SVR ENGINEERING COLLEGE NANDYAL
(AUTONOMOUS)

B. Tech (Regular-Full time)

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

CIVIL ENGINEERING

I YEAR COURSE STRUCTURE AND SYLLABUS

B.TECH. –CIVIL EGINEERING - COURSE STRUCTURE & SYLLABUS – R24

(Applicable from the academic year 2024-25 onwards)

CIVIL Engineering

B.Tech. – I Year I						
S.No.	Course code	Title	L/D	T	P	Credits
1	24PH1001/24PH2001	Engineering Physics	3	0	0	3
2	24MA1001	Linear Algebra & Calculus	3	0	0	3
3	24EE1001/24EE2001	Basic Electrical & Electronics Engineering	3	0	0	3
4	24ME1001/24ME2001	Engineering Graphics	1	0	4	3
5	24CS1001	Introduction to Programming	3	0	0	3
6	24CS1002/24CS2002	IT Workshop	0	0	2	1
7	24PH1002/24PH2002	Engineering Physics Lab	0	0	2	1
8	24EE1002/24EE2002	Electrical & Electronics Engineering Workshop	0	0	3	1.5
9	24CS1003	Computer Programming Lab	0	0	3	1.5
10	24NA1001/24NA2001	NSS/NCC/Scouts &Guides/Community Service	-	-	1	0.5
Total			13	0	15	20.5

B.Tech. – I Year II						
S.No.	Course code	Title	L	T	P	Credits
1	24EN1001/24EN2001	Communicative English	2	0	0	2
2	24CH2003	Engineering Chemistry	3	0	0	3
3	24MA2001	Differential Equations & Vector Calculus	3	0	0	3
4	24CE1001/24CE2001	Basic Civil & Mechanical Engineering	3	0	0	3
5	24CE2002	Engineering Mechanics	3	0	0	3
6	24EN1002/24EN2002	Communicative English Lab	0	0	2	1
7	24CH2004	Engineering Chemistry Lab	0	0	2	1
8	24ME1002/24ME2002	Engineering Workshop	0	0	3	1.5
9	24CE2003	Engineering Mechanics & Building Materials Lab	0	0	3	1.5
10	24NA1002/24NA2002	Health and wellness, Yoga and Sports	-	-	1	0.5
Total			14	0	11	19.5

SVR ENGINEERING COLLEGE

(Autonomous)

Approved by AICTE: New Delhi, 2(f) & 12(B) Recognition by UGC Act.1956
Affiliated to JNT University – Ananthapuramu,
Accredited by NAAC & NBA
ISO 9001-2015 Certified Institution, Ayyaluru Village, NANDYAL Dist – 518 502, A.P.

Department of Civil Engineering

ENGINEERING PHYSICS Subject Code: 24PH1001/24PH2001			
Year & Semester	I-Year, I-Semester	**Course**	B.Tech
Course Category	Civil Department	**Credits**	3
Course Type	Theory	**L-T-P-C**	3-0-0-3
Regulations	R24	**Continuous Eval** **Semester Eval** **Total Marks**	30 70 100

COURSE OBJECTIVES:

To bridge the gap between the Physics in school at 10+2 level and UG level engineering courses by identifying the importance of the 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: A student after completion of the course will be able to

CO1: Analyze the intensity variation of light due to polarization, interference and diffraction
CO2: Familiarize with the basics of crystals and their structures.
CO3: Explain fundamentals of quantum mechanics and apply it to one dimensional motion of particles.
CO4: Summarize various types of polarization of dielectrics and classify the magnetic materials.
CO5: Explain the basic concepts of Quantum Mechanics and the band theory of solids.
CO6: Identify the type of semiconductor using Hall Effect.

COURSE OUTCOMES AND PROGRAM OUTCOMES MAPPING

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2
CO.1	3	2	2	2	3					3	2	3	3	3
CO.2	3	2	3	3		2	2	1				2	3	
CO.3	3	3	3	2	3		1			2				2
CO.4	2	3	3	2	2	3	3		2		3	3	3	
CO.5	2	2	3	2		2				3	2			3

UNIT-I:-	**Wave Optics**	**Lecture Hrs: 10**
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**	**Lecture Hrs: 08**
Crystallography: 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**	**Lecture Hrs: 10**
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**	**Lecture Hrs: 10**
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	**Semiconductor**	**Lecture Hrs: 10**
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 –Hall effect and its applications.		
Textbooks:		
1. A Text book of Engineering Physics, M. N. Avadhanulu, P.G.Kshirsagar & TVS Arun Murthy, S. Chand Publications, 11th Edition 2019. 2. Engineering Physics-D. K. Bhattacharya and Poonam Tandon, Oxfordpress 1st Edition Edition 3. Introduction to Quantum Mechanics - David J. Griffiths and Darrell F. Schroeter, 3rd Edition, Cambridge University Press, 2018.		
Reference Books:		
1. Engineering Physics - B. K. Pandeyand, S. Chaturvedi, Cengage Learning 2021. 2. Engineering Physics - Shatendra Sharma, Jyotsna Sharma, Pearson Education, 2018. 3. Engineering Physics – Sanjay D Jain, D. Sahasrabudhe and Girish, University Press. 2010 4. Engineering Physics - M. R. Srinivasan, New Ageinter national publishers (2009).		
Online Learning Resources:		
https://www.loc.gov/rr/scitech/selected-internet/physics.html		

LINEAR ALGEBRA &CALCULUS

Subject Code: 24MA1001

Year & Semester	I-Year, I-Semester	**Course**	B.Tech
Course Category	Civil Department	**Credits**	3
Course Type	Theory	**L-T-P-C**	3-0-0-3
Regulations	R24	**Continuous Eval** **Semester Eval** **Total Marks**	30 70 100

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: A student after completion of the course will be able to

CO1: Develop and use of matrix algebra techniques that are needed by engineers for the practical applications.
CO2: Utilize mean value theorems to real life problems.
CO3: Familiarize with functions of several variables which is useful in optimization.
CO4: Learn important tools of calculus in higher dimensions.
CO5: Familiarize with double and triple integrals of functions of several variables in two dimensions using.

COURSE OUTCOMES AND PROGRAM OUTCOMES MAPPING

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO.1	3	3	2	2	3					3	2	3	3	3
CO.2	3	2	3	3		2	2	1				2	3	
CO.3	3	2	3	2	3		1			2				2
CO.4	2	3	3	2	2	3	3		2		3	3	3	
CO.5	3	2	3	2		2				3	2			3

UNIT-I:-	**Matrices**	**Lecture Hrs: 10**

Rank of a matrix by echelon form, normal form. Cauchy–Binet formulae (without proof).Inverse of Nonsingular 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, Eigen vectors and Orthogonal Transformation**	**Lecture Hrs: 08**

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**	**Lecture Hrs: 10**

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)**	**Lecture Hrs: 10**

Functions of several variables: Continuity and Differentiability, Partial derivatives, total derivatives, chain rule, Directional derivative, 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)	Lecture Hrs: 10
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).		
Textbooks:		
1. Higher Engineering Mathematics,B.S.Grewal,KhannaPublishers,2017,44thEdition 2.Advanced Engineering Mathematics, Erwin Kreyszig, John Wiley &Sons, 2018, 10thEdition.		
Reference Books:		
1. Thomas Calculus, George B.Thomas, Maurice D. Weir and Joel Hass, Pearson Publishers, 2018, 14th Edition. 2. Advanced Engineering Mathematics, R.K.Jainand S.R.K.Iyengar, Alpha Science International Ltd., 2021 5th Edition (9th reprint). 3. Advanced Modern Engineering Mathematics, Glyn James, Pearson publishers, 2018, 5 th Edition. 4. Advanced Engineering Mathematics, Michael Greenberg,, Pearson publishers, 9 thedition. 5. Higher Engineering Mathematics, H. K Das, Er. Rajnish Verma, S. Chand Publications, 2014, Third Edition (Reprint 2021).		

BASIC ELECTRICAL & ELECTRONICS ENGINEERING

Subject Code: 24EE1001/24EE2001

Year & Semester	I-Year, I-Semester	Course	B.Tech
Course Category	Civil Department	Credits	3
Course Type	Theory	L-T-P-C	3-0-0-3
Regulations	R24	Continuous Eval Semester Eval Total Marks	30 70 100

PART A: BASIC ELECTRICAL ENGINEERING

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: A student after completion of the course will be able to

CO1: Remember the fundamental laws, operating principles of motors, generators, MC and MI instruments.

CO2: Understand the problem solving concepts associated to AC and DC circuits, construction and operation of AC and DC machines, measuring instruments; different power generation mechanisms, Electricity billing concept and important safety measures related to electrical operations.

CO3: Apply mathematical tools and fundamental concepts to derive various equations related to machines, circuits and measuring instruments; electricity bill calculations and layout representation of electrical power systems.

CO4: Analyze different electrical circuits, performance of machines and measuring instruments.

CO5: Evaluate different circuit configurations, Machine performance and Power systems operation

COURSE OUTCOMES AND PROGRAM OUTCOMES MAPPING

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2
CO.1	3	3	2	2	3					3	2	3	3	3
CO.2	3	2	3	3		2	2	1				2	3	
CO.3	3	2	3	2	3		1			2				2
CO.4	2	3	3	2	2	3	3		2		3	3	3	
CO.5	3	2	3	2		2				3	2			3

UNIT-I:-	**DC & AC Circuits**	**Lecture Hrs: 10**

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**	**Lecture Hrs: 10**

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	Lecture Hrs: 10

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.

Textbooks:

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

Reference Books:

1. Basic Electrical Engineering, D. P. KothariandI. J. Nagrath, Mc Graw Hill, 2019, Fourth Edition
2. Principles of Power Systems, V.K. Mehtha, S.Chand Technical Publishers, 2020
3. Basic Electrical Engineering, T. K. Nagsarkar and M. S. Sukhija, Oxford University Press, 2017
4. Basic Electrical and Electronics Engineering, S. K. Bhatacharya, Person Publications, 2018, Second Edition.

Web Resources:

1. https://nptel.ac.in/courses/108105053
2. https://nptel.ac.in/courses/108108076

PART B: BASIC ELECTRONICS ENGINEERING

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: After the completion of the course students will be able to

CO1: Apply the concept of science and mathematics to understand the working of diodes, transistors, and their applications.

CO2: Explain the characteristics of diodes and transistors.

CO3: Familiarize with the number systems, codes, Boolean algebra and logic gates.

C04: Understand the working mechanism of different combinational, sequential circuits and their role in the digital systems.

UNIT: 1	SEMICONDUCTOR DEVICES	Lecture Hrs:
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. Introduction to MOSFET: Construction and V-I Characteristics.		
UNIT: 1I	**BASIC ELECTRONIC CIRCUITS AND INSTRUMENTTAION**	**Lecture Hrs:**
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: 1II	**DIGITAL ELECTRONICS**	**Lecture Hrs:**
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, Simplification of Boolean functions using algebraic method, 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.		

ENGINEERING GRAPHICS

Subject Code: 24ME1001/24ME2001

Year & Semester	I-Year, I-Semester	**Course**	B.Tech
Course Category	Civil Department	**Credits**	3
Course Type	Theory	**L-T-P-C**	3-0-0-3
Regulations	R24	**Continuous Eval** **Semester Eval** **Total Marks**	30 70 100

COURSE OBJECTIVES:

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

COURSE OUTCOMES: A student after completion of the course will be able to

CO1: Understand the principles of engineering drawing, including engineering curves, scales, orthographic and isometric projections.

CO2: Draw and interpret orthographic projections of points, lines, planes and solids in front, top and side views.

CO3: Understand and draw projection of solids in various positions in first quadrant.

CO4: Explain principles behind development of surfaces.

CO5: Prepare isometric and perspective sections of simple solids.

COURSE OUTCOMES AND PROGRAM OUTCOMES MAPPING

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2
CO.1	3		2	2	1			2	1	2	1		3	1
CO.2		2	1	1		1	2	1				1	2	
CO.3		2		2	2		1			1				1
CO.4	2		1	2	1	2	2		2		2		2	
CO.5	3	2	2			2		2		1				1

UNIT-I:-		**Lecture Hrs: 10**
Introduction: Lines, Lettering and Dimensioning, Geometrical Constructions and Constructing regular polygons by general methods. Curves: construction of ellipse, parabola and hyperbola by general, Cycloids, Involutes, Normal and tangent to Curves. **Scales**: Plain scales, diagonal scales and vernier scales.		
UNIT: II		**Lecture Hrs: 08**
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		**Lecture Hrs: 10**
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		**Lecture Hrs: 10**
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		**Lecture Hrs: 10**
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).		
Textbooks:		
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, TataMcGraw Hill, 2017		

Online Learning Resources:
https://nptel.ac.in/courses/112103019 https://nptel.ac.in/courses/112105294

INTRODUCTION TO PROGRAMMING

Subject Code: 24CS1001

Year & Semester	I-Year, I-Semester	**Course**	B.Tech
Course Category	Civil Department	**Credits**	3
Course Type	Theory	**L-T-P-C**	3-0-0-3
Regulations	R24	**Continuous Eval** **Semester Eval** **Total Marks**	30 70 100

COURSE OBJECTIVES:

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

COURSE OUTCOMES: A student after completion of the course will be able to

CO1: Understand basics of computers, the concept of algorithm and algorithmic thinking.
CO2: Analyse a problem and develop an algorithm to solve it.
CO3: Implement various algorithms using the C programming language.
CO4: Understand more advanced features of C language.
CO5: Develop problem-solving skills and the ability to debug and optimize the code.

COURSE OUTCOMES AND PROGRAM OUTCOMES MAPPING														
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
CO.1	3	3	2	2	3					3	2	3	3	3
CO.2	3	2	3	3		2	2	1				2	3	
CO.3	3	2	3	2	3		1			2				2
CO.4	2	3	3	2	2	3	3		2		3	3	3	
CO.5	3	2	3	2		2				3	2			3

UNIT-I:-	**Introduction to Programming and Problem Solving**	**Lecture Hrs: 11**

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 Dia Tool), pseudo code. Introduction to Compilation and Execution, Primitive Data Types, Variables, and Constants, Basic Input and Output Operations, Operators, 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**	**Lecture Hrs: 07**

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

UNIT: III	**Arrays and Strings**	**Lecture Hrs: 10**

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

UNIT: IV	**Pointers & User Defined Data types**	**Lecture Hrs: 11**

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

UNIT: V	**Functions & File Handling**	**Lecture Hrs: 12**

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, Storage classes – auto, register, static, extern, Command line arguments. Basics of File Handling

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

Textbooks:
1. The C Programming Language", Brian W. Kernighan and Dennis M. Ritchie,PrenticeHall, 1988 2. Schaum's Outline of Programming with C, Byron S Gottfried, McGraw-HillEducation, 1996 3. C Programming, A ProblemSolving Approach, Forouzan, Gilberg, Prasad, CENGAGE,
Reference Books:
1. Computing fundamentals and C Programming, Balagurusamy, E., McGraw-Hill Education, 2008. 2. Programming in C, Rema Theraja, Oxford, 2016, 2nd edition
Online Learning Resources:
1. https://onlinecourses.nptel.ac.in/noc24_cs02/preview 2. https://www.w3schools.com/c/ 3. https://www.tutorialspoint.com/cprogramming/c_useful_resources.htm 4. https://www.geeksforgeeks.org/c-programming-language/

IT WORKSHOP

Subject Code: 24CS1002/24CS2002

Year & Semester	I-Year, I-Semester	**Course**	B.Tech
Course Category	Civil Department	**Credits**	1
Course Type	Lab	**L-T-P-C**	0-0-2-1
Regulations	R24	**Continuous Eval** **Semester Eval** **Total Marks**	30 70 100

COURSE OBJECTIVES:

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

COURSE OUTCOMES: A student after completion of the course will be able to
CO1: Perform Hardware troubleshooting.
CO2: Understand Hardware components and inter dependencies.
CO3: Safeguard computer systems from viruses/worms.
CO4: Document/ Presentation preparation.
CO5: Perform calculations using spreadsheets.

COURSE OUTCOMES AND PROGRAM OUTCOMES MAPPING

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO 11	PO 12	PS O1	PS O2
CO.1	3	3	3	3	3	3	2		3	3	3	3	3	3
CO.2	3	3	2	3	3	2			3	3	3	3	2	2
CO.3	3	3	3	2	3	3			3	3	3	3	2	3
CO.4	3	2	3	3	3	3	3		2	3	3	2	2	2
CO.5	3	3	2	2	2	2		1	3	3	3	3	3	3

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 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 the 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 custom
LaTeX and WORD
Task 1 – Word Orientation: The mentor needs to give an overview of La TeX and Microsoft (MS) office or equivalent (FOSS) tool word: Importance of La TeX 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 La TeXand word – Accessing, overview of toolbars, saving files, Using help and resources, rulers, format painter in word. **Task 2**: Using La TeX 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 La TeX 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) 5. LaTeX Companion, Leslie Lamport, PHI/Pearson. 6. IT Essentials PC Hardware and Software Companion Guide, David Anfins on and Ken Quamme. – CISCO Press, Pearson Education, 3rd edition 7. IT Essentials PC Hardware and Software Labs and Study Guide, Patrick Regan– CISCO Press, Pearson Education, 3rd edition.

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Department of Civil Engineering

ENGINEERING PHYSICS LAB

Subject Code: 24PH1002/24PH2002

Year & Semester	I-Year, I-Semester	**Course**	B.Tech
Course Category	Civil Department	**Credits**	1
Course Type	Lab	**L-T-P-C**	0-0-2-1
Regulations	R24	**Continuous Eval** **Semester Eval** **Total Marks**	30 70 100

COURSE OBJECTIVES:

To study the concepts of optical phenomenon like interference, diffraction etc., recognize the importance of energy gap in the study of conductivity and Hall effect in semiconductors and study the parameters

COURSE OUTCOMES: A student after completion of the course will be able to
CO1: Operate optical instruments like travelling microscope and spectrometer.
CO2: Estimate the wavelengths of different colours using diffraction grating.
CO3: Plot the intensity of the magnetic field of circular coil carrying current with distance.
CO4: Evaluate dielectric constant and magnetic susceptibility for dielectric and magnetic materials respectively.
CO5: Calculate the band gap of a given semiconductor. CO6: Identify the type of semiconductor using Hall Effect

COURSE OUTCOMES AND PROGRAM OUTCOMES MAPPING

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2
CO.1	3	3	3	3	3	3	2		3	3	3	3	3	3
CO.2	3	3	2	3	3	2			3	3	3	3	2	2
CO.3	3	3	3	2	3	3			3	3	3	3	2	3
CO.4	3	2	3	3	3	3	3		2	3	3	2	2	2
CO.5	3	3	2	2	2	2		1	3	3	3	3	3	3

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 photo electric 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 and Hall coefficient of a given semiconductor 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 nonuniform 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. Out of which any TWO experiments may be conducted in virtual mode

References:

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

Web Resources

www.vlab.co.in
https://phet.colorado.edu/en/simulations/filter?subjects=physics&type=html,prototype
https://www.vlab.co.in/participating-institute-amrita-vishwa-vidyapeetham

ELECTRICAL & ELECTRONICS ENGINEERING WORKSHOP

Subject Code: 24EE1002/24EE2002

Year & Semester	I-Year, I-Semester	**Course**	B.Tech
Course Category	Civil Department	**Credits**	1.5
Course Type	Lab	**L-T-P-C**	0-0-3-1.5
Regulations	R24	**Continuous Eval** **Semester Eval** **Total Marks**	30 70 100

COURSE OBJECTIVES:

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

COURSE OUTCOMES: A student after completion of the course will be able to

CO1: Understand the Electrical circuit design concept; measurement of resistance, power, power factor; concept of wiring and operation of Electrical Machines and Transformer.

CO2: Apply the theoretical concepts and operating principles to derive mathematical models for circuits, Electrical machines and measuring instruments; calculations for the measurement of resistance, power and power factor.

CO3: Apply the theoretical concepts to obtain calculations for the measurement of resistance, power and power factor.

CO4: Analyse various characteristics of electrical circuits, electrical machines and measuring instruments.

CO5: Design suitable circuits and methodologies for the measurement of various electrical parameters; Household and commercial wiring

COURSE OUTCOMES AND PROGRAM OUTCOMES MAPPING

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO.1	3	3	3	3	3	3	2		3	3	3	3	3	3
CO.2	3	3	2	3	3	2			3	3	3	3	2	2
CO.3	3	3	3	2	3	3			3	3	3	3	2	3
CO.4	3	2	3	3	3	3	3		2	3	3	2	2	2
CO.5	3	3	2	2	2	2		1	3	3	3	3	3	3

PART A: ELECTRICAL ENGINEERING LAB

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

References:

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

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

Course Outcomes: At the end of the course, the student will be able to
CO1: Identify & testing of various electronic components.
CO2: Understand the usage of electronic measuring instruments.
CO3: Plot and discuss the characteristics of various electron devices.
CO4: Explain the operation of a digital circuit

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 Table 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.

References:

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 to be performed. All the experiments shall be implemented using both Hardware and Software

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Department of Civil Engineering

COMPUTER PROGRAMMING LAB

Subject Code: 24CS1003

Year & Semester	I-Year, I-Semester	**Course**	B.Tech
Course Category	Civil Department	**Credits**	1.5
Course Type	Lab	**L-T-P-C**	0-0-3-1.5
Regulations	R24	**Continuous Eval** **Semester Eval** **Total Marks**	30 70 100

COURSE OBJECTIVES:

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

COURSE OUTCOMES:

A student after completion of the course will be able to

CO1: Understand basics of computers, the concept of algorithm and algorithmic thinking.
CO2: Analyse a problem and develop an algorithm to solve it.
CO3: Implement various algorithms using the C programming language.
CO4: Understand more advanced features of C language.
CO5: Develop problem-solving skills and the ability to debug and optimize the code.

COURSE OUTCOMES AND PROGRAM OUTCOMES MAPPING

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2
CO1	3	3	3	3	3	3	2		3	3	3	3	3	3
CO2	3	3	2	3	3	2			3	3	3	3	2	2
CO3	3	3	3	2	3	3			3	3	3	3	2	3
CO4	3	2	3	3	3	3	3		2	3	3	2	2	2
CO5	3	3	2	2	2	2		1	3	3	3	3	3	3

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 with 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:
Tutorial 4: 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, nullelse, 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 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) Determinant of matrix
iv) Sort array elements using bubble sort
v) Concatenate two strings without built-in functions
vi) Reverse a string using built-in and without built-in string functions

UNIT: IV

WEEK9:

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

Tutorial 9: Pointers, structures and dynamic memory allocation

Lab 9: Pointers and structures, memory dereferences.

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

UNIT: V	

WEEK11:
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 integrationSuggested 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
v) illustrate the use of auto, static, register and external variables.

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.
v) Develop a C program which takes two numbers as command line arguments and finds all the common factors of those two numbers.

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 last n characters of a given file

Textbooks:

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, PrenticeHall of India
2. C Programming, A Problem-Solving Approach, Forouzan, Gilberg, Prasad, CENGAGE

1. The C Programming Language", Brian W. Kernighan and Dennis M. Ritchie,PrenticeHall, 1988
2. Schaum's Outline of Programming with C, Byron S Gottfried, McGraw-HillEducation, 1996 3. C Programming, A ProblemSolving Approach, Forouzan, Gilberg, Prasad, CENGAGE,

Reference Books:

Computing fundamentals and C Programming, Balagurusamy, E., McGraw-Hill Education, 2008.

3. Programming in C, Rema Theraja, Oxford, 2016, 2nd edition

Online Learning Resources:

5. https://onlinecourses.nptel.ac.in/noc24_cs02/preview
6. https://www.w3schools.com/c/
7. https://www.tutorialspoint.com/cprogramming/c_useful_resources.htm
8. https://www.geeksforgeeks.org/c-programming-language/

NSS/NCC/SCOUTS & GUIDES/COMMUNITY SERVICE

Subject Code: 24NA1001/24NA2001

Year & Semester	I-Year, I-Semester	**Course**	B.Tech
Course Category	Civil Department	**Credits**	0.5
Course Type	Theory	**L-T-P-C**	0-0-0-0.5
Regulations	R24	**Internal Eval**	100

COURSE OBJECTIVES:
The objective of introducing this course is to impart discipline, character, fraternity, teamwork, social consciousness among the students and engaging them in selfless service.

COURSE OUTCOMES: A student after completion of the course will be able to
CO1: Understand the importance of discipline, character and service motto.
CO2: Solve some societal issues by applying acquired knowledge, facts, and techniques.
CO3: Explore human relationships by analyzing social problems.
CO4: Determine to extend their help for the fellow beings and downtrodden people.
CO5: Develop leadership skills and civic responsibilities.

UNIT-I:-	**Orientation**	**Lecture Hrs: 10**

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	**Lecture Hrs: 10**

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**	**Lecture Hrs: 10**
Activities: i) Conducting One Day Special Camp in a village contacting village-area leaders Survey in the village, identification of problems- helping them to solve via media authorities-experts-etc. ii) Conducting awareness programs on Health-related issues such as General Health, Mental health, Spiritual Health, HIV/AIDS, iv) Conducting consumer Awareness. Explaining various legal provisions etc. v) Women Empowerment Programmes- Sexual Abuse, Adolescent Health and Population Education. v) 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		
Evaluation Guidelines:		
• Evaluated for a total of 100 marks. • A student can select 6 activities of his/her choice with a minimum of 01 activity per unit. Each activity shall be evaluated by the concerned teacher for 15 marks, totalling to 90 marks. • A student shall be evaluated by the concerned teacher for 10 marks by conducting viva voce on the subject.		

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Department of Civil Engineering

COMMUNICATIVE ENGLISH

Subject Code: 24EN1001/24EN2001

Year & Semester	I-Year, II-Semester	**Course**	B.Tech
Course Category	Civil Department	**Credits**	2
Course Type	Theory	**L-T-P-C**	2-0-0-2
Regulations	R24	**Continuous Eval** **Semester Eval** **Total Marks**	30 70 100

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 to make them effective in speaking and writing skills and to make them industry-ready

COURSE OUTCOMES: A student after completion of the course will be able to

CO1: Understand the context, topic, and pieces of specific information from social or Transactional dialogues.
CO2: Apply grammatical structures to formulate sentences and correct word forms.
CO3: Analyze discourse markers to speak clearly on a specific topic in informal discussions.
CO4: Evaluate reading/listening texts and to write summaries based on global comprehension of the texts.
CO5: Create a coherent paragraph, essay, and resume.

COURSE OUTCOMES AND PROGRAM OUTCOMES MAPPING

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2
CO.1	3		2	2	1			2	1	2	1		3	1
CO.2		2	1	1		1	2	1				1	2	
CO.3		2		2	2		1			1				1
CO.4	2		1	2	1	2	2		2		2		2	
CO.5	3	2	2			2		2		1				1

UNIT-I:-	**HUMAN VALUES**	**Lecture Hrs: 8**
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)**	**Lecture Hrs: 9**
Listening: Answering a series of questions about main ideas and supporting ideas after listening to audio texts. **Speaking:** Discussion in pairs/small groups on specific topics followed by short structured talks. **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 Types (Expository ,Narrative , Descriptive , Persuasive and other types compare and contrast) **Grammar:** Cohesive devices- linkers use of articles and zero articles; prepositions **Vocabulary;** Homonyms, homophones, homographs		
UNIT: III	**BIOGRAPHY: Elon Musk Listening**	**Lecture Hrs: 09**
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; **Vocabulary:** Compound words, Collocations		
UNIT: IV	**INSPIRATION:**	**Lecture Hrs: 10**
Listening: Making predictions while listening to conversations/ transactional dialogues without video; listening with video. **Speaking**: Role plays for practice of conversational English in academic contexts (formal and informal) -asking for and giving information/directions. **Reading:** Studying the use of graphic elements in texts to convey information, reveal trends/patterns/relationships, communicate processes or display complicated data. **Writing:** Academic Writing (Letter Writing, Letter writing, creative writing, critical thinking) **Grammar:** Reporting verbs, Direct & Indirect speech, Active & Passive Voice Vocabulary: Words often confused		

UNIT: V	MOTIVATION: The Power of Intrapersonal Communication (An Essay)	Lecture Hrs: 10

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 and specific Jargons

Textbooks:

1. Pathfinder: Communicative English for Undergraduate Students, 1st Edition, Orient Black Swan, 2023 (Units 1,2 &3)
2. Empowering with Language by Cen gage Publications, 2023 (Units 4 & 5)
3. THE CAMBRIDGE ENGLISH IELTS BOOK (series 1---12) 4. Barron's TOEFL IBT "17th edition

Reference Books:

1. Dubey, Sham Ji & Co. English for Engineers, Vikas Publishers, 2020
2. Bailey, Stephen. Academic writing: A Handbook for International Students. Rout ledge, 2014.
3. Murphy, Raymond. English Grammar in Use, Fourth Edition, Cambridge University Press, 2019.
4. Lewis, Norman. Word Power Made Easy- The Complete Handbook for Building a Superior Vocabulary. Anchor, 2014.
5. Ashraf Rizvi, Effective Technical Communication 2 Edition

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/

SVR ENGINEERING COLLEGE

(Autonomous)

Approved by AICTE: New Delhi, 2(f) & 12(B) Recognition by UGC Act.1956
Affiliated to JNT University – Ananthapuramu,
Accredited by NAAC & NBA
ISO 9001-2015 Certified Institution, Ayyaluru Village, NANDYAL Dist – 518 502, A.P.

Department of Civil Engineering

ENGINEERING CHEMISTRY

Subject Code: 24CH2003

Year & Semester	I-Year, II-Semester	**Course**	B.Tech
Course Category	Civil Department	**Credits**	3
Course Type	Theory	**L-T-P-C**	3-0-0-3
Regulations	R24	**Continuous Eval** **Semester Eval** **Total Marks**	30 70 100

COURSE OBJECTIVES:

- To familiarize engineering chemistry and its applications
- To impart the concept of soft and hard waters, softening methods of hard water
- To train the students on the principles and applications of electrochemistry, polymers, surface chemistry and cement

COURSE OUTCOMES: A student after completion of the course will be able to

CO1: Explain the industrial water treatment.
CO2: Demonstrate the corrosion prevention methods and factors affecting corrosion.
CO3: Explain the preparation, properties, and applications of thermoplastics & thermosetting, elastomers & conducting polymers. Explain calorific values, octane number, refining of petroleum and cracking of oils.
CO4: Explain the setting and hardening of cement.
CO5: Summarize the concepts of colloids, micelle and nano materials.

COURSE OUTCOMES AND PROGRAM OUTCOMES MAPPING

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2
CO.1	3	3	2	2	1	2	1	2	1	2	1		3	2
CO.2	3	2	1	1	2	1	2	1				1	2	
CO.3	2	2	2	2	2	1	1			1	1	2		2
CO.4	2	3	1	2	1	2	2		1	2			2	
CO.5	3	2	2	3	3	2		2		1	2	3	1	2

UNIT-I:-	WATER TECHNOLOGY	Lecture Hrs: 12
INTRODUCTION: Soft Water and hardness of water. Estimation of hardness of water by EDTA Method. **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 APPLICATIONS**	**Lecture Hrs: 12**
ELECTRODES – concepts, electrochemical cell, Nernst equation, cell potential calculations. **Primary Cells** – Zinc-air battery - working of the batteries including cell reactions. **Secondary Cells** – Nickel-Cadmium (Ni-Cd) and lithium ion batteries working of the batteries including cell reactions. **Fuel Cells** - Hydrogen-oxygen, Methanol fuel cells –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 Bed worth 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**	**Lecture Hrs: 12**
POLYMERS: Introduction Polymers, functionality of monomers, Mechanism of chain growth, step growth and coordination polymerization. **Plastics** –Thermo and Thermosetting plastics, Preparation, properties and applications of – PVC, Poly styrene, Bakelite, Nylon-6,6 **Elastomers** – Preparation, properties and applications of Buna S, Buna N, Thiokol rubbers. **FUELS** – Types of fuels, calorific value, numerical problems based on calorific value; Analysis of coal(Proximate and Ultimate analysis), Liquid Fuels, refining of petroleum, Octane and Cetane number, alternative fuels- propane, methanol, ethanol bio-fuel-bio-diesel.		
UNIT: IV	**ADVANCED ENGINEERING MATERIALS**	**Lecture Hrs: 12**
Composites- Definition, Constituents, Classification- Particle, Fibre and Structural reinforced 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, Setting and Hardening of cement.		

UNIT: V	SURFACE CHEMISTRY AND APPLICATIONS	Lecture Hrs: 12

Introduction to surface chemistry, colloids, nano metals and metal oxides, micelle formation, synthesis of colloids (Braggs Method), chemical and Biological methods of preparation of nano metals and metal oxides, stabilization of colloids and nano materials by stabilizing agents, adsorption isotherm(Freundlich and Longmuir), BET equation (no derivation) applications of colloids and nano materials – catalysis, medicine, sensors.etc.,

Textbooks:

1. Jain and Jain, Engineering Chemistry, 16/e, Dhanpat Rai, 2013.
2. Peter Atkins, Juliode Paula and James Keeler, Atkins' Physical Chemistry,10/e, Oxford University Press, 2010.

Reference Books:

1. H.F.W. Taylor, Cement Chemistry,2/e,ThomasTelfordPublications,1997.
2. D.J. Shaw, Introduction to Colloids and Surface Chemistry, Butterworth-Heineman, 1992.
3. Textbook of Polymer Science, Fred W. Billmayer Jr, 3rd Edition, 2007.

DIFFERENTIAL EQUATIONS & VECTOR CALCULUS

Subject Code: 24MA2001

Year & Semester	I-Year, II-Semester	**Course**	B.Tech
Course Category	Civil Department	**Credits**	3
Course Type	Theory	**L-T-P-C**	3-0-0-3
Regulations	R24	**Continuous Eval** **Semester Eval** **Total Marks**	30 70 100

COURSE OBJECTIVES:

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

COURSE OUTCOMES: A student after completion of the course will be able to

CO1: Solve the differential equations related to various engineering fields.
CO2: Solve the higher order linear differential equations related to various engineering fields.
CO3: Identify solution methods for partial differential equations that model physical processes.
CO4: Interpret the physical meaning of different operators such as gradient, curl and divergence.
CO5: Estimate the work done against a field, circulation and flux using vector calculus.

COURSE OUTCOMES AND PROGRAM OUTCOMES MAPPING

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO.1	3	2	2	2	2					3	2	2	2	3
CO.2	2	2	3	3		2	2	1				3	2	
CO.3	2	3	2	3	2		1			3				2
CO.4	2	2	2	2	2	2	3		3		3	3	2	
CO.5	3	3	2	3		2				3	2			3

UNIT-I:-	**Differential equations of first order and first degree**	**Lecture Hrs:**

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

UNIT: II	**Linear differential equations of higher order (Constant Coefficients)**	**Lecture Hrs:**

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

UNIT: III	**Partial Differential Equations**	**Lecture Hrs:**

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**	**Lecture Hrs:**

Scalar and vector point functions, Vector differential operator to scalar point functions-Gradient, Directional derivative, Vector differential operator to vector point functions-Divergence and Curl, vector identities.

UNIT: V	Vector integration	Lecture Hrs:
Linear 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		

Textbooks:

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. Weir and Joel Hass, Pearson Publishers, 2018, 14th Edition.
2. Advanced Engineering Mathematics, Dennis G. Zill and Warren S. Wright, Jones and Bartlett, 2018.
3. Advanced Modern Engineering Mathematics, Glyn James, Pearson publishers, 2018, 5th Edition.
4. Advanced Engineering Mathematics, R. K. Jain and S. R. K. Iyengar, Alpha Science International Ltd., 2021 5th Edition (9th reprint).
5. Higher Engineering Mathematics, B. V. Ramana, McGraw Hill Education, 2017

BASIC CIVIL & MECHANICAL ENGINEERING

Subject Code: 24CE1001/24CE2001

Year & Semester	I-Year, II-Semester	**Course**	B.Tech
Course Category	Civil Department	**Credits**	3
Course Type	Theory	**L-T-P-C**	3-0-0-3
Regulations	R24	**Continuous Eval** **Semester Eval** **Total Marks**	30 70 100

COURSE OBJECTIVES:

- Get familiarized with the scope and importance of Civil Engineering sub-divisions.
- Introduce the preliminary concepts of surveying.
- Acquire preliminary knowledge on Transportation and its importance in nation's economy.
- Get familiarized with the importance of quality, conveyance and storage of water.

- Introduction to basic civil engineering materials and construction techniques

COURSE OUTCOMES: A student after completion of the course will be able to

CO1: Understand various sub-divisions of Civil Engineering and to appreciate their role in ensuring better society.

CO2: Know the concepts of surveying and to understand the measurement of distances, angles and levels through surveying.

CO3: Realize the importance of Transportation in nation's economy and the engineering measures related to Transportation.

CO4: Understand the importance of Water Storage and Conveyance Structures so that the social responsibilities of water conservation will be appreciated.

CO5: Understand the b a s i c characteristics of Civil Engineering Materials and attain knowledge on prefabricated technology.

COURSE OUTCOMES AND PROGRAM OUTCOMES MAPPING

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3		2	2	1			2	2	2	2		3	1
CO2		2	1	1		1	2	1				2	2	
CO3		2		2	2		1			1				1
CO4	2		1	2	1	2	2		1		1		2	
CO5	3	2	2			2		2		1				2

PART A: BASIC CIVIL ENGINEERING

UNIT-I:-		**Lecture Hrs: 08**

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		**Lecture Hrs: 08**

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		Lecture Hrs: 08

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).

Textbooks:

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

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. Irrigation Engineering and Hydraulic Structures - Santosh Kumar Garg, Khanna Publishers, Delhi 2023. 38th Edition.
1. Highway Engineering, S.K.Khanna, C.E.G. Justo and Veeraraghavan, Nemchand and Brothers Publications 2019. 10th Edition.
2. Indian Standard DRINKING WATER — SPECIFICATION IS 10500-2012.

Textbooks:

PART B: BASIC MECHANICAL ENGINEERING

Course Objectives:
The students after completing the course are expected to

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

Course Outcomes: On completion of the course, the student should be able
CO1: Understand the different manufacturing processes**.**
CO2: Explain the basics of thermal engineering and its applications.
CO3: Describe the working of different mechanical power transmission systems and power

plants. CO4: Describe the basics of robotics and its applications.

COURSE OUTCOMES AND PROGRAM OUTCOMES MAPPING

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2
CO1	3		2	2	1			2	2	2	2		3	1
CO2		2	1	1		1	2	1				2	2	
CO3		2		2	2		1			1				1
CO4	2		1	2	1	2	2		1		1		2	
CO5	3	2	2			2		2		1				2

UNIT I | **Lecture Hrs: 08**

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 | **Lecture Hrs: 08**

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 Vehicle

UNIT III | **Lecture Hrs: 08**

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**).**

Textbooks:

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 MPandey, 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 M Engineering, Tata McGraw Hill publications (India) Pvt. Ltd.
Online Learning Resources:
Online Learning Resources:
https://nptel.ac.in/courses/112103019 https://nptel.ac.in/courses/112105294

ENGINEERING MECHANICS **Subject Code: 24CE2002**			
Year & Semester	I-Year, II-Semester	**Course**	B.Tech
Course Category	Civil Department	**Credits**	3
Course Type	Theory	**L-T-P-C**	3-0-0-3
Regulations	R24	**Continuous Eval** **Semester Eval** **Total Marks**	30 70 100

COURSE OBJECTIVES:

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

COURSE OUTCOMES: A student after completion of the course will be able to

CO1: Understand the fundamental concepts in mechanics and determine the frictional forces for bodies in contact.

CO2: Analyze different force systems such as concurrent, coplanar and spatial systems and calculate their resultant forces and moments.

CO3: Calculate the centroids, center of gravity and moment of inertia of different geometrical shapes.

CO4: Apply the principles of work-energy and impulse-momentum to solve the problems of rectilinear and curvilinear motion of a particle.

CO5: Solve the problems involving the translational and rotational motion of rigid bodies.

COURSE OUTCOMES AND PROGRAM OUTCOMES MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO.1	3	3	2	2	1	2			1	2	1	2	3	1
CO.2	3	2	1	1		1		1		2		1	2	2
CO.3	3	3	2	2	2	1	1	2	2	2	2		2	1
CO.4	2	3	1	2	2	2	2	2	2	2	2	2	2	2
CO.5	3	2	2	2		2		2		1		1	3	1

UNIT-I:-		**Lecture Hrs: 10**

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		**Lecture Hrs: 08**

Equilibrium of Systems of Forces: Free Body Diagrams, Lami's Theorm, 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		**Lecture Hrs: 10**

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 Momen to fInertia, 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		**Lecture Hrs: 10**
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		**Lecture Hrs: 10**
Rigid body Motion: Kinematics and Kinetics of translation, Rotation about fixed axis and plane motion, Work Energy method and Impulse Momentum method.		
Textbooks:		
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 5. Press, 2014. Second Edition		

COMMUNICATIVE ENGLISH LAB

Subject Code: 24EN1002/24EN2002

Year & Semester	I-Year, II-Semester	**Year & Semester**	B.Tech
Course Category	Civil Department	**Course Category**	1
Course Type	Lab	**Course Type**	0-0-2-1
Regulations	R24	**Regulations**	30 70 100

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 the basic communication skills and also make them ready

COURSE OUTCOMES: A student after completion of the course will be able to

CO1: Understand the different aspects of the English language proficiency with emphasis on LSRWskills.

CO2: Apply communication skills through various language learning activities.

CO3: Analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking comprehension.

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

CO5: Create effective resume and prepare them to face interviews in future.

COURSE OUTCOMES AND PROGRAM OUTCOMES MAPPING

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2
CO1	3	3	2	2	1	2			1		1	2	3	1
CO2			1	1		1		1				1	2	2
CO3	3	3	2	2	2	1	1			1			2	1
CO4		3	1	2		2			2		2	2	2	2
CO5	3	2	2	2		2		2		1			3	1

List of Topics:

1. Vowels & Consonants
2. Neutralization/Accent Rules/Syllable division
3. Communication Skills & JAM
4. Role Play or Conversational Practice
5. E-mail Writing
6. Resume Writing, Cover letter, SOP(Statement of Purpose)
7. Group Discussions-Methods & Practice
8. Debates - Methods & Practice 9. PPT Presentations/Poster Presentation 10. Interviews Skills

Suggested Software:

- Walden InfoTech
- Young India Films
- K-Van Solutions

Reference Books:
1. Raman Meenakshi , Sangeeta-Sharma. Technical Communication. Oxford Press.2018. .
2. Taylor Grant: English Conversation Practice, Tata McGraw-Hill Education India, 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
Web Resources:
Spoken English: 1. www.esl-lab.com 2. www.englishmedialab.com 3. www.englishinteractive.net 4. https://www.britishcouncil.in/english/online 5. http://www.letstalkpodcast.com/ 6. https://www.youtube.com/c/mmmEnglish_Emma/featured 7. https://www.youtube.com/c/ArnelsEverydayEnglish/featured 8. https://www.youtube.com/c/engvidAdam/featured 9. https://www.youtube.com/c/EnglishClass101/featured 10. https://www.youtube.com/c/SpeakEnglishWithTiffani/playlists 11. https://www.youtube.com/channel/UCV1h_cBE0Drdx19qkTM0WNw 12. https://www.bbc.co.uk/learningenglish/ 13.https://www.talkenglish.com/speaking/basics/speaking_basics_ii.aspx 14.https://www.englishclub.com/speaking/
Voice & Accent:
1.https://www.youtube.com/user/letstalkaccent/videos 2. https://www.youtube.com/c/EngLanguageClub/featured 3. https://www.youtube.com/channel/UC_OskgZBoS4dAnVUgJVexc 4. https://www.youtube.com/channel/UCNfm92h83W2i2ijc5Xwp_IA

ENGINEERING CHEMISTRY LAB
Subject Code: 24CH2004

Year & Semester	I-Year, II-Semester	**Course**	B.Tech
Course Category	Civil Department	**Credits**	1
Course Type	Lab	**L-T-P-C**	0-0-2-1
Regulations	R24	**Continuous Eval** **Semester Eval** **Total Marks**	30 70 100

COURSE OBJECTIVES:
To verify the fundamental concepts with experiments.

COURSE OUTCOMES: A student after completion of the course will be able to

CO1: Determine the cell constant and conductance of solutions.
CO2: Prepare advanced polymer materials.
CO3: Determine the physical properties like surface tension, adsorption and viscosity.
CO4: Estimate the Iron and Calcium in cement.
CO5: Calculate the hardness of water

COURSE OUTCOMES AND PROGRAM OUTCOMES MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1
CO1	3	3	2	2	1	2			2		1	2	3
CO2	2	2	3	1		1		2					2
CO3	3	3	2	2	2	1	2			1		3	2
CO4	2	3	3	2		2			2		2	2	2
CO5	3	2	2	2	3	2		2		1			3

List of Experiments:

1. Determination of Hardness of a groundwater sample.
2. Estimation of Dissolved Oxygen by Winkler's method
3. Determination of Strength of an acid in Pb-Acid battery
4. Preparation of a polymer (Bakelite)
5. Determination of percentage of Iron in Cement sample by colorimeter
6. Estimation of Calcium in port land Cement
7. Preparation of nano materials by precipitation method.
8. Adsorption of acetic acid by charcoal
9. Determination of percentage Moisture content in a coal sample
10. Determination of Viscosity of lubricating oil by Redwood Viscometer 1
11. Determination of Viscosity of lubricating oil by Redwood Viscometer 2
12. Determination of Calorific value of gases by Junker's gas Calorimeter

Note: Any TEN of the listed experiments are to be conducted.

References:

"Vogel's Quantitative Chemical Analysis 6th Edition 6th Edition" Pearson Publications by J. Mendham, R.C. Denney, J.D. Barnes M.Thomas and B. Sivasankar, 2009

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Department of Civil Engineering

ENGINEERING WORKSHOP

Subject Code: 24ME1002/24ME2002

Year & Semester	I-Year, II-Semester	**Course**	B.Tech
Course Category	Civil Department	**Credits**	1.5
Course Type	Lab	**L-T-P-C**	0-0-3-1.5
Regulations	R24	**Continuous Eval** **Semester Eval** **Total Marks**	30 70 100

COURSE OBJECTIVES:

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

COURSE OUTCOMES: A student after completion of the course will be able to

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

COURSE OUTCOMES AND PROGRAM OUTCOMES MAPPING

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2
CO1	3	3	2	3	1	2			2		1	2	1	
CO2	1	1	1	1		1		1			2	1	2	2
CO3	3	3	2	2	2	1	1			3	1	1	2	
CO4	2	3	1	1	2	2			2		2	2	2	2
CO5	3	2	2	3		2		2	1	1	1		1	3

Syllabus

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 Ten on joint c) Corner Dovetail joint or Bridle joint
3. Sheet Metal Working: Familiarity with different types of tools used in sheet met al 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 makes the following connections.
a) Parallel and series b) Two-way switch c) God own 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

Textbooks:

1. Basic Workshop Technology: Manufacturing Process, Felix W.; Independently Published, 2019. Workshop Processes, Practices and Materials; Bruce J. Black, Routledge publishers, 5th Edn. 2015.
2. 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.

Online Learning Resources:

https://nptel.ac.in/courses/112104526

ENGINEERING MECHANICS & BUILDING PRACTICES LAB

Subject Code: 24CE2003

Year & Semester	I-Year, II-Semester	**Course**	B.Tech
Course Category	Civil Department	**Credits**	1.5
Course Type	Lab	**L-T-P-C**	0-0-3-1.5
Regulations	R24	**Continuous Eval** **Semester Eval** **Total Marks**	30 70 100

COURSE OBJECTIVES:

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

COURSE OUTCOMES: A student after completion of the course will be able to

CO1: Evaluate the coefficient of friction between two different surfaces and between the inclined plane and the roller.

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

CO3: Determine the Centre of gravity different configurations and

CO4: Understand the Quality Testing and Assessment Procedures and principles of Non-Destructive Testing.

CO5: Exposure to safety practices in the construction industry

COURSE OUTCOMES AND PROGRAM OUTCOMES MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO.1	3	3	2	2	1	2	2		1	2	1	2	3	1
CO.2	3	2	1	3		1		1	1	1	1	1	2	2
CO.3	3	3	2	2	2	1	1	2	1	3	2	2	2	1
CO.4	3	3	3	2		2		2	2	2	2	2	2	3
CO.5	3	2	2	2	2	2	2	2	2	1		3	3	1

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.

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Department of Civil Engineering

HEALTH AND WELLNESS, YOGA AND SPORTS

Subject Code: 24NA1002/24NA2002

Year & Semester	I-Year, II-Semester	**Course**	B.Tech
Course Category	Civil Department	**Credits**	0.5
Course Type	Theory	**L-T-P-C**	0-0-0-1
Regulations	R24	**Internal Eval**	100

COURSE OBJECTIVES:
The main objective of introducing this course is to make the students maintain their mental and physical wellness by balancing emotions in their life. It mainly enhances the essential traits required for the development of the personality**.**

COURSE OUTCOMES: A student after completion of the course will be able to
CO1: Understand the importance of yoga and sports for Physical fitness and sound health.
CO2: Demonstrate an understanding of health-related fitness components. .
CO3: Compare and contrast various activities that help enhance their health.
CO4: Assess current personal fitness levels.
CO5: Develop Positive Personality

UNIT-I:-

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

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

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,

ii)	Volleyball, Basketball, Handball, Football, Badminton, Kabaddi, Kho-kho, Table tennis, Cricket etc. Practicing general and specific warm up, aerobics Practicing cardio respiratory fitness, treadmill, run test, 9 min walk, skipping and running.

Reference Books:

1. Gordon Edlin, Eric Golanty. Health and Wellness, 14th Edn. Jones & Bartlett Learning, 2022
2. T.K.V.Desikachar. The Heart of Yoga: Developing a Personal Practice
3. Archie J.Bahm. Yoga Sutras of Patanjali, Jain Publishing Company, 1993
4. Wiseman, John Lofty, SAS Survival Handbook: The Ultimate Guide to Surviving Anywhere Third Edition, William Morrow Paperbacks, 2014
5. The Sports Rules Book/ Human Kinetics with Thomas Hanlon. -- 3rd ed. Human Kinetics, Inc.2014

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.

Evaluation Guidelines:

- Evaluated for a total of 100 marks.
- A student can select 6 activities of his/her choice with a minimum of 01 activity per unit. Each activity shall be evaluated by the concerned teacher for 15 marks, totalling to 90 marks.

A student shall be evaluated by the concerned teacher for 10 marks by conducting viva voce on the subject.