ADITYA COLLEGE OF ENGINEERING, MADANAPALLE

(UGC-AUTONOMOUS INSTITUTION & ACCREDITED WITH NAAC A+ GRADE)

Approved by AICTE, New Delhi & Affiliated to JNTUA, Anantapuramu

MADANAPALLE -517325, ANNAMAYYA Dist., A.P.

www.acem.ac.in

ACEM- R24 REGULATION

CIVIL ENGINEERING

I & II YEAR COURSE STRUCTURE AND SYLLABUS

for

B.Tech (Regular – Full Time)

(Effective for the students admitted into I Year from the Academic Year 2024-25 onwards)

and

B.Tech (Lateral Entry Scheme)

(Effective for the students getting admitted into II year through Later Entry Scheme from the Academic Year 2025-26 onwards)

ADITYA COLLEGE OF ENGINEERING :: MADANAPALLE
Punganur Road, Valasapalle (Post), Madanapalle, Annamayya (Dist.,) – 517325.
(An Autonomous Institution)
Department of Civil Engineering

Institute Vision:

To impart quality in engineering education to meet the technological advances and industrial requirements with global standards.

Institute Mission:

- Provide quality technical education through skill-based trainings and promote research and development, and consultancy services.
- Offer state-of-the-art-infrastructure for supporting technological advances.
- Develop disciplined, creative and globally competent engineers.
- Equip and empower the faculty at all levels to promote innovations and technical advancements in various domains of engineering.

Department Vision:

To be a globally recognized civil engineering department that provides excellent education and research for building innovative infrastructure and sustainable communities."

Department Mission:

- Fostering excellence in teaching and learning through a balanced curriculum of theoretical science, technical skills, and practical application.
- Promoting innovative thinking and the use of emerging technologies for sustainable infrastructure design and construction.
- Instilling in students a strong foundation in engineering principles, professional ethics, and civic responsibility to make positive contributions to society as civil engineers.

Programme Outcomes (POs):

On Successful completion, the graduate 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, 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.

Program Specific Outcomes (PSOs):

On Successful completion , the graduate (Computer Engineering) will be able to,

- Analyze and design civil engineering structures using knowledge of structural analysis, mechanics, materials, and safety standards. Students will be able to design and evaluate structural systems like buildings, bridges, dams, and transportation infrastructure.
- Apply engineering principles to plan, design, construct, and maintain civil engineering works, including surveying, construction planning, project management, and infrastructure maintenance.

Programme Educational Objectives (PEOs):

After few years of graduation, the graduates of Computer Engineering are expected to

- Apply knowledge of mathematics, science, and engineering principles to identify, formulate, and solve civil engineering problems.
- Students will gain strong analytical and problem - solving skills to design civil engineering systems like bridges, roads, dams, and buildings.
- Students will become proficient in using software like Auto CAD, STAAD, and MATLAB to plan, execute, and interpret experiments and analyse data.
- Work professionally with effective communication, teamwork, and leadership skills. Students will practice collaboration, written and oral communication, project management, and ethical decision-making.

B.Tech. – Civil Engineering
Course Structure & Syllabus – ACEM R24 Regulations
(Applicable from the academic year 2024-25 onwards)

INDUCTION PROGRAMME

S.No.	Name of the Course	Category	L-T-P-C
1.	Physical Activities -- Sports, Yoga and Meditation, Plantation	MC	0-0-6-0
2.	Career Counselling	MC	2-0-2-0
3.	Orientation to all branches -- career options, tools, etc.	MC	3-0-0-0
4.	Orientation on admitted Branch -- corresponding labs, tools and platforms	EC	2-0-3-0
5.	Proficiency Modules & Productivity Tools	ES	2-1-2-0
6.	Assessment on basic aptitude and mathematical skills	MC	2-0-3-0
7.	Remedial Training in Foundation Courses	MC	2-1-2-0
8.	Human Values & Professional Ethics	MC	3-0-0-0
9.	Communication Skills -- focus on Listening, Speaking, Reading, Writing skills	BS	2-1-2-0
10.	Concepts of Programming	ES	2-0-2-0

Group - A
B.Tech. – I Year I Semester

S. No.	Category	Course code	Name of the Course	L/D	T	P	Credits
1.	BS	24BSHB101T	Linear Algebra & Calculus	2	1	0	3
2.	BS	24BSHB103T	Engineering Physics	2	1	0	3
3.	ES	24ES02101T	Basic Electrical & Electronics Engineering	3	0	0	3
4.	ES	24ES03101T	Engineering Graphics	1	0	4	3
5.	ES	24ES05101T	Introduction to Programming	2	1	0	3
6.	BS	24BSHB103P	Engineering Physics Lab	0	0	2	1
7.	ES	24ES02101P	Electrical & Electronics Engineering Workshop	0	0	3	1.5
8.	ES	24ES05101P	Computer Programming Lab	0	0	3	1.5
9.	ES	24ES05102P	IT Workshop	0	0	2	1
10.	HM	24HMHS103L	NSS/ NCC/ Scouts & Guides/ Community Service	0	0	1	0.5
			Total	**10**	**3**	**15**	**20.5**

B.Tech. – I Year II Semester

S. No.	Category	Course code	Name of the Course	L	T	P	Credits
1.	BS	24BSHB102T	Differential Equations & Vector Calculus	2	1	0	3
2.	BS	24BSHB105T	Engineering Chemistry	3	0	0	3
3.	HM	24HMHS101T	Communicative English	2	0	0	2
4.	ES	24ES01101T	Basic Civil & Mechanical Engineering	3	0	0	3
5.	PC	24PC01101T	Engineering Mechanics	2	1	0	3
6.	BS	24BSHB105P	Engineering Chemistry Lab	0	0	2	1
7.	HM	24HMHS101P	Communicative English Lab	0	0	2	1
8.	ES	24ES03102P	Engineering Workshop	0	0	3	1.5
9.	PC	24PC01101P	Engineering Mechanics & Building Practices Lab	0	0	3	1.5
10.	HM	24HMHS102L	Health and Wellness, Yoga and Sports	0	0	1	0.5
			Total	**12**	**2**	**11**	**19.5**

B.Tech. – II Year I Semester

S. No.	Category	Course code	Name of the Course	L	T	P	Credits
1.	BS	24BSHB206T	Numerical and Statistical Methods	2	1	0	3
2.	HM	24HMHS204L	Universal Human Values–Understanding Harmony and Ethical Human Conduct	2	1	0	3
3.	PC	24PC01202T	Surveying	2	1	0	3
4.	PC	24PC01203T	Strength of Materials	2	1	0	3
5.	PC	24PC01204T	Fluid Mechanics	2	1	0	3
6.	PC	24PC01202P	Surveying Lab	0	0	3	1.5
7.	PC	24PC01203P	Strength of Materials Lab	0	0	3	1.5
8.	SE	24SE01201S	Building Planning and Drawing	0	1	2	2
9.	HM	24HMHS205A	Environmental Science	2	0	0	--
			Total	**10+2**	**6**	**8**	**20**

B.Tech. – II Year II Semester

S. No.	Category	Course code	Name of the Course	L	T	P	Credits
1.	HM	24HMHS206T	Managerial Economics and Financial Analysis	2	0	0	2
		24HMHS207T	Organizational Behaviour				
		24HMHS208T	Business Environment				
2.	PC	24PC01205T	Engineering Geology	3	0	0	3
3.	PC	24PC01206T	Concrete Technology	3	0	0	3
4.	PC	24PC01207T	Structural Analysis	2	1	0	3
5.	PC	24PC01208T	Hydraulics & Hydraulic Machinery	2	1	0	3
6.	PC	24PC01205P	Engineering Geology Lab	0	0	3	1.5
7.	PC	24PC01206P	Concrete Technology Lab	0	0	3	1.5
8.	SE	24SEHS201S	Soft Skills	0	1	2	2
9.	ES	24ES03102T	Design Thinking & Innovation	1	0	2	2
			Total	**13**	**3**	**10**	**21**
Mandatory Community Service Project (24IPCP301L) of 08 Weeks duration during Summer Vacation							

B.Tech. – I Year I Semester

Course Code	Category	Name of the Course	L	T	P	C
24BSHB101T	**BS**	**Linear Algebra & Calculus** (Common for all branches of Engineering)	**2**	**1**	**0**	**3**

Pre-Requisites: Basic Knowledge of Mathematics

Course Objectives:

To equip the students with standard concepts and tools at an intermediate to advanced level mathematics to develop the confidence and ability among the students to handle various real-world problems and their applications.

Course Outcomes (COs):

On successful completion of the course, Student will be able to

CO1: Analyze the consistency and solution of systems of linear equations using matrix methods including echelon forms, normal forms, Gauss-Jordan method, and iterative techniques. (L4)

CO2: Apply the concepts of Eigenvalues, Eigenvectors, and orthogonal transformation to solve real-life problems. (L3)

CO3: Interpret the implications of Mean Value Theorems and apply Taylor's and Maclaurin's series to approximate and analyze the behavior of functions in single-variable calculus. (L4)

CO4: Examine functions of several variables using partial derivatives, Jacobians, and series expansions, and determine critical points using methods like Lagrange multipliers. (L4)

CO5: Evaluate double and triple integrals in various coordinate systems and apply them to determine areas and volumes in multivariable contexts. (L4)

Unit I: Matrices:

Rank of a matrix by echelon form, normal form. Cauchy–Binet formulae (without proof). Inverse of non-singular matrices by Gauss-Jordan method, System of linear equations: Solving system of Homogeneous and Non-Homogeneous equations by Gauss elimination method, Jacobi and Gauss Seidel Iteration Methods.

Unit II: Eigen values, Eigenvectors and Orthogonal Transformation:

Eigen values, Eigenvectors and their properties, Diagonalization of a matrix, Cayley Hamilton Theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton Theorem, Quadratic forms and Nature of the Quadratic Forms, Reduction of Quadratic form to canonical forms by Orthogonal Transformation.

Unit III: Calculus:

Mean Value Theorems: Rolle's Theorem, Lagrange's mean value theorem with their geometrical interpretation, Cauchy's mean value theorem, Taylor's and Maclaurin theorems with remainders (without proof), Problems and applications on the above theorems.

Unit IV: Partial differentiation and Applications (Multi variable calculus):

Functions of several variables: Continuity and Differentiability, Partial derivatives, total derivatives, chain rule, Taylor's and Maclaurin's series expansion of functions of two variables. Jacobians, Functional dependence, maxima and minima of functions of two variables, method of Lagrange multipliers.

Unit V: Multiple Integrals (Multi variable Calculus):
Double integrals, triple integrals, change of order of integration, change of variables to polar, cylindrical and spherical coordinates. Finding areas (by double integrals) and volumes (by double integrals and triple integrals).

Text Books:
1. Higher Engineering Mathematics, B. S. Grewal, Khanna Publishers, 2017, 44th Edition
2. Advanced Engineering Mathematics, Erwin Kreyszig, John Wiley &Sons, 2018, 10th Edition.

Reference Books:
1. Thomas Calculus, George B. Thomas, Maurice D. Weirand Joel Hass, Pearson Publishers, 2018, 14th Edition.
2. Advanced Engineering Mathematics, R. K. Jain and, S. R. K. Iyengar, Alpha Science International Ltd., 2021 5th Edition (9th reprint).
3. Advanced Modern Engineering Mathematics, Glyn James, Pearson publishers, 2018, 5th Edition.
4. Advanced Engineering Mathematics, Micheael Greenberg, Pearson publishers, 9th edition
5. Higher Engineering Mathematics, H. K Das, Er. Rajnish Verma, S. Chand Publications, 2014, Third Edition (Reprint 2021).

B.Tech. – I Year I Semester

Course Code	Category	Name of the Course	L	T	P	C
24BSHB103T	BS	**Engineering Physics** (Common for all branches of Engineering)	2	1	0	3

Pre-Requisites: Fundamentals of Physics

Course Objectives:

To bridge the gap between Physics in school at 10+2 level and UG level engineering courses by identifying the importance of optical phenomenon like interference, diffraction, etc, enlightening the periodic arrangement of atoms in crystalline solids and concepts of quantum mechanics, introduce novel concepts of dielectric and magnetic materials, physics of semiconductors.

Course Outcomes (COs):

On successful completion of the course, Student will be able to

CO1: Analyze the intensity variation of light due to Interference Diffraction and Polarization. (L4)

CO2: Analyze the properties of crystals and determine the type of structure using the X-ray Diffraction technique. (L4)

CO3: Summarize various types of Polarization of dielectric materials & Classify Magnetic materials. (L4)

CO4: Apply the fundamentals of quantum mechanics & free electron theory to the dimensional motion of particles. (L3)

CO5: Explain the basics concepts in semiconductors and identify the type of semiconductor using Hall effect. (L3)

Unit I: Wave Optics:

Interference: Introduction **-** Principle of superposition –Interference of light - Interference in thin films (Reflection Geometry) & applications - Colours in thin films- Newton's Rings, Determination of wavelength and refractive index.

Diffraction: Introduction - Fresnel and Fraunhofer diffractions - Fraunhofer diffraction due to single slit, double slit & N-slits (Qualitative) – Diffraction Grating - Dispersive power and resolving power of Grating (Qualitative).

Polarization: Introduction -Types of polarization - Polarization by reflection, refraction and Double refraction - Nicol's Prism -Half wave and Quarter wave plates.

Unit II: Crystallography and X-ray Diffraction :

Space lattice, Basis, Unit Cell and lattice parameters Bravais Lattices – crystal systems (3D) – coordination number - packing fraction of SC, BCC & FCC - Miller indices – separation between successive (hkl) planes.

X-ray diffraction: Bragg's law - X-ray Diffractometer –crystal structure determination by Laue's and powder methods.

Unit III : Dielectric and Magnetic Materials:

Dielectric Materials: Introduction - Dielectric polarization - Dielectric polarizability, Susceptibility, Dielectric constant and Displacement Vector – Relation between the electric vectors - Types of polarizations- Electronic (Quantitative), Ionic (Quantitative) and Orientation polarizations (Qualitative) - Lorentz internal field - Clausius- Mossotti equation - complex dielectric constant – Frequency dependence of polarization – dielectric loss

Magnetic Materials: Introduction - Magnetic dipole moment - Magnetization-Magnetic susceptibility and permeability – Atomic origin of magnetism - Classification of magnetic materials:

Dia, para, Ferro, anti-ferro & Ferri magnetic materials - Domain concept for Ferromagnetism & Domain walls (Qualitative) - Hysteresis - soft and hard magnetic materials.

Unit IV: Quantum Mechanics and Free electron Theory:

Quantum Mechanics: Dual nature of matter – Heisenberg's Uncertainty Principle – Significance and properties of wave function – Schrodinger's time independent and dependent wave equations– Particle in a one-dimensional infinite potential well.

Free Electron Theory: Classical free electron theory (Qualitative with discussion of merits and demerits) – Quantum free electron theory – electrical conductivity based on quantum free electron theory - Fermi-Dirac distribution - Density of states - Fermi energy

Unit V: Semiconductors :

Semiconductors: Formation of energy bands – classification of crystalline solids - Intrinsic semiconductors: Density of charge carriers – Electrical conductivity – Fermi level – Extrinsic semiconductors: density of charge carriers – dependence of Fermi energy on carrier concentration and temperature - Drift and diffusion currents – Einstein's equation **--** Direct and Indirect Band gap of semiconductors – Hall effect and its applications.

Text Books:

1. Palanisamy ,"Engineering Physics", Palanisamy, SciTech Publications.
2. K.Thyagarajan ,"Engineering Physics", McGraw Hill Publications.
3. A Text book of Engineering Physics, M. N. Avadhanulu, P.G.K.shirsagar& TVS Arun Murthy, S.Chand Publications, 11th Edition 2019
4 Engineering Physics - D.K.Bhattacharya and Poonam Tandon, Oxford press (2015)

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Reference Books:

1.Introduction to solid state physics , Charles kittel 7th Edition , John Wiley and Sons.
2. Gaur and Gupta, "Engineering Physics", Dhanpatrai Publications.
3. Engineering Physics - M.R. Srinivasan, New Age international publishers (2009).
4. Engineering Physics" - Sanjay D. Jain, D. Sahasrabudhe and Girish, University Press.2010

Reference Website:

1. https://www.youtube.com/watch?v=PEXSH8dB-Uk
2. https://www.youtube.com/watch?v=YvrwVK9ZqQY
3. https://www.digimat.in/nptel/courses/video/115107095/L01.html
4. https://www.youtube.com/watch?v=6QUFuZpCgGw
5.https://nptel.ac.in/courses/115/105/115105122/

B.Tech. – I Year I Semester

Course Code	Category	Name of the Course	L	T	P	C
24ES02101T	ES	**Basic Electrical and Electronics Engineering** (Common to all branches of Engineering)	3	0	0	3

Part - A: Basic Electrical Engineering

Pre-requisites: Fundamentals of Physics

Course Objectives:
To expose to the field of electrical & electronics engineering, laws and principles of electrical/ electronic engineering and to acquire fundamental knowledge in the relevant field.

Course Outcomes (COs) :
On successful completion of the course, Student will be able to
CO1: Apply KVL & KCL to AC & DC Circuits to determine the various electrical parameters. (L3)
CO2: Explain the construction and working principles of electrical machines and measuring instruments, and compare their functions and applications in practical scenarios. (L4)
CO3: Distinguish between various power generation systems and evaluate domestic energy consumption to calculate electricity bills and implement appropriate electrical safety measures. (L4)

Unit I: DC & AC Circuits:
DC Circuits: Electrical circuit elements (R, L and C), Ohm's Law and its limitations, KCL & KVL, series, parallel, series-parallel circuits, Super Position theorem, Simple numerical problems.
AC Circuits: A.C. Fundamentals: Equation of AC Voltage and current, waveform, time period, frequency, amplitude, phase, phase difference, average value, RMS value, form factor, peak factor, Voltage and current relationship with phasor diagrams in R, L, and C circuits, Concept of Impedance, Active power, reactive power and apparent power, Concept of power factor (Simple Numerical problems)**.**

Unit II: Machines and Measuring Instruments:
Machines: Construction, principle and operation of (i) DC Motor, (ii) DC Generator, (iii) Single Phase Transformer, (iv) Three Phase Induction Motor and (v) Alternator, Applications of electrical machines.
Measuring Instruments: Construction and working principle of Permanent Magnet Moving Coil (PMMC), Moving Iron (MI) Instruments and Wheat Stone bridge.

Unit III: Energy Resources, Electricity Bill & Safety Measures:
Energy Resources: Conventional and non-conventional energy resources; Layout and operation of various **Power Generation Systems :** Hydel, Nuclear, Solar & Wind power generation.
Electricity bill: Power rating of household appliances including air conditioners, PCs, Laptops, Printers, etc. Definition of "unit" used for consumption of electrical energy, two-part electricity tariff, calculation of electricity bill for domestic consumers.
Equipment Safety Measures: Working principle of Fuse and Miniature circuit breaker (MCB), merits and demerits. Personal safety measures: Electric Shock, Earthing and its types, Safety Precautions to avoid shock.

Text Books:
1. Basic Electrical Engineering, D. C. Kulshreshtha, Tata McGraw Hill, 2019, First Edition
2. Power System Engineering, P.V. Gupta, M.L. Soni, U.S. Bhatnagar and A. Chakrabarti, Dhanpat Rai & Co, 2013

3. Fundamentals of Electrical Engineering, Rajendra Prasad, PHI publishers, 2014, Third Edition

Reference Books:

1. Basic Electrical Engineering, D. P. Kothari and I. J. Nagrath, Mc Graw Hill, 2019, Fourth Edition
2. Basic Electrical Engineering, T. K. Nagsarkar and M. S. Sukhija, Oxford University Press, 2017.
3. Basic Electrical and Electronics Engineering, S. K. Bhatacharya, Person Publications, 2018, Second Edition.
4. E. Hughes, Electrical and Electronic Technology, PEARSON , 2010
5. 5. G. Rizzoni, Principles and Applications of Electrical Engineering, TMH , 2017

Web Resources:

1. https://nptel.ac.in/courses/108105053
2. https://nptel.ac.in/courses/108108076
3. https://archive.nptel.ac.in/courses/108/105/108105053

Part-B: Basic Electronics Engineering

Pre-Requisites: Basic fundamentals of Physics and Boolean Algebra

Course Objectives:

This course provides the student with the fundamental skills to understand the principles of digital electronics, basics of semiconductor devices like diodes & transistors, characteristics and its applications.

Course Outcomes (COs):

On successful completion of the course, Students will be able to

CO1: Apply the concept of science and mathematics to understand the working of diodes, transistors with characteristics. (L3)

CO2: Describe the operation of rectifiers, regulators, and amplifiers, and analyse the functional blocks of power supplies and electronic instrumentation systems for signal processing applications. (L4)

CO3: Interpret number systems and coding schemes, and construct basic combinational and sequential circuits using logic gates and Boolean algebra for digital system design. (L4)

Unit I: Semiconductor Devices:

Introduction - Evolution of electronics – Vacuum tubes to nano electronics - Characteristics of PN Junction Diode - Zener Effect -Zener Diode and its Characteristics. Bipolar Junction Transistor - CB, CE, CC Configurations and Characteristics- Elementary Treatment of Small Signal CE Amplifier.

Unit II: Basic Electronic Circuits and Instrumentation:

Rectifiers and power supplies: Block diagram description of a DC power supply, working of a full wave bridge rectifier, capacitor filter (no analysis), working of simple zener voltage regulator. **Amplifiers:** Block diagram of Public Address system, Circuit diagram and working of common emitter (RC coupled) amplifier with its frequency response. **Electronic Instrumentation:** Block diagram of an electronic instrumentation system.

Unit III: Digital Electronics:

Overview of Number Systems, Logic gates including Universal Gates, BCD codes, Excess-3 code, Gray code, Hamming code. Boolean Algebra, Basic Theorems and properties of Boolean Algebra,

Truth Tables and Functionality of Logic Gates – NOT, OR, AND, NOR, NAND, XOR and XNOR. Simple combinational Circuits – Half and Full Adder, Introduction to sequential circuits, Flip flops, Registers and counters (Elementary Treatment only)

Text Books:

1. R. L. Boylestad & Louis Nashlesky, Electronic Devices & Circuit Theory, Pearson Education, 2021.
2. R. P. Jain, Modern Digital Electronics, 4th Edition, Tata Mc Graw Hill, 2009

Reference Books:

1. R. S. Sedha, A Textbook of Electronic Devices and Circuits, S. Chand & Co, 2010.
2. Santiram Kal, Basic Electronics- Devices, Circuits and IT Fundamentals, Prentice Hall, India, 2002.
3. R. T. Paynter, Introductory Electronic Devices & Circuits – Conventional Flow Version, Pearson Education,2009.

Reference Website:

1. https://youtu.be/n9ZytPvXi7w
2. https://youtu.be/ngznoF6z0aw
3. https://youtu.be/S845RG7X70s
4. https://youtu.be/1OM3Bd8GXUo

B.Tech. – I Year I Semester

Course Code	Category	Name of the Course	L	T	P	C
24ES03101T	ES	**Engineering Graphics** (Common to all branches of Engineering)	1	0	4	3

Pre-Requisites: Basics of Geometry & Mathematics

Course Objectives:

1. To enable the students with various concepts like dimensioning, conventions and standards related to Engineering Drawing
2. To impart knowledge on the projection of points, lines and plane surfaces
3. To improve the visualization skills for better understanding of projection of solids
4. To develop the imaginative skills of the students required to understand Section of solids and Developments of surfaces.
5. To make the students understand the viewing perception of a solid object in Isometric and Perspective projections.

Course Outcomes (COs):

On successful completion of the course, Student will be able to

CO1: Construct geometrical shapes, regular polygons, and engineering curves using standard drawing instruments and apply appropriate methods to draw plain, diagonal, and vernier scales. (L3)

CO2: Draw the orthographic projections of points, lines, and planes in various positions using reference planes and apply projection principles to solve related engineering problems. (L3)

CO3: Represent the projections of polyhedral and solids of revolution in different positions, including those inclined to reference planes. (L4)

CO4: Determine sectional views and true shapes of solids and develop their surfaces using appropriate geometric methods. (L4)

CO5: Convert isometric views to orthographic views and vice versa, and demonstrate basic 2D and 3D object modelling using CAD tools. (L4)

Unit I: Introduction: Lines, Lettering and Dimensioning, Geometrical Constructions and Constructing regularpolygons by general methods.

Curves: construction of ellipse, parabola and hyperbola by general method, Cycloids, Involutes, Normal and tangent to Curves.

Scales: Plain scales, diagonal scales and vernier scales.

Unit II: Orthographic Projections: Reference plane, importance of reference lines or Plane, Projections of a point situated in any one of the four quadrants.

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

Projections of Planes: regular planes Perpendicular to both reference planes, parallel to one reference plane and inclined to the other reference plane; plane inclined to both the reference planes.

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

Unit IV: Sections of Solids: Perpendicular and inclined section planes, Sectional views and True shape of section, Sections of solids in simple position only.
Development of Surfaces: Methods of Development: Parallel line development and radial line development. Development of a cube, prism, cylinder, pyramid and cone.

Unit V: Conversion of Views: Conversion of isometric views to orthographic views; Conversion of orthographic views to isometric views.
Computer graphics: Creating 2D&3D drawings of objects including PCB and Transformations using Auto CAD (*Not for end examination*).

Text Books:

1. N. D. Bhatt, Engineering Drawing, Charotar Publishing House, 2016.

Reference Books:

1. Engineering Drawing, K.L. Narayana and P. Kannaiah, Tata McGraw Hill, 2013.
2. Engineering Drawing, M.B.Shah and B.C. Rana, Pearson Education Inc,2009.
3. Engineering Drawing with an Introduction to AutoCAD, Dhananjay Jolhe, Tata McGraw Hill, 2017.

B.Tech. – I Year I Semester

Course Code	Category	Name of the Course	L	T	P	C
24ES05101T	**ES**	**Introduction to Programming** (Common to all branches of Engineering)	**2**	**1**	**0**	**3**

Pre-Requisites: Nil

Course Objectives:

1. To introduce students to the fundamentals of computer programming.
2. To provide hands-on experience with coding and debugging.
3. To foster logical thinking and problem-solving skills using programming.
4. To familiarize students with programming concepts such as data types, control structures, functions, and arrays.
5. To encourage collaborative learning and teamwork in coding projects.

Course Outcomes (COs):

On successful completion of the course, Student will be able to

CO1: Demonstrate basics of computers, the concept of algorithm & flow chart and analyse the time & complexities of algorithms. (L4)

CO2: Write the algorithms, draw the flow charts and develop the programs using conditional statements of C-Language. (L3)

CO3: Write the algorithm, draw the flow chart and develop the programs using arrays & strings of C- Language. (L3)

CO4: Apply the Pointers & user defined Data types of C language and Develop solutions to real world problems. (L3)

CO5: Develop the programs using Functions for real world problems in C language. (L3)

Unit I: Introduction to Programming and Problem Solving:

History of Computers, Basic organization of a computer: ALU, input-output units, memory, program counter, Introduction to Programming Languages, Basics of a Computer Program, Algorithms, flowcharts (Using Día Tool), pseudo code. Introduction to Compilation and Execution, Primitive Data Types, Variables, and Constants, Basic Input and Output, Operations, Type Conversion, and Casting. Problem solving techniques: Algorithmic approach, characteristics of algorithm, Problem solving strategies: Top-down approach, Bottom-up approach, Time and space complexities of algorithms.

Unit II: Control Structures:

Simple sequential programs Conditional Statements (if, if-else, switch), Loops (for, while, do-while) Break and Continue.

Unit III: Arrays and Strings:

Arrays indexing, memory model, programs with array of integers, two dimensional arrays, Introduction to Strings.

Unit IV: Pointers & User Defined Data types:

Pointers, dereferencing and address operators, pointer and address arithmetic, array manipulation using pointers, User-defined data types-Structures and Unions.

Unit -5: Functions & File Handling:

Introduction to Functions, Function Declaration and Definition, Function call Return Types and Arguments, modifying parameters inside functions using pointers, arrays as parameters. Scope and Lifetime of Variables, Basics of File Handling

Note: The syllabus is designed with C Language as the fundamental language of implementation.

Text Books:

1. "The C Programming Language", Brian W. Kernighan and Dennis M. Ritchie, Prentice-Hall, 1988.
2. “Schaum’s Outline of Programming with C”, Byron S Gottfried, McGraw-Hill Education, 1996.

Reference Books:

1. “Computing fundamentals and C Programming”, Balagurusamy, E., McGraw-Hill Education, 2008.
2. “Programming in C”, Rema Theraja, Oxford, 2016, 2nd Edition.
3. “C Programming, A Problem-Solving Approach”, Forouzan, Gilberg, Prasad, CENGAGE, 3rd Edition.

B.Tech. – I Year I Semester

Course Code	Category	Name of the Course	L	T	P	C
24BSHB103P	**BS**	**Engineering Physics Lab** (Common for all branches of Engineering)	**0**	**0**	**3**	**1**

Pre-Requisites: Fundamentals of Physics

Course Objectives:

1. To study the concepts of optical phenomenon like Interference , Diffraction, etc
2. To recognize the importance of energy gap a study of conductivity.
3. To study the parameters and applications of di-electric and magnetic materials by conducting experiments
4 .To verify the laws of stretched strings
5. To Plot the intensity of the magnetic field of circular coil carrying current with distance.

Course Outcomes (COs):

On successful completion of the course, Student will be able to

CO1: Operate optical instruments like travelling microscope and spectrometer to measure the various physical quantities. (L2)

CO2: Examine the wavelengths of different colors using diffraction grating. (L4)

CO3: Plot the intensity of the magnetic field of circular coil carrying current with distance. (L2)

CO4: Determine dielectric constant for dielectric materials. (L2)

CO5: Calculate the band gap of a given semiconductor and to Identify the type of semiconductor using Hall effect. (L3)

CO6: Examine the laws of stretched string using sonometer (L4)

List of Experiments

1. Determination of radius of curvature of a given Plano-convex lens by Newton's rings.
2. Determination of wavelengths of different spectral lines in mercury spectrum using Diffraction grating in normal incidence configuration.
3. Verification of Brewster's law
4. Determination of dielectric constant using charging and discharging method.
5. Study the variation of B versus H by magnetizing the magnetic material (B-H curve).
6. Determination of wavelength of Laser light using diffraction grating.
7. Estimation of Planck's constant using photoelectric effect.
8. Determination of the resistivity of semiconductors by four probe methods.
9. Determination of energy gap of a semiconductor using p-n junction diode.
10. Magnetic field along the axis of a current carrying circular coil by Stewart Gee's Method
11. Determination of Hall voltage , Hall coefficient and type of semiconductor (N-type or P-Type) using Hall effect.
12. Determination of temperature coefficients of a thermistor.
13. Determination of acceleration due to gravity and radius of Gyration by using a compound pendulum.
14. Determination of magnetic susceptibility by Kundt's tube method.
15. Determination of rigidity modulus of the material of the given wire using Torsional pendulum.

16. Sonometer: Verification of laws of stretched string.
17. Determination of young's modulus for the given material of wooden scale by non-uniform bending (or double cantilever) method.
18. Determination of Frequency of electrically maintained tuning fork by Melde's experiment

Note: Any TEN of the listed experiments are to be conducted and TWO of these TEN experiments may be conducted in virtual mode.

Reference Book:

A Textbook of Practical Physics - S. Balasubramanian, M.N. Srinivasan, S. Chand Publishers, 2017.

Web Resources :

1.www.vlab.co.in

2.https://phet.colorado.edu/en/simulations/filter?subjects=physics&type=html,prototype

B.Tech. – I Year I Semester

Course Code	Category	Name of the Course	L	T	P	C
24ES02101P	ES	**Electrical and Electronics Engineering Workshop** (Common to all branches of Engineering)	0	0	3	1.5

Activities:

1. Familiarization of commonly used Electrical & Electronic Workshop Tools: Bread board, Solder, cables, relays, switches, connectors, fuses, Cutter, plier, screwdriver set, wire stripper, flux, knife/blade, soldering iron, de-soldering pump etc.
   - Provide some exercises so that hardware tools and instruments are learned to be used by the students.
2. Familiarization of Measuring Instruments like Voltmeters, Ammeters, multimeter, LCR-Q meter, Power Supplies, CRO, DSO, Function Generator, Frequency counter.
   - Provide some exercises so that measuring instruments are learned to be used by the students.
3. Components:
   - Familiarization/Identification of components (Resistors, Capacitors, Inductors, Diodes, transistors, IC's etc.) – Functionality, type, size, colour coding package, symbol, cost etc.
   - Testing of components like Resistor, Capacitor, Diode, Transistor, ICs etc. - Compare values of components like resistors, inductors, capacitors etc with the measured values by using instruments

Part A: Electrical Engineering Lab

Pre-requisites: Fundamentals of Physics

Course Objectives:

To impart knowledge on the fundamental laws & theorems of electrical circuits, functions of electrical machines and energy calculations.

Course Outcomes (COs):

On successful completion of the course, Student will be able to

CO1: Verify KVL, KCL & various network theorems and Apply to AC & DC Electrical circuits to measure Electric Circuit parameters (R, L & C), Power, Power factor etc. (L3)

CO2: Conduct Experiments on AC&DC Machines, plot characteristics and measure the various electrical parameters or quantities. (L3)

CO3: Design suitable circuits and methodologies for the measurement of various electrical parameters; House hold and commercial wiring. (L3)

List of experiments:

1. Verification of KCL and KVL
2. Verification of Superposition theorem
3. Measurement of Resistance using Wheat stone bridge
4. Magnetization Characteristics of DC shunt Generator
5. Measurement of Power and Power factor using Single-phase wattmeter
6. Measurement of Earth Resistance using Megger
7. Calculation of Electrical Energy for Domestic Premises

Note: Minimum Six Experiments are to be performed.

Reference Books:
1. Basic Electrical Engineering, D. C. Kulshreshtha, Tata McGraw Hill, 2019, First Edition
2. Power System Engineering, P.V. Gupta, M.L.Soni, U.S. Bhatnagar and A. Chakrabarti, Dhanpat Rai & Co, 2013
3. Fundamentals of Electrical Engineering, Rajendra Prasad, PHI publishers, 2014, Third Edition.

Part-B: Electronics Engineering Lab

Pre-requisites: Fundamentals of Physics

Course Objectives:
To impart knowledge on the principles of digital electronics and fundamentals of electron devices & its applications.

Course Outcomes (COs):
On successful completion of the course, Student will be able to
CO1: Understand the usage of electronic measuring instruments and Analyze the V-I characteristics of various electronic devices. (L4)
CO2: Develop various Analog Electronic Circuits such as Rectifier, Regulators and Amplifiers (L3)
CO3: Develop Digital Electronic Circuits such as Combinational and Sequential Circuits. (L3)

List of Experiments:
1. Plot V-I characteristics of PN Junction diode A) Forward bias B) Reverse bias.
2. Plot V – I characteristics of Zener Diode and its application as voltage Regulator.
3. Implementation of half wave and full wave rectifiers
4. Plot Input & Output characteristics of BJT in CE and CB configurations
5. Frequency response of CE amplifier.
6. Simulation of RC coupled amplifier with the design supplied
7. Verification of Truth Tables of AND, OR, NOT, NAND, NOR, Ex-OR, Ex-NOR gates using ICs.
8. Verification of Truth Tables of S-R, J-K& D flip flops using respective ICs.

Tools / Equipment Required: DC Power supplies, Multi meters, DC Ammeters, DC Voltmeters, AC Voltmeters, CROs, all the required active devices.

Reference Books:
1. R. L. Boylestad & Louis Nashlesky, Electronic Devices & Circuit Theory, Pearson Education, 2021.
2. R. P. Jain, Modern Digital Electronics, 4th Edition, Tata Mc Graw Hill, 2009
3. R. T. Paynter, Introductory Electronic Devices & Circuits – Conventional Flow Version, Pearson Education,2009.

Note: Minimum Six Experiments are to be performed. All the experiments shall be performed using both Hardware and Software

B.Tech. – I Year I Semester

Course Code	Category	Name of the Course	L	T	P	C
24ES05101P	ES	**Computer Programming Lab** (Common to all branches of Engineering)	0	0	3	1.5

Pre-Requisites: Nil

Course Objectives:

The course aims at providing students with hands – on experience and train them on the concepts of the C- programming language.

Course Outcomes(COs):

On successful completion of the course, Student will be able to

CO1: Read, understand, and trace the execution of programs written in C language. (L2)

CO2: Select the right control structure for solving the problem. (L3)

CO3: Develop C programs which utilize memory efficiently using programming constructs like pointers. (L3)

CO4: Develop, Debug and Execute programs to demonstrate the applications of arrays, functions, basic concepts of pointers in C. (L3)

Unit I: Week 1:

Objective: Getting familiar with the programming environment on the computer and writing the first program.

Suggested Experiments/Activities:

Tutorial 1: Problem-solving using Computers.

Lab1: Familiarization with programming environment

i) Basic Linux environment and its editors like Vi, Vim & Emacs etc.

ii) Exposure to Turbo C, gcc

iii) Writing simple programs using printf(), scanf()

Week 2:

Objective: Getting familiar how to formally describe a solution to a problem in a series of finite steps both using textual notation and graphic notation.

Suggested Experiments /Activities:

Tutorial 2: Problem-solving using Algorithms and Flow charts.

Lab 1: Converting algorithms/flow charts into C Source code.

Developing the algorithms/flowcharts for the following sample programs

i) Sum and average of 3 numbers

ii) Conversion of Fahrenheit to Celsius and vice versa

iii) Simple interest calculation

Week 3:

Objective: Learn how to define variables with the desired data-type, initialize them with appropriate values and how arithmetic operators can be used with variables and constants.

Suggested Experiments/Activities:

Tutorial 3: Variable types and type conversions:

Lab 3: Simple computational problems using arithmetic expressions.

i) Finding the square root of a given number

ii) Finding compound interest

iii) Area of a triangle using heron's formulae

iv) Distance travelled by an object

UNIT – II : Week 4:

Objective: Explore the full scope of expressions, type-compatibility of variables & constants and operators used in the expression and how operator precedence works.

Suggested Experiments/Activities:

Tutorial4: Operators and the precedence and as associativity:

Lab4: Simple computational problems using the operator' precedence and associativity

i) Evaluate the following expressions.

a. A+B*C+(D*E) + F*G b. A/B*C-B+A*D/3

c. A+++B---A d. J= (i++) + (++i)

ii) Find the maximum of three numbers using conditional operator

iii) Take marks of 5 subjects in integers, and find the total, average in float

Week 5:

Objective: Explore the full scope of different variants of "if construct" namely if-else, null-else, if-else if*-else, switch and nested-if including in what scenario each one of them can be used and how to use them. Explore all relational and logical operators while writing conditionals for "if construct".

Suggested Experiments/Activities:

Tutorial 5: Branching and logical expressions:

Lab 5: Problems involving if-then-else structures.

i) Write a C program to find the max and min of four numbers using if-else.

ii) Write a C program to generate electricity bill.

iii) Find the roots of the quadratic equation.

iv) Write a C program to simulate a calculator using switch case.

v) Write a C program to find the given year is a leap year or not.

Week 6:

Objective: Explore the full scope of iterative constructs namely while loop, do-while loop and for loop in addition to structured jump constructs like break and continue including when each of these statements is more appropriate to use.

Suggested Experiments/Activities:

Tutorial 6: Loops, while and for loops

Lab 6: Iterative problems e.g., the sum of series

i) Find the factorial of given number using any loop.

ii) Find if the given number is a prime or not.

iii) Compute sine and cos series

iv) Checking a number palindrome

v) Construct a pyramid of numbers.

Unit III: Week 7:

Objective: Explore the full scope of Arrays construct namely defining and initializing 1-D and 2-D and more generically n-D arrays and referencing individual array elements from the defined array. Using integer 1-D arrays, explore search solution linear search.

Suggested Experiments/Activities:

Tutorial 7: 1 D Arrays: searching.

Lab 7:1D Array manipulation, linear search

i) Find the min and max of a 1-D integer array.

ii) Perform linear search on1D array.

iii) The reverse of a 1D integer array

iv) Find 2's complement of the given binary number.

v) Eliminate duplicate elements in an array.

Week 8:

Objective: Explore the difference between other arrays and character arrays that can be used as Strings by using null character and get comfortable with string by doing experiments that will reverse a string and concatenate two strings. Explore sorting solution bubble sort using integer arrays.

Suggested Experiments/Activities:

Tutorial 8: 2 D arrays, sorting and Strings.

Lab 8: Matrix problems, String operations, Bubble sort

i) Addition of two matrices

ii) Multiplication two matrices

iii) Sort array elements using bubble sort

iv) Concatenate two strings without built-in functions

v) Reverse a string using built-in and without built-in string functions

Unit – IV : Week 9:

Objective: Explore pointers to manage a dynamic array of integers, including memory allocation & value initialization, resizing changing and reordering the contents of an array and memory de-allocation using malloc (), calloc (), realloc () and free () functions. Gain experience processing command-line arguments received by C

Suggested Experiments/Activities:

Tutorial 9: Pointers, structures and dynamic memory allocation

Lab 9: Pointers and structures, memory dereference.

i) Write a C program to find the sum of a 1D array using malloc()

ii) Write a C program to find the total, average of n students using structures

iii) Enter n students data using calloc () and display failed students list

iv) Read student name and marks from the command line and display the student details along with the total.

v) Write a C program to implement realloc ()

Week 10:

Objective: Experiment with C Structures, Unions, bit fields and self-referential structures (Singly linked lists) and nested structures

Suggested Experiments/Activities:

Tutorial 10: Bitfields, Self-Referential Structures, Linked lists

Lab10: Bitfields, linked lists

Read and print a date using dd/mm/yyyy format using bit-fields and differentiate the same without using bit-fields

i) Create and display a singly linked list using self-referential structure.

ii) Demonstrate the differences between structures and unions using a C program.

iii) Write a C program to shift/rotate using bitfields.

iv) Write a C program to copy one structure variable to another structure of the same type.

Unit – V: Week 11:

Objective: Explore the Functions, sub-routines, scope and extent of variables, doing some experiments by parameter passing using call by value. Basic methods of numerical integration

Suggested Experiments/Activities:

Tutorial 11: Functions, call by value, scope and extent,

Lab 11: Simple functions using call by value, solving differential equations using Eulers theorem.

i) Write a C function to calculate NCR value.

ii) Write a C function to find the length of a string.

iii) Write a C function to transpose of a matrix.

iv) Write a C function to demonstrate numerical integration of differential equations using Euler's method

Week 12:

Objective: Explore how recursive solutions can be programmed by writing recursive functions that can be invoked from the main by programming at least five distinct problems that have naturally recursive solutions.

Suggested Experiments/Activities:

Tutorial 12: Recursion, the structure of recursive calls

Lab 12: Recursive functions

i) Write a recursive function to generate Fibonacci series.

ii) Write a recursive function to find the lcm of two numbers.

iii) Write a recursive function to find the factorial of a number.

iv) Write a C Program to implement Ackermann function using recursion.

v) Write a recursive function to find the sum of series.

Week 13:

Objective: Explore the basic difference between normal and pointer variables, Arithmetic operations using pointers and passing variables to functions using pointers

Suggested Experiments/Activities:

Tutorial 13: Call by reference, dangling pointers

Lab 13: Simple functions using Call by reference, Dangling pointers.

i) Write a C program to swap two numbers using call by reference.

ii) Demonstrate Dangling pointer problem using a C program.

iii) Write a C program to copy one string into another using pointer.

iv) Write a C program to find no of lowercase, uppercase, digits and other characters using pointers.

Week14:

Objective: To understand data files and file handling with various file I/O functions. Explore the differences between text and binary files.

Suggested Experiments/Activities:

Tutorial 14: File handling

Lab 14: File operations

i) Write a C program to write and read text into a file.

ii) Write a C program to write and read text into a binary file using fread() and fwrite()

iii) Copy the contents of one file to another file.

iv) Write a C program to merge two files into the third file using command-line arguments.

v) Find no. of lines, words and characters in a file

vi) Write a C program to print the last n characters of a given file.

Text Books:

1. Ajay Mittal, Programming in C: A practical approach, Pearson 1st Edition 2010.
2. Byron Gottfried, Schaum's Outline of Programming with C, Mc Graw Hill; 2nd edition 1996.

Reference Books:

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice-Hall of India, 1988.
2. C Programming, A Problem-Solving Approach, Forouzan, Gilberg, Prasad, CENGAGE, 3rd edition, 2011.

B.Tech. – I Year I Semester

Course Code	Category	Name of the Course	L	T	P	C
24ES05102P	ES	**IT Workshop** (Common to all branches of Engineering)	0	0	2	1

Pre-Requisites: Nil

Course Objectives:

1. To introduce the internal parts of a computer, peripherals, I/O ports, connecting cables
2. To demonstrate configuring the system as Dual boot both Windows and other Operating Systems Viz. Linux, BOSS
3. To teach basic command line interface commands on Linux.
4. To teach the usage of Internet for productivity and self-paced life-long learning
5. To introduce Compression, Multimedia and Antivirus tools and Office Tools such as Word processors, Spread sheets and Presentation tools.

Course Outcomes (COs):

On successful completion of the course, Student will be able to

CO1: Perform Hardware troubleshooting. (L3)
CO2: Demonstrate the Hardware components and inter dependencies. (L2)
CO3: Safeguard computer systems from viruses/worms. (L3)
CO4: Prepare Document/ Presentation by utilizing computer tools. (L3)
CO5: Perform calculations using spreadsheets. (L3)

PC Hardware & Software Installation:

Task 1: Identify the peripherals of a computer, components in a CPU and its functions. Draw the block diagram of the CPU along with the configuration of each peripheral and submit it to your instructor.

Task 2: Every student should disassemble and assemble the PC back to working condition. Lab instructors should verify the work and follow it up with a Viva. Also, students need to go through the video which shows the process of assembling a PC. A video would be given as part of the course content.

Task 3: Every student should individually install MS windows on the personal computer. Lab instructor should verify the installation and follow it up with a Viva.

Task 4: Every student should install Linux on the computer. This computer should have windows installed. The system should be configured as dual boot (VMWare) with both Windows and Linux. Lab instructors should verify the installation and follow it up with a Viva

Task 5: Every student should install BOSS on the computer. The system should be configured as dual boot (VMWare) with both Windows and BOSS. Lab instructors should verify the installation and follow it up with a Viva

Internet & World Wide Web:

Task1: Orientation & Connectivity Boot Camp: Students should get connected to their Local Area Network and access the Internet. In the process they configure the TCP/IP setting. Finally, students should demonstrate to the instructor how to access websites and email. If there is no internet connectivity preparations need to be made by the instructors to simulate the WWW on the LAN.

Task 2: Web Browsers, Surfing the Web: Students customize their web browsers with the LAN proxy settings, bookmarks, search toolbars and pop-up blockers. Also, plug-ins like Macromedia Flash and JRE for applets should be configured.
Task 3: Search Engines & Netiquette: Students should know what search engines are and how to use the search engines. A few topics would be given to the students for which they need to search on Google. This should be demonstrated to the instructors by the student.
Task 4: Cyber Hygiene: Students would be exposed to the various threats on the internet and would be asked to configure their computer to be safe on the internet. They need to customize their browsers to block pop ups, block active x downloads to avoid viruses and/or worms.

LaTeX and Word:
Task 1: Word Orientation: The mentor needs to give an overview of LaTeX and Microsoft (MS) office or equivalent (FOSS) tool word: Importance of LaTeX and MS office or equivalent (FOSS) tool Word as word Processors, Details of the four tasks and features that would be covered in each, Using LaTeX and word –Accessing, overview of toolbars, saving files, Using help and resources, rulers, format painter in word.
Task 2: Using LaTeX and Word to create a project certificate. Features to be covered: -Formatting Fonts in word, Drop Cap in word, Applying Text effects, Using Character Spacing, Borders and Colors, Inserting Header and Footer, Using Date and Time option in both LaTeX and Word.
Task 3: Creating project abstract Features to be covered: -Formatting Styles, inserting table, Bullets and Numbering, Changing Text Direction, Cell alignment, Footnote, Hyperlink, Symbols, Spell Check, Track Changes.
Task 4: Creating a Newsletter: Features to be covered: -Table of Content, Newspaper columns, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Textboxes, Paragraphs and Mail Merge in word.

Excel:
Excel Orientation: The mentor needs to tell the importance of MS office or equivalent (FOSS) tool Excel as a Spreadsheet tool, give the details of the four tasks and features that would be covered in each. Using Excel –Accessing, overview of toolbars, saving excel files, Using help and resources.
Task 1: Creating a Scheduler -Features to be covered: Gridlines, Format Cells, Summation, auto fill, Formatting Text
Task 2: Calculating GPA -. Features to be covered: -Cell Referencing, Formulae in excel –average, std. deviation, Charts, Renaming and Inserting worksheets, Hyper linking, Count function,
Lookup/Vlookup
Task 3: Split cells, freeze panes, group and outline, Sorting, Boolean and logical operators, Conditional formatting

Power Point
Task 1: Students will be working on basic power point utilities and tools which help them create basic power point presentations. PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows in PowerPoint.
Task 2: Interactive presentations -Hyperlinks, Inserting –Images, Clip Art, Audio, Video, Objects, Tables and Charts.
Task 3: Master Layouts (slide, template, and notes), Types of views (basic, presentation, slide slotter, notes etc), and Inserting –Background, textures, Design Templates, Hidden slides.

AI Tools –ChatGPT

Task 1: Prompt Engineering: Experiment with different types of prompts to see how the model responds. Try asking questions, starting conversations, or even providing incomplete sentences to see how the model completes them.

Ex: Prompt: "You are a knowledgeable AI. Please answer the following question: What is the capital of France?"

Task 2: Creative Writing: Use the model as a writing assistant. Provide the beginning of a story or a description of a scene, and let the model generate the rest of the content. This can be a fun way to brainstorm creative ideas

Ex: Prompt: "In a world where gravity suddenly stopped working, people started floating upwards. Write a story about how society adapted to this new reality."

Task 3: Language Translation: Experiment with translation tasks by providing a sentence in one language and asking the model to translate it into another language. Compare the output to see how accurate and fluent the translations are.

Ex: Prompt: "Translate the following English sentence to French: 'Hello, how are you doing today?'"

Reference Books:

1. Comdex Information Technology course tool kit, Vikas Gupta, WILEY Dream tech, 2003
2. The Complete Computer upgrade and repair book, Cheryl A Schmidt, WILEY Dream tech, 2013, 3rd edition
3. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education, 2012, 2nd edition
4. PC Hardware -A Handbook, Kate J. Chase, PHI (Microsoft), 1st Edition, 2004.
5. LaTeX Companion, Leslie Lamport, PHI/Pearson, 1st edition, 1994.
6. IT Essentials PC Hardware and Software Companion Guide, David Anfins on and Ken Quamme. – CISCO Press, Pearson Education, 3rd edition, 2008.
7. IT Essentials PC Hardware and Software Labs and Study Guide, Patrick Regan–CISCO Press, Pearson Education, 3rd edition, 2008.

B.Tech. – I Year I Semester

Course Code	Category	Name of the Course	L	T	P	C
24HMHS103L	**HM**	**NSS/NCC/Scouts & Guides/Community Service** (Common to all branches of Engineering)	**0**	**0**	**1**	**0.5**

Pre-Requisites: Nil

Course Objectives:

1. To impart discipline, character, and fraternity amongst young citizens
2. To train them to work in teams/groups to enhance their team spirit.
3. To enable the students to acquire leadership qualities.
4. To induce social consciousness among students through various activities.
5. To instill self-confidence and the ideals of selfless service
6. To engage students in responsible and challenging actions for the common good.

Course Outcomes (COs):

On successful completion of the course, the students will be able to

CO1: Explain the importance of discipline, character and service motto. (L2)

CO2: Outline the needs and problems of the community. (L2)

CO3: Solve some societal issues by applying acquired knowledge, facts, and techniques. (L3)

CO4: Explore human relationships by analyzing social problems. (L4)

CO5: Determine to extend their help for the fellow beings and downtrodden people and Develop leadership skills and civic responsibilities. (L3)

Unit I: Orientation:

General Orientation on NSS/NCC/ Scouts & Guides/Community Service activities, career guidance.

Activities:

i. Conducting –ice breaking sessions-expectations from the course-knowing personal talents and skills
ii. Conducting orientations programs for the students –future plans-activities-releasing road map etc.
iii. Displaying success stories-motivational biopics- award winning movies on societal issues etc.
iv. Conducting talent show in singing patriotic songs-paintings- any other contribution.

Unit II: Nature & Care:

Activities:

i. Best out of waste competition.
ii. Poster and signs making competition to spread environmental awareness.
iii. Recycling and environmental pollution article writing competition.
iv. Organising Zero-waste day.
v. Digital Environmental awareness activity via various social media platforms.
vi. Virtual demonstration of different eco-friendly approaches for sustainable living.
vii. Write a summary on any book related to environmental issues.

Unit III: Community Service:

Activities:

i. Conducting One Day Special Camp in a village contacting village-area leaders- Survey

ii. in the village, identification of problems- helping them to solve via media- authorities experts etc.
    a. Conducting awareness programs on Health-related issues such as General Health,
iii. Mental health, Spiritual Health, HIV/AIDS,
    a. Conducting consumer Awareness. Explaining various legal provisions etc.
    b. Women Empowerment Programmes- Sexual Abuse, Adolescent Health and Population
iv. Education.
    a. Any other programmes in collaboration with local charities, NGOs etc.

Reference Books:

1. Nirmalya Kumar Sinha & Surajit Majumder, *A Text Book of National Service Scheme* Vol;.I, Vidya Kutir Publication, 2021 (ISBN 978-81-952368-8-6)
2. *Red Book - National Cadet Corps* – Standing Instructions Vol I & II, Directorate General of NCC, Ministry of Defence, New Delhi
3. Davis M. L. and Cornwell D. A., "Introduction to Environmental Engineering", McGraw Hill, New York 4/e 2008
4. Masters G. M., Joseph K. and Nagendran R. "Introduction to Environmental Engineering and Science", Pearson Education, New Delhi. 2/e 2007
5. Ram Ahuja. *Social Problems in India*, Rawat Publications, New Delhi.

General Guidelines:

1. Institutes must assign slots in the Timetable for the activities.
2. Institutes are required to provide instructor to mentor the students.

B.Tech. – I Year II Semester

Course Code	Category	Name of the Course	L	T	P	C
24BSHB102T	**BS**	**Differential Equations & Vector Calculus** (Common for all branches of Engineering)	**2**	**1**	**0**	**3**

Pre-Requisites: Basic Knowledge of Mathematics

Course Objectives:

- To enlighten the learners about the concepts of differential equations and multivariable calculus.
- To furnish the learners with basic concepts and techniques at plus two level to lead them to advanced level by handling various real-world applications.

Course Outcomes (COs):

On successful completion of the course, Student will be able to

CO1: Solve the differential equations of first order and first degree and apply in Newton's law of Cooling and Electrical Circuits applications. (L3)

CO2: Solve the linear constant coefficient differential equations of higher order and apply in L-C-R Electrical Circuits and Simple Harmonic motion applications. (L3)

CO3: Find the solution to Partial Differential Equations and Homogeneous Linear Partial differential equations with constant coefficients and solve real time related problems. (L3)

CO4: Examine the physical meaning of different operators such as gradient, curl anddivergence. (L4)

CO5: Determine the Line, Surface and Volume integrals using Vector Calculus and solve related engineering problems. (L4)

Unit I: Differential Equations of First Order and First Degree:

Linear differential equations – Bernoulli's equations- Exact equations and equations reducible to exact form. Applications: Newton's Law of cooling – Law of natural growth and decay- Electrical circuits.

Unit II: Linear Differential Equations of Higher Order (Constant Coefficients):

Definitions, homogenous and non-homogenous, complimentary function, general solution, particular integral, Wronskian, Method of variation of parameters. Simultaneous linear equations, Applications to L-C-R Circuit problems and Simple Harmonic motion.

Unit III: Partial Differential Equations:

Introduction and formation of Partial Differential Equations by elimination of arbitrary constants and arbitrary functions, solutions of first order linear equations using Lagrange's method. Homogeneous Linear Partial differential equations with constant coefficients.

Unit IV: Vector Differentiation:

Scalar and vector point functions, vector operator Del, Del applies to scalar point functions- Gradient, Directional derivative, del applied to vector point functions-Divergence and Curl, vector identities.

Unit V: Vector Integration:

Line integral-circulation-work done, surface integral-flux, Green's theorem in the plane (without proof), Stoke's theorem (without proof), volume integral, Divergence theorem (without proof) and related problems.

Text Books:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2018.
2. B.S. Grewal, Higher Engineering Mathematics, 44/e, Khanna publishers, 2017.

Reference Books:

1. Dennis G. Zill and Warren S. Wright, Advanced Engineering Mathematics, Jones and Bartlett, 2018.
2. Micheael Greenberg, Advanced Engineering Mathematics, 9th edition, Pearson edn
3. George B. Thomas, Maurice D. Weir and Joel Hass, Thomas Calculus, 14/e, Pearson Publishers, 2018.
4. R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, 5/e, Alpha Science International Ltd., 2021 (9th reprint).
5. B. V. Ramana, Higher Engineering Mathematics, Mc Graw Hill Education, 2017.

B.Tech. – I Year II Semester

Course Code	Category	Name of the Course	L	T	P	C
24BSHB105T	BS	Engineering Chemistry (Civil Engineering)	3	0	0	3

Pre-Requisites: Fundamentals of Chemistry

Course Educational Objectives (CEOs)

1. To learn different purification methods and analyse the impurities present in water.
2. To understand and apply the concepts of electrochemistry effectively.
3. To train the students on the fundamentals and applications of polymers.
4. To understand and apply the concepts of Cement, Refractories, Lubricants and Composite materials.
5. To introduce basic principles of Micelle, colloids and nano metals

Course Outcomes (COs):

On successful completion of the course, Student will be able to

CO1: Analyse the hardness of the water using EDTA Method, causes & prevention methods of boiler troubles and demonstrate the softening methods of hard water. (L4)

CO2: Analyse the construction and working of electrochemical cells, batteries, and fuel cells, and differentiate various types of corrosion and protection techniques based on electrochemical principles. (L4)

CO3: Classify different types of polymers and elastomers based on their synthesis and properties, and analyse the efficiency of fuels using calorific value and fuel quality indicators. (L4)

CO4: Examine the structure and characteristics of composites, refractories, lubricants, and building materials, and determine their suitability for specific engineering applications. (L4)

CO5: Differentiate types of colloids and nanomaterials based on synthesis methods and stabilization techniques, and analyse surface phenomena using adsorption isotherms and surface area concepts. (L4)

Unit I: Water Quality and Treatment:

Introduction –Soft Water and hard water, Estimation of hardness of water by EDTA Method, Estimation of dissolved oxygen - Boiler troubles –Priming, foaming, scale and sludge, Caustic embrittlement, Industrial water treatment. Specifications for drinking water, Bureau of Indian Standards (BIS) and World health organization (WHO) standards, ion-exchange processes - desalination of brackish water, reverse osmosis (RO) and electro dialysis.

Unit II: Electrochemistry and Corrosion:

Electrodes – concepts, electrochemical cell, Nernst equation, cell potential calculations. Primary cells – Zinc-air battery, Secondary cells – Nickel-Cadmium (NiCad), and lithium-ion batteries-working of the batteries including cell reactions; Fuel cells, hydrogen-oxygen fuel cell – working of the cells.

Corrosion: Introduction to corrosion, electrochemical theory of corrosion, differential aeration cell corrosion, galvanic corrosion, metal oxide formation by dry electrochemical corrosion, Pilling Bedworth ratios and uses, Factors affecting the corrosion, cathodic and anodic protection, electroplating and electro less plating (Nickel and copper).

Unit III: Polymers and Fuel Chemistry:
Introduction to polymers, functionality of monomers, Mechanism of chain growth, step growth polymerization Thermoplastics and Thermo-setting plastics-: Preparation, properties and applications of poly styrene, PVC, Nylon 6:6 and Bakelite. Elastomers – Preparation, properties and applications of Buna-S, Buna-N, Thiokol. Fuels – Types of fuels, calorific value, numerical problems based on calorific value; Analysis of coal, Liquid Fuels refining of petroleum, Octane and Cetane values, alternative fuels- Propane, methanol and ethanol, bio-fuels- bio diesel.

Unit IV: Modern Engineering Materials:
Composites- Definition, Constituents, classification- particle, Fiber and structural Rein forced composites, properties and Engineering applications. Refractories- Classification, Properties, Factors affecting the refractory materials and Applications. Lubricants- Classification, Functions of lubricants, Mechanism, Properties of lubricating oils – Viscosity, Viscosity Index, Flash point, Fire point, Cloud point, saponification and Applications. Building materials- Portland Cement, constituents, manufacturing of cement, Setting and Hardening of cement.

Unit V: Surface Chemistry and Nanomaterials:
Introduction to surface chemistry, colloids, micelle formation, synthesis of colloids (Braggs method), chemical and biological methods of preparation of nanometals and metal oxides, stabilization of colloids and nanomaterials by stabilizing agents, adsorption isotherm (Freundlich and Longmuir), BET equation (no derivation). Applications of colloids and nanomaterials – catalysis, medicine, sensors.

Text Books:
1.Jain and Jain, Engineering Chemistry, 16/e, DhanpatRai, 2013.
2.Peter Atkins, Julio de Paula and James Keeler, Atkins' Physical Chemistry, 10/e, Oxford University Press, 2010.

Reference Books:
1. G.V. Subba Reddy, K.N. Jayaveera and C. Ramachandraiah, Engineering Chemistry, Mc Graw Hill, 2020.
2. Skoog and West, Principles of Instrumental Analysis, 6/e, Thomson, 2007.
3. H.F.W. Taylor, Cement Chemistry, 2/e, Thomas Telford Publications, 1997.
4. D.J. Shaw, Introduction to Colloids and Surface Chemistry, Butterworth-Heineman,1992.

Reference Website:
1. https://youtu.be/HfBeICCOaG4?si=J7HNHoJ-xGymomXa
2. https://youtu.be/CKyo2M1mNqQ?si=xLqBkrqtYm3uyN3G
3. https://youtu.be/rG1qDXuRRoE?si=O0z5iQg7AUlZ_2Ik
4. https://youtu.be/cHw3H9_jrZo?si=7I38ZdeJ9r84HTNC
5. https://www.youtube.com/live/7zS5IUCmTuo?si=pP-EGEP49UCDX8lH

B.Tech. – I Year II Semester

Course Code	Category	Name of the Course	L	T	P	C
24HMHS101T	HM	**Communicative English** (Common to all branches of Engineering)	2	0	0	2

Pre-Requisites: Basics of LSRW skills

Course Objectives:

The main objective of introducing this course, *Communicative English*, is to facilitate effective listening, Reading, Speaking and Writing skills among the students. It enhances the same in their comprehending abilities, oral presentations, reporting useful information and providing knowledge of grammatical structures and vocabulary. This course helps the students make them effective in speaking and writing skills and make them industry ready.

Course Outcomes (COs):

On successful completion of the course, Student will be able to

CO1: Understand the context, topic, and pieces of specific information from social or Transactional dialogues. (L2)

CO2: Apply grammatical structures to formulate sentences and correct word forms. (L3)

CO3: Analyze discourse markers to speak clearly on a specific topic in informal discussions. (L4)

CO4: Evaluate reading / listening texts and to write summaries based on global – Comprehension of these texts. (L5)

CO5: Create a coherent paragraph, essay, and resume. (L6)

Unit I: Human Values: Gift of Magi (Short Story)

Listening: Identifying the topic, the context and specific pieces of information by listening to short audio texts and answering a series of questions.

Speaking: Asking and answering general questions on familiar topics such as home, family, work, studies and interests; introducing oneself and others.

Reading: Skimming to get the main idea of a text; scanning to look for specific pieces of information.

Writing: Mechanics of Writing-Capitalization, Spellings, Punctuation-Parts of Sentences.

Grammar: Parts of Speech, Basic Sentence Structures-forming questions

Vocabulary: Synonyms, Antonyms, Affixes (Prefixes/Suffixes), Root words.

Unit II: Nature: The Brook by Alfred Tennyson (Poem)

Listening: Answering a series of questions about main ideas and supporting ideas afterlistening to audio texts.

Speaking: Discussion in pairs /small groups on specific topics followed by short structuretalks.

Reading: Identifying sequence of ideas; recognizing verbal techniques that help to link the ideas in a paragraph together.

Writing: Structure of a paragraph - Paragraph writing (specific topics)

Grammar: Cohesive devices -linkers, use of articles and zero article; prepositions.

Vocabulary: Homonyms, Homophones, Homographs.

Unit III: Biography: Elon Musk

Listening: Listening for global comprehension and summarizing what is listened to.

Speaking: Discussing specific topics in pairs or small groups and reporting what is discussed

Reading: Reading a text in detail by making basic inferences-recognizing and

interpreting specific context clues; strategies to use text clues for comprehension.

Writing: Summarizing, Note-making, paraphrasing

Grammar: Verbs - tenses; subject-verb agreement; Compound words, Collocations

Vocabulary: Compound words, Collocations

Unit IV: Inspiration: The Toys of Peace by Saki

Listening: Making predictions while listening to conversations/ transactional dialogueswithout video; listening with video.

Speaking: Role plays for practice of conversational English in academic contexts (formaland informal) - asking for and giving information/directions.

Reading: Studying the use of graphic elements in text stocon vey information, reveal trends /patterns/ relationships, communicate processes or display complicated data.

Writing: Letter Writing: Official Letters, Resumes

Grammar: Reporting verbs, Direct & Indirect speech, Active & Passive Voice

Vocabulary: Words often confused, Jargons

Unit V: Motivation: The Power of Intrapersonal Communication (An Essay)

Listening: Identifying key terms, understanding concepts and answering a series of relevant questions that test comprehension.

Speaking: Formal oral presentations on topics from academic contexts

Reading: Reading comprehension.

Writing: Writing structured essays on specific topics.

Grammar: Editing short texts –identifying and correcting common errors in grammar and usage (articles, prepositions, tenses, subject verb agreement)

Vocabulary: Technical Jargons

Text Books:

1. Pathfinder: Communicative English for Undergraduate Students, 1st Edition, OrientBlack Swan, 2023 (Units 1,2 & 3)
2. Empowering with Language by Cengage Publications, 2023 (Units 4 & 5)

Reference Books:

1. Dubey, Sham Ji & Co. English for Engineers, Vikas Publishers, 2020
2. Bailey, Stephen. Academic writing: A Handbook for International Students. Routledge, 2014.
3. Murphy, Raymond. English Grammar in Use, Fourth Edition, Cambridge UniversityPress.
4. Lewis, Norman. Word Power Made Easy- The Complete Handbook for Building aSuperior Vocabulary. Anchor, 2014.

Web Resources:

Grammar:

1. www.bbc.co.uk/learningenglish
2. https://dictionary.cambridge.org/grammar/british-grammar/
3. www.eslpod.com/index.html
4. https://www.learngrammar.net/
5. https://english4today.com/english-grammar-online-with-quizzes/
6. https://www.talkenglish.com/grammar/grammar.aspx

Vocabulary:

1. https://www.youtube.com/c/DailyVideoVocabulary/videos
2. https://www.youtube.com/channel/UC4cmBAit8i_NJZE8qK8sfpA

B.Tech. – I Year II Semester

Course Code	Category	Name of the Course	L	T	P	C
24ES01101T	**ES**	**Basic Civil and Mechanical Engineering** (Common to All branches of Engineering)	**3**	**0**	**0**	**3**

Part – A: Basic Civil Engineering

Pre-Requisites: Basic Knowledge in Physics & Chemistry

Course Objectives:

1. Get familiarized with the scope and importance of Civil Engineering sub-divisions.
2. Introduce the preliminary concepts of surveying
3. Acquire preliminary knowledge on Transportation and its importance in nation's economy and also learn water resource and water quality.

Course Outcomes (COs):

On successful completion of the course, Student will be able to

CO1: Identify the roles and disciplines within civil engineering and apply basic knowledge of construction materials and building techniques, including prefabricated construction, in practical civil engineering contexts. (L3)

CO2: Analyse the methods of horizontal and angular measurements used in surveying and interpret levelling and bearing data to generate contour maps and elevation profiles. (L4)

CO3: Differentiate types of transportation systems and pavement structures, and examine the basic components of water resources and environmental engineering systems including hydrology and water conveyance structures. (L4)

Unit I: Basics of Civil Engineering: Role of Civil Engineers in Society- Various Disciplines of Civil Engineering- Structural Engineering- Geo-Technical Engineering- Transportation Engineering Hydraulics and Water Resources Engineering - Environmental Engineering - Scope of each discipline - Building Construction and Planning- Construction Materials - Cement – Aggregate Bricks- Cement concrete- Steel. Introduction to Prefabricated Construction Techniques.

Unit II: Surveying: Objectives of Surveying- Horizontal Measurements- Angular Measurements- Introduction to Bearings Levelling instruments used for levelling -Simple problems on levelling and bearings-Contour mapping.

Unit III: Transportation Engineering: Importance of Transportation in Nation's economic development- Types of Highway Pavements- Flexible Pavements and Rigid Pavements - Simple Differences. Basics of Harbour, Tunnel, Airport, and Railway Engineering. **Water Resources and Environmental Engineering:** Introduction, Sources of water- Quality of water- Specifications- Introduction to Hydrology–Rainwater Harvesting-Water Storage and Conveyance Structures (Simple introduction to Dams and Reservoirs).

Text Books:

1. Basic Civil Engineering, M.S.Palanisamy, , Tata Mcgraw Hill publications (India) Pvt. Ltd. Fourth Edition.
2. Introduction to Civil Engineering, S.S. Bhavikatti, New Age International Publishers. 2022. First Edition.
3. Basic Civil Engineering, Satheesh Gopi, Pearson Publications, 2009, First Edition.

Reference Books:

1. Surveying, Vol- I and Vol-II, S.K. Duggal, Tata McGraw Hill Publishers 2019. Fifth Edition.
2. Hydrology and Water Resources Engineering, Santosh Kumar Garg, Khanna Publishers, Delhi. 2016.

3. Highway Engineering, S.K.Khanna, C.E.G. Justo and Veeraraghavan, Nemchand and Brothers Publications 2019. 10th Edition.

Part-B : Basic Mechanical Engineering

Pre-Requisites: Basic Knowledge in Physics & Chemistry

Course Objectives:

1. Get familiarized with the scope and importance of Mechanical Engineering in different sectors and industries.
2. Explain different engineering materials and different manufacturing processes.
3. Provide an overview of different thermal and mechanical transmission systems and introduce basics of robotics and its applications.

Course Outcomes (COs):

On successful completion of the course, Student will be able to

CO1: Identify the role of mechanical engineering across various industrial sectors and apply basic knowledge of engineering materials—including metals, ceramics, composites, and smart materials—in mechanical applications. (L3)

CO2: Differentiate between various manufacturing processes including CNC and smart manufacturing, and analyze the working principles of thermal systems such as engines, refrigeration cycles, and hybrid vehicles. (L4)

CO3: Examine the operating principles of different power plants and mechanical transmission systems, and classify types of robotic configurations based on their structure and applications. (L4)

Unit I: Introduction to Mechanical Engineering: Role of Mechanical Engineering in Industries and Society-Technologies in different sectors such as Energy, Manufacturing, Automotive, Aerospace, and Marine sectors.

Engineering Materials - Metals-Ferrous and Non-ferrous, Ceramics, Composites, Smart materials.

Unit II: Manufacturing Processes: Principles of Casting, Forming, joining processes, Machining, Introduction to CNC machines, 3D printing, and Smart manufacturing.

Thermal Engineering – Working principle of Boilers, Otto cycle, Diesel cycle, Refrigeration and air-conditioning cycles, IC engines, 2-Stroke and 4-Stroke engines, SI/CI Engines, Components of Electric and Hybrid Vehicles.

Unit III: Power Plants – working principle of Steam, Diesel, Hydro, Nuclear power plants.

Mechanical Power Transmission - Belt Drives, Chain, Rope drives, Gear Drives and their applications. **Introduction to Robotics** - Joints & links, configurations, and applications of robotics. (**Note:** The subject covers only the basic principles of Civil and Mechanical Engineering systems. The evaluation shall be intended to test only the fundamentals of the subject)

Text Books:

1. Internal Combustion Engines by V.Ganesan, By Tata McGraw Hill publications (India) Pvt. Ltd.
2. A Tear book of Theory of Machines by S.S. Rattan, Tata McGraw Hill Publications, (India) Pvt. Ltd.
3. An introduction to Mechanical Engg by Jonathan Wicker and Kemper Lewis, Cengage learning India Pvt. Ltd.

Reference Books:

1. Appuu Kuttan KK, Robotics, I.K. International Publishing House Pvt. Ltd. Volume-I
2. 3D printing & Additive Manufacturing Technology- L. Jyothish Kumar, Pulak M Pandey, Springer publications
3. Thermal Engineering by Mahesh M Rathore Tata McGraw Hill publications (India) Pvt. Ltd.
4. G. Shanmugam and M.S.Palanisamy, Basic Civil and the Mechanical Engineering, Tata McGraw Hill publications (India) Pvt. Ltd.

B.Tech. – I Year II Semester

Course Code	Category	Name of the Course	L	T	P	C
24PC01101T	PC	**Engineering Mechanics** (Civil Engineering)	2	1	0	3

Pre-Requisites: Basic Knowledge in Physics & Mathematics

Course Objectives:

1. To get familiarized with different types of force systems
2. To draw accurate free body diagrams representing forces and moments acting on a body to analyze the equilibrium of system of forces.
3. To teach the basic principles of center of gravity, centroid and moment of inertia and determine them for different simple and composite bodies.
4. To apply the Work-Energy method to particle motion
5. To understand the kinematics and kinetics of translational and rotational motion of rigid bodies.

Course Outcomes (COs):

On successful completion of the course, Student will be able to

CO1: Analyse coplanar and spatial force systems using vector methods, and evaluate the effects of moments, couples, and friction on static systems. (L4)

CO2: Examine the equilibrium conditions of planar and spatial force systems using free-body diagrams, vector algebra, and apply principles like Lami's Theorem and virtual work to determine structural stability. (L4)

CO3: Determine centroids, centers of gravity, and moments of inertia (area and mass) for simple and composite bodies using standard theorems and transfer principles. (L4)

CO4: Interpret rectilinear and curvilinear motion using kinematics and kinetics, and analyze dynamic systems with D'Alembert's principle, work-energy, and impulse-momentum methods. (L4)

CO5: Analyse the motion of rigid bodies under translation, rotation, and general plane motion using kinematics, kinetics, energy principles, and momentum concepts. (L4)

Unit I: Introduction to Engineering Mechanics:

Basic Concepts: Scope and Applications Systems of Forces: Coplanar Concurrent Forces–Components in Space–Resultant–Moment of Force and its Application –Couples and Resultant of Force Systems.

Friction: Introduction, limiting friction and impending motion, Coulomb's laws of dry friction, coefficient of friction, Cone of Static friction.

Unit II: Equilibrium of Systems of Forces:

Free Body Diagrams, Lami's Theorem, Equations of Equilibrium of Coplanar Systems, Graphical method for the equilibrium, Triangle law of forces, converse of the law of polygon of forces condition of equilibrium, Equations of Equilibrium for Spatial System of forces, Numerical examples on spatial system of forces using vector approach, Analysis of plane trusses. Principle of virtual work with simple examples

Unit III : Centroid:

Centroids of simple figures (from basic principles)–Centroids of Composite Figures. Centre of Gravity: Centre of gravity of simple body (from basic principles), Centre of gravity of composite bodies, Pappus theorems. Area Moments of Inertia: Definition–Polar Moment to inertia, Transfer Theorem, Moments of Inertia of Composite Figures, Products of Inertia, Transfer Formula for Product

of Inertia. Mass Moment of Inertia: Moment of Inertia of Masses, Transfer Formula for Mass Moments of Inertia, Mass Moment of Inertia of composite bodies.

Unit IV: Rectilinear and Curvilinear motion of a particle:
Kinematics and Kinetics –D'Alembert's Principle - Work Energy method and applications to particle motion-Impulse Momentum method.

Unit V: **Rigid body Motion:**
Kinematics and Kinetics of translation, Rotation about fixed axis and plane motion, Work Energy method and Impulse Momentum method.

Text Books:
1.Engineering Mechanics, S. Timoshenko, D. H. Young, J.V. Rao, S. Pati., , McGraw Hill Education 2017. 5th Edition.
2.Engineering Mechanics, P.C.Dumir- S.Sengupta and Srinivas V .Veeravalli , University press. 2020. First Edition.
3.A Textbook of Engineering Mechanics, S.S Bhavikatti. New age international publications 2018. 4th Edition.

Reference Books:
1. Engineering Mechanics, Statics and Dynamics, Rogers and M A. Nelson., McGraw Hill Education. 2017. First Edition.
2. Engineering Mechanics, Statics and Dynamics, I.H. Shames., PHI, 2002. 4th Edition.
3. Engineering Mechanics, Volume-I: Statics, Volume-II: Dynamics, J. L. Meriam and L. G. Kraige., John Wiley, 2008. 6th Edition.
4. Introduction to Statics and Dynamics, Basudev Battachatia, Oxford University Press, 2014. Second Edition.
5. Engineering Mechanics: Statics and Dynamics, Hibbeler R.C.,Pearson Education, Inc., New Delhi, 2022, 14th Edition.

Reference Website:
1. https://archive.nptel.ac.in/courses/112/106/112106286/
2.https://www.youtube.com/watch?v=2E8IZy8aWhw&list=PL3OVqiyXzMVKMO-dDl0J3bsCJb91xfh6
3. https://www.iitg.ac.in/rkbc/me101/Presentation/L01-03.pdf

B.Tech. – I Year II Semester

Course Code	Category	Name of the Course	L	T	P	C
24BSHB105P	BS	**Engineering Chemistry Lab** (Civil Engineering)	0	0	2	1

Pre-Requisites: Fundamentals of Chemistry

Course Objectives:

1. To provide solid foundation in chemistry laboratory to solve engineering problems.
2. To apply the theoretical principles and perform experiments on hardness of water
3. To apply the theoretical principles and perform experiments dissolved oxygen.
4. To Illustrate the properties of analytical equipments like Red wood, Viscometer and conductometry.

Course Outcomes (COs):

On successful completion of the course, Student will be able to

CO1: Calculate the hardness of water using EDTA method (L2)
CO2: Measure the strength of an acid present in secondary batteries. (L2)
CO3: Determine the cell constant and conductance of solutions. (L2)
CO4: Determine the physical properties like surface tension, adsorption and viscosity. (L2)
CO5: Examine the Iron and Calcium in cement (L4)

List of Chemistry Experiments

1. Determination of Hardness of a groundwater sample
2. Preparation of a Bakelite.
3. Determination of Viscosity of lubricating oil by Redwood Viscometer 1
4. Determination of Viscosity of lubricating oil by Redwood Viscometer 2
5. Determination of Strength of an acid in Pb-Acid battery
6. Determination of dissolved oxygen by Winkler's method
7. Determination of percentage of Iron in Cement sample by Colorimetry
8. Estimation of Calcium in Portland cement
9. Precipitation of Nanomaterials by precipitation method
10. Adsorption of acetic acid by charcoal
11. Determination of percentage moisture content in a coal sample
12. Determination of Calorific value of gases by Junker's gas Calorimeter

Note: Minimum Ten experiments are to be performed.

Reference Books:

1. Vogel's Text book of Quantitative Chemical Analysis, Sixth Edition – Mendham J et al, Pearson Education, 2012.
2. Chemistry Practical– Lab Manual, First edition, Chandra Sekhar KB, Subba Reddy GV and Jayaveera KN, SM Enterprises, Hyderabad, 2014.
3. Chemistry Laboratory Manual, Sri Krishna Hitech Publishing Company Pvt.Ltd,2nd Edition, A Ravi Krishanan, B Tirumala Rao, 2020-2021.

B.Tech. – I Year II Semester

Course Code	Category	Name of the Course	L	T	P	C
24HMHS101P	**HS**	**Communicative English Lab** (Common to all branches of Engineering)	**0**	**0**	**2**	**1**

Pre-Requisites: Basics of LSRW skills

Course Objectives:

The main objective of introducing this course Communicative English Laboratory is to expose the students to a variety of self-instructional, learner friendly modes of language learning. The students will get trained in basic communication skills and also make them ready to face job interviews.

Course Outcomes (COs):

On successful completion of the course, Student will be able to

CO1 : Understand the different aspects of the English language proficiency with emphasison LSRW skills.(L2)

CO2 : Apply communication skills through various language learning activities(L3)

CO3 : Analyze the English speech sounds, stress, rhythm, intonation and syllable division forbetter listening and speaking comprehension.(L4)

CO4 : Evaluate and exhibit professionalism in participating in debates and group discussions.(L5)

CO5 : Create effective Course Objectives. (L6)

List of Topics:

1. Vowels & Consonants
2. Neutralization/Accent Rules
3. Communication Skills & JAM
4. Role Play or Conversational Practice
5. Group Discussions-methods & practice
6. Debates - Methods & Practice
7. PPT Presentations/ Poster Presentation
8. Interview Skills
9. E-mail Writing
10. Resume Writing, Cover letter, SOP

Suggested Software:

- Walden Infotech
- Young India Films

Reference Books:

1. Raman Meenakshi, Sangeeta- Sharma. *Technical Communication*. Oxford Press.2018.
2. TaylorGrant:*EnglishConversationPractice*,TataMcGraw-HillEducationIndia,2016
3. Hewing's, Martin. Cambridge *Academic English*(B2).CUP,2012.
4. J. Sethi & P.V. Dhamija. *A Course in Phonetics and Spoken English*, (2nd Ed),Kindle,2013
5. T. Balasubramanyam, A Textbook of English Phonetics for Indian Students, (3rd Ed) Trinity Press.

B.Tech. – I Year II Semester

Course Code	Category	Name of the Course	L	T	P	C
24ES03102P	ES	**Engineering Workshop** (Common to all branches of Engineering)	0	0	3	1.5

Pre-Requisites: Nil

Course Objectives:

- To familiarize students with wood working, sheet metal operations, fitting and electrical house wiring skills

Course Outcomes (COs):

On successful completion of the course, Student will be able to

CO1: Identify workshop tools and their operational capabilities. (L3)
CO2: Practice on manufacturing of components using workshop trades including fitting, carpentry, foundry and welding. (L3)
CO3: Apply fitting operations in various applications. (L3)
CO4: Apply basic electrical engineering knowledge for House Wiring Practice (L3)

1. **Demonstration**: Safety practices and precautions to be observed in workshop.
2. **Wood Working:** Familiarity with different types of woods and tools used in wood working and make following joints.
   a) Half – Lap joint b) Mortise and Tenon joint c) Corner Dovetail joint or Bridle joint
3. **Sheet Metal Working**: Familiarity with different types of tools used in sheet metal working, Developments of following sheet metal job from GI sheets.
   a) Tapered tray b) Conical funnel c) Elbow pipe d) Brazing
4. **Fitting:** Familiarity with different types of tools used in fitting and do the following fitting exercises.
   a) V-fit b) Dovetail fit c) Semi-circular fit d) Bicycle tire puncture and change of two-wheeler tyre
5. **Electrical Wiring**: Familiarity with different types of basic electrical circuits and make the following connections.
   a) Parallel and series b) Two-way switch c) Godown lighting
   d) Tube light e) Three phase motor f) Soldering of wires
6. **Foundry Trade:** Demonstration and practice on Moulding tools and processes, Preparation of Green Sand Moulds for given Patterns.
7. **Welding Shop**: Demonstration and practice on Arc Welding and Gas welding. Preparation of Lap joint and Butt joint.
8. **Plumbing:** Demonstration and practice of Plumbing tools, Preparation of Pipe joints with coupling for same diameter and with reducer for different diameters.

Text Books:

1. Basic Workshop Technology: Manufacturing Process, Felix W.; Independently Published,2019.
2. Workshop Processes, Practices and Materials; Bruce J. Black, Routledge publishers, 5th Edn. 2015.
3. A Course in Workshop Technology Vol I. & II, B.S. Raghuwanshi, Dhanpath Rai & Co., 2015 & 2017.

Reference Books:

1. Elements of Workshop Technology, Vol. I by S. K. Hajra Choudhury & Others, Media Promoters and Publishers, Mumbai. 2007, 14th edition
2. Workshop Practice by H. S. Bawa, Tata-McGraw Hill, 2004.
3. Wiring Estimating, Costing and Contracting; Soni P.M. & Upadhyay P.A.; Atul Prakashan, 2021-22.

B.Tech. – I Year II Semester

Course Code	Category	Name of the Course	L	T	P	C
24PC01101P	**PC**	**Engineering Mechanics & Building Practices Lab** (Civil Engineering)	**0**	**0**	**3**	**1.5**

Pre-Requisites: Basic Knowledge in Physics & Mathematics

Course Objectives:

1. Verify the Law of Parallelogram of Forces and Lami's theorem.
2. Determine the coefficients of friction of Static and Rolling friction and Centre of gravity of different plane Lamina.
3. Understand the layout of a building, concepts of Non-Destructive Testing and different Alternative Materials.

Course Outcomes (COs):

On successful completion of the course, Student will be able to

CO1: Determine the coefficient of friction between two different surfaces and between the inclined plane and the roller. (L2)

CO2: Verify Law of Parallelogram of forces and Law of Moment using force polygon and bell crank lever. (L3)

CO3: Determine the Centre of gravity different configurations. (L2)

CO4: Conduct experiments on Understand the Quality Testing and Assessment Procedures and principles of Non-destructive Testing. (L2)

CO5: Demonstrate safety practices in the construction industry. (L2)

Students have to perform any 10 of the following Experiments:

1. To study various types of tools used in construction.
2. Forces in Pin Jointed Trusses
3. Experimental Proof of Lami's Theorem
4. Verification of Law of Parallelogram of Forces.
5. Determination of Center of Gravity of different shaped Plane Lamina.
6. Determination of coefficient of Static and Rolling Friction.
7. Verification of Law of Moment using Rotation Disc Apparatus and Bell Crank Lever
8. Study of Alternative Materials like M-sand, Fly ash, Sea Sand etc.
9. Field-Visit to understand the Quality Testing - report.
10. Safety Practices in Construction industry
11. Demonstration of Non-Destructive Testing - using Rebound Hammer & UPV
12. Study of Plumbing in buildings

Text Book:

1. Engineering Mechanics lab manual (2022), B. B. Gokaldas and Vandana Somkuwar, All India Council for Technical Education (AICTE).

B.Tech. – I Year II Semester

Course Code	Category	Name of the Course	L	T	P	C
24HMHS102L	HM	Health and Wellness, Yoga and Sports (Common to all branches of Engineering)	0	0	1	0.5

Pre-Requisites: Nil

Course Objectives:

1. To maintain their mental and physical wellness upright and develop ability in them to cope up with the stress arising in the life.
2. To create space in the curriculum to nurture the potential of the students in sports/games/yoga etc.
3. To introduce a practice oriented introductory course on the subject.

Course Outcomes (COs):

On successful completion of the course, the students will be able to

CO1: Be Physical fit to perform daily routine without undue fatigue.(L2)
CO2: Be Mentally alert and Socially Cohesive. (L2)
CO3: Consider success and failure equally.
CO4: Develop Positive Personality. (L3)
CO5: Improve Leadership qualities. (L3)

Unit I: **Health and Fitness:**

Concept of health and fitness, Nutrition and Balanced diet, basic concept of immunity Relationship between diet and fitness, Globalization and its impact on health, Body Mass Index (BMI) of all age groups.

Activities:

i) Organizing health awareness programmes in community
ii) Preparation of health profile
iii) Preparation of chart for balance diet for all age groups

Unit II: Yoga:

Concept of yoga, need for and importance of yoga, origin and history of yoga in Indian context, classification of yoga, Physiological effects of Asanas- Pranayama and meditation, stress management and yoga, Mental health and yoga practice.

Activities: Yoga practices – Asana, Kriya, Mudra, Bandha, Dhyana, Surya Namaskar

Unit III: Sports and Fitness:

Concept of Sports and fitness, importance, fitness components, history of sports, Ancient and Modern Olympics, Asian games and Commonwealth games.

Activities:

i) Participation in one major game and one individual sport viz., Athletics, Volleyball, Basketball, Handball, Football, Badminton, Kabaddi, Kho-kho, Table tennis, Cricket etc. Practicing general and specific warm up, aerobics
ii) Practicing cardiorespiratory fitness, treadmill, run test, 9 min walk, skipping and running.

General Guidelines:

1. Institutes must assign slots in the Timetable for the activities of Health/Sports/Yoga.
2. Institutes must provide field/facility and offer the minimum of five choices of as many as Games/Sports.
3. Institutes are required to provide sports instructor / yoga teacher to mentor the students.

B.Tech. – II Year I Semester

Course Code	Category	Name of the Course	L	T	P	C
24BSHB206T	BS	Numerical and Statistical Methods	2	1	0	3

Pre-requisite: Basic algebraic Equations and Statistics.

Course Objectives:

To equip the students with standard concepts and tools at an intermediate to advanced level mathematics to develop the confidence and ability among the students to handle various real-world problems and their applications

Course Outcomes (COs):

On successful completion of the course, the students will be able to

COl: Analyze various numerical methods and iterative techniques to solve algebraic and transcendental equations, and evaluate their applicability in civil engineering problems such as structural analysis and flow computations. (L4)

CO2: Analyze interpolation techniques and Lagrange's interpolation, along with least squares methods for curve fitting, to interpret and model engineering data relevant to Civil Engineering, including material behavior, structural responses, and environmental trends. (L4)

CO3: Compare and apply numerical methods to solve ordinary differential equations arising in civil engineering problems, including structural dynamics, fluid flow, and geotechnical analysis.(L4)

CO4: Distinguish and apply statistical estimation and hypothesis testing concepts to interpret and validate civil engineering data, including material testing results, quality control, and survey analysis. (L4)

CO5: Select and apply appropriate statistical tests such as t-tests, F-test, and Chi-square tests to evaluate civil engineering data related to material strength comparison, process variability, and association between categorical variables in quality control and experimental studies. (L4)

UNIT I: Solution of Algebraic & Transcendental Equations:

Introduction-Bisection Method-Iterative method, Regula-falsi method and Newton Raphson method System of Algebraic equations: Jacoby and Gauss Siedal method.

UNIT II: Interpolation:

Finite differences-Newton's forward and backward interpolation formulae – Lagrange's formulae. Curve fitting: Fitting of straight line, second-degree and Exponential curve by method of least squares.

UNIT III: Solution of Initial value problems to Ordinary differential equations:

Numerical solution of Ordinary Differential equations: Solution by Taylor's series-Picard's Method of successive Approximations-Euler's and modified Euler's methods-Runge-Kutta methods (second and fourth order).

UNIT IV: Estimation and Testing of hypothesis, large sample tests:

Estimation-parameters, statistics, sampling distribution, point estimation, Formulation of null hypothesis, alternative hypothesis, the critical and acceptance regions, level of significance, two types of errors and power of the test. Large Sample Tests: Test for single proportion, difference of

proportions, test for single mean and difference of means. Confidence interval for parameters in one sample and two sample problems

UNIT V: Small sample tests:

Student t-distribution (test for single mean, two means and paired t-test), testing of equality of variances (F-test), $\chi 2$ - test for goodness of fit, $\chi 2$ - test for independence of attributes.

Textbooks:

1. S S Sastry, Introductory Methods of Numerical Analysis, PHI Learning Private Limited.
2. B. S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 2017, 44th Edition
3. Miller and Freunds, Probability and Statistics for Engineers,7/e, Pearson, 2008.India.

Reference Books:

1. Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons, 2018, 10th Edition.
2. R.K.Jain and S.R.K.Iyengar, Advanced Engineering Mathematics, Alpha Science International Ltd.,2021 5th Edition (9th reprint).
3. Ronald E. Walpole, Probability and Statistics for Engineers and Scientists, PNIE 4. H. K Das, Er. Rajnish Verma, Higher Engineering Mathematics, S. Chand Publications,2014, Third Edition (Reprint 2021)

Online Learning Resources:

1. https://onlinecourses.nptel.ac.in/noc17_ma14/preview
2. https://onlinecourses.nptel.ac.in/noc24_ma05/preview
3. http://nptel.ac.in/courses/111105090

B.Tech. – II Year I Semester

Course Code	Category	Name of the Course	L	T	P	C
24HMHS204L	**HM**	**Universal Human Values– Understanding Harmony and Ethical Human Conduct** (Common to all Engineering branches)	**2**	**1**	**0**	**3**

Pre-Requisites: A basic understanding of human relationships, communication skills, and a willingness for self-reflection and ethical thinking are the prerequisites for this course.

Course Objectives:

To help the students appreciate the essential complementary between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity which are the core aspirations of all human beings.

To facilitate the development of a Holistic perspective among students towards life and profession as well as towards happiness and prosperity based on a correct understanding of the Human reality and the rest of existence. Such holistic perspective forms the basis of Universal Human Values and movement towards value-based living in a natural way.

To highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually fulfilling human behaviour and mutually enriching interaction with Nature.

Course Outcomes (COs):

On successful completion of the course, Student will be able to

CO1: Analyze the interrelationship between right understanding, human relationships, and physical facilities to identify how these contribute to holistic development and fulfilment of basic human aspirations. (L4)

CO2: Analyze the co-existence of the self and the body to distinguish their respective needs and evaluate the conditions necessary to ensure harmony, self-regulation, and health in the human being. (L4)

CO3: Differentiate core human values such as trust and respect, and examine their role in fostering harmonious relationships within the family and society, leading toward a universal human order. (L4)

CO4: Differentiate the four orders of nature and examine their interconnectedness to understand existence as co-existence, leading to a holistic perception of harmony in nature and the universe. (L4)

CO5: Examine how human values shape professional ethics and conduct, supporting competence and transition toward a value-based universal human order. (L4)

UNIT I: Introduction to Value Education (6 lectures and 3 tutorials for practice session):

Lecture 1: Right Understanding, Relationship and Physical Facility (Holistic Development and the Role of Education)

Lecture 2: Understanding Value Education

Tutorial 1: Practice Session PS1 Sharing about Oneself

Lecture 3: self-exploration as the Process for Value Education

Lecture4: Continuous Happiness and Prosperity – the Basic Human Aspirations

Tutorial 2: Practice Session PS2 Exploring Human Consciousness

Lecture 5: Happiness and Prosperity – Current Scenario

Lecture 6: Method to Fulfill the Basic Human Aspirations

Tutorial 3: Practice Session PS3 Exploring Natural Acceptance

UNIT II: Harmony in the Human Being (6 lectures and 3 tutorials for practice session):

Lecture 7: Understanding Human being as the Co-existence of the self and the body.
Lecture 8: Distinguishing between the Needs of the self and the body
Tutorial 4: Practice Session PS4 Exploring the difference of Needs of self and body.
Lecture 9: The body as an Instrument of the self
Lecture 10: Understanding Harmony in the self
Tutorial 5: Practice Session PS5 Exploring Sources of Imagination in the self
Lecture 11: Harmony of the self with the body
Lecture 12: Programme to ensure self-regulation and Health
Tutorial 6: Practice Session PS6 Exploring Harmony of self with the body

UNIT III: Harmony in the Family and Society (6 lectures and 3 tutorials for practice session):
Lecture 13: Harmony in the Family – the Basic Unit of Human Interaction
Lecture 14: 'Trust' – the Foundational Value in Relationship
Tutorial 7: Practice Session PS7 Exploring the Feeling of Trust
Lecture 15: 'Respect' – as the Right Evaluation
Tutorial 8: Practice Session PS8 Exploring the Feeling of Respect
Lecture 16: Other Feelings, Justice in Human-to-Human Relationship
Lecture 17: Understanding Harmony in the Society
Lecture 18: Vision for the Universal Human Order
Tutorial 9: Practice Session PS9 Exploring Systems to fulfil Human Goal

UNIT IV: Harmony in the Nature/Existence (4 lectures and 2 tutorials for practice session):
Lecture 19: Understanding Harmony in the Nature
Lecture 20: Interconnectedness, self-regulation and Mutual Fulfilment among the Four Orders of Nature Tutorial 10: Practice Session PS10 Exploring the Four Orders of Nature
Lecture 21: Realizing Existence as Co-existence at All Levels
Lecture 22: The Holistic Perception of Harmony in Existence
Tutorial 11: Practice Session PS11 Exploring Co-existence in Existence

UNIT V: Implications of the Holistic Understanding – a Look at Professional Ethics (6 lectures and 3 tutorials for practice session):
Lecture 23: Natural Acceptance of Human Values
Lecture 24: Definitiveness of (Ethical) Human Conduct
Tutorial 12: Practice Session PS12 Exploring Ethical Human Conduct
Lecture 25: A Basis for Humanistic Education, Humanistic Constitution and Universal Human Order
Lecture 26: Competence in Professional Ethics
Tutorial 13: Practice Session PS13 Exploring Humanistic Models in Education
Lecture 27: Holistic Technologies, Production Systems and Management Models-Typical Case Studies Lecture 28: Strategies for Transition towards Value-based Life and Profession
Tutorial 14: Practice Session PS14 Exploring Steps of Transition towards Universal Human Order
Practice Sessions for UNIT I – Introduction to Value Education
PS1 Sharing about Oneself PS2 Exploring Human Consciousness
PS3 Exploring Natural Acceptance
Practice Sessions for UNIT II – Harmony in the Human Being
PS4 Exploring the difference of Needs of self and body
PS5 Exploring Sources of Imagination in the self
PS6 Exploring Harmony of self with the body

Practice Sessions for UNIT III – Harmony in the Family and Society
PS7 Exploring the Feeling of Trust
PS8 Exploring the Feeling of Respect
PS9 Exploring Systems to fulfil Human Goal
Practice Sessions for UNIT IV – Harmony in the Nature (Existence)
PS10 Exploring the Four Orders of Nature
PS11 Exploring Co-existence in Existence
Practice Sessions for UNIT V – Implications of the Holistic Understanding – a Look at Professional Ethics
PS12 Exploring Ethical Human Conduct PS13 Exploring Humanistic Models in Education
PS14 Exploring Steps of Transition towards Universal Human Order

Readings:
Textbook and Teachers Manual
a. The Textbook R R Gaur, R Asthana, G P Bagaria, A Foundation Course in Human Values and Professional Ethics, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-47-1

b. The Teacher's Manual

R R Gaur, R Asthana, G P Bagaria,Teachers' Manual for A Foundation Course in Human Values and Professional Ethics, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-53-2

Reference Books:

1. JeevanVidya: EkParichaya, A Nagaraj, JeevanVidyaPrakashan, Amarkantak, 1999.

2. Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.

3. The Story of Stuff (Book).

4. The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi

5. Small is Beautiful - E. F Schumacher.

6. Slow is Beautiful - Cecile Andrews

7. Economy of Permanence - J C Kumarappa

8. Bharat Mein Angreji Raj – PanditSunderlal

9. Rediscovering India - by Dharampal

10. Hind Swaraj or Indian Home Rule - by Mohandas K. Gandhi

11. India Wins Freedom - Maulana Abdul Kalam Azad

12. Vivekananda - Romain Rolland (English)

13. Gandhi - Romain Rolland (English)

Mode of Conduct:
Lecture hours are to be used for interactive discussion, placing the proposals about the topics at hand and motivating students to reflect, explore and verify them.
Tutorial hours are to be used for practice sessions.

While analysing and discussing the topic, the faculty mentor's role is in pointing to essential elements to help in sorting them out from the surface elements. In other words, help the students explore the important or critical elements.

In the discussions, particularly during practice sessions (tutorials), the mentor encourages the student to connect with one's own self and do self-observation, self-reflection and self-exploration.

Scenarios may be used to initiate discussion. The student is encouraged to take up"ordinary" situations rather than" extra-ordinary" situations. Such observations and their analyses are shared and discussed with other students and faculty mentor, in a group sitting.

Tutorials (experiments or practical) are important for the course. The difference is that the laboratory is everyday life, and practical are how you behave and work in real life. Depending on the nature of topics, worksheets, home assignment and/or activity are included.

The practice sessions (tutorials) would also provide support to a student in performing actions commensurate to his/her beliefs. It is intended that this would lead to development of commitment, namely behaving and working based on basic human values.

It is recommended that this content be placed before the student as it is, in the form of a basic foundation course, without including anything else or excluding any part of this content.

Additional content may be offered in separate, higher courses. This course is to be taught by faculty from every teaching department, not exclusively by anyone department.

Teacher preparation with a minimum exposure to at least one 8-day Faculty Development Program on Universal Human Values is deemed essential.

Online Resources

1. *https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%201-Introduction%20to%20Value%20Education.pdf*
2. *https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%202-Harmony%20in%20the%20Human%20Being.pdf*
3. *https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%203-Harmony%20in%20the%20Family.pdf*
4. *https://fdp-si.aicte-india.org/UHV%201%20Teaching%20Material/D3-S2%20Respect%20July%2023.pdf*
5. *https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%205-Harmony%20in%20the%20Nature%20and%20Existence.pdf*
6. *https://fdp-si.aicte-india.org/download/FDP Teaching Material/3-days%20FDP-SI%20UHV%20Teaching%20Material/Day%203%20Handouts/UHV%203D%20D3-S2A%20Und%20Nature-Existence.pdf*
7. *https://fdp-si.aicte-india.org/UHV%20II%20Teaching%20Material/UHV%20II%20Lecture%2023-25%20Ethics%20v1.pdf*
8. *https://www.studocu.com/in/document/kiet-group-of-institutions/universal-human-values/chapter-5-holistic-understanding-of-harmony-on-professional-ethics/62490385*
https://onlinecourses.swayam2.ac.in/aic22_ge23/preview

B.Tech. – II Year I Semester

Course Code	Category	Name of the Course	L	T	P	C
24PC01202T	PC	Surveying	2	1	0	3

Pre-Requisites: Basics of Engineering Physics and Engineering Mathematics

Course Objectives:

This course introduces the principles and methods of surveying, covering both conventional and modern techniques. It develops skills in measuring, mapping, and data interpretation for engineering applications. Students learn to use instruments and apply surveying data in practical scenarios.

Course Outcomes (COs):

On successful completion of the course, Student will be able to

CO1: Apply surveying principles and methods using appropriate instruments to measure distances and analyse bearings, angles, and corrections. (L3)

CO2: Analyse levelling and contouring data to determine elevations, landform characteristics, and compute areas and volumes for earthwork and reservoir design. (L4)

CO3: Interpret theodolite and traversing data to measure angles, perform trigonometrical levelling, and compute and adjust traverse measurements including omitted data. (L4)

CO4: Differentiate types of curves and apply modern surveying techniques such as EDM, Total Station, GPS, Drone, and LiDAR for effective spatial data collection and field applications. (L4)

CO5: Analyse aerial photographs and photogrammetric methods to evaluate perspective geometry, perform aerial triangulation, and produce accurate photographic maps using stereo-plotting and related techniques. (L4)

UNIT I:

Introduction and Basic Concepts: Introduction, Objectives, classification and principles of surveying, surveying accessories. Introduction to Compass, levelling and Plane table surveying.

Linear distances- Approximate methods, Direct Methods- Chains- Tapes, ranging, Tape corrections.

Prismatic Compass- Bearings, included angles, Local Attraction, Magnetic Declination, and dip – systems and W.C.B and Q.B systems of locating bearings.

UNIT II:

Levelling-Types of levels, methods of levelling, and Determination of levels, Effect of Curvature of Earth and Refraction.

Contouring- Characteristics and uses of Contours, methods of contour surveying.

Areas - Determination of areas consisting of irregular boundary and regular boundary.

Volumes- Determination of volume of earth work in cutting and embankments for level section, capacity of reservoirs.

UNIT III

Theodolite Surveying: Types of Theodolites, temporary adjustments, measurement of horizontal angle by repetition method and reiteration method, measurement of vertical Angle, Trigonometrical levelling when base is accessible and inaccessible.

Traversing: Methods of traversing, traverse computations and adjustments, Introduction to Omitted measurements.

UNIT IV

Curves: Types of curves and their necessity, elements of simple, compound, reverse curves. Introduction to Tacheometric Surveying.

Modern Surveying Methods: Principle and types of E.D.M. Instruments, Total station-advantages and Applications. Introduction to Global Positioning System. Introduction to Drone survey and LDAR Survey (Light Detection and Ranging).

UNIT-V

Photogrammetry Surveying:

Introduction, Basic concepts, perspective geometry of aerial photograph, relief and tilt displacements, terrestrial photogrammetry, flight planning; Stereoscopy, ground control extension for photographic mapping- aerial triangulation, radial triangulation, methods; photographic mapping- mapping using paper prints, mapping using stereo-plotting instruments, mosaics, map substitutes.

Textbooks:

1. Surveying (Vol– 1& 2) by Duggal SK, Tata Mc Graw Hill Publishing Co. Ltd. New Delhi, 5th edition, 2019.
2. Text book of Surveying by C Venkatramaiah, Universities Press1st Edition,2011.

Reference Books:

1. Surveying (Vol–1), by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain- Laxmi Publications(P) ltd., New Delhi, 18thedition 2024.
2. Surveying (Vol–2), by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain- Laxmi Publications(P) ltd., New Delhi 17th 2022.
3. Surveying (Vol–3), by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain- Laxmi Publications(P) ltd., New Delhi 16th 2023.
4. Plane Surveying and Higher Surveying by Chandra AM, New age International Pvt. Ltd., Publishers, New Delhi,3rdEdition,2015.
5. Surveying and Levelling by N. Basak Tata Mc Graw Hill Publishing Co. Ltd . New Delhi, 4 th edition, 2014.
6. Surveying (Vol 1, 2 & 3), by Arora K R, Standard Book House, Delhi. Edition: 12th, 2015.

B. Tech. – II Year I Semester

Course Code	Category	Name of the Course	L	T	P	C
24PC01203T	PC	Strength of Materials	2	1	0	3

Pre-Requisites: Fundamentals of Engineering Mechanics

Course Objectives:

This course introduces the fundamental concepts of Strength of Materials, including stress, strain, and the principles of elasticity and plasticity. It covers the analysis of shear force and bending moment in beams under various loading conditions. Students will learn to evaluate bending stresses, apply bending equations, and calculate section modulus for different cross-sectional shapes. The course also explores beam deflections and stress analysis in cylinders and columns subjected to external pressure.

Course Outcomes (COs):

On successful completion of the course, Student will be able to

- **CO1:** Analyse the basic materials behaviour under the influence of different external loading conditions and the support conditions. (L3)
- **CO2:** Evaluate shear force and bending moment in different types of beams under various loads, and construct S.F. and B.M. diagrams to identify points of contra flexure and load effects. (L4)
- **CO3:** Determine bending and shear stresses in various beam sections using bending and shear stress theories, and apply torsion theory to circular shafts for design. (L4)
- **CO4:** Determine the slope and deflection of beams using double integration, Macaulay's method, and moment area method for various loading conditions and support types. (L4)
- **CO5:** Compare the behaviour of short and long columns under axial and eccentric loading using classical and empirical formulas, and determine stress distribution in thin and thick cylindrical shells using appropriate theories. (L4)

UNIT I: Simple Stresses and Strains:

Elasticity and plasticity — Types of stresses and strains — Hooke's law — Factor of safety, Poisson's ratio - Relationship between Elastic constants — Bars of varying section — stresses in composite bars.

UNIT II: Shear Force and Bending Moment:

Definition of beam — Types of beams — Concept of shear force and bending moment — Point of contra flexure — Relation between S.F., B.M and rate of loading at a section of a beam; S.F and B.M diagrams for cantilever, simply supported and overhanging beams subjected to point loads, uniformly distributed loads, uniformly varying loads, partial uniformly distributed loads, couple and combination of these loads.

UNIT III : Flexural and Shear Stresses:

Flexural Stresses: Theory of simple bending — Assumptions — Derivation of bending equation, Neutral axis — Determination of bending stresses — section modulus of rectangular and circular sections (Solid and Hollow), I, T, Angle and Channel sections — Design of simple beams. Shear Stresses: Derivation of formula — Shear stress distribution across various beam sections like rectangular, circular, I, T Angle sections. Torsion – circular shafts only.

UNIT IV: Deflection of Beams:

Double integration and Macaulay's methods — Determination of slope and deflection for cantilever, simply supported and overhanging beams subjected to point loads, uniformly distributed loads, uniformly varying loads, partial uniformly distributed loads, couple and combination of these loads. Mohr's theorems — Moment area method — application to simple cases of cantilever.

UNIT V: **Column and thin and thick cylinder:**

Column -Introduction – Classification of columns – Axially loaded compression members – Euler's crippling load theory – Derivation of Euler's critical load formulae for various end conditions – Equivalent length – Slenderness ratio – Euler's critical stress – Limitations of Euler's theory – Rankine – Gordon formula – Eccentric loading and Secant formula – Prof. Perry's formula.

Thin and Thick cylindrical shells — Derivation of formula for longitudinal and circumferential stresses — hoop, longitudinal and volumetric strains — changes in diameter, and volume of thin cylinders. Lames theory for thick cylinders, Derivation of Lames formulae, distribution of hoop and radial stresses across the thickness, compound cylinders distribution of stresses

Textbooks:

1. Strength of Materials by R. K. Bansal, Lakshmi Publications, 16th Edition, 2022.
2. Strength of Materials by B. S. Basavarajaiah and P. Mahadevapura, Universities Press 3rd Edition, 2010.
3. Strength of Materials by J.K. Gupta and S.K. Gupta, Cengage publications 2nd edition ,2024.

Reference Books:

1. Advanced Mechanics of Solids, L.S Srinath, McGraw Hill Education, 2017, 3rd Edition
2. Strength of Materials - Fundamentals and Applications, T.D.Gunneswara Rao and Mudimby Andal, Cambridge University Press, 2018, 1st Edition
3. Mechanics of Materials, Beer and Johnston, McGraw Hill India Pvt. Ltd., 2020, 8th Edition (SI Units).
4. A Textbook of Strength of Materials, by R. K. Rajput, 7e (Mechanics of Solids) SI Units S. Chand & Co, New Delhi 7th edition 2022.
5. Strength of Materials by S.S.Ratan Tata McGrill Publications 3rd Edition , 2016.

B. Tech. – II Year I Semester

Course Code	Category	Name of the Course	L	T	P	C
24PC01204T	PC	Fluid Mechanics	2	1	0	3

Pre Requisites: Basics of Engineering Mechanics and Engineering Physics.

Course Objectives: The objective of this course is to provide a solid foundation in fluid mechanics, focusing on the properties, statics, and kinematics of fluids. It aims to develop analytical skills for solving problems related to fluid flow, pressure measurement, and pipe system analysis using key principles such as Bernoulli's equation and continuity equations. The course also emphasizes practical applications in energy losses, pipe networks, and fluid stability.

Course Outcomes (COs):

On successful completion of the course, Student will be able to

CO1: Differentiate between fluids and solids and apply fundamental fluid properties such as viscosity, surface tension, compressibility, and vapor pressure to describe fluid behaviour. (L4)

CO2: Examine fluid pressure measurement techniques and assess hydrostatic forces and buoyancy effects to determine the stability of submerged and floating bodies. (L4)

CO3: Differentiate types of fluid flow and apply continuity equations in Cartesian coordinates to examine fluid motion in one, two, and three dimensions. (L4)

CO4: Analyse fluid motion using Bernoulli's and momentum equations to solve practical problems in flow measurement and vortex flow. (L4)

CO5: Analyse energy losses in pipe flow and apply pipeline analysis methods for systems with pipes in series and parallel. (L4)

UNIT I: Basic concepts and definitions:

Distinction between a fluid and a solid; Density, Specific weight, Specific gravity, Kinematic and dynamic viscosity; Variation of viscosity with temperature, Newton law of viscosity; Vapor pressure, Boiling point, Surface tension, Capillarity, Bulk modulus of elasticity, Compressibility

UNIT II: Fluid statics:

Fluid Pressure: Pressure at a point, Pascal 's law, pressure variation with temperature, density and altitude. Piezometer, U-Tube Manometer, Single Column Manometer, U Tube Differential Manometer. Pressure gauges, Hydrostatic pressure and force: horizontal, vertical and inclined surfaces. Buoyancy and stability of floating bodies

UNIT III: Fluid kinematics:

Classification of fluid flow: steady and unsteady flow; uniform and non-uniform flow; laminar and turbulent flow; rotational and irrotational flow; compressible and incompressible flow; ideal and real fluid flow; one-, two- and three-dimensional flows; Stream line, path line, streak line and stream tube; stream function, velocity potential function. One, two and three- Dimensional continuity equations in Cartesian coordinates.

UNIT IV: Fluid Dynamics:

Surface and body forces; Equations of motion- Euler 's equation; Bernoulli 's equation– Derivation; Energy Principle; Practical applications of Bernoulli 's equation: Venturi meter, orifice meter and Pitot tube; Momentum principle; Forces exerted by fluid flow on pipe bend; Vortex Flow– Free and

Forced; Definitions of Reynolds Number, Froude Number, Mach Number, Weber Number and Euler Number.

UNIT V: **Analysis of Pipe Flow:**
Energy losses in pipelines; Darcy– Weisbach equation; Minor losses in pipelines; Hydraulic Grade Line and Total Energy Line; Concept of equivalent length Pipes in Parallel and Series**.**

Text Books:

1. P. M. Modi and S. M. Seth, Hydraulics and Fluid Mechanics, Standard Book House22nd,2019.
2. K. Subrahmanyam, Theory and Applications of Fluid Mechanics, Tata McGraw Hill, 2nd edition 2018

Reference Books:

1. R.K. Bansal, A text of Fluid mechanics and hydraulic machines, Laxmi Publications (P)Ltd., NewDelhi11thedition, 2024.
2. N. Narayana Pillai, Principles of Fluid Mechanics and Fluid Machines, Universities Press Pvt Ltd, Hyderabad. 3rd Edition 2009.
3. Fluid Mechanics by Frank M. White, Henry Xue, Tata Mc Graw Hill,9th edition, 2022.
4. C.S.P. Ojha, R. Berndtsson and P.N. Chadramouli, Fluid Mechanics and Machinery, Oxford University Press, 2010.
5. Introduction to Fluid Mechanics & Fluid Machines by S K Som, Gautam Biswas, S Chakraborty Tata McGraw Hill, 3rd edition 2011

B. Tech. – II Year I Semester

Course Code	Category	Name of the Course	L	T	P	C
24PC01202P	PC	Surveying Lab	0	0	3	1.5

Pre Requisites: Basic Knowledge on Surveying

Course Objectives:

To impart practical knowledge and skills in surveying techniques including chain surveying for road widening, compass and plane table methods, fly levelling using height of instrument and rise & fall methods, and advanced theodolite operations for angle, height, and distance measurements. The course also introduces the use of modern equipment like total stations for determining area, perimeter, inaccessible distances, and setting out curves, with an emphasis on accurate data collection and interpretation.

Course Outcomes (COs):

On successful completion of the course, Student will be able to

CO1: Analyze the appropriate use of various linear and angular measuring instruments for different types of surveying tasks. (L4)

CO2: Examine linear and angular measurement data to identify potential sources of error and ensure measurement accuracy. (L4)

CO3: Interpret field data to compute area and volume for a variety of land surveying applications. (L4)

CO4: Analyze the functionality and application of modern surveying instruments such as total stations in complex field conditions. (L4)

CO5: Evaluate survey data and prepare accurate and comprehensive field notes for documentation and further analysis. (L4)

List of Experiments:

1. Chain survey of road profile with offsets in case of road widening.
2. Determination of distance between two inaccessible points by using compass.
3. Plane table survey finding the area of a given boundary by the method of radiation
4. Fly levelling: Height of the instrument method (differential leveling)
5. Fly levelling : rise and fall method.
6. Theodolite survey: determining the horizontal and vertical angles by the method of repetition method
7. Theodolite survey: finding the distance between two inaccessible points.
8. Theodolite survey: finding the height of far object.
9. Determination of area perimeter using total station.
10. Determination of distance between two inaccessible point by using total station.
11. Setting out a curve
12. Determining the levels of contours

Textbooks:

1. B.C.Punmia,"SurveyingVol.1",LaxmiPublicationspvt.Ltd.,NewDelhi– 2009.
2. Kanetkar T P and S V Kulkarni, Surveying and Levelling Part I, Pune Vidyarthi Griha Prakashan, 1988.

Reference Books:

1. S. K. Duggal, "Surveying Vol.1",Tata Mc Graw Hill Publishing Co. Ltd. New Delhi. 2009.
2. K.R.Arora, "Surveying Vol.1" Standard Book House, New Delhi.–2010.

B. Tech. – II Year I Semester

Course Code	Category	Name of the Course	L	T	P	C
24PC01203P	PC	Strength of Materials Lab	0	0	3	1.5

Pre-Requisites: Basic Knowledge on Strength of Materials

Course Objectives: To experimentally evaluate the mechanical properties of engineering materials such as mild steel, wood, and springs by determining their tensile strength, yield strength, flexural strength, torsional properties, hardness, impact and shear resistance, and load-deflection behavior, thereby enhancing the understanding of material behavior under various loading conditions.

Course Outcomes (COs):

On successful completion of the course, Student will be able to

CO1: Analyze the stress-strain behavior of ductile metals by conducting tensile tests and interpreting the mechanical properties from the resulting curves. (L4)

CO2: Analyze the flexural response of steel and wood specimens under bending loads by evaluating load-deflection behavior. (L4)

CO3: Interpret torsional strength parameters such as modulus of rigidity and angle of twist by analyzing results from torsion testing of mild steel bars. (L4)

CO4: Evaluate the mechanical response of metals to sudden and gradual loads by analyzing hardness, impact, and shear test data. (L4)

CO5: Analyze the load-deflection characteristics of closely and open-coiled springs and determine stiffness and energy absorption capacity. (L4)

List of Experiments:

1. Tension test.
2. Bending test on (Steel/Wood) Cantilever beam.
3. Bending test on simply supported beam.
4. Torsion test.
5. Hardness test.
6. Compression test on Open coiled springs
7. Tension test on Closely coiled springs
8. Compression test on wood/concrete
9. Izod/Charpy Impact test on metals
10. Shear test on metals
11. Continuous beam–deflection test.

Reference Books:

1. Davis, Troxell and Hawk, “Testing of Engineering Materials”, International Student Edition – McGraw Hill Book Co. New Delhi.
2. M L Gambhir and Neha Jamwal, “Building and construction materials-Testing and quality control”, McGraw Hill education (India)Pvt. Ltd.,2014.
3. Fenner, “Mechanical Testing of Materials”, George Newnes Ltd. London.
4. Holes K A, “Experimental Strength of Materials”, English Universities Press Ltd. London.
5. Suryanarayana A K, “Testing of Metallic Materials”, Prentice Hall of India Pvt. Ltd. New Delhi.
6. Kukreja C B, Kishore K. and Ravi Chawla “Material Testing Laboratory Manual”, Standard Publishers & Distributors1996.

B. Tech. – II Year I Semester

Course Code	Category	Name of the Course	L	T	P	C
24SE01201S	SE	Building Planning and Drawing	0	1	2	2

Pre-Requisites: Basic Knowledge on Engineering Graphics

Course Objectives: The program builds a strong foundation in building bye-laws and regulations, promoting responsible and compliant architectural practice. It offers in-depth knowledge of planning principles for residential and public buildings, with a focus on functionality, space optimization, and design efficiency. Through practical exercises in interpreting construction signs, structural bonds, and building design, students gain technical proficiency and confidence for real-world architectural applications.

Course Outcomes (COs):

On successful completion of the course, Student will be able to

CO1: Analyze the structural and functional significance of various bonds (English and Flemish) in masonry construction through detailed drawings. (L4)

CO2: Interpret and differentiate the design principles and components of doors, windows, ventilators, and roofs by preparing detailed technical drawings. (L4)

CO3: Examine and apply building bye-laws to develop line diagrams for residential buildings, ensuring compliance with regulatory standards. (L4)

CO4: Analyze the spatial relationships and functional zoning to generate plan, elevation, and sectional views from line diagrams for different building types (residential, hospital, industrial).(L4)

CO5: Distinguish and evaluate the architectural and structural elements in various building typologies by preparing comprehensive working drawings (plan, elevation, section) from conceptual designs. (L4)

Detailed Syllabus:

Students have to perform the following Experiments:

1. Detailing & Drawing of Sign Conventions.
2. Detailing & Drawing of English Bond.
3. Detailing & Drawing of Flemish Bond.
4. Detailing & Drawing of Doors.
5. Detailing & Drawing of Windows.
6. Detailing & Drawing of Ventilators &Roofs.
7. Drawing of Line Diagram of Residential Buildings by using Building Bye- Laws.
8. Drawing of Plan, Elevation & Section from line diagram for a single Storey Building.
9. Drawing of Plan, Elevation & Section for Hospital Building.
10. Drawing of Plan, Elevation & Section for Industrial Building.

Text books:

1. Planning, designing and Scheduling, Gurcharan Singh and Jagdish Singh
2. Building planning and drawing by M.Chakraborti.

Reference Books:

1. National Building Code 2016(Volume-I&II).
2. Principles of Building Drawing, M G Shah and C M Kale, Trinity Publications, NewDelhi.
3. Civil Engineering drawing and House planning, B. P. Verma, Khanna publishers, NewDelhi.
4. Civil Engineering Building practice, Suraj Singh: CBS Publications, New Delhi, and Chennai
5. Building Materials and Construction, G. C Saha and Joy Gopal Jana, McGraw Hill Education (P) India Ltd. New Delhi.

B. Tech. – II Year I Semester

Course Code	Category	Name of the Course	L	T	P	C
24HMHS205A	HM	Environmental Science (Common for all branches of Engineering)	2	0	0	--

Pre-Requisites: Nil

Course Objectives:

- To make the students to get awareness on environment.
- To understand the importance of protecting natural resources, ecosystems for future generations and pollution causes due to the day-to-day activities of human life
- To save earth from the inventions by the engineers.

Course Outcomes (COs):

On successful completion of the course, Student will be able to

CO1: Apply the concepts of multidisciplinary environmental studies to real-world issues by identifying the interconnections between natural resources and environmental problems. (L3)

CO2: Analyze the structure, function, and energy dynamics of various ecosystems and apply ecological principles and biodiversity conservation strategies to evaluate environmental issues and promote sustainable ecosystem management. (L4)

CO3: Analyze the causes, effects, and control measures of various types of pollution and disasters, and apply appropriate pollution prevention and waste management strategies to mitigate environmental and public health risks. (L4)

CO4: Apply methods like rainwater harvesting, watershed management, and wasteland reclamation to practical scenarios and use of environmental laws (e.g., Air, Water, Wildlife Acts) to explain pollution control strategies to Encourage public awareness and responsible consumer behaviour. (L3)

CO5: Apply concepts of family welfare, value education, and IT in real-world contexts of environmental health and awareness. Use observations from field visits to identify environmental problems and local biodiversity. (L3)

UNIT I: Multidisciplinary Nature of Environmental Studies:

Definition, Scope and Importance – Need for Public Awareness.

Natural Resources:

Renewable and non-renewable resources – Natural resources and associated problems – Forest resources – Use and over – exploitation, deforestation, case studies – Timber extraction – Mining, dams and other effects on forest and tribal people – Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. – Energy resources:

UNIT II: Ecosystems:

Concept of an ecosystem. – Structure and function of an ecosystem – Producers, consumers and decomposers – Energy flow in the ecosystem – Ecological succession – Food chains, food webs and

ecological pyramids – Introduction, types, characteristic features, structure and function of the following ecosystem:

a. Forest ecosystem.
b. Grassland ecosystem
c. Desert ecosystem.
d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Biodiversity and its Conservation : Introduction Definition: genetic, species and ecosystem diversity – Bio-geographical classification of India – Value of biodiversity: consumptive use, Productive use, social, ethical, aesthetic and option values – Biodiversity at global, National and local levels – India as a mega-diversity nation – Hot-sports of biodiversity – Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – Endangered and endemic species of India – Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

UNIT III: Environmental Pollution:

Definition, Cause, effects and control measures of:

a. Air Pollution.
b. Water pollution
c. Soil pollution
d. Marine pollution
e. Noise pollution
f. Thermal pollution
g. Nuclear hazards

Solid Waste Management:

Causes, effects and control measures of urban and industrial wastes – Role of an individual in prevention of pollution – Pollution case studies – Disaster management: floods, earthquake, cyclone and landslides.

UNIT IV: Social Issues and the Environment:

From Unsustainable to Sustainable development – Urban problems related to energy – Water conservation, rain water harvesting, watershed management – Resettlement and rehabilitation of people; its problems and concerns. Case studies – Environmental ethics: Issues and possible solutions – Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies – Wasteland reclamation. – Consumerism and waste products. – Environment Protection Act. – Air (Prevention and Control of Pollution) Act. – Water (Prevention and control of Pollution) Act – Wildlife Protection Act – Forest Conservation Act – Issues involved in enforcement of environmental legislation – Public awareness.

UNIT V: Human Population and the Environment:

Population growth, variation among nations. Population explosion – Family Welfare Programmes. – Environment and human health – Human Rights – Value Education – HIV/AIDS – Women and Child Welfare – Role of information Technology in Environment and human health – Case studies. Field Work: Visit to a local area to document environmental assets River/forest grassland/hill/mountain – Visit to a local polluted site-Urban/Rural/Industrial/Agricultural Study of common plants, insects, and birds – river, hill slopes, etc.

Textbooks:

1. Textbook of Environmental Studies for Undergraduate Courses Erach Bharucha for University Grants Commission, Universities Press.
2. Palani Swamy, “Environmental Studies”, Pearson education
3. S.Azeem Unnisa, “Environmental Studies” Academic Publishing Company
4. Raghavan Nambiar, “Text book of Environmental Studies for Undergraduate Courses as per UGC model syllabus”, SciTech Publications (India), Pvt. Ltd.

References:

1. Deeksha Dave and E.Sai Baba Reddy, “Textbook of Environmental Science”, Cengage Publications.
2. M.Anji Reddy, “Text book of Environmental Sciences and Technology”, BS Publication.
3. J.P.Sharma, Comprehensive Environmental studies, Laxmi publications.
4. J. Glynn Henry and Gary W. Heinke, “Environmental Sciences and Engineering”, Prentice hall of India Private limited
5. G.R.Chatwal, “A Text Book of Environmental Studies” Himalaya Publishing House
6. Gilbert M. Masters and Wendell P. Ela, “Introduction to Environmental Engineering and Science, Prentice hall of India Private limited.
1. https://www.coursera.org/learn/python-for-applied-data-science-ai
2. https://www.coursera.org/learn/python?specialization=python#syllabus

B. Tech. – II Year II Semester

Course Code	Category	Name of the Course	L	T	P	C
24HMHS206T	HM	**Managerial Economics and Financial Analysis** (Common for all branches of Engineering)	2	0	0	2

Pre-Requisites: Nil

Course Objectives:

- To inculcate the basic knowledge of microeconomics and financial accounting
- To make the students learn how demand is estimated for different products, input-output relationship for optimizing production and cost
- To Know the Various types of market structure and pricing methods and strategy
- To give an overview on investment appraisal methods to promote the students to learn how to plan long-term investment decisions.
- To provide fundamental skills on accounting and to explain the process of preparing financial statements

Course Outcomes (COs):

On successful completion of the course, Student will be able to

CO1: Understand the significance of managerial economics, analyse demand and its elasticity, and apply appropriate forecasting methods for effective business decision-making. (L4)

CO2: Analyse production functions, cost behaviours, and economies of scale, and apply break-even analysis to determine optimal production and cost efficiency in business decisions. (L4)

CO3: Explain forms of business organizations and analyse various market structures and pricing strategies for effective decision-making. (L4)

CO4: Explain the concept and components of working capital, identify sources of capital, and apply capital budgeting techniques for evaluating investment projects. (L4)

CO5: Apply accounting principles and conventions to prepare final accounts, and analyse financial performance using key financial ratios. (L4)

UNIT I: Managerial Economics:

Introduction – Nature, meaning, significance, functions, and advantages. Demand-Concept, Function, Law of Demand - Demand Elasticity- Types – Measurement. Demand Forecasting Factors governing Forecasting, Methods. Managerial Economics and Financial Accounting and Management.

UNIT II: Production and Cost Analysis:

Introduction – Nature, meaning, significance, functions and advantages. Production Function– Least-cost combination– Short run and long run Production Function- Isoquants and Is costs.

Economies of Scale -Cost & Break-Even Analysis - Cost concepts and Cost behaviour- Break-Even Analysis (BEA) - Determination of Break-Even Point (Simple Problems).

UNIT III: Business Organizations and Markets:

Introduction – Forms of Business Organizations- Sole Proprietary - Partnership - Joint Stock Companies - Public Sector Enterprises. Types of Markets - Perfect and Imperfect Competition - Features of Perfect Competition Monopoly- Monopolistic Competition– Oligopoly-Price-Output Determination - Pricing Methods and Strategies

UNIT IV: Capital Budgeting:

Introduction – Nature, meaning, significance. Types of Working Capital, Components, Sources of Short-term and Long-term Capital, Estimating Working capital requirements. Capital Budgeting– Features, Proposals, Methods and Evaluation. Projects – Pay Back Method, Accounting Rate of Return (ARR) Net Present Value (NPV) Internal Rate Return (IRR) Method (sample problems)

UNIT V: Financial Accounting and Analysis:

Introduction – Concepts and Conventions- Double-Entry Bookkeeping, Journal, Ledger, Trial Balance- Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments). Introduction to Financial Analysis - Analysis and Interpretation of Liquidity Ratios, Activity Ratios, and Capital structure Ratios and Profitability.

Textbooks:

1. Varshney & Maheshwari: Managerial Economics, Sultan Chand.
2. Aryasri: Business Economics and Financial Analysis, 4/e, MGH.

Reference Books:

1. Ahuja Hl Managerial economics Schand.
2. S.A. Siddiqui and A.S. Siddiqui: Managerial Economics and Financial Analysis, New Age International.
3. Joseph G. Nellis and David Parker: Principles of Business Economics, Pearson, 2/e, New Delhi.
4. Domnick Salvatore: Managerial Economics in a Global Economy, Cengage.

Online Learning Resources:

https://www.slideshare.net/123ps/managerial-economics-ppt
https://www.slideshare.net/rossanz/production-and-cost-45827016
https://www.slideshare.net/darkyla/business-organizations-19917607
https://www.slideshare.net/balarajbl/market-and-classification-of-market

B. Tech. – II Year II Semester

Course Code	Category	Name of the Course	L	T	P	C
24HMHS207T	HM	**Organizational Behaviour** (Common for all branches of Engineering)	2	0	0	2

Pre-Requisites: Nil

Course Objectives:

- To enable student's comprehension of organizational behavior
- To offer knowledge to students on self-motivation, leadership and management
- To facilitate them to become powerful leaders
- To Impart knowledge about group dynamics
- To make them understand the importance of change and development

Course Outcomes (COs):

On successful completion of the course, Student will be able to

CO1: Explain the nature, scope, and functions of organization and examine individual behavior aspects to improve organizational effectiveness. (L4)

CO2: Apply theories of motivation to analyze the performance problems (L4)

CO3: Analyze the different theories of leadership and their application in the organizations. (L4)

CO4: Evaluate group dynamics and demonstrate skills required for working in groups (L4)

CO5: Develop as powerful leader by applying relevant theories to solve problems of change within the organizations. (L4)

UNIT I: Introduction to Organizational Behaviour:

Meaning, definition, nature, scope and functions - Organizing Process – Making organizing effective -Understanding Individual Behaviour –Attitude -Perception - Learning – Personality.

UNIT II: Motivation and Leading:

Theories of Motivation- Maslow's Hierarchy of Needs - Hertzberg's Two Factor Theory - Vroom's theory of expectancy – Mc Cleland's theory of needs–Mc Gregor's theory X and theory Y– Adam's equity theory.

UNIT III: Organizational Culture:

Introduction – Meaning, scope, definition, Nature - Organizational Climate - Leadership - Traits Theory–Managerial Grid - Transactional Vs Transformational Leadership - Qualities of good Leader - Conflict Management -Evaluating Leader.

UNIT IV: Group Dynamics:

Introduction – Meaning, scope, definition, Nature- Types of groups - Determinants of group behaviour - Group process – Group Development - Group norms - Group cohesiveness - Small Groups - Group decision making - Team building - Conflict in the organization– Conflict resolution

UNIT V: Organizational Change and Development:

Introduction –Nature, Meaning, scope, definition and functions- Organizational Culture - Changing the Culture – Change Management – Work Stress Management - Organizational management – Managerial implications of organization's change and development

Textbooks:

1. Luthans, Fred, Organisational Behaviour, McGraw-Hill, 12 Th edition.
2. P Subba Ran, Organisational Behaviour, Himalya Publishing House.

Reference Books:

1. McShane, Organizational Behaviour, TMH
2. Nelson, Organisational Behaviour, Thomson.
3. Robbins, P. Stephen, Timothy A. Judge, Organisational Behaviour, Pearson.
4. Aswathappa, Organisational Behaviour, Himalaya.

Online Learning Resources:

https://www.slideshare.net/Knight1040/organizational- culture9608857
https://www.slideshare.net/AbhayRajpoot3/motivation - 165556714
https://www.slideshare.net/harshrastogi1/group-dynamics-159412405
https://www.slideshare.net/vanyasingla1/organizational

B. Tech. – II Year II Semester

Course Code	Category	Name of the Course	L	T	P	C
24HMHS208T	HM	**Business Environment** (Common for all branches of Engineering)	2	0	0	2

Pre-Requisites: Nil

Course Objectives:

- To make the student to understand about the business environment
- To enable them in knowing the importance of fiscal and monitory policy
- To facilitate them in understanding the export policy of the country
- To Impart knowledge about the functioning and role of WTO
- To Encourage the student in knowing the structure of stock markets

Course Outcomes (COs):

On successful completion of the course, Student will be able to

CO1: Apply business environment concepts, classify types and industry structures, and assess environmental analysis pros and cons. (L3)

CO2: Apply concepts of public finance and evaluate recent trends and roles of institutions like RBI and Finance Commission. (L4)

CO3: Analyze India's Trade Policy (L4)

CO4: Analyze trade policies, agreements, EXIM policy, Bop issues, and WTO roles to assess global and Indian trade dynamics. (L4)

CO5: Analyze the Indian financial system, money and capital markets, SEBI regulations, and recent reforms including aspects of international finance. (L4)

UNIT I: Overview of Business Environment:

Introduction – meaning Nature, Scope, significance, functions and advantages. Types Internal & External, Micro and Macro. Competitive structure of industries -Environmental analysis- advantages & limitations of environmental analysis.

UNIT II: Fiscal & Monetary Policy:

Introduction – Nature, meaning, significance, functions and advantages. Public Revenues - Public Expenditure - Evaluation of recent fiscal policy of GOI. Highlights of Budget Monetary Policy - Demand and Supply of Money –RBI -Objectives of monetary and credit policy - Recent trends- Role of Finance Commission.

UNIT III: India's Trade Policy:

Introduction – Nature, meaning, significance, functions and advantages. Magnitude and direction of Indian International Trade - Bilateral and Multilateral Trade Agreements - EXIM policy and role of EXIM bank -Balance of Payments– Structure & Major components - Causes for Disequilibrium in Balance of Payments - Correction measures.

UNIT IV: World Trade Organization:

Introduction – Nature, significance, functions and advantages. Organization and Structure - Role and functions of WTO in promoting world trade - GATT -Agreements in the Uruguay Round –TRIPS, TRIMS - Disputes Settlement Mechanism - Dumping and Anti-dumping Measures.

UNIT V: Money Markets and Capital Markets:

Introduction – Nature, meaning, significance, functions and advantages. Features and components of Indian financial systems - Objectives, features and structure of money markets and capital markets -

Reforms and recent development – SEBI – Stock Exchanges - Investor protection and role of SEBI, Introduction to international finance.

Textbooks:

1. Francis Cherunilam, International Business: Text and Cases, Prentice Hall of India.
2. K. Aswathappa, Essentials of Business Environment: Texts and Cases & Exercises 13th Revised Edition.HPH

Reference Books:

1.K. V. Sivayya, V. B. M Das, Indian Industrial Economy, Sultan Chand Publishers, New Delhi, India.
2. Sundaram, Black, International Business Environment Text and Cases, Prentice Hall of India, New Delhi, India.
3. Chari. S. N, International Business, Wiley India.
4.E. Bhattacharya, International Business, Excel Publications, New Delhi.

Online Learning Resources:

https://www.slideshare.net/ShompaDhali/business-environment-53111245
https://www.slideshare.net/rbalsells/fiscal-policy-ppt
https://www.slideshare.net/aguness/monetary-policy-presentationppt
https://www.slideshare.net/DaudRizwan/monetary-policy-of-india-69561982
https://www.slideshare.net/ShikhaGupta31/indias-trade-policyppt
https://www.slideshare.net/viking2690/wto-ppt-60260883
https://www.slideshare.net/prateeknepal3/ppt-mo

B. Tech. – II Year II Semester

Course Code	Category	Name of the Course	L	T	P	C
24PC01205T	PC	Engineering Geology	3	0	0	3

Pre-Requisites: Nil

Course Objectives:

To know the importance of Engineering Geology to the Civil Engineering. To enable the students, understand what minerals and rocks are and their formation and identification. To highlight significance/ importance/ role of Engineering Geology in construction of Civil Engineering structures. To enable the student, realize its importance and applications of Engineering Geology in Civil Engineering constructions. Concepts of Ground water and its geo physical methods.

Course Outcomes (COs):

On successful completion of the course, Student will be able to

CO1: Analyse the branches of geology and evaluate their significance in solving civil engineering problems through case studies of geological processes like weathering and river action. (L4)

CO2: Differentiate minerals and rocks based on physical properties to classify igneous, sedimentary, and metamorphic rocks, and interpret their structures and textures. (L4)

CO3: Analyse geological structures such as folds, faults, joints, and unconformities to assess their impact on the design and safety of civil engineering structures. (L4)

CO4: Examine the causes and effects of groundwater movement, earthquakes, landslides, and geophysical data to recommend mitigation strategies for engineering applications. (L4)

CO5: Analyse geological factors affecting the selection, design, and construction of dams, reservoirs, and tunnels to optimize site stability and structural safety. (L4)

UNIT I: Introduction:

Branches of Geology, Importance of Geology in Civil Engineering with case studies, weathering of rocks, Geological agents, weathering process of Rock, Rivers and geological work of rivers.

UNIT II: Mineralogy and Petrology

Definitions of mineral and rock-Different methods of study of mineral and rock. Physical properties of minerals and rocks for megascopic study for the following minerals and rocks. Common rock forming minerals: Feldspar, Quartz Group, Olivine, Augite, Hornblende, Mica Group, Asbestos, Talc, Chlorite, Kyanite, Garnet, Calcite and ore forming minerals are Pyrite, Hematite, Magnetite, Chlorite, Galena, Pyrolusite, Graphite, Chromite, Magnetite and Bauxite. Classification, structures, textures and forms of Igneous rocks, Sedimentary rocks, Metamorphic rocks, and their megascopic study of granite varieties, (pink, grey, green). Pegmatite, Dolerite, Basalt etc., Shale, Sand Stone, Lime Stone, Laterite, Quartzite, Gneiss, Schist, Marble, Khond alite and Slate.

UNIT III : Structural Geology:

Strike, Dip and Outcrop study of common geological structures associating with the rocks such as Folds, Faults, Joints and Unconformities- parts, types, mechanism and their importance in Civil Engineering.

UNIT IV: Ground Water, Earthquakes and Land Slides:

Water table, Cone of depression, Geological controls of Ground Water Movement, Ground Water Exploration Techniques.

Terminology, Classification, causes and effects, Shield areas and Seismic bells, Richter scale intensity, Precautions of building constructions in seismic areas. Classification of Landslides, Causes and Effects, measures to be taken prevent their occurrence at Landslides.

Geophysics: Importance of Geophysical methods, Classification, Principles of Geophysical study by Gravity method, Magnetic method, Electrical methods, Seismic methods, Radiometric method and Electrical resistivity, Seismic refraction methods and Engineering properties of rocks.

UNIT V: **Geology of Dams, Reservoirs and Tunnels:**

Types and purpose of Dams, Geological considerations in the selection of a Dam site. Geology consideration for successful constructions of reservoirs, Life of Reservoirs. Purpose of Tunnelling, effects, Lining of Tunnels. Influence of Geology for successful Tunnelling.

Textbooks:

1. Engineering Geology by N.Chenna Kesavulu, LaxmiPublications.2ndEdn2014.
2. Engineering & General Geology by Parbin Singh Katson educational series 8th 2023

Reference Books:

1. Engineering Geology by Subinoy Gangopadhay Oxford University press1stedition, 2012.
2. Engineering Geology by D. Venkat Reddy, VikasPublishing,2ndEdn,2017.
3. Environmental Geology (2013) K.S.Valdiya, 2nd Edition., McGraw Hill Publications.

Web Materials:

1.http://nptel.iitm.ac.in/video.php?subjectId=105105106
2.http://nptel.iitm.ac.in/video.php?courseId=1055&p=1
4.http://nptel.iitm.ac.in/video.php?courseId=1055&p=3
5.http://nptel.iitm.ac.in/video.php?courseId=1055&p=4

B. Tech. – II Year II Semester

Course Code	Category	Name of the Course	L	T	P	C
24PC01206T	PC	Concrete Technology	3	0	0	3

Pre-Requisites: Basics of civil and Mechanical Engineering.

Course Objectives:

This course introduces the properties, composition, and behaviour of concrete and its constituents. It develops understanding of both fresh and hardened concrete, including their testing and performance characteristics. Students also learn concrete mix design methods and explore special concretes for advanced applications.

Course Outcomes (COs):

On successful completion of the course, Student will be able to

CO1: Analyze the properties and behavior of cement and aggregates, including their roles in concrete performance. (L4)

CO2: Evaluate the workability and quality of fresh concrete through various tests and interpret their results for practical applications. (L4)

CO3: Assess the strength and durability characteristics of hardened concrete using both destructive and non-destructive testing methods. (L4)

CO4: Examine the effects of elasticity, creep, and shrinkage on concrete structures and their long-term performance. (L4)

CO5: Design concrete mixes using ACI and IS code methods and recommend appropriate special concretes for specific engineering needs. (L4)

UNIT I:

CEMENTS: Portland Cement–Chemical Composition–Hydration, Setting of Cement, Fineness of cement, Structure of hydrate cement– Test for physical properties – Different grades of cements–Admixtures–Mineral and chemical admixtures–accelerators, retarders, air entrains, plasticizers, super plasticizers, fly ash and silica fume.

AGGREGATES: Classification of aggregate – Particle shape & texture – Bond, strength & other mechanical properties of aggregates–Specific gravity, Bulk density, porosity, adsorption & moisture content of aggregate–Bulking of sand–Deleterious substances– Soundness–Alkali aggregate reaction–Thermal properties–Sieve analysis–Fineness modulus–Grading curves–Grading of fine & coarse Aggregates–Maximum aggregate size, Quality of mixing water.

UNIT II: Fresh Concrete:

Steps in Manufacture of Concrete–proportion, mixing, placing, compaction, finishing, curing – including various types in each stage. Properties of fresh concrete-Workability – Factors affecting workability – Measurement of workability by different tests, setting times of concrete, Effect of time and temperature on workability – Segregation & bleeding – Mixing and vibration of concrete, Ready mixed concrete, Shot Crete.

UNIT III: Hardened Concrete:

Water / Cement ratio – Abram's Law – Gel/space ratio – Nature of strength of concrete –Maturity concept – Strength in tension & compression – Factors affecting strength–Relation between compression & tensile strength–Curing, Testing of Hardened Concrete: Compression test –Tension

test –Factors affecting strength– Flexure test –Splitting test – Non-destructive testing methods – Codal provisions for NDT.

UNIT IV: Elasticity, Creep & Shrinkage:

Modulus of elasticity – Dynamic modulus of elasticity – Poisson's ratio – Creep of concrete – Factors influencing creep – Relation between creep & time – Nature of creep – Effects of creep – Shrinkage –types of shrinkage.

UNIT V: MIX DESIGN AND SPECIAL CONCRETES:

Factors in the choice of mix proportions – Quality control of concrete- Statistical Methods Acceptance Criteria-Concepts Proportioning of concrete mixes by ACI method and IS Code method. Ready mixed concrete, Fibre reinforced concrete – Different types of fibres– Factors affecting properties of FRC, High performance concrete – Self consolidating concrete, Self-healing concrete.

Textbooks:

1. Properties of Concrete by A.M. Neville –PEARSON–4th edition
2. Concrete Technology by M.L. Gambhir. – Tata McGraw Hill Publishers, New Delhi 5 th edition 2013.
3. Concrete Technology by Job Thomas, Cengage Publications,1st edition,2015

Reference Books:

1. Concrete Microstructure, Properties of Materials by P.K. Mehta and Moterio. McGraw Hill 4 th edition 2014
2. Concrete Technology, J.J.Brooks and A.M. Neville, Pearson, 2019, 2 nd Edition.
3. Concrete Technology by M.S.Shetty.–S.Chand & Co.;2004
4. Concrete Technology by A.R. Santha Kumar, Oxford University Press, NewDelhi.

B. Tech. – II Year II Semester

Course Code	Category	Name of the Course	L	T	P	C
24PC01207T	PC	Structural Analysis	2	1	0	3

Pre-Requisites: Basic Knowledge on Strength of Materials

Course Objectives:

To develop a comprehensive understanding of energy theorems and the analysis of indeterminate structures, including fixed and continuous beams, through the application of methods such as slope-deflection and moment-distribution.

Course Outcomes (COs):

On successful completion of the course, Student will be able to

CO1: Apply strain energy principles and Castiglioni's First Theorem to determine deflections in simple beams and pin-jointed trusses. (L3)

CO2: Analyse statically and kinematically indeterminate trusses using Castiglioni's Second Theorem, identifying internal forces and deflections. (L4)

CO3: Apply principles of statics to determine shear force, bending moment, and deflection in fixed and continuous beams under various loading conditions, including support sinking and rotation. (L3)

CO4: Analyse continuous beams and portal frames using the slope-deflection method considering different support conditions and settlements. (L4)

CO5: Apply the moment distribution method to solve continuous beams and portal frames, including cases with support settlements. (L3)

UNIT I: Energy Theorems:

Introduction-Strain energy in linear elastic system, expression of strain energy due to axial load, bending moment and shear forces– Castiglioni's first theorem Deflections of simple beams and pin jointed trusses.

UNIT II: Analysis of Indeterminate Trusses:

Indeterminate Structural Analysis Determination of static and kinematic indeterminacies– Solution of trusses with up to two degrees of internal and external indeterminacies– Castiglioni's–II theorem.

UNIT III: Fixed Beams & Continuous Beams:

Introduction to statically indeterminate beams with uniformly distributed load, central point load, eccentric point load, number of point loads, uniformly varying load, couple and combination of loads– Shear force and Bending moment diagrams– Deflection of fixed beams effect of sinking of support, effect of rotation of a support.

UNIT IV: Slope-Deflection Method:

Introduction-derivation of slope deflection equations application to continuous beams with and without settlement of supports- Analysis of single bay portal frames without sway.

UNIT V: Moment Distribution Method:

Introduction to moment distribution method Application to continuous beams with and without settlement of Supports-Analysis of single bay storey portal frames without sway.

Textbooks:

1. Analysis of Structures– Vol-I&II by V.N.Vazirani & M.M.Ratwani, Khanna Publications, New Delhi.
2. Basic Structural Analysis by C.S.Reddy., Tata McGraw Hill Publishers.3rdedition 2017.

Reference Books:

1. Structural analysis by Aslam Kassimali Cengage publications 6th edition2020.
2. Structural analysis Vol.I and II by Dr.R.Vaidyanathan and Dr. Perumal–Laxmi publications. 3rd 2016
3. Introduction to structural analysis by B.D. Nautiyal, New Age international publishers, NewDelhi.
4. Structural Analysis–D.S. Prakasa Rao- University press.
5. Strength of Materials and Mechanics of Structures by B.C.Punmia, Khanna Publications, New Delhi.

B. Tech. – II Year II Semester

Course Code	Category	Name of the Course	L	T	P	C
24PC01208T	PC	Hydraulics and Hydraulics Machinery	2	1	0	3

Pre-Requisites: Fundamentals of Engineering Mechanics and Fluid Mechanics

Course Objectives: This course aims to develop students' understanding of fluid flow in pipes and open channels, including laminar, turbulent, and boundary layer concepts. It enables students to analyze and design efficient flow systems, evaluate hydraulic jumps, turbines, and jet impacts. The course also focuses on pump performance, characteristic curves, and troubleshooting operational issues.

Course Outcomes (COs):
On successful completion of the course, Student will be able to

CO1: Analyze laminar and turbulent flow in pipes using Reynolds experiment, Moody's diagram, and boundary layer theory. (L4)

CO2: Analyze velocity distribution and design of hydraulically efficient open channel sections. (L4)

CO3: Analyze specific energy, critical flow, and hydraulic jump for non-uniform open channel flow. (L4)

CO4: Analyze forces, work done, and efficiency of jets and hydraulic turbines using velocity triangles. (L4)

CO5: Analyze performance, efficiency, and operational issues of centrifugal pumps from characteristic curves. (L4)

UNIT I: Laminar & Turbulent flow in pipes:
Laminar Flow- Laminar flow through: circular pipes, annulus and parallel plates. Stoke's law, Measurement of viscosity. Reynolds experiment, Transition from laminar to turbulent flow. Resistance to flow of fluid in smooth and rough pipes- Moody 's diagram– Introduction to boundary layer theory.

UNIT II: Uniform flow in Open Channels:
Open Channel Flow- Comparison between open channel flow and pipe flow, geometrical parameters of a channel, classification of open channels, classification of open channel flow, Velocity Distribution of channel section. Hydraulically efficient channel sections: Rectangular, trapezoidal and triangular channels, Energy and Momentum correction factor

UNIT III: Non-Uniform flow in Open Channels:
Specific energy, critical flow, discharge curve, Specific force, Specific depth, and Critical depth. Measurement of Discharge and Velocity Gradually Varied Flow- Dynamic Equation of Gradually Varied Flow. Hydraulic Jump and classification- Elements and characteristics- Energy dissipation.

UNIT IV: Impact of Jets:
Hydrodynamic force of jets on stationary and moving flat, inclined and curved vanes- Velocity triangles at inlet and outlet- Work done and efficiency Hydraulic Turbines: Classification of turbines; Pelton wheel and its design. Franci's turbine and its design efficiency- Draft tube: theory- characteristic curves of hydraulic turbines. Cavitation: causes and effects.

UNIT V: **Pumps:**

Working principles of a centrifugal pump, work done by impeller; heads, losses and efficiencies; minimum starting speed; Priming; specific speed; limitation of suction lift, net positive suction head (NPSH); Performance and characteristic curves; Cavitation effects; Multistage centrifugal pumps; troubles and remedies

Text Books:

1.P.M. Modi and S. M. Seth, Hydraulics and Fluid Mechanics, StandardBookHouse22nd, 2019.
2. K. Subrahmanyam, Theory and Applications of Fluid Mechanics, Tata McGraw Hill,2nd edition 2018

Reference Books:

1. R. K. Bansal, A text of Fluid mechanics and hydraulic machines, Laxmi Publications (P) Ltd., New Delhi 11thedition, 2024.
2.Fluid Mechanics by Frank M. White, Henry Xue, Tata McGrawHill,9thedition,2022.
3.C.S.P. Ojha, R. Berndts on and P.N. Chadramouli, Fluid Mechanics and Machinery, Oxford University Press, 2010.
4.Introduction to Fluid Mechanics &Fluid Machines by S K Som, Gautam Biswas, S Chakra borty 3rd edition 2011

B. Tech. – II Year II Semester

Course Code	Category	Name of the Course	L	T	P	C
24PC01205P	PC	Engineering Geology Lab	0	0	3	1.5

Pre-Requisites: Nil

Course Objectives: To identify the Megascopic types of Ore minerals & Rock forming minerals. To identify the Megascopic types of Igneous, Sedimentary, Metamorphic rocks. To identify the topography of the site & material selection

Course Outcomes (COs):

On successful completion of the course, Student will be able to

CO1: Analyze and classify rock-forming and ore-forming minerals through megascopic identification based on their physical properties. (L4)

CO2: Analyze and interpret the characteristics of igneous, sedimentary, and metamorphic rocks to identify their types, textures, and structures. (L4)

CO3: Analyze geological maps and construct geological cross-sections by interpreting features like tilted beds, faults, and unconformities. (L4)

CO4: Analyze structural geology problems and borehole data to assess geological formations and their relevance to engineering applications. (L4)

CO5: Analyze field observations, including the identification of minerals, rocks, and geological structures, to apply theoretical knowledge in practical scenarios. (L4)

List of Experiments:

1. Physical properties of minerals: Mega-scopic identification of

a) Rock forming minerals– Quartz group, Feldspar group, Garnet group, Mica group & Talc, Chlorite, Olivine, Kyanite, Asbestos, Tourmaline, Calcite, Gypsum, etc…

b) Ore forming minerals– Magnetite, Hematite, Pyrite, Pyrolusite, Graphite, Chromite, etc…

2. Mega-scopic description and identification of rocks.

a) Igneous rocks–Types of Granite, Pegmatite, Gabbro, Dolerite, Syenite, Granite Periphery, Basalt, etc. b) Sedimentary rocks–Sandstone, Ferruginous sandstone, Limestone, Shale, Laterite, Conglomerate, etc. c) Metamorphic rocks–Biotite–Granite Gneiss, Slate, Muscovite & Biotite schist, Marble, Khond alite, etc.

3. Interpretation and drawing of sections for geological maps showing tilted beds, faults, unconformities etc.

4. Simple Structural Geology problems.

5. Borehole data.

6. Strength of the rock using laboratory tests.

7. Fieldwork–To identify Minerals, Rocks, Geomorphology & Structural Geology.

Textbooks:

1.Engineering Geology by N.Chenna Kesavulu, LaxmiPublications.2ndEdn2014.

1.Engineering & General Geology by Parbin Singh Katson educational series 8th 2023

Reference Books:

1. Engineering Geology by Subinoy Gango padhay Oxford University press1stedition, 2012.

2. Engineering Geology by D. Venkat Reddy, Vikas Publishing,2nd Edition, 2017,

3. Environmental Geology , S.Valdiya ,2nd Edition., McGraw Hill Publications, 2013.

B. Tech. – II Year II Semester

Course Code	Category	Name of the Course	L	T	P	C
24PC01206P	PC	Concrete Technology Lab	0	0	3	1.5

Pre-Requisites: Engineering Mechanics Lab, Strength of Materials Lab

Course Objectives: The course develops practical skills in testing and evaluating cement, aggregates, and concrete to ensure material quality and compliance with standards. Students learn to assess workability, strength, and durability through laboratory experiments on fresh and hardened concrete. It prepares students for effective material selection, quality control, and performance analysis in civil engineering projects.

Course Outcomes (COs):

On successful completion of the course, Student will be able to

CO1: Analyze the properties of cement and aggregates through tests like consistency, fineness, specific gravity, and water absorption (L4)

CO2: Analyze the workability of fresh concrete using compaction factor, slump, and Vee-bee tests. (L4)

CO3: Analyze the mechanical properties of hardened concrete, including strength, Young's modulus, and Poisson's ratio. (L4)

CO4: Analyze non-destructive testing results to assess the integrity and durability of concrete structures. (L4)

Detailed Syllabus:

1.Tests on Cement

a) Normal Consistency and Fineness of cement.
b) Initial setting time and Final setting time of cement.
c) Specific gravity and soundness of cement.
d) Compressive strength of cement.

2.Tests on Fine Aggregates

a) Grading and fineness modulus of Fine aggregate by sieve analysis.
b) Specific gravity of fine aggregate
c) Water absorption and Bulking of sand.

3.Tests on Coarse Aggregates

a) Grading of Coarse aggregate by sieve analysis.
b) Specific gravity of coarse aggregate
c) Water absorption of Coarse aggregates

4.Tests on fresh Concrete

a) Workability of concrete by compaction factor method
b) Workability of concrete by slump test
c) Workability of concrete by Vee-bee test.

5.Tests on Hardened Concrete

a) Compressive strength of cement concrete and Modulus of rupture
b) Young's Modulus and Poisson's Ratio
c) Split tensile strength of concrete.
d) Non-Destructive testing on concrete (for demonstration)

Textbooks:

1. Properties of Concrete by A. M.Neville–PEARSON–4thedition
2. Concrete Technology by M.L. Gambhir.– Tata McGraw Hill Publishers, New Delhi 5th edition 2013.
3. Concrete Technology by Job Thomas, Cengagae Publications,1stedition,2015
4. Building construction and materials (Lab Manual) by Gambhir , TMH publishers 2017 edition.

References

1. Concrete Microstructure, Properties of Materials by P.K. Mehta and Moterio. McGraw Hill 4th edition 2014
2. Concrete Technology by M.S.Shetty.–S.Chand&Co.;2004
3. Concrete Technology by A.R. Santha Kumar, Oxford University Press, NewDelhi

B. Tech. – II Year II Semester

Course Code	Category	Name of the Course	L	T	P	C
24SEHS201S	SE	**Soft Skills** (Common for all branches of Engineering)	0	1	2	2

Pre-Requisites: Basics of LSRW skills

Course Objectives:

- To encourage all round development of the students by focusing on soft skills
- To make the students aware of critical thinking and problem-solving skills
- To enhance healthy relationship and understanding within and outside an organization
- To function effectively with heterogeneous teams Course Outcomes

Course Outcomes (COs):

On successful completion of the course, Student will be able to

CO1: Apply effective communication techniques by understanding its significance, process, types, and overcoming barriers to enhance professional and interpersonal interactions. (L3)

CO2: Apply active listening, observation, curiosity, introspection, and critical thinking skills to enhance problem-solving, decision-making, and reflective practices. (L3)

CO3: Apply problem-solving techniques, conflict management strategies, and team decision-making methods to resolve issues and enhance collaboration in professional environments. (L3)

CO4: Analyse emotional and stress responses to identify triggers, evaluate coping strategies, and develop effective methods for emotional control and resilience in personal and professional contexts. (L4)

CO5: Analyse the importance of etiquette and grooming in professional settings to enhance personal branding and overcome workplace challenges. (L4)

UNIT I: Soft Skills & Communication Skills Soft Skills:

Introduction, Need - Mastering Techniques of Soft Skills – Communication Skills -Significance, process, types - Barriers of communication - Improving techniques.

Activities: Intrapersonal Skills- Narration about self- strengths and weaknesses- clarity of thought – self-expression – articulating with felicity.

(The facilitator can guide the participants before the activity citing examples from the lives of the great, anecdotes and literary sources)

Interpersonal Skills- Group Discussion – Debate – Team Tasks - Book and film Reviews by groups - Group leader presenting views (non- controversial and secular) on contemporary issues or on a given topic.

Verbal Communication- Oral Presentations- Extempore- brief addresses and speeches convincing- negotiating- agreeing and disagreeing with professional grace.

Non-verbal communication – Public speaking – Mock interviews – presentations with an objective to identify non- verbal clues and remedy the lapses on observation.

UNIT II: Critical Thinking:

Active Listening – Observation – Curiosity – Introspection – Analytical Thinking – Open mindedness – Creative Thinking - Positive thinking - Reflection

Activities: Gathering information and statistics on a topic - sequencing – assorting – reasoning – critiquing issues –placing the problem – finding the root cause - seeking viable solution – judging with rationale – evaluating the views of others - Case Study, Story Analysis

UNIT III: Problem Solving & Decision Making:
Meaning & features of Problem Solving – Managing Conflict – Conflict resolution – Team building - Effective decision making in teams – Methods & Styles
Activities: Placing a problem which involves conflict of interests, choice and views – formulating the problem – exploring solutions by proper reasoning – Discussion on important professional, career and organizational decisions and initiate debate on the appropriateness of the decision. Case Study & Group Discussion

UNIT IV: Emotional Intelligence & Stress Management:
Managing Emotions – Thinking before Reacting – Empathy for Others – Self-awareness – Self-Regulation – Stress factors – Controlling Stress – Tips
Activities: Providing situations for the participants to express emotions such as happiness, enthusiasm, gratitude, sympathy, and confidence, compassion in the form of written or oral presentations. Providing opportunities for the participants to narrate certain crisis and stress –ridden situations caused by failure, anger, jealousy, resentment and frustration in the form of written and oral presentation, Organizing Debates

UNIT V: Corporate Etiquette Etiquette:
Introduction, concept, significance - Corporate etiquette - meaning, modern etiquette, benefits - Global and local culture sensitivity - Gender Sensitivity - Etiquette in interaction- Cell phone etiquette - Dining etiquette - Netiquette - Job interview etiquette - Corporate grooming tips -Overcoming challenges
Activities: Providing situations to take part in the Role Plays where the students will learn about bad and good manners and etiquette - Group Activities to showcase gender sensitivity, dining etiquette etc. - Conducting mock job interviews - Case Study - Business Etiquette Games
NOTE-:
1. The facilitator can guide the participants before the activity citing examples from the lives of the great, anecdotes, epics, scriptures, autobiographies and literary sources which bear true relevance to the prescribed skill.
2. Case studies may be given wherever feasible for example for Decision Making- The decision of King Lear.

Prescribed Books:
1. Mitra Barun K, Personality Development and Soft Skills, Oxford University Press, Pap/Cdr edition 2012
2. Dr Shikha Kapoor, Personality Development and Soft Skills: Preparing for Tomorrow, I K International Publishing House, 2018

Reference Books:
1. Sharma, Prashant, Soft Skills: Personality Development for Life Success, BPB Publications 2018.
2. Alex K, Soft Skills S.Chand& Co, 2012 (Revised edition)
3. Gajendra Singh Chauhan & Sangeetha Sharma, Soft Skills: An Integrated Approach to Maximise Personality Published by Wiley, 2013

4. Pillai, Sabina & Fernandez Agna, Soft Skills and Employability Skills, Cambridge University Press, 2018
5. Soft Skills for a Big Impact (English, Paperback, Renu Shorey) Publisher: Notion Press
6. Dr. Rajiv Kumar Jain, Dr. Usha Jain, Life Skills (Paperback English) Publisher : Vayu Education of India, 2014

Online Learning Resources:

1. **https://youtu.be/DUlsNJtg2L8?list=PLLy_2iUCG87CQhELCytvXh0E_y-bOO1_q**
2. **https://youtu.be/xBaLgJZ0t6A?list=PLzf4HHlsQFwJZel_j2PUy0pwjVUgj7KlJ**
3. **https://youtu.be/-Y-R9hDl7lU**
4. **https://youtu.be/gkLsn4ddmTs**
5. **https://youtu.be/2bf9K2rRWwo**
6. **https://youtu.be/FchfE3c2jzc**
7. **https://www.businesstrainingworks.com/training-resource/five-free-business-etiquette-traini ng-games/**
8. **https://onlinecourses.nptel.ac.in/noc24_hs15/preview**

B. Tech. – II Year II Semester

Course Code	Category	Name of the Course	L	T	P	C
24ES03102T	ES	Design Thinking & Innovation (Common for all branches of Engineering)	1	0	2	2

Pre-Requisites: Nil

Course Objectives:

The main objectives of the course are to

- familiarize students with design thinking process as a tool for breakthrough innovation.
- equip students with design thinking skills and ignite the minds to create innovative ideas.
- develop solutions for real-time problems.

Course Outcomes (COs):

On successful completion of the course, Student will be able to

CO1: Explain fundamental elements and principles of design, and analyze the role of design thinking and material innovations in shaping modern industrial practices. (L4)

CO2: Apply the design thinking process—empathize, analyze, ideate, prototype—and use tools like journey maps and brainstorming to develop innovative solutions for product and social innovation. (L4)

CO3: Distinguish between creativity and innovation, and apply creative thinking in teams to develop and evaluate innovative ideas in organizational contexts. (L4)

CO4: Formulate problems and define product specifications by applying product design strategies and planning for value-driven innovation. (L4)

CO5: Apply design thinking principles to address business challenges and develop innovative business models, prototypes, and start-up strategies. (L4)

UNIT I: Introduction to Design Thinking:

Introduction to elements and principles of Design, basics of design-dot, line, shape, form as fundamental design components. Principles of design. Introduction to design thinking, history of Design Thinking, New materials in Industry.

UNIT II: Design Thinking Process:

Design thinking process (empathize, analyze, idea & prototype), implementing the process in driving inventions, design thinking in social innovations. Tools of design thinking - person, costumer, journey map, brainstorming, product development

Activity: Every student presents their idea in three minutes, every student can present design process in the form of flow diagram or flow chart etc. Every student should explain about product development.

UNIT III: Innovation:

Art of innovation, Difference between innovation and creativity, role of creativity and innovation in organizations- Creativity to Innovation- Teams for innovation- Measuring the impact and value of creativity.

Activity: Debate on innovation and creativity, Flow and planning from idea to innovation, Debate on value-based innovation.

UNIT IV: Product Design:

Problem formation, introduction to product design, Product strategies, Product value, Product planning, product specifications- Innovation towards product design- Case studies

Activity:

Importance of modelling, how to set specifications, Explaining their own product design.

UNIT V: Design Thinking in Business Processes:

Design Thinking applied in Business & Strategic Innovation, Design Thinking principles that redefine business – Business challenges: Growth, Predictability, Change, Maintaining Relevance, Extreme competition, Standardization. Design thinking to meet corporate needs Design thinking for Start-ups- Defining and testing Business Models and Business Cases Developing & testing prototypes.

Activity: How to market our own product, about maintenance, Reliability and plan for start-up.

Textbooks:

1. Tim Brown, Change by design, Harper Bollins (2009)
2. Idris Mootee, Design Thinking for Strategic Innovation, 2013, John Wiley & Sons.

Reference Books:

1. David Lee, Design Thinking in the Classroom, Ulysses press
2. Shrutin N Shetty, Design the Future, Norton Press
3. William Lidwell,Universal Principles of Design- Kritinaholden, Jill Butter.
4. Chesbrough.H, The Era of Open Innovation – 2013

Online Learning Resources:

https://nptel.ac.in/courses/110/106/110106124/
https://nptel.ac.in/courses/109/104/109104109/
https://swayam.gov.in/nd1_noc19_mg60/preview

Course Code	Category	Name of the Course	L	T	P	C
24IPCP301L	IP	Community Service Project (Common for all branches of Engineering)	0	0	0	2

Pre-Requisites: Problem-Solving & Critical Thinking, Communication & Presentation Skills, Teamwork & Collaboration Skills, Foundations in Ethics and Social Responsibility.

Course Objectives:

- To develop social awareness and responsibility among engineering students by engaging with real-world community needs.
- To apply basic engineering knowledge and problem-solving skills in designing practical solutions for local societal challenges.
- To foster teamwork, leadership, and communication skills through collaborative, interdisciplinary project work.
- To cultivate ethical reasoning, empathy, and intercultural understanding by working with diverse communities and stakeholders.
- To enhance students' ability to plan, execute, and document projects through structured project management and reporting.
- To bridge academic learning with practical experience, strengthening the relevance of engineering education to societal development.

Course Outcomes (COs):

On successful completion of the Course, Student will be able to

CO1: Apply engineering knowledge to identify and address community needs through structured service-based projects. (L3)

CO2: Work collaboratively in diverse teams to plan, execute, and evaluate community service initiatives. (L3)

CO3: Communicate project goals, processes, and outcomes effectively through written reports and oral presentations. (L3)

CO4: Assess the social, ethical, and environmental implications of engineering solutions implemented in community settings. (L4)

CO5: Evaluate personal and professional development achieved through community engagement, with emphasis on leadership, empathy, and social responsibility. (L4)

COMMUNITY SERVICE PROJECT ……Experiential learning through community engagement

Introduction

- Community Service Project is an experiential learning strategy that integrates meaningful community service with instruction, participation, learning and community development.
- Community Service Project involves students in community development and service activities and applies the experience to personal and academic development.
- Community Service Project is meant to link the community with the college for mutual benefit. The community will benefit with the focused contribution of the college students for the village/ local development. The college finds an opportunity to develop social sensibility and responsibility among students and emerge as a socially responsible institution.

Objective

Community Service Project should be an integral part of the curriculum, as an alternative to the 2 months of Summer Internships / Apprenticeships / On the Job Training, whenever there is an exigency when students cannot pursue their summer internships.

The specific objectives are

- To sensitize the students to the living conditions of the people who are around them,
- To help students to realize the stark realities of society.
- To bring about an attitudinal change in the students and help them to develop societal consciousness, sensibility, responsibility and accountability
- To make students aware of their inner strength and help them to find new /out of box solutions to social problems.
- To make students socially responsible citizens who are sensitive to the needs of the disadvantaged sections.
- To help students to initiate developmental activities in the community in coordination with public and government authorities.
- To develop a holistic life perspective among the students by making them study culture, traditions, habits, lifestyles, resource utilization, wastages and its management, social problems, public administration system and the roles and responsibilities of different persons across different social systems.

Implementation of Community Service Project

- Every student should put in 6 weeks for the Community Service Project during the summer vacation.
- Each class/section should be assigned with a mentor.
- Specific Departments could concentrate on their major areas of concern. For example, Dept. of Computer Science can take up activities related to Computer Literacy to different sections of people like - youth, women, housewives, etc
- A logbook must be maintained by each of the students, where the activities undertaken/ involved to be recorded.
- The logbook has to be countersigned by the concerned mentor/faculty in charge.
- An evaluation to be done based on the active participation of the student and grade could be awarded by the mentor/faculty member.
- The final evaluation to be reflected in the grade memo of the student.
- The Community Service Project should be different from the regular programs of NSS/NCC/Green Corps/Red Ribbon Club, etc.
- Minor project reports should be submitted by each student. An internal Viva shall also be conducted by a committee constituted by the principal of the college.
- Award of marks shall be made as per the guidelines of Internship/apprentice/ on the job training.

Procedure

- A group of students or even a single student could be assigned for a particular habitation or village or municipal ward, as far as possible, in the near vicinity of their place of stay, to enable them to commute from their residence and return back by evening or so.
- The Community Service Project is a twofold one –

- First, the student/s could conduct a survey of the habitation, if necessary, in terms of their own domain or subject area. Or it can even be a general survey, incorporating all the different areas. A common survey format could be designed. This should not be viewed as a duplication of work by the Village or Ward volunteers, rather, it could be another primary source of data.
- Secondly, the student/s could take up a social activity, concerning their domain or subject area. The different areas, could be like –
  - Agriculture
  - Health
  - Marketing and Cooperation
  - Animal Husbandry
  - Horticulture
  - Fisheries
  - Sericulture
  - Revenue and Survey
  - Natural Disaster Management
  - Irrigation
  - Law & Order
  - Excise and Prohibition
  - Mines and Geology
  - Energy
  - Internet
  - Free Electricity
  - Drinking Water

EXPECTED OUTCOMES

BENEFITS OF COMMUNITY SERVICE PROJECT TO STUDENTS

Learning Outcomes

- Positive impact on students' academic learning
- Improves students' ability to apply what they have learned in "the real world"
- Positive impact on academic outcomes such as demonstrated complexity of understanding, problem analysis, problem-solving, critical thinking, and cognitive development.
- Improved ability to understand complexity and ambiguity

Personal Outcomes

- Greater sense of personal efficacy, personal identity, spiritual growth, and moral development
- Greater interpersonal development, particularly the ability to work well with others, and build leadership and communication skills.

Social Outcomes

- Reduced stereotypes and greater inter-cultural understanding
- Improved social responsibility and citizenship skills
- Greater involvement in community service after graduation

Career Development

- Connections with professionals and community members for learning and career opportunities

- Greater academic learning, leadership skills, and personal efficacy can lead to greater opportunity. Relationship with the Institution
- Stronger relationships with faculty
- Greater satisfaction with college
- Improved graduation rates

BENEFITS OF COMMUNITY SERVICE PROJECT TO FACULTY MEMBERS

- Satisfaction with the quality of student learning
- New avenues for research and publication via new relationships between faculty and community
- Providing networking opportunities with engaged faculty in other disciplines or institutions
- A stronger commitment to one's research.

BENEFITS OF COMMUNITY SERVICE PROJECT TO COLLEGES AND UNIVERSITIES

- Improved institutional commitment.
- Improved student retention
- Enhanced community relations

BENEFITS OF COMMUNITY SERVICE PROJECT TO COMMUNITY

- Satisfaction with student participation
- Valuable human resources needed to achieve community goals.
- New energy, enthusiasm and perspectives applied to community work.
- Enhanced community-university relations.

SUGGESTIVE LIST OF PROGRAMMES UNDER COMMUNITY SERVICE PROJECT

The following the recommended list of projects for Engineering students. The lists are not exhaustive and open for additions, deletions, and modifications. Colleges are expected to focus on specific local issues for this kind of project. The students are expected to carry out these projects with involvement, commitment, responsibility, and accountability. The mentors of a group of students should take the responsibility of motivating, facilitating, and guiding the students. They have to interact with local leadership and people and appraise the objectives and benefits of this kind of project. The project reports shall be placed in the college website for reference. Systematic, Factual, methodical and honest reporting should be ensured.

For Engineering Students

1. Water facilities and drinking water availability
2. Health and hygiene
3. Stress levels and coping mechanisms
4. Health intervention programmes
5. Horticulture
6. Herbal plants
7. Botanical survey
8. Zoological survey
9. Marine products
10. Aqua culture
11. Inland fisheries
12. Animals and species
13. Nutrition
14. Traditional health care methods

15. Food habits
16. Air pollution
17. Water pollution
18. Plantation
19. Soil protection
20. Renewable energy
21. Plant diseases
22. Yoga awareness and practice
23. Health care awareness programmes and their impact
24. Use of chemicals on fruits and vegetables
25. Organic farming
26. Crop rotation
27. Floury culture
28. Access to safe drinking water
29. Geographical survey
30. Geological survey
31. Sericulture
32. Study of species 3
3. Food adulteration
34. Incidence of Diabetes and other chronic diseases
35. Human genetics
36. Blood groups and blood levels
37. Internet Usage in Villages
38. Android Phone usage by different people
39. Utilisation of free electricity to farmers and related issues
40. Gender ration in schooling level- observation.

Complimenting the community service project the students may be involved to take up some awareness campaigns on social issues/special groups. The suggested list of programs

Programs for School Children

1. Reading Skill Program (Reading Competition)
2. Preparation of Study Materials for the next class.
3. Personality / Leadership Development
4. Career Guidance for X class students
5. Screening Documentary and other educational films
6. Awareness Program on Good Touch and Bad Touch (Sexual abuse)
7. Awareness Program on Socially relevant themes.

Programs for Women Empowerment

1. Government Guidelines and Policy Guidelines
2. Women's Rights
3. Domestic Violence
4. Prevention and Control of Cancer
5. Promotion of Social Entrepreneurship

General Camps

1. General Medical camps
2. Eye Camps
3. Dental Camps

4. Importance of protected drinking water
5. ODF awareness camp
6. Swatch Bharath
7. AIDS awareness camp
8. Anti-Plastic Awareness
9. Programs on Environment
10. Health and Hygiene
11. Hand wash programmes
12. Commemoration and Celebration of important days

Programs for Youth Empowerment

1. Leadership
2. Anti-alcoholism and Drug addiction
3. Anti-tobacco
4. Awareness on Competitive Examinations
5. Personality Development

Common Programs

1. Awareness on RTI
2. Health intervention programmes
3. Yoga
4. Tree plantation
5. Programs in consonance with the Govt. Departments like –
    i. Agriculture
    ii. Health
    iii. Marketing and Cooperation
    iv. Animal Husbandry
    v. Horticulture
    vi. Fisheries
    vii. Sericulture
    viii. Revenue and Survey
    ix. Natural Disaster Management
    x. Irrigation
    xi. Law & Order
    xii. Excise and Prohibition
    xiii. Mines and Geology
    xiv. Energy

Role of Students:

- Students may not have the expertise to conduct all the programmes on their own. The students then can play a facilitator role.
- For conducting special camps like Health related, they will be coordinating with the Governmental agencies.
- As and when required the College faculty themselves act as Resource Persons.
- Students can work in close association with Non-Governmental Organizations like Lions Club, Rotary Club, etc or with any NGO actively working in that habitation.
- And also, with the Governmental Departments. If the program is rolled out, the district Administration could be roped in for the successful deployment of the program.
- An in-house training and induction program could be arranged for the faculty and

participating students, to expose them to the methodology of Service Learning.

Timeline for the Community Service Project Activity
Duration: 8 weeks

1. **Preliminary Survey (One Week)**
   - A preliminary survey including the socio-economic conditions of the allotted habitation to be conducted.
   - A survey form based on the type of habitation to be prepared before visiting the habitation with the help of social sciences faculty. (However, a template could be designed for different habitations, rural/urban.
   - The Governmental agencies, like revenue administration, corporation and municipal authorities and village secretariats could be aligned for the survey.
2. **Community Awareness Campaigns (One Week)**
   - Based on the survey and the specific requirements of the habitation, different awareness campaigns and programmes to be conducted, spread over two weeks of time. The list of activities suggested could be taken into consideration.
3. **Community Immersion Programme (Three Weeks)**
   Along with the Community Awareness Programmes, the student batch can also work with any one of the below-listed governmental agencies and work in tandem with them. This community involvement programme will involve the students in exposing themselves to experiential learning about the community and its dynamics. Programs could be in consonance with the Govt. Departments.
4. **Community Exit Report (One Week)**
   - During the last week of the Community Service Project, a detailed report of the outcome of the 8 weeks' works to be drafted and a copy shall be submitted to the local administration. This report will be a basis for the next batch of students visiting that habitation. The same report submitted to the teacher-mentor will be evaluated by the mentor and suitable marks are awarded for onward submission to the University. Throughout the Community Service Project, a daily logbook needs to be maintained by the student's batch, which should be countersigned by the governmental agency representative and the teacher-mentor, who is required to periodically visit the students and guide them.