



ANDHRA UNIVERSITY
DEPARTMENT OF CIVIL ENGINEERING

SCHEME AND SYLLABI
(with effect from 2022-23)

B.Tech &B.Tech. +M.Tech
I Year - I Semester

Course code	Category	Course Title	Hours per week		Internal Marks	External Marks	Total Marks	Credits
			L	P				
CV1101	BS	Mathematics – I	4	0	30	70	100	3
CV1102	BS	Physics	4	0	30	70	100	3
CV1103	ES	Engineering Graphics	2	3	30	70	100	3
CV1104	ES	Civil Engineering Materials	4	0	30	70	100	3
CV1105	ES	Engineering Mechanics	4	0	30	70	100	3
CV1106	ES	Workshop Lab	0	3	50	50	100	1.5
CV1107	BS	Physics Lab	0	3	50	50	100	1.5
CV1108	ES	Engineering Geology Lab	0	3	50	50	100	1.5
Total Credits								19.5

B.Tech & B.Tech. +M.TechI
Year - II Semester

Course code	Category	Course Title	Hours per week		Internal Marks	External Marks	Total Marks	Credits
			L	P				
CV1201	BS	Mathematics – II	4	0	30	70	100	3
CV1202	BS	Green Chemistry	4	0	30	70	100	3
CV1203	HSS	English	4	0	30	70	100	3
CV1204	ES	Computer Programming and Numerical Methods	4	0	30	70	100	3
CV1205	ES	Surveying and Geomatics	4	0	30	70	100	3
CV1206	HSS	English Language Lab	0	3	50	50	100	1.5
CV1207	PC	Survey Field Work	0	3	50	50	100	1.5
CV1208	ES	Computer Programming and Numerical Methods Lab	0	3	50	50	100	1.5
Total Credits								19.5

B.Tech I Year - I Semester

CV-1101 MATHEMATICS-I

Course Objectives:

- To transmit the knowledge of Partial differentiation.
- To know of getting maxima and minima of function of two variables and finding errors and approximations.
- To evaluate double and triple integrals, volumes of solids and area of curved surfaces.
- To expand a periodical function as Fourier series and half-range Fourier series.

Course Outcomes:

The students will be able to

- Find the partial derivatives of functions of two or more variables.
- Evaluate maxima and minima, errors and approximations.
- Evaluate double and triple integrals, volumes of solids and area of curved surfaces.
- Expand a periodical function as Fourier series and half-range Fourier series.
- Have a fundamental understanding of Fourier series and be able to give Fourier expansions of a given function.

SYLLABUS

Partial Differentiation: Introduction - Functions of two or more variables - Partial derivatives - Homogeneous functions – Euler’s theorem - Total derivative - Change of variables – Jacobins. Mean value Theorems (without proofs)

Applications of Partial Differentiation: Geometrical interpretation -Tangent plane and Normal to a surface -Taylor’s theorem for functions of two variables - Errors and approximations -Total differential. Maxima and Minima of functions of two variables - Lagrange’s method of undetermined multipliers - Differentiation under the integral Sign - Leibnitz’s rule.

Multiple Integrals: Introduction - Double Integrals - Change of Order of Integration - Double Integrals in Polar Coordinates - Triple Integrals - Change of Variables.

Multiple Integrals-Applications: Area enclosed by plane curves - Volumes of solids - Area of a curved surface - Calculation of Mass - Center of gravity - Moment of inertia - product of inertia – principal axes- Beta Function - Gamma Function - Relation between Beta and Gamma Functions. Error Function or Probability Integral.

Fourier Series: Introduction - Euler’s Formulae - Conditions for a Fourier Expansion - Functions having points of discontinuity - Change of Interval - Odd and Even Functions -

Expansions of Odd or Even Periodic Functions, Half-Range Series - Parseval's Formula.
Practical Harmonic analysis.

Text Books:

1. Scope and Treatment as in "Higher Engineering Mathematics", by Dr. B.S. Grewal, 43rd Edition, Khanna publishers.

Reference Books:

1. Graduate Engineering Mathematics by V B Kumar Vatti., I.K. International publishing house Pvt. Ltd.
2. Advanced Engineering Mathematics by Erwin Kreyszig.
3. A Text Book of Engineering Mathematics, by N.P. Bali and Dr. Manish Goyal, Lakshmi Publications.
4. Advanced Engineering Mathematics by H.K. Dass. S. Chand Company.
5. Higher Engineering Mathematics by B.V. Ramana, Tata Mc Graw Hill Company.
6. Higher Engineering Mathematics by Dr. M.K.Venkataraman.

CV-1102 PHYSICS

Course Objectives:

- To impart knowledge in basic concept of physics of Thermodynamics relevant to engineering applications.
- To grasp the concepts of physics for electromagnetism and its application to engineering. Learn production of Ultrasonics and their applications in engineering.
- To Develop understanding of interference, diffraction and polarization: connect it to a few engineering applications.
- To Learn basics of lasers and optical fibers and their use in some applications.
- To Understand concepts and principles in quantum mechanics and Nanopahse Materials. Relate them to some applications.

Course Outcomes:

The students will be able to

- Understand the fundamentals of Thermodynamics and Laws of thermodynamics. Understand the working of Carnot cycle and concept of entropy.
- Gain Knowledge on the basic concepts of electric and magnetic fields. Understand the concept of the nature of magnetic materials. Gain knowledge on electromagnetic induction and its applications .
- Understand the Theory of Superposition of waves. Understand the formation of Newton's rings and the working of Michelson's interferometer. Remember the basics of diffraction, Evaluate the path difference. Analysis of Fraunhofer Diffraction due to a single slit

- Understand the interaction of matter with radiation, Characteristics of Lasers, Principle, working schemes of Laser and Principle of Optical Fiber. Realize their role in optical fiber communication.
- Understand the intuitive ideas of the Quantum physics and understand dual nature of matter. Compute Eigen values, Eigen functions, momentum of Atomic and subatomic particles using Time independent one Dimensional Schrodinger's wave equation. Understand the fundamentals and synthesis processes of Nanophase materials.

SYLLABUS

Thermodynamics: Introduction, Heat and Work, First law of thermodynamics and applications, Reversible and Irreversible process, Carnot cycle and Efficiency, Second law of thermodynamics, Carnot's Theorem, Entropy, Second law in terms of entropy, Entropy and disorder, Third law of thermodynamics (statement only).

Electromagnetism: Concept of electric flux, Gauss's law - some applications, Magnetic field - Magnetic force on current, torque on current loop, The Biot-Savart's Law, B near a long wire, B for a circular Current loop, Ampere's law, B for a solenoid, Hall effect, Faraday's law of induction, Lenz's law, Induced magnetic fields, Displacement current, Maxwell's equations (no derivation), Magnetic materials: Classification of magnetic materials and properties.

Ultrasonics: Introduction, Production of Ultrasonics – Piezoelectric and Magnetostriction methods, acoustic grating, applications of ultrasonics.

Optics Interference: Principles of superposition – Young's Experiment – Coherence - Interference in thin films (reflected light), Newton's Rings, Michelson Interferometer and its applications.

Diffraction: Introduction, Differences between interference and diffraction, Fresnel and Fraunhofer diffraction, Fraunhofer diffraction at a single slit (Qualitative and quantitative treatment).

Polarisation: Polarisation by reflection, refraction and double refraction in uniaxial crystals, Nicol prism, Quarter and Half wave plate, circular and elliptical polarization.

Lasers and Fibre Optics: Introduction, characteristics of a laser beam, spontaneous and stimulated emission of radiation, population inversion, Ruby laser, He-Ne laser, Semiconductor laser, applications of lasers. Introduction to optical fibers, principle of propagation of light in optical fibers, Acceptance Angle and cone of a fibre, Numerical aperture, , classification of fibers, Fibre optics in communications, Application of optical fibers.

Modern Physics: Introduction, De Broglie concept of matter waves, Heisenberg uncertainty principle, Schrodinger time independent wave equation, application to a particle in a box. Free electron theory of metals, Kronig - Penney model (qualitative treatment), Origin of energy band formation in solids, Classification of materials into conductors, semi-conductors and insulators.

Nanophase Materials: Introduction, properties, Top-down and bottom up approaches, Synthesis - Ball milling, Chemical vapour deposition method , sol-gel methods, Applications of nano materials.

Text Books:

1. Physics by David Halliday and Robert Resnick – Part I and Part II - Wiley.
2. A textbook of Engineering Physics, Dr. M. N. Avadhanulu, Dr. P.G. Kshirsagar - S. Chand
3. Engineering Physics by R.K. Gaur and S.L. Gupta –Dhanpat Rai

Reference Books:

1. Modern Engineering Physics by A.S. Vadudeva
2. University Physics by Young and Freedman

CV-1103 ENGINEERING GRAPHICS

Course Objectives:

- Understand the basics of Engineering Graphics and BIS conventions.
- Develop the graphical skills for communication of concepts, ideas and design of engineering products through technical drawings
- Demonstrate and practice the various profiles/curves used in engineering practice through standard procedures.
- Demonstrate and practice the orthographic projections of points, lines, planes, solids and section of solids
- Demonstrate and practice the development of surfaces of simple solids
Familiarize the basic concept of isometric views clearly.

Course Outcomes:

The students will be able to

- Develop simple engineering drawings by considering BIS standards.
- Draw different engineering curves with standard Procedures.
- Comprehend the basics of orthographic projections and deduce orthographic projections of points, lines, planes and solids at different orientations in real life environment.
- Visualize clearly the sections of solids.

- Apply the concepts of development of surfaces while designing/analyzing any product.
- Recognize the significance of isometric drawing to relate 2D environment with 3D environment.

SYLLABUS

Introduction: Lines, Lettering and Dimensioning, Geometrical Constructions, and Scales.

Curves: Conic sections: General construction of ellipse, parabola and hyperbola. Construction of involutes of circle and polygons only. Normal and tangent to curves.

Projections of Points: Principal or Reference Planes, Projections of a point situated in any one of the four quadrants.

Projections of Straight Lines: Projections of straight lines parallel to both reference planes, perpendicular to one reference plane and parallel to other reference plane, inclined to one reference plane and parallel to the other reference plane.

Projections of Straight Line inclined to both the Reference Planes: Projections of Planes: Projection of Perpendicular planes: Perpendicular to both reference planes, perpendicular to one reference plane and parallel to other reference plane and perpendicular to one reference plane and inclined to other reference plane. Projection of Oblique planes. Introduction to Auxiliary Planes.

Projections of Solids: Types of solids: Polyhedra and Solids of revolution. Projections of solids in simple positions: Axis perpendicular to horizontal plane, Axis perpendicular to vertical plane and Axis parallel to both the reference planes, Projection of Solids with axis inclined to one reference plane and parallel to other and axes inclined to both the reference planes.

Sections of Solids: Perpendicular and inclined section planes, Sectional views and True shape of section, Sections of solids (Prism, Pyramid, Cylinder and Cone) in simple position only.

Development of Surfaces: Methods of Development: Parallel line development and radial line development. Development of a cube, prism, cylinder, pyramid and cone.

Isometric Views: Isometric projection, Isometric scale and Isometric view. Isometric view of Prisms, Pyramids, cylinder, cone, and their combinations.

Text Books:

1. Elementary Engineering Drawing by N.D.Bhatt, Charotar Publishing House.

Reference Books:

1. Engineering Graphics by K.L. Narayana and P. Kannaiah, Tata Mc-Graw Hill

CV1104 CIVIL ENGINEERING MATERIALS

Course Objectives:

- Student can enlisting the various materials of different types of stones, cement, bricks, timber, lime products, tar, bitumen, metal, sand, paints, admixtures, etc...used in building construction
- Student will have the capability of understanding the different processes of brick and cement manufacturing, and their types and uses.

Course Outcomes:

- Student will have the capability of testing of building construction materials like cement, bricks, aggregate, etcto find various properties of them.
- Student will have the capability of preservation of building construction materials like cement, bricks, aggregate, etcfrom the external agencies. weather, etc
- Students will understand the design concepts of different types of windows, Doors and stair cases etc

SYLLABUS

Masonry: Different Types of Stone Masonry – Plan, Elevation, Sections of Stone Masonry Works – Brick Masonry – Different Types of Bonds – Plan, Elevation and Section of Brick Bonds up to Two-Brick Wall Thickness – Partition walls – Different Types of Block Masonry – Hollow Concrete Blocks – FAL-G Blocks, Hollow Clay Blocks.

Paints, Varnishes: Constituents and Characteristics of Paints, Types of Paint, their uses and preparation on Different Surfaces, Painting Defects, Causes and Remedies. Constituents of Varnishes, Uses of Varnishes, Different Kinds of Varnishes, Polishes. Painting of Interior Walls, Exterior Walls, Wooden Doors and Windows – Steel Windows – Various Types of Paints (Chemistry of Paints not included) Including Distempers; Emulsion Paints etc., Varnishes Wood Work Finishing Types.

Asbestos, Asphalt Bitumen and Tar: Availability and uses of Asbestos, Properties of Asbestos, Various Types of Asbestos, Difference Between Asphalt and Bitumen, Types, Uses and Properties of Asphalt and Bitumen, Composition of Coal Tar, Wood Tar, Mineral Tar and Naphtha.

Roofing: Mangalore Tiled Roof, RCC Roof, Madras Terrace, Hollow Tiled Roof, Asbestos Cement, Fibre Glass, Aluminium, G.I. Sheet Roofings.

Trusses: King Post and Queen Post Trusses – Steel Roof Truss for 12 m Span with details.

Wooden Doors and Windows: Parallel – Glazed – Flush Shutters, Plywood, Particle Board Shutters – Aluminum, PVC, Steel Doors, Windows and Ventilators, various types of Windows, Glazing – Different Varieties.

Stair Cases: Stair Cases or Stairway Design (Architectural Design or Planning only) various types such as, Straight Flight, Dog-legged, Quarter Landing, Open Spiral, Spiral Stairs etc.

Text Books

1. Engineering Materials [Material Science] by Rangwala, Charotar Publications.
2. Building Construction by B.C. Punmia, Laxmi Publications.
3. Civil Engineering Construction Materials, S.K. Sharma, KBP House.

Reference Books

1. Concrete: Microstructure, Properties & Materials, PK Mehta, Tata McGraw-Hill Publications.
2. Building Construction, Vol.II& III By W.B. McKay, E.L.B.S. and Longman, UK.
3. Building Materials by S.K. Duggal, New Age International Publishers.

CV-1105 ENGINEERING MECHANICS

Course Objectives:

- To provide students with practise in applying their knowledge of mathematics, science, and engineering, as well as to broaden this knowledge into the vast field of "rigid body Mechanics."
- To prepare students for advanced courses such as Mechanics of Solids and Structural Analysis.
- To educate about distributed force systems, the centroid/center of gravity, how to locate centroids, moment of inertia, and how to find moment of inertia of composite figures and bodies.
- To know frame types and analyse forces in truss members using the method of joints and the method of sections.
- To understand the kinetics and kinematics of rigid bodies and use the work-energy technique to solve simple problems.
- To discuss the implementation of work-energy and impulse-momentum to dynamic systems.

Course Outcomes:

The student will be able to:

- Understand the Effect of forces and its components, the principle of Moments on wide variety of practical situations that are encountered by Engineers.
- Analyse forces in statically determinate structures using scalar and vector analytical techniques.

- Identify the significance of the centroid/center of gravity and locate the centroids of composite figures and bodies.
- Recognize the moment of inertia and the method for determining the moment of inertia of areas and bodies.
- Understand the dynamics of rigid bodies and how to solve simple problems using the work-energy approach and the virtual work method.

SYLLABUS

Basic concepts : Introduction to Engineering Mechanics – Scalar and Vector quantities – Forces – Characteristics of a force – Definitions and examples of various types of force systems – Definition of resultant – Composition and resolution of forces – Moment of a force – Principles of moments of force – Couples – characteristics of a couple – on Transformations of a couple – Resolution of a force into a force and couple. Resultants of Force Systems, Possible resultants of different types of force systems – Resultant of a concurrent, coplanar force system – Resultant of a non-concurrent coplanar force system – Resultant of a concurrent non-coplanar force system – Resultant of a parallel, non-coplanar force system – Resultant of a system of couples in space – Resultant of non-concurrent, non-coplanar, non-parallel force system – screw of Wrench.

Equilibrium: Free body diagrams – Equations of equilibrium for a concurrent coplanar force system – Equilibrium of Bodies acted on by two or three forces – Equilibrium of bodies acted on by non-concurrent coplanar force system – Equilibrium of bodies acted on by parallel, non-coplanar force system – Equilibrium of non-concurrent, non-coplanar non-parallel force system.

Draw a free body diagram (FBD) and evaluate the equilibrium of different force systems.

Centroids and Centres of Gravity: Centre of gravity of parallel forces in a plane – Centre of gravity of parallel forces in space – centroids and centres of gravity of composite bodies – Theorems of Pappus – Distributed Loads on Beams.

Moments of inertia, Definition – Parallel axis theorem for areas – Second moments of areas by integration – Radius of gyration of areas – Moments of inertia of composite areas – Parallel axis and parallel plane theorems for masses – Moments of inertia of masses by integration – Radius of gyration of mass – Moments of inertia of composite masses.

Friction : Nature of friction – Laws of friction – Coefficient of friction – Angle of friction – Cone of friction – Problems involving frictional forces – Frictional forces on flexible bands and belts – Rolling friction.

Method of Virtual Work: Principle of virtual work – Equilibrium of ideal system – Stability of equilibrium.

Kinematics : Absolute Motion : Introduction – Recapitulation of basic terminology of mechanics – Newton's Laws – Introduction to Kinematics of Absolute Motion – Rectilinear

motion of a particle – Angular motion of a line – Curvilinear motion of a particle using rectangular components – Motion of projectiles – Curvilinear motion using Radial and Transverse Components – (Simple Problems only) – basics of simple harmonic motion (Simple problems) – Motion of rigid bodies.

Kinematics: Relative Motion: Introduction to kinematics of relative motion – Relative displacement – Relative velocity – Instantaneous centre – Relative acceleration.

Kinetics: Introduction to Kinetics – Force, Mass and Acceleration approach – Newton's Laws of motion – Equation of motion for a particle. Motion of the mass centre of a system of particles – D'Alembert's principle – Rectilinear translation of a rigid body – Curvilinear translation of a rigid body – Rotation of a rigid body – Plane motion of a rigid body – Reserved effective forces and couples and their use in Dynamic Equilibrium method.

Kinetics : Work and Energy approach – Work done by a force – Work done by a couple – Work done by a force system – Energy: Potential energy – Kinetic energy of a particle – Kinetic energy of a rigid body – Principle of Work and kinetic energy – Conservation of energy – Power and efficiency.

Impulse – Momentum approach – Linear impulse – Linear momentum – Principle of linear impulse and linear momentum – Conservation of linear momentum – Elastic impact – Angular impulse – Angular momentum – Principles of angular impulse and angular momentum.

Text Books

1. Engineering Mechanics by Ferdinand Leon Singer, B.S.Publications.
2. Applied Mechanics by I.B. Prasad, Khanna Publishers.

ReferenceBooks

1. Engineering Mechanics by S.Timoshenko and D.H. Young, Tata McGraw-Hill Publishing Co. Ltd. India.
2. Engineering Mechanics Vol. I and Vol. II by J.L.Meriam and L.G.Kraige, Wiley Publications.
3. Mechanics for Engineers Statics and Dynamics by F.B. Beer and E.R. Johnston.
4. Engineering Mechanics by R.S.Kurmi, S.Chand Publishing.

CV-1106 WORKSHOP LAB

Course Objectives:

- Get hands on experience with the working skills in Carpentry trade.
- Know how to work with Sheet Metal tools.
- Get familiar with the working skills of Metal Fitting operations.
- Get hands on experience with house hold electrical wiring.

Course Outcomes:

The student will be able

- To work with Wood Materials in real time applications.
- To build various parts with Sheet Metal in day-to-day life.
- To apply Metal Fitting skills in various applications.
- To apply this knowledge to basic house electrical wiring and repairs.

SYLLABUS

Carpentry: Any three jobs from – Half lap joint, Mortise and Tenon joint, Half – lap Dovetail joint, Corner Dovetail joint, Central Bridle joint.

Sheet Metal: Any three jobs from – Square tray, Taper tray(sides), Funnel, Elbow pipe joint.

Fitting: Any three jobs from – Square, Hexagon, Rectangular fit, Circular fit and Triangular fit.

House Wiring: Any three jobs from – Tube light wiring, Ceiling fan wiring, Stair-case wiring, Corridor wiring.

Reference Books:

1. Elements of workshop technology, Vol.1 by S. K. and H. K. Choudary.
2. Work shop Manual / P.Kannaiah/ K.L.Narayana/ SciTech Publishers.
3. Engineering Practices Lab Manual, Jeyapooan, Saravana Pandian, 4/e Vikas.

CV-1107PHYSICS LAB

Course Objectives:

- To enable the students to acquire skill, technique and utilization of the Instruments
- Draw the relevance between the theoretical knowledge and to imply it in a practical manner with respect to analyze various electronic circuits and its components.
- To impart the practical knowledge in basic concepts of Wave optics, Lasers and Fiber optics.
- To familiarize the handling of basic physical apparatus like Vernier callipers, screw gauge,

- spectrometers, travelling microscope, laser device, optical fibre, etc.

Course Outcomes:

The student will be able to

- Design and conduct experiments as well as to analyze and interpret
- Apply experimental skills to determine the physical quantities related to Heat, Electromagnetism and Optics
- Draw the relevance between theoretical knowledge and the means to imply it in a practical manner by performing various relative experiments.

LIST OF EXPERIMENTS

1. Determination of Radius of Curvature of a given Convex Lens by forming Newton's Rings.
2. Determination of Wavelength of Spectral Lines in the Mercury Spectrum by Normal Incidence method.
3. Study the Intensity Variation of the Magnetic Field along axis of Current Carrying Circular Coil.
4. Determination of Cauchy's Constants of a Given Material of the Prism using Spectrometer.
5. Determination of Refractive Index of Ordinary ray μ_o and Extraordinary μ_e ray.
6. Determination of Thickness of Given Paper Strip by Wedge Method.
7. Calibration of Low Range Voltmeter.
8. Calibration of Low Range Ammeter.
9. Determination of Magnetic Moment and Horizontal Component of Earth's Magnetic Field.
10. Lees Method - Coefficient of thermal Conductivity of a Bad Conductor.
11. Carey Foster's Bridge – Verification of laws of Resistance and Determination Of Specific Resistance.
12. Melde's Apparatus – Frequency of electrically maintained Tuning Fork.
13. Photoelectric cell-Characteristics.
14. Planks Constants.
15. Laser- Diffraction.

CV-1108ENGINEERING GEOLOGY LAB

Course Objectives:

- To enable the students to know different types of soils.
- To enable the students to know different properties of different soils.
- To enable the students to know the application of Remote Sensing and Geo Physical Methods.
- Understand weathering process and mass movement

Course Outcomes:

- Students can identify different types of rocks and their mineral composition.
- Students will study the physical properties of minerals by conducting laboratory tests.
- Students can study the models of folds, faults, joints and tunnels.
- Students can study the satellite data and evaluate the terrain through integrated approach.

SYLLABUS

1. General study of topo sheet
2. Physical properties of minerals
3. Physical properties of 3 types of rocks
4. Study of folds, faults and joints (Models)
5. Study of tunnels (models)
6. General observation of satellite data for abstraction of data
7. Integrated approach of Terrain evaluation.

Text Books

1. Principles of Engineering Geology by K.V.G.K.Gokhale. B.S. Publications-2005
2. Engineering Geology by N.Chennakesavalu, Mc-Millan, Indian Ltd-2005
3. A text book of Geology by P.K.Mukherjee, World Press
4. Engineering and General Geology by Parbin Singh, Katson Publishing House
5. Fundamentals of Remote Sensing by George Jospheh, University Press (India) PrivateLtd.