St. Johns College of Engineering & Technology (Autonomous)

(Accredited by NAAC, Approved by AICTE, Recognized by UGC under 2(f) & 12(B) An ISO 9001:2015 Certified Institution and Affiliated to JNTUA, Ananthapuramu)

Yerrakota, Yemmiganur-518360, Kurnool (Dist), Andhra Pradesh, India.

B.Tech (Regular-Full time)

(Effective for the students admitted into I-Year from the Academic Year **2024-25** onwards & Lateral Entry Students Admitted from the Academic Year **2025-26** onwards)

Mechanical Engineering

I & II YEAR COURSE STRUCTURE AND SYLLABUS

St.Johns College of Engineering and Technology
(AUTONOMOUS)
DEPARTMENT OF MECHANICAL ENGINEERING

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

(Applicable from the academic year 2024-25 onwards)

INDUCTION PROGRAMME

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

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DEPARTMENT OF MECHANICAL ENGINEERING

B.TECH. – I YEAR COURSE STRUCTURE & SYLLABI

B.Tech.–I Year I Semester

S.No.	Course code	Title	L	T	P	Credits
1	24G3A56101T	Engineering Physics	3	0	0	3
2	24G3A54101	Linear Algebra & Calculus	3	0	0	3
3	24G3A02101T	Basic Electrical & Electronics Engineering	3	0	0	3
4	24G3A03101T	Engineering Graphics	1	0	4	3
5	24G3A05101T	Introduction to Programming	3	0	0	3
6	24G3A05102	IT Workshop	0	0	2	1
7	24G3A56101P	Engineering Physics Lab	0	0	2	1
8	24G3A02101P	Electrical & Electronics Engineering Workshop	0	0	3	1.5
9	24G3A05101P	Computer Programming Lab	0	0	3	1.5
10	24G3A99101	NSS/NCC/Scouts & Guides/Community Service	-	-	1	0.5
Total			**13**	**00**	**15**	**20.5**

B.Tech. I Year II Semester

S.No.	Course code	Title	L	T	P	Credits
1	24G3A52201T	Communicative English	2	0	0	2
2	24G3A51201T	Engineering Chemistry	3	0	0	3
3	24G3A54201	Differential Equations & Vector Calculus	3	0	0	3
4	24G3A01201T	Basic Civil & Mechanical Engineering	3	0	0	3
5	24G3A01202T	Engineering Mechanics	3	0	0	3
6	24G3A52201P	Communicative English Lab	0	0	2	1
7	24G3A51201P	Engineering Chemistry Lab	0	0	2	1
8	24G3A03201	Engineering Workshop	0	0	3	1.5
9	24G3A03202	Engineering Mechanics Lab	0	0	3	1.5
10	24G3A99201	Health and wellness, Yoga and Sports	-	-	1	0.5
Total			**14**	**00**	**11**	**19.5**

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DEPARTMENT OF MECHANICAL ENGINEERING

B.TECH. – II YEAR COURSE STRUCTURE & SYLLABI

B.Tech. II Year I Semester

S.NO	Subject Code	Title	L	T	P	Credits
1	24G3A54303	Numerical Methods & Transform Techniques	3	0	0	3
2	24G3A52301	Universal Human Values - Understanding Harmony and Ethical human conduct	2	1	0	3
3	24G3A03301	Engineering Thermodynamics	3	0	0	3
4	24G3A03302	Mechanics of Solids	3	0	0	3
5	24G3A03303	Material Science and Metallurgy	3	0	0	3
6	24G3A03304	Mechanics of Solids and Materials Science Lab	0	0	3	1.5
7	24G3A03305	Computer-Aided Machine Drawing	0	0	3	1.5
8	24G3A05304	Python programming	0	1	2	2
9	24G3A99301	Environmental Science	2	0	0	-
		Total	**15**	**02**	**10**	**20**

B.Tech. II Year II Semester

S.NO	Subject Code	Title	L	T	P	Credits
1	24G3A52402d	Industrial Engineering & Management	2	0	0	2
2	24G3A54403	Complex Variables, Probability and Statistics	3	0	0	3
3	24G3A03401T	Manufacturing processes	3	0	0	3
4	24G3A03402T	Fluid Mechanics & Hydraulic Machines	3	0	0	3
5	24G3A03403	Theory of Machines	3	0	0	3
6	24G3A03402P	Fluid Mechanics & Hydraulic Machines Lab	0	0	3	1.5
7	24G3A03401P	Manufacturing processes Lab	0	0	3	1.5
8	24G3A52403	Soft Skills	0	1	2	2
9	24G3A99401	Design Thinking & Innovation	1	0	2	2
		Total	**15**	**01**	**10**	**21**
Mandatory Community Service Project Internship of 08 Weeks duration during Summer Vacation						

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DEPARTMENT OF MECHANICAL ENGINEERING

ENGINEERING PHYSICS

I B.Tech– I Semester								SJCET-R24
Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
24G3A56101T	BS&H	3	0	0	3	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:

After the completion of the course students 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:	Summarize various types of polarization of dielectrics and classify the magnetic materials.
CO4:	Explain fundamentals of quantum mechanics and apply it to one dimensional motion of particles and the band theory of solids.
CO5:	Identify the type of semiconductor using Hall effect.

UNIT-I: Wave Optics
Interference: Introduction - Principle of superposition –Interference of light - Interference in thin films (Reflection Geometry) & applications - Colours in thin films- Newton's Rings, Determination of wavelength and refractive index. **Diffraction:** Introduction - Fresnel and Fraunhofer diffractions - Fraunhofer diffraction due to single slit, double slit & N-slits (Qualitative) – Diffraction Grating - Dispersive power and resolving power of Grating (Qualitative). **Polarization:** Introduction -Types of polarization - Polarization by reflection, refraction and Double refraction - Nicol's Prism -Half wave and Quarter wave plates.
UNIT-II: Crystallography and X-ray diffraction
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 (h k l) planes. **X-ray diffraction:** Bragg's law - X-ray Diffractometer – crystal structure determination by Laue's and powder methods.
UNIT-III: Dielectric and Magnetic Materials
Dielectric Materials: Introduction - Dielectric polarization - Dielectric polarizability, Susceptibility, Dielectric constant and Displacement Vector – Relation between the electric vectors - Types of polarizations- Electronic (Quantitative), Ionic (Quantitative) and Orientation polarizations (Qualitative) - Lorentz internal field - Clausius- Mossotti equation - complex dielectric constant – Frequency dependence of polarization – dielectric loss. **Magnetic Materials:** Introduction - Magnetic dipole moment - Magnetization- Magnetic susceptibility and permeability – Atomic origin of magnetism - Classification of magnetic materials: Dia, para, Ferro, anti-ferro & Ferri magnetic

materials - Domain concept for Ferromagnetism & Domain walls (Qualitative) - Hysteresis - soft and hard magnetic materials.
UNIT-IV: Quantum Mechanics and Free electron theory
Quantum Mechanics: Dual nature of matter – Heisenberg's Uncertainty Principle – Significance and properties of wave function – Schrodinger's time independent and dependent wave equations– Particle in a one-dimensional infinite potential well. **Free Electron Theory:** Classical free electron theory (Qualitative with discussion of merits and demerits) – Quantum free electron theory – electrical conductivity based on quantum free electron theory - Fermi-Dirac distribution - Density of states - Fermi energy.
UNIT-V: Semiconductors
Semiconductors: 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. M. N. Avadhanulu, P.G. Kshirsagar & T.V.S.Arun Murthy, A Textbook of Engineering Physics, S Chand Publications, Eleventh Edition, 2019.
2. Engineering Physics - D.K.Bhattacharya and Poonam Tandon, Oxford press (2015).

Reference Books:

1. Engineering Physics - B.K. Pandey and 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 Age international publishers (2009).

Online Learning Resources:

https://www.youtube.com/watch?v=2XOQXgj18Qk
https://www.youtube.com/watch?v=UXqWixel_f8
https://www.youtube.com/watch?v=DocyilQj8yE
https://www.youtube.com/watch?v=GzE7__dxxAU&list=PLDVC8J0Twuc9DCeiUaM0PRakAqalYwmP&index=2
https://www.youtube.com/watch?v=3WW60S48f-s

St.Johns College of Engineering and Technology

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DEPARTMENT OF MECHANICAL ENGINEERING

LINEAR ALGEBRA & CALCULUS

(Common to All Branches of Engineering)

I B.Tech– I Semester								SJCET-R24
Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
24G3A54101	BS&H	3	0	0	3	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:

After the completion of the course students 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 Cartesian and polar coordinates and in three dimensions using cylindrical and spherical coordinates.

UNIT-I: Matrices
Rank of a matrix by echelon form. Cauchy–Binet formulae (without proof). Inverse of non-singular matrices by Gauss-Jordan method, System of linear equations: Solving system of Homogeneous and Non-Homogeneous equations by Gauss elimination method, Jacobi and Gauss Seidel Iteration Methods.
UNIT-II: Eigen values, Eigenvectors and Orthogonal Transformation
Eigen values, Eigenvectors of Real Matrices and their properties, Diagonalization of a matrix, Cayley Hamilton Theorem (without proof), finding inverse and power of a matrix by Cayley Hamilton Theorem, Quadratic forms and Nature of the Quadratic Forms, Reduction of Quadratic form to canonical forms by Orthogonal Transformation.
UNIT-III: Calculus
Mean Value Theorems: Rolle's Theorem, Lagrange's mean value theorem with their geometrical interpretation, Cauchy's mean value theorem, Taylor's and Maclaurin theorems with remainders (without proof), Problems and applications on the above theorems.
UNIT-IV: Partial differentiation and Applications (Multi variable calculus)
Functions of several variables: Limit, Continuity and Differentiability, Partial derivatives, total derivatives, chain rule, Taylor's and Maclaurin's series expansion of functions of two variables. Jacobians, Functional dependence, maxima and minima of functions of two variables, method of Lagrange multipliers.
UNIT-V: Multiple Integrals (Multi variable Calculus)
Double integrals, triple integrals, change of order of integration, change of variables to polar, cylindrical and spherical coordinates. Finding areas (by double integrals) and volumes (by double integrals and triple integrals).

Textbooks:

1. Advanced Engineering Mathematics, Micheael Greenberg,, Pearson publishers, 9 thedition.
2. Higher Engineering Mathematics, H. K Das, Er. RajnishVerma, S. Chand Publications, 2014, Third Edition (Reprint 2021)

Reference Books:

1. Higher Engineering Mathematics, B.S.Grewal,KhannaPublishers,2017, 44th Edition
2. Advanced Engineering Mathematics, Erwin Kreyszig, John Wiley &Sons, 2018, 10th Edition.
3. Thomas Calculus, George B.Thomas, MauriceD. Weir and Joel Hass, Pearson Publishers, 2018, 14th Edition.
4. Advanced Engineering Mathematics, R.K. Jainand, S.R.K.Iyengar, Alpha Science International Ltd., 2021 5th Edition (9th reprint).
5. Advanced Modern Engineering Mathematics, GlynJames, Pearson publishers, 2018 5 th Edition.

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DEPARTMENT OF MECHANICAL ENGINEERING

BASIC ELECTRICAL & ELECTRONICS ENGINEERING

(Common to All branches of Engineering)

I B.Tech– I Semester								SJCET-R24
Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
24G3A02101T	ES	3	0	0	3	30	70	100

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.

PART-A: BASIC ELECTRICAL ENGINEERING

Course Outcomes:

After the completion of the course students will be able to

CO1:	Analyze the behavior of DC and AC circuits using fundamental laws and theorems, including the application of phasor diagrams and impedance concepts.
CO2:	Evaluate the performance and applications of various electrical machines and measuring instruments by understanding their construction and operating principles.
CO3:	Apply knowledge of energy resources, electricity billing, and safety measures to solve real-world electrical engineering problems related to power generation and household electrical safety.

UNIT-I: DC &AC Circuits
DC Circuits: Electrical circuit elements (R, L and C), Ohm's Law and its limitations, KCL & KVL, series, parallel, series-parallel circuits, Super Position theorem, Simple numerical problems. **AC Circuits:** A.C. Fundamentals: Equation of AC Voltage and current, waveform, time period, frequency, amplitude, phase, phase difference, average value, RMS value, form factor, peak factor, Voltage and current relationship with phasor diagrams in R, L, and C circuits, Concept of Impedance, Active power, reactive power and apparent power, Concept of power factor (Simple Numerical problems).
UNIT-II: Machines and Measuring Instruments
Machines: Construction, principle and operation of (i) DC Motor, (ii) DC Generator, (iii) Single Phase Transformer, (iv)Three Phase Induction Motor and (v)Alternator, Applications of electrical machines. **Measuring Instruments:** Construction and working principle of Permanent Magnet Moving Coil (PMMC), Moving Iron (MI) Instruments and Wheat Stone bridge.
UNIT-III: Energy Resources, Electricity Bill & Safety Measures
Energy Resources: Conventional and non-conventional energy resources; Layout and operation of various Power Generation systems: Hydel, Nuclear, Solar & Wind power generation. **Electricity bill:** Power rating of household appliances including air conditioners, PCs, Laptops, Printers, etc. Definition of "unit" used for consumption of electrical energy, two-part electricity tariff, calculation of electricity bill for domestic consumers.

Equipment Safety Measures: Working principle of Fuse and Miniature circuit breaker (MCB), merits and demerits. Personal safety measures: Electric Shock, Earthing and its types, Safety Precautions to avoid shock.

Textbooks:

1. Basic Electrical Engineering,D. P. Kothari and I. 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

St.Johns College of Engineering and Technology

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DEPARTMENT OF MECHANICAL ENGINEERING

PART-B: BASIC ELECTRONICS ENGINEERING

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.
CO2:	Understand the operation of electronic circuits such as Rectifiers, power supplies, and Electronic Instrumentation
CO3:	Familiarize with the number systems, codes, Boolean algebra and logic gates and understand the working mechanism of different combinational, sequential circuits and their role in the digital systems.

UNIT-I: SEMICONDUCTOR DEVICES
Introduction - Evolution of electronics – Vacuum tubes to nano electronics - Characteristics of PN Junction Diode — Zener Effect — Zener Diode and its Characteristics. Bipolar Junction Transistor — CB, CE, CC Configurations and Characteristics — Elementary Treatment of Small Signal CE Amplifier
UNIT-II: BASIC ELECTRONIC CIRCUITS AND INSTRUMENTTAION
Rectifiers and power supplies: Block diagram description of a dc power supply, working of a full wave bridge rectifier, capacitor filter (no analysis), working of simple zener voltage regulator. Amplifiers: Block diagram of Public Address system, Circuit diagram and working of common emitter (RC coupled) amplifier with its frequency response. Electronic Instrumentation: Block diagram of an electronic instrumentation system.
UNIT-III: DIGITAL ELECTRONICS
Overview of Number Systems, Logic gates including Universal Gates, BCD codes, Excess-3 code, Gray code, Hamming code. Boolean Algebra, Basic Theorems and properties of Boolean Algebra, Truth Tables and Functionality of Logic Gates – NOT, OR, AND, NOR, NAND, XOR and XNOR. Simple combinational circuits–Half and Full Adder, Introduction to sequential circuits, Flip flops, Registers and counters (Elementary Treatment only)

Textbooks:

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

St.Johns College of Engineering and Technology

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DEPARTMENT OF MECHANICAL ENGINEERING

ENGINEERING GRAPHICS

(Common to all branches of Engineering)

I Year B. Tech (CE, ME, ECE, CSD, AIML)–I Semester I Year B. Tech (EEE, CSE, CAI) – II Semester

I B.Tech– I Semester								SJCET-R24
Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
24G3A03101T	ES	1	0	4	3	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:

After the completion of the course students will be able to

CO1:	Understand the principles of engineering drawing, including engineering curves Including cycloids and involutes
CO2:	Draw and interpret orthographic projections of points, lines in front, top views.
CO3:	Understanddrawprojectionofplanesandsolidsinvariouspositionsinfirstquadrant.
CO4:	Explain principles of sections of solids
CO5:	Prepare isometric and development of simple solids.

UNIT-I: Introduction to Engineering Drawing:
Principles of Engineering Drawing and its significance Conventions in drawing-lettering - BIS conventions. a) Conic sections-using Eccentricity method, oblong method, concentric circle method including the rectangular hyperbola b) Cycloid, epicycloids and hypocycloid c) Involutes.
UNIT-II: Projections of Points and Projections of Lines
Projections of Points: Projections of Points in all the quadrants. **Projections of Lines:** Projections of Straight Lines-Parallel to one and inclined to other plane, inclined to planes, determination of true lengths, angle of inclinations.
UNIT-III: Projections of Planes and Projections of Solids
Projections of Planes: Regular Planes, Plane Perpendicular to one plane and Parallel to another Reference plane, Plane inclined to one of the principal plane and perpendicular to the other Plane. Plane inclined to both the planes. **Projections of Solids:** Prisms, Pyramids, Cones and Cylinders with the axis perpendicular to one plane and parallel to the reference plane, Plane inclined to one reference Plane and parallel to other.
UNIT-IV: Sections of solids

Sections of solids: Sectioning of prism, pyramid, cone and cylinder– sectional view–true shape. Section of plane parallel to one principal plane, Section of plane Inclined to one principal plane and perpendicular to other. Section of plane perpendicular to both H.P and V.P.
UNIT-V: Development of surface of solids and Conversion of Views
Development of surface of solids: Development of surfaces of right regular solids and their sections - prism, pyramid, cylinder and cone. **Conversion of Views:** Conversion of isometric views to orthographic views.

Textbooks:

1. Engineering Drawing. K.L Narayana, P. Kannaiah, Scitech Publications, 2011
2. Engineering Drawing by N.D.Bhatt, ChariotPublications,2014

Reference Books:

1. K. Venugopal, Engineering Drawing and Graphics with Auto CAD, Fourth Edition, 2001, New Age International (P) Limited, Publishers, New Delhi, 2001.
2. Dhananjay A Jolhe, Engineering Drawing with an introduction to Auto CAD,Tata McGraw-Hill Publishing Company Ltd., New Delhi, 2008.
3. M.B.Shaw &B.C.Rana, Engineering Drawing,Second Edition Pearson Education,New Delhi, 2009.
4. Engineering Drawing, B.V.RGupta ,J.K. Publishers,2008
5. K.V.Natarajan,„ Atext book of Engineering Graphics", Dhanalakshmi publishers, Chennai, 2006.

Additional Sources:

https://archive.nptel.ac.in/courses/112/102/112102304/https://www.youtube.com/watch?v=p62LPzFqGQw&list=PLp6ek2hDcoNCjoRLQ4rjpCozisCACBxKA

St.Johns College of Engineering and Technology

(AUTONOMOUS)

DEPARTMENT OF MECHANICAL ENGINEERING

INTRODUCTION TO PROGRAMMING

(Common to All branches of Engineering)

I B.Tech– I Semester								SJCET-R24
Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
24G3A05101T	ES	3	0	0	3	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:	Apply appropriate Control structures to solve problems.
CO3:	Describe the concept of Arrays and Strings
CO4:	Write User defined functions and performing operations on Files
CO5:	Describe the concept of Pointers and Structures.

UNIT-1: Introduction to Programming and Problem Solving
History of Computers, Basic organization of a computer: ALU, input-output units, memory, program counter, Introduction to Programming Languages, Basics of a Computer Program- Algorithms, flowcharts (Using Dia Tool), pseudo code. Introduction to Compilation and Execution, Primitive Data Types, Variables, and Constants, Basic Input and Output, Operations, Type Conversion, and Casting. Problem solving techniques: Top-down approach, Bottom-up approach, Time and space complexities of algorithms.
UNIT-1I: Control Structures
Simple sequential programs Conditional Statements (if, if-else, switch), Loops (for, while, do while) Break and Continue.
UNIT-III: Arrays and Strings
Arrays indexing, memory model, programs with array of integers, two dimensional arrays, Introduction to Strings.
UNIT-1V: Pointers & User Defined Data types
Introduction to Functions, Function Declaration and Definition, Function call Return Types and Arguments, Recursion, modifying parameters inside functions using pointers, arrays as parameters. Scope and Lifetime of Variables, Basics of File Handling
UNIT-V: Functions & File Handling
Pointers, dereferencing and address operators, pointer and address arithmetic, array manipulation using pointers, User-defined data types-Structures and Unions.

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, Prentice- Hall, 1988
2. Schaum's Outline of Programming with C, Byron S Gottfried, McGraw-Hill Education, 1996

Reference Books:

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

St.Johns College of Engineering and Technology

(AUTONOMOUS)

DEPARTMENT OF MECHANICAL ENGINEERING

IT WORKSHOP

(Common to all branches of Engineering)

I B.Tech– I Semester								SJCET-R24
Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
24G3A05102	ES	0	0	2	1	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:

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.

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 customize their browsers to block pop ups, block active x downloads to avoid viruses and/or worms.

LaTeX and WORD

Task 1 – Word Orientation: The mentor needs to give an overview of 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

St.Johns College of Engineering and Technology

(AUTONOMOUS)

DEPARTMENT OF MECHANICAL ENGINEERING

ENGINEERING PHYSICS LAB

I B.Tech– I Semester								SJCET-R24
Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
24G3A56101P	BS&H	0	0	2	1	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 and applications of dielectric and magnetic materials by conducting experiments.

Course Outcomes:

After the completion of the course students will be able to

CO1:	Measurement of Optical parameters using optical instruments.
CO2:	Able to measure magnetic, dielectric parameters by various methods.
CO3:	Analyzing the basic properties of Semiconductors.
CO4:	Student Able estimate the various material properties.

List of Experiments

S.No.	Title of the Experiment
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	Determination of dispersive power of a prism using spectrometer.
8	Determination of the resistivity of semiconductors by four probe methods.
9	Determination of the resistivity of semiconductors by four probe methods
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 10 from the above experiments, out of which two may be conducted through virtual labs.	
Virtual Lab Experiments	
1.	To find the resolving power of prism:https://vlab.amrita.edu/index.php?sub=1&brch=281&sim=1524&cnt=1
2.	To determine Energy Band Gap of Semiconductor. https://bop-iitk.vlabs.ac.in/exp/energy-band-gap/
3.	Determination of refractive index of liquid using newton's rings experiment. https://vlab.amrita.edu/index.php?sub=1&brch=189&sim=1520&cnt=1

Reference Books/Lab Manuals:	
1.	S. Balasubramanian, M.N. Srinivasan, A Textbook of Practical Physics, S Chand Publishers, 2017.

Web Resources

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

St.Johns College of Engineering and Technology

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DEPARTMENT OF MECHANICAL ENGINEERING

ELECTRICAL & ELECTRONICS ENGINEERING WORKSHOP

(Common to All branches of Engineering)

I B.Tech– I Semester								SJCET-R24
Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
24G3A02101P	ES	0	0	3	1.5	30	70	100

Course Objectives:

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

Activities:

1. Familiarization of commonly used Electrical & Electronic Workshop Tools: Bread board, Solder, cables, relays, switches, connectors, fuses, Cutter, plier, screwdriver set, wire stripper, flux, knife/blade, soldering iron, de-soldering pump etc.

- Provide some exercises so that hardware tools and instruments are learned to be used by the students.

2. Familiarization of Measuring Instruments like Voltmeters, Ammeters, multimeter, LCR-Q meter, Power Supplies, CRO, DSO, Function Generator, Frequency counter.

- Provide some exercises so that measuring instruments are learned to be used by the students.

3. Components:

- Familiarization/Identification of components (Resistors, Capacitors, Inductors, Diodes, transistors, IC's etc.) – Functionality, type, size, colour coding package, symbol, cost etc.

- Testing of components like Resistor, Capacitor, Diode, Transistor, ICs etc. - Compare values of components like resistors, inductors, capacitors etc with the measured values by using instruments

PART-A: ELECTRICAL ENGINEERING LAB

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

CO1:	Apply fundamental circuit laws such as Kirchhoff's Current Law (KCL) and Kirchhoff's Voltage Law (KVL) to verify the behavior of electrical circuits through practical experiments.
CO2:	Analyze and interpret the results of experiments involving the measurement of resistance, power, and power factor using instruments like the Wheatstone bridge and single-phase wattmeter.
CO3:	Evaluate the performance characteristics of electrical machines, such as DC shunt generators and single-phase transformers, by conducting load tests and magnetization characteristic experiments.

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

Reference Books:

1. Basic Electrical Engineering, D. C. Kulshreshtha, Tata McGraw Hill, 2019, First Edition

2. Power System Engineering, P.V. Gupta, M.L. Soni, U.S. Bhatnagar and A. Chakrabarti, Dhanpat Rai & Co, 2013

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

Note: **Minimum Six Experiments to be performed.**

PART-B: ELECTRONICS ENGINEERING LAB

Course Outcomes: After the completion of the course students 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.

List of Experiments:

1. Plot V-I characteristics of PN Junction diode A) Forward bias B) Reverse bias.
2. Plot V – I characteristics of Zener Diode and its application as voltage Regulator.
3. Implementation of half wave and full wave rectifiers
4. Plot Input & Output characteristics of BJT in CE and CB configurations
5. Frequency response of CE amplifier.
6. Simulation of RC coupled amplifier with the design supplied
7. Verification of Truth 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.

St.Johns College of Engineering and Technology

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DEPARTMENT OF MECHANICAL ENGINEERING

COMPUTER PROGRAMMING LAB

(Common to All branches of Engineering)

I B.Tech– I Semester								SJCET-R24
Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
24G3A05101P	ES	0	0	3	1.5	30	70	100

Course Objectives:

- The course aims to give students hands – on experience and train them on the concepts of the C- Programming language.

Course Outcomes:

CO1:	Read, understand, and trace the execution of programs written in C language.
CO2:	Select the right control structure for solving the problem.
CO3:	Develop C programs which utilize memory efficiently using programming constructs like pointers.
CO4:	Develop Debug and Execute programs to demonstrate the applications of arrays, functions, basic concepts of pointers in C.

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:

Tutorial4: Operators and the precedence and as associativity:

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

i) Evaluate the following expressions.

a. A+B*C+(D*E) + F*G

b. A/B*C-B+A*D/3

c. A+++B---A

d. J= (i++) + (++i)

ii) Find the maximum of three numbers using conditional operator

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

WEEK 5

Objective: Explore the full scope of different variants of "if construct" namely if-else, 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.

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UNIT III

WEEK 7:

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

Suggested Experiments/Activities:

Tutorial 7: 1 D Arrays: searching.

Lab 7:1D Array manipulation, linear search

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

ii) Perform linear search on1D array.

iii) The reverse of a 1D integer array

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

v) Eliminate duplicate elements in an array.

WEEK 8:

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

Suggested Experiments/Activities:

Tutorial 8: 2 D arrays, sorting and Strings.

Lab 8: Matrix problems, String operations, Bubble sort

i) Addition of two matrices

ii) Multiplication two matrices

iii) Sort array elements using bubble sort

iv) Concatenate two strings without built-in functions

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

UNIT IV

WEEK 9:

Objective: Explore pointers to manage a dynamic array of integers, including memory allocation & value initialization, resizing changing and reordering the contents of

an array and memory de-allocation using malloc (), calloc (), realloc () and free () functions. Gain experience processing command-line arguments received by C

Suggested Experiments/Activities:

Tutorial 9: Pointers, structures and dynamic memory allocation

Lab 9: Pointers and structures, memory 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 bitfields.

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

UNIT V

WEEK 11:

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

Suggested Experiments/Activities:

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

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

i) Write a C function to calculate NCR value.

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

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

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

WEEK 12:

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

Suggested Experiments/Activities:

Tutorial 12: Recursion, the structure of recursive calls

Lab 12: Recursive functions

i) Write a recursive function to generate Fibonacci series.

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

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

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

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

WEEK 13:

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

Suggested Experiments/Activities:

Tutorial 13: Call by reference, dangling pointers

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

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

ii) Demonstrate Dangling pointer problem using a C program.

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

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

WEEK14:

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

Suggested Experiments/Activities:

Tutorial 14: File handling

Lab 14: File operations

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

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

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

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

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

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

Textbooks:

1. Ajay Mittal, Programming in C: A practical approach, Pearson.

2. Byron Gottfried, Schaum' s Outline of Programming with C, McGraw Hill

Reference Books:

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice- Hall of India

2. C Programming, A Problem-Solving Approach, Forouzan, Gilberg, Prasad, CENGAGE

St.Johns College of Engineering and Technology

(AUTONOMOUS)

DEPARTMENT OF MECHANICAL ENGINEERING

NSS/NCC/SCOUTS & GUIDES/COMMUNITY SERVICE

(Common to All branches of Engineering)

I B.Tech– I Semester								SJCET-R24
Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
24G3A99101	BS&H	0	0	1	0.5	-	-	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: After completion of the course the students 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

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

Activities:

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

UNIT II: Nature & Care

Activities:

i) Best out of waste competition.
ii) Poster and signs making competition to spread environmental awareness.
iii) Recycling and environmental pollution article writing competition.
iv) Organizing Zero-waste day.
v) Digital Environmental awareness activity via various social media platforms. vi)Virtual demonstration of different eco-friendly approaches for sustainable living.

vii) Write a summary on any book related to environmental issues.

UNIT III: Community Service

Activities:

i) Conducting One Day Special Camp in a village contacting village-area leaders- Survey 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, iii)Conducting consumer Awareness. Explaining various legal provisions etc.

iv) Women Empowerment Programmes- Sexual Abuse, Adolescent Health and Population Education.

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, totaling to 90 marks.
- A student shall be evaluated by the concerned teacher for 10 marks by conducting viva voce on the subject.

St.Johns College of Engineering and Technology

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DEPARTMENT OF MECHANICAL ENGINEERING

COMMUNICATIVE ENGLISH

I B.Tech– II Semester								SJCET-R24
Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
24G3A52201T	BS&H	2	0	0	2	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:

After the completion of the course students 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 formal and informal discussions.
CO4:	Evaluate reading / listening text sand to write summaries based on global –Comprehension of these texts.
CO5:	Create a coherent paragraph, essay, and resume.

UNIT-I: Lesson: HUMAN VALUES: Gift of Magi (Short Story)
Listening: Identifying the topic, the context and specific pieces of information by listening to short audio texts and answering a series of questions **Speaking:** Asking and answering general questions on familiar topics such as home family, work, studies and interests; introducing oneself and others **Reading:** Skimming to get the main idea of a text; scanning to look for specific pieces of Information **Writing:** Mechanics of Writing-Capitalization, Spellings, Punctuation-Parts of Sentences. **Grammar:** Parts of Speech, Basic Sentence Structures-forming questions **Vocabulary:** Synonyms, Antonyms, Affixes (Prefixes/Suffixes), Root words.
UNIT-II: Lesson: NATURE: The Brook by Alfred Tennyson (Poem)
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 structure 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 (specific topics) **Grammar**: Cohesive devices -linkers, use of articles and zero article; prepositions **Vocabulary:** Homonyms, Homophones, Homographs.
UNIT-III: Lesson: BIOGRAPHY: Elon Musk
Listening: Listening for global comprehension and summarizing what is listened to. **Speaking:** Discussing specific topics in pairs or small groups and reporting what is discussed **Reading:** Reading a text in detail by making basic inferences-recognizing and interpreting specific context clues; strategies to use text clues for comprehension. **Writing:** Summarizing, Note-making, paraphrasing **Grammar:** Verbs - tenses; subject-verb agreement; Compound words, Collocations **Vocabulary**: Compound words, Collocations
UNIT-IV: Lesson: INSPIRATION: The Toys of Peace by Saki
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**: Letter Writing: Official Letters, Resumes **Grammar**: Reporting verbs, Direct & Indirect speech, Active & Passive Voice **Vocabulary**: Words often confused, Jargons
UNIT-V: Lesson: MOTIVATION: The Power of Intrapersonal Communication (An Essay)
Listening: Identifying key terms, understanding concepts and answering a series of relevant questions that test comprehension. **Speaking**: Formal oral presentations on topics from academic contexts **Reading**: Reading comprehension. **Writing**: Writing structured essays on specific topics. **Grammar**: Editing short texts –identifying and correcting common errors in grammar and usage (articles, prepositions, tenses, subject verb agreement) **Vocabulary**: Technical Jargons

Textbooks:

1. Pathfinder: Communicative English for Undergraduate Students, 1st Edition, Orient Black Swan, 2023 (Units 1,2 & 3)

2. Empowering with Language by Cengage Publications, 2023 (Units 4 & 5)

Reference Books:

1. Dubey, Sham Ji & Co. English for Engineers, Vikas Publishers, 2020

2. Bailey, Stephen. Academic writing: A Handbook for International Students. Routledge, 2014.

3. Murphy, Raymond. English Grammar in Use, Fourth Edition, Cambridge

University Press, 2019.

4. Lewis, Norman. Word Power Made Easy- The Complete Handbook for Building a Superior Vocabulary. Anchor, 2014

Web Resources:

GRAMMAR:

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

VOCABULARY

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

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(AUTONOMOUS)

DEPARTMENT OF MECHANICAL ENGINEERING

ENGINEERING CHEMISTRY

(Common to Civil, Mechanical Engineering)

I B.Tech– II Semester								SJCET-R24
Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
24G3A51201T	BS&H	3	0	0	3	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 ectro chemistry, polymers, surface chemistry, and cement

Course Outcomes:

After the completion of the course students will be able to

CO1:	Demonstrate the corrosion prevention methods and factors affecting corrosion.
CO2:	Explain the preparation, properties, and applications of thermoplastics & thermo setting, elastomers & conducting polymers.
CO3:	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.

UNIT-I: Water Technology
Soft and hard water, Estimation of hardness of water by EDTA Method, Estimation of dissolved Oxygen - Boiler troubles –Priming, foaming, scale and sludge, Caustic embrittlement, Industrial water treatment – Specifications for drinking water, Bureau of Indian Standards (BIS) and World health organization (WHO) standards, Ion-exchange processes - desalination of brackish water, reverse osmosis (RO) and electro dialysis.
UNIT-II: Electrochemistry and Applications
Electrodes –electrochemical cell, Nernst equation, cell potential calculations. Primary cells – Zinc-air battery, Secondary cells – Nickel-Cadmium (NiCad), and lithium-ion batteries- working principle of the batteries including cell reactions; Fuel Cells-Basic Concepts, the principle and working of hydrogen-oxygen Fuel cell. 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
Introduction to polymers, functionality of monomers, Mechanism of chain growth, step growth polymerization. Thermoplastics and Thermo-setting plastics-:

Preparation, properties and applications of poly styrene. PVC Nylon 6,6 and Bakelite. Elastomers – Preparation, properties and applications of Buna S, Buna N, Thiokol rubbers. Fuels – Types of fuels, calorific value of fuels, 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 and bio fuel-bio diesel.
UNIT-IV: Modern Engineering Materials
Composites- Definition, Constituents, Classification- Particle, Fiber and Structural reinforced composites, properties and Engineering applications Refractoriness-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 Nano materials
Introduction to surface chemistry, colloids, nanometals and nanometal oxides, micelle formation, synthesis of colloids (Braggs Method), chemical and biological methods of preparation of nonmetals and metal oxides, stabilization of colloids and nanomaterials by stabilizing agents, adsorption isotherm (Freundlich and Longmuir), BET equation (no derivation) applications of colloids and nanomaterials – catalysis, medicine, sensors, 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,Thomas Telford Publications, 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

St.Johns College of Engineering and Technology

(AUTONOMOUS)

DEPARTMENT OF MECHANICAL ENGINEERING

DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS

(Common to All Branches of Engineering)

I B.Tech– II Semester								SJCET-R24
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
		L	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
24G3A54201	**ES**	3	0	0	3	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:

After the completion of the course students will be able to

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

UNIT-I: Differential equations of first order and first degree
Linear differential equations – Bernoulli's equations- Exact equations and equations reducible to exact form. Applications: Newton's Law of cooling – Law of natural growth and decay- Electrical circuits.
UNIT-II: Linear differential equations with Constant Coefficients
Definitions, homogenous and non-homogenous, complimentary function, general solution, particular integral, Wronskian, Method of variation of parameters. Simultaneous linear equations, Applications to L-C-R Circuit problems and Simple Harmonic motion.
UNIT-III: Partial Differential Equations
Introduction and formation of Partial Differential Equations by elimination of arbitrary constants and arbitrary functions, solutions of first order linear equations using Lagrange's method. Homogeneous Linear Partial differential equations with constant coefficients.
UNIT-IV: Vector differentiation
Scalar and vector point functions, vector operator Del, Del applies to scalar point functions Gradient, Directional derivative, del applied to vector point functions- Divergence and Curl, vector identities.
UNIT-V: Vector integration
Line integral-circulation-work done, surface integral-flux, Green's theorem in the plane (without proof), Stoke's theorem (without proof), volume integral, Gauss Divergence theorem (without proof) and related problems.

Textbooks:

1. Advanced Engineering Mathematics, R. K. Jain and S. R. K. Iyengar, Alpha Science International Ltd., 2021 5th Edition (9th reprint).

2. Higher Engineering Mathematics, B. V. Ramana, McGraw Hill Education, 2017

Reference Books:

1. Higher Engineering Mathematics, B. S. Grewal, Khanna Publishers, 2017, 44th Edition.

2. Advanced Engineering Mathematics, Erwin Kreyszig, John Wiley & Sons, 2018, 10th Edition.

3. Thomas Calculus, George B. Thomas, Maurice D. Weir and Joel Hass, Pearson Publishers, 2018, 14th Edition.

4. Advanced Engineering Mathematics, Dennis G. Zill and Warren S. Wright, Jones and Bartlett, 2018.

5. Advanced Modern Engineering Mathematics, Glyn James, Pearson publishers, 2018, 5th Edition

St.Johns College of Engineering and Technology

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DEPARTMENT OF MECHANICAL ENGINEERING

BASICS OF CIVIL AND MECHANICAL ENGINEERING

(Common to All branches of Engineering)

I B.Tech– II Semester								SJCET-R24
Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
24G3A01201T	ES	3	0	0	3	30	70	100

PART A: BASICS OF CIVIL ENGINEERING

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:

After the completion of the course students 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 basic characteristics of Civil Engineering Materials and attain knowledge on prefabricated technology.

UNIT-I
Basics of Civil Engineering: Role of Civil Engineers in Society-Various Disciplines of Civil Engineering-Structural Engineering-Geo-technical Engineering-Transportation Engineering –Hydraulics and Water Resources Engineering -Environmental Engineering-Scope of each discipline –Building Construction and Planning-ConstructionMaterials-Cement-Aggregate-Bricks-Cementconcrete-Steel. Introduction to Prefabricated construction Techniques.
UNIT-II
Surveying: Objectives of Surveying-HorizontalMeasurements-AngularMeasurements-Introduction to Bearings Leveling instruments used for leveling -Simple problems on leveling and bearings-Contour mapping.
UNIT-III
Transportation Engineering: Importance of Transportation in Nation's economic development Types of Highway Pavements-Flexible Pavements and Rigid Pavements -Simple Differences. Basics of Harbor, 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:

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

Reference Books:

1. Surveying, Vol-I and Vol-II, S.K Duggal, Tata McGraw Hill Publishers 2019.FifthEdition.
2. Hydrology and Water Resources Engineering, Santosh Kumar Garg, Khanna Publishers, Delhi.2016
3. Irrigation Engineering and Hydraulic Structures-Santosh Kumar Garg, Khanna Publishers, Delhi2023. 38thEdition.
4. Highway Engineering, S.K.Khanna, C.E.G. Justo and Veeraraghavan, Nemchand and Brothers Publications 2019. 10thEdition.
5. IndianStandardDRINKINGWATER—SPECIFICATIONIS10500-2012

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:

After the completion of the course students will be able to

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.
CO5:	Acquiring knowledge of materials and their properties for engineering applications

UNIT-I: Introduction to Mechanical Engineering and Engineering Materials

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DEPARTMENT OF MECHANICAL ENGINEERING

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, Composite Materials.
UNIT-II: Manufacturing Processes and Thermal Engineering
Manufacturing Processes: Sand Casting**,** Arc and Gas welding, Conventional Machining Process: Lathe, Milling, Non- Conventional Machining Process: Abrasive Jet, Laser Beam, 3D printing. **Thermal Engineering** – Otto cycle, Diesel cycle, Refrigeration and air-conditioning cycles, IC engines, 2-Stroke and 4-Stroke engines, SI/CI Engines, Components of Electric and Hybrid Vehicles.
UNIT-III: Power plants, Mechanical Power Transmission and Robotics
Power plants–working principle of Steam, Diesel, Hydro, Nuclear power plants. **Mechanical Power Transmission-**Belt Drives, Chain Drives and their Applications, Gear Drives and their applications. **Introduction to Robotics-** Joints & links, configurations, and applications of robotics.

Textbooks:

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

Additional Sources:

https://onlinecourses.nptel.ac.in/noc24_me104/previewhttps://www.youtube.com/watch?v=FCF8QMV31H8&list=PLFW6lRTa1g83TjuxZs9VH4Yh3Ri6EbPps

St.Johns College of Engineering and Technology

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DEPARTMENT OF MECHANICAL ENGINEERING

ENGINEERING MECHANICS

(Common to Civil, Mechanical Engineering & Allied branches)

I B.Tech– II Semester								SJCET-R24
Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
24G3A01202T	PC	3	0	0	3	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: On Completion of the course, the student should 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.

St.Johns College of Engineering and Technology

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DEPARTMENT OF MECHANICAL ENGINEERING

UNIT-I
Introduction to Engineering Mechanics–Basic Concepts. Scope and Applications **Systems of Forces:** Coplanar Concurrent Forces–Components in Space–Resultant–Moment of Force and its Application –Couples and Resultant of Force Systems. **Friction:** Introduction**,** limiting friction and impending motion, Coulomb's laws of dry friction, coefficient of friction, Cone of Static friction.
UNIT-II
Equilibrium of Systems of Forces: Free Body Diagrams, Lami's Theorem, Equations of Equilibrium of Coplanar Systems, Graphical method for the equilibrium, Triangle law of forces, converse of the law of polygon of forces condition of equilibrium, Equations of Equilibrium for Spatial System of forces, Numerical examples on spatial system of forces using vector approach, Analysis of plane trusses. Principle of virtual work with simple examples
UNIT-III
Centroid: Centroids of simple figures (from basic principles)–Centroids of Composite Figures. **Centre of Gravity:** Centre of gravity of simple body (from basic principles), Centre of gravity of composite bodies, Pappus theorems. **Area Moments of Inertia:** Definition–Polar 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
Rectilinear and Curvilinear motion of a particle: Kinematics and Kinetics – D'Alembert's Principle - Work Energy method and applications to particle motion-Impulse Momentum method.
UNIT-V
Rigid body Motion: Kinematics and Kinetics of translation, Rotation about fixed axis and plane motion, Work Energy method and Impulse Momentum method.

Textbooks:

1. Engineering Mechanics,S. Timoshenko, D.H.Young, J.V.Rao, S.Pati., ,Mc Graw Hill Education 2017. 5thEdition.

2. Engineering Mechanics, P.C. Dumir. Sengupta and Srinivas V veeravalli, University press .2020. First Edition.

3. A Text book of Engineering Mechanics, S.S Bhavikatti.Newageinternationalpublications2018. 4thEdition.

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. 6thEdition.

4. Introduction to Statics and Dynamics, Basudev Battachatia, Oxford University Press, 2014.Second Edition

5. Engineering Mechanics: Statics and Dynamics, Hibbeler R.C., Pearson Education, Inc., NewDelhi, 2022, 14thEdition

Additional Sources:

https://archive.nptel.ac.in/courses/112/106/112106286/

https://www.youtube.com/watch?v=nGfVTNfNwnk&list=PLOSWwFV98rfKXq2KBphJz 95rao7q8PpwT

St.Johns College of Engineering and Technology

(AUTONOMOUS)

DEPARTMENT OF MECHANICAL ENGINEERING

COMMUNICATIVE ENGLISH LAB

I B.Tech– II Semester								SJCET-R24
Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
24G3A52201P	BH&S	0	0	2	1	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 basic communication skills and also make them ready to face job interviews.

Course Outcomes:

After the completion of the course students will be able to

CO1:	Understand the different aspects of the English language proficiency with emphasis on LSRW skills.
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 Course Objectives:

List of Topics:

1. Vowels & Consonants
2. Neutralization/Accent Rules
3. Communication Skills &JAM
4. Role Play or Conversational Practice
5. E-mail Writing
6. Resume Writing, Cover letter, SOP
7. Group Discussions-methods & practice
8. Debates-Methods &Practice
9. PPT Presentations/Poster Presentation
10. Interviews Skills
11. Describing (Persons, places, Things and Events)
12. Paraphrasing

Suggested Software:

- Walden Info tech
- 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

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

https://www.youtube.com/channel/UCNfm92h83W2i2ijc5Xwp_IA

St.Johns College of Engineering and Technology

(AUTONOMOUS)

DEPARTMENT OF MECHANICAL ENGINEERING

ENGINEERING CHEMISTRY LAB

(Common to Civil, Mechanical Engineering)

I B.Tech– II Semester								SJCET-R24
Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
24G3A51201P	BH&S	0	0	2	1	30	70	100

Course Objectives:

- To verify the fundamental concepts with experiments

Course Outcomes:

After the completion of the course students 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.

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 Calorimetry
6. Estimation of Calcium in Portland cement
7. Preparation of nanomaterials 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

*Students must be performed 10 experiments from the above list.

Reference:

"Vogel's Quantitative Chemical Analysis 6th Edition 6th Edition" Pearson• Publications by

1. J. Mendham, R.C. Denney, J.D. Barnes and B. Sivasankar

St.Johns College of Engineering and Technology

(AUTONOMOUS)

DEPARTMENT OF MECHANICAL ENGINEERING

ENGINEERING WORKSHOP

(Common to all branches of Engineering)

I Year B. Tech. (EEE, CSE, CAI)–I Semester

I Year B. Tech. (CE, ME, ECE, CSD)–II Semester

I B.Tech– II Semester								SJCET-R24
Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
24G3A03201	ES	0	0	3	1.5	30	70	100

Course Objectives:

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

Course Outcomes:

After the completion of the course students will be able to

CO1:	Identify workshop tools and their operational capabilities.
CO2:	Practice on manufacturing of components using workshop trades including fitting, carpentry, foundry and welding.
CO3:	Apply fitting operations in various applications.
CO4:	Apply basic electrical engineering knowledge for House Wiring Practice
CO5:	Ability to make various basic prototypes in the trade of Tinsmithy such as rectangular tray, and open Cylinder

LISTOFEXPERIMENTS
Introduction to tools and equipment used in each trade
SECTION–I (Carpentry)
1. Dovetail joint
2. Half-lap joint
3. Mortise and Tenon joint
SECTION–II (Sheet Metal Working)
1. Tapered tray
2. Conical funnel
3. Elbow pipe
4. Brazing

SECTION–III (Fitting)
1. V–fitting
2. Stepped fitting
3. Half round fitting
SECTION–IV (Foundry& Welding)
1. Preparation of mould with single piece pattern.
2. Preparation of mould with split piece pattern.
3. Preparation of Lap Joint using Arc welding
4. Preparation of Butt Joint using Arc welding
SECTION–V (House wiring)
Familiarity with different types of basic electrical circuits and makes the following connections.
1. Parallel and series
2. Two-ways witch
3. Go down lighting
4. Tube light
5. Soldering of wires

Note: In each section a minimum of *TWO* exercises are to be carried out.

Text books:

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.

References:

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-Mc GrawHill, 2004.

3. Wiring Estimating, Costing and Contracting; SoniP. M.& Upadhyay P.A.;Atul Prakashan, 2021-22.

St.Johns College of Engineering and Technology

(AUTONOMOUS)

DEPARTMENT OF MECHANICAL ENGINEERING

ENGINEERING MECHANICS LAB

(Mechanical Engineering & allied branches)

I B.Tech– II Semester								SJCET-R24
Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
24G3A03202	PC	0	0	3	1.5	30	70	100

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

- Verify the Law of Parallelogram and Triangle of Forces.
- Determine the coefficients of friction of Static and Rolling friction and Centre of gravity of different plane Lamina.
- Analyse the system of Pulleys and Moment of Inertia of Compound Pendulum and Flywheel.

Course Outcomes:

After the completion of the course students 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.
CO4:	Verify the equilibrium conditions of a rigid body under the action of different force systems.

Students have to perform any 10 of the following Experiments:

List of Experiments: Verification of Law of Parallelogram of Forces.
1. Verification of Law of Triangle of Forces.
2. Verification of the Law of polygon for coplanar-concurrent forces acting on a particle in equilibrium and to find the value of unknown forces considering particle to be in equilibrium using universal force table.
3. Determination of coefficient of Static and Rolling Frictions
4. Determination of Centre of Gravity of different shaped Plane Lamina.
5. Verification of the conditions of equilibrium of a rigid body under the action of coplanar non-concurrent, parallel force system with the help of a simply supported beam.
6. Study of the systems of pulleys and draw the free body diagram of the system.
7. Determine the acceleration due to gravity using a compound pendulum.
8. Determine the Moment of Inertia of the compound pendulum about an axis perpendicular to the plane of oscillation and passing through its centre of mass.
9. Determine the Moment of Inertia of a Flywheel.
10. Verification of Law of Moment using Rotation Disc Apparatus and Bell Crank Lever.

References:

1. S. Timoshenko, D.H. Young, J.V. Rao, S. Pati., Engineering Mechanics, 5th Edition, McGraw Hill Education.

2. Hibbeler R.C., Engineering Mechanics: Statics and Dynamics, 14th Edition, Pearson Education, Inc., New Delhi, 2022

St.Johns College of Engineering and Technology

(AUTONOMOUS)

DEPARTMENT OF MECHANICAL ENGINEERING

HEALTH AND WELLNESS, YOGA AND SPORTS

(Common to All branches of Engineering)

I B.Tech– II Semester								SJCET-R24
Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
24G3A99201	BS&H	0	0	1	0.5			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:

After completion of the course the student 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

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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, Volleyball, Basketball, Handball, Football, Badminton, Kabaddi, Kho-kho, Table tennis, Cricket etc.

ii) Practicing general and specific warm up, aerobics ii) 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, totaling 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 MECHANICAL ENGINEERING

NUMERICAL METHODS & TRANSFORM TECHNIQUES (MECH)

II B.Tech– I Semester								SJCET-R24
Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
24G3A54303	BS&H	3	0	0	3	30	70	100

Course Outcomes:

After successful completion of this course, the students should be able to:

COs	Statements
CO1	Apply numerical methods to solve algebraic and transcendental equations
CO2	Derive interpolating polynomials using interpolation formulae
CO3	Solve differential and integral equations numerically
CO4	Understand the use of Laplace transform in system modeling, digital signal processing, process control, solving Boundary Value Problems.
CO5	Apply Fourier series and Fourier transform in communication theory and signal analysis, image processing and filters, data processing and analysis, solving partial differential equations for problems on gravity.

UNIT I: Solution of Algebraic & Transcendental Equations
Introduction-Bisection Method-Iterative method, Regula-falsi method and Newton Raphson method System of Algebraic equations: Jacoby and Gauss Siedal method.
UNIT II Interpolation
Finite differences-Newton's forward and backward interpolation formulae – Lagrange's formulae. Curve fitting: Fitting of straight line, second-degree and Exponential curve by method of least squares.
UNIT III Solution of Initial value problems to Ordinary differential equations
Numerical solution of Ordinary Differential equations: Solution by Taylor's series-Picard's Method of successive Approximations-Euler's and modified Euler's methods-Runge-Kutta methods (second and fourth order).
UNIT-IV: Laplace Transforms
Definition-Laplace transform of standard functions-existence of Laplace Transform – Inverse transform – First shifting Theorem, transforms of derivatives and integrals – Unit step function – Second shifting theorem– Convolution theorem – Laplace transform of Periodic function.

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UNIT-V: Fourier series and Fourier transforms
Fourier series: Determination of Fourier coefficients (Euler's) – Dirichlet conditions for the existence of Fourier series -Fourier series of Even and odd functions – Fourier series in an arbitrary interval – Half-range Fourier sine and cosine expansions **Fourier transforms:** Fourier integral theorem (without proof) – Fourier sine and cosine integrals complex form of Fourier integral. Fourier transform – Fourier sine and cosine transforms – Properties – Inverse transforms – convolution theorem.

Textbooks:

1. S S Sastry, Introductory Methods of Numerical Analysis, PHI Learning Private Limited.
2. B. S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 2017, 44th Edition

Reference Books:

1. Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley &Sons, 2018, 10th Edition.
2. R.K.Jain and S.R.K.Iyengar, Advanced Engineering Mathematics, Alpha Science International Ltd.,2021 5th Edition(9th reprint).
3. H. K Das, Er. Rajnish Verma, Higher Engineering Mathematics, S. Chand Publications, 2014, Third Edition (Reprint 2021)
4. Alan Jeffrey, Advanced Engineering Mathematics, Elsevier

Online Learning Resources:

1. https://onlinecourses.nptel.ac.in/noc17_ma14/preview

2. https://onlinecourses.nptel.ac.in/noc24_ma05/preview

3. http://nptel.ac.in/courses/111105090

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DEPARTMENT OF MECHANICAL ENGINEERING

UNIVERSAL HUMAN VALUES – UNDERSTANDING HARMONY AND ETHICAL HUMAN CONDUCT

(Common to All Branches of Engineering)

II B.Tech– I Semester								SJCET-R24
Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
24G3A52301	BS&MC	2	1	0	3	30	70	100

Course Outcomes:		Blooms Level
CO1	Define the terms like Natural Acceptance, Happiness and Prosperity	L1, L2
CO2	Identify one's self, and one's surroundings (family, society nature)	L1, L2
CO3	Apply what they have learnt to their own self in different day-to- day settings in real life	L3
CO4	Relate human values with human relationship and human society.	L4
CO5	Justify the need for universal human values and harmonious existence	L5
CO6	Develop as socially and ecologically responsible engineers	L3, L6

Course Topics

The course has 28 lectures and 14 tutorials in 5 modules. The lectures and tutorials are of 1- hour duration. Tutorial sessions are to be used to explore and practice what has been proposed during the lecture sessions.

The Teacher's Manual provides the outline for lectures as well as practice sessions. The teacher is expected to present the issues to be discussed as propositions and encourage the students to have a dialogue.

UNIT-I: Introduction to Value Education (6 lectures and 3 tutorials for practice session)
Lecture 1: Right Understanding, Relationship and Physical Facility (Holistic Development and the Role of Education)
Lecture 2: Understanding Value Education
Tutorial 1: Practice Session PS1 Sharing about Oneself
Lecture 3: self-exploration as the Process for Value Education
Lecture 4: Continuous Happiness and Prosperity–the Basic Human Aspirations
Tutorial 2: Practice Session PS2 Exploring Human Consciousness
Lecture 5: Happiness and Prosperity – Current Scenario
Lecture 6: Method to Fulfill the Basic Human Aspirations

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Tutorial 3: Practice Session PS3 Exploring Natural Acceptance
UNIT-II: Harmony in the Human Being (6 lectures and 3 tutorials for practice session)
Lecture 7: Understanding Human being as the Co-existence of the self and the body. Lecture 8: Distinguishing between the Needs of the self and the body Tutorial 4: Practice Session PS4 Exploring the difference of Needs of self and body. Lecture 9: The body as an Instrument of the self Lecture 10: Understanding Harmony in the self Tutorial 5: Practice Session PS5 Exploring Sources of Imagination in the self Lecture 11: Harmony of the self with the body Lecture12: Programme to ensure self-regulation and Health Tutorial 6: Practice Session PS6 Exploring Harmony of self with the body
UNIT-III: Harmony in the Family and Society(6lectures and 3 tutorials for practice session)
Lecture 13: Harmony in the Family–the Basic Unit of Human Interaction Lecture 14: 'Trust' – the Foundational Value in Relationship Tutorial 7: Practice Session PS7 Exploring the Feeling of Trust Lecture 15: 'Respect' – as the Right Evaluation Tutorial 8: Practice Session PS8 Exploring the Feeling of Respect Lecture16: Other Feelings, Justice in Human-to-Human Relationship Lecture 17: Understanding Harmony in the Society Lecture18: Vision for the Universal Human Order Tutorial9: Practice Session PS9 Exploring Systems to fulfil Human Goal
UNIT-IV: Harmony in the Nature/Existence (4lectures and 2 tutorials for practice session)
Lecture 19: Understanding Harmony in the Nature Lecture 20: Interconnectedness, self-regulation and Mutual Fulfillment among the Four Orders of Nature Tutorial 10: Practice Session PS10 Exploring the Four Orders of Nature Lecture 21: Realizing Existence as Co-existence at All Levels Lecture 22: The Holistic Perception of Harmony in Existence Tutorial11: Practice Session PS11 Exploring Co-existence in Existence.
UNIT-V: Implications of the Holistic Understanding – a Look at Professional Ethics (6 lectures and 3 tutorials for practice session)
Lecture 23: Natural Acceptance of Human Values Lecture 24: Definitiveness of (Ethical) Human Conduct Tutorial 12: Practice Session PS12 Exploring Ethical Human Conduct Lecture 25: A Basis for Humanistic Education, Humanistic Constitution and Universal

Human Order
Lecture 26: Competence in Professional Ethics
Tutorial 13: Practice Session PS13 Exploring Humanistic Models in Education
Lecture 27: Holistic Technologies, Production Systems and Management Models-Typical Case Studies
Lecture 28: Strategies for Transition towards Value-based Life and Profession
Tutorial 14: Practice Session PS14 Exploring Steps of Transition towards Universal Human Order

Practice Sessions for UNIT I–Introduction to Value Education

PS1 Sharing about Oneself

PS2 Exploring Human Consciousness

PS3 Exploring Natural Acceptance

Practice Sessions for UNIT II –Harmony in the Human Being

PS4 Exploring the difference of Needs of self and body

PS5ExploringSources of Imagination in the self

PS6 Exploring Harmony of self with the body

Practice Sessions for UNIT III –Harmony in the Family and Society

PS7 Exploring the Feeling of Trust

PS8 Exploring the Feeling of Respect

PS9 Exploring Systems to fulfil Human Goal

Practice Sessions for UNIT IV–Harmony in the Nature(Existence)

PS10 Exploring the Four Orders of Nature

PS11Exploring Co-existence in Existence

Practice Sessions for UNIT V – Implications of the Holistic Understanding – a Look at Professional

Ethics

PS12 Exploring Ethical Human Conduct

PS13 Exploring Humanistic Models in Education

PS14 Exploring Steps of Transition towards Universal Human Order

READINGS:

Textbook and Teachers Manual

a. The Textbook

R R Gaur, R Asthana, G P Bagaria, *A Foundation Course in Human Values and*

Professional Ethics, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-47-1

b. The Teacher's Manual

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

Reference Books

1. JeevanVidya: EkParichaya, A Nagaraj, JeevanVidyaPrakashan, Amarkantak, 1999.
2. Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
3. The Story of Stuff (Book).
4. The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi
5. Small is Beautiful - E. F Schumacher.
6. Slow is Beautiful - Cecile Andrews
7. Economy of Permanence - J C Kumarappa
8. Bharat Mein Angreji Raj – PanditSunderlal
9. Rediscovering India - by Dharampal
10. Hind Swaraj or Indian Home Rule - by Mohandas K. Gandhi
11. India Wins Freedom - Maulana Abdul Kalam Azad
12. Vivekananda - Romain Rolland (English)
13. Gandhi - Romain Rolland (English)

Mode of Conduct:

Lecture hours are to be used for interactive discussion, placing the proposals about the topics at hand and motivating students to reflect, explore and verify them.

Tutorial hours are to be used for practice sessions.

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

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

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

Tutorials (experiments or practical) are important for the course. The difference is that the laboratory is everyday life, and practical are how you behave and work in real life. Depending on the nature of topics, worksheets, home assignment and/or activity are included. The practice sessions (tutorials) would also provide support to a student in performing actions commensurate to his/her beliefs. It is intended that this would lead to development of commitment, namely behaving and working based on basic human values.

It is recommended that this content be placed before the student as it is, in the form of a basic foundation course, without including anything else or excluding any part of this content. Additional content may be offered in separate, higher courses. This course is to be taught by faculty from every teaching department, not exclusively by any one department.

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

Online Resources

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

   https://onlinecourses.swayam2.ac.in/aic22_ge23/preview

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DEPARTMENT OF MECHANICAL ENGINEERING

ENGINEERING THERMODYNAMICS

II B.Tech– I Semester								SJCET-R24
Course Code	Category	Hours/Week			Credits	Maximum Marks		
24G3A03301	PC	L	T	P	C	CIA	SEE	Total
		3	0	0	3	30	70	100

Course Outcomes:

CO	Statement
CO 1	Explain the importance of thermodynamic properties related to conversion of heat energy into work.
CO 2	Apply the Zeroeth and First Law of Thermodynamics.
CO 3	Understand Second Law of Thermodynamics.
CO 4	Analyze the Mollier charts, T-S and h-s diagrams, Steam calorimetry, Phase Transformations
CO 5	Evaluate the COP of refrigerating systems and properties, processes of psychrometry and sensible and latent heat loads.

UNIT-I: Introduction: Basic Concepts

Introduction: Basic Concepts : System, boundary, Surrounding, control volume, Universe, Types of Systems, Macroscopic and Microscopic viewpoints, Concept of Continuum, Thermodynamic Equilibrium, State, Property, Process, Cycle – Reversibility – Quasi static Process, Irreversible Process, Causes of Irreversibility

UNIT-II: First law of Thermodynamics

Energy in State and in Transition, Types, Work and Heat, Point and Path function. Zeroeth Law of Thermodynamics – Perpetual Motion Machine-I, Joule's Experiment – First law of Thermodynamics and applications. Limitations of the First Law – Enthalpy, Thermal Reservoir, Heat Engine, Heatpump, Parameters of performance.

UNIT-III: Second Law of Thermodynamics

Second Law of Thermodynamics, Kelvin-Planck and Clausius Statements and their Equivalence / Corollaries, Perpetual Motion Machine-II, Carnot's principle, Carnot cycle and its specialties, Thermodynamic scale of Temperature, Clausius Inequality, Entropy, Principle of EntropyIncrease – Energy Equation, Availability and Irreversibility – Thermodynamic Potentials,Gibbs and Helmholtz Functions, Maxwell Relations – Elementary Treatment of the ThirdLaw of Thermodynamics.

UNIT-IV: Properties of Steam and use of Steam Tables

Pure Substances, P-V-T- surfaces, T-S and h-s diagrams, Mollier Charts, Phase Transformations – Triple point at critical state properties during change of phase, Dryness Fraction – Clausius – Clapeyron equation.

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DEPARTMENT OF MECHANICAL ENGINEERING

UNIT-V: Introduction to Refrigeration and Air Conditioning
Introduction to Refrigeration: working of Air Refrigeration System, Vapour Compression Refrigeration System (VCR), and Coefficient of performance (COP). Introduction to Air Conditioning: Psychrometric properties & processes, working of simple air conditioning system. Requirements of human comfort and concept of effective temperature.

Text Books:

1. P.K.Nag, Engineering Thermodynamics, 5/e, Tata McGraw Hill, 2013.
2. Claus Borgnakke Richard E. Sonntag, Fundamentals of Thermodynamics, 7/e, Wiley, 2009.
3. Steam tables with Mollier diagram by RS Khurmi, S Chand Publications 3. Steam tables with Mollier diagram by RS Khurmi, S Chand Publications

Reference Books:

1. J.B. Jones, and R.E. Dugan, Engineering Thermodynamics, 1/e,Prentice Hall, 1995.
2. Y.A.Cengel&M.A.Boles , Thermodynamics – An Engineering Approach, 7/e, McGraw Hill, 2010.
3. P.Chattopadhyay, Engineering Thermodynamics, 1/e, Oxford University Press, 2011.
4. CP Arora, Refrigeration and Air-conditioning, 4/e, McGraw Hill, 2021.

Online Learning Resources:

NPTEL / SWAYAM

1. Basic Thermodynamics, Prof. S. K. Som, IIT Kharagpur
https://nptel.ac.in/courses/112104118
2. Applied Thermodynamics, Prof. G. V. Sreenivasan, IIT Madras
https://nptel.ac.in/courses/112106133
3. Thermodynamics, Prof. B. V. R. Tata, IIT Madras
https://nptel.ac.in/courses/122106031
4. Power Plant Engineering (Steam & Rankine cycles), Prof. Ravi Kumar, IIT Roorkee
https://nptel.ac.in/courses/112107214
5. Refrigeration and Air Conditioning, Prof. M. Ramgopal, IIT Kharagpur
https://nptel.ac.in/courses/112105129
6. Design and Innovation through SWAYAM, Prof. B. K. Chakravarthy, IIT Bombay
https://swayam.gov.in/nd1_noc20_ge11/preview

Coursera

1. Introduction to Thermodynamics: Transferring Energy, University of Michigan
https://www.coursera.org/learn/thermodynamics
2. Energy Principles in Thermodynamics,Georgia Institute of Technology
https://www.coursera.org/learn/energy-principles
3. Classical Thermodynamics,University of Colorado Boulder
https://www.coursera.org/learn/classical-thermodynamics
4. HVAC Fundamentals (Air Conditioning topics), Georgia Institute of Technology
https://www.coursera.org/learn/hvac

edX

1. Fundamentals of Thermodynamics, TU Delft
https://www.edx.org/course/fundamentals-of-thermodynamics
2. Introduction to Thermodynamics, MIT (OpenCourseWare)
https://ocw.mit.edu/courses/mechanical-engineering/2-05-thermal-fluid-engineering-i-fall-2011/
3. Thermodynamics & Heat Transfer, IITBombayX on edX
https://onlinecourses.nptel.ac.in/noc22-me42

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DEPARTMENT OF MECHANICAL ENGINEERING

MECHANICS OF SOLIDS

II B.Tech– I Semester								SJCET-R24
Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
24G3A03302	PC	3	0	0	3	30	70	100

Course Outcomes:

CO	Statement
CO 1	Learn all the methods to analyze beams, columns, frames for normal, shear, and torsion stresses and to solve deflection problems in preparation for the design of such structural components
CO 2	Analyse beams and draw correct and complete shear and bending moment diagrams for beams.
CO 3	Apply the concept of stress and strain to analyze and design structural members and machine parts under axial, shear and bending loads, and moments.
CO 4	Determine the resistance and deformation in machine members subjected to torsional loads and springs.
CO 5	Design and analysis of Industrial components like pressure vessels.

UNIT-I:SIMPLE STRESSES & STRAINS
SIMPLE STRESSES & STRAINS : Elasticity and plasticity – Types of stresses &strains–Hooke's law – stress – strain diagram for mild steel – Working stress – Factor ofsafety – Lateral strain, Poisson's ratio & volumetric strain – Bars of varying section –composite bars- Stresses on an inclined planeunder different uniaxial and biaxial stress conditions. Principal planes and principalstresses - Mohr's circle - Relation between elastic constants.
UNIT-II:SHEAR FORCE AND BENDING MOMENT
SHEAR FORCE AND BENDING MOMENT :Definition of beam – Types of beams – Concept of shear force and bending moment – Shear force and Bending moment diagrams for cantilever, simply supported and overhanging beams subjected to point loads, uniformly distributed load (UDL), uniformly varying loads and combination of these loads – Point of contra flexure – Relation between Shear force and Bending moment and rate of loading at a section of a beam.
UNIT-III: FLEXURAL STRESSES AND SHEAR STRESSES
FLEXURAL STRESSES: Theory of simple bending, Derivation of bending equation, Determination of bending stresses – section modulus of rectangular, circular, I and T sections - Design of simple beam sections. SHEAR STRESSES: Derivation of formula – Shear stress distribution across variousbeams sections like rectangular, circular, triangular, I and T sections.
UNIT-IV: TORSION OF SHAFTS AND SPRINGS
TORSION OF SHAFTS AND SPRINGS: Introduction-Derivation- Torsion of Circular

shafts- Pure Shear-Transmission of power bycircular shafts, Shafts in series, Shafts in parallel-Stresses in helical springs – Deflection of helical springs, carriage springs.

UNIT-V: THIN AND THICK CYLINDERS

THIN AND THICK CYLINDERS: Thin seamless cylindrical shells – Derivation of formula for longitudinal and circumferential stresses – hoop, longitudinal and volumetric strains – changes in diameter, and volume of thin cylinders– Thin spherical shells. Wire wound thin cylinders. Lame's equation –cylinders subjected to inside & outside pressures – compound cylinders.

Textbooks:

1. GH Ryder,Strength of materials, Palgrave Macmillan publishers India Ltd, 1961.

2. B.C. Punmia,Strength of materials,10/e, Lakshmi publications Pvt.Ltd, New Delhi, 2018

References:

1. Gere &Timoshenko,Mechanics of materials, 2/e, CBS publications, 2004.
2.U.C.Jindal, Strength of Materials, 2/e, Pearson Education, 2017.
3.Timoshenko, Strength of Materials Part – I& II, 3/e, CBS Publishers, 2004.
4. Andrew Pytel and Ferdinand L. Singer,Strength of Materials,4/e, Longman Pulications, 1990.
5. Popov, Mechanics of Solids, 2/e, New Pearson Education, 2015.

Online Learning Resources:

NPTEL / SWAYAM

1. Strength of Materials, Prof. S. K. Bhattacharyya, IIT Kharagpur
https://nptel.ac.in/courses/105105105
Mechanics of Solids, Prof. S. Sengupta, IIT Kharagpur
https://nptel.ac.in/courses/112105048
Covers: Stress-strain, beams, shear force & bending moment, torsion, deflection.
2. Solid Mechanics, Prof. N. G. R. Iyengar, IIT Madras
https://nptel.ac.in/courses/112106179

Coursera

1. Mechanics of Materials I: Fundamentals of Stress and Strain and Axial Loading Georgia Institute of Technology,https://www.coursera.org/learn/mechanics-of-materials1
2. Mechanics of Deformable Structures, École Polytechnique Fédérale de Lausanne (EPFL)
https://www.coursera.org/learn/mechanics-deformable-structures

YouTube Playlists

1. MIT OCW – Mechanics and Materials, Prof. Lorna Gibson, MIT
https://www.youtube.com/playlist?list=PLUl4u3cNGP62KjYwlPjYCp4Z-MFZ2YCFl
2. Strength of Materials – NPTEL (Video Playlist), Prof. S. K. Bhattacharyya, IIT Kharagpur
https://www.youtube.com/playlist?list=PL4C939924B732EDA7
3. Mechanics of Solids – GATE Academy
https://www.youtube.com/playlist?list=PLG7pRsmMJvVJtUPIF_iMy2EXGkNWL9JGV

St.Johns College of Engineering and Technology

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DEPARTMENT OF MECHANICAL ENGINEERING

MATERIAL SCIENCE & METALLURGY

II B.Tech– I Semester								SJCET-R24
Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
24G3A03303	PC	3	0	0	3	30	70	100

Course Outcomes:

CO	Statement
CO 1	Understand the crystalline structure of different metals and study the stability of phases in different alloy systems.
CO 2	Study the behavior of ferrous and non-ferrous metals and alloys and their application in different domains.
CO 3	Understand the effect of heat treatment, addition of alloying elements on properties of ferrous metals.
CO 4	Grasp the methods of making of metal powders and applications of powder metallurgy.
CO 5	Comprehend the properties and applications of ceramics, composites and other advanced methods.

UNIT-I: Structure of Metals and Constitution of alloys and Equilibrium Diagrams

Structure of Metals and Constitution of alloys: Crystallization of metals, Packing Factor –Simple Cubic, Body Centered Cubic, Face Centered Cubic & Hexagonal Close Packed-line density, plane density. Grain and grain boundaries, effect of grain boundaries–determination of grain size. Imperfections, Slip and Twinning. Necessity of alloying, types of solid solutions, Hume Rothery's rules, intermediate alloy phases, and electron compounds. Equilibrium Diagrams: Experimental methods of construction of equilibrium diagrams, Isomorphous alloy systems, equilibrium cooling and heating of alloys, Lever rule, coring miscibility gaps, eutectic systems, congruent melting intermediate phases, peritectic reaction. Transformations in the solid state – allotropy, eutectoid, peritectoid reactions, phase rule, relationship between equilibrium diagrams and properties of alloys. Study ofbinary phase diagrams such as Cu-Ni and Fe-Fe3C.

UNIT-II: Ferrous metals and alloys and Non-ferrous Metals and Alloys

Ferrous metals and alloys: Structure and properties of White Cast iron, Malleable Castiron, grey castiron, Spheriodal graphite castiron, Alloy castiron. Classification of steels, structure and properties of plain carbon steels, Low alloy steels, Hadfield manganese steels, tool and diesteels. Non-ferrous Metals and Alloys: Structure and properties of Copper and its alloys, Aluminium and its alloys, Titanium and its alloys, Magnesium and its alloys, Super alloys.

UNIT-III: Heat treatment of Steels

Heat treatment of Steels: Effect of alloying elements on Fe-Fe3C system, annealing, normalizing, hardening, TTT diagrams, tempering, hardenability, surface – hardening methods, age hardening treatment, Cryogenic treatment.

UNIT-IV: Powder Metallurgy
Powder Metallurgy: Basic processes- Methods of producing metal powders- milling atomization- Granulation-Reduction-Electrolytic Deposition. Compacting methods – Sintering - Methods of manufacturing sintered parts. Secondary operations, Applications of powder metallurgical products.
UNIT-V: Ceramics and Advanced materials
Ceramics and Advanced materials: Crystalline ceramics, glasses, cermets, abrasive materials, Classification of composites, manufacturing methods, particle reinforced composites, fiber reinforced composites, PMC, MMC, CMC and CCCs.

Textbooks:

1. S.H.Avner, Introduction to Physical Metallurgy, 2/e, Tata McGraw- Hill, 1997.
2. Donald R.Askeland, Essentials of Materials science and Engineering, 4/e, CL Engineering publications, 2018.

References:

1. Dr.V.D.kodgire, Material Science and Metallurgy, 39/e, Everest Publishing House, 2017.
2. V.Raghavan, Material Science and Engineering, 5/e, Prentice Hall of India, 2004.
3. William D. CallisterJr, Materials Science and Engineering: An Introduction, 8/e, John Wiley and Sons, 2009.
4. George E.Dieter, Mechanical Metallurgy, 3/e, McGraw-Hill, 2013.
5. Yip-Wah Chung, Introduction to Material Science and Engineering, 2/e, CRC Press, 2022.
6. A V K Suryanarayana, Material Science and Metallurgy, B S Publications, 2014.
7. U. C. Jindal, Material Science and Metallurgy, 1/e, Pearson Publications, 2011.

Online Learning Resources:

NPTEL / SWAYAM

1. Materials Science and Engineering, Prof. R. Singh, IIT Roorkee
https://nptel.ac.in/courses/113104068
Material Science,Prof. D. Basu, IIT Guwahati
https://nptel.ac.in/courses/113105028
2. Introduction to Materials Science and Engineering, Prof. S. Murugeshan, Anna University
https://swayam.gov.in/nd1_noc20_me49/preview

Coursera

1. Materials Science: 10 Things Every Engineer Should Know, University of California, Davis
https://www.coursera.org/learn/materials-science-engineering
2. The Science of Materials, University of Tokyo
https://www.coursera.org/learn/science-of-materials

YouTube Playlists

1. NPTEL - Material Science and Engineering (Video Playlist), Prof. R. Singh, IIT Roorkee
https://www.youtube.com/playlist?list=PLbMVogVj5nJQKkhsYWAUBoS_cF7eQwwhL

2. Material Science – GATE Academy
https://www.youtube.com/playlist?list=PL3dS1FQFg9twHHGeX_ZR4UEX-4nKh1YTK.
3. Material Science Tutorials – Technical Education YouTube
https://www.youtube.com/watch?v=Rp4sz6N-DFE

St.Johns College of Engineering and Technology

(AUTONOMOUS)

DEPARTMENT OF MECHANICAL ENGINEERING

MECHANICS OF SOLIDS & MATERIAL SCIENCE LAB

II B.Tech– I Semester								SJCET-R24
Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
24G3A03304	PC	0	0	3	1.5	30	70	100

Course Outcomes:

CO	Statement
CO 1	Understand the stress strain behavior of different materials.
CO 2	Evaluate the hardness of different materials.
CO 3	Explain the relation between elastic constants and hardness of materials.
CO 4	Identify various microstructures of steels and cast irons..
CO 5	Evaluate hardness of treated and untreated steels.

NOTE: Any 5 experiments from each section A and B.

A) MECHANICSOFSOLIDSLAB:

1. Tensile test on Universal Testing Machine
2. Bending test on
a) Simply supported beam
b) Cantilever beam
3. Torsion test
4. Hardness test
a) Brinell's hardness test
b) Rockwell hardness test
c) Vickers hardness test
5. Test on springs
6. Impact test
a) Charpy test
b) Izod test
7. Punch shear test
8. Liquid penetration test

B) MATERIAL SCIENCELAB:

1. Preparation and study of the Microstructure of pure metals.
2. Preparation and study of the Microstructure of Mild steel, medium carbon steels, andHigh carbon
steels.
3. Study of the Microstructures of Cast Irons.
4. Study of the Microstructures of Non-Ferrous alloys.
5. Study of the Microstructures of Heat treated steels.
6. Hardenability of steels by Jominy End Quench Test.

Virtual lab:

1. To investigate the principal stresses σa and σb at any given point of a structuralelement or machine
component when it is in a state of plane stress. (https://virtuallabs.github.io/exp-rockwell-hardness
experiment-iiith/objective.html)
2. To find the impact resistance of mild steel and cast iron.(https://smnitk.vlabs.ac.in/exp/izod-impact

test).
3. To find the impact resistance of mild steel.(https://sm-nitk.vlabs.ac.in/exp/charpyimpact test/index.html)
4. To find the Rockwell hardness number of mild steel, cast iron, brass, aluminum andspring steel etc.
(https://sm-nitk.vlabs.ac.in/exp/rockwell-hardness-test)
5. To determine the indentation hardness of mild steel, brass, aluminum etc. usingVickers hardness
testing machine. (https://sm-nitk.vlabs.ac.in/exp/vickers-hardnesstest).

St.Johns College of Engineering and Technology

(AUTONOMOUS)

DEPARTMENT OF MECHANICAL ENGINEERING

COMPUTER-AIDED MACHINE DRAWING

II B.Tech– I Semester								SJCET-R24
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
		L	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
24G3A03305	**PC**	0	0	3	1.5	30	70	100

Course Outcomes:

CO	Statement
CO 1	Demonstrate the conventional representations of materials and machine components.
CO 2	Model riveted, welded and key joints using CAD system.
CO 3	Create solid models and sectional views of machine components.
CO 4	Generate solid models of machine parts and assemble them.
CO 5	Translate 3D assemblies into 2D drawings.

The following are to be done by any 2D software package

Conventional representation of materials and components:

Detachable joints: Drawing of thread profiles, hexagonal and square-headed bolts and nuts, bolted joint with washer and locknut, stud joint, screw joint and foundation bolts.

Riveted joints: Drawing of rivet, lap joint, butt joint with single strap, single riveted, double riveted double strap joints.

Welded joints: Lap joint and T joint with fillet, butt joint with conventions.

Keys: Taper key, sunk taper key, round key, saddle key, feather key, woodruff key.

Couplings: rigid – Muff, flange; flexible – bushed pin-type flange coupling, universal coupling, Oldham's' coupling.

The following exercises are to be done by any 3D software package:

Sectional views:

Creating solid models of complex machine parts and sectional views.

Assembly drawings:(Any four of the following using solid model software)

Lathe tool post, tool head of shaping machine, tail-stock, machine vice, gate valve,carburetor, piston, connecting rod, eccentric, screw jack, plumber block, axle bearing, pipevice, clamping device, Geneva cam, universal coupling.

Production drawing:

Representation of limits, fits and tolerances for mating parts. Use any four parts of aboveassembly drawings and prepare manufacturing drawing with dimensional and geometrictolerances.

Textbooks:

1 Machine Drawing by K.L.Narayana, P.Kannaiah and K.Venkat Reddy, New Age International
Publishers, 3/e, 2014
2 Machine drawing by N. Sideshwar, P. Kannaiah, V.V.S.Sastry, TMH Publishers.

2014.

Reference Books:
1. Cecil Jensen, Jay Helsel and Donald D.Voisinet, Computer Aided Engineering Drawing, Tata
McGraw-Hill, NY, 2000.
2. James Barclay, Brain Griffiths, Engineering Drawing for Manufacture, Kogan Page Science, 2003.
3. N.D.Bhatt, Machine Drawing, Charotar Publishers, 50/e, 2014.

Online Learning Resources:

https://eeedocs.wordpress.com/wp-content/uploads/2014/02/machinedrawing.pdf

https://archive.nptel.ac.in/courses/112/105/112105294/

https://www.edx.org/learn/engineering/dassault-systemes-solidworks-solidworks-cadfundamentals?

index=product&queryID=c90b35a82a6ef58b0d6f89679c63f6a1&position=2&linked_from=autocomplete&c=autocomplete

https://www.youtube.com/watch?v=0bQkS3_3Fq4

St.Johns College of Engineering and Technology

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DEPARTMENT OF MECHANICAL ENGINEERING

PYTHON PROGRAMMING

II B.Tech– I Semester								SJCET-R24
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
24G3A05304	**SEC**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
		0	1	2	2	30	70	100

Course Objectives: The main objectives of the course are to

- Introduce core programming concepts of Python programming language.
- Demonstrate about Python data structures like Lists, Tuples, Sets and dictionaries
- Implement Functions, Modules and Regular Expressions in Python Programming and to create practical and contemporary applications using these

Course Outcomes:

CO	Statement
CO 1	showcase adept command of Python syntax, deftly utilizing variables, data types, control structures, functions, modules, and exception handling to engineer robust and efficient code solutions. (L4)
CO 2	apply Python programming concepts to solve a variety of computational problems (L3)
CO 3	understand the principles of object-oriented programming (OOP) in Python, including classes, objects, inheritance, polymorphism, and encapsulation, and apply them to design and implement Python programs (L3)
CO 4	understand the principles of object-oriented programming (OOP) in Python, including classes, objects, inheritance, polymorphism, and encapsulation, and apply them to design and implement Python programs (L3)
CO 5	exhibit competence in implementing and manipulating fundamental data structures such as lists, tuples, sets, dictionaries (L3)

UNIT-1:

History of Python Programming Language, Thrust Areas of Python, Installing Anaconda Python Distribution, Installing and Using Jupyter Notebook.

Parts of Python Programming Language: Identifiers, Keywords, Statements and Expressions, Variables, Operators, Precedence and Associativity, Data Types, Indentation, Comments, Reading Input, Print Output, Type Conversions, the type () Function and Is Operator, Dynamic and Strongly Typed Language.

Control Flow Statements: if statement, if-else statement, if...elif...else, Nested if statement, while Loop, for Loop, continue and break Statements, Catching Exceptions Using try and except Statement.

Sample Experiments:

1. Write a program to find the largest element among three Numbers.
2. Write a Program to display all prime numbers within an interval
3. Write a program to swap two numbers without using a temporary variable.
4. Demonstrate the following Operators in Python with suitable examples.

i) Arithmetic Operators ii) Relational Operators iii) Assignment Operatorsiv) Logical Operators v) Bit wise Operators vi) Ternary Operator vii) Membership Operatorsviii) Identity Operators

5. Write a program to add and multiply complex numbers
6. Write a program to print multiplication table of a given number.

UNIT-II:

Functions: Built-In Functions, Commonly Used Modules, Function Definition and Calling the function, return Statement and void Function, Scope and Lifetime of Variables, Default Parameters, Keyword Arguments, *args and **kwargs, Command Line Arguments.
Strings: Creating and Storing Strings, Basic String Operations, Accessing Characters in String by Index Number, String Slicing and Joining, String Methods, Formatting Strings.
Lists: Creating Lists, Basic List Operations, Indexing and Slicing in Lists, Built-In Functions Used on Lists, List Methods, del Statement.

Sample Experiments:

7. Write a program to define a function with multiple return values.
8. Write a program to define a function using default arguments.
9. Write a program to find the length of the string without using any library functions.
10. Write a program to check if the substring is present in a given string or not.
11. Write a program to perform the given operations on a list:
    i. Addition ii. Insertion iii. slicing
12. Write a program to perform any 5 built-in functions by taking any list.

UNIT-III-

Dictionaries: Creating Dictionary, Accessing and Modifying key:value Pairs in Dictionaries, Built-In Functions Used on Dictionaries, Dictionary Methods, del Statement.
Tuples and Sets: Creating Tuples, Basic Tuple Operations, tuple() Function, Indexing and Slicing in Tuples, Built-In Functions Used on Tuples, Relation between Tuples and Lists, Relation between Tuples and Dictionaries, Using zip() Function, Sets, Set Methods, Frozenset.

Sample Experiments:

13. Write a program to create tuples (name, age, address, college) for at least two members and concatenate the tuples and print the concatenated tuples.
14. Write a program to count the number of vowels in a string (No control flow allowed).
15. Write a program to check if a given key exists in a dictionary or not.
16. Write a program to add a new key-value pair to an existing dictionary.
17. Write a program to sum all the items in a given dictionary.

UNIT-IV

UNIT-IV: Files: Types of Files, Creating and Reading Text Data, File Methods to Read and Write Data, Reading and Writing Binary Files, Pickle Module, Reading and Writing CSV Files, Python os and os.path Modules. Object-Oriented Programming: Classes and Objects, Creating Classes in Python, Creating Objects in Python, Constructor Method, Classes with Multiple Objects, Class Attributes Vs Data Attributes, Encapsulation, Inheritance, Polymorphism.

Sample Experiments:

18. Write a program to sort words in a file and put them in another file. The output file should have only lower-case words, so any upper-case words from source must be lowered.
19. Python program to print each line of a file in reverse order.
20. Python program to compute the number of characters, words and lines in a file.
21. Write a program to create, display, append, insert and reverse the order of the

items in the array.

22. Write a program to add, transpose and multiply two matrices.
23. Write a Python program to create a class that represents a shape. Include methods to calculate its area and perimeter. Implement subclasses for different shapes like circle, triangle, and square.

UNIT-V-

Introduction to Data Science: Functional Programming, JSON and XML in Python, NumPy with Python, Pandas.

Sample Experiments:

24. Python program to check whether a JSON string contains complex object or not.
25. Python Program to demonstrate NumPy arrays creation using array () function.
26. Python program to demonstrate use of ndim, shape, size, dtype.
27. Python program to demonstrate basic slicing, integer and Boolean indexing.
28. Python program to find min, max, sum, cumulative sum of array
29. Create a dictionary with at least five keys and each key represent value as a list where this list contains at least ten values and convert this dictionary as a pandas data frame and explore the data through the data frame as follows:
    a) Apply head () function to the pandas data frame
    b) Perform various data selection operations on Data Frame
30. Select any two columns from the above data frame, and observe the change in one attribute with respect to other attribute with scatter and plot operations in matplotlib

A Mandatory Case study: Implement any real-world application.

Reference Books:

1. Gowrishankar S, Veena A., Introduction to Python Programming, CRC Press.
2. Python Programming, S Sridhar, J Indumathi, V M Hariharan, 2nd Edition, Pearson, 2024
3. Introduction to Programming Using Python, Y. Daniel Liang, Pearson.

Online Learning Resources/Virtual Labs:

1. https://www.coursera.org/learn/python-for-applied-data-science-ai
2. https://www.coursera.org/learn/python?specialization=python#syllabus

St.Johns College of Engineering and Technology

(AUTONOMOUS)

DEPARTMENT OF MECHANICAL ENGINEERING

ENVIRONMENTAL SCIENCE

II B.Tech– I Semester								SJCET-R24
Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
24G3A99301	ES	2	0	0	0	30	-	30

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

CO1: Grasp multidisciplinary nature of environmental studies and various renewable and
nonrenewable resources.
CO2: Understand flow and bio-geo- chemical cycles and ecological pyramids.
CO3: Understand various causes of pollution and solid waste management and related preventive
measures.
CO4: About the rainwater harvesting, watershed management, ozone layer depletion and waste land
reclamation.
CO5: Casus of population explosion, value education and welfare programmes.

UNIT-I

Multidisciplinary Nature of Environmental Studies: – Definition, Scope and Importance – Need for Public Awareness.

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

UNIT-II

Ecosystems: Concept of an ecosystem. – Structure and function of an ecosystem – Producers, consumers and decomposers – Energy flow in the ecosystem – Ecological succession – Food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the following ecosystem:

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

Biodiversity and its Conservation : Introduction 0 Definition: genetic, species and ecosystem diversity – Bio-geographical classification of India – Value of biodiversity: consumptive use, Productive use, social, ethical, aesthetic and option values – Biodiversity at global, National and local levels – India as a mega-diversity nation – Hot-sports of biodiversity – Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – Endangered and endemic species of India – Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

UNIT-III

Environmental Pollution: Definition, Cause, effects and control measures of :

a. Air Pollution.

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

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

UNIT-IV

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

UNIT-V

Human Population and the Environment: Population growth, variation among nations. Population explosion – Family Welfare Programmes. – Environment and human health – Human Rights – Value Education – HIV/AIDS – Women and Child Welfare – Role of information Technology in Environment and human health – Case studies.

Field Work: Visit to a local area to document environmental assets River/forest grassland/hill/mountain – Visit to a local polluted site-Urban/Rural/Industrial/Agricultural Study of common plants, insects, and birds – river, hill slopes, etc..

Text Books:

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

Reference Books:

1. Deeksha Dave and E.Sai Baba Reddy, "Text book of Environmental Science", Cengage Publications.
2. M.AnjiReddy,"TextbookofEnvironmentalSciencesandTechnology",BSPublication.
3. J.P.Sharma, Comprehensive Environmental studies, Laxmi publications.
4. J.Glynn Henry and Gary W. Heinke, "Environmental Sciences and Engineering", Prentice hall of India Private limited
5. G.R.Chatwal, "A Text Book of Environmental Studies" Himalaya Publishing House
6. Gilbert M.Masters and Wendell P.Ela, "Introduction to Environmental Engineering and Science, Prentice hall of India Private limited.

St.Johns College of Engineering and Technology

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DEPARTMENT OF MECHANICAL ENGINEERING

INDUSTRIAL ENGINEERING AND MANAGEMENT

II B.Tech– II Semester								SJCET-R24
Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
24G3A52402d	PC	2	0	0	2	30	70	100

Course Outcomes:

CO	Statement
CO 1	Learn about how to design the optimal layout
CO 2	Demonstrate work study methods
CO 3	Explain Quality Control techniques
CO 4	Discuss the financial management aspects
CO 5	Understand the human resource management methods.

UNIT-I: INTRODUCTION TO INDUSTRIAL ENGINEERING AND PLANT LAYOUT
INTRODUCTION: Definition of industrial engineering (I.E), development, applications, role of an industrial engineer, quantitative tools of IE and productivity measurement. Concepts of management, importance, functions of management, scientific management, Taylor's principles, Fayol's principles of management. PLANT LAYOUT: Factors governing plant location, types of production layouts, advantages and disadvantages of process layout and product layout, applications, quantitative techniques for optimal design of layouts.
UNIT-II:WORK STUDY
WORK STUDY: Importance, types of production, applications, work study, method study and time study, work sampling, Pre determined Motion Time Systems, micro motion study, rating techniques, MTM, work factors system, principles of Ergonomics, flow process charts, string diagrams and Therbligs.
UNIT-III: STATISTICAL QUALITY CONTROL AND TQM
STATISTICAL QUALITY CONTROL: Quality control, Queuing assurance and itsimportance, SQC,attribute sampling inspection with single and double sampling, Control charts– X and R –charts X and Scharts and their applications, simple numerical examples. TOTALQUALITYMANAGEMENT: Elements of TQM – Continuous Improvement –zero defect concept, quality circles, implementation, applications, ISO quality systems. Six Sigma–definition, basic concepts.
UNIT-IV: FINANCIAL MANAGEMENT
FINANCIAL MANAGEMENT: Scope and nature of financial management, Sources offinance, Management of working capital, estimation of working capital requirements, budget and budgetary control, Capital budgeting – Nature of Investment Decisions– Investment Evaluation criteria-NPV, IRR, PI, Payback Period, and ARR, numerical problems.
UNIT-V:HUMAN RESOURCE MANAGEMENT AND VALUE ANALYSIS
HUMAN RESOURCE MANAGEMENT: Concept of human resource management, personnel management and industrial relations, functions of personnel management, Job evaluation, its importance and types, merit rating, quantitative methods,

wageincentive plans, andtypes.
VALUE ANALYSIS: Value engineering, implementation procedure, enterprise resource planning and supply chain management.

Text Books:

1. O.PKhanna, Industrial Engineering and Management, Dhanpat Rai Publications(P)Ltd.
2.Martand Telsang Industrial Chand & Company Ltd.New Delhi

Reference Books:

1. Bhattacharya DK, Industrial Management, S.Chand, publishers.
2. J.G Monks, Operations Management, 3/e, McGraw Hill Publishers.
3. T.R.Banga,S.C.Sharma,N.K.Agarwal,IndustrialEngineeringandManagementScience, KhannaPublishers.
4. Koontz O'Donnell, Principles of Management, McGraw Hill Publishers.
5. R.C.Gupta, Statistical Quality Control, Khanna Publishers.
6. NVS Raju, Industrial Engineering and Management, Cengage India Private Limited.

Online Learning Sources

NPTEL / SWAYAM

1. Industrial Engineering, Prof. Inderdeep Singh, IIT Roorkee
https://nptel.ac.in/courses/112107143
2. Work System Design, Prof. Shantanu Bhattacharya, IIT Kanpur
https://nptel.ac.in/courses/
3. Total Quality Management, Prof. Inderdeep Singh, IIT Roorkee
https://nptel.ac.in/courses/112107251

Coursera

1. Operations Management: Strategy and Quality Management, University of Illinois
https://www.coursera.org/learn/operations-management
2. Finance for Non-Finance Professionals, Rice University
https://www.coursera.org/learn/finance-for-non-finance
3. Quality Improvement in Manufacturing, Technische Universität München (TUM)
https://www.coursera.org/learn/quality-improvement

YouTube

1. Industrial Engineering – NPTEL HRD YouTube Playlist, Prof. Inderdeep Singh, IIT Roorkee
https://www.youtube.com/playlist?list=PLbRMhDVUMngcLXNfLsVbiu8J7MYbQhr1l
2. Work Study & Time Study Explained, Mech Zone / Learn Engineering
https://www.youtube.com/watch?v=rYh0Hh6RTOU
3. Financial Management Basics, CA Rachana Phadke Ranade
https://www.youtube.com/watch?v=2wJz7Va8C1E

St.Johns College of Engineering and Technology

(AUTONOMOUS)

DEPARTMENT OF MECHANICAL ENGINEERING

COMPLEX VARIABLES, PROBABILITY AND STATISTICS

II B.Tech– II Semester								SJCET-R24
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
24G3A54403	**ES**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
		3	0	0	3	30	70	100

Course Outcomes:

CO	Statement
CO 1	Analyze limit, continuity and differentiation of functions of complex variables and Understand Cauchy- Riemann equations, analytic functions and various properties of analytic functions.
CO 2	Understand Cauchy theorem, Cauchy integral formulas and apply these to evaluate complex contour integrals. Classify singularities and poles; find residues and evaluate complex integrals using the residue theorem.
CO 3	Apply Probability theory to find the chances of happening of events.
CO 4	Understand various probability distributions and calculate their statistical constants.
CO 5	Analyze to test various hypotheses included in theory and types of errors for large samples.

UNIT-I: Complex Variable – Differentiation
Introduction to functions of complex variable-concept of Limit & continuity-Differentiation, Cauchy Riemann equations, analytic functions harmonic functions, finding harmonic conjugate-construction of analytic function by Milne Thomson method.
UNIT-II: Complex Variable – Integration
Line integral-Contour integration, Cauchy's integral theorem (Simple Case), Cauchy Integral formula, Power series expansions: Taylor's series, zeros of analytic functions, singularities, Laurent's series, Residues, Cauchy Residue theorem (without proof), Evaluation of definite integral involving sine and cosine.
UNIT-III: Probability theory
Probability, probability axioms, addition law and multiplicative law of probability, conditional probability, Baye's theorem, random variables (discrete and continuous), probability density functions, properties, mathematical expectation
UNIT-IV: Random variables & Distributions
Random variables (discrete and continuous), probability density functions, properties, mathematical expectation Probability distribution - Binomial, Poisson approximation to the binomial distribution, Normal distribution and their properties
UNIT-V: Estimation and Testing of hypothesis, large sample tests
Estimation-parameters, statistics, sampling distribution, point estimation, Formulation of null hypothesis, alternative hypothesis, the critical and acceptance regions, level of significance, two types of errors and power of the test. Large Sample Tests: Test for single proportion, difference of proportions, test for single mean and difference of means. Confidence interval for parameters in one sample and two sample problems

Text Books:

1. B.S.Grewal, Higher Engineering Mathematics, Khanna Publishers, 2017, 44th Edition P
2. Miller and Freunds, Probability and Statistics for Engineers, 7/e, Pearson, 2008.

Reference Books:

1. R.K.Jain and S.R.K.Iyengar, Advanced Engineering Mathematics, Alpha Science International Ltd., 2021 5th Edition (9th reprint).
2. B.V.Ramana, Higher Engineering Mathematics, Mc Graw Hill publishers
3. W. Feller, an Introduction to Probability Theory and its Applications, 1/e, Wiley, 2008.

Online Learning Resources:

1. https://onlinecourses.nptel.ac.in/noc20_ma50/preview
2. https://archive.nptel.ac.in/courses/111/106/111106111

St.Johns College of Engineering and Technology

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DEPARTMENT OF MECHANICAL ENGINEERING

MANUFACTURING PROCESSES

II B.Tech– II Semester								SJCET-R24
Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
24G3A03401T	PC	3	0	0	3	30	70	100

Course Outcomes:

CO	Statement
CO 1	Design the patterns and core boxes for metal casting processes
CO 2	Understand the different welding processes
CO 3	Demonstrate the different types of bulk forming processes
CO 4	Understand sheet metal forming processes
CO 5	Learn about the different types of additive manufacturing processes

UNIT-I: Casting
Casting: Steps involved in making a casting – Advantage of casting and its applications. Patterns and Pattern making – Types of patterns, Principles of Gating, Risers, casting design considerations. Solidification of castings and casting defects-causes and remedies. Basic principles and applications of special casting processes - Centrifugal casting, Diecasting.
UNIT-II: Welding
Welding: Classification of welding processes, Gas welding. arc welding, TIG & MIG welding. Resistance welding, Friction welding, Friction stir welding, Thermit welding, Plasma Arc welding, Laser welding, electron beam welding.
UNIT-III: Bulk Forming
Bulk Forming: Plastic deformation in metals and alloys-recovery, recrystallization and grain growth. Hot working and Cold working - Strain hardening and Annealing. Bulk forming processes: Forging Types of Forging, forging defects and remedies; Rolling – fundamentals, types of rolling mills and products. Types of extrusions: Impact extrusion, Hydrostatic extrusion; Wire drawing and Tube drawing.
UNIT-IV: Sheet metal forming
Sheet metal forming- Deep drawing, Stretch forming, Bending, Spring back and its remedies, Coining, Spinning, Types of presses and press tools. High energy rate forming processes: Principles of explosive forming, electromagnetic forming, Electro hydraulic forming, advantages and limitations.
UNIT-V: Additive manufacturing
Additive manufacturing - Steps in Additive Manufacturing (AM), Classification of AM processes, Advantages of AM, Extrusion Based AM Processes, Powder Bed Fusion AM Processes, Direct Energy Deposition AM Processes, Applications

Text Books:

1. Kalpakjain S and Steven R Schmid, Manufacturing Processes for Engineering Materials, 5/e, Pearson Publications, 2017.
2. P.N. Rao, Manufacturing Technology -Vol I, 5/e, McGraw Hill Education, 2018.

Reference Books:

1. A.Ghosh&A.K.Malik, Manufacturing Science, East West Press Pvt. Ltd, 2010.
2. Lindberg and Roy, Processes and materials of manufacture, 4/e, Prentice Hall India Learning Private Limited, 1990.
3. Sharma P.C., A Text book of Production Technology, 8/e, S Chand Publishing, 2014.
4. H.S. Shaun, Manufacturing Processes, 1/e, Pearson Publishers, 2012.
5. WAJ Chapman , Workshop Technology, 5/e, CBS Publishers & Distributors Pvt. Ltd, 2021.
6. Hindustan Machine Tools, Production Technology, Tata McGraw Hill Publishers, 2017.
7. Ian Gibson, David W Rosen, Brent Stucker., Additive Manufacturing Technologies: 3D Printing, Rapid Prototyping, and Direct Digital Manufacturing, 2/e, Springer, 2015.

OnlineLearningResources:

NPTEL / SWAYAM

1. Manufacturing Processes I, Prof. D. Ravi Kumar, IIT Delhi
https://nptel.ac.in/courses/112102275
2. Manufacturing Processes II, Prof. A. B. Chattopadhyay, IIT Kharagpur
https://nptel.ac.in/courses/112105127
3. Principles of Manufacturing Processes, Prof. Shantanu Bhattacharya, IIT Kanpur
https://nptel.ac.in/courses/112104265

Coursera

1. Fundamentals of Manufacturing Processes, University of Buffalo, SUNY
https://www.coursera.org/learn/manufacturing-processes
2. Additive Manufacturing,University of Illinois at Urbana-Champaign
https://www.coursera.org/learn/additive-manufacturing
3. Modern Robotics: Mechanics, Planning, and Control (For High-Energy Forming), Northwestern University
https://www.coursera.org/specializations/modernrobotics

YouTube Channels / Playlists

1. Manufacturing Processes – NPTEL (IIT Delhi, Prof. D. Ravi Kumar)
https://www.youtube.com/playlist?list=PLvF6gD1X_l5ZXNDEio3WIDgkkhMZ4r8a5
2. Learn Engineering – Manufacturing Basics
https://www.youtube.com/watch?v=OLaodHEZ1N4
3. Skill Lync – Additive Manufacturing Tutorials
https://www.youtube.com/playlist?list=PLIQgCj0BLdiuDp5pqGk13FeIHTFMGl58L

St.Johns College of Engineering and Technology

(AUTONOMOUS)

DEPARTMENT OF MECHANICAL ENGINEERING

FLUID MECHANICS & HYDRAULIC MACHINES

II B.Tech– II Semester								SJCET-R24
Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
24G3A03402T	PC	3	0	0	3	30	70	100

Course Outcomes:

CO	Statement
CO 1	Understand the basic concepts of fluid properties and measurement of pressure.
CO 2	Estimate the mechanics of fluids in kinematics and dynamic conditions.
CO 3	Estimate losses in fluid flow and apply the Boundary layer theory, flow separation.
CO 4	Estimate the hydro dynamic forces of jet on vanes and Performance evaluation of Hydraulic turbines.
CO 5	Understand the Working Principles and performance evaluation of hydraulic pumps.

UNIT-I: Fluid statics
Fluid statics: Dimensions and units: physical properties of fluids - specific gravity, viscosity and its significance, surface tension, capillarity, and vapor pressure. Atmospheric, gauge and vacuum pressure, Measurement of pressure – Manometers - Piezometer, U-tube, inverted and differential manometers. Pascal's & hydrostatic laws.
UNIT-II: Fluid kinematics and Fluid dynamics
Fluid kinematics: Introduction, flow types. Equation of continuity for one dimensional flow, Stream line, path line and streak lines and stream tube. Stream function and velocity potential function, differences and relation between them. Fluid dynamics: surface and body forces –Euler's and Bernoulli's equations for flow along a streamline, momentum equation and its applications, force on pipe bend.
UNIT-III: Closed conduit flow and Boundary Layer Theory
Closed conduit flow: Reynold's experiment- Darcy Weisbach equation- Minor losses in pipes- pipes in series and pipes in parallel. Boundary Layer Theory: Introduction, momentum integral equation, displacement, momentum and energy thickness, separation of boundary layer, control of flow separation.
UNIT-IV: Basics of turbo machinery and Hydraulic Turbines
Basics of turbo machinery: hydrodynamic force of jets on stationary and moving flat, inclined, and curved vanes, jet striking centrally and at tip, velocity diagrams, workdone and efficiency, flow Over radial vanes. Hydraulic Turbines: classification of turbines, impulse and reaction turbines, Peltonwheel, Francis turbine and Kaplan turbine-working proportions, work done, efficiencies.
UNIT-V: Centrifugal and Reciprocating pumps
Centrifugal pumps: classification, working, work done – manometric head- losses and efficiencies specific speed - performance characteristic curves. Reciprocating pumps: Working, Discharge, slip, indicator diagrams.

Text Books:

1. Y.A.Cengel,J.M.Cimbala, Fluid Mechanics,FundamentalsandApplications,6/e,McGraw Hill Publications, 2019.
2. Dixon,Fluid Mechanics and Thermodynamics of Turbomachinery,7/e, ElsevierPublishers, 2014.

Reference Books:

1. P N Modi and S M Seth, Hydraulics & Fluid Mechanics including HydraulicsMachines, Standard Book House, 2017.
2. RKBansal, FluidMechanicsandHydraulicMachines, 10/e,LaxmiPublications(P)Ltd,2019.
3. Rajput, FluidMechanicsandHydraulicMachines, S Chand & Company, 2016.
4. D.S.Kumar,FluidMechanicsandFluidPowerEngineering, S K Kataria&Sons, 2013.
5. D.RamaDurgaiah,FluidMechanicsandMachinery,1/e, NewAgeInternational, 2002.

Online Learning Resources:

NPTEL / SWAYAM

1. Fluid Mechanics, Prof. S.K. Som, IIT Kharagpur
https://nptel.ac.in/courses/112105171
2. Hydraulic Machines, Prof. M.K. Moharana, IIT Roorkee
https://nptel.ac.in/courses/112107115
3. Introduction to Fluid Mechanics, Prof. B.N. Mandal, IIT Guwahati
https://nptel.ac.in/courses/112103021

Coursera

1. Fundamentals of Fluid Power,University of Minnesota
https://www.coursera.org/learn/fluid-power
2. Fluid Mechanics and Its Applications, Delft University of Technology (TU Delft)
https://www.edx.org/course/fluid-mechanics (via edX)
3. Introduction to Thermodynamics: Transferring Energy from Here to There, University of Michigan
https://www.coursera.org/learn/thermodynamics

YouTube Channels / Playlists

1. NPTEL Fluid Mechanics Playlist (Prof. S.K. Som – IIT Kharagpur)
https://www.youtube.com/playlist?list=PLD6DFE30F90B8B3E0
2. Learn Engineering – Fluid Mechanics Concepts
https://www.youtube.com/watch?v=OWiZ2WEfPkM
3. GATE Academy – Hydraulic Machines & Pumps
https://www.youtube.com/watch?v=1KHoTI-0mcI

St.Johns College of Engineering and Technology

(AUTONOMOUS)

DEPARTMENT OF MECHANICAL ENGINEERING

THEORY OF MACHINES

II B.Tech– II Semester								SJCET-R24
Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
24G3A03403	PC	3	0	0	3	30	70	100

Course Outcomes:

CO	Statement
CO 1	Understand different mechanisms and their inversions.
CO 2	Calculate velocity and acceleration of different links in a mechanism
CO 3	Apply the effects of gyroscopic couple in ships, aero planes and road vehicles.
CO 4	Evaluate unbalance mass in rotating machines.
CO 5	Analyze free and forced vibrations of single degree freedom systems.

UNIT-I: Simple Mechanisms
Simple Mechanisms: Classification of mechanisms – Basic kinematic concepts and definitions Degree of freedom, mobility – Grashof's law, kinematic inversions of four bar chain and slider crank chains- Limit positions – Mechanical advantage- Transmission angle- Description of some common mechanisms- Quick return mechanism, straight line mechanisms – Universal Joint.
UNIT-II: Plane and motion analysis
Plane and motion analysis: Displacement, velocity and acceleration analysis of simple mechanisms, graphical velocity analysis using instantaneous centers, velocity and acceleration analysis using loop closure equations – kinematic analysis of simple mechanisms – slider crank mechanism dynamics – Coincident points.
UNIT-III: Gyroscope & Gear Profile
Gyroscope: Principle of gyroscope, gyroscopic effect in an aeroplane, ship, car and two wheeler,simple problems Gear Profile: Involute and cycloidal gear profiles, gear parameters, fundamental law of gearing andconjugate action, spur gear contact ratio and interference/undercutting – helical, bevel, worm, rack& pinion gears, epicyclic and regular gear train kinematics.
UNIT-IV: Balancing of Rotating masses & Cams
Balancing of Rotating masses: Need for balancing, balancing of single mass and several masses indifferent planes, using analytical and graphical methods. Cams: Classification of cams and followers- Terminology and definitions – Displacement diagrams Uniform velocity, parabolic, simple harmonic and cycloidal motions – derivatives of followermotions- specified contour cams- circular and tangent cams –pressure angle and undercutting.
UNIT-V: Vibrations & Turning Moment Diagrams and Flywheels
Vibrations: Introduction, degree of freedom, types of vibrations, free natural vibrations, Newtonmethod and energy method for single degree of freedom. Damped vibrations- under damped,critically damped; and over damped systems, forced vibrations with and without damping in singledegree of freedom; Vibration isolation and transmissibility. Turning Moment Diagrams and Flywheels: Turning moment diagrams for steam engine, I.Cengine and Multi Cylinder Engine. Crank effort – coefficient of fluctuation of

energy, coefficient offluctuation of speed – Fly Wheel and their design, fly wheels for punching press.

Text Books:

1. S.S.Rattan, Theory of Machines, 4/e, Tata Mc-Graw Hill, 2014.
2. P.L.Ballaney, Theory of Machines & Mechanisms, 25/e, Khanna Publishers, Delhi, 2003.

Reference Books:

1. F. Haidery, Dynamics of Machines, 5/e, NiraliPrakashan, Pune, 2003.
2. J.E.Shigley, Theory of Machines and Mechanisms, 4/e, Oxford, 2014.
3. G.K.Groover, Mechanical Vibrations, 8/e, Nemchand Bros, 2009.
4. Norton, R.L., Design of Machinery – An Introduction to Synthesis and Analysis of Mechanisms and Machines, 2/e, McGraw Hill, New York, 2000.
5. William T. Thomson, Theory of vibration with applications, 4/e, Englewood Cliffs, N.J.: Prentice Hall, 2013.

Online Learning Resources:

NPTEL / SWAYAM

1. Kinematics of Machines, Prof. A. Ramesh, IIT Madras
https://nptel.ac.in/courses/112106137
2. Dynamics of Machines, Prof. Amarnath, IIT Kharagpur
https://nptel.ac.in/courses/112105267
3. Mechanics of Machinery, Prof. S.K. Dwivedy, IIT Guwahati
https://nptel.ac.in/courses/112103019

Coursera / edX

1. Mechanics and Kinematics, Moscow Institute of Physics and Technology (edX)
https://www.edx.org/course/mechanics-and-kinematics
2. Mechanical Behavior of Materials: Part 1 – Linear Elastic Behavior, Georgia Institute of Technology (Coursera)
https://www.coursera.org/learn/mechanical-behavior-materials-1
3. Vibration and Control (for advanced vibrations), IITBombayX (edX)
https://onlinecourses.nptel.ac.in/noc23_me61/

YouTube

1. Theory of Machines Full Playlist – NPTEL (Prof. A. Ramesh, IIT Madras)
https://www.youtube.com/playlist?list=PLi1R2xpi4Z6pqsKdzQ4WpGfO3BhoIg0bK
2. Balancing & Vibrations Explained – Learn Engineering
https://www.youtube.com/watch?v=R8yC9SxLfbw

St.Johns College of Engineering and Technology

(AUTONOMOUS)

DEPARTMENT OF MECHANICAL ENGINEERING

FLUID MECHANICS & HYDRAULIC MACHINERY LAB

II B.Tech– II Semester								SJCET-R24
Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
24G3A03402P	PC	0	0	3	1.5	30	70	100

Course Outcomes:

CO	Statement
CO 1	Demonstrate the devices used for measuring flow.
CO 2	Compute major losses in pipes.
CO 3	Illustrate the operating parameters of turbines.
CO 4	Explain the working of different types of pumps.
CO 5	Explain the devices used for measuring flow.

List of Experiments

1. Impact of jetson Vanes.
2. Performance Test on Pelton Wheel.
3. Performance Test on Francis Turbine.
4. Performance Test on Kaplan Turbine.
5. Performance Test on Single Stage Centrifugal Pump.
6. Performance Test on Multi Stage Centrifugal Pump.
7. Performance Test on Reciprocating Pump.
8. Calibration of Venturimeter.
9. Calibration of Orificemeter.
10. Determination of friction factor for a given pipeline.
11. Determination of loss of head due to sudden contraction in a pipeline.
12. Turbine flow meter.

Note: Any 10 experiments of the above 12 are to be conducted

Virtual Lab:

1. To study different patterns of a flow through a pipe and correlate them with the Reynolds number of the flow. (https://me.iitp.ac.in/VirtualFluidLaboratory/reynolds/introduction.html)
2. To calculate Total Energy at different points of venture meter. (https://me.iitp.ac.in/Virtual-Fluid-Laboratory/bernoulli/introduction.html).
3. To calculate the flow (or point) velocity at center of the given tube usingdifferent flow rates. (https://me.iitp.ac.in/Virtual-Fluid-Laboratory/pitot/introduction.html)
4. To determine the hydrostatic force on a plane surface under partial submerge and full submerge condition. (https://me.iitp.ac.in/Virtual-Fluid-Laboratory/cop/introduction.html).
5. To determine the discharge coefficient of a triangular notch. (https://me.iitp.ac.in/Virtual-Fluid-Laboratory/notch/introduction.html)
6. To determine the coefficient of impact of jet on vanes. (https://fmnitk.vlabs.ac.in/exp/impact-of-jet).
7. To determine friction in pipes. (https://fm-nitk.vlabs.ac.in/exp/friction-inpipes/index.html).

St.Johns College of Engineering and Technology

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DEPARTMENT OF MECHANICAL ENGINEERING

MANUFACTURING PROCESSESLAB

II B.Tech– II Semester								SJCET-R24
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
		L	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
24G3A03401P	**PC**	0	0	3	1.5	30	70	100

Course Outcomes:

CO	Statement
CO 1	Make moulds for sand casting.
CO 2	Fabricate different types of components using various manufacturing techniques.
CO 3	Develop Different Weld joints.
CO 4	Explain different types of 3d Printing techniques.

List of Experiments

1. Designandmakingof pattern
i. Split pattern
2. Sandproperties testing
i. Sieveanalysis(drysand)
ii. Claycontenttest
3. Mould preparation
i. Bent pipe
ii. Dumble
4. Gascuttingand welding
5. Manualmetalarcwelding
i. Lapjoint
ii. Buttjoint
6. InjectionMolding
7. BlowMolding
8. Simplemodelsusingsheetmetaloperations
9. To join using BrazingandSoldering
10. Demonstration of metal casting.

Virtual Lab:

1. To study and observe various stages of casting through demonstration of casting process. (https://virtual-labs.github.io/exp-sand-casting-processdei/theory.html)
2. To weld and cut metals using an oxyacetylene welding setup.(https://virtuallabs.github.io/expgas-cutting-processes-iitkgp/index.html).
3. To simulate Fused deposition modelling process (FDM) (https://3dpdei.vlabs.ac.in/exp/simulation-modelling-process)
4. https://altair.com/inspire-mold/
5. https://virtual-labs.github.io/exp-simulation-cartesian-system-dei/theory.html

St.Johns College of Engineering and Technology

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DEPARTMENT OF MECHANICAL ENGINEERING

SOFT SKILLS

II B.Tech– II Semester								SJCET-R24
Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
24G3A52403	SEC	0	1	2	2	30	70	100

Course Outcomes:

CO	Statement
CO 1	List out various elements of soft skills and describe methods for building professional image
CO 2	Apply critical thinking skills in problem solving
CO 3	Understand and apply problem solving skills and decision making skills in professional life
CO 4	Understand the emotional intelligence and stress management and apply them in real life
CO 5	Understand the meaning, concept, significance of Corporate Etiquette

UNIT-I

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

Activities:

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

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

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

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

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

UNIT-II

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

Activities:

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

UNIT-III

Problem Solving & Decision Making: Meaning & features of Problem Solving – Managing Conflict – Conflict resolution – Team building - Effective decision making in teams – Methods & Styles

Activities:

Placing a problem which involves conflict of interests, choice and views – formulating the problem – exploring solutions by proper reasoning – Discussion on important professional, career and organizational decisions and initiate debate on the appropriateness of the decision. Case Study & Group Discussion
UNIT-IV
Emotional Intelligence & Stress Management: Managing Emotions – Thinking before Reacting – Empathy for Others – Self-awareness – Self-Regulation – Stress factors – Controlling Stress – Tips Activities: Providing situations for the participants to express emotions such as happiness, enthusiasm, gratitude, sympathy, and confidence, compassion in the form of written or oral presentations. Providing opportunities for the participants to narrate certain crisis and stress –ridden situations caused by failure, anger, jealousy, resentment and frustration in the form of written and oral presentation, Organizing Debates
UNIT-V
Corporate Etiquette: Etiquette- Introduction, concept, significance - Corporate etiquette - meaning, modern etiquette, benefits - Global and local culture sensitivity - Gender Sensitivity - Etiquette in interaction- Cell phone etiquette - Dining etiquette - Netiquette - Job interview etiquette Corporate grooming tips -Overcoming challenges Activities Providing situations to take part in the Role Plays where the students will learn about bad and good manners and etiquette - Group Activities to showcase gender sensitivity, dining etiquette etc. - Conducting mock job interviews - Case Study - Business Etiquette Games

NOTE-:

1. The facilitator can guide the participants before the activity citing examples from the lives of the great, anecdotes, epics, scriptures, autobiographies and literary sources which bear true relevance to the prescribed skill.
2. Case studies may be given wherever feasible for example for Decision Making- The decision of King Lear.

Text Books:

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

Reference Books:

1. Sharma, Prashant, Soft Skills: Personality Development for Life Success, BPB Publications 2018.
2. Alex K, Soft Skills S.Chand& Co, 2012 (Revised edition)
3. Gajendra Singh Chauhan & Sangeetha Sharma, Soft Skills: An Integrated Approach to Maximise Personality Published by Wiley, 2013
4. Pillai, Sabina & Fernandez Agna, Soft Skills and Employability Skills, Cambridge University Press, 2018

5. Soft Skills for a Big Impact (English, Paperback, Renu Shorey) Publisher: Notion Press
6. Dr. Rajiv Kumar Jain, Dr. Usha Jain, Life Skills (Paperback English) Publisher : Vayu Education of India, 2014

Online Learning Resources:

1. https://youtu.be/DUlsNJtg2L8?list=PLLy_2iUCG87CQhELCytvXh0E_y-bOO1_q
2. https://youtu.be/xBaLgJZ0t6A?list=PLzf4HHlsQFwJZel_j2PUy0pwjVUgj7KlJ
3. https://youtu.be/-Y-R9hDl7lU
4. https://youtu.be/gkLsn4ddmTs
5. https://youtu.be/2bf9K2rRWwo
6. https://youtu.be/FchfE3c2jzc
7. https://www.businesstrainingworks.com/training-resource/five-free-business etiquette-training-games/
8. https://onlinecourses.nptel.ac.in/noc24_hs15/preview
9. https://onlinecourses.nptel.ac.in/noc21_hs76/preview

St.Johns College of Engineering and Technology

(AUTONOMOUS)

DEPARTMENT OF MECHANICAL ENGINEERING

DESIGN THINKING & INNOVATION

II B.Tech– II Semester								SJCET-R24
Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
24G3A99401	BS&H	1	0	2	2	30	70	100

Course Outcomes:

CO	Statement
CO 1	Understand the fundamentals of Design Thinking and innovation and define the concepts related to design thinking
CO 2	Apply the design thinking techniques for solving problems in various sectors.
CO 3	Evaluate the value of creativity
CO 4	Formulate specific problem statements of real time issues
CO 5	Analyze to work in a multidisciplinary environment

UNIT-I

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

UNIT-II

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

Activity:

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

UNIT-III

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

Activity:

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

UNIT-IV

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

Activity:

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

UNIT-V

Design Thinking in Business: Processes Design Thinking applied in Business & Strategic Innovation, Design Thinking principles that redefine business – Business challenges: Growth, Predictability, Change, Maintaining Relevance, Extreme

competition, Standardization. Design thinking to meet corporate needs- Design thinking for Startups- Defining and testing Business Models and Business Cases- Developing & testing prototypes.

Activity:

How to market our own product, About maintenance, Reliability and plan for start up.

Text Books:

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

Reference Books:

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

Online Learning Resources:

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

St.Johns College of Engineering and Technology

(AUTONOMOUS)

DEPARTMENT OF MECHANICAL ENGINEERING

COMMUNITY SERVICE PROJECT

.....Experiential learning through community engagement

Introduction

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

Objective

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

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

Implementation of Community Service Project

- Every student should put in 6 weeks for the Community Service Project during the summer vacation.
- Each class/section should be assigned with a mentor.
- Specific Departments could concentrate on their major areas of concern. For example, Dept. of Computer Science can take up activities related to Computer Literacy to different sections of people like - youth, women, housewives, etc
- A logbook must be maintained by each of the students, where the activities undertaken/involved to be recorded.
- The logbook has to be countersigned by the concerned mentor/faculty in charge.
- An evaluation to be done based on the active participation of the student and grade could be awarded by the mentor/faculty member.

- The final evaluation to be reflected in the grade memo of the student.
- The Community Service Project should be different from the regular programs of NSS/NCC/Green Corps/Red Ribbon Club, etc.
- Minor project reports should be submitted by each student. An internal Viva shall also be conducted by a committee constituted by the principal of the college.
- Award of marks shall be made as per the guidelines of Internship/apprentice/ on the job training.

Procedure

- A group of students or even a single student could be assigned for a particular habitation or village or municipal ward, as far as possible, in the near vicinity of their place of stay, to enable them to commute from their residence and return back by evening or so.
- The Community Service Project is a twofold one –
    - o First, the student/s could conduct a survey of the habitation, if necessary, in terms of their own domain or subject area. Or it can even be a general survey, incorporating all the different areas. A common survey format could be designed. This should not be viewed as a duplication of work by the Village or Ward volunteers, rather, it could be another primary source of data.
    - o Secondly, the student/s could take up a social activity, concerning their domain or subject area. The different areas, could be like –
        - ♣ Agriculture
        - ♣ Health
        - ♣ Marketing and Cooperation
        - ♣ Animal Husbandry
        - ♣ Horticulture
        - ♣ Fisheries
        - ♣ Sericulture
        - ♣ Revenue and Survey
        - ♣ Natural Disaster Management
        - ♣ Irrigation
        - ♣ Law & Order
        - ♣ Excise and Prohibition
        - ♣ Mines and Geology
        - ♣ Energy
        - ♣ Internet
        - ♣ Free Electricity
        - ♣ Drinking Water

EXPECTED OUTCOMES
BENEFITS OF COMMUNITY SERVICE PROJECT TO STUDENTS

Learning Outcomes

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

Personal Outcomes

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

Social Outcomes

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

Career Development

- Connections with professionals and community members for learning and career opportunities
- Greater academic learning, leadership skills, and personal efficacy can lead to greater opportunity.

Relationship with the Institution

- Stronger relationships with faculty
- Greater satisfaction with college
- Improved graduation rates

BENEFITS OF COMMUNITY SERVICE PROJECT TO FACULTY MEMBERS

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

BENEFITS OF COMMUNITY SERVICE PROJECT TO COLLEGES AND UNIVERSITIES

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

BENEFITS OF COMMUNITY SERVICE PROJECT TO COMMUNITY

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

SUGGESTIVE LIST OF PROGRAMMES UNDER COMMUNITY SERVICE PROJECT

The following the recommended list of projects for Engineering students. The lists are not exhaustive and open for additions, deletions, and modifications. Colleges are expected to focus on specific local issues for this kind of project. The students are expected to carry out these projects with involvement, commitment, responsibility, and accountability. The mentors of a group of students should take the responsibility of

motivating, facilitating, and guiding the students. They have to interact with local leadership and people and appraise the objectives and benefits of this kind of project. The project reports shall be placed in the college website for reference. Systematic, Factual, methodical and honest reporting should be ensured.

For Engineering Students

1. Water facilities and drinking water availability
2. Health and hygiene
3. Stress levels and coping mechanisms
4. Health intervention programmes
5. Horticulture
6. Herbal plants
7. Botanical survey
8. Zoological survey
9. Marine products
10. Aqua culture
11. Inland fisheries
12. Animals and species
13. Nutrition
14. Traditional health care methods
15. Food habits
16. Air pollution
17. Water pollution
18. Plantation
19. Soil protection
20. Renewable energy
21. Plant diseases
22. Yoga awareness and practice
23. Health care awareness programmes and their impact
24. Use of chemicals on fruits and vegetables
25. Organic farming
26. Crop rotation
27. Floury culture
28. Access to safe drinking water
29. Geographical survey
30. Geological survey
31. Sericulture
32. Study of species
33. Food adulteration
34. Incidence of Diabetes and other chronic diseases
35. Human genetics
36. Blood groups and blood levels
37. Internet Usage in Villages
38. Android Phone usage by different people
39. Utilisation of free electricity to farmers and related issues
40. Gender ration in schooling lvel- observation.

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

Programs for School Children

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

Programs for Women Empowerment

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

General Camps

1. General Medical camps
2. Eye Camps
3. Dental Camps
4. Importance of protected drinking water
5. ODF awareness camp
6. Swatch Bharath
7. AIDS awareness camp
8. Anti Plastic Awareness
9. Programs on Environment
10. Health and Hygiene
11. Hand wash programmes
12. Commemoration and Celebration of important days

Programs for Youth Empowerment

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

Common Programs

1. Awareness on RTI
2. Health intervention programmes
3. Yoga
4. Tree plantation
5. Programs in consonance with the Govt. Departments like –

    i. Agriculture
    ii. iii. Health Marketing and Cooperation
    iv. Animal Husbandry
    v. Horticulture
    vi. Fisheries
    vii. Sericulture

viii. Revenue and Survey
ix. Natural Disaster Management
x. Irrigation
xi. Law & Order
xii. Excise and Prohibition
xiii. Mines and Geology
xiv. Energy

Role of Students:

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

Timeline for the Community Service Project Activity

Duration: 8 weeks

1.Preliminary Survey (One Week)

- A preliminary survey including the socio-economic conditions of the allotted habitation to be conducted.
- A survey form based on the type of habitation to be prepared before visiting the habitation with the help of social sciences faculty. (However, a template could be designed for different habitations, rural/urban.
- The Governmental agencies, like revenue administration, corporation and municipal authorities and village secreteriats could be aligned for the survey.

2.Community Awareness Campaigns (One Week)

- Based on the survey and the specific requirements of the habitation, different awareness campaigns and programmesto be conducted, spread over two weeks of time. The list of activities suggested could be taken into consideration.

3.Community Immersion Programme (Three Weeks)

- Along with the Community Awareness Programmes, the student batch can also work with any one of the below-listed governmental agencies and work in tandem with them. This community involvement programme will involve the students in exposing themselves to experiential learning about the community and its dynamics. Programs could be in consonance with the Govt. Departments.

4.Community Exit Report (One Week)

- During the last week of the Community Service Project, a detailed report of the outcome of the 8 weeks' works to be drafted and a copy shall be submitted to the

local administration. This report will be a basis for the next batch of students visiting that habitation. The same report submitted to the teacher-mentor will be evaluated by the mentor and suitable marks are awarded for onward submission to the University. Throughout the Community Service Project, a daily logbook need to be maintained by the students batch, which should be countersigned by the governmental agency representative and the teacher-mentor, who is required to periodically visit the students and guide them.