SYLLABUS

B.Tech.

ELECTRICAL AND ELECTRONICS ENGINEERING

2024 SCHEME

Signed By:Devassia V P
Approved by SJCET Academic Council held on 29.11.2024

COURSES

SEMESTER – I

SEMESTER I COURSES														
Sl. No:	**Slot**	**Course Code**	**Course Type**	**Course Category**	**Course Title (Course Name)**	**Credit Structure**				**SS**	**Total Marks**		**Credits**	**Hrs./Week**
						L	**T**	**P**	**R**		**CIE**	**ESE**		
1	A	24SJGYMAT101	BSC	GC	Mathematics for Electrical Science and Physical Science-1	3	0	0	0	4.5	40	60	3	3
2	B S1/ S2	24SJGBPHT121	BSC	GC	Physics for Electrical Science	3	0	2	0	5.5	40	60	4	5
		24SJGXCYT122			Chemistry for Information Science and Electrical Science									
3	C	24SJGXEST103	ESC	GC	Engineering Graphics and Computer Aided Drawing	2	0	2	0	4	40	60	3	4
4	D	24SJGXEST104	ESC	GC	Introduction to Electrical & Electronics Engineering (part 1: Electrical Engineering)	2	0	0	0	3	20	30	2+ 2= 4	4
					(Part 2: Electronics Engineering)	2	0	0	0	3	20	30		
5	F	24SJICEST105	ESC	IC	Algorithmic Thinking with Python	3	0	2	0	5.5	40	60	4	5
6	L	24SJGXESL106	ESC	GC	Basic Electrical and Electronics Engineering Workshop	0	0	2	0	1	70	30	1	2
7	I* S1/ S2	24SJICHWT127	HWP	IC	Health and Wellness	1	0	1	0	0	50	0	1	2/3
		24SJICHUT128	HMC		Life Skills and Professional Communication	2	0	1	0	3.5	100	0		
8	S1/ S2	24SJICSEM129	SEC	IC	Skill Enhancement Course: *Digital 101(NASSCOM)*	MOOC				2		-		
Total										**30/ 32**			**20**	**25/ 26**

Bridge Course (Mathematics or Introduction to Computer Science) *: Total 15 Hrs.

No Grade Points will be awarded for the MOOC course and I slot course.

MATHEMATICS FOR ELECTRICAL SCIENCE AND PHYSICAL SCIENCE - 1

Course Code	24SJGYMAT101	CIE Marks	40
Teaching Hours/Week (L:T:P:R)	3:0:0:0	ESE Marks	60
Credits	3	Exam Hours	2 Hrs. 30 Min.
Pre-requisites (if any)	Basic knowledge in single variable calculus and matrix operations.	Course Type	Theory

Course Objectives:

- To provide a comprehensive understanding and basic techniques of matrix theory to analyse linear systems.
- To offer advanced knowledge and practical skills in solving second-order ordinary differential equations, applying Laplace transforms and understanding Fourier series, enabling students to analyse and model dynamic systems encountered in engineering disciplines effectively.

Course Outcomes (COs)

At the end of the course students should be able to:

Course Outcome		Bloom's Knowledge Level (KL)
CO1	Solve systems of linear equations and diagonalize matrices.	K3
CO2	Solve homogeneous and non-homogeneous linear differential equations with constant coefficients.	K3
CO3	Compute Laplace transforms and apply it to solve ODEs arising in engineering.	K3
CO4	Determine the Taylor series and Fourier series expansion for different periodic functions and to apply in engineering Problems	K3

K1- Remember, K2- Understand, K3- Apply, K4- Analyse, K5- Evaluate, K6- Create

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	3	-	2	-	-	-	-	-	-	2
CO2	3	3	-	2	-	-	-	-	-	-	2
CO3	3	3	-	2	-	-	-	-	-	-	2
CO4	3	3	-	2	-	-	-	-	-	-	2

SYLLABUS

Module	Syllabus Description	Contact Hours	CO
1	Linear systems of equations: Gauss elimination, Row echelon form, Linear independence: Rank of a matrix, Solutions of linear systems: Existence, Uniqueness (without proof), The matrix eigen value problem, Determining eigen values and eigen vectors, Diagonalization of matrices. **(Text 1: Relevant topics from sections 7.3, 7.4, 7.5, 8.1, 8.4)**	9	1
2	Homogeneous linear ODEs of second order, Superposition principle, General solution, Homogeneous linear ODEs of second order with constant coefficients (Method to find general solution, Solution of linear initial value problem). Non-homogenous ODEs (with constant coefficients) - General solution, Particular solution by the method of undetermined coefficients (Particular solutions for the functions $ke^{\gamma x}$, kx^n, $kcos\omega x$, $ksin\omega x$, $ke^{\alpha x}cos\omega x$, $ke^{\alpha x}sin\omega x$), Initial value problem for Non-Homogeneous second order linear ODE (with constant coefficients), Solution by variation of parameters (second order). **(Text 1: Relevant topics from sections 2.1, 2.2, 2.7, 2.10)**	9	2
3	Laplace Transform, Inverse Laplace transform, Linearity property, First shifting theorem, Transform of derivatives, Solution of initial value problems by Laplace transform (second order linear ODE with constant coefficients with initial conditions at t = 0 only), Unit step function, Second shifting theorem, Dirac delta function and its transform (initial value problems involving unit step function and Dirac delta function are excluded), Convolution theorem (without proof) and its application to finding inverse Laplace transform of products of functions. **(Text 1: Relevant topics from sections 6.1, 6.2, 6.3, 6.4, 6.5)**	9	3
4	Taylor series representation (without proof, assuming the possibility of power series expansion in appropriate domains), Maclaurin series representation, Fourier series, Euler formulas, Convergence of Fourier series (Dirichlet's conditions), Fourier series of 2π periodic functions, Fourier series of $2l$ periodic functions, Half range sine series expansion, Half range cosine series expansion. **(Text 1: Relevant topics from sections 11.1, 11.2, Text 2: Relevant topics from section 10.8)**	9	4

Course Assessment Method (CIE: 40 marks, ESE: 60 marks)

Continuous Internal Evaluation Marks (CIE):

Attendance	Assignment/ Micro project	Internal Examination-1 (Written)	Internal Examination- 2 (Written)	Total

5	**15**	**10**	**10**	**40**

End Semester Examination Marks (ESE):

In Part A, all questions need to be answered and in Part B, each student can choose any one full question out of two questions

Part A	Part B	Total
2 Questions from each module. Total of 8 Questions, each carrying 3 marks **(8x3 = 24marks)**	Each question carries 9 marks. Two questions will be given from each module, out of which one question should be answered. Each question can have a maximum of 3 sub divisions. **(4x9 = 36 marks)**	**60**

Text Books

Sl. No	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
1	Advanced Engineering Mathematics	Erwin Kreyszig	John Wiley & Sons	10th edition, 2016
2	Calculus	H.Anton, I.Biven, S.Davis	Wiley	12th edition, 2024

Reference Books

Sl. No	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
1	Thomas' Calculus	Maurice D. Weir, Joel Hass, Christopher Heil, Przemyslaw Bogacki	Pearson	15th edition, 2023
2	Essential Calculus	J. Stewart	Cengage	2nd edition, 2017
3	Elementary Linear Algebra	Howard Anton, Chris Rorres	Wiley	11th edition, 2019
4	Bird's Higher Engineering Mathematics	John Bird	Taylor & Francis	9th edition, 2021
5	Higher Engineering Mathematics	B. V. Ramana	McGraw-Hill Education	39th edition, 2023
6	Signals and Systems	Simon Haykin, Barry Van Veen	Wiley	2nd edition, 2002

Video Links (NPTEL, SWAYAM…)

ModuleNo.	Link ID
1	https://archive.nptel.ac.in/courses/111/107/111107164/
2	https://archive.nptel.ac.in/courses/111/104/111104031/
3	https://archive.nptel.ac.in/courses/111/106/111106139/
4	https://archive.nptel.ac.in/courses/111/101/111101164/

CHEMISTRY FOR INFORMATION SCIENCE AND ELECTRICAL SCIENCE

Course Code	24SJGXCYT122	CIE Marks	40
Teaching Hours/Week (L: T:P: R)	3:0:2:0	ESE Marks	60
Credits	4	Exam Hours	2 Hrs. 30 Min.
Prerequisites (if any)	None	Course Type	Theory+ Lab

Course Objectives:

1. To equip students with a comprehensive understanding of chemistry concepts that are relevant to engineering applications.
2. To familiarize students with applied topics such as spectroscopy, electrochemistry, and instrumental methods.
3. To raise awareness among students about environmental issues, including climate change, pollution, and waste management, and their impact on the quality of life.

Course Outcomes (COs)

At the end of the course students should be able to:

Course Outcome		Bloom's Knowledge Level (KL)
CO1	Explain the Basic Concepts of Electrochemistry and Corrosion to explore the possible applications in various engineering fields	K2
CO2	Describe the use of various engineering materials in different industries	K2
CO3	Apply appropriate analytical techniques for the synthesis and characterization of various engineering materials.	K3
CO4	Outline various water treatment and waste management methods	K2

K1- Remember, K2- Understand, K3- Apply, K4- Analyse, K5- Evaluate, K6- Create

CO-PO Mapping:

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

SYLLABUS

Module	Syllabus Description	Contact Hours	CO
1	**Electrochemistry and Corrosion Science** Electrochemical Cell- Electrode potential- Nernst equation for single electrode and cell (Numerical problems)- Reference electrodes – SHE & Calomel electrode –Construction and Working - Electrochemical series - Applications – Glass Electrode & pH Measurement-Conductivity Measurement using Digital conductivity meter. Li-ion battery & H2-O2 fuel cell (acid electrolyte only) construction and working. Corrosion –Electrochemical corrosion mechanism (acidic & alkaline medium) - Galvanic series - Corrosion control methods - Cathodic Protection - Sacrificial anodic protection and impressed current cathodic protection – Electroplating of copper - Electroless plating of copper	9	1
2	**Materials for Electronic Applications** Nanomaterials - Classification based on Dimension & Materials Synthesis – Sol gel & Chemical Reduction - Applications of nanomaterials – Carbon Nanotubes, Fullerenes, Graphene & Carbon Quantum Dots – structure, properties & application. Polymers - Fire Retardant Polymers- Halogenated & Non-halogenated polymers (Examples only)- Conducting Polymers-Classification Polyaniline & Polypyrrole-synthesis, properties and applications. Organic electronic materials and devices- construction, working and applications of Organic Light Emitting Diode (OLED) & Dye-Sensitized Solar Cells (DSSC) Materials used in Quantum computing Technology, Super capacitors, Spintronics	9	2
3	**Molecular Spectroscopy and Analytical Techniques** Spectroscopy- Types of spectra- Molecular energy levels - Beer Lambert's law – Numerical problems - Electronic Spectroscopy – Principle, Types of electronic transitions –Role of conjugation in absorption maxima Instrumentation-Applications – Vibrational spectroscopy – Principle Number of vibrational modes - Vibrational modes of CO2 and H2O – Applications Thermal Analysis: Dielectric Thermal Analysis (DETA) of Polymers Working and Application. Electron Microscopic Techniques: SEM - Principle, instrumentation and Applications.	9	3

4	**Environmental Chemistry** Water characteristics - Hardness - Types of hardness- Temporary and Permanent - Disadvantages of hard water -Degree of hardness (Numericals) Water softening methods-Ion exchange process- Principle, procedure and advantages. Reverse osmosis – principle, process and advantages. – Water disinfection methods – chlorination- Break point chlorination, ozone and UV irradiation. Dissolved oxygen (DO), BOD and COD- Definition & Significance. Waste Management: Sewage water treatment- Primary, Secondary and Tertiary - Flow diagram -Trickling filter and UASB process. E Waste, Methods of disposal – recycle, recovery and reuse. Chemistry of climate change- Greenhouse Gases- Ozone Depletion-Sustainable Development- an introduction to Sustainable Development Goals.	**9**	**4**

Course Assessment Method (CIE: 40 marks, ESE: 60 marks)

Continuous Internal Evaluation Marks (CIE):

Attendance	Continuous Assessment	Internal Examination-1 (Written)	Internal Examination-2 (Written)	Internal Examination- 3 (Lab Examination)	Total
5	10	10	10	5	40

End Semester Examination Marks (ESE)

In Part A, all questions need to be answered and in Part B, each student can choose any onefull question out of two questions

Part A	Part B	Total
2 Questions from each module. Total of 8 Questions, each carrying 3 marks **(8x3 = 24 marks)**	Each question carries 9 marks. Two questions will be given from each module, out of which 1 question should be answered. Each question can have a maximum of 3 subdivisions. **(4x9 = 36 marks)**	**60**

Continuous Assessment (10 Marks)

Continuous assessment evaluations are conducted based on laboratory associated with the theory.

Mark distribution

1. **Preparation and Pre-lab work (2 Marks)**
   - Pre-lab assignments: Assessment of pre-lab assignments or quizzes that test understanding of the upcoming experiment.
   - Understanding of theory: Evaluation based on students' preparation and

understanding of the theoretical background related to the experiments

2. **Conduct of experiments (2 Marks)**
   - Procedure and execution: Adherence to correct procedures, accurate execution of experiments, and following safety protocols.
   - Skill proficiency: Proficiency in handling equipment, accuracy in observations, and trouble shooting skills during the experiments.
   - Teamwork: Collaboration and participation in group experiments.
3. **Lab reports and record keeping (3 Marks)**
   - Quality of reports: Clarity, completeness and accuracy of lab reports. Proper documentation of experiments, data analysis and conclusions.
   - Timely submission: Adhering to deadlines for submitting lab reports/rough record/ maintaining a well organized record.
4. **Viva voce (3 Marks)**
   - Oral examination: Ability to explain the experiment, results and underlying principles during viva voce session.

Final marks averaging: *The final marks for preparation, conduct of experiments, viva, and record are the average of all the specified experiments in the syllabus.*

Evaluation Pattern for Lab Examination (5 Marks)

1. **Procedure/Preliminary work/Conduct of experiments (2 Marks)**
   - Procedure understanding and description: Clarity in explaining the procedure and understanding each step involved.
   - Preliminary work and planning: Thoroughness in planning and organizing materials / equipment.
   - Setup and execution: Proper setup and accurate execution of the experiment or programming task.
2. **Result (2 Marks)**
   - Accuracy of results: Precision and correctness of the obtained results.
3. **Viva voce (1 Mark)**
   - Proficiency in answering questions related to theoretical and practical aspects of the subject

Text Books

Sl.No	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
1	Engineering Chemistry	B. L. Tembe, Kamaluddin, M. S. Krishnan	NPTEL Web-book	2018
2	Physical Chemistry	P. W. Atkins	Oxford University Press	International Edition-2018
3	Instrumental Methods of Analysis	H. H. Willard, L. L. Merritt	CBS Publishers	7th Edition-2005
4	Engineering Chemistry	Jain & Jain	Dhanpath Rai PublishingCompany	17th Edition - 2015

Reference Books				
Sl.No	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
1	Fundamentals of Molecular Spectroscopy	C. N. Banwell	McGraw-Hill	4th Edn.,1995
2	Principles of Physical Chemistry	B. R. Puri, L. R.Sharma, M. S. Pathania	Vishal Publishing Co	47th Edition, 2017
3	Introduction to Spectroscopy	Donald L. Pavia	Cengage LearningIndia Pvt. Ltd	2015
4	Polymer Chemistry: An Introduction	Raymond B. Seymour, Charles E. Carraher	Marcel Dekker Inc	4th Revised Edition,1996
5	The Chemistry of Nanomaterials: Synthesis, Properties andApplications	Prof. Dr. C. N. R. Rao, Prof. Dr. H.C. Mult. Achim Müller, Prof. Dr. A. K. Cheetham	Wiley-VCH Verlag GmbH& Co. KGaA	2014
6	Organic Electronics Materials and Devices	Shuichiro Ogawa	Springer Tokyo	2024
7	Principles and Applications of Thermal Analysis	Gabbot, P	Oxford: Blackwell Publishing	2008

Video Links (NPTEL, SWAYAM…)	
Sl No.	**Link ID**
1	https://archive.nptel.ac.in/courses/104/106/104106137/ https://archive.nptel.ac.in/courses/113/105/113105102/ https://archive.nptel.ac.in/courses/113/104/113104082/ https://www.youtube.com/watch?v=BeSxFLvk1h0
2	https://archive.nptel.ac.in/courses/113/104/113104102/ https://archive.nptel.ac.in/courses/104/105/104105124/ https://archive.nptel.ac.in/courses/105/104/105104157/

List of Experiments (*Minimum 10 Experiments)

Expt. Nos.	Experiment	CO
1	Estimation of iron in iron ore	4
2	Estimation of copper in brass	4
3	Determination of cell constant and conductance of solutions	1
4	Calibration of pH meter and determination of pH of a solution	1
5	Synthesis of polymers (a) Urea-formaldehyde resin (b) Phenol-formaldehyde resin	2
6	Determination of wavelength of absorption maximum and colorimetric estimation of Fe^{3+} in solution	3
7	Determination of molar absorptivity of a compound ($KMnO_4$ or any water-soluble food colorant)	3
8	Analysis of IR spectra	3
9	Identification of drugs using TLC	3
10	Estimation of total hardness of water-EDTA method	4
11	Estimation of dissolved oxygen by Winkler's method	4
12	Determination of calorific value using Bomb calorimeter	2
13	Determination of saponification value of a given vegetable oil	2
14	Determination of acid value of a given vegetable oil	2
15	Verification of Nernst equation for electrochemical cell.	1

ENGINEERING GRAPHICS AND COMPUTER AIDED DRAWING

Course Code	24SJGXEST103	CIE Marks	40
Teaching Hours/Week (L:T:P:R)	2-0-2-0	ESE Marks	60
Credits	3	Exam Hours	2 Hrs. 30 Min.
Prerequisites (if any)	None	Course Type	Theory & Lab

Course Objectives:

1. Learn the principles and techniques of dimensioning and preparation of drawings.
2. Develop the ability to accurately interpret engineering drawings.
3. Learn the features of CAD software(s).

Course Outcomes (COs)

At the end of the course students should be able to:

	Course Outcome	Bloom's Knowledge Level (KL)
CO1	Understand and plot the projection of points and lines located in different quadrants	K3
CO2	Prepare Multiview orthographic projections of objects by visualizing them in different positions	K3
CO3	Plot sectional views and develop surfaces of a given object	K3
CO4	Prepare pictorial drawings using the principles of isometric projection	K3
CO5	Sketch simple drawing using CAD tools.	K3

K1- Remember, K2- Understand, K3- Apply, K4- Analyse, K5- Evaluate, K6- Create

CO-PO Mapping:

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

SYLLABUS

Module	Syllabus Description	Contact Hours	CO
1	**Introduction:** Relevance of technical drawing in engineering field. Types of lines, Dimensioning, BIS code of practice for technical drawing. (No questions for the end semester examination) Projection of points in different quadrants, Projection of straight lines inclined to one plane and inclined to both planes. Traces of a line. Inclination of lines with reference planes. True length and true inclinations of line inclined to both the reference planes.	18	CO1
2	Projection of simple solids such as Triangular, Rectangle, Square, Pentagonal and Hexagonal Prisms, Pyramids, Cone, Cylinder and Tetrahedron. Projection of solids in simple position including profile view. Projection of solids with axis inclined to one of the references planes and with axis inclined to both reference planes.	16	CO2
3	**Sections of Solids:** Sections of Tetrahedron, Prisms, Pyramids, Cone, Cylinder with axis in vertical position and cut by different section planes. True shape of the sections. (Exclude true shape given problems) **Development of Surfaces:** Development of surfaces of the solids and solids cut by different section planes. (Exclude problems with through holes)	16	CO3
4	**Isometric Projection:** Isometric scale- Isometric View and Projections of Prisms, Pyramids, Cone, Cylinder, Frustum of Pyramid, Frustum of Cone, Sphere, Hemisphere and their combinations. **Computer Aided Drawing (CAD):** Introduction, Role of CAD in design and development of new products, Advantages of CAD. Creating two-dimensional drawing with dimensions using suitable software. (CAD, only internal evaluation)	18	CO4 CO5

Course Assessment Method (CIE: 40 marks, ESE: 60 marks)

Continuous Internal Evaluation Marks (CIE):

Attendance	Class work	CAD – Internal Evaluation	Internal Examination -1 (Written)	Internal Examination - 2 (Written)	Total
5	10	5	10	10	40

End Semester Examination Marks (ESE)

Student can choose any one full question out of two questions from each module

2 Questions from one module. Total 8 Questions, each question carries 15 marks **(15x4 = 60marks)**	**Total**
	60

Text Books				
Sl. No	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
1	Engineering Graphics	Varghese, P. I.	V I P Publishers	34th Edition 2024
2	Engineering Graphics	Benjamin, J.	Pentex Publishers	5th Edition 2021
3	Engineering Graphics using AutoCAD	T Jeyapoovan	Vikas Publishing House Pvt. Ltd.	7th Edition, 2015
4	Engineering Graphics	Anilkumar, K. N.	Adhyuth Narayan Publishers	10th Edition 2016
5	Engineering Drawing	N. D. Bhatt	Charotar Publishing House Pvt. Ltd.	54th Edition 2023

Reference Books				
Sl. No	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
1	Engineering Graphics with AutoCAD	Kulkarni, D. M., Rastogi, A. P. and Sarkar, A. K.	Prentice Hall India Publishers	2009
2	Engineering Drawing & Graphics	Venugopal, K.	New Age International Publishers	4th edition 2007
3	Engineering Drawing	Parthasarathy, N. S., and Murali, V.	Oxford University Press	2015
4	Engineering Graphics for degree	John, K. C.	Prentice Hall India Publishers	Published in 2011

Video Links (NPTEL, SWAYAM…)	
Module	**Link ID**
All modules	https://archive.nptel.ac.in/courses/112/102/112102304/

INTRODUCTION TO ELECTRICAL AND ELECTRONICS ENGINEERING

Course Code	**24SJGXEST104**	**CIE Marks**	40
Teaching Hours/Week (L: T:P: R)	4:0:0:0	**ESE Marks**	60
Credits	4	**Exam Hours**	2 Hrs. 30 Min.
Prerequisites (if any)	None	**Course Type**	Group Core-Theory

Course Objectives:

1. To provide an understanding of the fundamental principles of electrical engineering
2. To introduce the working principles of fundamental electronic devices and circuits
3. To provide an overview of the basic concepts in different types of communication.

SYLLABUS

Module No.	Syllabus Description	Contact Hours	CO
1	**Elementary concepts of DC electric circuits:** Fundamentals of Voltage, Current, Resistance and Power. Current and Voltage Division Rule - Relative potential Capacitors and Inductors: V-I relations and Energy stored. Ohms Law and Kirchhoff's laws - numerical problems. Star-delta conversion *(resistive networks only - derivation notrequired)* -numerical problems. **Analysis of DC Electric circuits:** Mesh current method - matrix representation - Solution of network equations. Node voltage methods-matrix representation-solution of network equations by matrix methods - numerical problems. **Elementary Concepts of Magnetic circuits:** Magnetic Circuits: Basic Terminology: MMF, field strength, flux density, reluctance - Comparison between electric and magnetic circuits - Series and parallel magnetic circuits with composite materials (*numerical problems not needed*)	**14**	**1**

2	**Electromagnetic Induction**: Faraday's laws, Lenz's law- statically induced and dynamically induced emf – Self-inductance and mutual inductance, coefficient of coupling *(numerical problems not needed)* **Alternating Current fundamentals:** Generation of alternating voltages - Representation of sinusoidal waveforms: frequency, period, average value, RMS value and form factor -numerical problems AC Circuits: Phasor representation of sinusoidal quantities, Trigonometric,Rectangular, Polar and complex forms. **Analysis of simple AC circuits:** Purely resistive, inductive & capacitive circuits; Inductive and capacitive reactance, concept of impedance - numerical problems. RL, RC and RLC series circuits- power factor, active, reactive and apparent power. Simple numerical problems. Three phase AC systems: Generation of three phase voltages, advantages of three phase systems, star and delta connections (balanced only), relation between line and phase voltages, line and phase currents- numerical problems	**14**	**2**
3	**Introduction to Electronic devices:** Passive and active components in electronics. Working of PN junction diode, V-I characteristics of PN Junction diode. Zener diode and avalanche breakdown. Basics of Zener voltage regulator Block diagram of DC power supply, circuit and working of half wave, full wave and bridge rectifiers, ripple factor (with and without capacitor filters) Construction, working and V-I Characteristics of BJT, Input output characteristics of CE configuration, Comparison of CE, CB and CC configurations.Transistor as a switch, Transistor as an amplifier (Circuit Diagram and working) RC coupled amplifier - Circuit diagram and frequency response Introduction to FET, Construction and working of N-channel and P- Channel MOSFETs	**13**	**3**

4	**Modern Electronics and its applications:** General block diagram of a Communication system, Block diagram ofFiber optic Communication system Concept of AM and FM (No derivation required), Block diagram of AMand FM super-heterodyne receiver Basic concepts of Wired and Wireless communication, Block diagram ofGSM Comparison of 3G, 4G, 5G and 6G communication technologies Block diagrams of Electronic instrumentation system, Digital Multimeter, Function generator Introduction to CRO and Lissajous patterns Applications of modern electronics – IoT based smart homes, healthcareand agriculture *(Case study only)*	**9**	**4**

Course Assessment Method (CIE: 40 marks, ESE: 60 marks)

Continuous Internal Evaluation Marks (CIE):

Attendance	Assignment/ Microproject	Internal Examination-1 (Written)	Internal Examination- 2 (Written)	Total
5	**15**	**10**	**10**	**40**

End Semester Examination Marks (ESE)

In Part A, all questions need to be answered and in Part B, each student can choose any onefull question out of two questions

Part A	Part B	Total
• 2 Questions from eachmodule. • Total of 8 Questions, each carrying 3 marks **(8x3 =24 marks)**	• Each question carries 9 marks. • Two questions will be given from each module,out of which 1 question should be answered. • Each question can have a maximum of 3 subdivisions. **(4x9 = 36 marks)**	**60**

Course Outcomes (COs)

At the end of the course students should be able to:

Course Outcome		Bloom's Knowledge Level (KL)
CO1	Apply fundamental concepts and circuit laws to solve simple electric and magnetic circuits.	**K3**
CO2	Understand electromagnetic induction and AC systems.	**K2**
CO3	Describe the characteristics of key electronic components and their roles in various circuits.	**K2**
CO4	Outline the principles of communication systems & Identify an application of electronics in the contemporary world.	**K2**

Note*: K1- Remember, K2- Understand, K3- Apply, K4- Analyse, K5- Evaluate, K6- Create*

CO-PO Mapping Table:

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

Text Books				
Sl. No	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
1	Basic Electrical Engineering	D P Kothari and I J Nagrath	Tata McGraw Hill	4/e 2019
2	Schaum's Outline of Basic Electrical Engineering	J.J.Cathey and Syed A Nasar	Tata McGraw Hill	3/e 2010
3	Basic Electronics: Principlesand Applications	Chinmoy Saha, Arindham Halder and Debarati Ganguly	Cambridge University Press	1/e 2018
4	Basic Electrical and Electronics Engineering	D. P. Kothari and I. J.Nagrath	McGraw Hill	2/e 2020
5	The Internet of Things: HowSmart TVs, Smart Cars, Smart Homes, and Smart Cities Are Changing the World	Michael Miller	QUE	1/e 2015
6	Basic Electronics and Linear Circuits	N N Bhargava D C Kulshreshtha and S. C. Gupta	McGraw Hill	2/e 2017
7	Electronic Communication Systems	Kennedy and Davis	McGraw Hill	6/e 2017

Reference Books				
Sl. No	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
1	Basic Electrical Engineering	D C Kulshreshtha	Tata McGraw Hill	2/e 2019
2	Electrical Engineering Fundamentals	Del Toro V	Pearson Education	2/e 2019
3	Basic Electrical Engineering	T. K. Nagsarkar, M. S. Sukhija	Oxford Higher Education	3/e 2017
4	Electronics: A Systems Approach	Neil Storey	Pearson	6e 2017
5	Electronic Devices and Circuit Theory	Robert L. Boylestad and Louis Nashelsky	Pearson	11e 2015
6	Principles of Electronic Communication Systems	Frenzel, L. E	MGH	4e 2016
7	Internet of Things: Architecture and Design Principles	Raj Kamal	McGraw Hill	1/e 2017
8	Electronic Communication	Dennis Roddy and John Coolen	Pearson	4/e 2008

ALGORITHMIC THINKING WITH PYTHON

Course Code	**24SJICEST105**	**CIE Marks**	40
Teaching Hours/Week (L: T:P: R)	3:0:2:0	**ESE Marks**	60
Credits	4	**Exam Hours**	2 Hrs. 30 Min
Prerequisites (if any)	None	**Course Type**	Theory

Course Objectives:

1. To provide students with a thorough understanding of algorithmic thinking and its practical applications in solving real-world problems.
2. To explore various algorithmic paradigms, including brute force, divide-and-conquer, dynamic programming, and heuristics, in addressing and solving complex problems.

SYLLABUS

Module No.	Syllabus Description	Contact Hours	CO
1	PROBLEM-SOLVING STRATEGIES: - Problem-solving strategies defined, Importance of understanding multiple problem-solving strategies, Trial and Error, Heuristics, Means-Ends Analysis, and Backtracking (Working backward). THE PROBLEM-SOLVING PROCESS:- Computer as a model of computation, Understanding the problem, Formulating a model, Developing an algorithm, Writing the program, Testing the program, and Evaluating the solution. ESSENTIALS OF PYTHON PROGRAMMING:- Creating and using variables in Python, Numeric and String data types in Python, Using the math module, Using the Python Standard Library for handling basic I/O - print, input, Python operators and their precedence.	7	CO1

2	ALGORITHM AND PSEUDOCODE REPRESENTATION:- Meaning and Definition of Pseudocode, Reasons for using pseudocode, The main constructs of pseudocode - Sequencing, selection (if-else structure, case structure) and repetition(for, while, repeat-until loops), Sample problems* FLOWCHARTS** :- Symbols used in creating a Flowchart - start and end, arithmetic calculations, input/output operation, decision (selection), module name (call), for loop (Hexagon), flow-lines, on-page connector, off-page connector. --- * - *Evaluate an expression,* ***d=a+b*c****, find simple interest, determine the larger of two numbers, determine the smallest of three numbers, determine the grade earned by a student based on KTU grade scale (using if-else and case structures), print the numbers from 1 to 50 in descending order, find the sum of n numbers input by the user (using all the three loop variants), factorial of a number, largest of n numbers (****Not to be limited to these exercises. More can be worked out if time permits****).* ** ***Only for visualizing the control flow of Algorithms. The use of tools like RAPTOR (https://raptor.martincarlisle.com/) is suggested. Flowcharts for the sample problems listed earlier may be discussed***	**9**	**CO2**
3	SELECTION AND ITERATION USING PYTHON:- if-else, elif, for loop, range, while loop. Sequence data types in Python - list, tuple, set, strings, dictionary, Creating and using Arrays in Python (using ***Numpy*** library). DECOMPOSITION AND MODULARIZATION* :- Problem decomposition as a strategy for solving complex problems, Modularization, Motivation for modularization, Defining and using functions in Python, Functions with multiple return values RECURSION:- Recursion Defined, Reasons for using Recursion, The Call Stack, Recursion and the Stack, Avoiding Circularity in Recursion, *Sample problems - Finding the* ***n****th Fibonacci number, greatest common divisor of two positive integers, the factorial of a positive integer, adding two positive integers, the sum ofdigits of a positive number* **.	**10**	**CO3**

	** The idea should be introduced and demonstrated using Merge sort, the problem of returning the top three integers from a list of* ***n>=3*** *integers as examples.* (***Not to be limited to these two exercises. More can be worked out if time permits***). **** ***Not to be limited to these exercises. More can be worked out if time permits***		
4	COMPUTATIONAL APPROACHES TO PROBLEM-SOLVING (*Introductory diagrammatic/algorithmic explanations only. Analysis not required*) :- Brute-force Approach - - *Example: Padlock, Password guessing* Divide-and-conquer Approach - - *Example: The Merge Sort Algorithm* - Advantages of Divide and Conquer Approach - Disadvantages of Divide and Conquer Approach Dynamic Programming Approach - *Example: Fibonacci series* - Recursion vs Dynamic Programming Greedy Algorithm Approach - *Example: Given an array of positive integers each indicating the completion time for a task, find the maximum number of tasks that can be completed in the limited amount of time that you have.* - Motivations for the Greedy Approach - Characteristics of the Greedy Algorithm - Greedy Algorithms vs Dynamic Programming Randomized Approach - *Example 1: A company selling jeans gives a coupon for each pair of jeans.* *There are n different coupons. Collecting* ***n*** *different coupons would give* *you free jeans. How many jeans do you expect to buy before getting a free one?* - *Example 2:* ***n*** *people go to a party and drop off their hats to a hat-check person. When the party is over, a different hat-check person is on duty and returns the* ***n*** *hats randomly back to each person. What is the expected number of people who get back their hats?* Motivations for the Randomized Approach	**10**	**CO4**

Course Assessment Method (CIE: 40 marks, ESE: 60 marks)

Continuous Internal Evaluation Marks (CIE):

Attendance	Continuous Assessment (Accurate Execution of Programming Tasks)	Internal Examination-1 (Written Examination)	Internal Examination-2 (Written Examination)	Internal Examination- 3 (Lab Examination)	Total
5	5	10	10	10	40

End Semester Examination Marks (ESE)

In Part A, all questions need to be answered and in Part B, each student can choose any one full question out of two questions

Part A	Part B	Total
• 2 Questions from each module. • Total of 8 Questions, each carrying 3 marks **(8x3 =24marks)**	• Each question carries 9 marks. • Two questions will be given from each module, out of which 1 question should be answered. • Each question can have a maximum of 3 sub divisions. **(4x9 = 36 marks)**	**60**

Course Outcomes (COs)

At the end of the course students should be able to:

Course Outcome		Bloom's Knowledge Level (KL)
CO1	Utilize computing as a model for solving real-world problems.	**K2**
CO2	Articulate a problem before attempting to solve it and prepare a clear and accurate model to represent the problem.	**K3**
CO3	Utilize effective algorithms to solve the formulated models and translate algorithms into executable programs.	**K3**
CO4	Interpret the problem-solving strategies, a systematic approach to solving computational problems, and essential Python programming skills	**K3**

Note*: K1- Remember, K2- Understand, K3- Apply, K4- Analyse, K5- Evaluate, K6- Create*

CO-PO Mapping Table:

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

Reference Books				
Sl. No	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
1	Problem solving & programming concepts	Maureen Sprankle, Jim Hubbard	Pearson	9/e, 2011
2	How to Solve It: A New Aspect of Mathematical Method	George Pólya	Princeton University Press	2/e, 2015
3	Creative Problem Solving: An Introduction	Donald Treffinger., Scott Isaksen, Brian Stead-Doval	Prufrock Press	4/e,2005
4	Psychology (Sec. Problem Solving.)	Spielman, R. M., Dumper, K., Jenkins, W., Lacombe, A., Lovett, M., & Perlmutter, M	H5P Edition	1/e, 2021
5	Computational Thinking: A Primer for Programmers and Data Scientists	G Venkatesh Madhavan Mukund	Mylspot Education Services Pvt Ltd	1/e, 2020
6	Computer Arithmetic Algorithms	Koren, Israel	AK Peters/CRC Press	2/e, 2001
7	Python for Everyone	Cay S. Horstmann, Rance D. Necaise	Wiley	3/e, 2024
8	Introduction to Computation and Programming using Python	Guttag John V	PHI	2/e., 2016

Video Links (NPTEL, SWAYAM…)	
Module No.	**Link ID**
1	https://opentextbc.ca/h5ppsychology/chapter/problem-solving/

2	https://onlinecourses.nptel.ac.in/noc21_cs32/preview

1. Continuous Assessment (5 Marks)

Accurate Execution of Programming Tasks

- Correctness and completeness of the program
- Efficient use of programming constructs
- Handling of errors
- Proper testing and debugging

2. Evaluation Pattern for Lab Examination (10 Marks)

1. **Algorithm (2 Marks)**

   Algorithm Development: Correctness and efficiency of the algorithm related to the question.

2. **Programming (3 Marks)**

   Execution: Accurate execution of the programming task.

3. **Result (3 Marks)**

   Accuracy of Results: Precision and correctness of the obtained results.

4. **Viva Voce (2 Marks)**

Proficiency in answering questions related to theoretical and practical aspects of the subject.

Sample Classroom Exercises:

1. Identify three ill-defined problems and well-defined problems
2. Identify five use cases for Trial and error, Heuristics, backtracking, and Means-ends analysis.
3. Use a diagram to solve the Tower of Hanoi for three pegs with the minimum number of moves.
4. Evaluate different algorithms discussed earlier based on their efficiency by counting the number of steps.
5. A recursive function that takes a number and returns the sum of all the numbers from zero to that number.
6. A recursive function that takes a number as an input and returns the factorial of that number.
7. A recursive function that takes a number '**n**' and returns the nth Fibonacci number.
8. A recursive function that takes an array of numbers as input and returns the product of all the numbers in the array.
9. A program to reverse the contents of an **1D** array without using a second array.

10. To register for the end-semester examination, you need to log into the University portal with your credentials. Write a program to validate the credentials. Assume that the usernames are stored in an array of strings called **USERNAME** and the corresponding passwords are stored in another array of strings called **PASSWORD** such that **password[i]** is the password for the user **username[i]**.
11. You are given a list and your task is to divide it to make two smaller lists. The sub lists should be made from alternate elements in the original list. So if the original list is **{5,1,4,12,6}**, then one sub list should be **{5,4,6}** and the other should be **{1,12}**.
12. A program that takes three points in a 2D plane and determines whether they are collinear. Two pairs of points are collinear if they have the same slope.

LAB Experiments:

1. Simple desktop calculator using Python. *Only the five basic arithmetic operators.*
2. Create, concatenate, and print a string and access a sub-string from a given string.
3. Familiarize time and date in various formats (Eg. "Thu Jul 11 10:26:23 IST 2024").
4. Write a program to create, append, and remove lists in Python using NumPy.
5. Program to find the largest of three numbers.
6. Convert temperature values back and forth between Celsius (c), and Fahrenheit (f). [Formula: c/5 = f-32/9]
7. Program to construct patterns of stars (*), using a nested for loop.
8. A program that prints prime numbers less than ***N***.
9. Program to find the factorial of a number using Recursion.
10. Recursive function to add two positive numbers.
11. Recursive function to multiply two positive numbers.
12. Recursive function to find the greatest common divisor of two positive numbers.
13. A program that accepts the lengths of three sides of a triangle as inputs. The program should output whether or not the triangle is a right triangle (Recall from the Pythagorean Theorem that in a right triangle, the square of one side equals the sum of the squares of the other two sides). Implement using functions.
14. Program to define a module to find Fibonacci Numbers and import the module to another program.
15. Program to check whether the given number is a valid mobile number or not using

functions. Rules:

1. Every number should contain exactly 10 digits.
2. The first digit should be 7 or 8 or 9

16. Input two lists from the user. Merge these lists into a third list such that in the merged list, all even numbers occur first followed by odd numbers. Both the even numbers and odd numbers should be in sorted order.

17. Write a program to play a sticks game in which there are 16 sticks. Two players take turns to play the game. Each player picks one set of sticks (needn't be adjacent) during his turn. A set contains 1, 2, or 3 sticks. The player who takes the last stick is the loser. The number of sticks in the set is to be input.

18. Suppose you're on a game show, and you are given the choice of three doors: Behind one door is a car; behind the others, goats. You pick a door, say No. 1, and the host, who knows what is behind the doors, opens another door, say No. 3, which has a goat. He then asks, "Do you want to pick door No. 2?" Is it to your advantage to switch your choice?

(source:https://en.wikipedia.org/wiki/Monty_Hall_problem#:~:text=The%20Monty%20Hall%20problem%20is,the%20American%20Statistician%20in%201975.)

BASIC ELECTRICAL AND ELECTRONICS ENGINEERING WORKSHOP

Course Code	**24SJGXESL106**	**CIE Marks**	**70**
Teaching Hours/Week (L: T:P: R)	**0:0:2:0**	**ESE Marks**	**30**
Credits	**1**	**Exam Hours**	**2 Hrs.**
Prerequisites (if any)	None	**Course Type**	**Lab**

Course Objectives:

1. To create awareness and familiarity with electrical wiring and safety measures to be taken.
2. To Identify various electronic components and to operate various measuring instruments
3. Learn to setup simple electronic circuits on breadboard and PCB

Expt. No.	Experiments
	Electrical Workshop
1	a) Demonstrate the precautionary steps adopted in case of Electrical shocks. b) Identify different types of cables, wires, switches, fuses, fuse carriers, MCB, ELCB and MCCB, familiarize the ratings.
2	Wiring of simple light circuit for controlling light/ fan point (PVC conduit wiring)
3	Wiring of light/fan circuit using two-way switches. (Staircase wiring)
4	Wiring of a simple light circuit for light/ fan point (PVC conduit wiring) and a 6A plug socket with individual control.
5	Wiring of power distribution arrangement using single phase MCB distribution board with ELCB, main switch and Energy meter.
6	Identify battery specifications using different types of batteries. (Lead acid, Li Ion, NiCd
7	Familiarize different types of Earthing (Pipe, Plate Earthing, Mat Schemes) and Ground Enhancing Materials (GEM).

Electrical Workshop - Advanced Experiments	
1	Wiring of a power plug (16 A) socket with a control switch.
2	Familiarization of step up and step-down transformers, (use low voltage transformers) Measurement and representation of voltage and waveform to scale in graph sheet with the help of CRO
3	Familiarization of rheostats, measurement of potential across resistance elements and introducing the concept of relative potential using a DC circuit.

ELECTRONICS WORKSHOP (Minimum of 7 Experiments to be done)	
1	Familiarization/Identification of electronic components with specification (Functionality, type, size, colour coding, package, symbol and cost of -Active, Passive, Electrical, Electronic, Electro-mechanical, Wires, Cables, Connectors, Fuses, Switches, Relays, Crystals, Displays, Fasteners, Heat sink etc.)
2	Drawing of electronic circuit diagrams using BIS/IEEE symbols and Interpret data sheets of discrete components and IC's
3	Familiarization/Application of testing instruments and commonly used tools. - Multimeter, Function generator, Power supply, CRO, DSO. Soldering iron, Desoldering pump, Pliers, Cutters, Wire strippers, Screw drivers, Tweezers, Crimping tool, Hot air soldering and de- soldering station
4	Testing of electronic components using multimeter - Resistor, Capacitor, Diode, Transistor and JFET.
5	Printed circuit boards (PCB) - Types, Single sided, Double sided, PTH, Processing methods. Design and fabrication of a single sided PCB for a simple circuit.
6	Inter-connection methods and soldering practice. Bread board, Wrapping, Crimping, Soldering - types - selection of materials and safety precautions. Soldering practice in connectors and general-purpose PCB, Crimping.
7	Assembling of electronic circuit/system on general purpose PCB, test and show the functioning (Any two)- Fixed voltage power supply with transformer • Rectifier diode • Capacitor filter • Zener/IC regulator • Square wave generation using IC 555 timer in IC base.
8	Introduction to EDA tools (such as KiCad or XCircuit)

Course Assessment Method (CIE: 70 marks, ESE: 30 marks)

Continuous Internal Evaluation Marks (CIE):

Attendance	Preparation/Pre-Lab Work, experiments, Viva and Timely completion of Lab Reports / Record (Continuous Assessment)	Total
10	60	70

***End Semester Examination Marks (ESE):**

Procedure/ Preparatory work/Design/ Algorithm	Conduct of experiment/ Execution of work/ troubleshooting/ Programming	Result with valid inference/ Quality of Output	Viva voce	Record	Total
5	10	5	5	5	30

- Submission of Record: Students shall be allowed for the end semester examination only upon submitting the duly certified record.
- Minimum Pass Mark: The requirement for passing the lab course included in the first-year curriculum is that the student must score a minimum of 50% overall, combining marks from both Continuous Internal Evaluation (CIE) and End Semester Examination (ESE). There is no separate minimum requirement for each component.
- There will not be any relaxation in the attendance requirement.

Course Outcomes (COs)

At the end of the course students should be able to:

	Course Outcome	Bloom's Knowledge Level (KL)
CO1	Demonstrate safety measures against electrical shocks	**K2**
CO2	Familiarize with batteries and Earthing schemes	**K2**
CO3	Illustrate the connection diagram and identify the suitable accessories necessary for wiring simple electric circuits	**K3**
CO4	Identify various electronic components	**K2**
CO5	Operate various measuring instruments	**K3**
CO6	Apply the design procedure of simple electronic circuits on breadboard and PCB	**K3**
CO7	Build the ability to work in a team with good interpersonal skills	**K3**

Note: *KI- Remember, K2- Understand, K3- Apply, K4- Analyse, K5- Evaluate, K6- Create*

CO-PO Mapping Table:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1						3					2
CO2	1					2					2
CO3	2					1					2
CO4	3					2					3
CO5	3				3	2		2			3
CO6	3		3	1	3	2		2			3
CO7								3	2		2

Text Books				
SI. No	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
1	Electrical Design Estimating and Costing	K B Raina and S KBhattacharya	New Age International Publishers	2/e2024
2	Electrical Systems Design	M K Giridharan	IK International Publishing House Pvt. Ltd	3/e2022
3	Basic Electrical Engineering	DP Kothari and IJ Nagrath	Tata McGraw Hill	4/e2019
4	Basic Electronics and Linear Circuits	NN Bhargava, D C Kulshreshtha and S C Gupta	Me Graw Hill	2/e2017

Continuous Assessment with equal weightage for both specializations (60 Marks)

1. **Preparation and Pre-Lab Work (25 Marks)**

   - Pre-Lab Assignments: Assessment of pre-lab assignments or quizzes that test understanding of the upcoming experiment.
   - Skill Proficiency: Proficiency in handling equipment, accuracy in observations, and troubleshooting skills during the experiments.
   - Teamwork: Collaboration and participation in group experiments.

2. **Lab Reports and Record Keeping (25 Marks)**

   - Quality of Reports: Clarity, completeness and accuracy of lab reports. Proper

documentation of experiments, data analysis and conclusions.

- Timely Submission: Adhering to deadlines for submitting and maintaining a well-organized lab record.

3. **Viva Voce (10 Marks)**
    - Oral Examination: Ability to explain the experiment, results and underlying principles during a viva voce session.

***Evaluation Pattern for End Semester Examination (30 Marks)**

ESE to be conducted by the course offering department based on the following evaluation criteria

1. **Procedure/Preliminary Work/Design/Algorithm (5 Marks)**
    - Procedure Understanding and Description: Clarity in explaining the procedure and understanding each step involved.
    - Preliminary Work and Planning: Thoroughness in planning and organizing materials/equipment. • Algorithm Development: Correctness and efficiency of the algorithm related to the experiment. • Creativity and logic in algorithm or experimental design.
2. **Conduct of Experiment/Execution of Work/Programming (10 Marks)**
    - Setup and Execution: Proper setup and accurate execution of the experiment or programming task.
3. **Result with Valid Inference/Quality of Output (5 Marks)**
    - Accuracy of Results: Precision and correctness of the obtained results.
    - Analysis and Interpretation: Validity of inferences drawn from the experiment or quality of program output.
4. **Viva Voce (5 Marks)**
    - A written examination or an MCQ to assess the knowledge level of the student in the experiments & proficiency in answering questions related to theoretical and practical aspects of the course.
5. **Record (5 Marks)**
    - Completeness, clarity, and accuracy of the lab record submitted

LIFE SKILLS AND PROFESSIONAL COMMUNICATION

Course Code	**24SJICHUT128**	**CIE Marks**	100
Teaching Hours/ Week (L:T:P:R)	2:0:1:0	**ESE Marks**	0
Credits	1	**Exam Hours**	-
Prerequisites (if any)	None	**Course Type**	Activity-based learning

Course objectives:

1. To foster self-awareness and personal growth, enhance communication and interpersonal connection skills, promote effective participation in groups and teams, develop critical thinking, problem-solving, and decision-making skills, and cultivate the ability to exercise emotional intelligence.
2. To equip students with the necessary skills to listen, read, write & speak, to comprehendand successfully convey any idea, technical or otherwise.
3. To equip students to build their profile in line with the professional requirements and standards.

Continuous Internal Evaluation Marks (CIE):

- Continuous internal evaluation is based on the individual and group activities as detailed in the activity table given below.
- The students should be grouped into groups of size 4 to 6 at the beginning of the semester. They should use online collaboration tools for group activities, report/presentation making andwork management.
- Activities are to be distributed between 3 class hours (2L+1P) and 3.5 Self-study hours.
- Marks given against each activity should be awarded fully if the students successfully complete the activity.
- Students should maintain a portfolio file with all the reports and other textual materials generated from the activities. Students should also keep a journal related to the activities undertaken.
- Portfolio and journal are mandatory requirements for passing the course, in addition to the minimum marks required.
- The portfolio and journal should be carried forward and displayed during the 7th Semester Seminar course as a part of the experience sharing regarding the skills

developed through the HMC courses and Mini project course.

- Self-reflection questionnaire shall be given at the beginning of the semester, in between and atthe end of the semester based on the guidelines in the manual of the course.

Table 1: Activity Table

Sl. No.	Activity	Class room (L) / Self Study (SS)	Week of completion	Group / Individual(G/I)	Marks	Skills	CO
1.1	Group formation and self-introduction among the group members	L	1	G	-	Connecting with group members Time management - Gantt Chart	
1.2	Familiarizing the activities and preparation of the time plan for theactivities	L	1	G	-		
1.3	Preparation of Gantt chart based on the time plan	SS	1	G	2		
2.1	Take an online personality development test, self reflect and report	SS	1	I	2	Self-awareness Writing	CO1
2.2	Role-storming exercise 1: Students assume 2 different roles givenbelow and write about their ● Strengths, ● Areas for improvement, ● Concerns, ● Areas in which he/she hesitates to takeadvice, ● Goals/Expectations, from the point of view of the followingassumed roles i) their parent/guardian/mentor ii) their friend/sibling/cousin	L	1	I	2	Goal setting Identification of skills and settinggoa l Self-awareness Discussion ingroups Group work- Compiling ofideas Mind mapping	CO1

2.3	Role-storming exercise 2: Students assume the role of their teacherand write about the ● Skills required as a B.Tech graduate ● Attitudes, habits, approaches requiredand activities to be practised during their B.Tech years, in order to achieve the set goals	SS	1	I	2		CO1
2.4	Discuss the skills identified through rolestorming excercise by each one within their own group and improvise the list of skills	L	1	G	2		CO1
2.5	Prepare a mind map based on the role- storming exercise and exhibit/present itin class	SS	2	G	2		CO1
3	Prepare a presentation on instances ofempathy they have observed in their own life or in other's life	L	2 to 4	I	2	Empathy	CO2
4.1	Each student connects and networkswith a minimum of 3 professionals from industry/public sector organizations/other agencies/NGOs /academia (atleast 1 through LinkedIn)	SS	3	I	2	Work place Awareness Listening Communication	
4.2	Interact with them to understand their workplace details including ● workplace skills required ● their work experience ● activities they have done to enhance their employability during their B.Techyears ● suggestions on the different activities to be done during B.Tech years Prepare a documentation of this	SS	3	I	4	interacting with people Networking through various media including LinkedIn	CO2

3

4.3	Discuss the different workplace details& work readiness activities assimilatedby each through the interactions withintheir group and compile the inputs collected by the individuals Prepare the Minutes of the discussions	SS	3	G	2	Discussion in groups Report Preparation Creativity Goal setting Preparation of action plan	CO2
4.4	Report preparation based on the discussions	SS	4	G	3		CO4
4.5	Perform a role-play based on the workplace dynamics assimilated through interactions and group discussions	L	5	G	4		CO3
4.6	Identify their own goal and prepare an action plan for their undergraduate journey to achieve the goal	SS	5	I	2		CO1
5.1	Select a real-life problem that requires a technical solution and list the study materials needed	L	6	G	2		CO3
5.2	Listen to TED talks & video lectures from renowned Universities related tothe problem and prepare a one-page summary (Each group member should select a different resource)	SS	6	I	2		CO4
5.3	Use any online tech forum to gather ideas for solving the problem chosen	SS	6	G	2		CO5
5.4	Arrive at a possible solution using six thinking hat exercise	L	7	G	3		CO3
5.5	Prepare a report based on the problem-solving experience	SS	7	G	2		CO4
6.1	Linkedin profile creation	SS	1	I	2	Profile-building	CO6
6.2	Resume preparation	SS	8	I	2		CO6
6.3	Self-introduction video	SS	8	I	3		CO6
7	Prepare a presentation on instances of demonstration of emotional intelligence	SS	9	I	2	Emotional intelligence	CO2
8	Prepare a short video presentation on diversity aspects observed in our society (3 to 5 minutes)	SS	10	G	3	Diversity	CO2, CO5

9	Take online Interview skills development sessions like robotic interviews; self-reflect and report	SS	10	I	2	Interview skills	CO6
10	Take an online listening test, self-reflect and report	SS	11	I	2	Listening skills	CO6
11.1	Activities to improve English vocabulary of students	L	8	I/ G	4	English vocabulary English languageskills Writing Presentation Group work Self-reflection	CO4
11.2	Activities to help students identify errors in English language usage	L	9	I/ G	2		CO4
11.3	Activity to help students identify commonly mispelled words, commonlymispronounced words and confusing words	L	10	I/ G	2		CO4
11.4	Write a self-reflection report on the improvement in English language communication through this course	SS	1 2	I	2		CO4
11.5	Presentation by groups on the experience of using online collaboration tools in various groupactivities and time management experience as per the Gantt chart prepared	L	11 to 12	G	2		CO4, CO5
12.1	Each group prepares video content for podcasts on innovative technological interventions/research work tried out in Kerala context by academicians/professionals/Govt. agencies/research institutions/private agencies/NGOs/other agencies	SS	12	G	4	Audio-visual Presentations creations with the use of technology tools Effective use of social media platforms Profile building	CO2, CO4, CO5
12.2	Upload the video content to podcasting platforms or YouTube	SS	12	G	1		CO5
12.3	Add the link of the podcast in their LinkedIn profile	SS	12	G	1		CO5

Table 2. Lab hour Activities (P)(Any 8 Activities): 24 Marks

Sl No	Activity	Marks	Skill	CO
1	Hands-on sessions on day-to-day engineering skills and a self-reflection report on the experience gained: 1. Drilling practice using electric hand drilling machines. 2. Cutting of MS rod and flat using electric hand cutters. 3. Filing, finishing and smoothening using electrically operated hand grinders. 4. MS rod cutting using Hack saw by holding the work in bench wise. 5. Study and handling different types of measuring instruments. 6. Welding of MS, SS work pieces. 7. Pipe bending practice (PVC and GI). 8. Water tap fitting. 9. Water tap rubber seal changing practice. 10. Union and valves connection practice in pipes. 11. Foot valve fitting practice. 12. Water pump seal and bearing changing practice.	**24**	Basic practical engineering skills	**3**
2	Language Lab sessions	**-**	Language Skills	**4**

Course Outcomes

Course Outcome		Bloom's Knowledge Level (KL)
CO1	Develop the ability to know & understand oneself, show confidence in one's potential & capabilities, set goals and develop plans to accomplish tasks	**K2**
CO2	Develop the ability to communicate and connect with others, participate in groups/teams, empathise, respect diversity, be responsible and understand the need to exercise emotional intelligence	**K2**
CO3	Develop thinking skills, problem-solving and decision-making skills	**K3**
CO4	Develop listening, reading, writing & speaking skills, ability to comprehend & successfully convey any idea, and ability to analyze, interpret & effectively summarize textual, audio & visual content	**K2**
CO5	Develop the ability to create effective presentations through audio-visual mediums with the use of technology tools and initiate effective use of social media platforms & tech forums for content delivery and discussions	**K3**
CO6	Initiate profile-building exercises in line with the professional requirements, and start networking with professionals/academicians	**K3**

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1									1		3
CO2					1		3		3		3
CO3		1	1		1				1		1
CO4					1				1		2
CO5					1	1			1		2
CO6					1				1		

Note*: K1- Remember, K2- Understand, K3- Apply, K4- Analyse, K5- Evaluate, K6- Create*

Text Books				
Sl. No	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
1	Life Skills & Personality Development	Maithry Shinde et.al.	Cambridge University Press	First Edition, 2022
2	Emotional Intelligence: Why it can matter more than IQ	Daniel Goleman	Bloomsbury, Publishing PLC	25th Anniversary Edition December 2020
3	Think Faster, Talk Smarter: How to speak successfully when you are put on the spot	Matt Abrahams	Macmillan Business	September 2023
4	Deep Work: Rules for focused success in a distracted world	Cal Newport	PIATKUS	January 2016
5	Effective Technical Communication	Ashraf Rizvi	McGraw Hill Education	2nd Edition 2017
6	Interchange	Jack C. Richards, With Jonathan Hull, Susan Proctor	Cambridge publishers	5th Edition

Reference Books				
Sl. No	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition And Year**
1	Life Skills for Engineers	Remesh S., Vishnu R.G.	Ridhima Publications	First Edition, 2016
2	Soft Skills & Employability Skills	Sabina Pillai and Agna Fernandez	Cambridge University Press	First Edition, 2018
3	Effective Technical Communication	Ashraf Rizvi	McGraw Hill Education	2nd Edition 2017
4	English Grammar in Use	Raymond Murphy,	Cambridge University Press India PVT LTD	5th Edition 2023
5	Guide to writing as an Engineer	David F. Beer and David McMurrey	John Willey. New York	2004

SEMESTER – II

SEMESTER II COURSES														
Sl. No:	Slot	Course Code	Course Type	Course	Course Title (Course Name)	Credit Structure				SS	Total Marks		Credits	Hrs./Week
						L	T	P	R		CIE	ESE		
1	A	24SJGYMAT201	BSC	GC	Mathematics for Electrical Science and Physical Science-2	3	0	0	0	4.5	40	60	3	3
2	B S1/ S2	24SJGBPHT121	BSC	GC	Physics for Electrical Science	3	0	2	0	5.5	40	60	4	5
		24SJGXCYT122			Chemistry for Information Science and Electrical Science									
3	C	24SJGBEST213	ESC	GC	Engineering Mechanics	3	0	0	0	4.5	40	60	3	3
4	D	24SJGXEST204	ESC	GC	Programming in C	3	0	2	0	5.5	40	60	4	5
5	E	24SJPCEET205	PC	PC	Measurements and Instrumentation	3	1	0	0	5	40	60	4	4
6	F	24SJICEST206	ESC	IC	Engineering Entrepreneurship and IPR	3	0	0	0	4.5	60	40	3	3
7	*I S1/ S2	24SJICHWT127	HWP	IC	Health and Wellness	1	0	1	0	0	50	0	1	2/3
		24SJICHUT128	HM C		Life Skills and Professional Communication	2	0	1	0	3.5	100	0		
8	L	24SJGXESL208	ESC	GC	IT Workshop	0	0	2	0	1	50	50	1	2
	S1/ S2	24SJICSEM129	SEC	IC	Skill Enhancement Course: Digital 101 (NASSCOM)	MOOC							1	
Total										**34**			**24**	**27/ 28**

No Grade Points will be awarded for the MOOC course and I slot course

MATHEMATICS FOR ELECTRICAL SCIENCE AND PHYSICAL SCIENCE – 2

Course Code	24SJGYMAT201	CIE Marks	40
Teaching Hours/Week (L: T:P: R)	3:0:0:0	ESE Marks	60
Credits	3	Exam Hours	2 Hrs. 30 Min.
Pre-requisites (if any)	Basic knowledge in single variable calculus.	Course Type	Theory

Course Objectives:

To provide a comprehensive understanding of partial derivatives, multiple integrals and the differentiation and integration of vector-valued functions, emphasizing their applications in engineering contexts.

Course Outcomes (COs)

At the end of the course students should be able to:

	Course Outcome	Bloom's Knowledge Level (KL)
CO1	Compute the partial and total derivatives and maxima and minima of multivariable functions and to apply in engineering problems.	K3
CO2	Understand theoretical idea of multiple integrals and to apply them to find areas and volumes of geometrical shapes.	K3
CO3	Compute the derivatives and line integrals of vector functions and to learn their applications.	K3
CO4	Apply the concepts of surface and volume integrals and tolearn their inter-relations and applications.	K3

K1- Remember, K2- Understand, K3- Apply, K4- Analyse, K5- Evaluate, K6- Create

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	3	-	2	-	-	-	-	-	-	2
CO2	3	3	-	2	-	-	-	-	-	-	2
CO3	3	3	-	2	-	-	-	-	-	-	2
CO4	3	3	-	2	-	-	-	-	-	-	2

SYLLABUS

Module	Syllabus Description	Contact Hours	CO
1	Limits and continuity, Partial derivatives, Partial derivatives of functions with two variables, Partial derivatives viewed as rate of change and slopes, Partial derivatives of functions with more than two variables, Higher order partial derivatives, Local linear approximations, Chain rule, Implicit differentiation, Maxima and minima of functions of two variables - Relative maxima and minima **(Text 1: Relevant topics from sections 13.2, 13.3, 13.4, 13.5, 13.8)**	**9**	**1**
2	Double integrals, Reversing the order of integration in double integrals, change of coordinates in double integrals (Cartesian to polar), Evaluating areas using Double integrals, finding volumes using double integration, Triple integrals, Volume calculated as triple integral, Triple integral in Cartesian and cylindrical coordinates. **(Text 1: Relevant topics from section 14.1, 14.2, 14.3, 14.5, 14.6)**	**9**	**2**
3	Vector valued function of single variable - derivative of vector valued function, Concept of scalar and vector fields, Gradient and its properties, Directional derivative, Divergent and Curl, Line integrals of vector fields, Work done as line integral, Conservative vector field, independence of path, Potential function (results without proof). **(Text 1: Relevant topics from section 12.1, 12.2, 13.6, 15.1, 15.2, 15.3)**	**9**	**3**
4	Green's theorem (for simply connected domains, without proof) and applications to evaluating line integrals, finding areas using Green's theorem, Surface integrals over surfaces of the form $z = g(x, y)$, Flux integrals over surfaces of the form $z = g(x, y)$, Divergence theorem (without proof), Using Divergence theorem to find flux, Stokes' theorem (without proof) **(Text 1: Relevant topics from section 15.4, 15.5, 15.6, 15.7, 15.8)**	**9**	**4**

Course Assessment Method (CIE: 40 marks, ESE: 60 marks)

Continuous Internal Evaluation Marks (CIE):

Attendance	Assignment/ Micro project	Internal Examination-1 (Written)	Internal Examination- 2 (Written)	Total
5	15	10	10	40

End Semester Examination Marks (ESE)

Part A	Part B	Total
• 2 Questions from each module. • Total of 8 Questions, each carrying 3 marks **(8x3 =24 marks)**	• Each question carries 9 marks. • Two questions will be given from each module, out of which one question should be answered. • Each question can have a maximum of 3 sub divisions **(4x9 = 36 marks)**	**60**

Text Books

Sl. No	Title of the Book	Name of theAuthor/s	Name of the Publisher	Edition and Year
1	Calculus	H. Anton, I. Biven, S.Davis	Wiley	12th edition, 2024

Reference Books

Sl. No	Title of the Book	Name of theAuthor/s	Name of the Publisher	Edition and Year
1	Thomas' Calculus	Maurice D. Weir, Joel Hass, Christopher Heil, Przemys law Bogacki	Pearson	15th edition, 2023
2	Essential Calculus	J. Stewart	Cengage	2nd edition, 2017
3	Advance Engineering Mathematics	Erwin Kreyszig	John Wiley & Sons	10th edition, 2016
4	Bird's Higher Engineering Mathematics	John Bird	Taylor & Francis	9th edition, 2021
5	Higher Engineering Mathematics	B. V. Ramana	McGraw-Hill Education	39th edition, 2023

Video Links (NPTEL, SWAYAM…)

Module	Link ID
1	https://nptel.ac.in/courses/111107108

PHYSICS FOR ELECTRICAL SCIENCE

Course Code	24SJGBPHT121	CIE Marks	40
Teaching Hours/Week (L: T:P: R)	3:0:2:0	ESE Marks	60
Credits	4	Exam Hours	2 Hrs. 30 Min.
Prerequisites (if any)	None	Course Type	Theory + Lab

Course Objectives:

1. To provide students with a solid background in the fundamentals of Physics and to impart this knowledge in Electrical Science disciplines.
2. To develop scientific attitudes and enable students to correlate Physics concepts with their core programs.
3. To equip students with practical knowledge that complements their theoretical studies and develop their ability to create practical applications and solutions in engineering based on their understanding of Physics.

SYLLABUS

Module No.	Syllabus Description	Contact Hours	CO
1	**Semiconductor Physics** Intrinsic semiconductor, Derivation of density of electrons in conduction band and density of holes in valence band, Intrinsic carrier concentration, Variation of Intrinsic carrier concentration with temperature, Extrinsic semiconductor (qualitative) Formation of p-n junction, Fermi level in semiconductors-intrinsic and extrinsic, Energy band diagram of p-n junction - Qualitative description of charge flow across a p-n junction - Forward and reverse biased p-n junctions, Diode equation (Derivation), V-I Characteristics of p-n junction	9	1

2	**Semiconductor Devices** Semiconductor devices - Rectifiers- Full wave and Half wave, Zener diode - V-I characteristics - Zener breakdown and Avalanche breakdown, Tunnel diode - V-I characteristics, Applications of Zener and Tunnel diodes. Photonic devices (qualitative) - Photo detectors (Junction and PIN photodiodes), Applications, Solar cells- V-I Characteristics, Efficiency, Stringing of Solar cells to solar panel, Light Emitting Diode, Applications of LED	**9**	**2**
3	**Superconductivity & Dielectrics** Super conductivity, Transition temperature, Critical field, Meissner effect, Type I and Type II Super conductors, Applications of superconductors. Dielectric constant, Polarization, Permittivity- relative permittivity, Relation between polarization and dielectric constant, Types of Polarization, Internal fields in liquids and solids, Clausius Mossotti Relation, Dielectric loss(qualitative), Dielectric breakdown (qualitative)	**9**	**3**
4	**Laser & Fiber Optics** Optical processes - Absorption, Spontaneous emission and stimulated emission, Properties of laser, Principle of laser - conditions for sustained lasing – Population inversion, Pumping, Metastable states, Basic components of laser - Active medium- Optical resonant cavity, Construction and working of Ruby laser, Semiconductor Laser (Qualitative), Applications of laser. Optical fiber-Principle of propagation of light, Types of fibers-Step index and Graded index fibers, Numerical aperture –Derivation, Applications of optical fibers - Fiber optic communication system (block diagram)	**9**	**4**

Course Assessment Method (CIE: 40 marks, ESE: 60 marks)

Continuous Internal Evaluation Marks (CIE):

Attendance	Continuous Assessment	Internal Examination-1 (Written)	Internal Examination-2 (Written)	Internal Examination- 3 (Lab Examination)	Total
5	10	10	10	5	40

End Semester Examination Marks (ESE)

In Part A, all questions need to be answered and in Part B, each student can choose any one fullquestion out of two questions

Part A	Part B	Total
• 2 Questions from each module. • Total of 8 Questions, each carrying 3 marks **(8x3 =24marks)**	• Each question carries 9 marks. • Two questions will be given from each module, out of which 1 question should be answered. • Each question can have a maximum of 3 sub divisions. **(4x9 = 36 marks)**	**60**

Course Outcomes (COs)

At the end of the course students should be able to:

	Course Outcome	Bloom's Knowledge Level (KL)
CO1	Apply the fundamentals of Semiconductor Physics in engineering.	**K3**
CO2	Apply the behaviour of semiconductor materials in semiconductor devices and the theoretical knowledge to conduct experiments.	**K3**
CO3	Explain Superconductivity and basic theory of dielectrics.	**K2**
CO4	Apply the comprehended knowledge about laser and fiber optics in various engineering applications.	**K3**

Note*: K1- Remember, K2- Understand, K3- Apply, K4- Analyse, K5- Evaluate, K6- Create*

CO-PO Mapping Table:

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

Text Books				
Sl. No	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
1	Concepts of Modern Physics	Arthur Beiser	Tata McGraw Hill Publications	6th Edition, 2003
2	Engineering Physics	H K Malik and A K Singh	McGraw Hill Education	2nd Edition, 2017
3	A Textbook of Engineering Physics	MN Avadhanulu, P G Kshirsagar, TVS Arun murthy	S. Chand	11th Edition 2018

Reference Books				
Sl. No	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
1	Semiconductor DevicesFundamentals	Robert F Pierret	Pearson Education	1995
2	Advanced Semiconductor Fundamental	Robert F Pierret	Pearson Education	2nd Edition, 2002
3	Solid State Electronic Devices	Ben G Streetman and Sanjay Kumar Banerjee	Pearson Education 6/e	2010
4	Solid State Physics	S.O. Pillai	New age international publishers	10th Edition, 2022
5	Introduction to Solid State Physics	Charles Kittel	Wiley India Edition	2019
6	Advanced EngineeringPhysics	Premlet B	Phasor Books	10th Edition, 2017
7	A Text Book of Engineering Physics	I. Dominic and. A. Nahari,	Owl Books Publishers	Revised Edition, 2016

Video Links (NPTEL, SWAYAM etc)	
Module No.	**Link ID**
1	https://nptel.ac.in/courses/108106181
2	https://nptel.ac.in/courses/108108112
3	https://nptel.ac.in/courses/115103108
4	https://nptel.ac.in/courses/115102124

1. Continuous Assessment (10 Marks)

i. Preparation and Pre-Lab Work (2 Marks)

- Pre-Lab Assignments: Assessment of pre-lab assignments or quizzes that testunderstanding of the upcoming experiment.
- Understanding of Theory: Evaluation based on students' preparation and understanding ofthe theoretical background related to the experiments.

ii. Conduct of Experiments (2 Marks)

- Procedure and Execution: Adherence to correct procedures, accurate execution ofexperiments, and following safety protocols.
- Skill Proficiency: Proficiency in handling equipment, accuracy in observations, andtroubleshooting skills during the experiments.
- Teamwork: Collaboration and participation in group experiments.

iii. Lab Reports and Record Keeping (3 Marks)

- Quality of Reports: Clarity, completeness and accuracy of lab reports. Properdocumentation of experiments, data analysis and conclusions.
- Timely Submission: Adhering to deadlines for submitting lab reports/rough record/ maintaining a well-organized record.

iv. Viva Voce (3 Marks)

- Oral Examination: Ability to explain the experiment, results and underlying principlesduring a viva voce session.

Final Marks Averaging: *The final marks for preparation, conduct of experiments, viva, andrecord are the average of all the specified experiments in the syllabus.*

2. Evaluation Pattern for Lab Examination (5 Marks)

1. **Procedure/Preliminary Work/Conduct of Experiments (2 Marks)**
   - Procedure Understanding and Description: Clarity in explaining the procedure andunderstanding each step involved.
   - Preliminary Work and Planning: Thoroughness in planning and organizingmaterials/equipment.
   - Setup and Execution: Proper setup and accurate execution of the experiment orprogramming task
2. **Result (2 Marks)**
   - Accuracy of Results: Precision and correctness of the obtained results.
3. **Viva Voce (1 Marks)**
   - Proficiency in answering questions related to theoretical and practical aspects of thesubject.

Experiment List (Minimum 10 Experiments)

Experiment No.	Experiment
1	Diode characteristics
2	Zener diode- V-I characteristics
3	Measuring of unknown resistance using Wheatstone bridge
4	Half wave rectifier
5	Full wave rectifier
6	Solar Cell- V-I and Intensity Characteristics
7	Laser – Determination of wavelength using diffraction grating
8	CRO -Measurement of frequency and amplitude of wave forms
9	Numerical aperture of optical fiber

10	CRO- Lissajous Patterns
11	Laser- To measure the wavelength using a millimeter scale as a grating
12	Compare the variation of current with potential difference, for a metal, filament bulb andsemiconductor diode.
13	Determination of dielectric constant
14	Characteristics of LED
15	Photo diode - V-I Characteristics
16	Hall effect in semiconductors
17	Advanced learning of experiments 1-5 using virtual labs (optional)

ENGINEERING MECHANICS

Course Code	24SJGBEST213	CIE Marks	40
Teaching Hours/Week (L: T:P: R)	3:0:0:0	ESE Marks	60
Credits	3	Exam Hours	2 Hrs. 30 Min.
Prerequisites (if any)	None	Course Type	Theory

Course Objectives:

- To enable students to analyze basic mechanics problems and apply a vector-based approach to solve them.

SYLLABUS

Module No.	Syllabus Description	Contact Hours	CO
1	**Introduction to statics:** Introduction to branches of mechanics, concept of rigid body scalars and vectors, vector operations, forces in space. Support reactions of beams (point load and UDL on Simply supported and cantilever beams) **Force systems:** Rectangular components in 2D and 3D, moment and couple, resultants Equilibrium: system isolation and the free-body diagram, equilibrium conditions 2D and 3D	10	1
2	**Friction:** Laws of friction – analysis of blocks and ladder Centroid of composite areas- – moment of inertia- parallel axis and perpendicular axis theorems. Polar moment of inertia, radius of gyration, mass moment of inertia-ring and disc	10	2
3	**Dynamics** – Rectilinear translation - equations of motion in kinematics and kinetics – D'Alembert's principle. – motion on horizontal and inclined surfaces, motion of connected bodies. Combined motion of translation and rotation.	8	3
4	**Mechanical vibration** - Free and forced vibration, degree of freedom. Simple harmonic motion - spring mass model, period, stiffness, frequency, simple numerical problems of single degree of freedom	8	4

Course Assessment Method

(CIE: 40 marks, ESE: 60 marks)

Continuous Internal Evaluation Marks (CIE):

Attendance	Assignment/ Microproject	Internal Examination-1 (Written)	Internal Examination-2 (Written)	Total
5	15	10	10	40

End Semester Examination Marks (ESE)

In Part A, all questions need to be answered and in Part B, each student can choose any one full question out of two questions

Part A	Part B	Total
• 2 Questions from each module. • Total of 8 Questions, each carrying 3 marks **(8x3 =24marks)**	• Each question carries 9 marks. • Two questions will be given from each module, out of which 1 question should be answered. • Each question can have a maximum of 3 sub divisions. **(4x9 = 36 marks)**	**60**

Course Outcomes (COs)

At the end of the course students should be able to:

	Course Outcome	Bloom's Knowledge Level (KL)
CO1	Recall principles and theorems related to rigid body mechanics and describe the components of forces acting on the rigid body	**K2**
CO2	Understand and apply the principles of friction and compute the centroid and moment of inertia of various composite areas	**K3**
CO3	Understand and apply the fundamental principles of rigid body dynamics in translation and rotation	**K3**
CO4	Understand and solve problems on mechanical vibration	**K3**

Note*: K1- Remember, K2- Understand, K3- Apply, K4- Analyse, K5- Evaluate, K6- Create*

CO-PO Mapping Table:

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

Text Books				
Sl. No	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
1	Engineering Mechanics	Timoshenko and Young	McGraw Hill Publishers	5th Edition 2017
2	Engineering Mechanics: Combined Statics and Dynamics	Russell C. Hibbeler	Pearson Education,	14th Edition 2015
3	Engineering Mechanics - Statics and Dynamics,	Shames, I. H.	Prentice Hall Of India.	4th Edition 2008

Reference Books				
Sl. No	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
1	Engineering Mechanics Statics	J. L. Meriam, L. G.	Wiley	*9th Edition 2020*
2	Engineering Mechanics	Chandramouli	PHI Learning	*2011*

Video Links (NPTEL, SWAYAM…)	
	Link ID
1	https://nptel.ac.in/courses/112106286

PROGRAMMING IN C

Course Code	24SJGXEST204	**CIE Marks**	40
Teaching Hours/Week(L: T:P: R)	3:0:2:0	**ESE Marks**	60
Credits	4	**Exam Hours**	2 Hrs. 30 Min.
Prerequisites (if any)	None	**Course Type**	Theory

Course Objectives:

1. To prepare learner to write versatile C programs for solving computational problems that theycome across in their professional life.
2. To equip the learner to write efficient C programs using suitable language constructs to solvereal world computational problems.

SYLLABUS

Module No.	Syllabus Description	Contact Hours
1	**C Fundamentals -** Character Set, Constants, Identifiers, Keywords, Basic Data types, Variables, Operators and its precedence, Bit-wise operators, Expressions; Statements - Input and Output statements; Structure of a C program; Simple programs. **Control Statements -** if, if-else, nested if, switch, while, do-while, for, break & continue, nested loops.	**9**
2	**Arrays -** Single dimensional arrays, Defining an array, Array initialization, Accessing array elements; Enumerated data type; Type Definition; Two-dimensional arrays – Defining a two-dimensional array; Programs for matrix processing; Programs for sequential search; Bubble sort; **Strings -** Declaring a string variable, Reading and displaying strings, String related library functions – Programs for string matching.	**9**

3	**Functions -** Function definition, Function call, Function prototype, Parameter passing; Recursion; Passing array to function; Macros - Defining and calling macros; Command line Arguments. **Structures -** Defining a Structure variable, Accessing members, Array of structures, Passing structure to function; Union. **Storage Class -** Storage Classes associated with variables: automatic, static, external and register.	**9**
4	**Pointers -** Declaration, Operations on pointers, Passing pointer to a function, Accessing array elements using pointers, Processing strings using pointers, Pointer to pointer, Array of pointers, Pointer to function, Pointer to structure, Dynamic Memory Allocation. **Files-** Different types of files in C, Opening & Closing a file, Writing to and Reading from a file, Processing files, Library functions related to file – fseek(), ftell(), fread(), fwrite().	**9**

Course Assessment Method (CIE: 40 marks, ESE: 60 marks)

Continuous Internal Evaluation Marks (CIE):

Attendance	Assignment/ Microproject	Internal Examination-1 (Written)	Internal Examination- 2 (Written)	Total
5	**15**	**10**	**10**	**40**

End Semester Examination Marks (ESE)

Part A	Part B	Total
• 2 Questions from each module. • Total of 8 Questions, each carrying 3 marks **(8x3 =24marks)**	• Each question carries 9 marks. • Two questions will be given from each module, out of which 1 question should be answered. • Each question can have a maximum of 3 sub divisions. **(4x9 = 36 marks)**	**60**

Course Outcomes (COs)

At the end of the course students should be able to:

Course Outcome		Bloom's Knowledge Level (KL)
CO1	Infer a computational problem and develop C programs from them using basic constructs of C language including the control statements.	**K2**
CO2	Develop C programs using arrays, matrices, and strings.	**K3**
CO3	Utilize functions to find solution to the computational problems by dividing it into a number of modules and abstract data types.	**K3**
CO4	Develop C programs using pointers for dynamic data handling.	**K3**
CO5	Use files in C to permanently store and manipulate data.	**K3**

Note*: K1- Remember, K2- Understand, K3- Apply, K4- Analyse, K5- Evaluate, K6- Create*

CO-PO Mapping Table:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1 0	PO1 1
CO1	3	3	3	3	-	-	-	-	-	-	3
CO2	3	3	3	3	-	-	-	-	-	-	3
CO3	3	3	3	3	-	-	-	-	-	-	3
CO4	3	3	3	3	-	-	-	-	-	-	3
CO5	3	3	3	3	-	-	-	-	-	-	3

Text Books

Sl. No	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
1	Programming with C	Byron S Gottfried	Mc Graw Hill	4/e, 2018
2	Problem Solving and Program Design in C	Jeri R. Hanly, Elliot B. Koffman	Pearson	8/e, 2016

Reference Books				
Sl. No	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
1	The C Programming Language	Brian W. Kernighan and Dennis Ritchie	Pearson	2/e, 2015
2	C The Complete Reference	Herbert Schildt	Mc Graw Hill	4/e, 2017
3	Let us C	Yashavant Kanetkar	BPB Publishers	19/e, 2022
4	Programming in ANSI C	E Balagurusamy	Mc Graw Hill	9/e, 2024

MEASUREMENTS AND INSTRUMENTATION

Course Code	24SJPCEET205	CIE Marks	40
Teaching Hours/Week (L: T:P: R)	3-1-0-0	ESE Marks	60
Credits	4	Exam Hours	2 Hrs. 30 Min.
Prerequisites (if any)	Nil	Course Type	PC -Theory

Course Objectives:

1. To introduce the concepts of electrical measurement systems and instrumentation.
2. To discuss the principles of operation and construction of basic instruments for measuring circuit parameters, magnetic quantities, and passive parameters using bridge circuits, sensors, and transducers.
3. To introduce modern digital instrumentation systems.

SYLLABUS

Module No.	Syllabus Description	Contact Hours
1	Functional Elements of Measurements Systems- Block Schematic and brief operation of building blocks Standards of Measurements- Static characteristics (accuracy, precision, linearity, resolution), Need for calibration, Types of errors Instruments- Classification; Operating Forces and Torques: deflecting, controlling and damping torques- Gravity and spring control; air, fluid friction and eddy current damping. Measurement of Voltage and Current- Moving Coil and Moving Iron types., Range Extension - shunts and multipliers (Include fundamental problems of range extension)	11
2	Magnetic Measurement- Flux Meter, Determination of BH Curve - Hysteresis Loop (Method of Reversal). Measurement of Resistance,	11

	Wheatstone's Bridge, Kelvin's Double Bridge (Basic Problems), Loss of Charge Method, Measurement of Earth Resistance. Measurement of Inductance- Maxwell's Inductance Bridge, Measurement of Capacitance - Schering's Bridge, Measurement of Frequency- Wien Bridge (Include fundamental Problems) Q-meter, LCR Meters (Theory only)	
3	Measurement of Power and Energy: Measurement of Power using Dynamometer type wattmeter, Three phase Power Measurement using Two Wattmeter Method (Include Phasor Diagrams and Expressions, Include basic problems of two wattmeter method) Measurement of Energy Using Induction type Energy Meter, Two Element Energy Meter . Instrument Transformers-CT and PT- Principle of Operation- Range Extension. Basic Principles of Electronic Multimeter, Digital Voltmeter Digital Energy Meter, TOD Meter, Smart Metering, Bidirectional Meters (Theory Only)	11
4	Block Schematic of electronic instrumentation system - role of sensors and transducers Classification of Temperature transducers- Principle of operation of Thermistors and RTD Classification of flow transducers- Principle of operation of Electromagnetic and ultrasonic types Strain gauge: Basic working principle, types and applications; Measurement of angular speed and luminous intensity Principles of Digital Data Acquisition systems - Role of Signal conditioning systems (Basic Principles only)- Phasor Measurement Unit (Block Schematic and Theory Only) CRO, DSO and Harmonic Analyzers: Block Diagram, Basic Principles and applications only Virtual Instrumentation Systems: Block schematic and Description only IOT and Data analytics for Industrial Process- Case study on Smart Grid	11

Course Assessment Method (CIE: 40 marks, ESE: 60 marks)

Continuous Internal Evaluation Marks (CIE):

Attendance	Assignment/ Microproject	Internal Examination- I (Written)	Internal Examination- 2 (Written)	Total
5	15	10	10	40

End Semester Examination Marks (ESE)

PART A	PART B	TOTAL
• 2 Questions from each module. • Total of 8 Questions, each carrying 3 marks • **(8x3 =24marks)**	• Each question carries 9 marks. • Two questions will be given from each module, out of which 1 question should be answered. • Each question can have a maximum of 3 sub divisions. **(4x9 = 36 marks)**	60

Course Outcomes

At the end of the course students should be able to:

Course Outcome		Bloom's Knowledge Level (KL)
CO1	Understand various parameters and errors associated with measuring instruments and methods for measurement of voltage and current.	K2
CO2	Understand suitable methods for the measurement of magnetic quantities, resistance, inductance and capacitance.	K2
CO3	Apply suitable methods for the measurement of power and energy and the operation of digital measurement systems.	K3
CO4	Discuss the applications of modern instrumentation schemes for industrial process and various sensors and transducers in relation to measurements systems.	K2
Note: K1:Remember, K2: Understand, K3:Apply, K4:Analyse, K5: Evaluate , K6:Create		

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

Text Books

SI. No	Title of the Book	Name of the Author/s	Nameofthe Publisher	Edition and Year
1	A course in Electrical and Electronic Measurements & Instrumentation	A.K Sawhney	Dhanpat Rai & Co.	2023
2	A course in Electrical & Electronic Measurement & Instrumentation	J.B. Gupta	S K Kataria & Sons	14th Ed., 2014
3	Electrical Measurements & Measuring Instruments	Golding E.W and Widdis	Wheeler Pub.	3rd Ed.,2011
4	Electronic Instrumentation	H. S. Kalsi	McGraw Hill, New Delhi	4th Ed., 2019
5	Principles of Electrical Measurement	S Tumanski	Taylor & Francis.	2006
6	Electronic Instrumentation and Measurements	David A Bel	Oxford	3rd Ed,, 2013

Ref ere nee Books

SI. No	Title of the Book	Name of the Author/s	Nameofthe Publisher	Edition and Year
1	Modern Electronic Instrumentation and Measurement Techniques	Albert D. Helfrick, Cooper William D	Prentice Hall of India	2016
2	Basic Electrical Measurements	StoutM.B	Prentice Hall	2012
3	Electronic Measurements & Instrumentation	Oliver & Cage	McGraw Hill	2017
4	Doebelin's Measurements Systems	E.O Doebelin and D.N Manik	McGraw Hill Education (India) Pvt. Ltd.	7th Ed., 2019
5	Electrical and Electronics Measurements and Instrumentation	P.Purkait, B.Biswas, S.Das and C. Kaley	McGraw Hill Education (India) Pvt. Ltd.,	2013

Video Links (NPTEL, SWAYAM...)	
Module No.	**Link ID**
1	https://archive.nptel.ac.in/courses/108/105/108105153/ https://archive.nptel.ac.in/courses/108/108/108108147/
2	https://archive.nptel.ac.in/courses/108/105/108105153/
3	https://archive.nptel.ac.in/courses/108/105/108105153/
4	https://archive.nptel.ac.in/courses/108/108/108108147/ https://archive.nptel.ac.in/courses/106/105/106105166/

ENGINEERING ENTREPRENEURSHIP AND IPR

Course Code	24SJICEST206	CIE Marks	60
Teaching Hours/Week (L: T:P: R)	3:0:0:0	ESE Marks	40
Credits	3	Exam Hours	2 Hrs. 30 Min.
Prerequisites (if any)	None	Course Type	Theory

Course Objectives:

- Develop a framework for identifying, curating and validating engineering-based business ideas.
- Learn essential tools for understanding product-market fit and customer needs.
- Develop a comprehensive business plan for a new venture.
- Gain foundational knowledge of Intellectual Property Rights (IPR) and their importance for startups.
- Develop skills for prototyping, stakeholder engagement, and team collaboration.

Course Outcomes (COs)

At the end of the course students should be able to:

	Course Outcome	Bloom's Knowledge Level (KL)
CO1	Gain foundational knowledge of Ideation, Innovation & Entrepreneurship and importance of Intellectual Property Rights (IPR)	K2
CO2	Develop a framework for identifying, curating and validating engineering-based business ideas grounded on customer analysis	K3
CO3	Develop a comprehensive business plan for a new venture by gaining knowledge of essential tools for understanding product-market fit and customer needs and competitor profiling	K3
CO4	Develop skills for prototyping, stakeholder engagement, and team collaboration.	K3

K1- Remember, K2- Understand, K3- Apply, K4- Analyse, K5- Evaluate, K6- Create

CO-PO Mapping:

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

SYLLABUS

Module	Syllabus Description	Contact Hours	CO
1	**Introduction to Ideation, Innovation & Entrepreneurship** • What is Ideation? • Understanding Innovation • Frameworks for Innovation • The Entrepreneurial Mindset • Starting a Business, types formation statutory compliances. • Resources for Aspiring Entrepreneurs **Introduction to Intellectual Property Rights (IPR)** • Types of IPR: Patents, Trademarks, Copyrights, Trade secrets • Strategies for protecting intellectual property based on the type of innovation • Role of IPR in securing funding and competitive advantage **Importance of building a strong team** • Identifying roles • Skill sets • Team dynamics **Identifying Pain Points and problem statement** • Idea Generation Techniques • Developing and Refining Ideas • Develop strategies for bringing your innovation to life	9	1
2	**Problem and solution canvas preparation** • Orientation and canvas introduction • Customer needs assessment • Market segmentation • Value proposition • Competitive analysis • Market entry strategy • Market validation • Regulatory and legal considerations **Customer profiling** • Review of market research • Customer segmentation • Customer profiling • Persona development • Validation and feedback • Prioritisation and selection • Communication and messaging	9	2

3	**Competitor analysis** • Identify competitors • Competitor profiling • SWOT analysis • Market positioning • Customer feedback and reviews • Pricing analysis • Differentiation strategy • Benchmarking and improvement **Business plan preparation** • Business plan framework • Market analysis • Product/Service description • Marketing and sales strategy • Operations plan • Financial projections • Risk management	9	3
4	**Prototype development plan preparation** • Prototype requirements analysis • Technical specifications • Development approach • Development timeline • Resource allocation • Testing and quality assurance • Iterative development and feedback loop • Documentation and version control **Prototype development Stakeholder engagement strategies** • Investors • Partners • Customers • Advisors & Mentors	9	4

Course Assessment Method (CIE: 60 marks, ESE: 40 marks)

Continuous Internal Evaluation Marks (CIE):

Attendance	Micro Project	Internal Exam 1	Internal Exam 2	Total
5	35	10	10	60

Micro project / Comprehensive Business Plan:

The course will be evaluated based on a comprehensive Business Plan Report submitted and prototype development evaluation at the end of the course. The report should integrate learnings and activities from each module, demonstrating a deep understanding of the concepts and your ability to apply them to a chosen engineering venture.

End Semester Examination Marks (ESE)

In Part A, all questions need to be answered and in Part B, each student can choose any one full question out of two questions

Part A	Part B	Total
• 2 Questions from each module. • Total of 8 Questions, each carrying 2 marks **(8x2 =16 marks)**	• Each question carries 6 marks. • 2 questions will be given from each module, out of which 1 question should be answered. • Each question can have a maximum of 2subdivisions. **(4x6 = 24 marks)**	40

Text Books

Sl. No	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
1	Entrepreneurship: Creating and Leading an entrepreneurial Organization	Arya Kumar	Peasrson	1st Edition, 2012
2	The Innovator's DNA	Clayton M. Christensen and Jeffrey H. Dyer	Harvard Business Review Press	Revised edition (June 4, 2019)
3	Start with Why	Simon Sinek	Portfolio	Reprint edition (December 27, 2011)
4	Business Model Generation	Alexander Osterwalder & Yves Pigneur	Wiley	2010
5	Entrepreneurship Development in India	Debasish Biswas and Chanchal Dey	Routledge Focus	1st Edition, 2021
6	Innovation and Entrepreneurship for Engineers	Bharat Bhushan and Seema Bhushan	CRS Press	2016
7	Entrepreneurship The Practice and Mindset	Heidi M. Neck, Christopher P. Neck, Emma L. Murray	SAGE Publishers	1st Edition, 2018
8	Entrepreneurship Development and Small Business Enterprises	Poornima M Charanatimath	Pearson Education	1st Edition, 2006

REFERENCE BOOKS				
1	The Engineering Handbook	Richard C. Dorf	CRC Press	2nd Edn, 2004
2	The Engineering Entrepreneur: A Practical Guide to Starting and Running a Successful Engineering Business in India	Saibal Gupta and Ashok Jhunjhunwala	Sage Publications	2011
3	Patent Law	P. Narayanan	Eastern Law House	4th Edition, 2023
4	The Law of Copyright and Designs	B. L. Wadehra	Universal Law	5th Edn/2010
5	Intellectual Property Rights (Including IPR in the Digital Age)	Prabuddha Ganguli	Tata McGraw-Hill Education	2001
6	The Startup India Manifesto: A Guide to the Indian Startup Ecosystem	Rashmi Bansal and Deepinder Goyal	Westland Publications	2020

HEALTH AND WELLNESS

Course Code	24SJICHWT127	CIE Marks	50
Teaching Hours/Week (L: T:P: R)	1:0:1:0	ESE Marks	0
Credits	1	Exam Hours	Nil
Prerequisites (if any)	None	Course Type	Theory and Practical

Course Objectives:

1. To provide essential knowledge on physical activity, health, and wellness.
2. To ensure students understand body systems, exercise principles, nutrition, mental health, anddisease management.
3. To educate students on the benefits of yoga, the risks of substance abuse and basic first aid skills.
4. To equip students with the ability to lead healthier lifestyles.
5. To enable students to design effective and personalized exercise programs.

SYLLABUS

Module No.	Syllabus Description	Contact Hours
1	Human Body Systems related to Physical activity and its functions: Respiratory System - Cardiovascular System. Musculoskeletal System and the Major Muscle groups of the Human Body. Quantifying Physical Activity Energy Expenditure and Metabolic equivalentof task (MET) Exercise Continuum: Light-intensity physical activity, Moderate -intensity physical activity, Vigorous -intensity physical activity. Defining Physical Activity, Aerobic Physical Activity, Anaerobic Physical Activity, Exercise and Health-Related Physical Fitness. FITT principle to design an Exercise programme Components of Health related Physical Fitness: - Cardiorespiratory Fitness- Muscular strength- Muscular endurance- Flexibility- Body composition.	4

2	Concept of Health and Wellness: Health and wellness differentiation, Factors affecting health and wellness. Mental health and Factors affecting mental health. Sports and Socialization: Sports and character building - Leadership through Physical Activity and Sports Diet and nutrition: Exploring Micro and Macronutrients: Concept of Balanced diet Carbohydrate & the Glycemic Index Animal & Plant - based Proteins and their Effects on Human Health Dietary Fats & their Effects on Human Health Essential Vitamins and Minerals	**2**
3	Lifestyle management strategies to prevent / manage common hypokinetic diseases and disorders - Obesity - Cardiovascular diseases (e.g., coronary artery disease, hypertension) - Diabetes - Osteoporosis - Musculoskeletal disorders (e.g., osteoarthritis, Low back pain, Kyphosis, lordosis, flat foot, Knock knee) Meaning, Aims and objectives of yoga - Classification and importance of Yogic Asanas (Sitting, Standing, lying) Pranayama and Its Types - Active Lifestyle and Stress Management Through Yoga Understanding on substance abuse and addiction - Psychoactive substances & its ill effects- Alcohol- Opioids- Cannabis -Sedative - Cocaine -Other stimulants, including caffeine -Hallucinogens - Tobacco -Volatile solvents.	**4**
4	First aid and principles of First Aid: Primary survey: ABC (Airway, Breathing, Circulation). Qualities of a Good First Aider First aid measures for: - Cuts and scrapes - Bruises - Sprains - Strains - Fractures - Burns - Nosebleeds. First Aid Procedures: Cardiopulmonary Resuscitation (CPR) - Heimlich Maneuver - Applying a sling Sports injuries: Classification (Soft Tissue Injuries - Abrasion, Contusion, Laceration, Incision, Sprain & Strain)	**2**

Additional Topics

- Need and Importance of Physical Education and its relevance in interdisciplinary context.Understanding of the Endocrine System
- Developing a fitness profile
- Healthy foods habits for prevention and progression of Lifestyle Diseases. Processed foodsand unhealthy eating habits.
- Depression - Anxiety - Stress
- Different ways of carrying an injured person. Usage of Automated external defibrillator

Course Assessment Method (CIE: 50 marks)

Continuous Internal Evaluation Marks (CIE):

Attendance	Case Study/Micro project/Presentation	Activity evaluation	Total
10	20	20	50

Course Outcomes (COs)

At the end of the course students should be able to:

	Course Outcome	Bloom's KnowledgeLevel (KL)
CO1	Explain the different human body systems and describe various types of physical activities along with methods to measure andquantify these activities.	K2
CO2	Explain how to maintain or improve health and wellness through psychological practices, dietary habits, and sports activities.	K2
CO3	Discuss about common hypokinetic disorders and musculoskeletal disorders, and describe the importance of leading a healthy lifestyle through the practice of yoga and abstaining from addictive substances.	K2
CO4	Explain the basics of first aid and describe common sportsinjuries	K2

Note*: K1- Remember, K2- Understand, K3- Apply, K4- Analyse, K5- Evaluate, K6- Create*

CO-PO Mapping Table:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1				2		3	3	3	2		2
CO2				2		3	2	2			2
CO3				0		3	3				2
CO4				2		3					2

Text Books				
Sl. No	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
1	Foundations of Nutrition	Bhavana Sabarwal	Commonwealth Publishers	1999
2	Anatomy and physiology in health and illness.	Ross and Wilson	Waugh, A., & Grant, A.	2022

Reference Books				
Sl. No	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
1	Fit to be Well Essential Concept	Thygerson, A. L., Thygerson, S. M., & Thygerson, J. S.	Jones & Bartlett Learning.	2018
2	Introduction to physical education, fitness, and sport.	Siedentop, D., & Van der Mars, H.	Human kinetics.	2022
3	Substance Use Disorders. Manual for Physicians.	Lal, R., & Ambekar, A. (2005).	National Drug Dependence Treatment Centre, NewDelhi	2005
4	The exercise health connection-how to reduce your risk of disease and other illnesses by making exercise your medicine.	Nieman, D. C., & White, J. A	Public Health	1998
5	ACSM's resource manual for guidelines for exercise testing and prescription.	Lippincott Williams& Wilkins.	American College of Sports Medicine.	2012

6	Exercise Physiology: energy, nutrition and human performance.	Katch, F. I., Katch, V. L., & McArdle, W. D.	Lippincott Williams & Wilkins	2010

Continuous Internal Evaluation Marks (CIE): for the Health and Wellness

Students will be evaluated as follows.

Title	Method of Evaluation
Attendance	Students must attend at least 75% of both theory and practical classes. They will receive 10 marks based on their class attendance. Students who do not meet the minimum attendance requirement for a course, as specified in the B. Tech regulations, will not be eligible to proceed to the next criteria.
Assignment / Presentation	Assignments will be given to students to assess their understanding of the subjects taught. Students will be required to make presentations on the subjects taught in class, and their understanding of the subjects will be assessed. Based on the Assignments and Presentations the students will be awarded marks out of 20
Activity Evaluation	The Assignment / Presentation faculty handling the class will use the tests from the Fitness Protocols and Guidelines for ages 18+ to 65 years, as set forth by FIT India. Measurements will be taken for all the tests of the FIT India Fitness Protocol and the evaluation will be based on the benchmark score received for the following tests: 1. V Sit Reach Test 2. Partial Curl Up - 30 seconds 3. Push Ups (Male) and Modified Push Up (Female) 4. Two (2) Km Run/Walk Students who achieve a total benchmark score of 8 across the aforementioned 4 tests will be awarded pass marks for activity evaluation. Students who score better will be awarded a maximum mark of 20.
Activity Evaluation - Special Circumstances	Physically challenged and medically unfit students can opt for an objective test to demonstrate their knowledge of the subjects taught. Based on their performance in the objective test, they will be awarded marks out of 20.
Activity Evaluation - Special Considerations - NCC	Students who enrolled themselves in the NCC during the course period (between the start and end dates of the program) and attended 5 college level parades will be awarded pass marks for activity evaluation. Students who attend more parades will be eligible for a maximum mark of 20 based on their parade attendance.

Tests to evaluated as per Benchmark Scores of V Sit Reach Test and Benchmark Scores

V Sit Reach Test

How to Perform:

1. The subject removes their shoes and sits on the floor with the measuring line between their legs and the soles of their feet placed immediately behind the baseline, heels 8-12" apart.
2. The thumbs are clasped so that hands are together, palms facing down and placed on the measuring line.
3. With the legs held flat by a partner, the subject slowly reaches forward as far as possible, keeping the fingers on baseline and feet flexed.
4. After three tries, the student holds the fourth reach for three seconds while that distance is recorded.
5. Make sure there are no jerky movements, and that the fingertips remain level and the legs flat.

Infrastructure/Equipment Required:

1. A tape for marking the ground, marker pen, and ruler.
2. With the tape mark a straight line two feet long on the floor as the baseline, and a measurement line perpendicular to the midpoint of the baseline extending two feet on each side.
3. Use the marker pen to indicate every centimeter and millimeter along the measurement line. The point where the baseline and the measuring line intersect is the zero point.
4. Scoring: The score is recorded in centimeters and millimeters as the distance reached by the hand, which is the difference between the zero point (where the baseline and measuring line intersect) andthe final position.

Scoring for V Sit Reach Test for Males

Level	Benchmark Score	Measurement (cm)
1	2	<11
2	4	12-13
3	6	14-17
4	7	18-19
5	8	20-21
6	9	22
7	10	>22

Scoring for V Sit Reach Test for Females

Level	Benchmark Score	Measurement (cm)
1	2	<14
2	4	15-16
3	6	17-19
4	7	20-21
5	8	22
6	9	23
7	10	>23

Partial Curl Up - 30 secondsHow to Perform:

1. The subject lies on a cushioned, flat, clean surface with knees flexed, usually at 90 degrees, with hands straight on the sides (palms facing downwards) closer to the ground, parallel to thebody.
2. The subject raises the trunk in a smooth motion, keeping the arms in position, curling upthe desired amount (at least 6 inches above/along the ground towards the parallel strip).
3. The trunk is lowered back to the floor so that the shoulder blades or upper back touch thefloor.

Flat clean cushioned surface with two parallel strips (6 inches apart), Stopwatch

Scoring: Record the maximum number of Curl ups in a certain time period 30 seconds.

Scoring for Partial Curl Up - 30 seconds Test for Males

Level	Benchmark Score	Numbers
1	2	<25
2	4	25-30
3	6	31-34
4	7	35-38
5	8	39-43
6	9	44-49
7	10	>49

Scoring for Partial Curl Up - 30 seconds Test for Females

Level	Benchmark Score	Numbers

1	2	**<18**
2	4	18-24
3	6	25-28
4	7	29-32
5	8	33-36
6	9	37-43
7	10	>43

Push Ups for Male/Modified Push

Ups for Female How to Perform:

1. A standard push up begins with the hands and toes touching the floor, the body and legs in a straight line, feet slightly apart, the arms at shoulder width apart, extended and at a right angle to the body.
2. Keeping the back and knees straight, the subject lowers the body to a predetermined point, to touch some other object, or until there is a 90-degree angle at the elbows, then returns back to the starting position with the arms extended.
3. This action is repeated, and the test continues until exhaustion, or until they can do no more in rhythm or have reached the target number of push-ups.
4. For Female: push-up technique is with the knees resting on the ground.

Flat clean cushioned surface/Gym mat

Scoring: Record number of correctly completed pushups.

Scoring for Push Ups for Male

Level	Benchmark Score	Numbers
1	2	<4
2	4	04- 10
3	6	11 -18
4	7	19-34
5	8	35-46
6	9	47-56
7	10	>56

Scoring for Modified Push Ups for Female

Level	Benchmark Score	Numbers
1	2	0-1
2	4	2 - 5
3	6	6 -10
4	7	11 - 20
5	8	21-27
6	9	27-35

7	10	>35

2 Km Run/WalkHow to Perform:

1. Participants are instructed to run or walk 2 kms in the fastest possible pace.
2. The participants begin on signal (Starting point)- "ready, start". As they cross the finish line, elapsed time should be announced to the participants.
3. Walking is permitted but the objective is to cover the distance in the shortest possible time.

Infrastructure/Equipment Required:

Stopwatch, whistle, marker cone, lime powder,measuring tape, 200 or 400 m with 1.22 m (minimum 1 m) width preferably on a flat and even playground with a marking of starting and finish line. You can also use any application on your mobile phone that tells you the distance.

Scoring: Time taken for completion (Run or Walk) in min, sec.

Scoring for 2Km Run/walk for Male

Level	Benchmark Score	Minutes : Seconds
1	2	> 11:50
2	4	10:42
3	6	09:44
4	7	08:59
5	8	08:33
6	9	07:37
7	10	>07:37

Scoring for 2Km Run/walk for Female

Level	Benchmark Score	Minutes: Seconds
1	2	>13:47
2	4	12:51
3	6	12:00
4	7	11:34
5	8	10:42
6	9	09:45
7	10	>09:45

IT WORKSHOP

Course Code	**24SJGXESL208**	**CIE Marks**	50
Teaching Hours/Week(L: T:P: R)	0:0:2:0	**ESE Marks**	50
Credits	1	**Exam Hours**	2 Hrs. 30 Min.
Prerequisites (if any)	None	**Course Type**	Lab

Course Objectives:

1. To provide a basic understanding about computer hardware, software, and computernetwork.
2. To familiarize the learner with the web development process using HTML, CSS, and JavaScript.

Details of Experiments

Expt. No	Experiment (Minimum 10 Experiments)
1	Practice Computer Hardware – Familiarization CPU Box, Motherboard, CPU & Chip-set, Interface cards, Card slots, Hard disk, Cables, SMPS, NIC, Various ports, etc. Computer Peripherals - I/O Devices. Storage devices, Interface cards – Buses – Firmware
2	Familiarization of Boot process
3	Familiarizing installation of Linux and Windows operating systems
4	Familiarizing basic Unix/Linux commands - ls, mkdir, cp, mv, grep, rmdir, chmod, useradd, passwd, history, dmesg, cpuinfo, uname, du, time, write, fdisk
5	Familiarizing networking hardware - RJ45, UTP, fibre, switch, NIC, router, Wireless Access Point (WAP), modem
6	Familiarizing basic networking commands - ifconfig, ping, traceroute, nslookup, ssh, scp, telnet, ftp
7	View network traffic using Wireshark/Packet tracer

8	Familiarizing the steps how to configure and establishing a network connecting
9	Shell programming in Linux(bash)
10	Create a web page and deploy on a local web server.
11	Use JavaScript to validate forms.
12	Create an image slider using HTML, CSS, and JavaScript. Allow users to navigate between images using previous and next buttons.
13	Familiarisation of LaTeX - Basic only
14	Familiarisation of Development Environments - Visual studio code, Sublime Text, Atom
15	Introducing Repositories - Git / Bitbucket

Course Assessment Method (CIE: 50 Marks, ESE: 50 Marks)

Continuous Internal Evaluation Marks (CIE):

Attendance	Preparation/Pre-Lab Work, experiments, Viva and Timely completion of Lab Reports / Record. (Continuous Assessment)	Internal Exam	Total
5	25	20	50

End Semester Examination Marks (ESE):

Procedure/ Preparatory work/Design/ Algorithm	Conduct of experiment/ Execution of work/ troubleshooting/ Programming	Result with valid inference/ Quality of Output	Viva voce	Record	Total
10	15	10	10	5	50

Mandatory requirements for ESE:

- Submission of Record: Students shall be allowed for the end semester examination only upon submitting the duly certified record.

Course Outcomes (COs)

At the end of the course the student will be able to:

Course Outcome		Bloom's Knowledge Level (KL)
CO1	Experiment with the fundamental hardware components of a computer and how to interface them with software systems.	**K3**
CO2	Make use of the command line of Linux operating system and shell programming.	**K3**
CO3	Experiment with the data network communication scenarios using Wireshark.	**K3**
CO4	Develop basic websites using HTML, CSS & JavaScript and manage the versions.	**K3**

K1- Remember, K2- Understand, K3- Apply, K4- Analyse, K5- Evaluate, K6- Create

CO-PO Mapping Table

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	3	3		3						3
CO2	3	3	3	3	3						3
CO3	3	3	3	3	3						3
CO4	3	3	3	3	3						3

1: Slight (Low),2: Moderate (Medium),3: Substantial (High), : No Correlation

Text Books				
Sl. No	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
1	Invitation to Computer Science	G. Michael Schneider, Judith Gersting	Cengage	2/e, 2020
2	LINUX for Developers: Jumpstart Your Linux Programming Skills	William Rothwell	Pearson	1/e, 2018
3	HTML, CSS, and JavaScript -All in One, Sams Teach Yourself	Julie C. Meloni Jennifer Kyrnin	Pearson	1/e, 2018

Reference Books				
Sl. No	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
1	The Architecture of Computer Hardware, Systems Software, & Networking: An Information Technology Approach	Irv Englander	Wiley	5/e, 2014
2	Mastering Git : Attain expert level proficiency with Git for enhanced productivity and efficient collaboration	Jakub Narębski	Packt	1/e, 2016
3	Web Design with HTML, CSS, JavaScript, and Jquery.	Jon Duckett	Wiley	1/e, 2014

Video Links (NPTEL, SWAYAM…)	
Sl. No.	**Link ID**
1	https://overthewire.org/wargames/bandit/
2	https://www.w3schools.com/

Continuous Assessment (25 Marks)

1. **Preparation and Pre-Lab Work (7 Marks)**

   - Pre-Lab Assignments: Assessment of pre-lab assignments or quizzes that test understanding of the upcoming experiment.
   - Understanding of Theory: Evaluation based on students' preparation and understanding of the theoretical background related to the experiments.

2. **Conduct of Experiments (7 Marks)**

   - Procedure and Execution: Adherence to correct procedures, accurate execution ofexperiments, and following safety protocols.
   - Skill Proficiency: Proficiency in handling equipment, accuracy in observations, and troubleshooting skills during the experiments.
   - Teamwork: Collaboration and participation in group experiments.

3. **Lab Reports and Record Keeping (6 Marks)**

   - Quality of Reports: Clarity, completeness and accuracy of lab reports. Proper documentation of experiments, data analysis and conclusions.

- Timely Submission: Adhering to deadlines for submitting lab reports/rough recordand maintaining a well-organized fair record.

4. Viva Voce (5 Marks)

- Oral Examination: Ability to explain the experiment, results and underlyingprinciples during a viva voce session.

Final Marks Averaging: The final marks for preparation, conduct of experiments, viva, andrecord are the average of all the specified experiments in the syllabus.

Evaluation Pattern for End Semester Examination (50 Marks)

1. Procedure/Preliminary Work/Design/Algorithm (10 Marks)

- Procedure Understanding and Description: Clarity in explaining the procedure andunderstanding each step involved.
- Preliminary Work and Planning: Thoroughness in planning and organizing materials/equipment.
- Algorithm Development: Correctness and efficiency of the algorithm related tothe experiment.
- Creativity and logic in algorithm or experimental design.

2. Conduct of Experiment/Execution of Work/Programming (15 Marks)

- Setup and Execution: Proper setup and accurate execution of the experiment orprogramming task.

3. Result with Valid Inference/Quality of Output (10 Marks)

- Accuracy of Results: Precision and correctness of the obtained results.
- Analysis and Interpretation: Validity of inferences drawn from the experiment orquality of program output.

4. Viva Voce (10 Marks)

- Ability to explain the experiment, procedure results and answer related questions
- Proficiency in answering questions related to theoretical and practical aspects ofthe subject.

5. Record (5 Marks)

- Completeness, clarity, and accuracy of the lab record submitted.

Programme Outcomes (POs)

PO1: Engineering Knowledge: Apply knowledge of mathematics, natural science, computing, engineering fundamentals and an engineering specialization as specified in WK1 to WK4 respectively to develop to the solution of complex engineering problems.

PO2: Problem Analysis: Identify, formulate, review research literature and analyse complex engineering problems reaching substantiated conclusions with consideration for sustainable development. (WK1 to WK4)

PO3: Design/Development of Solutions: Design creative solutions for complex engineering problems and design/develop systems/components/processes to meet identified needs with consideration for the public health and safety, whole-life cost, net zero carbon, culture, society and environment as required. (WK5)

PO4: Conduct Investigations of Complex Problems: Conduct investigations of complex engineering problems using research-based knowledge including design of experiments, modelling, analysis & interpretation of data to provide valid conclusions. (WK8).

PO5: Engineering Tool Usage: Create, select and apply appropriate techniques, resources and modern engineering & IT tools, including prediction and modelling recognizing their limitations to solve complex engineering problems. (WK2 and WK6)

PO6: The Engineer and The World: Analyse and evaluate societal and environmental aspects while solving complex engineering problems for its impact on sustainability with reference to economy, health, safety, legal framework, culture and environment. (WK1, WK5, and WK7).

PO7: Ethics: Apply ethical principles and commit to professional ethics, human values, diversity and inclusion; adhere to national & international laws. (WK9)

PO8: Individual and Collaborative Team work: Function effectively as an individual, and as a member or leader in diverse/multi-disciplinary teams.

PO9: Communication: Communicate effectively and inclusively within the engineering community and society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentation considering cultural, language, and learning differences.

PO10: Project Management and Finance: Apply knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, and to manage projects and in multidisciplinary environments.

PO11: Life-Long Learning: Recognize the need for, and have the preparation and ability for i) independent and life-long learning ii) adaptability to new and emerging technologies and iii) critical thinking in the broadest context of technological change. (WK8)

Knowledge and Attitude Profile (WK)

WK1: A systematic, theory-based understanding of the natural sciences applicable to the discipline and awareness of relevant social sciences.

WK2: Conceptually-based mathematics, numerical analysis, data analysis, statistics and formal aspects of computer and information science to support detailed analysis and modelling applicable to the discipline.

WK3: A systematic, theory-based formulation of engineering fundamentals required in the engineering discipline.

WK4: Engineering specialist knowledge that provides theoretical frameworks and bodies of knowledge for the accepted practice areas in the engineering discipline; much is at the forefront of the discipline.

WK5: Knowledge, including efficient resource use, environmental impacts, whole-life cost, re-use of resources, net zero carbon, and similar concepts, that supports engineering design and operations in a practice area.

WK6: Knowledge of engineering practice (technology) in the practice areas in the engineering discipline.

WK7: Knowledge of the role of engineering in society and identified issues in engineering practice in the discipline, such as the professional responsibility of an engineer to public safety and sustainable development.

WK8: Engagement with selected knowledge in the current research literature of the discipline, awareness of the power of critical thinking and creative approaches to evaluate emerging issues.

WK9: Ethics, inclusive behaviour and conduct. Knowledge of professional ethics, responsibilities, and norms of engineering practice. Awareness of the need for diversity by reason of ethnicity, gender, age, physical ability etc. with mutual understanding and respect, and of inclusive attitudes.

Department of Electrical and Electronics Engineering

Vision

Develop technically competent, emotionally strong and socially committed Electrical & Electronics Engineering professionals of international excellence.

Mission

- To develop and maintain a conducive infrastructure and learning-environment, to bring out good quality Electrical & Electronics Engineering graduates.
- To appoint and retain a team of competent, dedicated and research-oriented faculty.
- To inculcate ethical & moral values among students and faculty.

Program Specific Outcomes (PSOs):

Graduates of the program will be able to:

- Apply knowledge of mathematics, science and engineering to design, commission and maintain various types of electrical systems and address challenges in the field.
- Derive sustainable solutions to complex electrical engineering problems that meet the specified needs with ethical, social and environmental considerations.
- Empower the students for lifelong learning so as to adapt to dynamic changes in Electrical Engineering.

ST. JOSEPH'S
COLLEGE OF ENGINEERING AND TECHNOLOGY, - PALAI -
AUTONOMOUS

Vision

Developing into a world class, pace setting institute of Engineering and Technology with distinct identity and character, meeting the goals and aspirations of the society.

Mission

- To maintain a conducive infrastructure and learning environment for world class education.
- To nurture a team of dedicated, competent and research-oriented faculty.
- To develop students with moral and ethical values, for their successful careers, by offering variety of programs and services.