



मेडी-केप्स विश्वविद्यालय, इन्दौर
Medi-Caps University, Indore



Engineering First-Year 2024 Scheme & Syllabus



Engineering First-Year 2024 Scheme & Syllabus



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Department of Computer Science and Engineering

CURRICULUM AND SYLLABUS (2024-2028)

B.Tech. Computer Science and Engineering



Computer Science and Engineering

B.Tech. (CSE)

CURRICULUM AND SYLLABUS

Vision Statement of University

Be an internationally acclaimed University recognised for its excellent teaching, research, innovation, outreach and creating top class technocrats and professionals who can serve the mankind as multi skilled global citizen.

Mission Statement of University

- Establish state-of-the-art facilities for world class education and research.
- Conduct scholarly research and creative endeavours that impact quality of life.
- Attract quality staff and students to cater for diverse needs and preferences and widen participation.
- Build a foundation for students to be successful at all levels through high-quality, innovative programs.
- Collaborate with institute, industry, and society to address current issues through research and align curriculum.
- Involve in societal outreach programs to identify concerns and provide sustainable ethical solutions.
- Encourage life-long learning and team-based problem solving through an enabling environment.

Vision of the Department:

Inculcate the innovative thinking in Computer Science and Engineering graduates with domain knowledge and skills to address contemporary industrial and social requirements.

Mission of the Department:

1. Provide an environment to the students to learn with passion and equip with proper skill set to address current problems.
2. Provide maximum exposure to innovative techniques available to cater industrial needs by maintain the best Industry- Academia relation.
3. Imparting best problem-solving strategies in students to work in a team.
4. Develop leadership qualities in Computer Science graduates to work for the society.
5. Attract experienced and expert faculty members and create an enthusiastic academic environment.

Department of Computer Science and Engineering

Program Education Objectives (PEOs)

- PEO₀₁** Provide strong theoretical foundations to work with cutting edge computing technologies and design solutions to complex engineering problems to work in any competitive environments.
- PEO₀₂** Impart skills such as team building, inter-personal skills, and leadership qualities in order to effectively communicate with engineering community and with society at large.
- PEO₀₃** Promote research culture through internships, industry trainings, research-oriented projects, sponsored collaborative research and enable them to pursue higher studies in computer and related fields.
- PEO₀₄** Create ethically strong, professionally, and globally competent employees and entrepreneurs.

Department of Computer Science and Engineering

PROGRAMME OUTCOMES (POs)

- PO₀₁** **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering, fundamentals, and an engineering specialization to the solution of
- PO₀₂** **Problem analysis:** Identify, formulate, review, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences
- PO₀₃** **Design / development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- PO₀₄** **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- PO₀₅** **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
- PO₀₆** **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- PO₀₇** **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

- PO₀₈ Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- PO₀₉ Individual and teamwork:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- PO₁₀ Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
- PO₁₁ Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
- PO₁₂ Life-long learning:** Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Department of Computer Science and Engineering

PROGRAMME SPECIFIC OUTCOMES (PSOs)

- PSO₀₁** Ability to understand the principles and working of computer systems and a good knowledge about the hardware and software aspects of computer systems.
- PSO₀₂** Ability to work in multidisciplinary teams in small- and large-scale projects by utilizing modern software engineering tools and emerging technologies.
- PSO₀₃** Ability to design and develop computer programs and understand the structure and development methodologies of software systems.
- PSO₀₄** Ability to apply their skills in the field of the specialization AI, Data Science, Web Technology, Networking and Cloud Computing web design, cloud computing and data analytics.

Medi-Caps University Indore (M.P.)
 DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
Choice Based Credit System- Scheme of B.Tech CSE (2024 Batch)

SEMESTER I

Sr. No.	Course Code	Courses	L	T	P	Credit
1	EN3BS11	Engineering Mathematics-I	3	0	0	3
2	EN3BS16	Engineering Physics	3	0	2	4
3	EN3ES17	Basic Electrical Engineering	3	0	2	4
4	EN3ES26	Engineering Graphics	2	0	2	3
5	EN3ES27	Basic Programming with C	2	0	2	3
6	EN3ES30	Basic Civil Engineering & Mechanics	3	0	2	4
7	EN3NG01	Environmental Science	2	0	0	2
8	EN3HS01	History of Science and Technology	2	0	0	2
		Total	20	0	10	25
		Total Contact Hours	30			

SEMESTER II

Sr. No.	Course Code	Courses	L	T	P	Credit
1	EN3BS12	Engineering Mathematics-II	3	0	0	3
2	EN3BS14	Engineering Chemistry	2	0	2	3
3	EN3ES16	Basic Electronics Engineering	3	0	2	4
4	EN3ES18	Basic Mechanical Engineering	3	0	2	4
5	EN3ES28	Advanced Programming with C	2	0	2	3
6	EN3ES29	Engineering Workshop	0	0	2	1
7	EN3NG02	Universal Human Values & Professional Ethics	2	0	0	2
8	EN3HS10	Communication Skills	2	0	2	3
9	EN3NG11/ EN3NG12/ EN3NG13/ EN3NG14/ EN3NG15	Club Activities/ NSS/NCC/Yoga/Sports	1	0	0	1
		Total	18	0	12	24
		Total Contact Hours	30			



SEMESTER – III

Sr. No.	Course Code	Courses	L	T	P	Credit
1	CS3BS04	Discrete Mathematics	3	0	0	3
2	CS3CO28	Data Communication	3	0	0	3
3	CS3CO30	Object Oriented Programming	3	0	2	4
4	CS3CO31	Data Structures	3	0	2	4
5	CS3CO32	Java Programming	2	0	2	3
6	CS3CO33	Digital Electronics	3	0	2	4
7	CS3CO34	Computer System Architecture	3	0	0	3
8	EN3NG03	Soft Skills-I	2	0	0	2
		Total	22	0	8	26
		Total Contact Hours	30			

SEMESTER – IV

Sr. No.	Course Code	Courses	L	T	P	Credit
1	CS3CO35	Microprocessor and Interfacing	3	0	2	4
2	CS3CO37	Advanced Java Programming	2	0	2	3
3	CS3CO39	Database Management Systems	3	0	2	4
4	CS3CO46	Theory of Computation	3	0	0	3
5	CS3CO47	Operating Systems	4	0	2	5
6	CS3ELXX	Elective-1	3	0	2	4
7	EN3NG10	Soft Skills-II	2	0	0	2
		Total	20	0	10	25
		Total Contact Hours	30			



Scheme of B.Tech -Computer Science &Engineering 2024

SEMESTER – V

Sr. No.	Course Code	Courses	L	T	P	Credit
1	CS3CO40	Software Engineering	3	0	2	4
2	CS3CO43	Computer Networks	4	0	2	5
3	CS3ELxx	Elective-2	3	0	2	4
4	CS3ELxx	Elective-3	3	0	2	4
5	EN3HS04	Fundamentals of Management, Economics & Accountancy	3	0	0	3
6	EN3NG09	Soft Skills-III	2	0	0	2
8	OE000xx	Open Elective-1	3	0	0	3
9	EN3NG11/ EN3NG12/ EN3NG13/ EN3NG14/ EN3NG15	Club Activities/ NSS/NCC/Yoga/Sports	1	0	0	1
		Total	22	0	8	26
		Total Contact Hours	30			

SEMESTER – VI

Sr. No.	Course Code	Courses	L	T	P	Credit
1	CS3CO44	Compiler Design	4	0	2	5
2	CS3CO45	Design and Analysis of Algorithms	4	0	2	5
3	CS3ELxx	Elective-4	3	0	0	3
4	CS3ES15	Research Methodology	3	0	0	3
5	CS3ELXX	Elective-5	3	0	0	3
6	CS3PC04	Mini Project	0	0	4	2
7	EN3NG08	Soft Skills-IV	2	0	0	2
8	OE000XX	Open Elective-2	3	0	0	3
		Total	22	0	8	26
		Total Contact Hours	30			



Scheme of B.Tech -Computer Science &Engineering

SEMESTER –

VII

Sr. No.	Course Code	Courses	L	T	P	Credit
1	CS3ELXX	Elective-6	3	0	0	3
2	CS3PC03	Industrial Training	0	2	0	2
3	CS3PC05	Project-I	0	0	8	4
4	OE000XX	Open Elective-3	3	0	0	3
5	EN3NG06	Open Learning Courses	1	0	0	1
Total			7	2	8	13
Total Contact Hours			17			

SEMESTER

VIII

Sr. No.	Course Code	Courses	L	T	P	Credit
1	CS3PC08	Project-II	0	0	20	10
Total			0	0	20	10
Total Contact Hours			20			

Total Credits

175

Summary of Credits

S.NO	Course Work	Total Credits	Credits as per Model scheme
1	Basic Sciences (BS)	16	10-15% (16-24)
2	Engineering Sciences (ES)	29	15-20% (24-32)
3	Humanities and Social Sciences (HS)	8	5-10% (8-16)
4	Core Courses (CO)	59	30-40%(48-64)
5	Program Electives (EL)	21	10-15%(16-24)
6	Open Electives (OE)	9	5-10%(8-16)
7	Project Work, Seminar	18	10-15%(16-24)
8	Non Grading	15	(11-16)

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MEDI-CAPS UNIVERSITY
Department of Computer Science & Engineering
Choice Based Credit System- Scheme of B.Tech. All Branches (2024 Batch)

SEMESTER I

Sr. No.	Course Code	Courses	L	T	P	Credit
1	EN3BS11	Engineering Mathematics-I	3	0	0	3
2	EN3BS16	Engineering Physics	3	0	2	4
3	EN3ES17	Basic Electrical Engineering	3	0	2	4
4	EN3ES26	Engineering Graphics	2	0	2	3
5	EN3ES27	Basic Programming with C	2	0	2	3
6	EN3ES30	Basic Civil Engineering & Mechanics	3	0	2	4
7	EN3NG01	Environmental Science	2	0	0	2
8	EN3HS01	History of Science and Technology	2	0	0	2
		Total	20	0	10	25
		Total Contact Hours	30			



Course Code	Course Name	Hours per week			Total	
		L	T	P	Hours	Credit
EN3BS11	Engineering Mathematics-I	3	0	0	3	3

Course Learning Objectives (CLOs):

CLO₀₁ To impart analytical ability of using concepts of matrices in various fields of engineering.

CLO₀₂ To explain the concept of Differential Calculus.

CLO₀₃ To discuss the concept of Integral Calculus and its applications.

CLO₀₄ To impart analytical ability in solving Ordinary Differential Equations of first and Higher order.

CLO₀₅ To impart basics of complex number and variables including concepts of analytical functions.

Unit I Matrices and Linear Systems

Rank and Nullity of a Matrix by reducing it into Echelon and Normal Forms, Solution of Simultaneous equations by elementary transformation methods, Consistency and Inconsistency of Equations, Eigen Values and Eigen Vectors.

Unit II Differential Calculus

Introduction to limit continuity, differentiability, Rolle’s theorem, Mean value theorem, Taylors and Maclaurin’s series expansions. Functions of Several variables, Partial differentiation, Euler’s Theorem, Total Derivative, Maxima and Minima of function of two variables.

Unit III Integral Calculus

Definite Integral as a limit of sum and its application in summation of series, Beta and Gamma functions (Definitions, Relation between Beta and Gamma functions without proof, Duplication formula without proof). Multiple Integral (Double and Triple Integrals), Change the Order of Integration, Applications of Multiple Integral in Area, Volume.

Unit IV Ordinary Differential Equations

First order differential equations (Separable, Exact, Homogeneous, Linear), Linear differential Equations of second and higher order with constant coefficients, Homogeneous linear differential equations, Simultaneous linear differential equations.

Unit V Complex Variable

Basics of Complex number, Functions of complex variable: Analytic functions, Harmonic Conjugate functions, Cauchy-Riemann Equations, Complex Line Integral, Cauchy’s Theorem, Cauchy’s Integral Formula.

Text books:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, New Delhi.
2. H.K. Dass, *Higher Engineering Mathematics*, S. Chand & Company Pvt LTD., New Delhi

References:

1. B.V. Ramana, Higher Engineering Mathematics, Tata McGraw Hill Pub. Co. Ltd., New Delhi.
2. Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons.
3. R.K. Jain and S.K. Iyengar, Advanced Engineering Mathematics, Narosa Pub. House, New- Delhi.

Web Source:

1. <http://nptel.ac.in/courses/111108066/>
2. <http://nptel.ac.in/courses/111104085/>
3. <https://swayam.gov.in/courses/public>
4. <http://nptel.ac.in/course.ph>

Course Outcomes (COs):

After completion of this course the students shall be able to:

- CO01** To illustrate the tools of matrices in solving the system of simultaneous equations,
- CO02** To investigate the tools of differential calculus to relevant fields of engineering and can implement the concept of several variables.
- CO03** To relate the integral calculus to relevant fields of engineering and can translate the concept of multiple integrals in finding area of regions and volume of solids.
- CO04** To solve Ordinary Differential Equations using different methods.
- CO05** To relate the knowledge of complex number and categorize it in solving functions of several complex numbers.

Course Code	Course Name	Hours per Week			Credits
		L	T	P	
EN3BS16	Engineering Physics	3	0	2	4

Course Learning Objectives (CLOs):

- CLO₀₁** Understand the concept of Quantum Mechanics.
- CLO₀₂** Know about the optical phenomenon like Interference, diffraction, and polarization with their use in daily life.
- CLO₀₃** Learn and understand about the concept of nuclear size, shape, and its various properties.
- CLO₀₄** Understand the concept of crystal structure and its basics.
- CLO₀₅** Learn about the solid-state Physics and concept of the superconductivity.
- CLO₀₆** Gain Knowledge of about concepts and application of Laser and Optical fibre.

Unit-I Quantum mechanics

Limitations of Classical Mechanics, De-Broglie hypothesis for matter waves, Phase and group velocity, wave packet, Heisenberg's uncertainty principle, Compton scattering, wave function, Schrodinger's Time dependent and time independent wave equation, Particle in a box problem.

Unit-II Wave Optics

Interference: Fresnel's biprism experiment, Newton's ring experiment. Diffraction of light: Fraunhofer diffraction for single slit, Grating and its types, and Rayleigh criterion of Resolution. Polarization: General concept of Polarization, Huygens theory of double refraction, Engineering Applications of Polarization.

Unit-III Nuclear Physics

Nuclear Structure, Nuclear model: Liquid drop model, Semi-empirical mass formula (Qualitative study), Shell model, Particle accelerators: LINAC, Cyclotron, Synchrotron (Qualitative study), Betatron. Geiger-Muller (GM) counter, Bainbridge Mass Spectrograph.

Unit-IV Solid State Physics

Crystal Physics: Unit cell, Crystal System, Types of Unit cell: Simple cubic, Face centred cubic, Body centred cubic Crystal, Number of atoms per unit cell, Packing fraction in different cubic lattices, Miller indices. Band theory of solids: Free Electron model, Band Model, Fermi level for Intrinsic and Extrinsic Semiconductors, Hall effect. Superconductivity: Zero resistance, persistent currents, superconducting transition temperature (T_c), Meissner effect, Type-I and Type-II superconductors, Engineering applications of superconductivity.

Unit-V: Laser and Fiber Optics

Lasers: Properties of lasers, Spontaneous and Stimulated emission of radiation, Einstein's A & B coefficient, Population inversion, Components of Laser, Ruby Laser, He-Ne Laser, Engineering applications of lasers. Fiber Optics: Fundamental idea about optical fibre, propagation of light through optical fibre acceptance angle, numerical aperture, fractional refractive index change, Classification of fibre, V number, Engineering applications of fibre.

Textbooks:

1. A Text book of Optics, N. Subramanyam and Brij Lal, S. Chand, New Delhi, 2010.
2. Engineering Physics, H. K. Malik and A. K. Singh, Tata McGraw Hill New Delhi, 2010
3. Concepts of Modern Physics A. Beiser, Tata McGraw Hill New Delhi.
4. Engineering Physics, Gaur and Gupta, Dhanpat Rai Publications.

References:

1. An Introduction to Lasers- Theory and Applications. Dr. M N. Avadhanulu, Dr. R. S. Hemne S. Chand Publications.
2. Optics, A. Ghatak: 4th Edition, Tata McGraw-Hill, New Delhi 2009.
3. An Introduction to Fiber Optics, Ghatak and Thiagarajan, Cambridge University Press.
4. Solid State Physics by Kittel, Wiley India
5. A Text book of Physics – N. Gupta & S.K. Tiwary, Dhanpat Rai & Co., Delhi
6. Quantum Mechanics by Ghatak & Loknathan, Macmillian India Ltd-new Delhi Revised Edition 2019.

List of Practical's List of suggestive core experiments (Any 10 experiments from the list of 15)

Quantum Mechanics

1. Determination of Planck's constant (h) using light emitting diode (LED) of various colors.
2. To study black body Radiation by PhET Simulation.

Wave Optics

3. To determine the radius of curvature of plano convex lens using Newton's ring experiment.
4. To determine wavelength of spectral lines of mercury vapor lamp with the help of grating and
 - a. spectrometer.
5. To determine the specific optical rotation of sugar solution by biquartz polarimeter.
6. To determine the wavelength of given sodium vapor lamp using Fresnel's Biprism.

Nuclear Physics

7. To understand Rutherford scattering using Ph ET Simulation module.
8. Determining the specific charge of the electron **Solid State Physics**
9. To study the Hall Effect experiment and calculate the charge carrier concentration (density) of given semiconductor diode.
10. To determine the energy band gap of semiconductor diode.

11. To study V-I characteristics of semiconductor diode and Zener diode.

Laser and Fiber Optics

12. To measure the beam divergence and beam waist of laser beam.

13. To measure the numerical aperture of an optical fiber by scanning method.

14. To find the thickness of thin wire using laser.

15. To establish a fiber optic analog link and study of bending loss in optical fiber.

Course Outcomes (COs):

After completion of this course the students shall be able to:

CO₀₁ : Gain a solid understanding of the fundamental principles and postulates
Of quantum mechanics.

CO₀₂ : Understand the principle of Interference, diffraction, and polarization.

CO₀₃ : Learn and understand about the concept of nuclear size, model and it's
Various types of accelerators.

CO₀₄ :Understand the electrical behaviour of electrons in solids using model.

CO₀₅ :Acquire and analyse the knowledge of Crystal structure and Solid-state Physics.

CO₀₆ :Understand the basic principles of various laser and optical fibres.

Course Code	Course Name	Hours per Week			Total Credits
		L	T	P	
EN3ES17	Basic Electrical Engineering	3	0	2	4

Course Learning Objectives (CLOs):

- CLO01** To Impart a basic knowledge of electrical quantities such as current, voltage & power and analyse the DC network problem.
- CLO02** To Provide working knowledge of AC supply and circuits used in electrical technology and analyse their concepts in various application.
- CLO03** To impart the basic knowledge about the magnetic circuits
- CLO04** To understand the working phenomenon and daily life application of electrical machines like Transformer, 1-phase and 3 phase AC motor and DC machine.
- CLO05** To gain the knowledge of Electrical power generation and installation.

Unit-I: DC Circuit Analysis

Elements and characteristics of electric circuits, ideal and practical sources, independent and dependent electrical sources, Ohm's law, source transformation, Kirchhoff's laws. Mesh analysis, nodal analysis, voltage and current division rules, star-delta conversions, Thevenin's and Norton's theorems.

Unit-II: AC Circuit Analysis

Generation of sinusoidal AC voltage, average and RMS values, concept of phasor, analysis of series RL, RC and RLC circuits, power triangle, power factor, series resonance, Generation of three phase voltages, advantages of three phase systems, star and delta connections (balanced only), relation between line and phase quantities.

Unit-III: Magnetic Circuits

Definitions of terms (m.m.f, reluctance, flux, magnetic flux density, magnetic field intensity, absolute & relative permeability), B-H curve - Hysteresis loop, Faradays laws of electromagnetic induction, analogy between electric and magnetic circuits, self inductance and mutual inductance, coefficient of coupling, coils connected in series and parallel, Types of induced EMF's, Simple problems.

Unit-IV: Electrical Machines

Single Phase Transformer: Construction & Working principle, simple problems on transformation ratio. DC Motor: Construction & Working principle. Three Phase Induction Motor: Types, Construction, and Working principle, Single Phase Induction Motor: Double revolving field theory and Working Principle, Starting methods

Unit-V: Electrical Energy Generation and Electrical Installation

Single line diagram of power generation to distribution, Block diagram representation of hydro and thermal power plants.

Electrical Installation: Fuse, MCB, Types of Wires and Cables, Earthing, Energy Billing – sample calculation.

Text Books:

1. V.N. Mittal & Mittle, Basic Electrical Engineering, Tata McGraw - Hill
2. D.P. Kothari and I. J, Nagrath, Basic Electrical Engineering, Tata McGraw - Hill.
3. B.L Theraja & A.K Theraja, A Text Book of Electrical Technology- volume-1, S Chand
4. V.K. Mehta, Rohit Mehta, Basic Electrical Engineering, S. Chand .

Reference Books:

1. D. C. kulshreshtha, Basic Electrical Engineering– McGraw Hill Education.
2. T.K.Nagasarkar and M.S. Sukhija, Basic Electrical Engineering – Oxford University.
3. M.S.Naidu and S. Kamakshiah, Basic Electrical Engineering – TMH.
4. J.B.Gupta, Basic Electrical Engineering– S K Kataria and Sons

Course Outcomes (COs):

After the completion of the course the student should be able to:

- CO01** Apply the concepts of KVL, KCL and network theorems in solving DC circuits.
- CO02** Illustrate the steady state behaviour of single phase and three phase AC circuits.
- CO03** Understand and analyze magnetic circuits.
- CO04** Describe different types of static and rotating electrical machines.
- CO05** Discuss the concept of power generation and illustrate domestic wiring system along with all protective measures.

List of Experiments:

1. Verification of Ohms Law
2. Verification of KCL & KVL
3. Verification of Thevenin's theorem
4. Verification of Norton's theorem.
5. Calculations and Verification of Impedance and Current of RL, RC and RLC series circuits.
6. Measurement of active power, reactive power & apparent power of a single-phase AC circuit.
7. Verification of relation between line and phase quantities in a three-phase system (Star & Delta).
8. Determine the voltage ratio and polarity of single-phase transformer.
9. Measurement of Voltage, Current and Real Power in primary and secondary circuits of a Single-Phase Transformer.
10. To find out fusing factor and plot characteristic of fuse.
11. Demonstration of cut-out sections of machines: dc machine, three phase induction machine.

Course Code	Course Name	Hours Per Week				
		L	T	P	Hrs.	Credits
EN3ES26	Engineering Graphics	2	0	2	4	3

Course Learning Objectives:

- CL01 To familiarize with the principle of orthographic projection, points and lines.
- CL02 To familiarize with the projection of 2D and 3D elements
- CL03 To familiarize with the projection, sectioning and development of solids.
- CL04 To familiarize with the AUTOCAD Drawing Software and its use.
- CL05 To familiarize with the advanced commands of AUTOCAD and their uses.

Unit –I

Orthographic Projection of Point and line

Introduction of orthographic projection: Reference planes, types of orthographic projections– First angle projections, Third angle projection.

Projections of points: Including points in all four quadrants

Projections of lines: Line parallel to reference plane, perpendicular to reference plane, inclined to one reference plane, inclined to both reference planes, traces of line.

Unit-II

Orthographic Projection of Planes and solids

Orthographic Projections of Planes: Projections of Planes in different Positions

Orthographic Projection of Solids: Classification of solid. Projections in simple and complex positions of the axis of the solid.

Unit-III

Section of solids and development of surfaces

Sections of Solids: Sectional views and true shape of the section.

Development of Surfaces: Prism, Pyramid, Cone and Cylinder.

Unit-IV

Introduction to Auto CAD and its basic commands

User Interface – Menu system – coordinate systems, axes Tool bars (draw, modify, annotations, layers, Blocks etc.) Status bar (ortho, grid, snap, iso etc.), Utility commands.

Drawing Tools : Line, polyline, Circle, arc Rectangle, polygon Ellipse, Elliptical arc, spline Spline Edit, Xline, Ray, Points Measure, Divide , Donut, , hatch, Gradient, CAD, advantages and limitation of auto cad.

Unit-V

Some advance commands of auto cad and orthographic projection using auto cad

Advance commands: Annotations Dimensions, dimension setting Linear dimension, Aligned dimension, Angular dimensions, arc length, Radius Diameter, ordinates, jogged Base line dimension, Dim base Continuous dimension TEXT: Text style, single text, multi text

TOOLS Property: color, line type, Line weight, Match properties

LAYERS Create layers, Edit layers properties Layer control (hide, freeze, lock Layout lock, print lock)

Orthographic Projection using Auto CAD: Various Objects (Conversion of Pictorial Views to Orthographic Views)

Text Books:

- N.D. Bhatt, Elementary Engineering Drawing, Chartor Publishing House.
- D. N. Johle, Engineering Drawing, Tata Mcgraw-hill Publishing Co. Ltd.
- P.S. Gill, Engineering Graphics, S.K. Kataria and Sons.
- Warren J. Luzzader, Fundamentals of Engineering Drawing, Prentice Hall of India, New Delhi.
- F. E. Giesecke, A. Mitchell & others, Principles of Engineering Graphics, Maxwell McMillan Publishing.
- K.C. John, Engineering Graphics for Degree, PHI Learning Pvt. Ltd.

References:

- Engineering Drawing- Basant Agarwal, TMH
- D. M. Kulkarni, A. P. Rastogi, and A. K. Sarkar (2009), Engineering Graphics with AutoCAD, PHI Learning Private Limited, New Delhi
- Venugopal (2010), Engineering Drawing and Graphics, 2nd edition, New Age Publications, New Delhi.
- Trymbaka Murthy (2007), Computer Aided Engineering Drawing, I.K. International Publishers, New Delhi.
- R.B. Choudary (2005), Engineering graphics with Auto CAD, Anuradha Publishers, New Delhi

Course Outcomes (COs):

After completion of this course the students shall be able to:

- CO01** Familiarize with different drawing equipment's and technical standards. Create and read an engineering drawing using standard views and have ability to Convert pictorial (3D) drawings to orthographic (2-D) drawings. Understand the projection of points, straight lines and have the ability to convert the practical problems in to projections
- CO02** To understand and apply concepts of the projection of simple planes & solids.



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- CO03** Understand and apply the concepts of Projection, Sections and development of solids
- CO04** To understand basic commands of AUTOCAD and its use.
- CO05** Convert simple 2D orthographic projections into 3D isometric projections with the help of auto cad commands



Course Code	Course Name	Hours per Week			Total
		L	T	P	Credits
EN3ES27	Basic Programming with C	2	0	2	3

Course Learning Objectives (CLOs):

- CLO01** Analyse Basics of Computers, programming environment and about different types of Programming languages.
- CLO02** Application of various basic concepts required to create programs, use good problem-solving approach.
- CLO03** Use different control structures for conditional programming.
- CLO04** Use of Arrays and string in different problems and also to apply different operations on arrays and strings.
- CLO05** Use the functions and procedures to solve different problems.

Unit-I Introduction to Computer and Problem-Solving Methodology

Computer System, Computing Environments, Software, Types of Software and Features of Software.

Design Tools (Algorithm, Flow-Chart, Pseudo-Code). Types and Generations of Programming Languages. Compiler, Interpreter, Linker, Loader, Execution of Program. Develop an Algorithm for Simple Problems.

Unit-II Basics of Language

Character set, Identifier, Keywords, Constants, Data Types, Preprocessor Directives, Variables and Declaration, White Space and Escape Sequence, Operators and Expressions, Type Conversions, Operator Precedence and Associativity, Expression Evaluation, Input and Output Functions. Computational Problems Solving Based on above Constructs.

Unit-III Control Statements

Selection (If, Else), Conditional Operator, Iteration (For, While, Do-While), Branching (Switch, Break, Continue, Goto), Nesting of Control Statements. Problem Solving Based on Control Statements.

Unit-IV Arrays and Strings

Defining an Array, One Dimensional Array, Two-Dimensional Array, Multi-Dimensional Array. Basic Array Operations and Matrix Manipulation Operations (Addition, Subtraction, and Multiplication). Problem Solving Based on Array.

Strings Definition, String Operations and String Functions. Problem Solving Based on Strings.

Unit-V Functions

Introduction, Functions Declaration, Definition, Calling, Return Statement, Parameter Passing (By Value), Recursion, Library Functions. Problem Solving Based on Functions.

Text Books:

1. Herbert Schildt, C: The complete Reference, Fourth Edition, Mc-GrawHill.
2. R. Sethi, Programming Language Concepts and Constructs, Pearson Education.
3. V. Rajaraman, Computer Programming in 'C', PHI.
4. M. Sprankle, Programming and Problem Solving, Pearson Education.
5. R.G. Dromey, How to solve it by Computer, Pearson Education.
6. E. Balaguruswamy, Programming in ANSI C by, Tata Mc-GrawHill.
7. Yashavant Kanetkar, Let Us C, BPB.
8. E. Balagurusamy, Fundamentals of Computers, TMH.

References:

1. Kernighan and Ritchie , The 'C' programming language, PHI
2. Programming With C, Schaum Series.
3. A. N. Kamthane, Programming with ANSI and Turbo C, Pearson Education.

Course Outcomes (COs):

After completion of this course the students shall be able to:

- CO₀₁** Understand Basics of Computers and Programming languages.
- CO₀₂** Understand basic concepts of C programming language required to create programs.
- CO₀₃** Apply different types of control structures in problem solving.
- CO₀₄** Use of Arrays and string in different problems and also to apply different operations on arrays and strings.
- CO₀₅** Apply and use the functions and procedures to solve different problems.

List of Practical

1. Write a program to print hello user on output screen.
2. Write a program to perform arithmetic operation on two numbers.
3. Write a program to find sum of individual digits of any three digits number.
4. Write a program to print any three-digit number in reverse order.
5. Write a program to swap any two numbers using third variable and without using third variable.

6. Write a program to check given number is even or odd.
7. Write a program to check given char is vowel or consonant.
8. Write a program to check given number is positive or negative.
9. Write a program to check given year is leap year or not.
10. Write a program to check given number in range of 100-200 or not.
11. Write a program to check given number is palindrome or not.
12. Write a program to print grade of student on the basis of percentage:
 - a. If per greater than or equal to 75 A grade
 - b. If per between 60-75 B grade
 - c. If per between 50-60 C grade
 - d. If per between 40-50 D grade
 - e. If per less than 40 Fail
13. Write a program for addition subtraction multiplication division using switch case.
14. Write a program to print table of any number.
15. Write a program to calculate factorial of any number.
16. Write a program to print series of alphabet.
17. Write a program to print Fibonacci series.
18. Write a program to check given number is perfect or not
19. Write a program to check given number is prime or not.
20. Write a program to check given number is Armstrong or not
21. Write a program to print number in word in between 1-5. Like (1 =one)
22. Write a program to check given char is vowel or consonant.
23. Write a program to print name of month according to number.
24. Write a program for convertor.
 - For currency convertor
 - For temperature convertor
 - For weight convertor
 - For length convertor
 - For time convertor
 - For energy convertor
25. Write a program to print series of number from 1-100 without using loop.



26. Write a program to find maximum & minimum number from array.
27. Write a program to check how many numbers is prime & not prime in a list
28. Write a program to check how many digits at each index of array.
29. Write a program to check (search) given number is present or not present in list.
30. Write a program to arrange (sort) array elements in ascending or descending order.
31. Write a program to print a 2*2 matrix.
32. Write a program to find sum of two matrix.
33. Write a program to find multiplication of two matrix.
34. Write a program of string functions.
35. Write a function to find sum of two numbers.
36. Write a function to calculate factorial of any number.
37. Write a function for call by value to find sum of two numbers.
38. Write a function to pass an integer array as an argument and find sum of array elements
39. Write a function to pass a char array as an argument and find length of string.
40. Write a recursive function to calculate factorial of any number.
41. Write a program to find the no of char no of word and no of lines from given text input.

Course Code	Course Name	Hours per Week			Total	Total
		L	T	P	Hrs.	Credits
EN3ES30	Basic Civil Engineering & Mechanics	3	0	2	5	4

Course Learning Objectives (CLOs):

CLO₀₁ To understand the utility of various types of building materials.

CLO₀₂ To determine the location of object on ground surface.

CLO₀₃ To understand the location, construction detail and suitability of various building elements.

CLO₀₄ To understand the effects of system of forces on rigid body in static conditions.

CLO₀₅ Analysis of determinate structure (beam & truss).

Unit- I Building Materials & Construction

Stones, bricks, cement, lime, timber-types, properties, test & uses, laboratory tests concrete and mortar Materials: Workability, Strength properties of Concrete, Nominal proportion of Concrete preparation of concrete, compaction, curing.

Elements of Building Construction, Foundations conventional spread footings, RCC footings, floors, staircases – types and their suitability

Unit II Surveying & Levelling

Surveying-classification, general principles of surveying–Basic terms and definitions of chain, Chain survey, Compass survey and levelling.

Unit III Mapping & Sensing

Mapping details and contouring, Profile Cross sectioning and measurement of areas, volumes, application of measurements in quantity computations, Survey stations.

Unit IV Forces & its applications

Graphical and Analytical Treatment of Concurrent and nonconcurrent Co- planner forces, Free Body Diagram, Force Diagram and Bow’s notations.

Application of Equilibrium Concepts: Analysis of plane Trusses: Method of joints, Method of Sections. Frictional force in equilibrium problems.

Unit-V Shear force and Bending moment

Introduction of shear force and bending moment and their sign conventions, Types of loads, Types of beams, Types of supports; Shear force and bending moment diagrams for simply supported, overhang and cantilever beams subjected to any combination of point loads, uniformly distributed load, and point moment; Relationship between load, shear force and bending moment.

Textbooks

- 1.S.C. Rangwala, Building materials, Charotar Publishing House, Pvt. Limited.
2. S. Ramamrutham , Basic Civil Engineering and Engineering Mechanics, Dhanpat Rai.
3. K. K. Dwivedi & K.K. Shukla, Basic Civil Engineering & Engineering Mechanics, Dhanpat Rai & Co.2017 (Revised).

References:

1. K. V. B. Raju and P. T. Ravichandran, Basics of Civil Engineering, Ayyappa Publications, Chennai, 2012.
2. S. Gopi, Basic Civil Engineering, Pearson Publishers, 2009.
3. M. S. Palanichamy, Basic Civil Engineering, Tata McGraw Hill.

Course Outcomes (COs)

After completion of this course the students shall be able to:

- CO1:** Understand concepts and terminologies of building, Construction materials, surveying and mechanics.
- CO2:** Apply various methods for surveying and mechanics.
- CO3:** Determine the location, area and volume of ground.
- CO4:** Solve the problems of surveying and mechanics by using various methods.
- CO5:** Analyse the effects of system of forces on rigid bodies in static conditions.

List of Practicals:

1. To determine particle size distribution & fineness modulus of coarse and fine aggregates.
2. To determine standard consistency, Initial & Final Setting time of cement paste using Vicat's Apparatus.
3. To determine the workability of fresh concrete of given proportion by slump cone test.
4. To determine the Crushing Strength of Brick by using CTM.
5. To determine the Compressive Strength of Concrete Sample by CTM.
6. To determine the area of land by chain surveying.
7. To perform traverse surveying with prismatic compass check for local attraction and determine corrected bearing and to balance the traversing by Included Angle Method.

8. To perform levelling by height of Instrument & Rise and Fall method.
9. To find the support reactions of a given truss and verify analytically.
10. To perform Plane Table Surveying work by radiation method.

Course Code	Course Name	Hours per Week			Credits
		L	T	P	
EN3NG01	Environmental Science	2	0	0	2

Course Learning Objectives (CLOs):

- CLO₀₁** To impart knowledge of Environment and its basic components.
- CLO₀₂** To build basic understanding of various effects of human activities to the environment.
- CLO₀₃** To understand concepts of water pollution
- CLO₀₄** To understand function of solid waste management
- CLO₀₅** To learn concepts of disaster management

Unit-I Ecosystem and Biodiversity

Concept of Ecosystem, Food Chains, Food Webs, Energy flow in an ecosystem.
 Biodiversity: Introduction, Types, Significance and Conservation.

Unit-II Air Pollution

Causes, Effects and Control of Air Pollution, Greenhouse Effect - Climate changes and Global warming, Ozone layer depletion, Acid Rain.
 Case studies on recent cases of air pollution and management.

Unit-III Water Pollution

Causes, Effects and Control of Water Pollution, DO, BOD and COD, Water sampling, Municipal water treatment.

Unit-IV Solid Waste Management

Introduction, Types of solid waste, Harmful effects of solid waste, Methods to manage and modern techniques for solid waste management.

Unit-V Disaster Management

Concept of Disaster, Types of Disaster, Pre-disaster risk and vulnerability reduction, Post disaster recovery and rehabilitation.
 Case studies on recent disasters and management.

Textbooks:

1. Preeti Jain, S.L.Garg, K.G.Garg, Energy, Environment, Ecology and Society, Variety Publication.
2. Surinder Deswal, Environmental Science, Dhanpat Rai & Co. publication.
3. R. Rajgopalan, Environmental Studies, Oxford IBH Publication.

References:

1. G. M. Masters, Introduction to Environmental Science and Engineering, Pearson Education Pvt. Ltd.
2. K. De, Environmental Chemistry, New Age International.
3. Daniel D. Chiras, Environmental Science, Jones & Bartlett Ltd.

Course Outcomes (COs):

After completion of this course the students shall be able to:

- CO₀₁** Gain knowledge of Ecosystem & Biodiversity.
- CO₀₂** Develop basic understanding of air pollution and its control method
- CO₀₃** Develop basic understanding of water pollution and its control method
- CO₀₄** Gain knowledge of Solid waste management and its importance.
- CO₀₅** Gain knowledge of Disaster Management.

Course Code	Course Name	Hours per Week			Credits
		L	T	P	
EN3HS01	History of Science and Technology	2	0	0	2

Course Learning Objectives (CLOs):

- CLO01** To know the historical perspective of science and technology in India, its roots and its role.
- CLO02** To know how research and development field is progressing in India.
- CLO03** To know what were the policies and plans are proposed after independence to be technologically sound.
- CLO04** To Know what were the developments done in major areas of science & technology.
- CLO05** To know the relationship between the technologies.

Unit-I Historical Perspective

Nature of science and technology, Roots of science and technology in India, Role of Science and Scientists in society, Science and Faith.

Unit-II Research and Development (R&D) in India

Science and Technology Education, Research activities and promotion of technology development, Technology mission, Programs aimed at technological self-reliance, activities of council of scientific and industrial research (CSIR).

Unit-III Policies and Plans after Independence

Nehru's vision of science for independent India, Science and technology developments in the new era, science and technology developments during the Five-Year Plan Periods and science and technology policy resolutions.

Unit-IV Science and Technological Developments in Major Areas

Space – Objectives of space programs, Geostationary Satellite Services – INSAT system and INSAT services remote sensing applications, Launch Vehicle Technology. Ocean Development. Objectives of ocean development, marine research. Biotechnology - Applications of biotechnology in medicine, agriculture, food, and fuel. Energy – Research and development in the field of nonconventional energy resources, India's nuclear energy program.

Unit-V Nexus between Technologies

Transfer of Technology – Types, Methods, Mechanisms, Process, Channels and Techniques, Appropriate technology, Technology assessment, Technological forecasting, Technological innovations and barriers of technological change.

Textbooks:

1. K. Rajaram, Science and Technology in India, Published and Distributed by SpectrumBooks (P) Ltd., New Delhi.
2. M. Srinivasan, Management of Science and Technology (Problems & Prospects), East- West Press (P) Ltd., New Delhi.
3. G.R. Kohili, The Role and Impact of Science and Technology in the Development of India, Surjeet Publications.
4. Government of India, Five Year Plans, Planning Commission, New Delhi.
5. K.D. Sharma, and M.A. Qureshi, Science, Technology and Development, Sterling Publications (P) Ltd., New Delhi.

References:

1. Suvobrata Sarkar , History of Science, Technology, Environment, and Medicine in India, Published by Routledge India.
2. Sabareesh P.A. , A Brief History Of Science In India. Published by Garuda rakashan.
3. G. Kuppuram, K. Kumudamani, History of Science and Technology in India, Published by Sundeep Prakashan.

Course Outcomes (COs):

After completion of this course the students shall be able to:

- CO01** Student will be aware about the ancient India & the existence of science & technology in that era & how it is reciprocated.
- CO02** Student will be aware about the upliftment done in the field of R & D after independence.
- CO03** Student will come to know about the plans and policies that brought about radical changes for the growth of science in India.
- CO04** Student will come to know about the major areas of the applied science and their existence. And can set the relationship between the technologies.
- CO05** Students will understand the need of technology transfer, its types and processes.



SEMESTER II

Sr. No.	Course Code	Courses	L	T	P	Credit
1	EN3BS12	Engineering Mathematics-II	3	0	0	3
2	EN3BS14	Engineering Chemistry	2	0	2	3
3	EN3ES16	Basic Electronics Engineering	3	0	2	4
4	EN3ES18	Basic Mechanical Engineering	3	0	2	4
5	EN3ES28	Advanced Programming with C	2	0	2	3
6	EN3ES29	Engineering Workshop	0	0	2	1
7	EN3NG02	Universal Human Values and Professional Ethics	2	0	0	2
8	EN3HS02	Communication Skills	2	0	2	3
9	EN3NG11/ EN3NG12/ EN3NG13/ EN3NG14/ EN3NG15	Club Activities/ NSS/NCC/Yoga/Sports	1	0	0	1
		Total	18	0	12	24
		Total Contact Hours	30			



Course Code	Course Name	Hours per week			Total	
		L	T	P	Hours	Credit
EN3BS12	Engineering Mathematics-II	3	0	0	3	3

Course Learning Objectives (CLOs):

- CLO₀₁** To illustrate knowledge of Laplace Transform and investigate its application.
- CLO₀₂** To explain the concept of Fourier Series and Fourier Transform.
- CLO₀₃** To illustrate the concept of Partial Differential Equations.
- CLO₀₄** To impart the knowledge of Vector Calculus.
- CLO₀₅** To discuss numerical methods and to outline its application in solving algebraic, transcendental equations and system of linear equations.

Course Outcomes (COs):

After completion of this course the students shall be able to:

- CO1** To impact mathematical models involving ordinary and partial differential equations with given boundary condition which is helpful in all engineering and research work.
- CO2** To examine the general mathematical concepts required for the field regarding Laplace and Fourier Transform.
- CO3** To compare and contrast importance of partial differential equations in physical problems.
- CO4** To prioritize derivatives of vector- point functions, gradient functions, evaluate integral of functions over curves, surfaces and domains in two and three dimensional.
- CO5** To examine numerical techniques and investigate its application in solving algebraic and transcendental equations.

Unit I Laplace Transform

Introduction of Laplace Transform, Laplace Transform of elementary functions, properties of Laplace Transform, Inverse Laplace transform and its properties, Convolution theorem, Applications of Laplace Transform to solve the Ordinary Differential Equation, Laplacetransform of Unit step function and Impulse function.

Unit II Fourier Series and Fourier Transform

Introduction of Fourier series, Fourier series for Discontinuous functions, Fourier series for Even and Odd function, Half range series, Fourier Transform, Sine and Cosine Transform.

Unit III Partial Differential Equations

Definition, Formulation, Solution of Partial Differential Equations (By Direct Integration Method and Lagrange's Method), Non-Linear Partial Differential Equations of First order {Standard form I, II, III & IV}, Charpit's method. Partial Differential Equations with Constant Coefficients (Higher Orders Homogeneous), Method of Separation of Variables.

Unit IV Vector Calculus

Scalar and Vector fields, Vector Differentiation, Laplacian operator, Gradient, Divergence and Curl, Line and surface integrals, Green's theorem, Gauss Divergence theorem, Stoke's theorem.

Unit V Numerical Analysis

Errors and Approximations, Solution of Algebraic and Transcendental Equations (Regula Falsi, Newton-Raphson and Iterative methods), Solution of Simultaneous linear equations by Gauss Elimination, Gauss Jordan, Jacobi's and Gauss-Siedel Iterative methods.

Textbooks:

1. B.S. Grewal, *Higher Engineering Mathematics*, Edition-43, Khanna Publishers, New Delhi.
2. H. K. Dass, *Higher Engineering Mathematics*, S. Chand & Company Pvt LTD., New Delhi

References:

1. B.V. Ramana, *Higher Engineering Mathematics*, Tata McGraw Hill Publishing Company Ltd., New Delhi.
2. Shanti Narayan, *A textbook of Vector Calculus*, S. Chand & Co., New Delhi.
3. Erwin Kreyszig, *Advanced Engineering Mathematics*, John Wiley & Sons 1999.

Web Source:

1. nptel.ac.in/courses/111103021/15
2. nptel.ac.in/courses/111105035/22
3. <https://swayam.gov.in/courses/public>
4. <http://nptel.ac.in/course.php>

Course Code	Course Name	Hours per Week			Credits
		L	T	P	
EN3BS14	Engineering Chemistry	2	0	2	3

Course Learning Objectives (CLOs):

- CLO₀₁** To gain fundamental knowledge of the principles related to, so as to meet the challenging requirements of students in chemistry studies.
- CLO₀₂** To attain awareness in students about current & new issues in the fields of chemistry.
- CLO₀₃** To make students understand about the present needs without compromising on the ability of future generations to meet their own needs for proper engineering, relevant education efficient management of resources.
- CLO₀₄** To increase curiosity and give them awareness about practical knowledge of various laboratory methods among the students regarding the course.

Unit-I Lubricants

Introduction, Classification of lubricants, Mechanism of lubrication, Properties and Testing of lubricating oils (Flash and Fire point, Cloud and Pour point, Viscosity and Viscosity Index, Neutralization number, Saponification Number, Steam Emulsification Number, Aniline Point, Iodine Value), Numerical problems based on testing methods.

Unit -II Polymer

Introduction and Classification of polymer, Preparation, Properties and Uses of the following- Polythene, PVC, Teflon, Nylon 66, Bakelite, Silicone resin, Natural and Synthetic Rubber, Vulcanization of Rubber, Biopolymers, Biodegradable polymers.

Unit -III New Engineering Materials

Introduction, Properties and Applications of - Superconductors, Optical Fiber, Fullerenes, Graphene, Carbon nanotubes, Nanowires.

Unit -IV Instrumental Techniques in Chemical Analysis

Spectroscopy, Electromagnetic spectrum, Beer & Lambert's Law and its limitations, Principle, Instrumentation and Applications of-UV-Visible Spectroscopy, IR Spectroscopy, Gas Chromatography.

Unit- V Electrochemistry

Concept of Enthalpy, Entropy and Free energy, EMF, Applications of EMF measurements, Corrosion- Definition, Types, Causes and Protection from corrosion.

Text Books:

1. Preeti Jain, Anjali Soni, Jeetendra Bhawsar, A text book of Engineering Chemistry, 1st edition, Manthan Publication, 2016.
2. Preeti Jain, S L Garg, Engineering Chemistry, 4th edition, Variety Publication.
3. Shashi Chawla, Engineering Chemistry, 11th edition, Dhanpat Rai Publications.

References:

1. P C Jain, Monika Jain, Engineering Chemistry, Dhanpat Rai Publications.
2. S. S. Dara, A Text Book of Engineering Chemistry, S. Chand & Company.

Course Outcomes (COs):**After completion of this course the students shall be able to:**

- CO₀₁ To Understand the lubricants, their mechanism and practically analyze the properties of lubricants.
- CO₀₂ Will acquire betterment in lifestyle by understanding the need of bio polymers in the current scenario and replacing synthetic polymers with its bio-polymer substitute.
- CO₀₃ Will get familiarised with new engineering materials and their commercial applications.
- CO₀₄ Will get knowledge of using instrumental techniques and their applications for determination of chemical structure of any compound.
- CO₀₅ Identify various types of corrosion and methods to protect the metallic structures from corrosive environment.

List of Practicals:**Volumetric Analysis:**

1. To determine Hardness of given water sample by Complexometric titration.
2. To determine total and mixed Alkalinity of given water sample using phenolphthalein and methyl orange as indicator.
3. To determine strength of unknown FAS solution by Redox titration using N-Phenyl anthranilic acid as internal indicator.
4. To determine strength of unknown CuSO₄ solution by Iodometric titration using Starch as internal indicator.
5. To determine Chloride content of water sample by Mohr's method (Argentometric titration).

Fuel Testing:

1. To determine moisture content of given sample of coal by proximate analysis.
2. To determine volatile content of given sample of coal by proximate analysis.
3. To determine ash content of given sample of coal by proximate analysis.
4. To determine percentage carbon content of coal by proximate analysis.

Lubricant Testing:

1. To determine penetration number of grease by Cone Penetrometer apparatus.
2. To determine flash and fire point of given oil sample by Cleveland's open cup apparatus.
3. To determine flash point of given oil sample by Penskey Marten's close cup apparatus.
4. To determine flash point of given oil sample by Abel's Closecup apparatus.
5. To determine Steam emulsification number of given lubricant.
6. To determine Aniline point of given oil sample.
7. To determine Cloud and Pour point of given lubricating sample.
8. To study rate of change of viscosity with temperature of the given lubricating oil by means of Redwood Viscometer no.1
9. To study rate of change of viscosity with temperature of the given lubricating oil by means of Redwood Viscometer no.2.

Electrochemistry:

Variation of cell potential in $Zn/Zn^{2+}/Cu^{2+}/Cu$ with change in concentration of electrolytes ($CuSO_4$ or $ZnSO_4$) at room temperature.

Kinetics:

Effect of concentration and temperature on the rate of reaction between sodium thiosulphate and hydrochloric acid.

Course Code	Course Name	Hours per Week			Credits
		L	T	P	
EN3ES16	Basic Electronics Engineering	3	0	2	4

Course Learning Objectives (CLOs):

- CLO₀₁** To learn the basics of semiconductor materials and their usage in variety of PN junction diodes and applications of diodes
- CLO₀₂** To study transistor in different modes of configuration and basic biasing techniques, FET.
- CLO₀₃** To study of the fundamental concepts and various types of analog communication systems
- CLO₀₄** To study of the concept of number systems and Boolean Algebra, minimization, Logic gates and other Combinational circuits and their designing.
- CLO₀₅** To learn about basic Measurement & Instrument components.

Unit-I SEMICONDUCTOR DIODE

Semiconductor basics, PN Junction diode construction & working, Volt-amp characteristics, Diode current equation, Half wave rectifier, Full wave rectifier: Bridge and center tapped rectifier, Clipper and Clamper. Zener diode and zener diode-based voltage regulator, LED

Unit-II BIPOLAR JUNCTION TRANSISTOR

Construction and working of transistor, characteristics of transistor, transistor as an amplifier and switch, transistor configurations, transistor biasing and biasing methods, basic amplifier configurations, Basic principle and working of FET and MOSFET

Unit-III BASICS OF COMMUNICATION SYSTEMS

Block schematic of communication system, Simplex and duplex systems, Modes of communication: Broadcast and point to point communication, Necessity of modulation, Classification of modulation: Amplitude, phase, frequency modulation, sampling theorem and pulse amplitude modulation.

Unit-IV DIGITAL SYSTEM

Number Systems – Decimal, Binary, Octal, Hexadecimal, 1's and 2's complements, Codes – Binary, BCD, Excess 3, Gray, Boolean theorems, Minterms and Maxterms, Sum of products and products of sums, Karnaugh map Minimization, Logic gates: NOT, AND, OR, NAND, NOR, EX-OR and EX-NOR, half adder and full adder. Function and Structure of a Computer System, Von Neumann Architecture, and modern computers.

Unit-V ELECTRONICS MEASUREMENT

Introduction, Basics of Measurements, Ammeter, Voltmeter, multimeter, Signal Generators, Cathode Ray Oscilloscope: Block diagram of CRO, Construction of CRT, Deflection sensitivity and various controls, Measurement of voltage, current frequency and phase angle using CRO

Textbooks:

1. Millman and Halkias: Integrated electronics, TMH.
2. D Roy Choudhury, Digital Electronics, Vol-I & II, TMH Publication.
3. A.K.Sawhney, A Course in Electrical and Electronic Measurements and Instrumentation, Dhanpat Rai.
4. Simon Haykins, Communication System, John Willy.
5. Andrew S. Tanenbaum, Structured Computer Organization, Upper Saddle River.

References:

1. Sedra and Smith: Microelectronics, Oxford Press.
2. Millman and Taub, Pulse, Digital and Switching Waveforms, MGM.
3. A.Anand Kumar: Digital Circuits, PHI.
4. Salivahanan: Electronic Circuits Analysis and Design, TMH
5. Boylestad and Nashelsky: Electronic Devices and Circuit Theory, Pearson Education.
6. B.P.Lathi, Modern Digital & Analog Communication System, TMH

Course Outcomes (COs):

After completion of this course the students shall be able to:

- CO01** Should have the knowledge of basic semiconductor materials and their usage in variety of PN junction diodes and applications of diodes
- CO02** Should be able to understand the concept operation of transistors and its configuration.
- CO03** Understand and identify the fundamental concepts and various components of analog communication systems
- CO04** Should have the knowledge of number systems and Boolean Algebra, minimization, Logic gates and other Combinational circuits and their designing.
- CO05** Should have understood the basics of Measurement & Instrument components.

List of Experiments:

1. To verify V-I characteristic of semiconductor & Zener diode.
2. To verify input and output waveform of half wave rectifier.
3. To verify input and output waveform of full wave rectifier.
4. To verify Input and output characteristic of BJT in CB and CE configurations.
5. Implementation of basic logic gates using Universal gates (NAND, NOR).
6. To verify half adder & full adder.
7. Study of computer system structure and main peripheral devices.
8. Study of Frequency Division Multiplexing with sinusoidal inputs / audio inputs.
9. Study of CRO and its demonstration kit.
10. Study of voltmeter and multimeter.

Course Code	Course Name	Hours per Week			Total	
		L	T	P	Hours	Credits
EN3ES18	Basic Mechanical Engineering	3	0	2	5	4

Course Learning Objectives (CLOs):

- CLO₀₁** To understand the properties of materials and their behavior with variation in temperature and Load. To understand different measuring instruments used in engineering applications.
- CLO₀₂** To understand the basic laws of thermodynamics and their applications in engineering, refrigeration cycles and properties of refrigerants.
- CLO₀₃** To understand Construction and Working of I. C. Engines.
- CLO₀₄** To understand Construction and Working of Steam Generators
- CLO₀₅** To understand the concepts of Centroid & Moment of Inertia and of plane areas and different theorems of moment of Inertia

Unit-I Materials & their mechanical properties

Classification of Engineering material and their mechanical properties, Composition of cast iron and carbon steels and their application. Stress-strain diagram, Hooks law and modulus of elasticity. Tensile, shear, hardness, and fatigue testing of materials.

Unit-II Thermodynamics

Thermodynamic properties and systems, First of thermodynamics, thermal processes at constant pressure, volume. Second law of thermodynamic, enthalpy, entropy, heat engine, heat pump, refrigerator and their numerical.

Unit-III I.C. Engines

Description and working of four stroke petrol engines, two stroke petrol engines, four stroke diesel engines and two stroke diesel engines, and its efficiency relative merits and demerits.

Unit-IV Steam generators

Definition, Classification, general study of Cochran, Lancashire and Locomotive boilers, boilers mountings and accessories. Steam properties and boiler performance. Draught Classification, Calculation of Chimney height, boiler efficiency and numerical. Unit V: Centroid & Moment of Inertia Location of centroid and Moment of Inertia of plane areas, Perpendicular Axis and Parallel Axis theorems.

Unit V Centroid & Moment of Inertia

Location of centroid and Moment of Inertia of plane areas, Perpendicular Axis and Parallel Axis theorems.

Textbooks:

1. R.K. Rajput, Basic Mechanical Engineering, Laxmi Publication.
2. P.K. Nag, Engineering Thermodynamics, McGraw Hill.

3. R.K. Bansal, Engineering Mechanics, Laxmi publications.

References:

1. Anand K Bewoor, Vinay A Kulkarni, Ist edition, Metrology & Measurement, McGraw Hill.
2. Cengel and Boles, Thermodynamic, An Engineering Approach in S.I Unit, McGraw Hill.
S.S. Bhavikatti and K.G.Rajashekarappa, Engineering Mechanics, New age international limited.

Course Outcomes (COs):

After completion of this course the students shall be able to:

- CO01** Students will be able to understand the engineering materials, their properties, Iron-Carbon Diagram and Stress-Strain Curve, Measuring Equipment's and Testing Machines.
- CO02** Student will be thorough with the basic laws of thermodynamics and their applications in engineering also know about Refrigeration cycles and properties of refrigerants.
- CO03** Students will be able to understand the construction and working of I.C. Engines .
- CO04** Students will be able to understand the construction and working of Steam Generators
- CO05** Students will be able to determine the Centroid & Moment of Inertia of areas/composite sections.

List of Experiments

1. Measurements using Vernier calliper & micrometer.
2. Measurements using dial gauges and combination set.
3. Measurements using slip gauges & sine-bar.
4. Tensile Testing of standard mild steel specimen on UTM.
5. To determine the hardness number by using Brinell Hardness Testing Machine.
6. Study of 2-stroke petrol and diesel engine.
7. Study of 4-stroke petrol and diesel engine.
8. Study of different type of boilers.
9. Study of different type of boilers mounting & accessories.
10. To find the centroid of different plane laminas.

Course Code	Course Name	Hours per Week			Total
		L	T	P	Credits
EN3ES28	Advanced Programming with C	2	0	2	3

Course Learning Objectives (CLOs):

- CLO01** Understand Pointer variables. Declaring and dereferencing pointer variables. Pointer Arithmetic. Accessing arrays, strings through pointers.
- CLO02** Declaration and use structures, perform operations on structures, passing structures as function arguments. type defining structures.
- CLO03** Use Function declaration, function definition, function call, Passing arguments to a function, by value, by reference. Scope of variable names, creation of header files
- CLO04** Use calloc, malloc, realloc dynamic memory.
- CLO05** Apply Input-output using files in C, Opening, closing and reading from files. Programming for command line arguments.
- CLO06** Apply graphics functions to create pictorial representation and animations

Unit-I Pointers

Introduction to Pointers (Declaration and Initialization), Double Pointer, Pointers and Array, Pointers and Functions, Operations on Pointers.

Unit-II User Defined Data Types

Defining a Structure, Declaration of Structure Variables, Initialization of Structure Variables, Accessing Structure Members, Storage of Structures in Memory Array within a Structure, Array of Structure, Pointer Structure, Passing Structure to a Function, Structure within a Structure. Define Union, Structure versus Union, Working with Union, Initializing Union, Enumerated Data Type.

Unit-III Pre-processor and Memory Allocation

Pre-processor Directives, Macro and Macro Expansions, File Inclusions, Conditional Compilation, Stringification (#) and Token Passing Operator (##), Type Def, Command Line Argument, Dynamic Memory Allocation. malloc(), calloc(), realloc(), free(), Core Dump, Memory Leak, Dynamic 1D and 2D Arrays. Header Files and Their Creations.

Unit-IV File Handling

File Concept, File Pointer and File Handling Operations Using files in C, Buffer and Streams, Working with Text Files and Binary Files, File Operations using std. Library and System Calls, File Management I/O Functions, Random Access Files.

Unit-V Graphics Programming

C Header Files for handling graphics and initializing graphics mode, Understand Coordinate system, Function to Draw Lines, Circle, Arc, Ellipse, pie slice, sector, Rectangle, Bar, 3-D Bars & Polygon, Color Spraying: filling Ellipse, polygons and flooding the fills, Filling Styles and Patterns, Understand Animation, Function to create Animation, Traffic Light and Moving Car Simulation.

Text Books:

1. Herbert Schildt, C: The complete Reference, Fourth Edition, Mc-Graw Hill.
2. R. Sethi, Programming Language Concepts and Constructs, Pearson Education.
3. V. Rajaraman, Computer Programming in 'C', PHI.
4. M. Sprankle, Programming and Problem Solving, Pearson Education.
5. R.G. Dromey, How to solve it by Computer, Pearson Education.
6. E. Balguruswamy, Programming in ANSI C by, Tata Mc-Graw Hill.
7. Yashavant Kanetkar, Let Us C, BPB.
8. E. Balagurusamy, Fundamentals of Computers, TMH.
9. AL Stevens, C Database Development, MIS Press.

References:

1. Kernighan and Ritchie, The 'C' programming language, PHI.
2. Programming With C, Schaum Series.
3. A. N. Kamthane, Programming with ANSI and Turbo C, Pearson Education.

Course Outcomes (COs):

After completion of this course the students shall be able to:

- CO₀₁** Apply Pointers, Pointer Arithmetic and Accessing arrays, strings through pointers.
- CO₀₂** Use different user defined data types like structures, union and enum.
- CO₀₃** Understand and Use of dynamic memory allocation and preprocessor directives.
- CO₀₄** Use the concepts of file handling.
- CO₀₅** Use Graphics programming to draw and use different shapes.

List of Practical

1. Program to create, initialize, assign and access a pointer variable.
2. Program to swap two numbers using pointers.
3. Program to change the value of constant integer using pointers.
4. Program to print a string using pointer.
5. Program to count vowels and consonants in a string using pointer.
6. Program to find sum of elements of array using pointer.
7. Program to swap two numbers using pointers.
8. Compare strings using pointer

9. Find smallest number in array using pointer.
10. Find largest element in array using pointer.
11. Find sum of all matrix elements using pointer.
12. Program to create a pointer array store elements in it and display.
13. Program to demonstrate function pointers.
14. Program to perform Addition Subtraction Multiplication Division using array of function pointers.
15. Program to display details of student two (Name, roll no, marks) using structure.
16. Program to display details of employee using array of structure.
17. Program to access member of structures using pointers.
18. Program for passing structure to a function.
19. Program for returning a structure from a function.
20. Program to display details of student two (Name, roll no, marks) with the help of union.
21. Program to demonstrate the memory allocation in structure and union.
22. Program to demonstrate malloc and calloc.
23. Program to allocate memory of array at run time.
24. Program to print the day of week.
25. Program to print month of a year.
26. Program to calculate area of circle using macro.
27. Program to calculate area of circle using macro function.
28. Program to create a header file and use it in a program.
29. Program to demonstrate file operation.
 - a. Creating a new file
 - b. Opening an existing file
 - c. Closing a file
 - d. Reading from and writing information to a file
30. Program to count number of words, number of character and number of lines from a given text file.
31. Program in C to delete a specific line from a file.
32. Write a program in C to append multiple lines at the end of a text file.
33. Write a program in C to copy a file in another name.
34. Write a program in C to merge two files and write it in a new file.
35. Write a program in C to encrypt a text file.
36. Write a program in C to decrypt a previously encrypted file.
37. Write a program in C to remove a file from the disk.
38. Write a program to draw a circle and fill blue color in it.
39. Write a program to draw a rectangle with diagonal and fill different colors in both halves.
40. Write a program to move a circle using suitable animations.



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41. Write a program to implement traffic signal.
42. Write a program to simulate a moving car. Draw car using simple shapes like line, circle and polygon.

Course Code	Course Name	Total Hours per week			Total	
		L	T	P	Hours	Credits
EN3ES29	Engineering Workshop	0	0	2	2	1

Course Learning Objectives (CLOs):

- CLO01** To familiar with Lathe, Drilling, Milling and shaping machines.
- CLO02** The basic law of physics and their utilization in engineering.
- CLO03** To understand different primary manufacturing process.
- CLO04** To understand different metal joining process.
- CLO05** To identify different tools used in basic manufacturing process.

Unit-I Introduction and Demonstration: - Introduction to various shops / sections and workshop layouts. Safety norms to be followed in a workshop.

Carpentry Shop: Introduction of Tools & operations, Types of woods & their applications, Types of Carpentry tools and their uses, Carpentry Joints, carpentry operations such as marking, sawing, planing, chiseling, grooving, boring, joining, types of woods and carpentry hardware.

Unit-II Fitting Shop: Introduction of Tools & operations, Types of Marking tools & their uses, Types of fitting cutting tool & their uses, fitting operations such as chipping, filing, scraping, grinding, sawing, marking, drilling, tapping

Unit-III Foundry Shop: Pattern Making: Study of Pattern materials, pattern allowances and types of patterns. Core box and core print. Use and care of tools used for making wooden patterns.

Molding: Properties of good mould & Core sand, Composition of Green, Dry and Loam sand. Methods used to prepare simple green sand mould using single piece and split patterns.

Black Smithy Shop: Use of various smithy tools. Forging operations: Upsetting, drawing down, Fullering Swaging and Cutting down.

Unit-IV: Welding Shop: Study and use of tools used for Brazing, Soldering, Gas & Arc welding. Preparing Lap & Butt joints using gas and arc welding methods, Study of TIG & MIG welding processes. Safety precautions.

Unit V: Machine Shop: Study of machine tools in particular Lathe machine (different parts, different operations, study of cutting tools). Demonstration of different operations on Lathe machine, Practice of Facing, Plane Turning, step turning, taper turning, knurling, and parting. Demonstration and applications of drilling machine, Demonstration of CNC Machines

Textbooks:

1. B.S. Raghuwanshi, Workshop Technology Vol. I & II, Dhanpath Rai & Sons.
2. R.S. Khurmi, Workshop Technology, S. Chand and Co.
3. S.K. Hajra Choudhary, A.K. Hajra Choudhary and Nirjhar Roy, Elements of Workshop Technology, vol. I Media promoters and Publishers Pvt. Ltd
4. R.K. Bansal, Engineering Mechanics, Laxmi publications.

References:

1. W. A.J. Chapman, Workshop Technology, 1998, Part -1, 1st South Asian Edition, Viva Book Pvt. Ltd.
2. P.N. Rao, 2009, Manufacturing Technology, Vol.1, 3rd Ed., Tata McGraw Hill Publishing Company.
3. Dr. S.K. Sinha , CNC programming — Golgotia publication.

Course Outcomes (COs):

After completion of this course the students shall be able to:

- CO01** Understand the engineering materials, their properties, and their utilization in manufacturing tool and other equipment's.
- CO02** Understand the primary manufacturing process.
- CO03** Understand the basic operation involve in casting.
- CO04** Understand the basic process of forging.
- CO05** Basic knowledge of simple cutting, holding. Marking and striking tool.

Course Code	Course Name	Hours per Week			Total
		L	T	P	Credits
EN3NG02	Universal Human Values and Professional Ethics	2	0	0	2

Course Learning Objectives (CLOs):

- CLO₀₁** Student will able to understand about the process of value education.
- CLO₀₂** Student will able to understand harmony in human being.
- CLO₀₃** Student will able to understand Harmony in the Family and Society
- CLO₀₄** Student will able to understand Harmony in the Nature and Existence
- CLO₀₅** Student will able to understand Holistic Understanding of Harmony

Unit-1

Introduction-Need, Basic Guidelines, Content and Process for Value Education

Understanding the need, basic guidelines, content and process for Value Education, Self-Exploration – what is it ?-its content and process; ‘Natural Acceptance’ and Experiential Validation- as the mechanism for self - exploration, Continuous Happiness and Prosperity-A look at basic Human Aspirations, Right understanding, Relationship and Physical Facilities-the basic requirements for fulfilment of aspirations of every human being with their correct priority, Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario, Method to fulfil the above human aspirations: understanding and living in harmony at various levels.

Unit-2

Understanding Harmony in the Human Being-Harmony in Myself

Understanding human being as a co-existence of the sentient ‘I’ and the material ‘Body’, Understanding the needs of Self (‘I’) and ‘Body’- Sukhand Suvidha, Understanding the Body as an instrument of ‘I’(I being the doer, seer and enjoyer), Understanding the characteristics and activities of ‘I’ and harmony in ‘I’, Understanding the harmony of I with the Body: Sanyamand Swasthya; correct appraisal of Physical needs, meaning of Prosperity in detail, Programs to ensure Sanyam and Swasthya.

Unit-3

Understanding Harmony in the Family and Society-Harmony in Human- Human Relationship

Understanding harmony in the Family- the basic unit of human interaction, Understanding values in human -human relationship ;meaning of Nyayaand program for its fulfilment to ensure Ubhay-tripti; Trust (Vishwas) and Respect (Samman) as the foundational values of relationship, Understanding them eaning of Vishwas; Difference between intention and competence, Understanding the meaning of Samman ,Difference between respect and differentiation ;the other salient value in relationship, Understanding the harmony in the society(society being an extension of family):Samadhan, Samridhi, Abhay, Sah-astitvaas comprehensive Human Goals, Visualizing a universal harmonious order in society-Undivided Society (AkhandSamaj), Universal Order (SarvabhaumVyawastha)-from family to world family!.

Unit-4

Understanding Harmony in the Nature and Existence-Whole existence as Co-existence

Understanding the harmony in the Nature, Inter connectedness and mutual fulfilment among the four orders of nature –recyclability and self-regulation in nature, Understanding Existence as Co-existence(Sah-astitva) of mutually interacting units in all-pervasive space, Holistic perception of harmony at all levels of existence.

Unit-5

Implications of the above Holistic Understanding of Harmony on Professional Ethics

Natural acceptance of human values, Definitiveness of Ethical Human Conduct, Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order, Competence in Professional Ethics:

- a) Ability to utilize the professional competence for augmenting universal human order,
- b) Ability to identify the scope and characteristics of people- friendly and eco-friendly production systems, technologies and management models, Case studies of typical holistic technologies, management models and production systems, Strategy for transition from the present state to Universal Human Order:
 - a) At the level of individual: as socially and ecologically responsible engineers, technologists and managers,
 - b) At the level of society :as mutually enriching institutions and organizations.

TextBooks:

1. R R Gaur, R Sangal, G P Bagaria, 2009, A Foundation Course in Human Values and Professional Ethics.

References:

1. Ivan Illich, 1974, Energy & Equity, The Trinity Press, Worcester, and Harper Collins, USA
2. E.F. Schumacher, 1973, Small is Beautiful: a study of economics as if people mattered, Blond & Briggs, Britain.
3. Susan George, 1976, How the Other Half Dies, Penguin Press. Reprinted 1986, 1991
4. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, Limits to Growth—Club of Rome's report, Universe Books.
5. A Nagraj, 1998, Jeevan Vidya Ek Parichay, Divya Path Sansthan, Amarkantak.
6. P L Dhar, R R Gaur, 1990, Science and Humanism, Commonwealth Publishers.
7. A N Tripathy, 2003, Human Values, New Age International Publishers.
- Subhas Palekar, 2000, How to practice Natural Farming, Pracheen (Vaidik) Krishi Tantra Shodh, Amravati.
8. E G Seebauer & Robert L. Berry, 2000, Fundamentals of Ethics for Scientists & Engineers, Oxford University Press
9. M Govindrajran, S Natrajan & V. S. Senthil Kumar, Engineering Ethics (including Human Values), Eastern Economy Edition, Prentice Hall of India Ltd.

10. BP Banerjee, 2005, Foundations of Ethics and Management, Excel Books.
BL Bajpai, 2004, Indian Ethos and Modern Management, New Royal Book Co.,
Lucknow. Reprinted 2008.

Course Outcomes (COs):

After completion of this course the students shall be able to:

- CO₀₁** Students get knowledge about the process of value education.
- CO₀₂** Understand human being as a co-existence
- CO₀₃** Understanding values in human -human relationship
- CO₀₄** Understanding Existence as Co-existence (Sah-astitva) of mutually interacting units in all-pervasive space
- CO₀₅** Understanding Natural acceptance of human values



Course Code	Course Name	Hours per Week			Credits
		L	T	P	
EN3HS10	COMMUNICATION SKILLS	2	0	2	3

Course Learning Objectives (CLOs):

- CLO₀₁** To develop, enhance and demonstrate LSRW Skills.
- CLO₀₂** To enable students to acquire oral presentation skills.
- CLO₀₃** To prepare students to become more confident and active participants in all aspects of their undergraduate programs
- CLO₀₄** To enable students with good vocabulary, grammar and writing skills.
- CLO₀₅** To enable students to distinguish between general and technical communication and understand its importance

Unit-I

Grammar and Vocabulary Development : Applied Grammar and usage: Parts of Speech, Tenses, Subject-Verb Agreement, Active and Passive Voice, Clauses, Modals, Reported Speech, common errors. Vocabulary: Synonyms, Antonyms, Homophones, One Word Substitution, Affixation: Prefixes & Suffixes, Correctly Spelt Words, Idioms, Proverbs, and Derivation from root words.

Unit-II

Developing Effective Communication Skills: Corporate Communication, Process, Characteristics and principles, Verbal and non-verbal communication, Barriers to effective communication, Importance of effective communication, Importance of Feedback in communication. Seven Cs of Communication.

Unit-III

Speaking Skills and Oral Presentation: Preparing for and conducting presentations, Introducing yourself, Use of formal expressions, Delivery using Audio – Visual Aids with stress on body language and voice modulations, audience research, objective of presentation, Assimilation of data and post presentation strategy.

Unit-IV

Developing Reading and Listening Skills: Reading Comprehension, Process, note-making, note - taking, SQ3R reading technique. Listening Skills: Meaning, process hearing and listening, types, barriers.

Unit-V

Developing Writing Skills: Précis, Paragraph writing, digital communication etiquettes. Business Letters: Parts & Layouts of Business Letters, writing job application and Resume, Calling/ Sending Quotations/ Orders/ Complaints and E-mails.

Text Books:

1. P.C. Wren and Martin, High School English Grammar & Composition, , S Chand and Co Pvt Ltd.
2. S. Kumar and P. Lata , English for Effective Communication, Oxford UP, New Delhi.
3. J.S. Korlahalli and R. Pal, Essentials of Business Communication All Courses, Sultan Chand & Sons.

References Books

1. A.C. Gimson, An introduction to the Pronunciation of English, ELBS.
2. S. Greenbaum, The Oxford English Grammar, Oxford University Press.
3. K.Mohan and M. Raman, Effective English Communication, Tata Mc-Graw Hill.
4. A.J. Thompson and A. V. Martinet, A Practical English Grammar, Oxford UP, New Delhi.
5. U. S. Rai and S.M, Rai, Effective Communication, Himalaya Publishing House.

List of Practicals (Wherever Applicable)

1. Exercises on Grammar and vocabulary
2. Exercises based on reading and comprehension which also include taking notes during presentation.
3. Exercises based on listening which also include taking notes.
4. Writing technical description precis, business letters.
5. Presentations on various issues.
6. Presentations with Non verbal communication.
7. Delivering speeches and exercising voice modulation transcription.
8. Performing extempore.
9. Role plays.
10. Group discussions.

Course Outcomes (COs):

After completion of this course the students shall be able to:

- CO₀₁** The students will be able to enhance confidence in their ability to read, comprehend, organize, and retain written and oral information.
- CO₀₂** The students will be able to distinguish between general and technical communication and understand its importance



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- CO₀₃** The students will be able to improve upon their language skills, communication skills, group discussion, and personality development and confidence level.
- CO₀₄** The students will be able to bridge the language gap which is vital to their success
- CO₀₅** Students will be able to communicate effectively.



Syllabus of First year is same for all branches except CSBS and for detail refer below page numbers:

First semester syllabus is available from page number:11-37

Second semester syllabus is available from page number:38-59



Medi-Caps University Indore (M.P.)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

Choice Based Credit System- Scheme of B.Tech CSE (2024 Batch)

Scheme for CSE- Artificial Intelligence (AI), Data Science (DS), Internet of Things (IOT), Artificial Intelligence and Machine Learning (AI/ML), Cyber Security, Networks.

SEMESTER I

Sr. No.	Course Code	Courses	L	T	P	Credit
1	EN3BS11	Engineering Mathematics-I	3	0	0	3
2	EN3BS16	Engineering Physics	3	0	2	4
3	EN3ES17	Basic Electrical Engineering	3	0	2	4
4	EN3ES26	Engineering Graphics	2	0	2	3
5	EN3ES27	Basic Programming with C	2	0	2	3
6	EN3ES30	Basic Civil Engineering & Mechanics	3	0	2	4
7	EN3NG01	Environmental Science	2	0	0	2
8	EN3HS01	History of Science and Technology	2	0	0	2
		Total	20	0	10	25
		Total Contact Hours	30			

SEMESTER II

Sr. No.	Course Code	Courses	L	T	P	Credit
1	EN3BS12	Engineering Mathematics-II	3	0	0	3
2	EN3BS14	Engineering Chemistry	2	0	2	3
3	EN3ES16	Basic Electronics Engineering	3	0	2	4
4	EN3ES18	Basic Mechanical Engineering	3	0	2	4
5	EN3ES28	Advanced Programming with C	2	0	2	3
6	EN3ES29	Engineering Workshop	0	0	2	1
7	EN3NG02	Universal Human Values & Professional Ethics	2	0	0	2
8	EN3HS10	Communication Skills	2	0	2	3
9	EN3NG11/ EN3NG12/ EN3NG13/ EN3NG14/ EN3NG15	Club Activities/ NSS/NCC/Yoga/Sports	1	0	0	1
		Total	18	0	12	24
		Total Contact Hours	30			

SEMESTER – III

Sr. No.	Course Code	Courses	L	T	P	Credit
1	CS3CO46	Theory of Computation	3	0	0	3
2	CS3CO28	Data Communication	3	0	0	3
3	CS3CO30	Object Oriented Programming	3	0	2	4
4	CS3CO31	Data Structures	3	0	2	4
5	CS3CO32	Java Programming	2	0	2	3
6	CS3CO33	Digital Electronics	3	0	2	4
7	CS3CO34	Computer System Architecture	3	0	0	3
8	EN3NG03	Soft Skills-I	2	0	0	2
		Total	22	0	8	26
		Total Contact Hours	30			

SEMESTER – IV

Sr. No.	Course Code	Courses	L	T	P	Credit
1	CS3CO35	Microprocessor and Interfacing	3	0	2	4
2	CS3CO47	Operating Systems	4	0	2	5
3	CS3CO37	Advanced Java Programming	2	0	2	3
4	CS3BS04	Discrete Mathematics	3	0	0	3
5	CS3CO39	Database Management Systems	3	0	2	4
6	CS3ELXX	Elective-1	3	0	2	4
7	EN3NG10	Soft Skills-II	2	0	0	2
		Total	20	0	10	25
		Total Contact Hours	30			

Scheme of B.Tech -Computer Science &Engineering 2024
SEMESTER – V

Sr. No.	Course Code	Courses	L	T	P	Credit
1	CS3CO40	Software Engineering	3	0	2	4
2	CS3CO43	Computer Networks	4	0	2	5
3	CS3ELxx	Elective-2	3	0	2	4
4	CS3ELxx	Elective-3	3	0	2	4
5	EN3HS04	Fundamentals of Management, Economics & Accountancy	3	0	0	3
6	EN3NG09	Soft Skills-III	2	0	0	2
8	OE000xx	Open Elective-1	3	0	0	3
9	EN3NG11/ EN3NG12/ EN3NG13/ EN3NG14/ EN3NG15	Club Activities/ NSS/NCC/Yoga/Sports	1	0	0	1
		Total	22	0	8	26
		Total Contact Hours	30			

SEMESTER – VI

Sr. No.	Course Code	Courses	L	T	P	Credit
1	CS3CO44	Compiler Design	4	0	2	5
2	CS3CO45	Design and Analysis of Algorithms	4	0	2	5
3	CS3ELxx	Elective-4	3	0	0	3
4	CS3ES15	Research Methodology	3	0	0	3
5	CS3ELXX	Elective-5	3	0	0	3
6	CS3PC04	Mini Project	0	0	4	2
7	EN3NG08	Soft Skills-IV	2	0	0	2
8	OE000XX	Open Elective-2	3	0	0	3
		Total	22	0	8	26
		Total Contact Hours	30			

Scheme of B.Tech -Computer Science &Engineering
SEMESTER – VII

Sr. No.	Course Code	Courses	L	T	P	Credit
1	CS3ELXX	Elective-6	3	0	0	3
2	CS3PC03	Industrial Training	0	2	0	2
3	CS3PC05	Project-I	0	0	8	4
4	OE000XX	Open Elective-3	3	0	0	3
5	EN3NG06	Open Learning Courses	1	0	0	1
		Total	7	2	8	13
		Total Contact Hours	17			

SEMESTER VIII

Sr. No.	Course Code	Courses	L	T	P	Credit
1	CS3PC08	Project-II	0	0	20	10
		Total	0	0	20	10
		Total Contact Hours	20			

Total Credits **175**

Summary of Credits

S.NO	Course Work	Total Credits	Credits as per Modal scheme
1	Basic Sciences (BS)	16	10-15% (16-24)
2	Engineering Sciences (ES)	29	15-20% (24-32)
3	Humanities and Social Sciences (HS)	8	5-10% (8-16)
4	Core Courses (CO)	59	30-40%(48-64)
5	Program Electives (EL)	21	10-15%(16-24)
6	Open Electives (OE)	9	5-10%(8-16)
7	Project Work, Seminar	18	10-15%(16-24)
8	Non Grading	15	(11-16)

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Syllabus of First year is same for all branches except CSBS and for detail refer below page numbers:

First semester syllabus is available from page number:11-37

Second semester syllabus is available from page number:38-59



Medi-Caps University Indore (M.P.)
DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
Scheme (B.Tech- Computer Science & Business Systems (CSBS))
Batch 2024

SEMESTER I

ID	Course Code	Course	L	T	P	Credit
1	EN3BS06	Discrete Mathematics	3	0	0	3
2	EN3BS07	Introductory Topics in Statistics, Probability and Calculus	3	0	0	3
3	EN3ES09	Fundamentals of Computer Science	3	0	2	4
4	EN3ES11	Principles of Electrical Engineering	3	0	2	4
5	EN3BS10	Physics for Computing Science	3	0	2	4
6	EN3HS09	Business Communication & Value Science – I	0	0	4	2
Total			15	0	10	20
			25 Hrs			

SEMESTER II

ID	Course Code	Course	L	T	P	Credit
1	EN3BS08	Linear Algebra	3	1	0	4
2	EN3ES10	Statistical Methods	3	1	0	4
3	CB3CO21	Data Structures & Algorithms	3	1	2	5
4	EN3ES23	Principles of Electronics	2	0	2	3
5	CB3CO02	Fundamentals of Economics	2	0	0	2
6	EN3HS06	Business Communication & Value Science – II	2	0	2	3
7	CB3NG01	Environmental Sciences	3	0	0	3
Total			18	3	6	24
			27 Hrs			

SEMESTER III

ID	Course Code	Course	L	T	P	Credit
1	CB3CO22	Formal Language and Automata Theory	3	0	0	3
2	EN3ES14	Computer Organization & Architecture	3	0	2	4
3	CB3CO04	Object Oriented Programming	3	0	2	4
4	EN3BS09	Computational Statistics	3	0	2	4
5	CB3CO07	Database Management Systems	3	0	2	4
6	CB3NG02	Open Learning Course	1	0	0	1
7	CB3NG03	Indian Constitution	2	0	0	2
8	CB3NG07	Soft Skills	2	0	0	2
Total			20	0	8	24
			28 Hrs			

SEMESTER IV

ID	Course Code	Course	L	T	P	Credit
1	CB3CO06	Operating Systems	3	0	2	4
2	CB3CO23	Design And Analysis of Algorithms	3	0	2	4
3	CB3CO24	Software Engineering	3	0	2	4
4	CB3NG04	Introduction to Innovation, IP Management & Entrepreneurship	2	0	0	2
5	EN3ES13	Design Thinking	2	0	2	3
6	EN3ES15	Operations Research	3	0	2	4
7	OE00092	Marketing Research & Marketing Management	2	0	0	2
8	CB3NG05	Essence of Indian Traditional Knowledge	2	0	0	2
Total			20	0	10	25
			30 Hrs			

SEMESTER V

ID	Course Code	Course	L	T	P	Credit
1	CB3CO25	Software Design with UML	3	0	2	4
2	CB3CO10	Compiler Design	3	0	2	4
3	CB3CO26	Fundamentals of Management	2	0	0	2
4	OE00090	Business Strategy	2	0	0	2
5	EN3HS07	Business Communication & Value Science – III	2	0	2	3
6	CB3EL01	Elective I: Machine Learning	3	0	2	4
7	CB3EL13	Elective II: Cryptology	3	0	2	4
8	CB3PC04	Mini Project	0	0	2	1
Total			18	0	12	24
			30 Hrs			

SEMESTER VI

ID	Course Code	Course	L	T	P	Credit
1	CB3CO12	Computer Networks	3	0	2	4
2	CB3CO29	Usability Design of Software Applications	2	0	2	3
3	CB3CO14	Artificial Intelligence	3	0	2	4
4	OE00086	Financial & Cost Accounting	2	0	2	3
5	CB3CO27	IT Workshop Scilab / MATLAB	2	0	2	3
6	CB3EL08	Elective III: Data Mining and Analytics	3	0	2	4
7	CB3EL04	Elective IV: Advance Finance	3	0	0	3
Total			18	0	12	24
			30 Hrs			
<i>Industrial Project (6-8 weeks)</i>						

SEMESTER VII

ID	Course Code	Course	L	T	P	Credit
1	EN3HS11	Business Communication & Value Science – IV	2	0	0	2
2	OE00087	Financial Management	2	0	0	2
3	OE00091	Human Resource Management	2	0	0	2
4	CB3EL02	Elective V: Industrial Psychology	3	0	0	3
5	CB3EL06	Elective VI: Advanced Social, Text and Media	3	0	0	3
6	CB3CO19	Services Science & Service Operational Management	3	0	0	3
7	CB3PC06	Industrial Training	0	2	0	2
8	CB3PC05	Minor Project	0	0	8	4
Total			15	2	8	21
			25 Hrs			

SEMESTER VIII

ID	Course Code	Course	L	T	P	Credit
1	CB3PC07	Major Project	0	0	20	10
Total			0	0	20	10
			20 Hrs			

Total Credits 172

S.NO	Course Work	Total Credits	Credits as per Model scheme
1	Basic Sciences (BS)	18	10-15% (16-24)
2	Engineering Sciences (ES)	26	15-20% (24-32)
3	Humanities and Social Sciences (HS)	10	5-10% (8-16)
4	Professional Subjects-Core (CO)	57	30-40% (48-64)
5	Professional Subjects – Electives (EL)	21	10-15% (16-24)
6	Open Subjects- Electives (OE)	11	5-10% (8-16)
7	Project Work, Industrial Training(PC)	17	10-15% (16-24)
8	Non Grading(NG)	12	(11-16)

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SEMESTER I

Course Code	Course	L	T	P	Credit
EN3BS06	Discrete Mathematics	3	0	0	3
EN3BS07	Introductory Topics in Statistics, Probability and Calculus	3	0	0	3
EN3ES09	Fundamentals of Computer Science	3	0	2	4
EN3ES11	Principles of Electrical Engineering	3	0	2	4
EN3BS10	Physics for Computing Science	3	0	2	4
EN3HS09	Business Communication & Value Science – I	0	0	4	2
	Total	15	0	10	20
		25 Hrs			

Course Code	Course Name	Hours Per Week				
		L	T	P	Hrs	Credits
EN3BS06	Discrete Mathematics	3	0	0		3

Course Learning Objectives (CLOs):

- CLO₀₁** Understand the fundamental concepts of abstract algebra, including sets, relations, functions, and posets.
- CLO₀₂** Comprehend Boolean algebra and its applications in logic gates, truth tables, and Karnaugh maps.
- CLO₀₃** Develop proficiency in combinatorics, including counting principles, generating functions, and recurrence relations.
- CLO₀₄** Explore graph theory, covering graph properties, Eulerian paths, Hamiltonian circuits, planar graphs, and the Four-color theorem.
- CLO₀₅** Gain knowledge of propositional calculus and logic, including truth assignments, normal forms, formal reducibility, and soundness and completeness.

UNIT I Abstract algebra:

Set, Different types of sets, Operation on sets, Relation, Binary Relation, Equivalence relation, Functions: Partial order relation, Posset, least upper bound, greatest lower bound, maximal, and minimal elements of a posset.

UNIT II Boolean algebra:

Group, Finite and Infinite group, Ring, Polynomial ring, Field, Subfield, Skew field. Lattices, Distributive laws in lattices Complemented lattices, 1 Introduction of Boolean algebra, truth table, basic logic gate, basic postulates of Boolean algebra, principle of duality, canonical form, Karnaugh map.

UNIT III Combinatorics:

Basic counting, balls, and bins problems, generating functions, recurrence relations. Proof techniques, principle of mathematical induction, pigeonhole principle.

UNIT IV Graph Theory:

Graphs and digraphs, complement, isomorphism, connectedness and reachability, adjacency matrix, Eulerian paths and circuits in graphs and digraphs, Hamiltonian paths and circuits in graphs and tournaments, trees; Planar graphs, Euler's formula, dual of a planer graph, independence number and clique number, chromatic number, statement of Four colour theorem.

UNIT V Logic:

Propositional calculus - propositions and connectives, syntax; Semantics- truth assignments and truth tables, validity and satisfiability, tautology; Adequate set of connectives; Equivalence and normal forms; Compactness and resolution; Formal reducibility natural deduction system and axiom system; Soundness and completeness.

Text books:

1. Liu and Mohapatra, Elements of Discrete Mathematics, McGraw Hill
2. 'Kenneth H. Rosen, Discrete Mathematics and Its Applications, McGraw Hill
3. M. Morris Mano, Digital Logic & Computer Design, Pearson.
4. N. Deo, Graph Theory with Applications to Engineering and Computer Science, Prentice Hall, Englewood Cliffs.

References:

1. J.P. Tremblay and R. Manohar Discrete Mathematical Structures with Applications to "Computer Science, McGraw Hill
2. 'R. A. Brualdi Introductory Combinatorics, North-Holland, New York.
3. J. A. Bondy and U. S. R. Murty, Graph Theory with Applications, Macmillan Press, London.
4. L.Zhongwan, Mathematical Logic for Computer Science, World Scientific, Singapore.
5. E. Mendelsohn, Introduction to Mathematical Logic, (Second Edition), Van-Nostrand London.

Course Outcomes (COs):

After completion of this course the students shall be able to:

- CO01** Ability to apply abstract algebra concepts to solve problems related to sets, relations, and functions.
- CO02** Proficiency in analyzing Boolean algebra and utilizing logic gates and truth tables for solving logical problems.
- CO03** Capability to use combinatorial techniques to solve counting and recurrence problems.
- CO04** Competence in analyzing graph properties and applying graph theory principles to solve graph-related problems.
- CO05** Aptitude to apply propositional calculus in logical reasoning, evaluate truth values, and construct formal proofs using natural deduction and axiom systems.

Course Code	Course Name	Hours Per Week				Credits
		L	T	P		
EN3BS07	Introductory Topics in Statistics Probability and Calculus	3	0	0		3

Course Learning Objectives (CLOs):

- CLO01** Understand the fundamental concepts of statistics, including its definition, objectives, and applications in various scientific fields.
- CLO02** Develop proficiency in collecting and distinguishing between internal and external data, primary and secondary data, and understanding the concepts of population and sample.
- CLO03** Comprehend the principles of descriptive statistics, including classifying, tabulating, and graphically representing univariate data, along with calculating measures of central tendency and dispersion.
- CLO04** Gain knowledge of the theory of probability, including the concept of experiments, sample space, events, and the application of probability in real-world scenarios.
- CLO05** Acquire a basic understanding of differential and integral calculus and its applications, including solving problems using double and triple integrals

UNIT 1 Introduction to Statistics

Definition of Statistics. Basic objectives. Applications in various branches of science with examples. Collection of Data: Internal and external data, Primary and secondary Data. Population and sample

UNIT II Descriptive Statistics

Classification 2nd tabulation of univariate data, graphical representation, Frequency curves. Descriptive measures - central tendency and dispersion. Bivariate data. Summarization, marginal 2nd conditions frequency distribution.

UNIT III Theory of Probability. Expected values and Moments.

Concept of experiments. sample space. event. Definition of Combination 121 Probability, Bayes Theorem. Mathematical expectation and its properties, Moments (including variance) and their properties. interpretation Moment generating function.all Probability.

UNIT IV Probability Distribution

Discrete and continuous distributions, Binomial. Poisson and Geometric distributions, Uniform, Exponential. Normal. Chi-square, t, F distributions.

UNIT IV Calculus

Basic concepts of Differential and integral calculus, application of double and triple integral.

Text books:

1. Introduction of Probability Models, S.M. Ross, Academic Press, N.Y.
2. Fundamentals of Statistics, vol. I & II. A. Goon, M. Gupta and B. Dasgupta, World Press.
3. Higher Engineering Mathematics, B. S. Grewal, Khanna Publication, Delhi.

References:

1. A first course in Probability, S.M. Ross, Prentice Hall.
2. Probability and Statistics for Engineers, (Fourth Edition), LR. Miller, J.E. Freund and R_ Johnson, PHIL.
2. Introduction to the Theory of Statistics, A.M. Mood, F.A. Graybill and D.C. Boas. McGraw Hill Education.
4. Advanced Engineering Mathematics, (Seventh Edition), Peter V. O'Neil, Thomson Learning.
5. Advanced Engineering Mathematics, (Second Edition) M. D. Greenberg, Pearson Education.
6. Applied Mathematics, Vol. I & II, P. N. Waurika and). N. Wanker, VidvarthiPrakashan.

Web Source:

1. <https://nptel.ac.in/course.php>

Open Learning Source:

1. <https://swayam.gov.in/courses/public>

Course Outcomes (COs):

After completion of this course the students shall be able to:

- CO01** Ability to apply statistical techniques to analyse and interpret data effectively across different scientific fields.
- CO02** Proficiency in summarizing and presenting data using appropriate graphical representations and statistical measures.
- CO03** Competence in utilizing probability theory to model and analyse uncertain events and make informed decisions based on probabilities.
- CO04** Capability to work with various probability distributions and understand their properties and applications in real-world situations.
- CO05** Aptitude to apply calculus concepts to solve mathematical and statistical problems, enhancing problem-solving skills in diverse scenarios.

Course Code	Course Name	Hours Per Week				Credit
		L	T	P		
EN3ES09	Fundamental of Computer Science	3	0	2		4

Course Learning Objectives (CLOs):

- CLO01** Understand algorithm development and problem-solving techniques using flowcharts and structured logic structures.
- CLO02** Comprehend the syntax and constructs of the ANSI C programming language, including data types, operators, and variable naming conventions.
- CLO03** Gain proficiency in utilizing control flow structures like if-else, switch, and loops (while, do, for) to create structured programming solutions.
- CLO04** Acquire knowledge of functions, their parameter passing mechanisms, scope rules, and the use of standard library functions in C programming.
- CLO05** Learn about pointers, arrays, structures, and file handling in C, enabling the implementation of complex data structures and input/output operations.

UNIT I

Algorithm, and Flowchart for problem solving with Sequential Logic Structure, Decisions and Loops. Introduction to imperative language; syntax and constructs of a specific language (ANSI C) Types Operator and Expressions with discussion of variable naming and Hungarian Notation: Variable Names, Data Type and Sizes (Little Endian Big Endian), Constants, Declarations,

UNIT II

Arithmetic Operators, Relational Operators, Logical Operators, Type Conversion, Increment Decrement Operators, Bitwise Operators, Assignment Operators and Expressions, Precedence and Order of Evaluation, Control Flow with discussion on structured and unstructured programming: Statements and Blocks, If-Else-If, Switch, Loops – while do, for, break and continue, got labels, structured and un- structured programming.

UNIT III

Functions and Program Structure with discussion on standard library: Basics of functions, parameter passing and returning type, C main return as integer, External, Auto, Local, Static, Register Variables, Scope Rules, Block structure, Initialisation, Recursion, Pre-processor, Standard Library Functions and return types.

UNIT IV

Pointers and address, Pointers and Function Arguments, Pointers and Arrays, Address Arithmetic, character Pointers and Functions, Pointer Arrays, Pointer to Pointer, Multi-dimensional array and Row/column major formats, Initialization of Pointer Arrays, Command line arguments: Pointer to functions, complicated declarations and how they are evaluated. Structures: Basic Structures, Structures and Functions, Array of structures, Pointer of structures, Self-referral structures, Table look up, typedef, unions, Bit-fields.

UNIT V

Input and Output: Standard I/O, Formatted Output — print, Formatted Input — scanf, Variable length argument list, file access including FILE structure, open, stdin, stdout and stderr, Error Handling including exit, error and error's, Line I/O, related miscellaneous functions. Unix system Interface: File Descriptor, Low level I/O — read and write, open, create, close and Function, make file utility.

Textbooks:

1. The C Programming Language, (Second Edition) B. W. Kernighan and D. M. Ritchi, PHI.
2. Programming in C, (Second Edition) B. Gottfried, Schaum Outline Series.

Reference Books:

1. C: The Complete Reference, (Fourth Edition), Herbert Schildt, McGraw Hill.
2. Let Us C. Yashavant Kanetkar, BPI Publications.

Practical: -

1. Algorithm and flowcharts of small problems like GCD
2. Structured code writing with:
 - i. Small but tricky codes
 - ii. Proper parameter passing.
 - iii. Command line Arguments
 - iv. Variable parameter
 - v. Pointer to functions
 - vi. User defined header
 - vii. Make file utility.
 - viii. ~ Multi file program and user defined libraries
 - ix. Interesting substring matching / searching programs.
 - x. Parsing related assignments

Course Outcomes (COs):

After completion of this course the students shall be able to:

- CO01** Ability to develop efficient algorithms and represent them using flowcharts for problem-solving.
- CO02** Proficiency in writing C programs, employing different data types, operators, and expressions effectively.

- CO03** Competence in using control flow structures to create structured and organized programs.
- CO04** Capability to design functions, handle pointers, arrays, and structures, and use standard library functions for efficient program development.
- CO05** Aptitude to implement input/output operations and handle file operations, making the students adept in file handling and Unix system interfaces.

Course Code	Course Name	Hours Per Week				Credit
		L	T	P		
EN3ES11	Principles of Electrical Engineering	3	0	2		4

Course Learning Objectives (CLOs):

- CLO₀₁** Understand the fundamental concepts of electric circuits, potential difference, voltage, current, and the functional relations of linear passive and active elements.
- CLO₀₂** Comprehend the terminology and symbols used to describe electric networks, as well as the properties of voltage and current sources, and their application in network analysis using Kirchhoff's laws.
- CLO₀₃** Gain proficiency in analyzing DC circuits using techniques like Thevenin's theorem, Norton's theorem, and series-parallel simplifications.
- CLO₀₄** Acquire knowledge of AC circuits, including waveform definitions, phasor representation, impedance, power concepts, and analysis of R-L, R-C, and RLC series and parallel circuits.
- CLO₀₅** Learn about electrostatics, electromechanics, and energy conversion, including capacitors, magnetic fields, inductance, transformers, and electromechanical energy conversion principles.

UNIT 1

Introduction: Concept of Potential difference, voltage, current, Fundamental linear passive and active elements to their functional current-voltage relation, Terminology, and symbols in order to describe electric networks, voltage source and current sources, ideal and practical sources, concept of dependent and independent sources, Kirchhoff-s laws, and applications to network solutions using mesh and nodal analysis, Concept of work, power, energy, and conversion of energy.

UNIT II

DC Circuits: Current-voltage relations of the electric network by mathematical equations to analyse the network (Thevenin's theorem, Norton's Theorem, theorem) Simplifications of networks using series-parallel, Star/Delta transformation. Superposition theorem.

UNIT III

AC Circuits: AC waveform definitions, form factor, peak factor, study of R-L, R-C, RLC series circuit, R-L-C parallel circuit, phasor representation in polar and rectangular form,

concept of impedance, admittance, active, reactive, apparent and complex power, power factor, 3 phase. Balanced AC Circuits (A-A & A-A). |

UNIT IV

Electrostatics and Electro-Mechanics: Electrostatic field, electric field strength, concept of permittivity in dielectrics, capacitor composite, dielectric capacitors, capacitors in series and parallel, energy stored in capacitors, charging, and discharging of capacitors, Electricity and Magnetism, magnetic field and Faraday's law, self and mutual inductance, Ampere's law, Magnetic circuit, Single phase transformer, principle of operation, EMF equation, voltage ratio, current ratio, KVA rating, efficiency and regulation, Electromechanical energy conversion.

UNIT V

Measurements and Sensors: Introduction to measuring devices/sensors and transducers. (Piezoelectric and thermo-couple) related to electrical signals, Elementary methods for the measurement of electrical quantities in DC and AC systems (Current & Single-phase power). **Electrical Wiring and Illumination system:** Basic layout of the distribution system, Types of Wiring System & Wiring Accessories, Necessity of earthing, Types of earthing, Safety devices & system.

For Additional Further Reading Only Principle of batteries, types, construction, and application, Magnetic material and B-H Curve, Basic concept of indicating and integrating instruments.

Text books:

1. Electric Machinery. (Sixth Edition) A. E. Fitzgerald, Kingsley Jr Charles, D. Umans Stephen, Tata McGraw Hill.
2. 'A Textbook of Electrical Technology, (vol. 1), B. L. Theraja, Chand and Company Ltd.
3. Basic Electrical Engineering, V. K. Mehta, S. Chand and Company Ltd., New Delhi.
4. Theory and problems of Basic Electrical Engineering, (Second Edition), J. Nagrath and ' Kothari, Prentice Hall of India Pvt. Ltd.

References:

1. Basic of Electrical Engineering, T. K. Nagsarkar and M. S. Sukhija, Oxford University Press.
2. Introduction to Electrodynamics, D. J. Griffiths, (Fourth Edition), Cambridge University Press.
3. Engineering Circuit Analysis, William H. Hayt & Jack E. Kemmerly, McGraw-Hill Book Company Inc.
4. Fundamentals of Electrical and Electronics Engineering, Smarjith Ghosh, Prentice Hall (India) Pvt. Ltd.
5. T. K. Nagsarkar and M. S. Sukhija, Basic of Electrical Engineering, Oxford University Press, 2011.

List of Practical's:

1. Familiarization of electrical Elements, sources, measuring devices and transducers related to electrical circuits.



- 2.To verify KCL and KVL.
- 3.To verify Maximum power transfer theorem.
- 4.To verify Thevenin's theorem.
- 5.To verify Norton's theorem.
- 6.To verify Superposition theorem.
- 7.Simulation of time response of series RC circuit.
- 8.Simulation of R-L-C series circuits for $X_i > X_c$, $X_i < X_e$.
- 9.Demonstration of measurement of electrical quantities (single-phase power & current) in RL, RIC & R-L-C circuit.
10. To verify relation in between voltage and current in three-phase balanced star and delta connected load.
11. Determination of resistance temperature coefficient.

Course Outcomes (COs):

After completion of this course the students shall be able to:

- CO01** Ability to analyze electric circuits using Kirchhoff's laws, mesh and nodal analysis, and simplify complex circuits using network theorems.
- CO02** Proficiency in solving DC circuit problems, determining current-voltage relationships, and applying Thevenin's theorem and other techniques for circuit analysis..
- CO03** Competence in understanding AC circuit behavior, calculating impedance, power factors, and analyzing balanced AC circuits.
- CO04** Capability to comprehend the principles of electromechanical energy conversion, magnetic fields, inductance, and transformers, and evaluate their efficiency and regulation.
- CO05** Aptitude to use measuring devices and sensors for electrical quantity measurements, understand electrical wiring systems, and apply safety measures in electrical installations.

Course Code	Course Name	Hours Per Week				
		L	T	P	Hrs.	Credits
EN3BS10	Physics for Computing Science	3	0	2		4

Course Learning Objectives (CLOs):

- CLO01** Understand Einstein's theory of matter radiation interaction and A and B coefficients in laser and fiber optics.
- CLO02** Describe the principles of population inversion and amplification of light in different types of lasers.
- CLO03** Explain the properties of laser beams, including monochromaticity, coherence, directionality, and brightness.
- CLO04** Analyze the phenomenon of laser speckles and explore the engineering applications of lasers.
- CLO05** Identify and categorize various types of optical fibers used in fiber optics and their applications.

UNIT 1

Laser and Fiber optics: Einstein's theory of matter radiation interaction and A and B coefficients; amplification of light by population inversion, different types of lasers: Ruby Laser, CO₂, and Neodymium lasers; Properties of laser beams: mono chromaticity coherence directionality and brightness, laser speckles, applications of lasers in engineering Fiber optics and Applications, Types of optical fibres.

UNIT 2

Interference-principle of superposition-young's experiment: Theory of interference fringes-types of interference-Fresnel's prism-Newton's rings, Dill action=Two kinds of diffraction-Difference between interference and diffraction=Fresnel's half period zone and zone plate-Fraunhofer diffraction at single slit-plane diffraction grating. 'Temporal and Spatial Coherence.

Polarization of light: Polarization - Concept of production of polarized beam of light from two SHM acting at right angle; plane, elliptical und circularly polarized light, Brewster's law, double refraction.

UNIT 3

Quantum Mechanics: Introduction - Planck's quantum theory- Matter waves, de-Broglie wavelength, Heisenberg's Uncertainty principle, time independent and time dependent Schrodinger's wave equation, Physical significance of wave function, Particle in a one dimensional potential box, Heisenberg Picture.

Crystallography: Basic terms-types of crystal systems, Bravais lattices, miller indices, d spacing, Atomic packing factor for SC, BCC, FCC, and HCP structures.

UNIT 4

Oscillation: Periodic motion-simple harmonic motion-characteristics of simple harmonic motion-vibration of simple spring mass system. Resonance-definition., damped harmonic oscillator — heavy, critical, and light damping, energy decay in a damped harmonic oscillator, quality factor, forced mechanical and electrical oscillators.

Basic Idea of Electromagnetisms: Continuity equation for current densities, Maxwell's equation in vacuum and non-conducting medium.

UNIT 5

Semiconductor Physics: Conductor, Semiconductor, and Insulator; Basic concept of Band theory. Lodi

Thermodynamics: Zeroth law of thermodynamics, first law of thermodynamics, brief discussion on application of Its law, second law of thermodynamics and concept of Engine, entropy, change in entropy in reversible and irreversible processes.

Textbooks:

1. Concepts of Modern Physics, (Fifth Edition) A Beiser, McGraw Hill International.
2. Fundamentals of Physics, David Halliday, Robert Resnick and Jearl Walker, Wileyplus.

References:

1. Optics, (Fifth Edition) Ajoy Ghatak, Tata McGraw Hill.
2. Sears & Zemansky University Physics, Addison-Wesley.
3. Fundamentals of Optics, (Third Edition) Jenkins and White, McGraw-Hill.

List of Practical:

1. To study the Hall effect experiment and find the Hall coefficient, carrier density and carrier mobility of a given semiconductor crystal.
2. To determine the radius of curvature of Plano convex lens using Newton's ring experiment.
3. To measure the Beam divergence and Beam waist of a Laser beam.
4. To determine wavelength of spectral lines of mercury vapor lamp with the help of grating and spectrometer.
5. To measure the numerical aperture of an optical fibre by scanning Method.
6. Determination of Planck's constant (1) using light emitting diode (LED) of various colours.
7. To determine the heating efficiency of an electric kettle with varying voltages.
8. To determine the specific optical rotation of sugar solution by biquartz Polarimeter.
9. To determine the value of acceleration due to gravity (g) using compound pendulum.
10. To determine the Standard deviation of any one of the following, by algebraic formula
 - i. Thickness of the given scale by Vernier callipers
 - ii Diameter of the wire by Screw gauge.
11. Mini Project(compulsory).

Course Outcomes (COs):

After completion of this course the students shall be able to:

- CO01** Apply the principles of laser technology to analyze and design engineering applications.
- CO02** Demonstrate an understanding of interference, diffraction, and polarization phenomena in light waves.
- CO03** Apply quantum mechanics principles to analyze the behavior of matter waves and the physical significance of wave functions.
- CO04** Identify and describe the crystal structures and properties of materials using crystallography concepts.
- CO05** Analyze the behavior of oscillating systems and their resonance characteristics, as well as the fundamentals of electromagnetism and its relevance in non-conducting media and vacuum.



Course Code	Course Name	Hours Per Week				Credit
		L	T	P		
EN3HS09	Business Communication & Value Science- I	0	0	4		2

Course Learning Objectives (CLOs):

- CLO01** Develop self-awareness and self-work skills by engaging in activities that involve interviewing and understanding the values that drive individuals from diverse backgrounds
- CLO02** Improve grammar and language skills, including parts of speech, tenses, sentence formation, common errors, and use of voices in both general and technical contexts.
- CLO03** Enhance vocabulary enrichment by learning words from various lists and sources and using them effectively in group discussions and written communication.
- CLO04** Acquire essential communication skills, including email writing (both formal and informal), verbal communication, listening skills, and expressing oneself effectively through role-play and activities.
- CLO05** Cultivate life skills such as stress management, teamwork, leadership, embracing diversity, and appreciating different intelligences through movie-based learning, trekking experiences, and real-life scenarios.

UNIT 1

Overview of LOL (include activity on introducing self)

Self-work with immersion — interview a maid, watchman, sweeper, cab driver, beggar and narrate what you think are the values that drive them.

Overview of business communication, Self-awareness — identity, body awareness, stress management

UNIT II

Essential Grammar — I: Refresher on Parts of Speech — Listen to an audio clip and note down. the different parts of speech followed by discussion.

Tenses: Applications of tenses in Functional Grammar — Take a quiz and then discuss Sentence formation (general & Technical), Common errors, Voices. Show sequence from film where a character uses wrong sentence structure (e.g., Zindagi Na Milegi Dobara where the characters use ‘the’ before every word).



UNIT III

Vocabulary Enrichment: Exposure to words from General Service List (GSL) by West, Academic word list (AWL) technical specific terms related to the field of technology, phrases, idioms, significant abbreviations formal business vocabulary — Read Economic Times, Reader's Digest, National Geographic and take part in a GD, using the words you learnt/liked. from the articles. Group discussion using words learnt.

UNIT IV

Email writing: Formal and informal emails, activity. **Verbal communication:** Pronunciation, clarity of speech **Communication Skills:** Overview of Communication Skills Barriers of communication, Effective communication. **Types of communication-** verbal and non — verbal — Role-play based learning. **Importance of Questioning Listening Skills:** Law of nature- Importance of listening skills, Difference between listening and hearing, Types of listening,

Expressing self, connecting with emotions, visualizing, and experiencing purpose

Written Communication: Summary writing, story writing

Build your CV — start writing your comprehensive CV including every achievement in your life, no format, no page limit

Life skill: Stress management, working with rhythm and balance, teamwork.

UNIT V

Understanding Life Skills: Movie based learning — **Pursuit of Happiness.** What are the skills? and values you can identify, what can you relate to?

Introduction to life skills What are the critical life skills **Multiple Intelligences?**

Embracing diversity — Activity on appreciation of diversity

Life skill: Join a trek — Values to be learned: Leadership, teamwork, dealing with ambiguity, managing stress, motivating people, creativity, result orientation

Text Books:

There are no prescribed texts for Semester 1 — there will be handouts and reference links. shared.

References:

1. English vocabulary in use — Alan McCarthy and O'Dell
2. APAART: Speak Well | (English language and communication)
3. APAART: Speak Well 2 (Soft Skills)
4. Business Communication — Dr. Saroj Hiremath

Web References:

1. Train your mind to perform under pressure- Simon sinek
<https://curiosity.com/videos/simon-sinek-on-training-your-mind-to-perform->



- underpressure-capture-your-flag/
2. Brilliant way one CEO rallied his team in the middle of layoffs
<https://www.inc.com/video/simon-sinek-explains-why-you-should-put-people-before-numbers.html>
3. Will Smith's Top Ten rules for success
<https://www.youtube.com/watch?v=bBsT9omTeh0>

Online Resources:

1. <https://www.coursera.org/learn/learning-how-to-learn>
2. <https://www.coursera.org/specializations/effective-business-communication>

Course Outcomes (COs):

After completion of this course the students shall be able to:

- CO01** Ability to demonstrate self-awareness and understanding of values, enhancing empathy and interpersonal skills.
- CO02** Proficiency in using correct grammar, tenses, and sentence structures to improve written and verbal communication.
- CO03** Competence in enriching vocabulary and applying new words in various contexts, fostering effective communication.
- CO04** Capability to utilize email writing techniques and effective verbal communication to convey messages clearly and professionally.
- CO05** Aptitude to demonstrate life skills such as stress management, teamwork, leadership, and embracing diversity in various situations, leading to personal and professional growth.



SEMESTER II

Course Code	Course	L	T	P	Credit
EN3BS08	Linear Algebra	3	1	0	4
EN3ES10	Statistical Methods	3	1	0	4
CB3CO21	Data Structures & Algorithms	3	1	2	5
EN3ES23	Principles of Electronics	2	0	2	3
CB3CO02	Fundamentals of Economics	2	0	0	2
EN3HS06	Business Communication & Value Science – II	2	0	2	3
CB3NG01	Environmental Sciences	3	0	0	3
	Total	18	3	6	24
		27 Hrs			

Course Code	Course Name	Hour Per Week			Credit
		L	T	P	
EN3BS08	Linear Algebra	3	1	0	4

Course Learning Objectives (CLOs):

- CLO₀₁** Understand the concepts of matrices and determinants, including types of matrices, positive definite matrices, and their properties.
- CLO₀₂** Acquire knowledge of methods to solve systems of linear equations, such as Cramer's rule and the inverse matrix method.
- CLO₀₃** Learn about matrix rank, linear combinations, Gaussian elimination, and LU decomposition for solving linear equations.
- CLO₀₄** Comprehend the concepts of vector spaces, subspaces, linear combinations, linear span, linear independence, and basis of a vector space.
- CLO₀₅** Gain insight into linear transformations, inner product spaces, orthogonal vectors, projections, and the Gram-Schmidt orthogonalization process.

UNIT I

Introduction to Matrices and Determinants; Types of Matrices, Positive Definite Matrices, Hermitian and Unitary Matrices; Solution of Linear Equations: Cramer's rule; Inverse Matrix Method.

UNIT II

Rank of the Matrix; Linear Combination; Gaussian elimination; LU Decomposition for Solving Systems of Linear Equations using the tools of Matrices; Eigenvalues and Eigenvectors of the matrix.

UNIT III

Definition of Vector spaces and Vector Sub Space (Some Important result on vector sub space only statement); Linear combination of Vector space; Linear Span of a set only definition (statements of some important result); Linear dependent and independent vectors; Some important Deductions ; Definition of Basis of a Vectors Space and Problems on basis of a vector space; Dimension of vector space and dimension theorem (only statement).

UNIT IV

Linear Transformation (zero transformation, identity transformation, negative transformation); (Def. Properties and Problems); Definition of Inner Product Space; Orthogonal Vector; Projections; Gram-Schmidt Orthogonalization process, Projection and QR decomposition.

UNIT V

Singular value decomposition and Principal component analysis; Introduction to their applications in Image Processing and Machine Learning.

Text Books:

1. B.S. Grewal, *Higher Engineering Mathematics*, Edition-43, Khanna Publishers, New Delhi, 2014.
2. B.V. Ramana, *Higher Engineering Mathematics*, Tata McGraw Hill Publishing Company Ltd., New Delhi, 2006.

References:

1. Michael. D. Greenberg, *Advanced Engineering Mathematics*, (Second Edition), Pearson.
2. Gilbert Strang, *Introduction to linear algebra*, (Fifth Edition), Wellesley-Cambridge Press.
3. R C Gonzalez and R E Woods, *Digital Image Processing*, Pearson.

Web Source:

1. <https://machinelearningmastery.com/introduction-matrices-machine-learning/>
2. <https://nptel.ac.in/courses/111101115/>
3. <https://nptel.ac.in/courses/111108066/>

Open Learning Source:

1. <https://swayam.gov.in/courses/public>
2. <http://nptel.ac.in/course.php>

Course Outcomes (COs):

After completion of this course the students shall be able to:

- CO01** Ability to apply matrix operations and determinants to solve systems of linear equations effectively.
- CO02** Proficiency in finding the rank of matrices and using LU decomposition to solve linear equations.
- CO03** Competence in analyzing vector spaces, subspaces, and linear independence, and determining the basis of a vector space.
- CO04** Capability to apply linear transformations, inner product spaces, and orthogonalization techniques to solve problems in vector spaces.
- CO05** Aptitude to understand and utilize singular value decomposition and principal component analysis in the context of applications in image processing and machine learning.

Course Code	Course Name	Hour Per Week			Credit
		L	T	P	
EN3ES10	Statistical Methods	3	1	0	4

Course Learning Objectives (CLOs):

- CLO01** Understand various sampling techniques, including random sampling, stratified random sampling, and their applications to finite and infinite populations.
- CLO02** Gain knowledge of linear statistical models, correlation, regression analysis, and curve fitting for different types of functions.
- CLO03** Learn about estimation techniques, point estimation, and criteria for good estimates such as unbiasedness and consistency.
- CLO04** Acquire proficiency in hypothesis testing, including concepts of Type I and Type II errors and the formulation of test procedures.
- CLO05** Comprehend non-parametric inference methods, order statistics, and tests like the Sign test, Wilcoxon signed rank test, Mann-Whitney test, and Kolmogorov-Smirnov test.

UNIT I

Sampling Techniques: Random sampling. Sampling from finite and infinite populations, Estimates and standard error (sampling with replacement and sampling without replacement), Sampling distribution of sample mean, stratified random sampling.

UNIT II

Linear Statistical Models: Scatter diagram, correlation, types of correlation, range of correlation coefficient, Karl Pearson coefficient of correlation, Regression, Line of Regression, Regression coefficient, Property of Regression Coefficient, Principle of Least squares method, Curve Fitting for (Straight line, Parabola, Hyperbola), Rank correlation, Spearman's Rank Correlation Coefficient, Multiple Regression Coefficient for three variable, Partial regression and Partial correlation, Partial Correlation coefficient for three variable.

UNIT III

Estimation: Point estimation, criteria for good estimates (un-biasedness, consistency), Methods of estimation including maximum likelihood estimation.

Sufficient Statistic: Concept and examples, complete sufficiency, their application in estimation. **Test of hypothesis:** Concept and formulation, Type I and Type II errors, Nyman Pearson lemma, Procedures of testing.

UNIT IV

Non-parametric Inference: Comparison with parametric inference, Use of order statistics, Sign test, Wilcoxon signed rank test, Mann-Whitney test, Run test, Kolmogorov-Smirnov test. Spearman's and Kendall's test. Tolerance region.

UNIT V

Basics of Time Series Analysis and Forecasting: Stationary, ARIMA Models: Identification, Estimation and Forecasting.

Analysis of variance: One way and two way Classification with as well as without interaction.

Text Books:

1. S.P. Gupta, *Statistical Methods*.
2. S.C Gupta and V.K Kapoor ,fundamentals of mathematical statistics.

References:

1. I.R. Johnson , *Probability and Statistics for Engineers* (Fourth Edition), , Prentice Hall India Learning private limited.
2. Goon, M. Gupta and B.Dasgupta ,*Fundamentals of Statistics* (vol. I &vol. II),World Private Limited.
3. *The Analysis of Time Series: An Introduction*, Chris Chatfield, Chapman & Hall/C

Data Source:

1. www.rbi.org.in

Web Source:

1. nptel.ac.in/courses/111103021/15
2. nptel.ac.in/courses/111105035/22
3. nptel.ac.in/courses/117101055/34
4. nptel.ac.in/courses/115101005/3

Open Learning Source:

1. <https://swayam.gov.in/courses/public>
2. <http://nptel.ac.in/course.php>

Course Outcomes (COs):

After completion of this course the students shall be able to:

- CO01** Ability to select appropriate sampling techniques and analyze samples from finite and infinite populations.
- CO02** Proficiency in interpreting and applying linear statistical models, correlation, and regression for data analysis and curve fitting.
- CO03** Competence in estimating population parameters and understanding the properties of good estimates.
- CO04** Capability to formulate and conduct hypothesis tests with a clear understanding of Type

I and Type II errors.

- CO05** Aptitude to apply non-parametric inference techniques and perform time series analysis and forecasting using ARIMA models. Additionally, proficiency in analyzing variance and performing classification with or without interaction in two-way analysis of variance.

Course Code	Course Name	Hour Per Week			Credit
		L	T	P	
CB3CO21	Data Structures and Algorithms	3	1	2	5

Course Learning Objectives (CLOs):

- CLO₀₁** Understand the basic terminologies of algorithms and data organization, including recursion, performance analysis, and asymptotic notations (Big-O, Omega, Theta).
- CLO₀₂** Comprehend programming styles and the refinement of coding, considering time-space trade-offs and the importance of testing in software development.
- CLO₀₃** Gain knowledge of linear data structures such as arrays, stacks, queues, and linked lists, along with their various representations, operations, and applications.
- CLO₀₄** Analyze non-linear data structures like trees (binary tree, threaded binary tree, binary search tree, B & B+ tree, AVL tree, splay tree) and their applications.
- CLO₀₅** Learn about graph data structures, including basic terminologies, representations (directed and undirected), operations, and graph search algorithms, along with file organization and accessing schemes.

UNIT I Basic Terminologies and Introduction to Algorithm & Data Organization:

Algorithm specification, Recursion, Performance analysis, Asymptotic Notation - The Big-O, Omega and Theta notation, Programming Style, Refinement of Coding - Time-Space Trade Off, Testing, Data Abstraction

UNIT II Linear Data Structure: Array, Stack, Queue, Linked-list and its types, Various Representations, Operations & Applications of Linear Data Structures

UNIT III Non-linear Data Structure-Trees: (Binary Tree, Threaded Binary Tree, Binary Search Tree, B & B+ Tree, AVL Tree, Splay Tree) and & Applications.

UNIT IV Non-linear Data Structure-Graph: Basic Terminologies and Representations Graphs (Directed, Undirected), Various Representations, Operations, Graph search and traversal algorithms and complexity analysis. Applications.

File: Organisation (Sequential, Direct, Indexed Sequential, Hashed) and various types of accessing schemes.

UNIT V Searching and Sorting on Various Data Structures: Sequential Search, Binary Search, Comparison Trees, Insertion Sort, Selection Sort, Shell Sort, Divide and Conquer Sort, Merge Sort, Quick Sort, Heapsort, Introduction to Hashing

Laboratory

1. Towers of Hanoi using user defined stacks.
2. Reading, writing, and addition of polynomials.
3. Line editors with line count, word count showing on the screen.
4. Trees with all operations.
5. All graph algorithms.
6. Saving / retrieving non-linear data structure in/from a file

Text Books:

1. Fundamentals of Data Structures, E. Horowitz, S. Sahni, S. A-Freed, Universities Press.
2. Data Structures and Algorithms, A. V. Aho, J. E. Hopperoft, J. D. Ullman, Pearson.

References:

1. The Art of Computer Programming: Volume 1: Fundamental Algorithms, Donald E. Knuth.
2. Introduction to Algorithms, Thomas, H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, The MIT Press.
3. *Open Data Structures: An Introduction (Open Paths to Enriched Learning)*, (Thirty First Edition), Pat Morin, UBC Press.

Course Outcomes (COs):

After completion of this course the students shall be able to:

- CO01** Ability to design and analyse algorithms using recursion and understand their performance using asymptotic notations.
- CO02** Proficiency in developing efficient programming styles and refining code to optimize time and space complexities, while incorporating testing for robust software development.
- CO03** Competence in implementing and utilizing linear data structures to solve various computational problems.
- CO04** Capability to implement and apply non-linear data structures like trees for organizing and managing data effectively.
- CO05** Aptitude to apply searching and sorting algorithms on different data structures, understanding their complexities and applications, and comprehend file organization and accessing schemes in practical scenarios.

Course Code	Course Name	Hour Per Week			Credit
		L	T	P	
EN3ES23	Principles of Electronics	2	0	2	3

Course Learning Objectives (CLOs):

- CLO01** Understand the properties of crystalline materials, energy band theory, and Fermi levels, distinguishing between conductors, semiconductors, and insulators based on their electrical properties.
- CLO02** Comprehend the characteristics and behavior of diodes and diode circuits, including formation of P-N junctions, energy band diagrams, and V-I characteristics under different biasing conditions
- CLO03** Gain knowledge of bipolar junction transistors, their configurations, and characteristics, analyzing cut-off, active, and saturation modes, as well as the calculation of bias stability.
- CLO04** Explore field-effect transistors, their types, structures, and characteristics, including JFET and MOSFET, and understand their applications in CS, CG, and CD configurations, including CMOS principles.
- CLO05** Learn about feedback amplifiers, oscillators, and operational amplifiers, analyzing their properties, feedback factors, and topologies, and explore the concepts of integrated circuits and operational amplifier applications.

UNIT I Semiconductors:

Crystalline material: Mechanical properties, Energy band theory, Fermi levels; Conductors, Semiconductors & Insulators: electrical properties, band diagrams. Semiconductors: intrinsic & extrinsic, energy band diagram, P&N-type semiconductors, drift & diffusion carriers.

UNIT II Diodes and Diode Circuits:

Formation of P-N junction, energy band diagram, built-in-potential, forward and reverse biased P-N junction, formation of depletion zone, V-I characteristics, Zener breakdown, Avalanche breakdown and its reverse characteristics; Junction capacitance and Varactor diode. Simple diode circuits, load line, linear piecewise model; Rectifier circuits: half wave, full wave, PIV, DC voltage and current, ripple factor, efficiency, idea of regulation.

UNIT III Bipolar Junction Transistors:

Formation of PNP / NPN junctions, energy band diagram; transistor mechanism and principle of transistors, CE, CB, CC configuration, transistor characteristics: cut-off active and saturation mode, transistor action, injection efficiency, base transport factor and current amplification factors for CB and CE modes. Biasing and Bias stability: calculation of stability factor

UNIT IV Field Effect Transistors:

Concept of Field Effect Transistors (channel width modulation), Gate isolation types, JFET Structure and characteristics, MOSFET Structure and characteristics, depletion and enhancement type; CS, CG, CD configurations; CMOS: Basic Principles

UNIT V Feed Back Amplifier, Oscillators and Operational Amplifiers:

Concept (Block diagram), properties, positive and negative feedback, loop gain, open loop gain, feedback factors; topologies of feedback amplifier; effect of feedback on gain, output impedance, input impedance, sensitivities (qualitative), bandwidth stability; effect of positive feedback: instability and oscillation, condition of oscillation, Barkhausen criteria. Introduction to integrated circuits, operational amplifier and its terminal properties; Application of operational amplifier; inverting and non-inverting mode of operation, Adders, Subtractors, Constant-gain multiplier, Voltage follower, Comparator, Integrator, Differentiator

Digital Electronics Fundamentals: Difference between analog and digital signals, Logic ICs, half and full adder/subtractor, multiplexers, demultiplexers, flip-flops, shift registers, counters.

Text Books:

1. Microelectronics Circuits, Adel S. Sedra and Kenneth Carless Smith, Oxford University Press.
2. Millman's Integrated Electronics, Jacob Millman, Christos Halkias, Chetan Parikh, McGraw Hill Education.
3. Digital Logic & Computer Design, M. Morris Mano, Pearson

References:

1. Electronic Devices and Circuit Theory, Robert L. Boylestad, Louis Nashelsky.
2. Solid State Electronic Devices, 6th Edition, Ben Streetman, Sanjay Banerjee
3. Electronic Principle, Albert Paul Malvino.
4. Electronics Circuits: Discrete & Integrated, D Schilling C Belove TApelewiczRSaccardi.
5. Microelectronics, Jacob Millman, Arvin Grabel.
6. Electronics Devices & Circuits, S. Salivahanan, N. Suresh Kumar, A. Vallavaraj
7. Electronic Devices & Circuit Theory, 11th Edition, Robert L. Boylestad, Louis Nashelsky.

Course Outcomes (COs):

After completion of this course the students shall be able to:

- CO01** Ability to analyse and describe the electrical properties and energy band diagrams of conductors, semiconductors, and insulators..
- CO02** Proficiency in understanding diode behaviour under different biasing conditions and the

characteristics of rectifier circuits, calculating their efficiency and ripple factor.

- CO03** Competence in analysing bipolar junction transistors and their configurations, evaluating bias stability, and understanding transistor action and amplification factors.
- CO04** Capability to comprehend the principles and characteristics of field-effect transistors, including JFET and MOSFET, and their applications in different configurations.
- CO05** Aptitude to design and analyse feedback amplifiers and oscillators, explore the terminal properties of operational amplifiers, and apply them in various configurations, such as adders, subtractors, voltage followers, and integrators.

Course Code	Course Name	Hour Per Week			Credit
		L	T	P	
CB3CO02	Fundamentals of Economics	2	0	0	2

Course Learning Objectives (CLOs):

- CLO01** Understand the principles of demand and supply in microeconomics, including the concepts of elasticity and equilibrium.
- CLO02** Comprehend consumer behavior, choice axioms, budget constraints, and indifference curves, and analyze the effects of price changes and income substitution on demand
- CLO03** Gain knowledge of the theory of production, production function, isoquants, and cost curves, and understand the equilibrium of a firm under different market structures like perfect competition, monopoly, and monopolistic competition.
- CLO04** Analyze the concepts of national income, its components, consumption function, investment, and the Keynesian model of income determination in macroeconomics.
- CLO05** Acquire knowledge about money, business cycles, and macroeconomic policies, including monetary and fiscal measures, and understand the classical paradigm and the concept of involuntary unemployment.

UNIT I Microeconomics:

Demand and Supply: Principles of Demand and Supply- Supply Curves of Firms – Elasticity of Supply; Demand Curves of Households- Elasticity of Demand; Equilibrium and Comparative Statics (Shift of a Curve and Movement along the Curve).

UNIT II

Welfare Analysis: Consumers’ and Producers’ Surplus - Price Ceilings and Price Floors; Consumer Behaviour- Axioms of Choice- Budget Constraints and Indifference Curves; Consumer’s Equilibrium- Effects of a Price Change, Income and Substitution Effects - Derivation of a Demand Curve; Applications- Tax and Subsidies - Intertemporal Consumption - Suppliers’ Income Effect;

UNIT III

Theory of Production: Production Function and Iso-quants - Cost Minimization; Cost Curves- Total, Average and Marginal Costs - Long Run and Short Run Costs; Equilibrium of a Firm Under Perfect Competition; Monopoly and Monopolistic Competition

UNIT IV Macroeconomics:

National Income and its Components: GNP, NNP, GDP, NDP; Consumption Function; Investment; Simple Keynesian Model of Income Determination and the Keynesian Multiplier; Government Sector- Taxes and Subsidies; External Sector- Exports and Imports;

UNIT V

Money, Business Cycle and Macroeconomic policy: Money- Definitions; Demand for Money- Transactionary and Speculative Demand; Supply of Money- Bank's Credit Creation Multiplier; Integrating Money and Commodity Markets- IS, LM Model; Business Cycles and Stabilization- Monetary and Fiscal Policy - Central Bank and the Government; The Classical Paradigm- Price and Wage Rigidities - Voluntary and Involuntary Unemployment.

Text Books:

1. Microeconomics, Pindyck, Robert S., and Daniel L. Rubinfeld, Pearson, New Delhi.
2. Macroeconomics, Dornbusch, Fischer and Startz, TMH, New Delhi
3. Economics, Paul Anthony Samuelson, William D. Nordhaus, TMH, New Delhi.

References:

1. Intermediate Microeconomics: A Modern Approach, Hal R, Varian, Tata McGraw Hills, New Delhi
2. Principles of Macroeconomics, N. Gregory Mankiw, [Worth Replika](#), New York

Course Outcomes (COs):

After completion of this course the students shall be able to:

- CO01** Ability to analyze market dynamics and understand the factors influencing demand and supply in various economic scenarios.
- CO02** Proficiency in applying consumer theory and equilibrium analysis to predict consumer choices and behavior.
- CO03** Competence in analyzing production processes, cost curves, and the behavior of firms under different market conditions.
- CO04** Capability to evaluate national income and its components, and understand the factors influencing aggregate demand and supply in the macroeconomy.
- CO05** Aptitude to comprehend the role of money, business cycles, and the significance of macroeconomic policies in stabilizing the economy, and analyze the classical paradigm in the context of price and wage rigidities.

Course Code	Course Name	Hour Per Week			Credit
		L	T	P	
EN3HS06	Business Communication and Value Science – II	2	0	2	3

Course Learning Objectives (CLOs):

- CLO₀₁** Identify and analyse social issues, conducting research and generating reports based on findings.
- CLO₀₂** Acquire effective writing techniques, avoiding common errors, and applying punctuation rules appropriately.
- CLO₀₃** Develop skills in storytelling and scriptwriting, creating skits and advertisements with compelling dialogues.
- CLO₀₄** Understand Belbin's 8 Team Roles and Lindgren's Big 5 personality traits, applying them to form effective teams and collaborations.
- CLO₀₅** Gain knowledge of diversity and inclusion, framing questions on diversity, and understanding the concepts of consequentialism and utilitarianism in ethical debates.

UNIT-I

Identification of social issues, generating a report based on the findings. Research on the social cause. Good and Bad Writing, writing techniques, Common errors, punctuation rules, use of words. SATORI –way of telling a story.

UNIT-II

Formation of an NGO. Create Vision, Mission, Value statement, tagline and Design a logo. Introduction to basic presentation skills, Speed Reading session: Introduction to skimming and scanning; reading skills activities, SQ3Rs technique.

UNIT-III

Advertisement making, Design a skit, write the script, completing dialogue. Belbin's 8 Team Roles (Shaper, Implementer, Completer / Finisher Co-ordinator Team worker, Resource Investigator, Plant Monitor / Evaluator, Specialist) and Lindgren's Big 5 personality traits (Extraversion, Introversion, openness, Conscientiousness Agreeableness) Lindgren's 8 team player Builder, Visualizer, Analyst, Controller, organizer networker, guide innovator)

UNIT-IV

Discussion on a film, key take away of the film, review of the film. Theory to connect the key take away of the film to the concept of empathy, impact of social issues on personal life.

Research on a book, incident or film based on the topic of students' respective NGO, Writing a review in a blog on the topics they are covering in their research.

UNIT-V

Session on Diversity & Inclusion- Different forms of Diversity in on society, framing questions on diversity. Definition of Consequentialism & Utilitarianism. GD and Debate skills, difference between GD and debate, Debate on the topic of diversity with an angle of ethics, morality and respect for individual. Respect for Individual and Integrity. Difference between morality and ethics. Writing Resume,

References:

1. Guiding Souls : Dialogues on the purpose of life; Dr. A.P.J Abdul Kalam ;Publishing Year-2005; Co-author--Arun Tiwari
2. The Family and the Nation; Dr. A.P.J Abdul Kalam; Publishing year: 2015; Co-author: Acharya Mahapragya
3. The Scientific India: A twenty First Century Guide to the World around Us; Dr. A.P.J Abdul Kalam; Publishing year: 2011; Co-author- Y.S.Rajan
4. Forge Your Future: Candid, Forthright, Inspiring ; Dr. A.P.J Abdul Kalam; Publishing year: 2014
5. Abundance: The Future is Better Than You Think; Peter H. Diamandis and Steven Kotler; Published: 21 Feb, 2012; Publisher: Free Press
6. Start With Why: How Great Leaders Inspire Everyone to Take Action; Simon Sinek; Published: 6 October 2011; Publisher: Penguin
7. Advertising & IMC: Principles and Practice; Sandra Moriarty, Nancy D. Mitchell, William D. Wells; Published: 15 June 2016; Publisher: Pearson Education India

Web References

1. ETHICS FUNDAMENTALS AND APPROACHES TO ETHICS
<https://www.eolss.net/Sample-Chapters/C14/E1-37-01-00.pdf>
2. A Framework for Making Ethical Decisions
<https://www.brown.edu/academics/science-and-technology-studies/framework-making-ethical-decisions>
3. Five Basic Approaches to Ethical Decision-
http://faculty.winthrop.edu/meelerd/docs/rolos/5_Ethical_Approaches.pdf

List of Practicals

1. Preparation of Slam book by the participant to be used for capturing individual learning points and observations,
2. SATORI (join the dots with participants personal life) Participants share the personal take away acquired from working in teams, , presenting their NGOs
3. Group Discussion.
4. Plan and design an E Magazine. Apply and assimilate the knowledge gathered from Sem-1 till date. Share objective & guideline. All members to contribute an article to the magazine, trainer to evaluate the content.
5. Group to come back and share their findings from the recording. Post work- individual write up to be written and evaluated for the E- magazine
6. articulating the message of their respective NGOs. Skit time-5 minutes



7. Presentations on various issues.
8. GD, learning about presentations and understanding diversity inclusion.
9. Teams to video record interviews of people from diverse groups (Ask 5 questions). Share the recordings in FB.
10. Prepared speech- Every student will narrate the challenges faced by a member of a diverse group in 4 minutes (speech in first person), Discussion on TCS values
11. Revisit your resume Include your recent achievements in your resume.

Course Outcomes (COs):

After completion of this course the students shall be able to:

- CO01** Ability to identify and address social issues, presenting research findings effectively through reports.
- CO02** Proficiency in written communication, demonstrating improved writing techniques and enhanced punctuation skills.
- CO03** Competence in storytelling and scriptwriting, creating engaging skits and advertisements with meaningful dialogues.
- CO04** Capability to form and lead effective teams, considering different team roles and personality traits for optimal teamwork.
- CO05** Aptitude to engage in discussions and debates on topics of diversity, ethics, and morality, promoting respect for individuality and integrity, while enhancing presentation and resume-writing skills.

Course Code	Course Name	Hour Per Week			Credit
		L	T	P	
CB3NG01	Environmental Sciences	3	0	0	3

Course Learning Objectives (CLOs):

- CLO01** Understand the multidisciplinary nature of environmental studies, recognizing the scope and significance of environmental education and sustainable development principles.
- CLO02** Comprehend the concepts of sustainability and sustainable agriculture, along with the principles of environmental laws and their implementation in India.
- CLO03** Gain knowledge of disaster management, solid waste management, deforestation, and urbanization, addressing domestic environmental concerns.
- CLO04** Analyze global environmental concerns, including climate change, ozone layer depletion, and their impact on human communities and agriculture.
- CLO05** Explore natural resources, their use, and overexploitation, as well as the types, causes, and control of environmental pollution in air, water, soil, and noise.

UNIT I Environmental Communication and Public Awareness

Multidisciplinary nature of environmental studies: Scope and Significance of environmental education; Concept of sustainability and sustainable development – Principles, imperatives and threats; three E's to optimize sustainable development, Sustainable Agriculture and Organic Farming.

An Introduction to Environmental laws in India: Environmental Impact Assessment and Environmental Auditing. Polices for Disaster preparedness programs, Rehabilitation measures and long-term reconstruction, Psychosocial care provision during the different phases of disaster

UNIT II Domestic and Global Environmental Concerns

Domestic environmental concerns: Disaster management – Introduction, types, disaster management cycle; Case studies of terrorist incidence, Bomb threat; Solid Waste management: Introduction, types of solid waste, methods to manage; Deforestation; Urbanization and Energy requirements

Global environmental concerns: Global Challenges - climate change and global warming, Kyoto Protocol, Greenhouse Gases, Ways to reduce Greenhouse gases emissions, Carbon Footprint, ways to reduce carbon footprint, Carbon Trading; Ozone layer depletion, Acid rain and impacts on human communities and agriculture.

UNIT III Natural resources and Environmental Pollution

Natural Resources: Land resources and land use change; Land degradation, soil erosion, salinization and desertification. Water: Use and over exploitation of surface and ground water, Forest Resources; Food resources. Case studies on natural disaster: Earthquake, floods, cyclone, volcanoes; Energy resources: Renewable and nonrenewable energy sources, use of alternate energy sources.

Environmental pollution: types, causes, effects and control of; Air, water, soil and noise pollution.

UNIT IV Ecosystem and Biodiversity

Ecosystem: Structure and function of ecosystem; Energy flow in an ecosystem: food chains, food webs and ecological succession.

Biological diversity: types of biodiversity; its significance, threats and conservation.

UNIT V Sustainable habitat and Green Technology

Sustainable Habitat: Concept of Green Building and its rating systems, Volatile Organic Compounds (VOC), Heating Ventilation and Air Conditioning (HVAC) systems.

Green Technology: Hybrid Vehicle Technology, Industrial ecology, Green Technology, Green Business, Green Computing, Green Chemistry.

Text Books:

1. Environmental Science by Dr. Preeti Jain, Dr. Devaanshi Jagwani, Manthan Publications, 2016
2. Environmental Science by Dr. Surinder Deswal, Dhanpat Rai & Co. publication
3. Environmental Studies by R. Rajgopalan ,Oxford IBH Publication 2011

References:

1. Environmental Science (8 th Edition) (2010): Daniel D. Chiras, Jones & Bartlett Ltd
2. Introduction to Environmental Science and Engineering (2nd Ed.) (2004): G. M. Masters, Pearson Education Pvt. Ltd.
3. Environmental Chemistry : A. K. De, New Age International,1996
4. Environmental Science (6 th ed) (1997): Jr. G. T. Miller, Wadsworth Publishing
5. A text book of Environmental Studies.,2006. D.K.Asthana, Meera Asthana (S.Chand&Co.)
6. Environmental Law in India, Singh Gurdip, 2004, Mcmillan & Co.
7. G.J. Rau and C.D. Wee ten, "Environmental Impact Analysis" Hand book, McGraw Hill, 1980.
8. Petts Judith, 1999, Handbook of environmental impact assessment. Vol. 1, Blackwell Science
9. Carter Nick, 1991, Disaster Management: A Disaster Manager's Handbook, Asian Development Bank, Manila Phillipines Govt. of India, 2009, National Disaster Management

Web Source:

1. <http://www.circularecology.com/sustainability-and-sustainable-development.html#.WwOcrkiFPIU>
2. <http://markdiesendorf.com/wp-content/uploads/2015/09/CorpSust2000.pdf>
3. <http://www.fao.org/docrep/005/v9933e/v9933e02.htm>



4. <http://www.yourarticlelibrary.com/essay/disaster-management-in-india-classification-policies-and-other-details/25006>
5. <https://ndma.gov.in/en/>
6. <https://www.conserve-energy-future.com/sources-effects-methods-of-solid-waste-management.php>
7. <https://beeindia.gov.in/sites/default/files/1Ch9.pdf>
8. <https://www.ugc.ac.in/oldpdf/modelcurriculum/Chapter2.pdf>
9. <http://download.nos.org/333courseE/10.pdf>
10. <http://download.nos.org/333courseE/5.pdf>
11. http://www.unesco.pl/fileadmin/user_upload/pdf/BIODIVERSITY_FACTSH EET.pdf
12. <http://www.nistads.res.in/images/ISTIP/report/green%20technology.pdf>

Open Learning Source:

1. <https://swayam.gov.in/courses/public>
2. <http://nptel.ac.in/course.php>

Course Outcomes (COs):

After completion of this course the students shall be able to:

- CO01** Ability to evaluate and discuss the importance of environmental education in sustainable development.
- CO02** Proficiency in understanding and analyzing the principles of environmental laws and their application in addressing environmental issues in India.
- CO03** Competence in dealing with disaster management, solid waste management, and deforestation, and proposing solutions to urbanization and energy requirements..
- CO04** Capability to identify and assess global environmental concerns, including climate change, ozone layer depletion, and their implications..
- CO05** Aptitude to comprehend ecosystem structures, energy flow, and biodiversity conservation, and explore sustainable habitat concepts and green technologies like green building, hybrid vehicle technology, and green computing.

Department of Civil Engineering

CURRICULUM AND SYLLABUS

(2024-2028)

B.Tech. Civil Engineering



Civil Engineering

B.Tech. (CE)

CURRICULUM AND SYLLABUS

Vision of the Department:

To emphasize deep understanding of fundamental principles, development of creative ability to handle the challenges of Civil Engineering, and the analytical ability to solve problems which are interdisciplinary in nature.

Mission of the Department:

6. To offer an exceptional curriculum including in-depth coverage in three technical sub-disciplines of civil engineering: structural engineering, Construction Management and Environmental engineering, as well as broad coverage in Computer Aided Design.
7. To engage students in creating innovative design solutions of civil engineering problems that include realistic constraints such as economic, environmental, sustainability, social, ethical, health and safety.
8. To provide research experiences, allowing students to work closely with members of the faculty.
9. To employ highly dedicated faculty members who are effective teacher scholars committed to maintaining a learner-centered environment with emphasis on student mentoring.

Department of Civil Engineering

Program Education Objectives (PEOs)

PEO 1 Graduates will use and apply necessary mathematical tools, scientific basics and fundamental concepts of Civil Engineering

PEO 1.1: Sound in Mathematical tools and scientific basics

PEO 1.2: Apply concepts of Civil Engineering

PEO 2 Graduates will demonstrate ability to analyze, design and develop civil engineering projects

PEO 2.1: Abilities to design Civil Engineering projects

PEO 2.2: Abilities to develop and execute Civil Engineering projects

PEO 3 Graduates are prepared to be employed, exhibit professionalism, engaged in lifelong learning and demonstrate entrepreneurship skills.

PEO 3.1: Employable and entrepreneurial skills.

PEO 3.2: Life Long Learning, Professionalism and ethics

Department of Civil Engineering

PROGRAMME OUTCOMES (POs)

PO 01

Engineering knowledge: Apply the knowledge of mathematics, science, engineering, fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO 02

Problem analysis: Identify, formulate, review, research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences

PO 03

Design / development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO 04

Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO 05

Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO 06

The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO 07

Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO 08

Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO 09

Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO 10

Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO 11

Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments



PO 12 Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Department of Civil Engineering

PROGRAMME SPECIFIC OUTCOMES (PSOs)

- PSO 1** Applying knowledge of applied sciences and engineering for analysing and solving civil Engineering Problems
- PSO 2** Application of civil engineering concepts concerning, ecology, energy conservation and management.
- PSO 3** Software based planning and execution of civil engineering projects applying relevant codes of practice for materials and techniques.
- PSO 4** Applying knowledge of applied sciences and engineering for analysing and solving civil Engineering Problems



Medi-Caps University Indore (M.P.)
DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
Scheme (B.Tech- Civil Engineering)
Batch 2024

SEMESTER I

Sr. No.	Course Code	Courses	L	T	P	Credit
1	EN3BS11	Engineering Mathematics-I	3	0	0	3
2	EN3BS16	Engineering Physics	3	0	2	4
3	EN3ES17	Basic Electrical Engineering	3	0	2	4
4	EN3ES26	Engineering Graphics	2	0	2	3
5	EN3ES27	Basic Programming with C	2	0	2	3
6	EN3ES30	Basic Civil Engineering & Mechanics	3	0	2	4
7	EN3NG01	Environmental Science	2	0	0	2
8	EN3NG02	Universal Human Values and Professional Ethics	2	0	0	2
		Total	20	0	10	25
		Total Contact Hours	30			

SEMESTER II

Sr. No.	Course Code	Courses	L	T	P	Credit
1	EN3BS12	Engineering Mathematics-II	3	0	0	3
2	EN3BS14	Engineering Chemistry	2	0	2	3
3	EN3ES16	Basic Electronics Engineering	3	0	2	4
4	EN3ES18	Basic Mechanical Engineering	3	0	2	4
5	EN3ES28	Advance Programming with C	2	0	2	3
6	EN3ES29	Engineering Workshop	0	0	2	1
7	EN3HS01	History of Science and Technology	2	0	0	2
8	EN3NG11/ /EN3NG12/ EN3NG13/ EN3NG14/ EN3NG15	Club Activities/NSS/NCC/Yoga/Sports	1	0	0	1
9	EN3HS10	Communication Skills	2	0	2	3
		Total	18	0	12	24
		Total Contact Hours	30			

SEMESTER – III

Sr. No.	Course Code	Courses	L	T	P	Credit
1	CE3CO22	Transportation Engineering -I	2	0	0	2
2	CE3CO01	Engineering Surveying	3	0	2	4
3	CE3CO05	Construction Material and Techniques	3	0	2	4
4	CE3CO19	Fluid Mechanics	3	0	2	4
5	CE3ES11	Strength of Material	3	0	2	4
6	CE3ES12	Python for Civil Engineering	0	0	2	1
7	EN3HS04	Fundamentals of Management, Economics and Accountancy	3	0	0	3
8	EN3NG11/ EN3NG12/ EN3NG13/ EN3NG14/ EN3NG15	Club Activities/NSS/NCC/Yoga/Sports	1	0	0	1
9	EN3NG03	Soft Skill-I	2	0	0	2
		Total	20	0	10	25
		Total Contact Hours	30			

SEMESTER – IV

Sr. No.	Course Code	Courses	L	T	P	Credit
1	EN3BS15	Engineering Mathematics-III	3	0	0	3
2	CE3CO20	Environmental Engineering -I	3	0	0	3
3	CE3CO21	Building Planning & Drawing	2	0	2	3
4	CE3CO23	Structural Analysis -I	3	0	2	4
5	CE3CO24	Hydraulic Engineering	3	0	0	3
6	CE3CO27	Geotechnical Engineering - I	3	0	2	4
7	CE3CO28	RCC Design	3	0	0	3
8	CE3CO32	Quantity Surveying & Estimation	2	0	0	2
9	EN3NG10	Soft Skills -II	2	0	0	2
		Total	24	0	6	27
		Total Contact Hours	30			

SEMESTER – V

Sr. No.	Course Code	Courses	L	T	P	Credit
1	CE3CO25	Structural Analysis -II	3	0	0	3
2	CE3CO26	Environmental Engineering-II	3	0	2	4
3	CE3CO29	Water Resources Engineering	3	0	0	3
4	CE3CO31	Design of Steel Structures	3	0	0	3
5	CE3CO33	Geotechnical Engineering - II	3	0	0	3
6	CE3ELXX	Elective-I	3	0	0	3
7	CE3ELXX	Elective-II	3	0	0	3
8	OEXX	Open Elective-I	3	0	0	3
9	EN3NG06	Open Learning Courses	1	0	0	1
10	EN3NG09	Soft Skill-III	2	0	0	2
		Total	27	0	2	28
		Total Contact Hours	29			

SEMESTER – VI

Sr. No.	Course Code	Courses	L	T	P	Credit
1	CE3CO30	Transportation Engineering - II	3	0	2	4
2	CE3CO34	Civil Engineering Software Lab	0	0	2	1
3	CE3CO35	Advance RCC Design	3	0	0	3
4	CE3PC08	Mini Project	0	0	4	2
5	CE3ELXX	Elective-III	3	0	0	3
6	CE3ELXX	Elective-IV	3	0	0	3
7	CE3ELXX	Elective-V	3	0	0	3
8	OEXX	Open Elective-II	3	0	0	3
9	EN3NG08	Soft Skills-IV	2	0	0	2
		Total	20	0	8	24
		Total Contact Hours	28			

SEMESTER – VII

Sr. No.	Course Code	Courses	L	T	P	Credit
1	CE3ELXX	Elective-VI	3	0	0	3
2	OEXX	Open Elective-III	3	0	0	3
3	CE3PC03	Industrial Training	0	2	0	2
4	CE3PC06	Project-I	0	0	8	4
		Total	6	2	8	12
		Total Contact Hours	16			

SEMESTER VIII

Sr. No.	Course Code	Courses	L	T	P	Credit
1	CE3PC07	Project-II	0	0	20	10
		Total	0	0	20	10
		Total Contact Hours	20			

S.NO	Course Work	Total Credits	Credits as per Modal scheme
1	Basic Sciences (BS)	16	10-15% (16-24)
2	Engineering Sciences (ES)	31	15-20% (24-32)
3	Humanities and Social Sciences (HS)	8	5-10% (8-16)
4	Core (CO)	60	30-40%(48-64)
5	Program Electives (EL)	18	10-15%(16-24)
6	Open Electives (OE)	9	5-10%(8-16)
7	Project Work, Seminar (PC)	18	10-15%(16-24)
8	Non Grading	15	(11-16)
	Total Credits	175	



Syllabus of First year is same for all branches except CSBS and for detail refer below page numbers:

First semester syllabus is available from page number:11-37

Second semester syllabus is available from page number:38-59



MEDI-CAPS
UNIVERSITY

Department of Electronics Engineering

CURRICULUM AND SYLLABUS **(2024-2028)**

B. Tech. Electronics Engineering



Electronics Engineering

B. Tech. (EC)

CURRICULUM AND SYLLABUS

Vision of the Department:

To promote excellence of global standards in field of Electronics Engineering education and research to create technocrats who are innovative, entrepreneurial and successful to gratify the dynamic industrial demands and social needs

Mission of the Department:

- To deliver best quality education to the students to strengthen their capacity and escalate their skills to make them globally competitive Electronics Engineer.
- To offer ultra-modern research facilities and open interactive environment in the department that motivates faculty, staff and students with prospective to generate, analyze, apply and promulgate knowledge.
- To make collaboration with world class organization in education, research and industrial sectors for achieving eminence in teaching, research and consultancy practices.
- To provide the students with academic environment for promoting creativity, leadership, ethical quality and lifelong learning habits required for successful elongated career.
- To recruit skillful, experienced and specialist faculty members for building comprehensive academic environment expert faculty members and create an enthusiastic academic environment.

B. Tech. in Electronics Engineering

Program Education Objectives (PEOs)

The Program Educational objectives of the Electronics Engineering undergraduate program are to:

- PEO01** : To impart students the education of basic sciences, fundamentals involved in electronics and related engineering fields, and computer programming, in addition, specifically prepare them to design, analysis and synthesis of electronic circuits, software tools and equipment's.
- PEO02** : To train students as expert to evaluate the real life technical problem and suggest solutions which are socially and economically viable.
- PEO03** : To give the students' knowledge of professional, administrative, ethical practices to make them outshining and adaptable to combat any critical situation in global scenario.
- PEO04** : To create a mindset among the faculty members to prepare and persuade students for research activity and scientific innovations to make continuous development in fields of Electronics engineering.
- PEO05** : To build graduates to involve in higher education and lifelong learning, having interpersonal skill and effective communication ability, able to lead teams involved in diverse fields, having quality to act with integrity, and contented with ethical and social values.

PROGRAMME OUTCOMES (POs)

Engineering graduates will be able to:

- PO1.** Engineering knowledge: Apply the knowledge of mathematics, science, engineering, fundamentals, and an engineering specialization to the solution of complex engineering problems.
- PO2. Problem analysis:** Identify, formulate, review, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- PO3. Design / development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- PO4. Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- PO5. Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
- PO6. The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- PO7. Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.



- PO8. Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- PO9. Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- PO10. Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
- PO11. Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
- PO12. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES (PSOs)

The Program Specific Outcomes of the Electronics Engineering undergraduate program are:

- PSO₁.** Validate skill in software programming and hardware design as expected in field of electronics and communication engineering.
- PSO₂.** Prove their capacity to do advance study and research related with electronics and communication subjects such as embedded system, wireless communication, VLSL design, signal processing etc.
- PSO₃.** Gain industrial exposure by completing long term internship in industry and making of project in collaboration with industry.
- PSO₄.** Attain soft skill such as verbal and written communication, teamwork, adaptability, leadership, critical observation, and problem solving.



MEDI-CAPS UNIVERSITY INDORE (M.P.)

DEPARTMENT OF Electronics Engineering

B.Tech. EC- VLSI 2024 Batch

SEMESTER I

Sr. No.	Course Code	Courses	L	T	P	Credit
1	EN3BS11	Engineering Mathematics-I	3	0	0	3
2	EN3BS16	Engineering Physics	3	0	2	4
3	EN3ES17	Basic Electrical Engineering	3	0	2	4
4	EN3ES26	Engineering Graphics	2	0	2	3
5	EN3ES27	Basic Programming with C	2	0	2	3
6	EN3ES30	Basic Civil Engineering & Mechanics	3	0	2	4
7	EN3NG01	Environmental Science	2	0	0	2
8	EN3HS01	History of Science and Technology	2	0	0	2
		Total	20	0	10	25
		Total Contact Hours	30			

SEMESTER II

Sr. No.	Course Code	Courses	L	T	P	Credit
1	EN3BS12	Engineering Mathematics-II	3	0	0	3
2	EN3BS14	Engineering Chemistry	2	0	2	3
3	EN3ES16	Basic Electronics Engineering	3	0	2	4
4	EN3ES18	Basic Mechanical Engineering	3	0	2	4
5	EN3ES28	Advanced Programming with C	2	0	2	3
6	EN3ES29	Engineering Workshop	0	0	2	1
7	EN3NG02	Universal Human Values & Professional Ethics	2	0	0	2
8	EN3HS10	Communication Skills	2	0	2	3
9	EN3NG11/ EN3NG12/ EN3NG13/ EN3NG14/ EN3NG15/	Club Activities/ NSS / NCC / Yoga / Sports	1	0	0	1
		Total	18	0	12	24
		Total Contact Hours	30			

**SEMESTER –
III**

Sr. No.	Subject Code	Courses	L	T	P	Credit
1	EC3BS01	Engineering Mathematics-III	3	0	0	3
2	EC3COXX	Computer System Architecture	3	0	0	3
3	EC3CO03	Electronic Devices and Circuits	4	0	2	5
4	EC3CO05	Circuit Analysis and Synthesis	3	1	2	5
5	EC3CO07	Digital Electronics	3	0	2	4
6	EN3HS04	Fundamentals of Management, Economics and Accountancy	3	0	0	3
7	EN3NG03	Soft Skills I	2	0	0	2
8	EN3NG06	Open Learning Courses	1	0	0	1
		Total	22	1	6	26
		Total Contact Hours	29			

**SEMESTER –
IV**

Sr. No.	Subject Code	Courses	L	T	P	Credit
1	EC3CO17	Linear Integrated Circuit and Applications	3	0	2	4
2	EC3CO20	VLSI Design	3	0	2	4
3	EC3COXX	Communication Systems	3	1	2	5
4	EC3CO08	Engineering Electromagnetics	4	0	0	4
5	EC3E*XX	Program Elective I	3	0	0	3
7	EN3ES23/ EC3ES01	Engineering Workshop II / Python Programming for Electronics Engg	0	0	2	1
8	EN3NG10	Soft Skills-II	2	0	0	2
		Total	18	1	8	23
		Total Contact Hours	27			

**SEMESTER –
V**

Sr. No.	Subject Code	Courses	L	T	P	Credit
1	EC3COXX	Digital Signal Processing	3	1	2	5
2	EC3COXX	VLSI Technology	3	1	0	4
3	EC3COXX	Scripting Languages and Verification	3	1	2	5
4	EC3CO10	Microprocessors & Microcontrollers	3	0	2	4
5	EC3E*XX	Program Elective II	3	0	0	3
6	OEXXXXX	Open Elective I	3	0	0	3
7	EN3NG09	Soft Skills-III	2	0	0	2
		Total	20	3	6	26
		Total Contact Hours	29			

**SEMESTER –
VI**

Sr. No.	Subject Code	Courses	L	T	P	Credit
1	EC3COXX	Digital Logic Synthesis using HDL	3	1	2	5
2	EC3COXX	Semiconductor Device Modelling	3	0	2	4
3	EC3CO21	Fiber Optic Communication	3	0	2	4
4	EC3E*XX	Program Elective III	3	0	0	3
5	EC3E*XX	Program Elective IV	3	0	0	3
6	EC3PC09	Mini Project	0	0	4	2
7	OEXXXXX	Open Elective II	3	0	0	3
8	EN3NG08	Soft Skills-IV	2	0	0	2
		Total	20	0	10	26
		Total Contact Hours	30			

**SEMESTER
VII**

Sr. No.	Subject Code	Courses	L	T	P	Credit
1	EC3E*XX	Program Elective V	3	0	0	3
2	EC3E*XX	Program Elective VI	3	0	0	3
3	OEXXXXX	Open Elective III	3	0	0	3
4	EC3PC06	Project I	0	0	8	4
5	EC3PC03	Industrial Training	0	2	0	2
		Total	9	2	8	15
		Total Contact Hours	19			

**SEMESTER
VIII**

Sr. No.	Subject Code	Courses	L	T	P	Credit
1	EC3PC10	Project II	0	0	20	10
		Total	0	0	20	10
		Total Contact Hours	20			

Total Credit 175

Summary of Credits

S.NO	Course Work	Total Credits	Credits as per Modal scheme
1	Basic Sciences (BS)	16	10-15% (16-24)
2	Engineering Sciences (ES)	27	15-20% (24-32)
3	Humanities and Social Sciences (HS)	8	5-10% (8-16)
4	Core Courses (CO)	64	30-40% (48-64)
5	Program Electives (EL)	18	10-15% (16-24)
6	Open Electives (OE)	9	5-10% (8-16)
7	Project Work, Seminar	18	10-15% (16-24)
8	Non Grading	15	(11-16)

175



**Syllabus of First year is same for all branches except CSBS
and for detail refer below page numbers:**

First semester syllabus is available from page
number:11-37

Second semester syllabus is available from
page number:38-59



Medi-Caps University Indore (M.P.)
DEPARTMENT OF ELECTRONICS ENGINEERING
Choice Based Credit System- Scheme of B.Tech EC (2024 Batch)
with specialization in Computer Technology

SEMESTER I

Sr. No.	Course Code	Courses	L	T	P	Credit
1	EN3BS11	Engineering Mathematics-I	3	0	0	3
2	EN3BS16	Engineering Physics	3	0	2	4
3	EN3ES17	Basic Electrical Engineering	3	0	2	4
4	EN3ES26	Engineering Graphics	2	0	2	3
5	EN3ES27	Basic Programming with C	2	0	2	3
6	EN3ES30	Basic Civil Engineering & Mechanics	3	0	2	4
7	EN3NG01	Environmental Science	2	0	0	2
8	EN3HS01	History of Science and Technology	2	0	0	2
		Total	20	0	10	25
		Total Contact Hours	30			

SEMESTER II

Sr. No.	Course Code	Courses	L	T	P	Credit
1	EN3BS12	Engineering Mathematics-II	3	0	0	3
2	EN3BS14	Engineering Chemistry	2	0	2	3
3	EN3ES16	Basic Electronics Engineering	3	0	2	4
4	EN3ES18	Basic Mechanical Engineering	3	0	2	4
5	EN3ES28	Advanced Programming with C	2	0	2	3
6	EN3ES29	Engineering Workshop	0	0	2	1
7	EN3NG02	Universal Human Values & Professional Ethics	2	0	0	2
8	EN3HS10	Communication Skills	2	0	2	3
9	EN3NG11/ EN3NG12/ EN3NG13/ EN3NG14/ EN3NG15	Club Activities/ NSS / NCC / Yoga / Sports	1	0	0	1
		Total	18	0	12	24
		Total Contact Hours	30			

SEMESTER – III

Sr. No.	Course Code	Courses	L	T	P	Credit
1	EC3BS02	Discrete Mathematics	3	0	0	3
2	EC3CO24	Computer System Architecture	3	0	0	3
3	EC3CO25	Analog Electronics	4	0	2	5
4	EC3CO05	Circuit Analysis and Synthesis	3	1	2	5
5	EC3CO07	Digital Electronics	3	0	2	4
6	EC3ELXX	Program Elective I	2	0	2	3
7	EN3NG09	Soft Skills I	2	0	0	2
8	EN3NGXX	NSS/NCC/Yoga/Sports/Club Activities	1	0	0	1
		Total	21	1	8	26
		Total Contact Hours	30			

SEMESTER – IV

Sr. No.	Course Code	Courses	L	T	P	Credit
1	EC3COXX	Digital Signal Processing	4	0	2	5
2	EC3COXX	Computer Peripherals and Interfacing	4	0	2	5
3	EC3COXX	Data Structures	3	0	2	4
4	EC3COXX	Theory of Computation	4	0	0	4
5	EC3ELXX	Program Elective II	3	0	0	3
6	EN3HS04	Fundamentals of Management, Economics and Accountancy	3	0	0	3
8	EN3NG10	Soft Skills-II	2	0	0	2
		Total	22	0	6	26
		Total Contact Hours	30			

SEMESTER – V

Sr. No.	Course Code	Courses	L	T	P	Credit
1	EC3CO30	Communication Systems	4	0	2	5
2	EC3COXX	Operating Systems	4	0	0	4
3	EC3CO08	Engineering Electromagnetics	4	0	0	4
4	EC3COXX	Microprocessor and Interfacing	3	0	2	4
5	EC3E*XX	Program Elective III	3	0	0	3
6	OEXXXXX	Open Elective I	3	0	0	3
7	EC3ES01	Python Programming for Electronics Engineering	0	0	2	1
8	EN3NG06	Open Learning Course	1	0	0	1
9	EN3NG05	Soft Skills III	2	0	0	2
		Total	24	0	6	27
		Total Contact Hours	30			

SEMESTER – VI

Sr. No.	Course Code	Courses	L	T	P	Credit
1	EC3CO20	VLSI Design	3	0	2	4
2	EC3COXX	Software Engineering	3	0	2	4
3	EC3COXX	Computer Networks	3	0	2	4
4	EC3E*XX	Program Elective IV	3	0	0	3
5	EC3E*XX	Program Elective V	3	0	0	3
6	OEXXXXX	Open Elective II	3	0	0	3
7	EC3PC09	Mini Project	0	0	4	2
8	EN3NG08	Soft Skills-IV	2	0	0	2
		Total	20	0	10	25
		Total Contact Hours	30			

SEMESTER – VII

Sr. No.	Course Code	Courses	L	T	P	Credit
1	EC3E*XX	Program Elective VI	3	0	0	3
2	OEXXXXX	Open Elective III	3	0	0	3
3	EC3PC06	Project I	0	0	8	4
4	EC3PC03	Industrial Training	0	2	0	2
		Total	6	2	8	12
		Total Contact Hours	16			



**SEMESTER
VIII**

Sr. No.	Course Code	Courses	L	T	P	Credit
1	EC3PC07	Project II	0	0	20	10
		Total	0	0	20	10
		Total Contact Hours	20			

Total Credits

175

Summary of Credits

S.NO	Course Work	Total Credits	Credits as per Modal scheme
1	Basic Sciences (BS)	16	10-15% (16-24)
2	Engineering Sciences (ES)	27	15-20% (24-32)
3	Humanities and Social Sciences (HS)	8	5-10% (8-16)
4	Core Courses (CO)	64	30-40% (48-64)
5	Program Electives (EL)	18	10-15% (16-24)
6	Open Electives (OE)	9	5-10% (8-16)
7	Project Work, Seminar	18	10-15% (16-24)
8	Non Grading	15	(11-16)

175



Syllabus of First year is same for all branches except CSBS and for detail refer below page numbers:

First semester syllabus is available from page number:11-37

Second semester syllabus is available from page number:38-59



Medi-Caps University Indore (M.P.)
DEPARTMENT OF ELECTRONICS ENGINEERING
Choice Based Credit System- Scheme of B.Tech EC (2024 Batch)
with specilization in Artificial Intelligence

SEMESTER I

Sr. No.	Course Code	Courses	L	T	P	Credit
1	EN3BS11	Engineering Mathematics-I	3	0	0	3
2	EN3BS16	Engineering Physics	3	0	2	4
3	EN3ES17	Basic Electrical Engineering	3	0	2	4
4	EN3ES26	Engineering Graphics	2	0	2	3
5	EN3ES27	Basic Programming with C	2	0	2	3
6	EN3ES30	Basic Civil Engineering & Mechanics	3	0	2	4
7	EN3NG01	Environmental Science	2	0	0	2
8	EN3HS01	History of Science and Technology	2	0	0	2
		Total	20	0	10	25
		Total Contact Hours	30			

SEMESTER II

Sr. No.	Course Code	Courses	L	T	P	Credit
1	EN3BS12	Engineering Mathematics-II	3	0	0	3
2	EN3BS14	Engineering Chemistry	2	0	2	3
3	EN3ES16	Basic Electronics Engineering	3	0	2	4
4	EN3ES18	Basic Mechanical Engineering	3	0	2	4
5	EN3ES28	Advanced Programming with C	2	0	2	3
6	EN3ES29	Engineering Workshop	0	0	2	1
7	EN3NG02	Universal Human Values & Professional Ethics	2	0	0	2
8	EN3HS02	Communication Skills	2	0	2	3
9	EN3NG11/ EN3NG12/ EN3NG13/ EN3NG14/ EN3NG15/	Club Activities/ NSS / NCC / Yoga / Sports	1	0	0	1
		Total	18	0	12	24
		Total Contact Hours	30			

SEMESTER – III

Sr. No.	Course Code	Courses	L	T	P	Credit
1	EC3BSXX	Discrete Mathematics	3	0	0	3
2	EC3COXX	Computer System Architecture	3	0	0	3
3	EC3COXX	Analog Electronics	4	0	2	5
4	EC3CO05	Circuit Analysis and Synthesis	3	1	2	5
5	EC3CO07	Digital Electronics	3	0	2	4
6	EC3ELXX	Program Elective I	2	0	2	3
7	EN3NG09	Soft Skills I	2	0	0	2
	EN3NGXX	NSS/NCC/Yoga/Sports/Club Activities	1	0	0	1
		Total	21	1	8	26
		Total Contact Hours	30			

SEMESTER – IV

Sr. No.	Course Code	Courses	L	T	P	Credit
1	EC3COXX	Digital Signal Processing	4	0	2	5
2	EC3COXX	Computer Peripherals and Interfacing	4	0	2	5
3	EC3COXX	Data Structures	3	0	2	4
4	EC3COXX	Theory of Computation	4	0	0	4
5	EC3ELXX	Program Elective II	3	0	0	3
6	EN3HS04	Fundamentals of Management, Economics and Accountancy	3	0	0	3
8	EN3NG10	Soft Skill-II	2	0	0	2
		Total	23	0	6	26
		Total Contact Hours	29			

SEMESTER – V

Sr. No.	Course Code	Courses	L	T	P	Credit
1	EC3COXX	Communication Systems	4	0	2	5
2	EC3COXX	Operating Systems	4	0	0	4
3	EC3CO08	Engineering Electromagnetics	4	0	0	4
4	EC3COXX	Microprocessor and Interfacing	3	0	2	4
5	EC3ELXX	Program Elective III	3	0	0	3
6	OEXXXXX	Open Elective I	3	0	0	3
7	EC3ES01	Python Programing for Electronics Engg.	0	0	2	1
8	EN3NG06	Open Learning Courses	1	0	0	1
9	EN3NG05	Soft Skills III	2	0	0	2
		Total	24	0	6	27
		Total Contact Hours	30			

SEMESTER – VI

Sr. No.	Course Code	Courses	L	T	P	Credit
1	EC3CO20	VLSI Design	3	0	2	4
2	EC3COXX	Software Engineering	3	0	2	4
3	EC3COXX	Computer Networks	3	0	2	4
4	EC3E*XX	Program Elective IV	3	0	0	3
5	EC3E*XX	Program Elective V	3	0	0	3
	OEXXXXX	Open Elective II	3	0	0	3
	EC3PC09	Mini Project	0	0	4	2
7	EN3NG08	Softskill-IV	2	0	0	2
		Total	20	0	10	25
		Total Contact Hours	30			

SEMESTER – VII

Sr. No.	Course Code	Courses	L	T	P	Credit
1	EC3E*XX	Program Elective VI	3	0	0	3
2	OEXXXXX	Open Elective III	3	0	0	3
3	EC3PC06	Project I	0	0	8	4
4	EC3PC03	Industrial Training	0	2	0	2
		Total	6	2	8	12
		Total Contact Hours	16			



**SEMESTER
VIII**

Sr. No.	Course Code	Courses	L	T	P	Credit
1	EC3PC07	Project II	0	0	20	10
		Total	0	0	20	10
		Total Contact Hours	20			

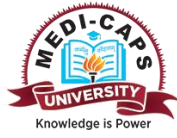
Total Credits

175

**Syllabus of First year is same for all branches except CSBS
and for detail refer below page numbers:**

First semester syllabus is available from page
number:11-37

Second semester syllabus is available from
page number:38-59



MEDI-CAPS
UNIVERSITY

Department of Electrical Engineering

CURRICULUM AND SYLLABUS (2024-2028)

B.Tech. Electrical Engineering



Electrical Engineering

B.Tech. (EE)

CURRICULUM AND SYLLABUS

Vision of the Department:

To become centre of excellence in technical education and research to bring innovation and entrepreneurship ethically in the advance fields of electrical and allied engineering to bring intellectual, social, industrial contemporary requirements and innovation to improve performance, productivity and environmental sustainability through lifelong learning.

Mission of the Department:

1. To produce globally competent and skilled electrical engineers by providing exceptional quality education.
2. To develop collaborative and state-of-art research environment to design, interpret, implement and disseminate knowledge in broader horizons.
3. To develop collaborations with educational institutions, R&D organizations, alumni, and industries for distinction in research, teaching and consultancy proceedings in electrical and allied engineering.
4. To provide an academic ambiance of ethical, excellence, environment friendly and lifelong learning to the students of electrical and allied engineering for contribution in energy efficient systems.
5. To attract experienced, highly qualified and expert faculty for an inclusive educational environment.

Department of Electrical Engineering

Program Education Objectives (PEOs)

- PEO01** To provide students with the knowledge of Mathematics, Basic Engineering principles and Computing, Basic Sciences and Electrical and allied Engineering in particular so as to develop necessary skill to analyze and synthesize electrical circuits, algorithms and complex apparatus.
- PEO02** To prepare students as competent to analyze and provide economically feasible and socially acceptable solutions of real-life technical problems in industry, research and academics related to power, information, science, business and public policy.
- PEO03** To prepare students to excel in professionalism and adoptability at the global level, with professional competence and ethical administrative acumen so as to be able to handle critical situations and meet deadlines.
- PEO04** To indoctrinate an attitude to prepare and encourage students to undergo research work as well as to involve in scientific innovations for sustainable development in Electrical and allied Engineering.
- PEO05** To prepare graduates to communicate effectively, adopt lifelong learning, pursue higher education and act with Integrity and have inter-personal skills needed to engage in, lead and nurture diverse teams, with commitment to their ethical and social responsibilities.

Department of Electrical Engineering

PROGRAMME OUTCOMES (POs)

- PO₀₂** **Problem analysis:** Identify, formulate, review, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences
- PO₀₃** **Design / development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- PO₀₄** **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- PO₀₅** **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
- PO₀₆** **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- PO₀₇** **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
- PO₀₈** **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- PO₀₉** **Individual and teamwork:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- PO₁₀** **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
- PO₁₁** **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.



MEDI-CAPS
UNIVERSITY

PO12 **Life-long learning:** Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Department of Electrical Engineering

PROGRAMME SPECIFIC OUTCOMES (PSOs)

- PSO₀₁** Graduates will be able to apply the fundamental knowledge of mathematics, science and engineering to formulate, design and analyze and investigate complex power system problems in electrical and allied engineering horizons.
- PSO₀₂** Graduates will be industry ready to design, develop and implement electrical and electronics and allied interdisciplinary projects to meet the contemporary demands of industry and provide solutions to the current real time problems related to electric drive systems.
- PSO₀₃** Graduates will be aware of the impact of professional engineering solutions in societal, energy efficiency, environmental context, professional ethics and able to demonstrate soft skill proficiency for sustainable global development.
- PSO₀₄** Graduates will be able to apply the appropriate techniques and knowledge of modern engineering hardware and software tools in electrical and allied engineering domain to engage in life-long learning and to successfully adapt in multi-disciplinary environment.



Medi-Caps University Indore (M.P.)
Department of Electrical Engineering

Scheme of B.Tech. Electrical Engineering (Specialization - Information Technology)
(Admission batch 2024)

SEMESTER I

S. No	Course Code	Course Name	L	T	P	Credit
1	EN3BS11	Engineering Mathematics-I	3	0	0	3
2	EN3BS16	Engineering Physics	3	0	2	4
3	EN3ES17	Basic Electrical Engineering	3	0	2	4
4	EN3ES26	Engineering Graphics	2	0	2	3
5	EN3ES27	Basic Programming with C	2	0	2	3
6	EN3ES30	Basic Civil Engineering & Mechanics	3	0	2	4
7	EN3HS01	History of Science & Technology	2	0	0	2
8	EN3NG01	Environmental Science	2	0	0	2
Total			20	0	10	25
Total Contact Hours			30			

SEMESTER II

S. No	Course Code	Course Name	L	T	P	Credit
1	EN3BS12	Engineering Mathematics-II	3	0	0	3
2	EN3BS14	Engineering Chemistry	2	0	2	3
3	EN3ES16	Basic Electronics Engineering	3	0	2	4
4	EN3ES18	Basic Mechanical Engineering	3	0	2	4
5	EN3ES28	Advanced Programming with C	2	0	2	3
6	EN3ES29	Engineering Workshop	0	0	2	1
7	EN3HS10	Communication Skill	2	0	2	3
8	EN3NG02	Universal Human Values & Professional Ethics	2	0	0	2
9	EN3NG11 / EN3NG12 / EN3NG13 / EN3NG14 / EN3NG15	Club Activities/NSS/NCC/Yoga/Sports	1	0	0	1
Total			18	0	12	24
Total Contact Hours			30			

SEMESTER III

S. No	Course Code	Course Name	L	T	P	Credit
1	EN3HS04	Fundamentals of Management, Economics and Accountancy	3	0	0	3
2	EE3BS02	Discrete Mathematics	3	0	0	3
3	EE3CO57	Analog & Digital Circuits	3	0	2	4
4	EE3CO49	Electrical Circuit Analysis	3	0	2	4
5	EE3CO58	Object Oriented Programming	3	0	2	4
6	EE3CO59	Data Structures through C	3	0	2	4
7	EN3NG03	Soft Skills -I	2	0	0	2
Total			20	0	8	24
Total Contact Hours			28			

SEMESTER IV

S. No	Course Code	Course Name	L	T	P	Credit
1	EE3CO60	Database Management Systems	3	1	2	5
2	EE3CO61	Operating Systems	3	0	2	4
3	EE3CO62	Computational Statistics	3	0	0	3
4	EE3CO63	Power System Engineering	3	1	0	4
5	EE3CO64	Theory of Computation	3	0	0	3
6	EE3CO53	Microprocessors & Microcontrollers	3	0	2	4
7	EE3ES05	Java Programming	0	0	2	1
8	EN3NG10	Soft Skills -II	2	0	0	2
Total			20	2	8	26
Total Contact Hours			30			

SEMESTER V

S. No	Course Code	Course Name	L	T	P	Credit
1	EE3CO29	Electromagnetic Theory	3	0	0	3
2	EE3CO65	Information Theory and Data Communication	3	0	0	3
3	EE3CO34	Control Systems	3	0	0	3
4	EE3ITXX	Elective 1	3	0	0	3
5	EE3ITXX	Elective 2	3	0	0	3
6	EE3ES01	Python Programming	0	0	2	1
7	EN3NG09	Soft Skills -III	2	0	0	2
8	EE3PC08	Mini Project	0	0	4	2
9	OE000XX	Open Elective 1	3	0	0	3
Total			20	0	6	23
Total Contact Hours			26			

SEMESTER VI

S. No	Course Code	Course Name	L	T	P	Credit
1	EE3CO66	Electrical Machines	3	0	2	4
2	EE3CO67	Computer System Architecture	3	0	0	3
3	EE3CO42	Power Electronics	3	0	2	4
4	EE3ITXX	Elective 3	3	0	0	3
5	EE3ITXX	Elective 4	3	0	0	3
6	EE3ES06	Web Programming	0	0	2	1
7	OE000XX	Open Elective 2	3	0	0	3
8	EN3NG08	Soft Skills-IV	2	0	0	2
9	EN3NG11	Club Activities/NSS/NCC/Yoga/Sports	1	0	0	1
	EN3NG12					
	EN3NG13					
	EN3NG14					
	EN3NG15					
Total			21	0	6	24
Total Contact Hours			27			

SEMESTER VII

S. No	Course Code	Course Name	L	T	P	Credit
1	EE3CO68	Artificial Intelligence	3	0	0	3
2	EN3NG06	Open Learning Course	1	0	0	1
3	EE3PC03	Industrial Training	0	2	0	2
4	EE3PC06	Project -I	0	0	8	4
5	EE3ITXX	Elective 5	3	0	0	3
6	EE3ITXX	Elective 6	3	0	0	3
7	OE000XX	Open Elective 3	3	0	0	3
Total			13	2	8	19
Total Contact Hours			23			

SEMESTER VIII

S. No	Course Code	Course Name	L	T	P	Credit
1	EE3PC07	Project -II	0	0	20	10
Total			0	0	20	10
Total Contact Hours			20			

Total Credits

175



Summary of Credits

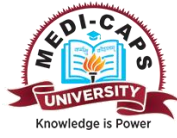
S. No	Course Work	% Range	Value	Total Credits
1	Basic Sciences (BS)	10-15%	16-24	16
2	Engineering Sciences (ES)	15-20%	24-32	29
3	Humanities and Social Sciences (HS)	5-10%	8-16	8
4	Core (CO)	30-40%	48-64	62
5	Program Electives (EL)	10-15%	16-24	18
6	Open Electives (OE)	5-10%	8-16	9
7	Project Work, Seminar	10-15%	16-24	18
8	Non Gradual			15
Total				175



Syllabus of First year is same for all branches except CSBS and for detail refer below page numbers:

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Second semester syllabus is available from page number:38-59



MEDI-CAPS
UNIVERSITY

Department of Information Technology

CURRICULUM AND SYLLABUS (2024-2028)

B.Tech. Information Technology



Information Technology

B.Tech. (IT)

CURRICULUM AND SYLLABUS

Vision of the Department:

To be recognized globally for imparting outstanding education and doing research leading to well qualified engineers who are innovative, entrepreneurial and successful in advanced fields of Information Technology and allied engineering to cater the ever-changing industrial demands and social needs.

Mission of the Department:

1. Imparting the highest quality education to the students to become more capable and competitive in the global IT market by enabling them with the use of newest technologies.
2. Maintaining cutting-edge research facilities in the field of Information Technology to offer a collaborative setting that inspires students, academic support staff and educators by giving them opportunity to generate, analyze, apply, and distribute knowledge.
3. Developing partnerships with top industry and academia involved in R&D for achieving excellence in teaching, research, and consulting practices for the worldwide IT market.
4. Providing the students with an academic environment of getting excellence in leadership, ethical guidelines and lifelong learning needed for a long productive career.
5. Providing resources and expertise required to incorporate technologies into the curriculum.
6. Developing partnership with alumni to advice and conduct activities that shall motivate and upgrade student skill sets.

Department of Information Technology

Program Education Objectives (PEOs)

- PEO₀₁** To prepare students for the development and implementation of Information Systems as a solution to complex problems of the industry and society to design appropriate systems to handle the real-time / online problems.
- PEO₀₂** To provide fundamental knowledge of mathematics, computer science and electronic communication to enable graduates to apply these fundamentals in Information Technology.
- PEO₀₃** To train students not only about the fundamentals of scientific and engineering disciplines but also to impart more and more (in breadth) knowledge in these areas, so as to comprehend, analyze, design, and create novel products and solutions as required by the IT industry in India and abroad.
- PEO₀₄** To inculcate among students, the professional and ethical attitude, effective teamwork skills, effective communication, multidisciplinary approach, and an ability to relate engineering issues to broader social context.
- PEO₀₅** To prepare students with strong fundamentals in engineering and excel in postgraduate programs, competitive examinations or to succeed in industry / technical professions through global and rigorous education.

Department of Information Technology

PROGRAMME OUTCOMES (POs)

- PO₀₁** **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering, fundamentals, and an engineering specialization to the solution of complex engineering problem.
- PO₀₂** **Problem analysis:** Identify, formulate, review, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences
- PO₀₃** **Design / development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- PO₀₄** **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- PO₀₅** **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
- PO₀₆** **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- PO₀₇** **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
- PO₀₈** **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- PO₀₉** **Individual and teamwork:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

- PO₁₀ Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
- PO₁₁ Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
- PO₁₂ Life-long learning:** Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Department of Information Technology

PROGRAMME SPECIFIC OUTCOMES (PSOs)

After the completion of B.Tech. Degree in IT, the students will be able to-

- PSO₀₁** Design, develop and test software systems for world-wide network of computers to provide solutions to real world problems.
- PSO₀₂** Apply current technical concepts and practices in the core Information Technologies of human computer interaction, data management, programming, networking.
- PSO₀₃** Integrate effectively IT-based solutions into the user environment.
- PSO₀₄** Ability to apply their skills in the field of the specialization AI, Data Science, Web Technology, Networking and Cloud Computing web design, cloud computing and data analytics.



Medi-Caps University Indore (M.P.)
Department of Information Technology
Scheme for B.Tech.-IT Batch 2024

SEMESTER I

S. No	Course Code	Course Name	L	T	P	Credit
1	EN3BS11	Engineering Mathematics-I	3	0	0	3
2	EN3BS16	Engineering Physics	3	0	2	4
3	EN3ES17	Basic Electrical Engineering	3	0	2	4
4	EN3ES26	Engineering Graphics	2	0	2	3
5	EN3ES27	Basic Programming with C	2	0	2	3
6	EN3ES30	Basic Civil Engineering & Mechanics	3	0	2	4
7	EN3HS01	History of Science and Technology	2	0	0	2
8	EN3NG01	Environmental Science*	2	0	0	2
Total			20	0	10	25
Total Contact Hours			30			

SEMESTER II

S. No	Course Code	Course Name	L	T	P	Credit						
1	EN3BS12	Engineering Mathematics-II	3	0	0	3						
2	EN3BS14	Engineering Chemistry	2	0	2	3						
3	EN3ES16	Basic Electronics Engineering	3	0	2	4						
4	EN3ES18	Basic Mechanical Engineering	3	0	2	4						
5	EN3ES28	Advanced Programming with C	2	0	2	3						
6	EN3ES29	Engineering Workshop	0	0	2	1						
7	EN3HS10	Communication Skills	2	0	2	3						
8	EN3NG02	Universal Human Values & Professional Ethics	2	0	0	2						
9	EN3NG11 / EN3NG12 / EN3NG13 / EN3NG14 / EN3NG15	Sports/ Club Activities/ NSS/ NCC/ Yoga	1	0	0	1						
	Total						18	0	12	24		
	Total Contact Hours						30					

SEMESTER III

S. No	Course Code	Course Name	L	T	P	Credit
1	IT3CO26	Digital Electronics	3	0	2	4
2	IT3CO27	Information Theory and Data Communication	3	0	0	3
3	IT3CO28	Object Oriented Programming	3	0	2	4
4	IT3BS01	Discrete Mathematics	3	0	0	3
5	IT3CO31	Computer System Architecture	3	0	0	3
6	IT3CO38	Data Structures	4	0	2	5
7	IT3ES02	Java Programming	0	0	2	1
8	EN3NG03	Soft Skills I	2	0	0	2
Total			21	0	8	25
Total Contact Hours			29			

SEMESTER IV

S. No	Course Code	Course Name	L	T	P	Credit
1	IT3CO29	Computational Statistics	3	0	0	3
2	IT3CO05	Database Management Systems	3	1	2	5
3	IT3CO21	Operating System	3	1	2	5
4	IT3CO30	Artificial Intelligence	3	0	0	3
5	IT3CO33	Theory of Computation	3	0	0	3
6	IT3CO32	Microprocessor & Microcontroller	3	0	2	4
7	EN3NG10	Soft Skills-II	2	0	0	2
Total			20	2	6	25
Total Contact Hours			28			

SEMESTER V

S. No	Course Code	Course Name	L	T	P	Credit
1	IT3CO34	Design and Analysis of Algorithms	3	0	2	4
2	IT3CO39	Computer Networks	4	0	2	5
3	IT3EXXX	Elective 1	3	0	0	3
4	IT3EXXX	Elective 2	3	0	0	3
5	IT3ES03	Python Programming	0	0	2	1
6	IT3ES01	Web Programming	0	0	2	1
7	EN3NG09	Soft Skills-III	2	0	0	2
8	OE000XX	Open Elective 1	3	0	0	3
9	EN3HS04	Fundamentals of Management, Economics and Accountancy	3	0	0	3
	EN3NG11 / EN3NG12 / EN3NG13 / EN3NG14 / EN3NG15					
10	EN3NG15	Sports/ Club Activities/ NSS/ NCC/ Yoga	1	0	0	1
Total			22	0	8	26
Total Contact Hours			30			

SEMESTER VI

S. No	Course Code	Course Name	L	T	P	Credit
1	IT3CO35	Distributed and Cloud Computing	3	0	2	4
2	IT3CO36	Software Engineering	3	0	2	4
3	IT3CO37	Compiler Design	3	0	0	3
4	IT3EXXX	Elective 3	2	0	2	3
5	IT3EXXX	Elective 4	3	0	0	3
6	IT3PC04	Mini Project	0	0	4	2
7	OE000XX	Open Elective 2	3	0	0	3
8	EN3NG08	Soft Skills-IV	2	0	0	2
Total			19	0	10	24
Total Contact Hours			29			

SEMESTER VII

S. No	Course Code	Course Name	L	T	P	Credit
1	EN3NG06	Open Learning Courses	1	0	0	1
2	IT3EXXX	Elective 5	3	0	0	3
3	IT3EXXX	Elective 6	3	0	0	3
4	IT3PC03	Industrial Training	0	2	0	2
5	IT3PC06	Project-I	0	0	8	4
6	OE000XX	Open Elective 3	3	0	0	3
Total			10	2	8	16
Total Contact Hours			20			

SEMESTER VIII

S. No	Course Code	Course Name	L	T	P	Credit
1	IT3PC08	Project-II	0	0	20	10
Total			0	0	20	10
Total Contact Hours			16			

Total Credits

175

Summary of Credits

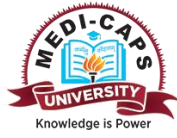
S. No	Course Work	% Range	Value	Total Credits
1	Basic Sciences (BS)	10-15%	16-24	16
2	Engineering Sciences (ES)	15-20%	24-32	29
3	Humanities and Social Sciences (HS)	5-10%	8-16	8
4	Core (CO)	30-40%	48-64	62
5	Program Electives (EL)	10-15%	16-24	18
6	Open Electives (OE)	5-10%	8-16	9
7	Project Work, Seminar	10-15%	16-24	18
8	Non Gradual			15
Total				175



Syllabus of First year is same for all branches except CSBS and for detail refer below page numbers:

First semester syllabus is available from page number:11-37

Second semester syllabus is available from page number:38-59



MEDI-CAPS
UNIVERSITY

Department of Mechanical Engineering

CURRICULUM AND SYLLABUS (2024-2028)

B.Tech. ME/RA/AU(EV)



Mechanical Engineering

B.Tech. (ME)

CURRICULUM AND SYLLABUS

Vision of the Department:

To develop engineers of par excellence to meet the ever-changing requirements of industries, motivated towards innovation, entrepreneurship and research in mechanical and allied engineering along with strong human values and ethics for the benefit of society and nation at large.

Mission of the Department:

1. To offer a platform to the students where they will be able to groom themselves technically as industry ready professionals.
2. To develop research environment where students will be motivated to enhance their knowledge to undertake research in mechanical and allied engineering.
3. To collaborate with industries, education institutes of excellence and aluminous to share and exchange latest technology and innovation.
4. To design curriculum to motivate and sensitize students towards environmental issues and respect for human values and ethics.
5. To develop conducive academic environment in the department to attract qualified faculties members from all around the country.

Department of Mechanical Engineering

Program Education Objectives (PEOs)

- PEO₀₁** To Imbibe strong fundamental concepts of modern technology, automobile engineering and the relevant disciplines.
- PEO₀₂** To develop analytical skills of students for decision making in complex engineering problems.
- PEO₀₃** To provide opportunity to students for learning towards recent development and future technologies related to automobile engineering.
- PEO₀₄** To prepare students to take up career in multidisciplinary industries or to pursue higher studies in automobile programs.

Medi-Caps University, Indore
Scheme of B.Tech -Mechanical Engineering
For the candidates admitted in session 2024-28

Semester I

S.No.	Course Code	Course Name	L	T	P	Credits
1	EN3BS11	Engineering Mathematics-I	3	0	0	3
2	EN3BS16	Engineering Physics	3	0	2	4
3	EN3ES17	Basic Electrical Engineering	3	0	2	4
4	EN3ES26	Engineering Graphics	2	0	2	3
5	EN3ES27	Basic Programming with C	2	0	2	3
6	EN3ES30	Basic Civil Engineering & Mechanics	3	0	2	4
7	EN3NG01	Environmental Science	2	0	0	2
8	EN3NG02	Universal Human Values & Professional Ethics	2	0	0	2
		Total	20	0	10	25
		Total Contact Hours	30			

Semester II

S.No.	Course Code	Course Name	L	T	P	Credits
1	EN3BS12	Engineering Mathematics-II	3	0	0	3
2	EN3BS14	Engineering Chemistry	2	0	2	3
3	EN3ES16	Basic Electronics Engineering	3	0	2	4
4	EN3ES18	Basic Mechanical Engineering	3	0	2	4
5	EN3ES28	Advanced Programming with C	2	0	2	3
6	EN3ES29	Engineering Workshop	0	0	2	1
7	EN3HS01	History of Science and Technology	2	0	0	2
8	EN3HS10	Communication Skills	2	0	2	3
9	EN3NG11/ EN3NG12/ EN3NG13/ EN3NG14/ EN3NG15/	NSS/NCC/Yoga/Sports/Club Activities	1	0	0	1
		Total	18	0	12	24
		Total Contact Hours	30			

SEMESTER – III

Sr. No.	Course Code	Course Name	L	T	P	Credits
1	EN3BS15	Engineering Mathematics - III	3	0	0	3
2	ME3CO18	Manufacturing Processes - I	3	0	0	3
3	ME3CO43	Mechanics of Materials	3	0	0	3
4	ME3CO44	Engineering Thermodynamics	3	0	0	3
5	ME3CO21	Sensors and Control	3	0	2	4
6	ME3CO40	CAD LAB	0	0	2	1
7	ME3CO23	Materials and Material Testing Lab	0	0	2	1
8	ME3CO24	Python Programming for Mechanical Engineers -I	0	0	2	1
9	EN3ES25	Engineering Materials	3	0	0	3
10	EN3NG03	Soft Skills -I	2	0	0	2
		Total	20	0	8	24
		Total Contact Hours	28			

SEMESTER – IV

Sr. No.	Course Code	Course Name	L	T	P	Credits
1	ME3CO45	Manufacturing Processes- II	4	0	2	5
2	ME3CO46	Fluid Mechanics and Machinery	4	0	2	5
3	ME3CO47	Kinematics of Machines	4	0	2	5
4	EN3HS04	Fundamentals of Management, Economics & Accountancy	3	0	0	3
5	ME3CO30	Industrial Engineering & Operations Research	3	0	0	3
6	ME3ELXX	Program Elective - I	3	0	0	3
7	EN3NG10	Soft Skills -II	2	0	0	2
8	EN3NG11/EN3NG12/EN3NG13/EN3NG14/EN3NG15/	NSS/NCC/Yoga/Sports/Club Activities	1	0	0	1
		Total	24	0	6	27
		Total Contact Hours	30			



L : Lecture T : Tutorial P : Practical

SEMESTER – V

Sr. No.	Course Code	Course Name	L	T	P	Credits
1	ME3CO48	Data Science for Mechanical Engineers	3	0	2	4
2	ME3CO32	Heat & Mass Transfer	4	0	0	4
3	ME3CO41	Design and Simulation Lab-1	0	0	2	1
4	ME3CO34	Dynamics of Machine	4	0	2	5
5	ME3CO35	Thermal Lab	0	0	2	1
6	ME3ELXX	Program Elective - II	3	0	0	3
7	ME3ELXX	Program Elective - III	3	0	0	3
8	OE000XX	Open Elective I	3	0	0	3
9	EN3NG09	Soft Skills -III	2	0	0	2
		Total	22	0	8	26
		Total Contact Hours	30			

SEMESTER – VI

Sr. No.	Course Code	Course Name	L	T	P	Credits
1	ME3CO49	Computer Integrated Manufacturing	3	0	0	3
2	ME3CO50	Refrigeration & Air Conditioning	4	0	2	5
3	ME3CO38	Design and Simulation Lab -II	0	0	2	1
4	ME3CO39	Machine Design	4	0	0	4
5	ME3ELXX	Program Elective - IV	3	0	0	3
6	ME3ELXX	Program Elective - V	3	0	0	3
7	OE000XX	Open Elective- II	3	0	0	3
	ME3PC11	Mini Project	0	0	4	2
8	EN3NG08	Soft Skills -IV	2	0	0	2
		Total	22	0	8	26
		Total Contact Hours	30			

SEMESTER – VII

Sr. No.	Course Code	Course Name	L	T	P	Credits
1	ME3ELXX	Program Elective - VI	3	0	0	3
2	OE000XX	Open Elective III	3	0	0	3
3	ME3PC12	Project-1	0	0	8	4
4	ME3PC03	Industrial Training	0	2	0	2
5	EN3NG06	Open Learning courses	1	0	0	1
		Total	7	2	8	13
		Total Contact Hours	17			

SEMESTER VIII

Sr. No.	Course Code	Course Name	L	T	P	Credits
1	ME3PC13	Project -II	0	0	20	10
		Total	0	0	20	10
		Total Contact Hours	20			

Total Credits	175
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Summary of Credits

S.NO	Course Work	Total Credits (CS)	Credits as per Modal scheme
1	Basic Sciences (BS)	16	10-15% (16-24)
2	Engineering Sciences (ES)	29	15-20% (24-32)
3	Humanities and Social Sciences (HS)	11	5-10% (8-16)
4	Core (CO)	59	30-40% (48-64)
5	Program Electives (EL)	18	10-15% (16-24)
6	Open Electives (OE)	9	5-10% (8-16)
7	Project Work, Seminar	18	10-15% (16-24)
8	Non Grading	15	

175



Syllabus of First year is same for all branches except CSBS and for detail refer below page numbers:

First semester syllabus is available from page number:11-37

Second semester syllabus is available from page number:38-59



Medi-Caps University , Indore
Scheme of B.Tech -Automobile Engineering (Electric Vehicle)
For the candidates admitted in session 2024-28

Semester I

S.No.	Course Code	Course Name	L	T	P	Credits
1	EN3BS11	Engineering Mathematics-I	3	0	0	3
2	EN3BS16	Engineering Physics	3	0	2	4
3	EN3ES17	Basic Electrical Engineering	3	0	2	4
4	EN3ES26	Engineering Graphics	2	0	2	3
5	EN3ES27	Basic Programming with C	2	0	2	3
6	EN3ES30	Basic Civil Engineering & Mechanics	3	0	2	4
7	EN3NG01	Environmental Science	2	0	0	2
8	EN3NG02	Universal Human Values & Professional Ethics	2	0	0	2
		Total	20	0	10	25
		Total Contact Hours	30			

Semester II

S.No.	Course Code	Course Name	L	T	P	Credits
1	EN3BS12	Engineering Mathematics-II	3	0	0	3
2	EN3BS14	Engineering Chemistry	2	0	2	3
3	EN3ES16	Basic Electronics Engineering	3	0	2	4
4	EN3ES18	Basic Mechanical Engineering	3	0	2	4
5	EN3ES28	Advanced Programming with C	2	0	2	3
6	EN3ES29	Engineering Workshop	0	0	2	1
7	EN3HS01	History of Science and Technology	2	0	0	2
8	EN3HS10	Communication Skills	2	0	2	3
9	EN3NG11/ EN3NG11/ EN3NG12/ EN3NG13/ EN3NG14/ EN3NG15/	NSS/NCC/Yoga/Sports/Club Activities	1	0	0	1
		Total	18	0	12	24
		Total Contact Hours	30			

SEMESTER – III

Sr.No.	Course Code	Course Name	L	T	P	Credits
1	EN3BS17	Mathematical Modelling for Electric Vehicles	3	0	0	3
2	AU3CO51	Introduction to Automotive Systems	3	0	0	3
3	AU3CO52	Mechanics of Materials	4	0	0	4
4	AU3CO53	Sensors and Control	3	0	2	4
5	AU3CO54	Thermal Engineering	4	0	2	5
6	AU3CO55	Python Programming	0	0	2	1
7	AU3CO56	Materials and Material Testing Lab	0	0	2	1
8	AU3CO57	Manufacturing Technology	3	0	0	3
9	EN3NG03	Soft Skills -I	2	0	0	2
			22	0	8	26
		Total Contact Hours	30			

SEMESTER – IV

Sr.No.	Course Code	Course Name	L	T	P	Credits
1	AU3CO58	CNC Machines and Metrology	3	0	2	4
2	AU3CO59	Mechanics of Machines	3	0	2	4
3	AU3CO60	Electric Vehicle Technology	3	0	0	3
4	EN3ES31	Engineering Design	3	0	2	4
5	EN3HS04	Fundamentals of Management, Economics & Accountancy	3	0	0	3
6	AU3ELXX	Program Elective-I	3	0	0	3
7	EN3NG10	Soft Skills -II	2	0	0	2
8	EN3NG11/ EN3NG11/ EN3NG12/ EN3NG13/ EN3NG14/ EN3NG15/	NSS/NCC/Yoga/Sports/Club Activities	1	0	0	1
		Total	21	0	6	24
		Total Contact Hours	27			

L : Lecture T : Tutorial P : Practical

SEMESTER – V

Sr.No.	Course Code	Course Name	L	T	P	Credits
1	AU3CO61	Industrial Engineering & Operations Research	3	0	0	3
2	AU3CO62	Automotive Electrical and Electronics System	3	0	2	4
3	AU3CO63	Vehicular Network and Communication	3	0	2	4
4	AU3CO64	Automotive Chassis	4	0	0	4
5	AU3CO65	Design and Simulation Lab	0	0	2	1
6	AU3ELXX	Program Elective-II	3	0	0	3
7	AU3ELXX	Program Elective-III	3	0	0	3
8	OE000XX	Open Elective I	3	0	0	3
9	EN3NG09	Soft Skills -III	2	0	0	2
		Total	24	0	6	27
		Total Contact Hours	30			

SEMESTER – VI

Sr.No.	Course Code	Course Name	L	T	P	Credits
1	AU3CO66	Electric and Hybrid Vehicles	4	0	0	4
2	AU3CO67	Power Electronics Circuits	4	0	2	5
3	AU3CO68	Data Science for Automobile Engineers	3	0	2	4
4	AU3ELXX	Program Elective-IV	3	0	0	3
5	AU3ELXX	Program Elective-V	3	0	0	3
6	OE000XX	Open Elective II	3	0	0	3
	AU3PC21	Mini Project	0	0	4	2
7	EN3NG08	Soft Skills -IV	2	0	0	2
		Total	20	0	8	26
		Total Contact Hours	28			

SEMESTER – VII

Sr.No.	Course Code	Course Name	L	T	P	Credits
1	AU3ELXX	Program Elective - VI	3	0	0	3
2	OE000XX	Open Elective III	3	0	0	3
3	AU3PC22	Project-I	0	0	8	4
4	AU3PC23	Industrial Training	0	2	0	2
5	EN3NG06	Open Learning courses	1	0	0	1
		Total	7	2	8	13
		Total Contact Hours	17			

SEMESTER VIII

Sr.No.	Course Code	Course Name	L	T	P	Credits
1	AU3PC24	Project-II	0	0	20	10
		Total	0	0	20	10
		Total Contact Hours	20			

Total Credits with NG Courses	175
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Syllabus of First year is same for all branches except CSBS and for detail refer below page numbers:

First semester syllabus is available from page number:11-37

Second semester syllabus is available from page number:38-59



Medi-Caps University , Indore
Scheme of B.Tech -Robotics and Automation Engineering
For the candidates admitted in session 2024-28

Semester I

S.No.	Course Code	Course Name	L	T	P	Credits
1	EN3BS11	Engineering Mathematics-I	3	0	0	3
2	EN3BS16	Engineering Physics	3	0	2	4
3	EN3ES17	Basic Electrical Engineering	3	0	2	4
4	EN3ES26	Engineering Graphics	2	0	2	3
5	EN3ES27	Basic Programming with C	2	0	2	3
6	EN3ES30	Basic Civil Engineering & Mechanics	3	0	2	4
7	EN3NG01	Environmental Science	2	0	0	2
8	EN3NG02	Universal Human Values & Professional Ethics	2	0	0	2
		Total	20	0	10	25
		Total Contact Hours	30			

Semester II

S.No.	Course Code	Course Name	L	T	P	Credits
1	EN3BS12	Engineering Mathematics-II	3	0	0	3
2	EN3BS14	Engineering Chemistry	2	0	2	3
3	EN3ES16	Basic Electronics Engineering	3	0	2	4
4	EN3ES18	Basic Mechanical Engineering	3	0	2	4
5	EN3ES28	Advanced Programming with C	2	0	2	3
6	EN3ES29	Engineering Workshop	0	0	2	1
7	EN3HS01	History of Science and Technology	2	0	0	2
	EN3HS10	Communication Skills	2	0	2	3
8	EN3NG11/ EN3NG12/ EN3NG13/ EN3NG14/ EN3NG15/	NSS/NCC/Yoga/Sports/Club Activities	1	0	0	1
		Total	18	0	12	24
		Total Contact Hours	30			

SEMESTER – III

Sr.No.	Course Code	Course Name	L	T	P	Credits
1	EN3BS15	Engineering Mathematics-III	3	0	0	3
2	RA3CO23	Strength of Materials for Mechanical Engineers	3	0	2	4
3	RA3CO24	Kinematics and Dynamics of Machines	3	0	2	4
4	RA3CO25	Basic of Thermal Engineering	3	0	2	4
5	RA3CO51	Digital Electronics	3	0	2	4
6	RA3CO27	Sensors and Instrumentation	3	0	0	3
7	RA3CO40	CAD Lab	0	0	2	1
8	EN3NG09	Soft Skills -I	2	0	0	2
			20	0	10	25
		Total Contact Hours	30			

SEMESTER – IV

Sr.No.	Course Code	Course Name	L	T	P	Credits
1	RA3CO43	Design of Machine Elements and Transmission Systems	3	0	2	4
2	RA3CO30	CNC Machine and Metrology	3	0	2	4
3	RA3CO31	Automatic Control Systems	3	0	0	3
4	RA3CO32	Python for Robotics Engineers	3	0	2	4
5	EN3HS04	Fundamentals of Management, Economics & Accountancy	3	0	0	3
6	RA3ELXX	Program Elective - I	3	0	0	3
7	EN3NG10	Soft Skills -II	2	0	0	2
8	EN3NG11/ EN3NG12/ EN3NG13/ EN3NG14/ EN3NG15/	NSS/NCC/Yoga/Sports/Club Activities	1	0	0	1
			21	0	6	24
		Total Contact Hours	27			

L : Lecture T : Tutorial P : Practical

SEMESTER – V

Sr.No.	Course Code	Course Name	L	T	P	Credits
1	RA3CO37	Electrical Machines and Power Systems	3	0	2	4
2	RA3CO51	Principles of Robotics	3	0	2	4
3	RA3CO49	Embedded Systems	3	0	0	3
4	RA3CO50	Digital Image Processing	3	0	2	4
5	RA3ELXX	Program Elective - II	3	0	0	3
6	RA3ELXX	Program Elective - III	3	0	0	3
7		Open Elective- I	3	0	0	3
8	EN3NG09	Soft Skills -III	2	0	0	2
		Total	23	0	6	26
		Total Contact Hours	29			

SEMESTER – VI

Sr.No.	Course Code	Course Name	L	T	P	Credits
1	RA3CO33	Robot System Design and SLAM(Simultaneous Localization and Area Mapping)	3	0	2	4
2	RA3CO38	Microcontroller and Programmable Logic Controllers	3	0	2	4
3	RA3CO46	Computer Vision	3	0	2	4
4	RA3ELXX	Program Elective - IV	3	0	0	3
5	RA3ELXX	Program Elective - V	3	0	0	3
6		Open Elective -II	3	0	0	3
	RA3PC11	Mini Project	0	0	4	2
7	EN3NG08	Soft Skills -IV	2	0	0	2
		Total	20	0	10	25
		Total Contact Hours	30			

SEMESTER – VII

Sr.No.	Course Code	Course Name	L	T	P	Credits
1		Program Elective - VI	3	0	0	3
2		Program Elective - VII	3	0	0	3
3		Open Elective III	3	0	0	3
4	RA3PC12	Project-1	0	0	8	4
5	RA3PC03	Industrial Training	0	2	0	2
6	EN3NG06	Open Learning courses	1	0	0	1
		Total	10	2	8	16
		Total Contact Hours	20			



SEMESTER VIII

Sr.No.	Course Code	Course Name	L	T	P	Credits
1	RA3PC13	Project-II	0	0	20	10
		Total	0	0	20	10
		Total Contact Hours	20			

Total Credits with NG Courses	175
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Summary of Credits

Sr.No.	Course Work	Total Credits	Credits as per Modal scheme
1	Basic Sciences (BS)	16	10-15% (16-24)
2	Engineering Sciences (ES)	26	15-20% (24-32)
3	Humanities and Social Sciences (HS)	8	5-10% (8-16)
4	Core (CO)	62	30-40% (48-64)
5	Program Electives (EL)	21	10-15% (16-24)
6	Open Electives (OE)	9	5-10% (8-16)
7	Project Work, Industrial Training	18	10-15% (16-24)
8	Non Grading	15	

175



**Syllabus of First year is same for all branches except CSBS
and for detail refer below page numbers:**

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