

Academic Program: UG

Academic Year 2022-23

I & II Semester B.E.

Syllabus

Under NEP 2020

Stream : Electrical & Electronics Engineering

Branch: Electronics and Communication Engineering



**SHRI DHARMASTHALA MANJUNATHESHWARA
COLLEGE OF ENGINEERING & TECHNOLOGY,
DHARWAD – 580 002**

**(An Autonomous Institute Approved by AICTE & Affiliated to VTU, Belagavi
Accredited by NBA under Tier-1(July 2018-June 2021))**

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Web: www.sdmcet.ac.in

SDMCET: Syllabus

SDM College of Engineering & Technology, Dharwad

It is certified that the scheme and syllabus for I & II semester B.E. in Electronics and Communication Engineering is recommended by the Board of Studies of Electronics and Communication Engineering Department and approved by the Academic Council, SDM College of Engineering & Technology, Dharwad. This scheme and syllabus will be in force from the academic year 2022-23 till further revision.

Chairman BOS & HOD

Principal

SDMCET: Syllabus

SDM College of Engineering & Technology, Dharwad-02

Department of Electronics & Communication Engineering

College – Vision and Mission

VISION:

To develop competent professionals with human values

MISSION:

1. To have contextually relevant Curricula.
2. To promote effective Teaching Learning Practices supported by Modern Educational Tools and Techniques.
3. To enhance Research Culture.
4. To involve Industrial Expertise for connecting classroom content to real life situations.
5. To inculcate Ethics and impart soft-skills leading to overall Personality Development.

SDMCET- Quality Policy

- In its quest to be a role model institution, committed to meet or exceed the utmost interest of all the stake holders.

SDMCET- Core Values

- Competency
- Commitment
- Equity
- Team work and
- Trust

Department- Vision and Mission**Vision**

Fostering excellence in the field of Electronics & Communication Engineering, showcasing innovation, research and performance with continuous Industry – Institute Interaction with the blend of Human values.

Mission

M1: To provide quality education in the domain of Electronics & Communication Engineering through state of the art curriculum, effective teaching learning process and the best of laboratory facilities.

M2: To encourage innovation, research culture and team work among students.

M3: Interact and work closely with industries and research organizations to accomplish knowledge at par.

M4: To train the students for attaining leadership with ethical values in developing and applying technology for the betterment of society and sustaining the global environment.

Program Educational Objectives (PEOs)

The Graduates, after a few years of Graduation will be able to:

- I. **Apply** the latest in-depth knowledge in the field of Electronics and Communication Engineering with Mathematical applications to address real life challenges.
- II. **Exhibit** the confidence for independent working and / or spirit to work cohesively with group.
- III. **Readily** be accepted by the Industry globally.
- IV. **Develop** design skills, fault diagnosis skills, communication skills and create research orientation.
- V. **Inculcate** professional, social ethics and to possess awareness regarding societal responsibility, moral and safety related issues

Programme Outcomes (POs):

Engineering Graduates will be able to:

1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

3. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES (PSOs)

13. Design economically and technically sound analog and / or digital systems based on the principles of signal processing, VLSI and communication Engineering (PO-13)
14. Integrate hardware – software, and apply programming practices to realize the solutions in electronics domain. (PO-14).

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Scheme of Teaching and Examinations-2022

Outcome-Based Education(OBE)and Choice Based Credit System(CBCS) (Effective from the academic year 2022-23)

Stream: Electrical and Electronics Engineering

Branch: Electronics and Communication Engineering

I Semester

(For Physics Group)

Sl. No	Course	Course Code	Course Title	TD/PSB	Teaching Hours/Week				Examination				Credits
					Theory/ Lecture	Tutorial	Practical/ Drawing	SDA	Duration in hours	CIE Marks	SEE Marks	Total Marks	
1	ASC(IC)	22MATE11	Mathematics for EEE Streams-I	Maths	2	2	2	0	3	50	50	100	4
2	ASC(IC)	22PHYE12	Physics for EEE Stream	PHY	2	2	2	0	3	50	50	100	4
3	ESC	22BEE13	Basic Electronics	ECE	2	2	0	0	3	50	50	100	3
4	ESC-I	22ESC144	Introduction to Mechanical Engineering	MECH	3	0	0	0	3	50	50	100	3
5	ETC-I	22ETC15H	Introduction to Internet of Things (IOT)	ECE	3	0	0	0	3	50	50	100	3
6	AEC	22ENG16	Communicative English	Humanities	1	0	0	0	1	50	50	100	1
7	HSMC	22KSK17/ 22KKBK17	Samskrutika Kannada/Balake Kannada	Humanities	1	0	0	0	1	50	50	100	1
8	AEC/SDC	22IDT18	Innovation and Design Thinking	ECE Dept.	1	0	0	0	1	50	50	100	1
				TOTAL						400	400	800	20

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Scheme of Teaching and Examinations-2022

Outcome-Based Education(OBE) and Choice Based Credit System(CBCS) (Effective from the academic year 2022-23)

Stream: Electrical and Electronics Engineering

Branch: Electronics and Communication Engineering

II Semester

(For Chemistry Group)

Sl. No	Course	Course Code	Course Title	TD/PSB	Teaching Hours/Week				Examination			Credits	
					Theory/ Lecture	Tutorial	Practical/ Drawing	SDA	Duration in hours	CIE Marks	SEE Marks		Total Marks
1	ASC(IC)	22MATE21	Mathematics for EES-II	Maths	2	2	2	0	3	50	50	100	4
2	ASC(IC)	22CHEE22	Chemistry for EES	Chemistry	2	2	2	0	3	50	50	100	4
3	ESC	22CED23	Computer-Aided Engineering Drawing	Mechanical	2	0	2	0	3	50	50	100	3
4	ESC-I	22ESC242	Introduction to Electrical Engineering	EEE	3	0	0	0	3	50	50	100	3
5	PLC-I	22PLC25B	Introduction to Python Programming	ECE	2	0	2	0	3	50	50	100	3
6	AEC	22PWS26	Professional Writing Skills in English	Humanities	1	0	0	0	1	50	50	100	1
7	HSMS	22ICO27	Indian Constitution	Humanities	1	0	0	0	1	50	50	100	1
8	HSMS	22SFH28	Scientific Foundations of Health	EEE	1	0	0	0	1	50	50	100	1
				TOTAL						400	400	800	20

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I Semester

Course Title:	MATHEMATICS-I FOR ELECTRICAL & ELECTRONICS ENGINEERING STREAM		
Course Code:	22MATE11	CIE Marks	50
Course Type (Theory/Practical/Integrated)	Integrated	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P: S)	2:2:2:0	Exam Hours	03
Total Hours of Pedagogy	40 hours Theory + 10 to 12 Lab Sessions	Credits	04

Course objectives: The goal of the course **Mathematics-I for Electrical & Electronics Engineering Stream (22MATE11)** is to

- **Familiarize** the importance of calculus associated with one variable and multivariable for computer science and engineering.
- **Analyze** computer science and engineering problems by applying Ordinary Differential Equations.
- **Apply** the knowledge of modular arithmetic to computer algorithms.
- **Develop** the knowledge of Linear Algebra to solve the system of equations.

Module-1 Calculus (8 hours)

Introduction to polar coordinates and curvature relating to EC & EE Engineering applications. Polar coordinates, Polar curves, angle between the radius vector and the tangent, angle between two curves. Pedal equations. Curvature and Radius of curvature - Cartesian, Parametric, Polar and Pedal forms. Problems.

Self-study: Center and circle of curvature, evolutes and involutes.

Applications: Communication signals, Manufacturing of microphones, and Image processing.
(RBT Levels: L1, L2 and L3)

Module-2 Series Expansion and Multivariable Calculus (8 hours)

Introduction of series expansion and partial differentiation in EC & EE Engineering applications.

Taylor's and Maclaurin's series expansion for one variable (Statement only) – problems. Indeterminate forms - L'Hospital's rule - Problems.

Partial differentiation, total derivative - differentiation of composite functions. Jacobian and problems. Maxima and minima for a function of two variables. Problems.

Self-study: Euler's Theorem and problems. Method of Lagrange's undetermined multipliers with single constraint.

Applications: Series expansion in communication signals, Errors and approximations, and vector calculus.

(RBT Levels: L1, L2 and L3)

Module-3 Ordinary Differential Equations (ODEs) of first order (8 hours)

Introduction to first-order ordinary differential equations pertaining to the applications for EC & EE engineering.

Linear and Bernoulli's differential equations. Exact and reducible to exact differential equations - Integrating factors on $\frac{1}{N} \left(\frac{\partial M}{\partial y} - \frac{\partial N}{\partial x} \right)$ and $\frac{1}{M} \left(\frac{\partial N}{\partial x} - \frac{\partial M}{\partial y} \right)$. Orthogonal trajectories, L-R and C-R circuits.

Problems.

Non-linear differential equations: Introduction to general and singular solutions, Solvable for p only, Clairaut's equations, reducible to Clairaut's equations. Problems.

Self-Study: Applications of ODEs, Solvable for x and y .

Applications of ordinary differential equations: Rate of Growth or Decay, Conduction of heat.
(RBT Levels: L1, L2 and L3)

Module-4 Integral Calculus (8 hours)

Introduction to Integral Calculus in EC & EE Engineering applications.

Multiple Integrals: Evaluation of double and triple integrals, evaluation of double integrals by change of order of integration, changing into polar coordinates. Applications to find Area and Volume by double integral. Problems.

Beta and Gamma functions: Definitions, properties, relation between Beta and Gamma functions. Problems.

Self-Study: Volume by triple integration, Center of gravity.

Applications: Antenna and wave propagation, Calculation of optimum power in electrical circuits, field theory.

(RBT Levels: L1, L2 and L3)

Module-5 Linear Algebra (8 hours)

Introduction of linear algebra related to EC & EE engineering applications.

Elementary row transformation of a matrix, Rank of a matrix. Consistency and Solution of system of linear equations - Gauss-elimination method, Gauss-Jordan method and approximate solution by Gauss-Seidel method. Eigenvalues and Eigenvectors, Rayleigh's power method to find the dominant Eigenvalue and Eigenvector.

Self-Study: Solution of system of equations by Gauss-Jacobi iterative method. Inverse of a square matrix by Cayley- Hamilton theorem

Applications of Linear Algebra: Network Analysis, Markov Analysis, Critical point of a network system. Optimum solution.

(RBT Levels: L1, L2 and L3)

List of Laboratory experiments (2 hours/week per batch/ batch strength 15)10

lab sessions + 1 repetition class + 1 Lab Assessment

1	2D plots for Cartesian and polar curves
2	Finding angle between polar curves, curvature and radius of curvature of a given curve
3	Finding partial derivatives, Jacobian and plotting the graph
4	Applications to Maxima and Minima of two variables
5	Solution of first-order differential equation and plotting the graphs
6	Program to compute area, volume and centre of gravity
7	Evaluation of improper integrals
8	Numerical solution of system of linear equations, test for consistency & graphical representation
9	Solution of system of linear equations using Gauss-Seidel iteration
10	Compute eigenvalues and eigenvectors and find the largest and smallest eigenvalue by Rayleigh power method.

Suggested software's: Mathematica/MatLab/Python/Scilab

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Suggested Learning Resources:

Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)

Text Books

1. **B. S. Grewal:** “Higher Engineering Mathematics”, Khanna publishers, 44th Ed., 2021.
2. **E. Kreyszig:** “Advanced Engineering Mathematics”, John Wiley & Sons, 10th Ed., 2018.

Reference Books

1. **Ramana:** “Higher Engineering Mathematics” McGraw-Hill Education, 11th Ed., 2017
2. **Srimanta Pal & Subodh C. Bhunia:** “Engineering Mathematics” Oxford University Press, 3rd Ed., 2016.
3. **N.P Bali and Manish Goyal:** “A textbook of Engineering Mathematics” Laxmi Publications, 10th Ed., 2022.
4. **C. Ray Wylie, Louis C. Barrett:** “Advanced Engineering Mathematics” McGraw – Hill Book Co., Newyork, 6th Ed., 2017.
5. **Gupta C.B, Sing S.R and Mukesh Kumar:** “Engineering Mathematic for Semester I and II”, Mc-Graw Hill Education(India) Pvt. Ltd 2015.
6. **H. K. Dass and Er. Rajnish Verma:** “Higher Engineering Mathematics” S. ChandPublication, 3rd Ed., 2014.
7. **James Stewart:** “Calculus” Cengage Publications, 7th Ed., 2019.
8. **David C Lay:** “Linear Algebra and its Applications”, Pearson Publishers, 4th Ed., 2018.
9. **Gareth Williams:** “Linear Algebra with applications”, Jones Bartlett Publishers Inc., 6thEd., 2017.

Web links and Video Lectures (e-Resources):

- <http://nptel.ac.in/courses.php?disciplineID=111>
- [http://www.class-central.com/subject/math\(MOOCs\)](http://www.class-central.com/subject/math(MOOCs))
- <http://academicearth.org/>
- VTU e-Shikshana Program
- VTU EDUSAT Program

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

- Quizzes
- Assignments
- Seminar

Course outcome (Course Skill Set)

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

CO1	apply the knowledge of calculus to solve problems related to polar curves and learn the notion of partial differentiation to compute rate of change of multivariate functions
CO2	analyze the solution of linear and nonlinear ordinary differential equations
CO3	apply the concept of change of order of integration and variables to evaluate multiple integrals and their usage in computing area and volume
CO4	make use of matrix theory for solving for system of linear equations and compute eigenvalues and eigenvectors
CO5	familiarize with modern mathematical tools namely MATHEMATICA/ MATLAB/ PYTHON/SCILAB

COs and POs Mapping (Individual teacher has to fill up)

Cos/ POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12
CO1	1	1										1
CO2	1	1										1

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CO3	1	1										1
CO4	2	2										1
CO5	1	1										1

Level 3- Highly Mapped, Level 2-Moderately Mapped, Level 1-Low Mapped, Level 0- Not Mapped

Course Title:	PHYSICS FOR ELECTRICAL & ELECTRONICS ENGINEERING STREAM		
Course Code:	22PHYE12	CIE Marks	50
Course Type (Theory/Practical/Integrated)	Integrated	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P: S)	2:2:2:0	Exam Hours	03
Total Hours of Pedagogy	40 hours+10-12 Lab Sessions	Credits	04

Course objectives

- To study the principles of quantum mechanics
- To understand the properties of dielectrics and superconductors
- To study the essentials of photonics for engineering applications.
- To understand the fundamentals of vector calculus and EM waves.
- To study the knowledge about semiconductors and devices.

Module-1 (08 Hours)

Quantum Mechanics:

de Broglie Hypothesis and Matter Waves, de Broglie wavelength and derivation of expression by analogy, Phase Velocity and Group Velocity, Heisenberg's Uncertainty Principle and its application (Non-existence of electron inside the nucleus-Non Relativistic), Principle of Complementarity, Wave Function, Time independent Schrodinger wave equation, Physical Significance of a wave function and Born Interpretation, Expectation value, Eigen functions and Eigen Values, Particle inside one-dimensional infinite potential well, Waveforms and Probabilities. Numerical Problems

Pre-requisite: Wave-Particle dualism

Self-learning: de Broglie Hypothesis

Module-2 (08 hours)

Electrical Properties of Solids:

Dielectric Properties: Polar and non-polar dielectrics, Types of Polarization, internal fields in solid, Clausius- Mossottiequation(Derivation), solid, liquid and gaseous dielectrics. Application of dielectrics in transformers, Capacitors, and Electrical Insulation. Numerical problems.

Superconductivity: Introduction to Superconductors, Temperature dependence of resistivity, Meissner's Effect, Silsbee Effect, Types of Super Conductors, Temperature dependence of Critical field, BCS theory (Qualitative), High- Temperature superconductivity, SQUID, MAGLEV, Numerical problems.

Pre-requisites: Difference between Insulators &

Dielectrics. Self-learning: Dielectrics Basics

Module-3 (08 hours)

Lasers and Optical Fibers:

Lasers: Characteristics of LASER, Interaction of radiation with matter, Expression for energy density equation and its significance. Requisites of a Laser system. Conditions for Laser action. Principle, Construction and working of carbon dioxide laser. Application of Lasers in Defence (Laser range finder) and Laser Printing. Numerical problems.

Optical Fibers: Propagation mechanism, TIR, angle of acceptance, Numerical aperture, fractional index change, Modes of propagation, Number of modes and V parameter, Types of optical fibers. Attenuation and Mention of expression for attenuation coefficient, Attenuation spectrum of an optical fiber with

optical windows. Discussion of the block diagram of point-to-point communication, Intensity-based fiber optic displacement sensor, Merits and demerits. Numerical problems.

Pre-requisite: Properties of light

Self-learning: Propagation Mechanism & TIR in optical fiber

Module-4(08 hours)

Maxwell's Equations and EM waves:

Maxwell's Equations: Fundamentals of vector calculus. Divergence and curl of electric field and magnetic field (static), Gauss' divergence theorem and Stokes' theorem. Description of laws of electrostatics, magnetism and Faraday's laws of EMI. Current density & equation of Continuity; displacement current (with derivation) Maxwell's equations in vacuum.

EM Waves: The wave equation in differential form in free space (Derivation of the equation using Maxwell's equations), Plane electromagnetic waves in vacuum, and their transverse nature. Numerical problems.

Pre-requisite: Electricity & Magnetism

Self-learning: Fundamentals of vector calculus

Module-5 (08 hours)

Semiconductor and Devices:

Fermi energy and Fermi level, Fermi level in intrinsic semiconductors, Expression for concentration of electrons in conduction band & holes concentration in valance band (only mention the expression), Law of mass action, Electrical conductivity of a semiconductor (derivation), Hall effect, Expression for Hall coefficient (derivation) and its application.

Photodiode and Power responsively, Construction and working of Semiconducting Laser, Four probe method to determine resistivity, Phototransistor. Numerical problems.

Pre-requisite: Basics of Semiconductors Self-learning: Photodiode

Suggested Learning Resources:

Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)

1. A Textbook of Engineering Physics- M.N. Avadhanulu and P.G. Kshirsagar, 10th revised Ed, S. Chand. & Company Ltd, New Delhi.
2. An Introduction to Lasers theory and applications by M.N.Avadhanulu and P.S.Hemme revised Edition 2012. S.Chand and Company Ltd -New Delhi.
3. Engineering Physics-Gaur and Gupta-Dhanpat Rai Publications-2017.
4. Concepts of Modern Physics-Arthur Beiser: 6th Ed;Tata McGraw Hill Edu Pvt Ltd- New Delhi 2006.
5. Fundamentals of Fibre Optics in Telecommunication & Sensor Systems, B.P. Pal, New Age International Publishers.
6. Introduction to Electrodynamics, David Griffith, 4th Edition, Cambridge University Press 2017.
7. Lasers and Non-Linear Optics – B.B. Laud, 3rd Ed, New Age International Publishers 2011.
8. LASERS Principles, Types and Applications by K.R. Nambiar-New Age International Publishers.
9. Solid State Physics-S O Pillai, 8th Ed- New Age International Publishers-2018.

Web links and Video Lectures (e-Resources):

Laser: <https://www.britannica.com/technology/laser,k>

Laser: <https://nptel.ac.in/courses/115/102/115102124/>

Quantum mechanics: <https://nptel.ac.in/courses/115/104/115104096/> **Physics:**

<http://hyperphysics.phy-astr.gsu.edu/hbase/hframe.html>

Numerical Aperture of fiber: <https://bop-iitk.vlabs.ac.in/exp/numerical-aperture-measurement> **NPTEL**

Superconductivity: <https://archive.nptel.ac.in/courses/115/103/115103108/>

Activity-Based Learning (Suggested Activities in Class)/Practical-Based Learning

- <http://nptel.ac.in> <https://swayam.gov.in>
<https://www.vlab.co.in/participating-institute-amrita-vishwa-vidyapeetham>
<https://vlab.amrita.edu/index.php?sub=1&brch=189&sim=343&cnt=1>
https://virtuallabs.merlot.org/vl_physics.html
<https://phet.colorado.edu>
<https://www.myphysicslab.com>

Laboratory Component:

Any Ten Experiments have to be completed from the list of experiments Note: The experiments have to be classified into

- a) Exercise
- b) Demonstration
- c) Structured Inquiry
- d) Open Ended

Based on convenience classify the following experiments into the above categories.

Select at least one simulation/spreadsheet activity.

List of Experiments:

1. Wavelength of LASER using Grating
2. Numerical Aperture using optical fiber
3. Four Probe Method
4. Charging and Discharging of a Capacitor
5. Transistor Characteristics
6. Photo-Diode Characteristics
7. Series and Parallel LCR Circuits
8. Magnetic Field at any point along the axis of a circular coil
9. Plank’s Constant using LEDs.
10. Fermi Energy
11. Black Box
12. Energy Gap of the given Semiconductor
13. Dielectric Constant
14. PHET Interactive Simulations

(<https://phet.colorado.edu/en/simulations/filter?subjects=physics&type=html.prototype>)

Online Circuit Simulator (<https://www.partsim.com/simulator>) Study of Electrical quantities using spreadsheet

Course outcome (Course Skill Set)

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

CO1	Describe the fundamental principles of Quantum Mechanics and the essentials of Photonics
CO2	Elucidate the concepts of dielectrics and superconductivity
CO3	Discuss the fundamentals of vector calculus and their applications in Maxwell’s Equations and EM Waves
CO4	Summarize the properties of semiconductors and the working principles of semiconductor devices
CO5	Practice working in groups to conduct experiments in physics and perform precise and honest measurements

COs and POs Mapping

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COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3	2	-	-	-	-	-	-	-	-	-	2
CO2	3	2	-	-	-	-	-	-	-	-	-	2
CO3	3	2	-	-	-	-	-	-	-	-	-	2
CO4	3	2	-	-	1	-	-	-	-	-	-	2
CO5	3	2	1	-	2	-	-	3	3	-	-	2

Level 3- Highly Mapped, Level 2-Moderately Mapped, Level 1-Low Mapped, Level 0- Not Mapped

Course Title:	BASIC ELECTRONICS		
Course Code:	22BEE13	CIE Marks	50
Course Type (Theory/Practical /Integrated)	Theory	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P: S)	3:0:0:0	Exam Hours	03
Total Hours of Pedagogy	40 hours	Credits	03

Course objectives: Students will be taught

- Operation of Semiconductor diode, Zener diode and Special purpose diodes and their applications.
- Biasing circuits for transistor (BJT) as an amplifier.
- Study of linear Op-amps and its applications.
- Logic circuits and their optimization.
- Principles of Transducers and Communication.

Module-1 (8 Hours)

Semiconductor Diodes: Introduction, PN Junction diode, Characteristics and Parameters, Diode Approximations, DC Load Line analysis (Text 1: 2.1,2.2,2.3,2.4)

Diode Applications: Introduction, Half Wave Rectification, Full Wave Rectification, Full Wave Rectifier Power Supply: Capacitor Filter Circuit, RC π Filter (includes numerical)
(Text 1: 3.1,3.2,3.4,3.5)

Zener Diodes: Junction Breakdown, Circuit Symbol and Package, Characteristics and Parameters, Equivalent Circuit, Zener Diode Voltage Regulator. (Text1:2.9, 3.7)

Module-2 (8 Hours)

Bipolar Junction Transistors: Introduction, BJT Voltages & Currents, BJT Amplification, Common Base Characteristics, Common Emitter Characteristics, Common Collector Characteristics, BJT Biasing: Introduction, DC Load line and Bias point(Text 1: 4.2, 4.3, 4.5,4.6, 5.1)

Field Effect Transistor: Junction Field Effect Transistor, JFET Characteristics, MOSFETs: Enhancement MOSFETs, Depletion Enhancement MOSFETs (Text 1: 9.1,9.2,9.5)

Module-3 (8 Hours)

Operational Amplifiers: Introduction, The Operational Amplifier, Block Diagram Representation of Typical Op-Amp, Schematic Symbol, Op-Amp parameters - Gain, input resistance, Output resistance, CMRR, Slew rate, Bandwidth, input offset voltage, Input bias Current and Input offset Current, The Ideal Op-Amp , Equivalent Circuit of Op-Amp, Open Loop Op-Amp configurations, Differential Amplifier, Inverting & Non Inverting Amplifier

Op-Amp Applications: Inverting Configuration, Non-Inverting Configuration, Differential Configuration, Voltage Follower, Integrator, Differentiator (Text 2: 1.1, 1.2, 1.3, 1.5, 2.2, 2.3, 2.4, 2.6, 6.5.1, 6.5.2, 6.5.3,6.12, 6.13).

Module-4 (8 Hours)

Boolean Algebra and Logic Circuits: Binary numbers, Number Base Conversion, octal & Hexa Decimal Numbers, Complements, Basic definitions, Axiomatic Definition of Boolean Algebra, Basic Theorems and

Properties of Boolean Algebra, Boolean Functions, Canonical and Standard Forms, Other Logic Operations, Digital Logic Gates (Text 3: 1.2, 1.3, 1.4, 1.5, 2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.7)

Combinational logic: Introduction, Design procedure, Adders- Half adder, Full adder (Text 3: 4.1, 4.2, 4.3)

Module-5 (8 Hours)

Introduction to Transducers: Introduction, Resistive Transducers, Inductive Transducers, Capacitive Transducers, Thermal transducers, Optoelectronic transducer, and Piezoelectric transducers (Text 4: Chapter 18: 18.1, 18.2, 18.3, 18.4, 18.5)

Communications : Introduction to communication, Communication System, Modulation (Text book 5: 1.1, 1.2, 1.3)

Suggested Learning Resources:

Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)

1. Electronic Devices and Circuits, David A Bell, 5th Edition, Oxford, 2016
2. Op-amps and Linear Integrated Circuits, Ramakanth A Gayakwad, Pearson Education, 4th Edition
3. Digital Logic and Computer Design, M. Morris Mano, PHI Learning, 2008 ISBN-978-81-203-0417-8
4. Electronic Instrumentation and Measurements (3rd Edition) – David A. Bell, Oxford University Press, 2013
5. Electronic Communication Systems, George Kennedy, 4th Edition, TMH

Web links and Video Lectures (e-Resources):

- <https://nptel.ac.in/courses/122106025>
- <https://nptel.ac.in/courses/108105132>
- <https://nptel.ac.in/courses/117104072>

Course outcome (Course Skill Set)

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

CO1: Develop the basic knowledge on construction, operation and characteristics of semiconductor devices. (Level: C3)

CO2: Apply the acquired knowledge to construct small scale circuit consisting of semiconductor devices (Level: C3)

CO3: Develop competence knowledge to construct basic digital circuit by make use of basic gate and its function. (Level: C3)

CO4: Construct the conceptual blocks for basic communication system. (Level: C3)

CO5: Apply the knowledge of various transducers principle in sensor system. (Level: C3)

CO -PO Mapping Table

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

Level 3- Highly Mapped, Level 2-Moderately Mapped, Level 1-Low Mapped, Level 0- Not Mapped

SDMCET: Syllabus

Course Title:	INTRODUCTION TO MECHANICAL ENGINEERING		
Course Code:	22ESC144	CIE Marks	50
Course Type (Theory/Practical/Integrated)	Theory	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P: S)	2:2:0:0	Exam Hours	03
Total Hours of Pedagogy	40 hours	Credits	03

Course Learning Objectives

- To develop basic Knowledge on Mechanical Engineering, Fundamentals and Energy Sources.
- Understand the concept of different types of Machine tool operations and Modern Manufacturing Processes like CNC, 3D printing.
- To know the concept of IC engines and Future Mobility vehicles.
- To give exposure in the field of Engineering Materials and Manufacturing Processes Technology and its applications
- To acquire a basic understanding role of Mechanical Engineering in the Robotics and Automation in industry.

Module-1 (8 hours)

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

Energy: Introduction and applications of Energy sources like Fossil fuels, Nuclear fuels, Hydel, Solar, wind, and bio-fuels, Environmental issues like Global warming and Ozone depletion

Module-2 (8 Hours)

Machine Tool Operations:

Working Principle of lathe, Lathe operations: Turning, facing, knurling. Working principles of Drilling Machine, drilling operations: drilling, boring, reaming. Working of Milling Machine, Milling operations: plane milling and slot milling.

(No sketches of machine tools, sketches to be used only for explaining the operations).

Introduction to Advanced Manufacturing Systems: Introduction, components of CNC, advantages and applications of CNC, 3D printing.

Module-3 (8 Hours)

Introduction to IC Engines: Components and Working Principles, 4-Stroke Petrol and Diesel Engines, Application of IC Engines.

Insight into Future Mobility; Electric and Hybrid Vehicles, Components of Electric and Hybrid Vehicles. Advantages and disadvantages of EVs and Hybrid vehicles.

Module-4 (8 hours)

Engineering Materials: Types and applications of Ferrous & Nonferrous Metals, silica, ceramics, glass, graphite, diamond and polymer. Shape Memory Alloys.

Joining Processes: Soldering, Brazing and Welding, Definitions, classification of welding process, Arc welding, Gas welding and types of flames.

Module-5 (8 hours)

Introduction to Mechatronics and Robotics: open-loop and closed-loop mechatronic systems. Classification based on robotics configuration: polar cylindrical, Cartesian coordinate and spherical. Application, Advantages and disadvantages.

Automation in industry: Definition, types – Fixed, programmable and flexible automation, basic elements

with block diagrams, advantages.

Introduction to IOT: Definition and Characteristics, Physical design, protocols, Logical design of IoT, Functional blocks, and communication models.

Suggested Learning Resources:

Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year) Text Books:

1. Elements of Mechanical Engineering, K R Gopala Krishna, Subhash Publications, 2008
2. An Introduction to Mechanical Engineering, Jonathan Wickert and Kemper Lewis, Third Edition, 2012

Reference Books:

1. Elements of Workshop Technology (Vol. 1 and 2), Hazra Choudhry and Nirzar Roy, Media Promoters and Publishers Pvt. Ltd., 2010.
2. Manufacturing Technology- Foundry, Forming and Welding, P.N.Rao Tata McGraw Hill 3rdEd., 2003.
3. Internal Combustion Engines, V. Ganesan, Tata McGraw Hill Education; 4th edition, 2017
4. Robotics, Appu Kuttan KK K. International Pvt Ltd, volume 1
5. Dr SRN Reddy, Rachit Thukral and Manasi Mishra, “ Introduction to Internet of Things: A Practical Approach”, ETI Labs
6. Raj kamal, “ Internet of Things: Architecture and Design”, McGraw hill.

Web links and Video Lectures (e-Resources):

- <https://rakhoh.com/en/applications-and-advantages-of-steam-in-manufacturing-and-process-industry/>
- [Videos | Makino \(For Machine Tool Operation\)](#)

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

- Demonstration of lathe/milling/drilling operations
- Demonstration of working of IC Engine.
- Study arc welding, oxy-acetylene gas flame structure.
- Video demonstration of latest trends in mobility robotics and Automation
- Demonstration of developing models on machine tools

Course Outcome (Course Skill Set)

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

CO1	Explain the concepts of Role of Mechanical Engineering and Energy sources.
CO2	Describe the Machine Tool Operations and advanced Manufacturing process.
CO3	Explain the Working Principle of IC engines and EV vehicles.
CO4	Discuss the Properties of Common Engineering Materials and various Metal Joining Processes.
CO5	Explain the Concepts of Mechatronics, Robotics and Automation in IoT

COs and POs Mapping (CO-PO mappings are only Indicative)

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

Level 3- Highly Mapped, Level 2-Moderately Mapped, Level 1-Low Mapped, Level 0- Not Mapped

SDMCET: Syllabus

Course Title:	INTRODUCTION TO INTERNET OF THINGS(IOT)		
Course Code:	22ETC15H	CIE Marks	50
Course Type (Theory/Practical /Integrated)	Theory	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P: S)	3-0-0-0	Exam Hours	03
Total Hours of Pedagogy	40 hours	Credits	03

Course objectives

- Understand about the fundamentals of Internet of Things and its building blocks along with their characteristics.
- Understand the recent application domains of IoT in everyday life.
- Gain insights about the current trends of Associated IOT technologies and IOT Analytics.

Module-1 (8 Hours of pedagogy)

Basics of Networking: Introduction, Network Types, Layered network models

Emergence of IoT: Introduction, Evolution of IoT, Enabling IoT and the Complex Interdependence of Technologies, IoT Networking Components

Textbook 1: Chapter 1- 1.1 to 1.3 Chapter 4 – 4.1 to 4.4

Module-2 (8 Hours of pedagogy)

IoT Sensing and Actuation: Introduction, Sensors, Sensor Characteristics, Sensorial Deviations, Sensing Types, Sensing Considerations, Actuators, Actuator Types, Actuator Characteristics.

Textbook 1: Chapter 5 – 5.1 to 5.9

Module-3 (8 Hours of pedagogy)

IoT Processing Topologies and Types: Data Format, Importance of Processing in IoT, Processing Topologies, IoT Device Design and Selection Considerations, Processing Offloading.

Textbook 1: Chapter 6 – 6.1 to 6.5

Module-4 (8 Hours of pedagogy)

ASSOCIATED IOT TECHNOLOGIES

Cloud Computing: Introduction, Virtualization, Cloud Models, Service-Level Agreement in Cloud Computing, Cloud Implementation, Sensor-Cloud: Sensors-as-a-Service.

IOT CASE STUDIES

Agricultural IoT – Introduction and Case Studies

Textbook 1: Chapter 10– 10.1 to 10.6; Chapter 12- 12.1-12.2

Module-5 (8 Hours of pedagogy)

IOT CASE STUDIES AND FUTURE TRENDS

Vehicular IoT – Introduction

Healthcare IoT – Introduction, Case Studies

IoT Analytics – Introduction

Textbook 1: Chapter 13– 13.1; Chapter 14- 14.1-14.2; Chapter 17- 17.1

Suggested Learning Resources:

Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)

1. Sudip Misra, Anandarup Mukherjee, Arijit Roy, “Introduction to IoT”, Cambridge University Press 2021.

Reference:

1. S. Misra, C. Roy, and A. Mukherjee, 2020. Introduction to Industrial Internet of Things and Industry 4.0. CRC Press.
2. Vijay Madiseti and Arshdeep Bahga, “Internet of Things (A Hands-on-Approach)”, 1st Edition, VPT, 2014.
3. Francis daCosta, “Rethinking the Internet of Things: A Scalable Approach to Connecting Everything”, 1st Edition, Apress Publications, 2013.

Web links and Video Lectures (e-Resources):

1. <https://nptel.ac.in/noc/courses/noc19/SEM1/noc19-cs31/>

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

Demonstrate a sensor based application

Course outcome (Course Skill Set)

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

CO1	Describe the evolution of IoT, IoT networking components, and addressing strategies in IoT.
CO2	Classify various sensing devices and actuator types.
CO3	Demonstrate the processing in IoT.
CO4	Explain Associated IOT Technologies
CO5	Illustrate architecture of IOT Applications

COs and POs Mapping

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

Level 3- Highly Mapped, Level 2-Moderately Mapped, Level 1-Low Mapped, Level 0- Not Mapped

Course Title:	Communicative English		
Course Code:	22ENG16	CIE Marks	50
Course Type (Theory/Practical /Integrated)	Theory	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P: S)	1:0:0:0	Exam Hours	01 Theory
Total Hours of Pedagogy	15 hours	Credits	01

Course objectives: The course Communicative English (22ENG16) will enable the students,

1. To know about Fundamentals of Communicative English and Communication Skills in general.
2. To train to identify the nuances of phonetics, intonation and enhance pronunciation skills for better Communication skills.
3. To impart basic English grammar and essentials of important language skills.
4. To enhance with English vocabulary and language proficiency for better communication skills.
5. To learn about Techniques of Information Transfer through presentation.

Language Lab : To augment LSRW, grammar and Vocabulary skills (Listening, Speaking, Reading, Writing and Grammar, Vocabulary) through tests, activities, exercises etc., comprehensive web-based learning and assessment systems can be referred as per the AICTE / VTU guidelines.

Module-1 (03 Hours of pedagogy)

Introduction to Communicative English : Communicative English, Fundamentals of Communicative English, Process of Communication, Barriers to Effective Communicative English, Different styles and levels in Communicative English.

Interpersonal and Intrapersonal Communication Skills.

Module-2 (03 Hours of pedagogy)

Introduction to Phonetics : Phonetic Transcription, English Pronunciation, Pronunciation Guidelines to consonants and vowels, Sounds Mispronounced, Silent and Non silent Letters, Syllables and Structure.

Word Accent, Stress Shift and

Intonation, Spelling Rules and Words often Misspelt. Common Errors in Pronunciation.

Module-3 (03 Hours of pedagogy)

Basic English Communicative Grammar and Vocabulary PART - I: Grammar: Basic English Grammar and Parts of Speech, Articles and Preposition. Question Tags, One Word Substitutes, Strong and Weak forms of words, Introduction to Vocabulary, All Types of Vocabulary – Exercises on it.

Module-4 (03 Hours of pedagogy)

Basic English Communicative Grammar and Vocabulary PART - II: Words formation - Prefixes and Suffixes, Contractions and Abbreviations. Word Pairs (Minimal Pairs) – Exercises, Tense and Types of tenses, The Sequence of Tenses (Rules in use of Tenses) and Exercises on it.

Module-5 (03 Hours of pedagogy)

Communication Skills for Employment : Information Transfer: Oral Presentation and its Practice. Difference between Extempore/Public Speaking, Communication Guidelines. Mother Tongue Influence (MTI), Various Techniques for Neutralization of Mother Tongue Influence. Reading and Listening Comprehensions – Exercises.

Suggested Learning Resources:

Textbook:

- 1) **Communication Skills** by Sanjay Kumar & Pushp Lata, Oxford University Press India Pvt Ltd - 2019.
- 2) **A Textbook of English Language Communication Skills**, (ISBN-978-81-955465-2-7), Published by Infinite Learning Solutions, Bengaluru - 2022.

Reference Books:

1. **Technical Communication** by Gajendra Singh Chauhan and Et al, (ISBN-978-93-5350-050-4), Cengage learning India Pvt Limited [Latest Revised Edition] - 2019.
2. **English for Engineers** by N.P.Sudharshana and C.Savitha, Cambridge University Press – 2018.
3. **English Language Communication Skills – Lab Manual cum Workbook**, Cengage learning India Pvt Limited [Latest Revised Edition] – (ISBN-978-93-86668-45-5), 2019.
4. **A Course in Technical English – D Praveen Sam, KN Shoba**, Cambridge University Press – 2020. **Practical English Usage** by Michael Swan, Oxford University Press – 2016.

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Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

- ✓ Contents related activities (Activity-based discussions)
- ✓ For active participation of students instruct the students to prepare Flowcharts and Handouts
- ✓ Organizing Group wise discussions Connecting to placement activities Quizzes and Discussions, Seminars and assignments

Course outcome (Course Skill Set)

At the end of the course Communicative English (22ENG16) the student will be able to:

CO1	Understand and apply the Fundamentals of Communication Skills in their communication skills.
CO2	Identify the nuances of phonetics, intonation and enhance pronunciation skills.
CO3	To impart basic English grammar and essentials of language skills as per present requirement.
CO4	Understand and use all types of English vocabulary and language proficiency.
CO5	Adopt the Techniques of Information Transfer through presentation.

COs and POs Mapping

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

Level 3- Highly Mapped, Level 2-Moderately Mapped, Level 1-Low Mapped, Level 0- Not Mapped

Course Title:	ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ		
Course Code:	22KSK17 / 27	CIE Marks	50
Course Type (Theory/Practical /Integrated)	Theory	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P: S)	1:0:0:0	Exam Hours	01 Theory
Total Hours of Pedagogy	15 hours	Credits	01

Course objectives : ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ ಪಠ್ಯ ಕಲಿಕೆಯ ಉದ್ದೇಶಗಳು

The course (22KSK17/27) will enable the students,

1. ಪದವಿ ವಿದ್ಯಾರ್ಥಿಗಳಾಗಿರುವುದರಿಂದ ಕನ್ನಡ ಭಾಷೆ, ಸಾಹಿತ್ಯ ಮತ್ತು ಸಂಸ್ಕೃತಿಯ ಪರಿಚಯ ಮಾಡಿಕೊಳ್ಳುವುದು.
2. ಕನ್ನಡ ಸಾಹಿತ್ಯದ ಪ್ರಧಾನ ಭಾಗವಾದ ಆಧುನಿಕ ಪೂರ್ವ ಮತ್ತು ಆಧುನಿಕ ಕಾವ್ಯಗಳನ್ನು ಪರಿಚಯಿಸುವುದು.
3. ವಿದ್ಯಾರ್ಥಿಗಳಲ್ಲಿ ಸಾಹಿತ್ಯ ಮತ್ತು ಸಂಸ್ಕೃತಿಯ ಬಗ್ಗೆ ಅರಿವು ಹಾಗೂ ಆಸಕ್ತಿಯನ್ನು ಮೂಡಿಸುವುದು.
4. ತಾಂತ್ರಿಕ ವ್ಯಕ್ತಿಗಳ ಪರಿಚಯವನ್ನು ಹಾಗೂ ಅವರುಗಳ ಸಾಧಿಸಿದ ವಿಷಯಗಳನ್ನು ಪರಿಚಯಿಸುವುದು.
5. ಸಾಂಸ್ಕೃತಿಕ ಜನಪದ ಹಾಗೂ ಪ್ರವಾಸ ಕಥನಗಳ ಪರಿಚಯ ಮಾಡಿಕೊಡುವುದು.

ಬೋಧನೆ ಮತ್ತು ಕಲಿಕಾ ವ್ಯವಸ್ಥೆ (Teaching-Learning Process - General Instructions) :

These are sample Strategies, which teacher can use to accelerate the attainment of the course outcomes.

1. ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡವನ್ನು ಬೋಧಿಸಲು ತರಗತಿಯಲ್ಲಿ ಶಿಕ್ಷಕರು ಪ್ರಸ್ತುತ ಪುಸ್ತಕ ಆಧಾರಿಸಿ ಬ್ಲಾಕ್ ಬೋರ್ಡ್ ವಿಧಾನವನ್ನು ಅನುಸರಿಸುವುದು. ಪ್ರಮುಖ ಅಂಶಗಳ ಚಾರ್ಚಗಳನ್ನು ತಯಾರಿಸಲು ವಿದ್ಯಾರ್ಥಿಗಳನ್ನು ಪ್ರೇರೇಪಿಸುವುದು ಮತ್ತು ತರಗತಿಯಲ್ಲಿ ಅವುಗಳನ್ನು ಚರ್ಚಿಸಲು ಅವಕಾಶ ಮಾಡಿಕೊಡುವುದು.

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2. ಇತ್ತೀಚಿನ ತಂತ್ರಜ್ಞಾನದ ಅನುಕೂಲಗಳನ್ನು ಬಳಸಿಕೊಳ್ಳುವುದು – ಅಜೆದರ ಕವಿ-ಕಾವ್ಯ ಪರಿಚಯದಲ್ಲಿ ಕವಿಗಳ ಚಿತ್ರಣ ಮತ್ತು ಲೇಖನಗಳು ಮತ್ತು ಕಥೆ ಕಾವ್ಯಗಳ ಮೂಲ ಅಂಶಗಳಿಗೆ ಸಂಬಂಧಪಟ್ಟ ಧ್ವನಿ ಚಿತ್ರಗಳು, ಸಂಭಾಷಣೆಗಳು. ಈಗಾಗಲೇ ಇತರ ವಿಮರ್ಶಕರು ಬರೆದಿರುವ ವಿಮರ್ಶಾತ್ಮಕ ವಿಷಯಗಳನ್ನು ಟಿಪ್ಪಣಿ, ಡಿಜಿಟಲ್ ಮಾಧ್ಯಮಗಳ ಮುಖಾಂತರ ವಿಶ್ಲೇಷಿಸುವುದು.
3. ನವೀನ ಮಾದರಿಯ ಸಾಹಿತ್ಯ ಬೋಧನೆಗೆ ಸಂಬಂಧಪಟ್ಟ ವಿಧಾನಗಳನ್ನು ಶಿಕ್ಷಕರು ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ಅನುಕೂಲವಾಗುವ ರೀತಿಯಲ್ಲಿ ಅಳವಡಿಸಿಕೊಳ್ಳಬಹುದು.

ಘಟಕ - 1 ಕನ್ನಡ ಸಂಸ್ಕೃತಿ ಮತ್ತು ಭಾಷೆ ಕುರಿತಾದ ಲೇಖನಗಳು (03 hours of pedagogy)

1. ಕರ್ನಾಟಕ ಸಂಸ್ಕೃತಿ - ಹಂಪ ನಾಗರಾಜ
2. ಕರ್ನಾಟಕ ಏಕೀಕರಣ: ಒಂದು ಅಪೂರ್ವ ಚರಿತ್ರೆ - ಜಿ. ವೆಂಕಟಸುಬ್ಬಯ್ಯ
3. ಆಡಳಿತ ಭಾಷೆಯಾಗಿ ಕನ್ನಡ - ಡಾ. ಎಲ್. ತಿಮ್ಮೇಶ ಮತ್ತು ಪ್ರೊ. ವಿ. ಕೇಶವಮೂರ್ತಿ

ಘಟಕ - 2 ಆಧುನಿಕ ಪೂರ್ವದ ಕಾವ್ಯ ಭಾಗ (03 hours of pedagogy)

1. ವಚನಗಳು: ಬಸವಣ್ಣ ಅಕ್ಕಮಹಾದೇವಿ, ಅಲ್ಲಮಪ್ರಭು, ಆಯ್ದಕ್ಕಿ ಮಾರಯ್ಯ, ಜೇಡರ ದಾಸಿಮಯ್ಯ, ಆಯ್ದಕ್ಕಿ ಲಕ್ಕಮ್ಮ
2. ಕೀರ್ತನೆಗಳು: ಅದರಿದೇನು ಫಲ ಇದರಿದೇನು ಫಲ - ಪುರಂದರದಾಸರು, ತಲ್ಲಣಿಸಿದಿರು ಕಂಡ್ಯ ತಾಳು ಮನವೇ - ಕನಕದಾಸರು
3. ತತ್ವಪದಗಳು: ಸಾವಿರ ಕೊಡಗಳ ಸುಟ್ಟು - ಶಿಶುನಾಳ ಶರೀಫ

ಘಟಕ - 3 ಆಧುನಿಕ ಕಾವ್ಯ ಭಾಗ (03 hours of pedagogy)

1. ಡಿವಿಜಿ ರವರ ಮಂಕುತಿಮ್ಮನ ಕಗ್ಗದಿಂದ ಆಯ್ದ ಕೆಲವು ಭಾಗಗಳು
2. ಕುರುಡು ಕಾಂಚಾಣ: ದ.ರಾ. ಬೇಂದ್ರೆ
3. ಹೊಸಬಾಳಿನ ಗೀತೆ: ಕುವೆಂಪು

ಘಟಕ - 4 (03 hours of pedagogy)

1. ಡಾ. ಸರ್.ಎಂ. ವಿಶ್ವೇಶ್ವರಯ್ಯ: ವ್ಯಕ್ತಿ ಮತ್ತು ಐತಿಹ್ಯ - ಎ.ಎನ್. ಮೂರ್ತಿರಾವ್.
2. ಕರಕುಶಲ ಕಲೆಗಳು ಮತ್ತು ಪರಂಪರೆಯ ವಿಜ್ಞಾನ: ಕರೀಗೌಡ ಬೀಚನಹಳ್ಳಿ

ಘಟಕ - 5 ಸಾಂಸ್ಕೃತಿಕ, ಜನಪದ ಕಥೆ ಮತ್ತು ಪ್ರವಾಸ ಕಥನ (03 hours of pedagogy)

1. ಯುಗಾದಿ: ವಸುಧೇಂದ್ರ
2. ಮೆಗಾನೆ ಎಂಬ ಗಿರಿಜನ ಪರ್ವತ: ಹಿ.ಚಿ. ಬೋರಲಿಂಗಯ್ಯ

Course outcome (Course Skill Set)

ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ (22KSK17/27) ಪಠ್ಯ ಕಲಿಕೆಯ ನಂತರ ವಿದ್ಯಾರ್ಥಿಗಳಲ್ಲಿ:

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

CO1	ಕನ್ನಡ ಭಾಷೆ, ಸಾಹಿತ್ಯ ಮತ್ತು ಕನ್ನಡದ ಸಂಸ್ಕೃತಿಯ ಕುರಿತು ಅರಿವು ಮೂಡಿರುತ್ತದೆ.
CO2	ಕನ್ನಡ ಸಾಹಿತ್ಯದ ಆಧುನಿಕ ಪೂರ್ವ ಮತ್ತು ಆಧುನಿಕ ಕಾವ್ಯಗಳನ್ನು ಸಾಂಕೇತಿಕವಾಗಿ ಕಲಿತು ಹೆಚ್ಚಿನ ಓದಿಗೆ ಮತ್ತು ಜ್ಞಾನಕ್ಕೆ
CO3	ವಿದ್ಯಾರ್ಥಿಗಳಲ್ಲಿ ಸಾಹಿತ್ಯ ಮತ್ತು ಸಂಸ್ಕೃತಿಯ ಬಗ್ಗೆ ಅರಿವು ಹಾಗೂ ಆಸಕ್ತಿ ಹೆಚ್ಚಾಗುತ್ತದೆ.
CO4	ತಾಂತ್ರಿಕ ವ್ಯಕ್ತಿಗಳ ಪರಿಚಯ ಹಾಗೂ ಅವರುಗಳ ಸಾಧಿಸಿದ ವಿಷಯಗಳನ್ನು ತಿಳಿದುಕೊಂಡು ನಾಡಿ ಇನ್ನಿತರ ವ್ಯಕ್ತಿಗಳ ಬಗ್ಗೆ
CO5	ಸಾಂಸ್ಕೃತಿಕ, ಜನಪದ ಹಾಗೂ ಪ್ರವಾಸ ಕಥನಗಳ ಪರಿಚಯ ಮಾಡಿಕೊಡುವುದು.

COs and POs Mapping

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

Level 3- Highly Mapped, Level 2-Moderately Mapped, Level 1-Low Mapped, Level 0- Not Mapped

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University Prescribed Text Book :

ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ

ಡಾ. ಹಿ.ಚಿ.ಬೋರಲಿಂಗಯ್ಯ ಮತ್ತು ಡಾ. ಎಲ್. ತಿಮ್ಮೇಶ,

ಪ್ರಕಟಣೆ: ಪ್ರಸಾರಂಗ,

ವಿಶ್ವೇಶ್ವರಯ್ಯ ಂತ್ರಿಕ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಬೆಳಗಾವಿ

ವಿಶೇಷ ಸೂಚನೆ:

1. ಮೇಲಿನ ಪಠ್ಯಕ್ರಮಕ್ಕೆ ಸೀಮಿತವಾಗಿ ಅಂತಿಮ ಪರೀಕ್ಷೆಯ ಪ್ರಶ್ನೆ ಪತ್ರಿಕೆ ಇರುತ್ತದೆ.
2. ಮೇಲಿನ ಪಠ್ಯಕ್ರಮವನ್ನು ಹೊರತುಪಡಿಸಿದ ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ ಪಠ್ಯಪುಸ್ತಕದಲ್ಲಿನ ಉಳಿದ ಪದ್ಯ & ಗದ್ಯ ಭಾಗ ಹಾಗೂ ಇತರ ಲೇಖನಗಳನ್ನು ಹೆಚ್ಚುವರಿ ಪೂರಕ ಓದಿಗಾಗಿ ಬಳಸಿಕೊಳ್ಳಬಹುದು. ಅಂತಿಮ ಪರೀಕ್ಷೆಯಲ್ಲಿ ಈ ಪಾಠಗಳಿಂದ ಪ್ರಶ್ನೆಗಳನ್ನು ಕೇಳಲಾಗುವುದಿಲ್ಲ.
3. ಹೆಚ್ಚಿನ ಮಾಹಿತಿ ಮತ್ತು ವಿವರಣೆಗಳಿಗೆ ಡಾ. ಎಲ್. ತಿಮ್ಮೇಶ (9900832331) ಇವರನ್ನು ಸಂಪರ್ಕಿಸಿ
4. ಮಾದರಿ ಪ್ರಶ್ನೆಪತ್ರಿಕೆ, ಕೋರ್ಸ್ ಆಯ್ಕೆ ಮಾಹಿತಿ, ಅಧ್ಯಯನ ಸಾಮಗ್ರಿ & ಬಹು ಆಯ್ಕೆ ಮಾದರಿಯ ಪ್ರಶ್ನೆಗಳ ಕೈಪಿಡಿಗಾಗಿ ವಿಶ್ವವಿದ್ಯಾಲಯ ವೆಬ್‌ಸೈಟ್ ನೋಡುವುದು.

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

- Contents related activities (Activity-based discussions)
- For active participation of students instruct the students to prepare Flowcharts and Handouts
- Organizing Group wise discussions Connecting to placement activities
- Quizzes and Discussions, Seminars and assignments.

ಬಳಕೆ ಕನ್ನಡ

ಕನ್ನಡ ಕಲಿಕೆಗಾಗಿ ನಿಗದಿಪಡಿಸಿದ ಪಠ್ಯಪುಸ್ತಕ

ಬಳಕೆ ಕನ್ನಡ ಪಠ್ಯಕಲಿಕೆಯ ಉದ್ದೇಶಗಳು

ಬೋಧನೆ ಮತ್ತು ಕಲಿಕಾ ವ್ಯವಸ್ಥೆ

1. ಬಳಕೆ ಕನ್ನಡವನ್ನು ತರಗತಿಯಲ್ಲಿ ಶಿಕ್ಷಕರು ಬೋಧಿಸಲು ವಿಟಿಯು ಸೂಚಿಸಿರುವ ಪಠ್ಯಪುಸ್ತಕವನ್ನು ಉಪಯೋಗಿಸಬೇಕು.
2. ಪ್ರಮುಖ ಅಂಶಗಳ ಚಾರ್ಟ್‌ಗಳನ್ನು ತಯಾರಿಸಲು ವಿದ್ಯಾರ್ಥಿಗಳನ್ನು ಉತ್ತೇಜಿಸುವುದು ಮತ್ತು ತರಗತಿಯಲ್ಲಿ ಅವುಗಳನ್ನು ಚರ್ಚಿಸಲು ಅವಕಾಶ ಮಾಡಿಕೊಡುವುದು.
3. ಪ್ರತಿ ವಿದ್ಯಾರ್ಥಿ ಪುಸ್ತಕವನ್ನು ತರಗತಿಯಲ್ಲಿ ಬಳಸುವಂತೆ ನೋಡಿಕೊಳ್ಳುವುದು ಮತ್ತು ಪ್ರತಿ ಪಾಠ ಮತ್ತು ಪ್ರವಚನಗಳ ಮೂಲ ಅಂಶಗಳಿಗೆ ಸಂಬಂಧಪಟ್ಟಂತೆ ಪೂರಕ ಚಟುವಟಿಕೆಗಳಿಗೆ ತೊಡಗಿಸತಕ್ಕದ್ದು.
4. ಡಿಜಿಟಲ್ ತಂತ್ರಜ್ಞಾನದ ಮುಖಾಂತರ ಇತ್ತೀಚೆಗೆ ಡಿಜಿಟಲೀಕರಣಗೊಂಡಿರುವ ಭಾಷೆ ಕಲಿಕೆಯ ವಿಧಾನಗಳನ್ನು ಪಿಪಿಟಿ ಮತ್ತು ದೃಶ್ಯ ಮಾಧ್ಯಮದ ಮುಖಾಂತರ ಚರ್ಚಿಸಲು ಕ್ರಮಕೈಗೊಳ್ಳುವುದು. ಇದರಿಂದ ವಿದ್ಯಾರ್ಥಿಗಳನ್ನು ತರಗತಿಯಲ್ಲಿ ಹೆಚ್ಚು ಏಕಾಗ್ರತೆಯಿಂದ ಪಾಠ ಕೇಳಲು ಮತ್ತು ಅಧ್ಯಯನದಲ್ಲಿ ತೊಡಗಲು ಅನುಕೂಲವಾಗುತ್ತದೆ.
5. ಭಾಷಾಕಲಿಕೆಯ ಪ್ರಯೋಗಾಲಯದ ಮುಖಾಂತರ ಬಹುಬೇಗ ಕನ್ನಡ ಭಾಷಾಯನ್ನು ಕಲಿಯಲು ಅನುಕೂಲವಾಗುವಂತೆ ಕಾರ್ಯಚಟುವಟಿಕೆಗಳನ್ನು ಮತ್ತು ಕ್ರಿಯಾ ಯೋಜನೆಗಳನ್ನು ರೂಪಿಸುವುದು.

Module - 1

(03 hours of pedagogy)

1. Introduction, Necessity of learning a local language. Methods to learn the Kannada language.
2. Easy learning of a Kannada Language: A few tips. Hints for correct and polite conversation, Listening and Speaking Activities, Key to Transcription
3. ವೈಯಕ್ತಿಕ, ಸ್ವಾಮ್ಯಸೂಚಕ/ಸಂಬಂಧಿತ ಸಾರ್ವನಾಮಗಳು ಮತ್ತು ಪ್ರಶ್ನಾರ್ಥಕ ಪದಗಳು - Personal Pronouns, Possessive Forms, Interrogative words

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Module - 2

(03 hours of pedagogy)

1. ನಾಮಪದಗಳ ಸಂಬಂಧಾರ್ಥಕ ರೂಪಗಳು, ಸಂದೇಹಾಸ್ಪದ ಪ್ರಶ್ನೆಗಳು ಮತ್ತು ಸಂಬಂಧವಾಚಕ ನಾಮಪದಗಳು - Possessive forms of nouns, dubitive question and Relative nouns
2. ಗುಣ, ಪರಿಮಾಣ ಮತ್ತು ವರ್ಣಬಣ್ಣ ವಿಶೇಷಣಗಳು, ಸಂಖ್ಯಾವಾಚಕಗಳು Qualitative, Quantitative and Colour Adjectives, Numerals
3. ಕಾರಕ ರೂಪಗಳು ಮತ್ತು ವಿಭಕ್ತಿ ಪ್ರತ್ಯಯಗಳು -ಸಪ್ತಮಿ ವಿಭಕ್ತಿ ಪ್ರತ್ಯಯ - (ಆ, ಅಮ, ಅವು, ಅಲ್ಲಿ) - Predictive Forms, Locative Case

Module - 3

(03 hours of pedagogy)

1. ಚತುರ್ಥಿ ವಿಭಕ್ತಿ ಪ್ರತ್ಯಯದ ಬಳಕೆ ಮತ್ತು ಸಂಖ್ಯಾವಾಚಕಗಳು - Dative Cases, and Numerals
2. ಸಂಖ್ಯಾಗುಣವಾಚಕಗಳು ಮತ್ತು ಬಹುವಚನ ನಾಮರೂಪಗಳು -Ordinal numerals and Plural markers
3. ನ್ಯೂನ/ನಿಷೇಧಾರ್ಥಕ ಕ್ರಿಯಾಪದಗಳು & ವರ್ಣ ಗುಣವಾಚಕಗಳು -Defective/Negative Verbs & Colour Adjectives

Module- 4

(03 hours of pedagogy)

1. ಅವ್ತನೆ / ಒಪ್ಪಿಗೆ, ನಿರ್ದೇಶನ, ಪ್ರೋತ್ಸಾಹ ಮತ್ತು ಒತ್ತಾಯ ಆರ್ಥರೂಪ ಪದಗಳು ಮತ್ತು ವಾಕ್ಯಗಳು
Permission, Commands, encouraging and Urging words (Imperative words and sentences)
2. ಸಾಮಾನ್ಯ ಸಂಭಾಷಣೆಗಳಲ್ಲಿ ದ್ವಿತೀಯ ವಿಭಕ್ತಿ ಪ್ರತ್ಯಯಗಳು ಮತ್ತು ಸಂಭವನೀಯ ಪ್ರಕಾರಗಳು
Accusative Cases and Potential Forms used in General Communication
3. "ಇರು ಮತ್ತು ಇರಲ್ಲ" ಸಹಾಯಕ ಕ್ರಿಯಾಪದಗಳು, ಸಂಭಾವ್ಯಸೂಚಕ ಮತ್ತು ನಿಷೇಧಾರ್ಥಕ ಕ್ರಿಯಾ ಪದಗಳು -
Helping Verbs "iru and iralla", Corresponding Future and Negation Verbs
4. ಹೋಲಿಕೆ (ತರತಮ), ಸಂಬಂಧ ಸೂಚಕ, ವಸ್ತು ಸೂಚಕ ಪ್ರತ್ಯಯಗಳು ಮತ್ತು ನಿಷೇಧಾರ್ಥಕ ಪದಗಳ ಬಳಕೆ-
Comparative, Relationship, Identification and Negation Words

Module - 5

(03 hours of pedagogy)

1. ಕಾಲ ಮತ್ತು ಸಮಯದ ಹಾಗೂ ಕ್ರಿಯಾಪದಗಳ ವಿವಿಧ ಪ್ರಕಾರಗಳು -Different types of Tense, Time and Verbs
2. ದ್, -ತ್, - ತು, - ಇತ್ತು, - ಆಗಿ, - ಅಲ್ಲ, - ಗ್, -ಕ್, ಇದೆ, ಕ್ರಿಯಾ ಪ್ರತ್ಯಯಗಳೊಂದಿಗೆ ಭೂತ, ಭವಿಷ್ಯತ್ ಮತ್ತು
ವರ್ತಮಾನ ಕಾಲ ವಾಕ್ಯ ರಚನೆ - Formation of Past, Future and Present Tense Sentences with Verb Forms

3. Kannada Vocabulary List :ಸಂಭಾಷಣೆಯಲ್ಲಿ ದಿನೋಪಯೋಗಿ ಕನ್ನಡ ಪದಗಳು -Kannada Words in Conversation
Course outcome (Course Skill Set)

ಬಳಕೆ ಕನ್ನಡ ಪಠ್ಯ ಕಲಿಕೆಯಿಂದ ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ಆಗುವ ಅನುಕೂಲಗಳು ಮತ್ತು ಫಲಿತಾಂಶಗಳು:

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

C01	To understand the necessity of learning of local language for comfortable life.
C02	To speak, read and write Kannada language as per requirement.
C03	To communicate (converse) in Kannada language in their daily life with kannada speakers.
C04	To Listen and understand the Kannada language properly.
C05	To speak in polite conversation.

COs and POs Mapping

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

Level 3- Highly Mapped, Level 2-Moderately Mapped,Level 1-Low Mapped, Level 0- Not Mapped

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Course Title	INNOVATION AND DESIGN THINKING		
Course Code	21IDT18	CIE Marks	50
Teaching Hours/Week (L: T:P: S)	1:0:0	SEE Marks	50
Total Hours of Pedagogy	14	Total Marks	100
Credits	01	Exam Hours	01

Course Category: Foundation

Preamble: This course provides an introduction to the basic concepts and techniques of engineering and reverses engineering, the process of design, analytical thinking and ideas, basics and development of engineering drawing, application of engineering drawing with computer aide.

Course objectives:

- To explain the concept of design thinking for product and service development
- To explain the fundamental concept of innovation and design thinking
- To discuss the methods of implementing design thinking in the real world.

Module-1

PROCESS OF DESIGN

Understanding Design thinking

Shared model in team-based design – Theory and practice in Design thinking – Explore presentation signers across globe – MVP or Prototyping

Teaching- Learning Process	Introduction about the design thinking: Chalk and Talk method Theory and practice through presentation MVP and Prototyping through live examples and videos
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Module-2

Tools for Design Thinking

Real-Time design interaction capture and analysis – Enabling efficient collaboration in digital space – Empathy for design – Collaboration in distributed Design

Teaching- Learning Process	Case studies on design thinking for real-time interaction and analysis Simulation exercises for collaborated enabled design thinking Live examples on the success of collaborated design thinking
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Module-3

Design Thinking in IT

Design Thinking to Business Process modelling – Agile in Virtual collaboration environment – Scenario based Prototyping

Teaching- Learning Process	Case studies on design thinking and business acceptance of the design Simulation on the role of virtual eco-system for collaborated prototyping
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Module-4

DT For strategic innovations

Growth – Story telling representation – Strategic Foresight - Change – Sense Making - Maintenance Relevance – Value redefinition - Extreme Competition – experience design - Standardization – Humanization - Creative Culture – Rapid prototyping, Strategy and Organization – Business Model design.

Teaching- Learning Process	Business model examples of successful designs Presentation by the students on the success of design Live project on design thinking in a group of 4 students
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Module-5

Design thinking workshop Design Thinking Work shop Empathize, Design, Ideate, Prototype and Test

Teaching- Learning Process	8 hours design thinking workshop from the expect and then presentation by the students on the learning from the workshop
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Suggested Learning Resources:**Text Books :**

1. John.R.Karsnitz, Stephen O'Brien and John P. Hutchinson, "Engineering Design", Cengage learning (International edition) Second Edition, 2013.
2. Roger Martin, "The Design of Business: Why Design Thinking is the Next Competitive Advantage", Harvard Business Press , 2009.
3. Hasso Plattner, Christoph Meinel and Larry Leifer (eds), "Design Thinking: Understand – Improve – Apply", Springer, 2011
4. Idris Mootee, "Design Thinking for Strategic Innovation: What They Can't Teach You at Business or Design School", John Wiley & Sons 2013.

References:

1. Yousef Haik and Tamer M. Shahin, "Engineering Design Process", Cengage Learning, Second Edition, 2011.
2. Book - Solving Problems with Design Thinking - Ten Stories of What Works (Columbia Business School Publishing) Hardcover – 20 Sep 2013 by Jeanne Liedtka (Author), Andrew King (Author), Kevin Bennett (Author).

Web links and Video Lectures (e-Resources):

1. www.tutor2u.net/business/presentations/. /productlifecycle/default.html
2. https://docs.oracle.com/cd/E11108_02/otn/pdf/. /E11087_01.pdf
3. www.bizfilings.com › Home › Marketing › Product Development
4. <https://www.mindtools.com/brainstm.html>
5. <https://www.quicksprout.com/. /how-to-reverse-engineer-your-competit>
6. www.vertabelo.com/blog/documentation/reverse-engineering
<https://support.microsoft.com/en-us/kb/273814>
7. <https://support.google.com/docs/answer/179740?hl=en>
8. <https://www.youtube.com/watch?v=2mjSDIBaUIM>
thevirtualinstructor.com/foreshortening.html
<https://dschool.stanford.edu/.../designresources/.../ModeGuideBOOTCAMP2010L.pdf>
<https://dschool.stanford.edu/use-our-methods/> 6. <https://www.interaction-design.org/literature/article/5-stages-in-the-design-thinking-process> 7.
<http://www.creativityatwork.com/design-thinking-strategy-for-innovation/> 49 8.
<https://www.nngroup.com/articles/design-thinking/> 9.
<https://designthinkingforeducators.com/design-thinking/> 10. www.designthinkingformobility.org/wp-content/.../10/NapkinPitch_Worksheet.pdf

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

<http://dschool.stanford.edu/dgift/>

https://onlinecourses.nptel.ac.in/noc19_mg60/preview

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Course Outcomes:

Upon the successful completion of the course, students will be able to:

Course Outcomes	Knowledge Level (Based on revised Bloom's Taxonomy)
Appreciate various design process procedure	K2
Generate and develop design ideas through different technique	K2
Identify the significance of reverse Engineering to Understand products	K2
Draw technical drawing for design ideas	K3

COs and POs Mapping

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

Level 3- Highly Mapped, Level 2-Moderately Mapped, Level 1-Low Mapped, Level 0- Not Mapped

II Semester

Course Title:	MATHEMATICS-II FOR ELECTRICAL & ELECTRONICS ENGINEERING STREAM		
Course Code:	22MATE21	CIE Marks	50
Course Type (Theory/Practical/Integrated)	Integrated	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P: S)	2:2:2:0	Exam Hours	03
Total Hours of Pedagogy	40 hours Theory + 10 to12 Lab sessions	Credits	04

Course objectives: The goal of the course **Mathematics-II for Electrical & Electronics Engineering Stream (22MATE21)** is to

- **Familiarize** the importance of Integral calculus and Vector calculus essential for electronics and electrical engineering.
- **Analyze** electronics and electrical engineering problems by applying Partial Differential Equations.
- **Develop** the knowledge of solving electronics and electrical engineering problems numerically.

Module-1 Vector Calculus (8 hours)

Introduction to Vector Calculus in EC & EE engineering applications.

Vector Differentiation: Scalar and vector fields. Gradient, directional derivative, curl and divergence - physical interpretation, solenoidal and irrotational vector fields. Problems.

Vector Integration: Line integrals, Surface integrals. Applications to work done by a force and flux. Statement of Green's theorem and Stoke's theorem. Problems.

Self-Study: Volume integral and Gauss divergence theorem.

Applications: Conservation of laws, Electrostatics, Analysis of streamlines and electric potentials. (RBT Levels: L1, L2 and L3)

Module-2 Vector Space and Linear Transformations (8 hours)

Importance of Vector Space and Linear Transformations in the field of EC & EE engineering applications.

Vector spaces: Definition and examples, subspace, linear span, Linearly independent and dependent sets, Basis and dimension.

Linear transformations: Definition and examples, Algebra of transformations, Matrix of a linear transformation. Change of coordinates, Rank and nullity of a linear operator, Rank-Nullity theorem. Inner product spaces and orthogonality.

Self-study: Angles and Projections. Rotation, reflection, contraction and expansion. **Applications:** Image processing, AI & ML, Graphs and networks, computer graphics. (RBT Levels: L1, L2 and L3)

Module-3 Laplace Transform (8 hours)

Importance of Laplace Transform for EC & EE engineering applications.

Existence and Uniqueness of Laplace transform (LT), transform of elementary functions, region of convergence, Properties—Linearity, Scaling, t-shift property, s-domain shift, differentiation in the s- domain, division by t, differentiation and integration in the time domain, LT of special functions- periodic functions (square wave, saw-tooth wave, triangular wave, full & half wave

rectifier), Heaviside Unit step function, Unit impulse function.

Inverse Laplace Transforms:

Definition, properties, evaluation using different methods, convolution theorem (without proof), problems, and Applications to solve ordinary differential equations.

Self-Study: Verification of convolution theorem.

Applications: Signals and systems, Control systems, LR, CR & LCR circuits.

(RBT Levels: L1, L2 and L3)

Module-4 Numerical methods -1 (8 hours)

Importance of numerical methods for discrete data in the field of EC & EE engineering applications.

Solution of algebraic and transcendental equations: Regula-Falsi method and Newton-Raphson method (only formulae). Problems.

Finite differences, Interpolation using Newton's forward and backward difference formulae, Newton's divided difference formula and Lagrange's interpolation formula (All formulae without proof). Problems.

Numerical integration: Trapezoidal, Simpson's $(1/3)^{rd}$ and $(3/8)^{th}$ rules (without proof). Problems.

Self-Study: Bisection method, Lagrange's inverse Interpolation, Weddle's rule.

Applications: Estimating the approximate roots, extremum values, Area, volume, and surface area.

(RBT Levels: L1, L2 and L3)

Module-5 Numerical methods -2 (8 hours)

Introduction to various numerical techniques for handling EC & EE applications. Numerical Solution of Ordinary Differential Equations (ODEs):

Numerical solution of ordinary differential equations of first order and first degree - Taylor's series method, Modified Euler's method, Runge-Kutta method of fourth order and Milne's predictor-corrector formula (No derivations of formulae). Problems.

Self-Study: Adam-Bashforth method.

Applications: Estimating the approximate solutions of ODE for electric circuits.

(RBT Levels: L1, L2 and L3)

List of Laboratory experiments (2 hours/week per batch/ batch strength 15)10 lab sessions + 1 repetition class + 1 Lab Assessment

1	Finding gradient, divergent, curl and their geometrical interpretation and Verification of Green's theorem
2	Computation of basis and dimension for a vector space and Graphical representation of linear transformation
3	Visualization in time and frequency domain of standard functions
4	Computing inverse Laplace transform of standard functions
5	Laplace transform of convolution of two functions
6	Solution of algebraic and transcendental equations by Regula-Falsi and Newton-Raphson method
7	Interpolation/Extrapolation using Newton's forward and backward difference formula
8	Computation of area under the curve using Trapezoidal, Simpson's $(1/3)^{rd}$ and $(3/8)^{th}$ rule
9	Solution of ODE of first order and first degree by Taylor's series and Modified Euler's method

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10	Solution of ODE of first order and first degree by Runge-Kutta 4 th order and Milne's predictor-corrector method
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Suggested software's: Mathematica/MatLab/Python/Scilab

Suggested Learning Resources:

Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year) Text Books

1. B. S. Grewal: "Higher Engineering Mathematics", Khanna publishers, 44th Ed., 2021.
2. E. Kreyszig: "Advanced Engineering Mathematics", John Wiley & Sons, 10th Ed., 2018.

Reference Books

1. **V. Ramana:** "Higher Engineering Mathematics" McGraw-Hill Education, 11th Ed., 2017
2. **Srimanta Pal & Subodh C. Bhunia:** "Engineering Mathematics" Oxford University Press, 3rd Ed., 2016.
3. **N.P Bali and Manish Goyal:** "A textbook of Engineering Mathematics" Laxmi Publications, 10th Ed., 2022.
4. **C. Ray Wylie, Louis C. Barrett:** "Advanced Engineering Mathematics" McGraw – Hill Book Co., Newyork, 6th Ed., 2017.
5. **Gupta C.B, Sing S.R and Mukesh Kumar:** "Engineering Mathematic for Semester I and II", Mc-Graw Hill Education(India) Pvt. Ltd 2015.
6. **H. K. Dass and Er. Rajnish Verma:** "Higher Engineering Mathematics" S. Chand Publication, 3rd Ed., 2014.
7. **James Stewart:** "Calculus" Cengage Publications, 7th Ed., 2019.
8. **David C Lay:** "Linear Algebra and its Applications", Pearson Publishers, 4th Ed., 2018.
9. **Gareth Williams:** "Linear Algebra with applications", Jones Bartlett Publishers Inc., 6thEd., 2017

Web links and Video Lectures (e-Resources):

- <http://nptel.ac.in/courses.php?disciplineID=111>
- [http://www.class-central.com/subject/math\(MOOCs\)](http://www.class-central.com/subject/math(MOOCs))
- <http://academicearth.org/>
- VTU e-Shikshana Program
- VTU EDUSAT Program

Activity-Based Learning (Suggested Activities in Class)/Practical-Based Learning

- Quizzes
- Assignments
- Seminar

Course outcome (Course Skill Set)

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

CO1	Understand the applications of vector calculus refer to solenoidal, irrotational vectors, line integral and surface integral.
CO2	Demonstrate the idea of Linear dependence and independence of sets in the vector space, and linear transformation
CO3	To understand the concept of Laplace transform and to solve initial value problems.
CO4	Apply the knowledge of numerical methods in solving physical and engineering phenomena.
CO5	Get familiarize with modern mathematical tools namely SCILAB/PYTHON/MATLAB

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- **COs and POs Mapping (Individual teacher has to fill up)**

COs	POs						
	1	2	3	4	5	6	7
CO1	1						
CO2	1						
CO3	1						
CO4	1						
CO5	1						

Level 3- Highly Mapped, Level 2-Moderately Mapped, Level 1-Low Mapped, Level 0- Not Mapped

Course Title:	CHEMISTRY FOR ELECTRICAL AND ELECTRONICS ENGINEERING STREAM		
Course Code:	22CHEE22	CIE Marks	50
Course Type (Theory/Practical/Integrated)	Integrated	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P: S) ¹	2:2:2:0	Exam Hours	03+02
Total Hours of Pedagogy	40 hours Theory + 10to12 Lab session	Credits	04

Course objectives

- To enable students to acquire knowledge on principles of chemistry for engineering applications.
- To develop an intuitive understanding of chemistry by emphasizing the related branches of engineering.
- To provide students with a solid foundation in analytical reasoning required to solve societal problems.

Teaching-Learning Process

These are sample strategies, which teacher can use to accelerate the attainment of the various course outcomes and make Teaching-Learning more effective

- Tutorial & remedial classes for needy students (not regular T/R)
- Conducting Makeup classes / Bridge courses for needy students
- Demonstration of concepts either by building models or by industry visit
- Experiments in laboratories shall be executed in blended mode (conventional or non-conventional methods)
- Use of ICT – Online videos, online courses
- Use of online platforms for assignments / Notes / Quizzes (Ex. Google classroom)

MODULE 1: Chemistry of Electronic Materials (8 Hours)

Conductors and Insulators: Introduction, principle with examples.

Semiconductors: Introduction, production of electronic grade silicon-Czochralski process (CZ) and Float Zone (FZ) methods.

Polymers: Introduction, Molecular weight - Number average, Weight average and numerical problems. Conducting polymers – synthesis and conducting mechanism of polyacetylene. Preparation, properties and commercial applications of graphene oxide.

PCB: Electroless plating – Introduction, Electroless plating of copper in the manufacture of double-sided PCB.

Self-learning: Technological importance of metal finishing and distinction between

electroplating and electroless plating.

MODULE 2: Energy Conversion and Storage (8 Hours)

Batteries: Introduction, classification of batteries. Components, construction, working and applications of modern batteries; Na-ion battery, solid state battery (Li-polymer battery) and flow battery (Vanadium redox flow battery).

Fuel Cells: Introduction, construction, working and applications of methanol–oxygen and polymer electrolyte membrane (PEM) fuel cell.

Solar Energy: Introduction, importance of solar PV cell, construction and working of solar PV cell, advantages and disadvantages.

Self-learning: Electrodes for electrostatic double layer capacitors, pseudo capacitors, and hybrid capacitor.

MODULE 3: Corrosion Science and E-waste Management (8 Hours)

Corrosion Chemistry: Introduction, electrochemical theory of corrosion, types of corrosion-differential metal and differential aeration. Corrosion control - galvanization, anodization and sacrificial anode method. Corrosion Penetration Rate (CPR) - Introduction and numerical problem.

E-waste Management: Introduction, sources, types, effects of e-waste on environment and human health, methods of disposal, advantages of recycling. Extraction of copper and gold from e-waste.

Self-learning: Recycling of PCB and battery components

MODULE 4: Nanomaterials and Display Systems (8 Hours)

Nanomaterials: Introduction, size dependent properties of nanomaterials (Surface area, Catalytic, Conducting), preparation of nanomaterials by sol-gel and co-precipitation method with example. Introduction, properties and applications - Nanofibers, Nanophotonics, Nanosensors.

Display Systems: Liquid crystals (LC's) - Introduction, classification, properties and application in Liquid Crystal Displays (LCD's). Properties and application of Organic Light Emitting Diodes (OLED's) and Quantum Light emitting diodes (QLED's).

Perovskite Materials: Introduction, properties and applications in optoelectronic devices.

Self-learning: Properties & electrochemical applications of carbon nanotubes and graphene.

MODULE 5: Sensors in Analytical Techniques (8 Hours)

Electrode System: Introduction, types of electrodes. Ion selective electrode – definition, construction, working and applications of glass electrode. Determination of pH using glass electrode. Reference electrode - Introduction, calomel electrode – construction, working and applications of calomel electrode. Concentration cell – Definition, construction and Numerical problems.

Sensors: Introduction, working principle and applications of Conductometric sensors, Electrochemical sensors, Thermometric sensors, and Optical sensors.

Analytical Techniques: Introduction, principle and instrumentation of Colorimetric sensors; its application in the estimation of copper, Potentiometric sensors; its application in the estimation of iron, Conductometric sensors; its application in the estimation of weak acid.

Self-learning: IR and UV- Visible spectroscopy.

PRACTICAL MODULE

A – Demonstration (any two) offline/virtual:

- A1. Synthesis of polyurethane
- A2. Determination of strength of an acid in Pb-acid battery
- A3. Synthesis of iron oxide nanoparticles
- A4. Electroplating of copper on metallic objects

B – Exercise (compulsorily any 4 to be conducted):

- B1. Conductometric estimation of acid mixture
- B2. Potentiometric estimation of FAS using $K_2Cr_2O_7$
- B3. Determination of pKa of vinegar using pH sensor (Glass electrode)
- B4. Determination of rate of corrosion of mild steel by weight loss method
- B5. Estimation of total hardness of water by EDTA method

C – Structured Enquiry (compulsorily any 4 to be conducted):

- C1. Estimation of Copper present in electroplating effluent by optical sensor (colorimetry)
- C2. Determination of Viscosity coefficient of lubricant (Ostwald's viscometer)
- C3. Estimation of iron in TMT bar by diphenyl amine/external indicator method
- C4. Estimation of Sodium present in soil/effluent sample using flame photometry
- C5. Determination of Chemical Oxygen Demand(COD) of industrial waste water sample

D – Open Ended Experiments (any two):

- D1. Estimation of metal in e-waste by optical sensors
- D2. Electroless plating of Nickel on Copper
- D3. Determination of glucose by electrochemical sensors
- D4. Synthesis of polyaniline and its conductivity measurement

Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)

1. Wiley Engineering Chemistry, Wiley India Pvt. Ltd. New Delhi, 2013- 2nd Edition.
2. Engineering Chemistry, Satyaprakash & Manisha Agrawal, Khanna Book Publishing, Delhi
3. A Text Book of Engg. Chemistry, Shashi Chawla, Dhanpat Rai & Co. (P) Ltd.
4. Essentials of Physical Chemistry, Bahl & Tuli, S.Chand Publishing
Applied Chemistry, Sunita Rattan, Kataria
5. Engineering Chemistry, Baskar, Wiley
5. Engineering Chemistry – I, D. Groukrishana, Vikas Publishing
6. A Text book of Engineering Chemistry, SS Dara & Dr. SS Umare, S Chand & Company
7. Ltd., 12th Edition, 2011.
8. A Text Book of Engineering Chemistry, R.V. Gadag and Nityananda Shetty, I. K.
9. Text Book of Polymer Science, F.W. Billmeyer, John Wiley & Sons, 4th Edition, 1999.
10. Nanotechnology A Chemical Approach to Nanomaterials, G.A. Ozin & A.C. Arsenault, RSC
Publishing, 2005.
11. Corrosion Engineering, M. G. Fontana, N. D. Greene, McGraw Hill Publications, New
York, 3rd Edition, 1996.
12. Linden's Handbook of Batteries, Kirby W. Beard, Fifth Edition, McGraw Hill, 2019.
13. OLED Display Fundamentals and Applications, Takatoshi Tsujimura, Wiley-Blackwell, 2012
14. Supercapacitors: Materials, Systems, and Applications, Max Lu, Francois Beguin,
Elzbieta Frackowiak, Wiley-VCH; 1st edition, 2013.
15. "Handbook on Electroplating with Manufacture of Electrochemicals", ASIA PACIFIC
BUSINESS PRESS Inc., 2017. Dr. H. Panda,

16. Expanding the Vision of Sensor Materials. National Research Council 1995, Washington, DC: The National Academies Press. doi: 10.17226/4782.
17. Engineering Chemistry, Edited by Dr. Mahesh B and Dr. Roopashree B, Sunstar Publisher, Bengaluru, ISBN 978-93-85155-70-3, 2022
18. High Performance Metallic Materials for Cost Sensitive Applications, F. H. Froes, et al. John Wiley & Sons, 2010
19. Instrumental Methods of Analysis, Dr. K. R. Mahadik and Dr. L. Sathiyarayanan, Nirali Prakashan, 2020
20. Principles of Instrumental Analysis, Douglas A. Skoog, F. James Holler, Stanley R. Crouch Seventh Edition, Cengage Learning, 2020
21. Polymer Science, V R Gowariker, N V Viswanathan, Jayadev, Sreedhar, Newage Int. Publishers, 4th Edition, 2021
22. Engineering Chemistry, P C Jain & Monica Jain, Dhanpat Rai Publication, 2015-16th Edition.
23. Nanostructured materials and nanotechnology, Hari Singh, Nalwa, academic press, 1st Edition, 2002.
24. Nanotechnology Principles and Practices, Sulabha K Kulkarni, Capital Publishing Company, 3rd Edition 2014
25. Principles of nanotechnology, Phanikumar, Scitech publications, 2nd Edition, 2010.
26. Chemistry for Engineering Students, B. S. Jai Prakash, R. Venugopal, Sivakumaraiah & Pushpa Iyengar., Subash Publications, 5th Edition, 2014
27. "Engineering Chemistry", O. G. Palanna, Tata McGraw Hill Education Pvt. Ltd. New Delhi, Fourth Reprint, 2015.
28. Chemistry of Engineering materials, Malini S, K S Anantha Raju, CBS publishers Pvt Ltd.,
29. Laboratory Manual Engg. Chemistry, Anupma Rajput, Dhanpat Rai & Co.

Web links and Video Lectures (e-Resources):

- <http://libgen.rs/>
- <https://nptel.ac.in/downloads/122101001/>
- <https://nptel.ac.in/courses/104/103/104103019/>
- <https://ndl.iitkgp.ac.in/>
- <https://www.youtube.com/watch?v=faESCxAWR9k>
- <https://www.youtube.com/watch?v=TBqXMWaxZYM&list=PLyhmwFtznRhuz8L1bb3X-9IbHrDMjHWWWh>
- <https://www.youtube.com/watch?v=j5Hml6KN4TI>
- <https://www.youtube.com/watch?v=X9GHBdyYcyo>
- <https://www.youtube.com/watch?v=1xWBPZnEJk8>
- <https://www.youtube.com/watch?v=wRAo-M8xBHM>

Activity Based Learning**(Suggested Activities in Class)/ Practical Based learning**

- <https://www.vlab.co.in/broad-area-chemical-sciences>
- <https://demonstrations.wolfram.com/topics.php>
- <https://interestingengineering.com/science>

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Course outcome (Course Skill Set)

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

C01	Identify the terms and applications
C02	Explain the phenomena of chemistry to describe the methods of engineering processes
C03	Solve for the problems in chemistry that are pertinent in engineering applications
C04	Apply the basic concepts of chemistry to explain the chemical properties and processes
C05	Analyze properties and multidisciplinary situations

COs and POs Mapping (Individual teacher has to fill up)												
PO												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C01	3	1	1				1					
C02	3	1	1				1					
C03	3	1	1				1					
C04	3	1	1				1					
C05	3	1	1				1					

Course Title:	COMPUTER AIDED ENGINEERING DRAWING		
Course Code	22CAED23	CIE Marks	50
Teaching Hour/Week (L:T:P:S)	2:0:2:0	SEE Marks	50
Total Hours of Teaching - Learning	40	Total Marks	100
Credits	03	Exam Hours	03

Course Learning Objectives:

CLO1: To understand the basic principles and conventions of engineering drawing

CLO2: To use drawing as a communication mode

CLO3: To generate pictorial views using CAD software

CLO4: To understand the development of surfaces

CLO5: To visualize engineering components

Module-1

Introduction: for CIE only

Significance of Engineering drawing, BIS Conventions of Engineering Drawing, Free hand sketching of engineering drawing, Scales. Introduction to Computer Aided Drafting software, Co-ordinate system and reference planes HP, VP, RPP & LPP of 2D/3D environment. Selection of drawing sheet size and scale. Commands and creation of Lines, coordinate points, axes, polylines, square, rectangle, polygons, splines, circles, ellipse, text, move, copy, off-set, mirror, rotate, trim, extend, break, chamfer, fillet and curves.

Orthographic Projections of Points, Lines and Planes:

Introduction to Orthographic projections: Orthographic projections of points in 1st and 3rd quadrants. Orthographic projections of lines (Placed in First quadrant only).

Orthographic projections of planes viz triangle, square, rectangle, pentagon, hexagon, and circular laminae (Placed in First quadrant only using change of position method).

Application on projections of Lines & Planes (For CIE only)

Module-2**Orthographic Projection of Solids:**

Orthographic projection of right regular solids (Solids Resting on HP only): Prisms & Pyramids (triangle, square, rectangle, pentagon, hexagon), Cylinders, Cones, Cubes & Tetrahedron.

Projections of Frustum of cone and pyramids (For practice only, not for CIE and SEE).

Module-3**Isometric Projections:**

Isometric scale, Isometric projection of hexahedron (cube), right regular prisms, pyramids, cylinders, cones and spheres. Isometric projection of combination of two simple solids.

Conversion of simple isometric drawings into orthographic views.

Problems on applications of Isometric projections of simple objects / engineering components.

Introduction to drawing views using 3D environment (For CIE only).

Module-4**Development of Lateral Surfaces of Solids:**

Development of lateral surfaces of right regular prisms, cylinders, pyramids and cones resting with base on HP only. Development of lateral surfaces of their frustums and truncations.

Problems on applications of development of lateral surfaces like funnels and trays.

Problems on applications of development of lateral surfaces of transition pieces connecting circular duct and rectangular duct (For CIE Only)

Module-5**Multidisciplinary Applications & Practice (For CIE Only):**

Free hand Sketching; True free hand, Guided Free hand, Roads, Buildings, Utensils, Hand tools & Furniture's etc Drawing Simple Mechanisms; Bicycles, Tricycles, Gear trains, Ratchets, two-wheeler cart & Four-wheeler carts to dimensions etc

Electric Wiring and lighting diagrams; Like, Automatic fire alarm, Call bell system, UPS system, Basic power distribution system using suitable software

Basic Building Drawing; Like, Architectural floor plan, basic foundation drawing, steel structures - Frames, bridges, trusses using Auto CAD or suitable software,

Electronics Engineering Drawings- Like, Simple Electronics Circuit Drawings, practice on layers concept.

Graphs & Charts: Like, Column chart, Pie chart, Line charts, Gantt charts, etc. using Microsoft Excel or any suitable software.

Course Outcomes

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

CO 1. Draw and communicate the objects with definite shape and dimensions

CO 2. Recognize and Draw the shape and size of objects through different views

CO 3. Develop the lateral surfaces of the object

CO 4. Create a Drawing views using CAD software.

CO 5. Identify the interdisciplinary engineering components or systems through its graphical representation.

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Text Books

1. *S.N. Lal, & T Madhusudhan*., Engineering Visulisation, 1st Edition, Cengage, Publication
2. *Parthasarathy N. S., Vela Murali*, Engineering Drawing, Oxford University Press, 2015.

Reference Books

3. *Bhattacharya S. K.*, Electrical Engineering Drawing, New Age International publishers, second edition 1998, reprint 2005.
4. *Chris Schroder*, Printed Circuit Board Design using AutoCAD, Newnes, 1997.
5. *K S Sai Ram* Design of steel structures, , Third Edition by Pearson
6. *Nainan p kurian* Design of foundation systems, Narosa publications
7. *A S Pabla*, Electrical power distribution, 6th edition, Tata Mcgraw hill
8. *Bhatt, N.D.*, *Engineering Drawing: Plane and Solid Geometry*, 53rd edition, Charotar Publishing House Pvt.Limited, 2019.
9. *K. R. Gopalakrishna, & Sudhir Gopalakrishna*: Textbook Of Computer Aided Engineering Drawing, 39th Edition, Subash Stores, Bangalore, 2017

COs and POs Mapping (CO-PO mappings are only Indicative)

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

Level 3- Highly Mapped, Level 2-Moderately Mapped, Level 1-Low Mapped, Level 0- Not Mapped

Course Title	INTRODUCTION TO ELECTRICAL ENGINEERING		
Course Code:	22ESC142	CIE Marks	50
Course Type (Theory/Practical /Integrated)	Theory	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P: S)	3:0:0:0	Exam Hours	03
Total Hours of Pedagogy	40 hours	Credits	03

Course objectives

- To explain the laws used in the analysis of DC and AC circuits.
- To explain the behavior of circuit elements in single-phase circuits.
- To explain the construction and operation of transformers, DC generators and motors and induction motors.
- To introduce concepts of circuit protecting devices and earthing.
- To explain electric power generation, transmission and distribution, electricity billing, equipment and personal safety measures.

Teaching-Learning Process

These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes and make Teaching –Learning more effective

1. Chalk and talk
2. Animated/NPTEL videos
3. Cut sections
4. PPTs

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Module-1 (08 Hours)

Introduction: Conventional and non-conventional energy resources; General structure of electrical power systems using single line diagram approach.

Power Generation: Hydel, Nuclear, Solar & wind power generation (Block Diagram approach).

DC Circuits:

Ohm's Law and its limitations. KCL & KVL, series, parallel, series-parallel circuits. Simple Numerical.

Module-2 (08 Hours)

A.C. Fundamentals:

Equation of AC Voltage and current, waveform, time period, frequency, amplitude, phase, phase difference, average value, RMS value, form factor, peak factor. (only definitions)

Voltage and current relationship with phasor diagrams in R, L, and C circuits. Concept of Impedance. Analysis of R-L, R-C, R-L-C Series circuits. Active power, reactive power and apparent power. Concept of power factor. (Simple Numerical).

Three Phase Circuits:

Generation of Three phase AC quantity, advantages and limitations; star and delta connection, relationship between line and phase quantities (excluding proof)

Module-3 (08 Hours)

DC Machines:

DC Generator: Principle of operation, constructional details, induced emf expression, types of generators. Relation between induced emf and terminal voltage. Simple numerical.

DC Motor: Principle of operation, back emf and its significance. Torque equation, types of motors, characteristics and speed control (armature & field) of DC motors (series & shunt only). Applications of DC motors. Simple numerical.

Module-4(08 Hours)

Transformers: Necessity of transformer, principle of operation, Types and construction of single-phase transformers, EMF equation, losses, variation of losses with respect to load. Efficiency and simple numerical.

Three-phase induction Motors: Concept of rotating magnetic field, Principle of operation, constructional features of motor, types – squirrel cage and wound rotor. Slip and its significance simple numerical.

Module-5 (08 Hours)

Domestic Wiring: Requirements, Types of wiring: casing, capping. Two way and three way control of load.

Electricity Bill: Power rating of household appliances including air conditioners, PCs, laptops, printers, etc. Definition of "unit" used for consumption of electrical energy, two-part electricity tariff, calculation of electricity bill for domestic consumers.

Equipment Safety measures: Working principle of Fuse and Miniature circuit breaker (MCB), merits and demerits.

Personal safety measures: Electric Shock, Earthing and its types, Safety Precautions to avoid shock.

Suggested Learning Resources:

Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year) Text Books:

1. Basic Electrical Engineering by D C Kulshreshtha, Tata McGraw Hill, First Edition 2019.
2. A text book of Electrical Technology by B.L. Theraja, S Chand and Company, reprint edition 2014.

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Reference Books:

1. Basic Electrical Engineering, D. P. Kothari and I. J. Nagrath, Tata McGraw Hill 4th edition, 2019.
2. Principles of Electrical Engineering & Electronics by V. K. Mehta, Rohit Mehta, S. Chand and Company Publications, 2nd edition, 2015.
3. Fundamentals of Electrical Engineering by Rajendra Prasad, PHI, 3rd edition, 2014.

Web links and Video Lectures (e-Resources): www.nptel.ac.in

Course outcome (Course Skill Set)

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

CO1	Understand the concepts of various energy sources and Electric circuits.
CO2	Apply the basic Electrical laws to solve circuits.
CO3	Discuss the construction and operation of various Electrical Machines.
CO4	Identify suitable Electrical machine for practical implementation.
CO5	Explain the concepts of electric power transmission and distribution, electricity billing, circuit protective devices and personal safety measures.

COs and POs Mapping (Individual teacher has to fill up)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	0	1	1	1	1	0	0	0	1
CO2	3	3	2	1	1	1	0	0	0	0	0	1
CO3	3	2	1	1	1	1	1	1	0	0	0	1
CO4	3	2	2	1	0	1	1	1	0	0	0	1
CO5	3	1	2	0	1	2	1	1	0	0	1	1

Level 3- Highly Mapped, Level 2-Moderately Mapped, Level 1-Low Mapped, Level 0- Not Mapped

Course Title:	INTRODUCTION TO PYTHON PROGRAMMING		
Course Code:	22PLC25B	CIE Marks	50
Course Type (Theory/Practical /Integrated)	Integrated	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P: S)	2:0:2:0	Exam Hours	03
Total Hours of Pedagogy	40 hours	Credits	03

Course objectives

- Learn the syntax and semantics of the Python programming language.
- Illustrate the process of structuring the data using lists, tuples
- Appraise the need for working with various documents like Excel, PDF, Word and Others.
- Demonstrate the use of built-in functions to navigate the file system.
- Implement the Object Oriented Programming concepts in Python.

Module-1 (08 hrs)

Python Basics: Entering Expressions into the Interactive Shell, The Integer, Floating-Point, and String Data Types, String Concatenation and Replication, Storing Values in Variables, Your First Program, Dissecting Your Program, **Flow control:** Boolean Values, Comparison Operators,

Boolean Operators, Mixing Boolean and Comparison Operators, Elements of Flow Control, Program Execution, Flow Control Statements, Importing Modules, Ending a Program Early with `sys.exit()`, **Functions:** `def` Statements with Parameters, Return Values and `return` Statements, The `None` Value, Keyword Arguments and `print()`, Local and Global Scope, The `global` Statement, Exception Handling, A Short Program: Guess the Number

Textbook 1: Chapters 1 – 3

Module-2 (08 Hours)

Lists: The List Data Type, Working with Lists, Augmented Assignment Operators, Methods, Example Program: Magic 8 Ball with a List, List-like Types: Strings and Tuples, References,

Dictionaries and Structuring Data: The Dictionary Data Type, Pretty Printing, Using Data Structures to Model Real-World Things,

Textbook 1: Chapters 4 – 5

Module-3 (08 Hours)

Manipulating Strings: Working with Strings, Useful String Methods, Project: Password Locker, Project: Adding Bullets to Wiki Markup

Reading and Writing Files: Files and File Paths, The `os.path` Module, The File Reading/Writing Process, Saving Variables with the `shelve` Module, Saving Variables with the `print.format()` Function, Project: Generating Random Quiz Files, Project: Multiclipboard,

Textbook 1: Chapters 6 , 8

Module-4 (08 Hours)

Organizing Files: The `shutil` Module, Walking a Directory Tree, Compressing Files with the `zipfile` Module, Project: Renaming Files with American-Style Dates to European-Style Dates, Project: Backing Up a Folder into a ZIP File,

Debugging: Raising Exceptions, Getting the Traceback as a String, Assertions, Logging, IDLE's Debugger.

Textbook 1: Chapters 9-10

Module-5 (08 Hours)

Classes and objects: Programmer-defined types, Attributes, Rectangles, Instances as return values, Objects are mutable, Copying,

Classes and functions: Time, Pure functions, Modifiers, Prototyping versus planning,

Classes and methods: Object-oriented features, Printing objects, Another example, A more complicated example, The `__init__` method, The `__str__` method, Operator overloading, Type-based dispatch, Polymorphism, Interface and implementation,

Textbook 2: Chapters 15 – 17

Programming Exercises:

- Develop a program to read the student details like Name, USN, and Marks in three subjects. Display the student details, total marks and percentage with suitable messages.
 - Develop a program to read the name and year of birth of a person. Display whether the person is a senior citizen or not.
- Develop a program to generate Fibonacci sequence of length (N). Read N from the console.
 - Write a function to calculate factorial of a number. Develop a program to compute binomial coefficient (Given N and R).
- Read N numbers from the console and create a list. Develop a program to print mean,

variance and standard deviation with suitable messages.

4. Read a multi-digit number (as chars) from the console. Develop a program to print the frequency of each digit with suitable message.
6. Develop a program to print 10 most frequently appearing words in a text file. [Hint: Use dictionary] Develop a program to sort the contents of a text file and write the sorted contents into a separate text file. [Hint: Use string methods strip(), len(), list methods sort(), append(), and file methods open(), readlines(), and write()].
7. Develop a program to backing Up a given Folder (Folder in a current working directory) into a ZIP File by using relevant modules and suitable methods.
8. Write a function named DivExp which takes TWO parameters a, b and returns a value c ($c=a/b$). Write suitable assertion for $a>0$ in function DivExp and raise an exception for when $b=0$. Develop a suitable program which reads two values from the console and calls a function Div Exp.
9. Define a function which takes TWO objects representing complex numbers and returns new complex number with a addition of two complex numbers. Define a suitable class 'Complex' to represent the complex number. Develop a program to read N ($N \geq 2$) complex numbers and to compute the addition of N complex numbers.
10. Develop a program that uses class Student which prompts the user to enter marks in three subjects and calculates total marks, percentage and displays the score card details. [Hint: Use list to store the marks in three subjects and total marks. Use `_init_()` method to initialize name, USN and the lists to store marks and total, Use `get Marks()` method to read marks into the list, and `display()` method to display the score card details.

Suggested Learning Resources:

Text Books

1. Al Sweigart, "**Automate the Boring Stuff with Python**", 1st Edition, No Starch Press, 2015. (Available under CC-BY-NC-SA license at <https://automatetheboringstuff.com/>)
(Chapters 1 to 18, except 12) for lambda functions use this link:
<https://www.learnbyexample.org/python-lambda-function/>
2. Allen B. Downey, "**Think Python: How to Think Like a Computer Scientist**", 2nd Edition, Green Tea Press, 2015. (Available under CC-BY-NC license at <http://greenteapress.com/thinkpython2/thinkpython2.pdf>)
(Chapters 13, 15, 16, 17, 18) (Download pdf/html files from the above link)

Web links and Video Lectures (e-Resources):

- <https://www.learnbyexample.org/python/>
- <https://www.learnpython.org/>
- <https://pythontutor.com/visualize.html#mode=edit>

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

Quizzes for list, tuple, string dictionary slicing operations using below link
https://github.com/sushantkhara/Data-Structures-And-Algorithms-with-Python/raw/main/Python%20%20_%20400%20exercises%20and%20solutions%20for%20beginners.pdf

SDMCET: Syllabus

Course outcome (Course Skill Set)

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

CO1	Demonstrate proficiency in handling loops and creation of functions.
CO2	Identify the methods to create and manipulate lists, tuples and dictionaries.
CO3	Develop programs for string processing and file organization
CO4	Interpret the concepts of Object-Oriented Programming as used in Python.

COs and POs Mapping (Individual teacher has to fill up)

COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	2	2										
CO2	2	2	2	1								
CO3					2							2
CO4		1		2								

Level 3- Highly Mapped, Level 2-Moderately Mapped, Level 1-Low Mapped, Level 0- Not Mapped

Course Title:	PROFESSIONAL WRITING SKILLS IN ENGLISH		
Course Code:	22PWS26	CIE Marks	50
Course Type (Theory/Practical /Integrated)	Theory	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P: S)	1:0:0:0	Exam Hours	01 Theory
Total Hours of Pedagogy	15 hours	Credits	01

Course objectives:

The course Professional Writing Skills in English (22PWS26) will enable the students,

1. To Identify the Common Errors in Writing and Speaking of English.
2. To Achieve better Technical writing and Presentation skills for employment.
3. To read Technical proposals properly and make them to write good technical reports.
4. To Acquire Employment and Workplace communication skills.
5. To learn about Techniques of Information Transfer through presentation in different level.

Language Lab : To augment LSRW, grammar and Vocabulary skills (Listening, Speaking, Reading, Writing and Grammar, Vocabulary) through tests, activities, exercises etc., comprehensive web-based learning and assessment systems can be referred as per the AICTE / VTU guidelines.

Module-1 (03 hours of pedagogy)

Identifying Common Errors in Writing and Speaking English : Common errors identification in parts of speech, Use of verbs and phrasal verbs, Auxiliary verbs and their forms, Subject Verb Agreement (Concord Rules), Common errors in Subject-verb agreement, Sequence of Tenses and errors identification in Tenses. Words Confused/Misused.

Module-2 (03 hours of pedagogy)

Nature and Style of sensible writing: Organizing Principles of Paragraphs in Documents, Writing Introduction and Conclusion, Importance of Proper Punctuation, Precise writing and Techniques in Essay writing, Sentence arrangements and Corrections activities. Misplaced modifiers, Contractions, Collocations, Word Order, Errors due to the Confusion of words.

Module-3 (03 hours of pedagogy)

Technical Reading and Writing Practices: Technical writing process, Introduction to Technical Reports writing, Significance of Reports, Types of Reports. Introduction to Technical Proposals Writing, Types of Technical Proposals, Characteristics of Technical Proposals. Scientific Writing Process. Grammar – Voices and Reported Speech, Spotting Error & Sentence Improvement, Cloze Test and Theme Detection Exercises.

Module-4(03 hours of pedagogy)

Professional Communication for Employment: Listening Comprehension, Types of Listening, Listening Barriers, Improving Listening Skills. Reading Comprehension, Tips for effective reading. Job Applications, Types of official/employment/business Letters, Resume vs. Bio Data, Profile, CV. Writing effective resume for employment, Emails, Blog Writing and Memos.

Module-5 (03 hours of pedagogy)

Professional Communication at Workplace: Group Discussion and Professional Interviews, Characteristics and Strategies of a GD and PI's, Intra and Interpersonal Communication Skills at workplace, Non-Verbal Communication Skills and its importance in GD and Interview. Presentation skills and Formal Presentations by Students, Strategies of Presentation Skills.

Course outcome (Course Skill Set)

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

Suggested Learning Resources:

Textbook:

- 1) **“Professional Writing Skills in English”** published by Phillip Learning – Education (ILS), Bangalore – 2022.
- 2) **“Functional English”** (As per AICTE 2018 Model Curriculum) (ISBN-978-93-5350-047-4) Cengage learning India Pvt Limited [Latest Edition 2019].

Reference Books:

- 1) **English for Engineers** by N.P.Sudharshana and C.Savitha, Cambridge University Press – 2018.
- 2) **Technical Communication** by Gajendra Singh Chauhan and Et al, (ISBN-978-93-5350-050-4), Cengage learning India Pvt Limited [Latest Revised Edition] - 2019.
- 3) **Technical Communication – Principles and Practice**, Third Edition by Meenakshi Raman and Sangeetha Sharma, Oxford University Press 2017.
- 4) **High School English Grammar & Composition** by Wren and Martin, S Chandh & Company Ltd – 2015.
- 5) **Effective Technical Communication – Second Edition** by M Ashraf Rizvi, McGraw Hill Education (India) Private

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

- ✓ Contents related activities (Activity-based discussions)
- ✓ For active participation of students instruct the students to prepare Flowcharts and Handouts
- ✓ Organising Group wise discussions Connecting to placement activities
- ✓ Quizzes and Discussions, Seminars and assignments

SDMCET: Syllabus

Course outcome (Course Skill Set)

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

CO1	Explain and identify the Common Errors in Writing and Speaking.
CO2	Achieve better Technical writing and Presentation skills.
CO3	Read Technical proposals properly and make them to Write good technical reports.
CO4	Acquire Employment and Workplace communication skills.
	Learn about Techniques of Information Transfer through presentation in different level.
CO5	Learn about Techniques of Information Transfer through presentation in different level

COs and POs Mapping (Individual teacher has to fill up)

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

Level 3- Highly Mapped, Level 2-Moderately Mapped, Level 1-Low Mapped, Level 0- Not Mapped

Course Title:	INDIAN CONSTITUTION		
Course Code:	22ICO27	CIE Marks	50
Course Type (Theory/Practical /Integrated)	Theory	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P: S)	1:0:0:0	Exam Hours	01 Theory
Total Hours of Pedagogy	15 hours	Credits	01

Course objectives :

The course **INDIAN CONSTITUTION (22ICO17 / 27)** will enable the students,

1. To know about the basic structure of Indian Constitution.
2. To know the Fundamental Rights (FR's), DPSP's and Fundamental Duties (FD's) of our constitution.
3. To know about our Union Government, political structure & codes, procedures.
4. To know the State Executive & Elections system of India.
5. To learn the Amendments and Emergency Provisions, other important provisions given by the constitution.

Module-1 (03 hours of pedagogy)

Indian Constitution: Necessity of the Constitution, Societies before and after the Constitution adoption. Introduction to the Indian constitution, Making of the Constitution, Role of the Constituent Assembly.

Module-2 (03 hours of pedagogy)

Salient features of India Constitution. Preamble of Indian Constitution & Key concepts of the Preamble. Fundamental Rights (FR's) and its Restriction and limitations in different Complex Situations. building.

Module-3 (03 hours of pedagogy)

Directive Principles of State Policy (DPSP's) and its present relevance in Indian society. Fundamental Duties and its Scope and significance in Nation, Union Executive : Parliamentary System, Union Executive – President, Prime Minister, Union Cabinet.

SDMCET: Syllabus

Module-4 (03 hours of pedagogy)

Parliament - LS and RS, Parliamentary Committees, Important Parliamentary Terminologies. Judicial System of India, Supreme Court of India and other Courts, Judicial Reviews and Judicial Activism.

Module-5 (03 hours of pedagogy)

State Executive and Governor, CM, State Cabinet, Legislature - VS & VP, Election Commission, Elections & Electoral Process. Amendment to Constitution, and Important Constitutional Amendments till today. Emergency Provisions.

Suggested Learning Resources:

Textbook:

1. “**Constitution of India**” (for Competitive Exams) - Published by Naidhruva Edutech Learning Solutions, Bengaluru. – 2022.
2. “**Introduction to the Constitution of India**”, (Students Edition.) by Durga Das Basu (**DD Basu**): Prentice –Hall, 2008.

Reference Books:

1. “**Constitution of India, Professional Ethics and Human Rights**” by Shubham Singles, Charles E. Haries, and et al: published by Cengage Learning India, Latest Edition – 2019.
2. “**The Constitution of India**” by Merunandan K B: published by Merugu Publication, Second Edition, Bengaluru.
3. “**Samvidhana Odu**” - for Students & Youths by Justice HN Nagamohan Dhas, Sahayana, kerekon.
4. M.Govindarajan, S.Natarajan, V.S.Senthilkumar, “**Engineering Ethics**”, Prentice –Hall, 2004.

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

- ✓ Contents related activities (Activity-based discussions)
- ✓ For active participation of students instruct the students to prepare Flowcharts and Handouts
- ✓ Organising Group wise discussions Connecting to placement activities
- ✓ Quizzes and Discussions
- ✓ Seminars and assignments

Course outcome (Course Skill Set)

At the end of the course 22ICO17/27 the student will be able to:

CO1	Analyze the basic structure of Indian Constitution.
CO2	Remember their Fundamental Rights, DPSP’s and Fundamental Duties (FD’s) of our constitution.
CO3	know about our Union Government, political structure & codes, procedures.
CO4	Understand our State Executive & Elections system of India.
CO5	Remember the Amendments and Emergency Provisions, other important provisions given by the constitution.

COs and POs Mapping (Individual teacher has to fill up)

COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
C01						1	1	3				
C02						1	1	3				
C03						1	1	3				
C04						1	1	3				
C05						1	1	3				

Level 3- Highly Mapped, Level 2-Moderately Mapped, Level 1-Low Mapped, Level 0- Not Mapped

SDMCET: Syllabus

Course Title:	SCIENTIFIC FOUNDATIONS OF HEALTH		
Course Code:	22SFH28	CIE Marks	50
Course Type (Theory/Practical /Integrated)	Theory	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P: S)	1:0:0:0	Exam Hours	01 Theory
Total Hours of Pedagogy	15 hours	Credits	01

Course objectives

The course Scientific Foundations of Health (22SFH18/28) will enable the students,

1. To know about Health and wellness (and its Beliefs) & It's balance for positive mindset.
2. To Build the healthy lifestyles for good health for their better future.
3. To Create a Healthy and caring relationships to meet the requirements of good/social/positive life.
4. To learn about Avoiding risks and harmful habits in their campus and outside the campus for their bright future
5. To Prevent and fight against harmful diseases for good health through positive mindset

Module-1(03 hours of pedagogy)

Good Health & It's balance for positive mindset: Health -Importance of Health, Influencing factors of Health,

Health beliefs, Advantages of good health, Health & Behavior, Health & Society, Health & family, Health & Personality, Psychological disorders-Methods to improve good psychological health, Changing health habits for good health.

Module-2 (03 hours of pedagogy)

Building of healthy lifestyles for better future: Developing healthy diet for good health, Food & health, Nutritional

guidelines for good health, Obesity & overweight disorders and its management, Eating disorders, Fitness components for health, Wellness and physical function, How to avoid exercise injuries.

Module-3 (03 hours of pedagogy)

Creation of Healthy and caring relationships : Building communication skills, Friends and friendship - Education,

the value of relationship and communication skills, Relationships for Better or worsening of life, understanding of basic instincts of life (more than a biology), Changing health behaviors through social engineering.

Module-4 (03 hours of pedagogy)

Avoiding risks and harmful habits : Characteristics of health compromising behaviors, Recognizing and avoiding of

addictions, How addiction develops, Types of addictions, influencing factors of addictions, Differences between addictive people and non-addictive people & their behaviors. Effects of addictions Such as..., how to recovery from addictions.

Module-5 (03 hours of pedagogy)

Preventing & fighting against diseases for good health: How to protect from different types of infections, How to

reduce risks for good health, Reducing risks & coping with chronic conditions, Management of

SDMCET: Syllabus

chronic illness for Quality of life, Health & Wellness of youth :a challenge for upcoming future, Measuring of health & wealth status.

Suggested Learning Resources:

Textbook:

1. “Scientific Foundations of Health” – Study Material Prepared by Dr. L Thimmesha, Published in VTU - University Website.
2. “Scientific Foundations of Health”, (ISBN-978-81-955465-6-5) published by Infinite Learning Solutions, Bangalore – 2022.
3. Health Psychology - A Textbook, FOURTH EDITION by Jane Ogden McGraw Hill Education (India) Private Limited - Open University Press.

Reference Books:

1. Health Psychology (Second edition) by Charles Abraham, Mark Conner, Fiona Jones and Daryl O’Connor –Published by Routledge 711 Third Avenue, New York, NY 10017.
2. HEALTH PSYCHOLOGY (Ninth Edition) by SHELLEY E. TAYLOR - University of California, Los Angeles, McGraw Hill Education (India) Private Limited - Open University Press.
3. SWAYAM / NPTL/ MOOCS/ We blinks/ Internet sources/ YouTube videos and other materials / notes.
4. Scientific Foundations of Health (Health & Wellness) - General Books published for university and colleges references by popular authors and published by the reputed publisher.

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

1. Contents related activities (Activity-based discussions)
2. For active participation of students instruct the students to prepare Flowcharts and Handouts
3. Organizing Group wise discussions Connecting to placement activities
4. Quizzes and Discussions, Seminars and assignments

Course outcome (Course Skill Set) :

At the end of the course Scientific Foundations of Health (22SFH18/28) the student will be able to:

CO1	To understand and analyze about Health and wellness (and its Beliefs) & It’s balance for positive mindset.
CO2	Develop the healthy lifestyles for good health for their better future.
CO3	Build a Healthy and caring relationships to meet the requirements of good/social/positive life.
CO4	To learn about Avoiding risks and harmful habits in their campus and outside the campus for their bright future.

COs and POs Mapping (Individual teacher has to fill up)

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

Level 3- Highly Mapped, Level 2-Moderately Mapped, Level 1-Low Mapped, Level 0- Not Mapped

CIE and SEE Evaluation (from 2022-23 batch)

CIE for Non integrated Courses: With LTP 3-0-0 and 4-0-0 or 2-2-0/3-2-0

- Two tests + One Improvement test : (20+20+20 each of one hour duration)

Two higher scores from three tests are taken representing 40 marks

QP pattern: Continue the existing (3 questions- Q.3 is compulsory and one question to be answered from Q.1 and Q.2, each question can be with maximum of two sub divisions)

CTA: Minimum two components such as assignments, quiz, seminar, written assignment, any technical activity related to course etc. each of 5 marks. Total CTA marks- 10

CIE= 40(from tests) +10(from CTA) = 50 marks

SEE: Exam will be conducted for 100 marks with 3 hours duration. It will be reduced to 50 marks. Five modules with built in choice. Each question can be with maximum of three sub divisions.

CIE for Integrated Courses : With LTP 2-0-2 and 3-0-2 and 2-2-2

Theory CIE component:

- Two tests + One Improvement test (20+20+20 each of one hour duration)

Two higher scores from three tests are taken representing 40 marks

QP pattern: Continue the existing (3 questions- Q.3 is compulsory and one question to be answered from Q.1 and Q.2, each question can be with maximum of two sub divisions)

Practical CIE component (CTA): Laboratory component. 5 marks for conduction, regularity, involvement, journal etc. Lab Test -5 marks. A test as per the schedule announced will be conducted at the end for 50 marks and scaled down to 5 marks. If the performance is not satisfactory in laboratory the student shall be detained and required to reregister for the course as a whole whenever offered next.

CIE= 40(from tests) +10(from CTA i.e. lab component) = 50 marks

SEE: Exam will be conducted for 100 marks with 3 hours duration. It will be reduced to 50 marks. Five modules with built in choice. Each question can be with maximum of three sub divisions. The questions shall be asked to test practical understanding for maximum of 30 marks.

CIE for AEC/HSMS Courses :With LTP 1-0-0 for 1 Credit

- CIE for 1 credit AEC/HSMS Courses with LTP 1-0-0
- Two tests + One Improvement test
- 20+20+20 each of one hour duration
- QP pattern for IA: MCQ 15 questions
- Two higher scores from three tests are taken representing 40 marks
- CTA: Minimum two components such as assignments, quiz, seminar, written assignment, any learning activity related to the course etc. each of 5 marks.
- CIE= 40(from tests)+10(from CTA)= 50 marks
- SEE: Exam will be conducted for 50 marks with 1 hour duration. There will be 50 MCQs. The question paper will contain 10 MCQ questions from each module.