

DYNAMICS OF FLUID FLOW: Forces acting on a Fluid in Motion; Euler’s equation of motion; Bernoulli’s equation ; Energy correction factor; Momentum principle; Force exerted on a pipe bend.

FLOW MEASUREMENTS IN PIPES: Discharge through Venturi Meter; Discharge through Orifice Meter; Discharge through flow nozzle; Measurement of velocity by Pitot tube, pitot-static tube.

UNIT IV

FLOWTHROUGH ORIFICES AND MOUTHPIECES: Flow through Orifices: Classification of Orifices; Determination of coefficients for an Orifice Flow through large rectangular Orifice; Flow through submerged Orifice – fully sub-merged and Partially sub-merged. Classification of Mouthpieces; Flow through external and internal cylindrical Mouthpiece

FLOW OVER NOTCHES & WEIRS: Classification of Notches and Weirs; Flow through rectangular, triangular and trapezoidal notches and weirs; End contractions; Velocity of approach; Cipolletti weir, Broad crested weir.

UNIT V

ANALYSIS OF PIPE FLOW: Energy losses in pipelines; Darcy – Weisbach equation; Minor losses in pipelines; Hydraulic Grade Line and Total Energy Line; Concept of equivalent length; Hydraulic power transmission through a pipe; Siphon; Pipes in series, parallel & branched pipes.

LAMINAR & TURBULENT FLOW IN PIPES: Reynolds’s experiment; Characteristics of laminar flow; Steady laminar flow through a circular pipe(Hazen poiseuille equation). Characteristics of turbulent flow, Prandtl’s mixing length theory, Hydro dynamically smooth and rough boundaries, Velocity distribution, Friction factor for pipe flow.

Text Books:

1. *Fluid Mechanics by Modi and Seth, Standard book house.*
2. *A text of Fluid Mechanics and Hydraulic Machines by Dr.R.k.Bansal – Laxmi Publications (P) Ltd., New Delhi.*
3. *Fluid Mechanics and Machinery, CSP Ojha, Oxford Higher Education*

Reference Books:

1. *Fluid mechanics and machinery by S.C.Gupta, Pearson publication*
2. *Theory and applications of fluid mechanics by K.Subramanyam, TMH Publications, New Delhi.*
3. *Principles of Fluid Mechanics and Fluid Machines by M.Narayana Pillai, Universities Press.*
4. *Fluid Mechanics and Machinery by D. Ramdurgaia New Age Publications.*
5. *Fluid Mechanics by J.F.Douglas, J.m.Gaserek and J.A.Swaffird (Longman)*
6. *Introduction to Fluid Machines by S.K.Som & G.Biswas .Tata Mc.Grawhill publishers Pvt.Ltd.*
7. *Fluid Mechanics by A.K.Mohanty, Prentice Hall of India Pvt.Ltd., New Delhi.*

AMTU

B.Tech. II - I Sem.

Th	Tu	C
3	1	3

(13A01304) BUILDING MATERIALS AND CONSTRUCTION

Course Objective:

- To give the students a basic idea about the construction materials, building components and to introduce component methodologies.

UNIT I

STONES, BRICKS :

Properties of building stones – relation to their structural requirements. Classification of stones – Stone quarrying – precautions in blasting, Dressing of stone, Composition of good brick earth, various methods of manufacture of bricks. Comparison between clamp burning and kiln burning. Qualities of a good brick.

WOOD: Structure – properties – Seasoning of timber. Classification of various types of woods used in buildings – Defects in timber. Alternative materials for wood, Galvanized Iron, Fiber-reinforced plastics, steel, Aluminum.

UNIT II

LIME AND CEMENT:

Various ingredients of lime – Constituents of lime stone – classification of lime – various methods of manufacture of lime. Various types of cement and their properties. Various field and laboratory tests for Cement. Various ingredients of Cement concrete and their importance – various test for concrete.

UNIT III

ROOFING MATERIALS & FINISHINGS:

Characteristics of good tile – manufacturing methods, Types of tiles. Use of Materials like aluminium, gypsum, glass and bituminous materials – their quality. Damp proofing and water proofing- materials used. Plastering, pointing, white washing and distempering – Painting – Constituents of a paint – Types of paints – Painting of new/old Wood – Varnish – Form work and scaffolding.

UNIT IV

BUILDING COMPONENTS: Lintels, Arches, Vaults-stair cases – Types. Different types of floors- Concrete, Mosaic, Terrazo floors, Pitched, flat and curved Roofs. Lean-to-Roof, Coupled Roofs, Trussed roofs- King and Queen Post Trusses. RCC Roofs, Madras Terrace/Shell Roofs.

UNIT V

MASONRY & FOUNDATIONS:

Types of masonry, English and Flemish bonds, □ Rubble and Ashlar masonry, cavity and partition walls. Foundations : Shallow foundations – Spread, combined strap and mat footings. Reinforced masonry

Text Books:

1. Building material by S K Duggal – New Age International Publishers; Second Edition
2. Building Construction by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain – Laxmi Publications (P) ltd., New Delhi
3. Building construction by W.B.Mckay, Vol.I, II, III & IV Pearson Publications, 2013 edition.
4. Building Materials and construction by S.S.Bhavikatti, Vikas Publishing House Pvt. Ltd.

Reference Books:

1. R.Chudly “Construction Technology “– Volumes I and II” 2nd Edition, Longman, UK, 1987.
2. Building Construction by P.C. Varghese, Prentice-Hall of India private Ltd, New Delhi.
3. Text book on Building Construction by S.P.Arora and S.P.Bindra, Dhanpathi Rai Publications.
4. Building materials by P.C. Varghese, Prentice-Hall of India private Ltd, New Delhi
5. I.S. 1905, SP.20

(13A01305) SURVEYING LAB-I

Course Objective:

- *To impart the practical knowledge in the field, it is essential to introduce in curriculum. Drawing of Plans and Maps and determining the area are pre requisites before taking up any Civil Engineering works.*

LIST OF EXERCISES:

1. Survey of an area by chain survey (Closed traverse) & Plotting
2. Chaining across obstacles
3. Determination of distance between two inaccessible points with compass.
4. Surveying of a given area by prismatic compass (Closed traverse) and plotting after adjustment.
5. Radiation method, intersection methods by plane Table survey
6. Two point and three point problems in plane table survey.
7. Traversing by plane table survey
8. Fly leveling (differential leveling)
9. An exercise of L.S. and C.S. and plotting.
10. Two exercises on contouring.

LIST OF MAJOR EQUIPMENT:

1. Chains, tapes, Ranging rods, cross staff, arrows
2. Compasses and Tripods, Optical square.
3. Plane tables, Alidade, Plumbing fork, trough compasses.
4. Leveling instruments and leveling staves.
5. Box sextants, planimeter.

(13A01306) STRENGTH OF MATERIALS LAB

Course Objective:

- *The objective of the course is to make the student to understand the behaviour of materials under different types of loading for different types structures.*

LIST OF EXERCISES:

1. Tension test.
2. Bending test on (Steel/Wood) Cantilever beam.
3. Bending test on simple support beam.
4. Torsion test.
5. hardness test.
6. Spring test.
7. Compression test on wood or concrete
8. Impact test
9. Shear test
10. Verification of Maxwell's Reciprocal theorem on beams.
11. Use of electrical resistance strain gauges.
12. Continuous beam – deflection test.

LIST OF MAJOR EQUIPEMNT:

1. UTM for conducting tension test on rods
2. Steel beam for flexure test.
3. Wooden beam for flexure test.
4. Toprsion testing mahine
5. Brinnell's/Rock well's hardness testing machine.
6. Spring testing machine
7. Compression testing machine
8. Izod Impact machine
9. Shear testing machine
10. beam setup for Maxwell's theorem verification.
11. Continuous beam setup
12. Electrical Resistance gauges.