

Academic Program - UG

Syllabus 2026-27

I & II Semester B.E.

Stream: Computer Science & Engineering

Branch: Computer Science & Engineering



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

(An Autonomous Institution approved by AICTE & Affiliated to VTU, Belagavi)

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SDM College of Engineering & Technology, Dharwad

It is certified that the scheme and syllabus for I & II semesters of UG program in Computer Science and Engineering is recommended by Board of Studies of Computer Science and 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 2026-27 till further revision.

Principal

Chairman BoS & HoD

Department of Computer Science and Engineering

College Vision and Mission

Vision

To develop competent professions with human values

Mission

- To have contextually relevant Curricula.
- To promote effective Teaching Learning Practices supported by Modern Educational Tools and Techniques.
- To enhance Research Culture.
- To involve the Industrial Expertise for connecting Classroom contents to real-life situations.
- To inculcate Ethics and soft-skills leading to overall personality development.

QUALITY POLICY:

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

Core Values:

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

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

VISION

To develop competent professionals in the field of Computer Science and Engineering with human values.

MISSION

1. To have contextually relevant curricula in line with industry trends and body of knowledge stated by IEEE/ACM.
2. To promote OBE based effective Teaching Learning Practices supported by modern educational tools and techniques.
3. To enhance research.
4. To involve the industrial expertise for connecting classroom contents to real-life situations.
5. To inculcate ethics and soft-skills leading to overall personality development.

Program educational Objectives (PEO)

- I. To prepare students for successful careers in Industry, Research and Institutions of higher learning
- II. To encourage students to work in teams to address industrial and socially relevant problems / projects.
- III. To provide students with a sound mathematical, scientific and engineering fundamentals necessary to formulate, analyse and solve engineering problems.
- IV. To promote student awareness and commitment to lifelong learning and professional ethics during the course of professional practice.

Program Outcomes (POs)

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

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

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

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

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

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

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

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

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

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

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

Knowledge and Attitude Profile (WK)

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

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

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

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

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

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

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

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

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

Sustainable Development Goals

SDG1: No Poverty

SDG2: Zero Hunger

SDG3: Good Health and Well-being

SDG4: Quality Education

SDG5: Gender Equality

SDG6: Clean Water and Sanitation

SDG7: Affordable and Clean Energy

SDG8: Decent Work and Economic Growth

SDG9: Industry, Innovation, and Infrastructure

SDG10: Reduced Inequalities

SDG11: Sustainable Cities and Communities

SDG12: Responsible Consumption and Production

SDG13: Climate Action

SDG14: Life Below Water

SDG15: Life on Land

SDG16: Peace, Justice, and Strong Institutions

SDG17: Partnerships for the Goals

SDMCET: Syllabus

SDM College of Engineering and Technology, Dharwad B.E. in Computer Science and Engineering, Scheme of Teaching and Examinations 2026-27 Outcome-Based Education (OBE) and Choice-Based Credit System (CBCS) (Effective from the academic year 2026-27)

I SEMESTER (Chemistry Cycle)														
Sl. No	Course	Course Code	Course Title	Teaching Department (TD) and Question Paper Setting Board (PSB)	Teaching & Learning Scheme					Examination				Credits
					CI		LI	TW & SL	TH/S	Duration in hours	CIE Marks	SEE Marks	Total Marks	
					L	T	P	SL						
1	ASC (IC)	26UMATCS11	Mathematics - I for CS Stream	Mathematics	42	0	28	50	120	3	50	100	100	4
2	ASC (IC)	26UCHECS12	Chemistry for CS Stream	Chemistry	42	0	28	50	120	3	50	100	100	4
3	ESC	26UPCP13	Principles of C Programming	Computer Science	28	0	28	34	90	3	50	100	100	3
4	ESC-I	26UESC141	Introduction to Electrical Engineering	Electrical	42	0	0	48	90	3	50	100	100	3
5	ETC	26UETC151	Introduction to AI and its application	Computer Science	42	0	0	48	90	3	50	100	100	3
6	HSMC	26UPWS16	Professional Writing Skills in English	Humanities	14	0	0	16	30	1	50	50	100	1
7	HSMC	26UICO17	Indian Constitution	Humanities	14	0	0	16	30	1	50	50	100	1
8	AEC	26UBEC18	Biology for Engineers	Computer Science	14	0	0	16	30	1	50	50	100	1
Total									600				800	20
9	AICTE Activity Points (Students have to earn 100 Activity points between 1-8 semester)				Compulsory requirement for the award of the Degree									

TH/S- Total Hours per Semester, TW & SL- Term Work & Self Learning, CI- Course Instructions, LI-Laboratory Instructions.

SDMCET: Syllabus

SDM College of Engineering and Technology, Dharwad B.E. in Computer Science and Engineering, Scheme of Teaching and Examinations 2026-27 Outcome-Based Education (OBE) and Choice-Based Credit System (CBCS) (Effective from the academic year 2026-27)

II SEMESTER (Physics Cycle)

II SEMESTER (Physics Cycle)														
Sl. No	Course	Course Code	Course Title	Teaching Department (TD) and Question Paper Setting Board (PSB)	Teaching & Learning Scheme					Examination				Credits
					CI		LI	TW & SL	TH/S	Duration in hours	CIE Marks	SEE Marks	Total Marks	
1	ASC (IC)	26UMATCS21	Mathematics-II for CS Stream	Mathematics	42	0	28	50	120	3	50	100	100	4
2	ASC (IC)	26UPHYCS22	Physics for CS Stream	Physics	42	0	28	50	120	3	50	100	100	4
3	ESC	26UCED23	Computer Aided Engineering Drawing	Mechanical	28	0	28	34	90	3	50	100	100	3
4	ESC-II	26UESC243	Introduction to Electronics and Communication Engineering	Electronics	42	0	0	48	90	3	50	100	100	3
5	PLC (IC)	26UPLC254	Advanced C Programming	Computer Science	28	0	28	34	90	3	50	100	100	3
6	HSMC	26UENG26	Communicative English	Humanities	14	0	0	16	30	1	50	50	100	1
7	HSMC	26UKSK27/ 26UKBK27	Sanskrutika Kannada/ Balake Kannada	Humanities	14	0	0	16	30	1	50	50	100	1
8	AEC	26UIDT28	Innovation and Design Thinking	Computer Science	14	0	0	16	30	1	50	50	100	1
Total									600				800	20
9	AICTE Activity Points (Students have to earn 100 Activity points between 1-8 semester)				Compulsory requirement for the award of the Degree									

TH/S- Total Hours per Semester, TW & SL- Term Work & Self Learning

26UMATCS11

Mathematics - I for CS stream

(42-0-28-50)4

Total Hours: 120

Course Learning Objectives (CLOs):

This course focuses on the following learning perspectives:

- 1) **Familiarize** the importance of vector calculus to compute derivatives, and learn concepts of multi-variable to apply to computer science and engineering.
- 2) **Develop** the knowledge of Equation Linear Algebra to solve the system of equations and to apply to computer science and engineering.
- 3) **Analyze** the importance of differential equations to computer science and engineering.

Course Outcomes (COs):

Description of the Course Outcome: At the end of the course the student will be able to:		Mapping to POs(1-11)		
		Substantial Level (3)	Moderate Level (2)	Slight Level (1)
CO-1	Solve the partial differential equations to compute rate of change of multivariate functions.	-	-	1,2,11
CO-2	Analyze vector fields for applications in computer science engineering.	-	1,2,11	-
CO-3	Analyze the solution of linear and non-linear ordinary differential equations. Solve higher order differential equations.	-	1,2,11	-
CO-4	Apply matrix theory for solving system of linear equations and compute Eigen values and Eigen vectors.	-	-	1,2,11
CO-5	Implement solutions for various mathematical problems using Python.	-	5	1,2,11

POs	1	2	3	4	5	6	7	8	9	10	11
Mapping Level	1.4	1.4	-	-	2	-	-	-	-	-	1.4

Pre-requisite: Knowledge of fundamentals of calculus, vectors, matrices.

Contents:**Unit-I****Calculus**

Partial differentiation, total derivative, differentiation of composite functions. Jacobian, Statements of Taylor's and Maclaurin's series expansion for two variables-problems. Maxima and minima for a function of two variables. Problems. **08 Hrs**

Unit-II**Vector Calculus**

Scalar and Vector fields, Gradient, directional derivative, curl and divergence-physical interpretation, solenoidal vector fields, irrotational vector fields and scalar potential. Problems. Introduction to polar co-ordinates and polar curves. Curvilinear coordinates: Scale factors, base vectors, Cylindrical polar coordinates, Spherical polar coordinates, transformation between Cartesian and curvilinear systems, orthogonality. Problems. **09 Hrs**

Unit-III**Differential Equations of First and Higher Order**

Linear and Bernoulli's differential equations. Exact and reducible to exact differential equations with integrating factors. Homogeneous and non-homogeneous Differential equations of higher order with constant coefficients. Inverse differential operators- e^{ax} , $\sin(ax+b)$, $\cos(ax+b)$ and x^n **09 Hrs**

Unit-IV**Linear Algebra -1**

Elementary row transformations of a matrix, Row reduced echelon form and Rank of a matrix. Consistency and Solution of system of linear equations - Gauss-Elimination method, Gauss-Jordon method and Gauss-Seidel method. Application to traffic flow. **08 Hrs**

Unit-V**Linear Algebra -2**

Eigen values and Eigenvectors, Rayleigh's power method to find the dominant Eigen value and Eigenvector. Modal matrix, Diagonalization of the matrix. Inverse of a matrix by Cayley-Hamilton theorem. **08 Hrs**

List of Laboratory experiments (2 hours/week, 14 lab sessions)

1. Introduction, Basics of Python.
2. Programming Structure in Python.
3. D plots for Cartesian.
4. 2D plots for polar curves.
5. Finding partial derivatives and Jacobian.
6. Expansion of Taylor's and Maclaurin's series.
7. Finding maxima and minima of two variables.
8. Finding gradient, divergence and curl.
9. Solving differential equations of first order.
10. Solving differential equations of higher order.
11. Finding rank, reduced echelon form, solving system of linear equations using Gauss elimination method.
12. Solving system of linear equations using Gauss-Seidal method.
13. Determine Eigen values and Eigen vectors.
14. Find the dominant Eigen value and corresponding Eigen vector by Rayleigh's power method.

Suggested softwares: Mathematica/MATLAB/Python/Scilab

Software used: Python

Reference Books:

- 1) B. S. Grewal, Higher Engineering Mathematics, Hanna Publishers, 44th Ed., 2021.
- 2) E. Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons, 10th Ed., 2018.
- 3) Gilbert Strang, Linear Algebra and its Applications, Dengage Publications, 4th Ed., 2022.

Course Learning Objectives (CLOs): This course focuses on the following learning perspectives:

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

Course Outcomes (COs):

Description of the Course Outcome: At the end of the course the student will be able to:		Mapping to POs (1-11)		
		Substantial Level (3)	Moderate Level (2)	Slight Level (1)
CO-1	Explain the working and application of organic memory devices and modern display technologies.	1	-	2,3
CO-2	Elucidate quantum confinement phenomena, size dependent physio-chemical properties, polymer molecular weight distribution and synthesis.	1	2	3,4
CO-3	Apply and analyse electrochemical principles with respect to advanced energy storage devices.	1	2	11
CO-4	Apply the concept of electrochemistry in chemical analysis using sensors, and suitable corrosion protection techniques.	1	2	3
CO-5	Analyse biomaterials and their applications in sustainable technologies.	1,7	-	2,6,11

POs	1	2	3	4	5	6	7	8	9	10	11
Mapping Level	3.0	1.6	1.0	1.0	-	1.0	3	-	-	-	1.0

Contents:

Unit-I

Memory Devices: Introduction, organic semiconductors: types of organic semiconductors used in memory devices, p-type semiconductor-pentacene and n-type semiconductor- perfluoro pentacene. Construction, working and advantages of pentacene semiconductor chip.

Display Systems: Introduction, liquid crystals (LCs)-classification, properties and

its applications. Construction, working principle and applications of Light Emitting Diodes (LEDs), Organic Light Emitting Diodes (OLEDs) and Quantum Light Emitting Diodes (QLEDs). **08 Hrs**

Unit-II

Quantum Dots: Introduction, size dependent properties: quantum confinement effect, surface-to-volume ratio & electrical conductance. Synthesis of SiO₂ nanoparticle by solgel method. Construction, working principles and applications of quantum dot sensitized solar cells (QDSSCs).

Polymer: Introduction, number average and weight average molecular weight of the polymers and numerical problems. Synthesis and properties of nylon- 6,6 and its advantages in 3D printing applications. Synthesis, properties and applications of polyvinyl chloride and PMMA.

Conducting polymers- Introduction, synthesis of polyaniline, conduction mechanism and its engineering applications. **08 Hrs**

Unit-III

Energy Systems: Introduction, basic overview of Nernst's equation. Construction and working of concentration cell and numerical problems. Batteries - component of batteries, classification of batteries. Characteristic of batteries – Capacity, Electrical storage density, Energy efficiency, cycle life and shelf life. Construction, working and application of Li-ion battery.

Next-Generation Energy Devices: Introduction, construction and working of sodium ion battery for EV applications. Construction and working of super capacitors and its applications.

Sustainable Energy Devices: Introduction, fuel cells, difference between fuel cell and battery. Construction, working principle, applications and limitations of solid-oxide fuel cell (SOFCs) and solar photovoltaic cell (PV cell). Production of green hydrogen by photocatalytic water splitting by TiO₂ catalyst and its advantages.

09 Hrs

Unit-IV

Sensors: Introduction, terminologies-Transducer, Actuators and Sensors. Conductometric sensor-principle, construction and its application in the estimation of acid mixture. Colorimetric sensor-principle, instrumentation and its application in the estimation of copper. Electrochemical sensors- principle, construction and its application in the detection of DO and pharmaceuticals (Diclofenac) in liquid sample.

Corrosion: Introduction, factors affecting rate of corrosion: Nature of corrosive product, Anode and Cathode area, pH and conductivity of media. Electrochemical theory of corrosion, types of corrosion-differential metal and differential aeration corrosion: waterline and pitting corrosion, stress corrosion. Corrosion control-galvanization and anodization. Vapour corrosion inhibitors for protecting computer circuit boards, corrosion penetration rate (CPR)-definition and numerical problems.

08Hrs

Unit-V

Green Chemistry: Introduction, properties and applications of green solvents for server heat management. Synthesis and properties of glycerol trioleate ester and its uses in IT infrastructure applications. Green synthesis of ZnO nanoparticles and its uses in magnetic Radio Frequency Identification (RFID) and Internet of Nano Things (IONT) system applications.

Biomaterials: Introduction, synthesis and properties of polylactic Acid (PLA) and polyethylene glycol (PEG) and its uses in touch screen applications. Synthesis and properties of Alginate Hydrogel and its uses in Brain-Computer Interfaces (BCIs) applications.

E-waste: Introduction, sources, composition of e-waste, effects of e-waste on environment and human health, Artificial intelligence in e-waste management, extraction of gold from e- waste by bioleaching method, Role of stake holders in e-waste management.

09 Hrs**PRACTICAL MODULE**

- 1) Estimation of total hardness of given water sample by EDTA method.
- 2) Estimation of percentage of CaO in cement by complexometric method.
- 3) Determination of chemical oxygen demand (COD) of industrial effluents.
- 4) Determination copper in brass by Iodometric method.
- 5) Estimation of iron in Haematite ore solution by external indicator method.
- 6) Estimation of Chloride by Argentometric method.
- 7) Determination of alkalinity of water sample by HCl method.
- 8) Estimation of acid mixture using conductometric sensor.
- 9) Estimation of iron in rust sample using potentiometric sensor.
- 10) Determination of pKa value of vinegar solution using pH sensor.
- 11) Estimation of copper present in e-waste (WPCB) by optical sensor (Colorimetry).
- 12) Determination of viscosity coefficient of green fuel using Ostwald's viscometer.
- 13) Estimation of percentage of iron in steel industry effluent by using optical sensor.
- 14) Estimation of Li/Na/K by using Flame photometer.

Reference Books:

- 1) Ishihara, Kobayashi & Ukai, High Quality Liquid Crystal Displays and Smart Devices, (2019, IET), ISBN: 9781785619397
- 2) Yotishkumar Parameswaranpillai, Poushali Das, Sayan Ganguly, Quantum Dots and Polymer Nanocomposites: Synthesis, Chemistry, and Applications- Publisher: CRC Press, 2022, ISBN 13: 978 1032210148.
- 3) Prasanna Chandrasekhar (IIT Delhi alumnus), Conducting Polymers, Fundamentals and Applications: Including Carbon Nanotubes and Graphene:, Springer, 2019 (2nd ed.), ISBN 13: 978 3030098858.
- 4) Vijay Kumar, Pardeep Singh, Devendra Kumar Singh (India), Green Carbon Quantum Dots: Environmental Applications: Springer Nature Singapore, Oct 2024, ISBN 13: 978 9819762026.
- 5) Deepak Verma, Semiconducting Materials and Devices-, ISBN: 978 9394777712

Course Learning Objectives (CLOs):

This course focuses on the following learning perspectives:

- 1) Developing the problem-solving skills that can be applied to problems in different areas which enables students to take-up subsequent course work and professional career.
- 2) Provides a comprehensive study of the features of C programming language.

Course Outcomes (COs):

Description of the Course Outcome: At the end of the course the student will be able to:		Mapping to POs (1-11)		
		Substantial Level (3)	Moderate Level (2)	Slight Level (1)
CO-1	Develop algorithms and flowcharts and implement them using fundamental C programming concepts to solve given problems.	-	1,2,3	-
CO-2	Develop C programs using appropriate decision-making and branching constructs to implement solutions for problems involving multiple conditions and alternative choices.	-	1,2,3	-
CO-3	Develop C programs using appropriate looping and control statements to implement repetitive and nested operations for solving computational problems.	-	1,2,3	-
CO-4	Develop C programs using arrays and strings to perform data storage, manipulation, searching, sorting, and processing operations for solving computational problems.	-	2,6	-
CO-5	Develop modular C programs using functions, parameter passing, and recursion to design structured and reusable solutions for computational problems.	-	-	1,2,3

POs	1	2	3	4	5	6	7	8	9	10	11
Mapping Level	1.7	1.8	1.7	-	-	2.0	-	-	-	-	-

Pre-requisites: None

Contents:

Unit-I

Flow-Chart and Algorithm: Solving various scientific, engineering and business-related problems of varying complexity.

Fundamentals of C Programming Language: Program structure and execution. Character set, data types, operators, type conversion, expression evaluation. Input and output statements. **05 Hrs**

Unit-II

Decision making and Branching: if statement and its different forms, switch statement. **06 Hrs**

Unit-III

Decision making and Looping: loops and their behaviour – entry and exit controlled loops, conditional and unconditional jump statements, Nested loops **06 Hrs**

Unit-IV

Arrays: Single and multidimensional arrays, advantages and disadvantages of arrays, searching and sorting

Strings: Definition, Different ways of reading and printing strings, string handling functions, applications. **06 Hrs**

Unit-V

Modular Programming: Declaration, definition and use of functions, passing parameters to function, Recursion. **05 Hrs**

Reference Books:

- 1) E Balagurusamy, "Programming in ANSI C", Tata McGraw Hill, 6/E, 2012.
- 2) Brian W Kernighan & Dennis M Ritchie, "The C programming language", Prentice-Hall India, 2/E, 2004.
- 3) R.G. Dromey., "How to solve it by Computer", Prentice-Hall India, 2008
- 4) B A Forouzan and R F Gilberg, "Computer Program: A structured programming approach using C", Thomson Learning, 3/E, 2005
- 5) Brain W. Kernighan and Rob Pike, "The Practice of Programming", Pearson Education Inc. 2008.

Course Learning Objectives (CLOs):

The students are expected to explain the laws used in the analysis of DC and AC circuits, the behavior of circuit elements in single-phase circuits, the construction and operation of transformers, DC generators, motors, and induction motors. Further, they are expected to understand the concepts of circuit protection devices, earthing, explain electric power generation, transmission, distribution, and electricity billing, and discuss equipment and personal safety measures.

Course Outcomes (COs):

Description of the Course Outcome: At the end of the course, the student will be able to:		Mapping to POs (1-11)		
		Substantial Level (3)	Moderate Level (2)	Slight Level (1)
CO-1	Comprehend the concepts of various energy sources and electric circuits.	1	2	11
CO-2	Apply the basic electrical laws to solve circuits.	1	2	11
CO-3	Discuss the construction and operation of various electrical machines.	1	2	11
CO-4	Identify a suitable electrical machine for practical implementation.	1	2	11
CO-5	Explain the concepts of electric power transmission and distribution, electricity billing, circuit protective devices, and personal safety measures.	1	2	6,7,9,11

POs	1	2	3	4	5	6	7	8	9	10	11
Mapping Level	3.0	2.0	-	-	-	1.0	1.0	-	1.0	-	1.0

Pre-requisites: Basic physics and mathematics

Contents:**Unit-I**

Introduction: Conventional and non-conventional energy resources; General structure of electrical power systems using a 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. Numericals.

08 Hrs**Unit-II**

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. Numericals.

Three Phase Circuits: Generation of three-phase AC quantity, advantages and limitations; star and delta connections, relationship between line and phase quantities (Simple Numerical on balanced system only).

09 Hrs**Unit-III**

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

09 Hrs**Unit-IV**

Transformers: Necessity of transformers, principle of operation, types and construction of single-phase transformers, EMF equation, losses, variation of losses with respect to load. Efficiency and numericals.

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 and numericals.

08 Hrs**Unit-V**

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 the consumption of electrical energy, a two-part electricity tariff, and the calculation of the 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. **08 Hrs**

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

Course Learning Objectives (CLOs):

This course focuses on the following learning perspectives:

- 1) Understand the basics of Artificial Intelligence and Machine Learning
- 2) Use of Gen AI and prompts to get the results for a given problem
- 3) Current trends in AI and its future directions
- 4) Applications of AI in various industrial domains

Course Outcomes (COs):

Description of the Course Outcome: At the end of the course the student will be able to:		Mapping to POs (1-11)		
		Substantial Level (3)	Moderate Level (2)	Slight Level (1)
CO-1	Explain the concepts and types of artificial intelligence	-	6	1,8,11
CO-2	Illustrate basic machine learning methods for regression, classification and clustering	-	3	2,4,5,8,11
CO-3	Illustrate prompt engineering Techniques to interact with generative AI tools	2	3	5,8,11
CO-4	Identify real-world applications across different disciplines	-	2,3	5,8,11
CO-5	Outline recent trends in artificial intelligence and machine learning	-	1,5	8,11

POs	1	2	3	4	5	6	7	8	9	10	11
Mapping Level	1.5	2.0	2.0	1.0	1.25	2.0	-	1.0	-	-	1.0

Pre-requisites: Google website and AI related information through any search Engines

Suggested Platforms: Chat GPT for prompt engineering, Jupyter notebook

Contents:**Unit-I**

Introduction to Artificial Intelligence: Definition and Brief discovery of Artificial Intelligence How Does AI Work? Advantages and Disadvantages of Artificial Intelligence, Types of Artificial Intelligence based on functionalities and capabilities, Augmented Intelligence Vs Cognitive Computing.

Defining Intelligence, Components of Intelligence, AI Agent and types, Uninformed Search Algorithms, and Informed Search Algorithms: Pure Heuristic Search, Best-First Search Algorithm (Greedy Search).

Introduction of Knowledge representation and concept of Knowledge Based Agent,
Brief Discussion of Types of Knowledge. **09 Hrs**

Unit-II

Machine Learning: Basic Techniques in AI, Machine Learning Model, Regression Analysis in Machine Learning, Classification Techniques, Clustering Techniques, Naïve Bayes Classification, Neural Network, Support Vector Machine (SVM).

09 Hrs

Unit-III

Introduction to Prompt Engineering: Introduction and evolution of Prompt Engineering, Types of Prompts, How Does Prompt Engineering Work? The Advantages of Prompt Engineering, The Future of LLM Communication.

Prompt Engineering Techniques for Chat GPT / Perplexity/ Deep seek/ Claude AI, Copilot and practical demonstration in the class room: Different types of Prompt Engineering Techniques, Zero, One, Few Shot Prompting and Self-Consistency Prompt.

07 Hrs

Unit-IV

Recent Trends in AI: Recent trends in AI, Brief reasons for maintaining Ethics in AI , AI as a Service (AlaaS), Vendors of AlaaS, Collaborative systems, Game theory and social sciences, Neuromorphic Computing and its models, Expert System and its functions Artificial Intelligence of Things (AIoT).

08 Hrs

Unit-V

Application of AI using Robotics and Drones Introduction to No Code AI and Low Code AI. Application of AI in Healthcare, Application of AI in Finance, Application of AI in Retail, Application of AI in Agriculture, Application of AI in Education, Application of AI in Transportation, AI in Experimentation and Multi-disciplinary research.

09 Hrs

Reference Books:

- 1) Reema Thareja, Artificial Intelligence: Beyond Classical AI, Pearson Education, 2023.
- 2) Ajantha Devi Vairamani and Anand Nayyar, Prompt Engineering: Empowering Communication, 1st Edition, CRC Press, Taylor & Francis Group, 2024. (DOI: <https://doi.org/10.1201/9781032692319>).
- 3) Saptarsi Goswami, Amit Kumar Das and Amlan Chakrabarti, "AI for Everyone — A Beginner's Handbook for Artificial Intelligence", Pearson, 2024.

26UPWS16 Professional Writing Skills in English (14-0-0-16) 1

Total Hours: 30

Course Learning Objectives (CLOs): This course focuses on the following learning perspectives:

- 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 write good technical reports.
- 4) To acquire Employment and Workplace communication skills.
- 5) To learn about Information Transfer techniques through presentation in different levels.

Course Outcomes (COs):

Description of the Course Outcome: At the end of the course the student will be able to:		Mapping to POs(1-11)		
		Substantial Level (3)	Moderate Level (2)	Slight Level (1)
CO-1	Identify the Common Errors in Writing and Speaking.	-	9,11	-
CO-2	Achieve better technical writing and Presentation skills.	-	9,11	-
CO-3	Read Technical proposals properly and write standard technical reports.	9,11	-	-
CO-4	Acquire Employment and Workplace communication skills.	-	9,11	-
CO-5	Learn Effective Presentation Skills.	9,11	-	-

POs	1	2	3	4	5	6	7	8	9	10	11
Mapping Level	-	-	-	-	-	-	-	-	2.4	-	2.4

Pre-requisites: None

Contents:

Unit-I

Identifying Common Errors in Written and Spoken English: Verb Phrase and phrasal verbs, Auxiliary verbs and their forms, Subject Verb Agreement (Concord Rules), Common errors in Subject-verb agreement, Words Confused / Misused, errors identification.

03 Hrs.

Unit-II

Nature and Style of sensible writing: Punctuation marks, Paragraph Writing, Writing Articles, Precise writing and Techniques in Essay writing, Sentence

arrangements and Corrections activities. Misplaced modifiers, Contractions, Collocations, Correction of Errors. **02 Hrs**

Unit-III

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. **03 Hrs**

Unit-IV

Professional Communication for Employment: Listening Comprehension, Types of Listening, Listening Barriers, Improving Listening Skills. TED talks, Reading Comprehension, Tips for effective reading. Job Applications, Types of official/employment/business Letters, Resume vs. Bio Data, Profile, CV. and effective resume writing, Emails, Blog Writing and Memos. **03 Hrs**

Unit-V

Professional Communication at Workplace: Agenda, Minutes of Meeting, 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. **03 Hrs**

Reference Books:

- 1) "Professional Writing Skills in English" published by Fillip Learning – Education (ILS), Bangalore – 2022.
- 2) Technical Communication – Principles and Practice, Third Edition by Meenakshi Raman and Sangeetha Sharma, Oxford University Press 2017.
- 3) Wood, Frederick. A Remedial English Grammar for Foreign Students. Macmillan Education, India, 1990.
- 4) Yadugiri, M A. Making Sense of English - A Textbook of Sounds, Words and Grammar, Viva Books, 2020.

Course Learning Objectives (CLOs):

- 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.

Course outcomes (COs):

Description of the Course Outcome: At the end of the course the student will be able to:		Mapping to POs (1-11)		
		Substantial Level (3)	Moderate Level (2)	Slight Level (1)
CO-1	Explain the basic structure of Indian Constitution.	-	-	7
CO-2	Describe the Fundamental Rights and Fundamental Duties present in our constitution.	-	-	7
CO-3	Describe the directive principles of state policy.	-	-	7
CO-4	Explain State Executive & Elections system in India.	-	-	7
CO-5	Describe the Amendments and Emergency Provisions, other important provisions given by the constitution.	-	-	7

POs	1	2	3	4	5	6	7	8	9	10	11
Mapping Level	-	-	-	-	-	-	1.0	-	-	-	-

Course Contents:

Unit-I

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.

03 Hrs

Unit-II

Salient features of Indian Constitution. Preamble of Indian Constitution & Key concepts of the Preamble. Fundamental Rights (FR's) and its Restriction and

limitations indifferent Complex Situations.

03 Hrs

Unit-III

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.

03 Hrs

Unit-IV

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.

03 Hrs

Unit-V

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.

02 Hrs

Reference Books:

- 1) "Constitution of India" (for Competitive Exams)- Published by Naidhruva Edutech Learning Solutions, Bengaluru.-2022.
- 2) "Constitution of India, Professional Ethics and Human Rights" by Shubham Singles, Charles E. Haries, and etal: published by Cengage Learning India, Latest Edition-2019.

Course Learning Objective (CLO):

Gain a fundamental understanding of basic biological concepts and their relevance to engineering applications.

Course Outcomes (COs):

Description of the Course Outcome: At the end of the course the student will be able to		Mapping to POs (1-11)		
		Substantial Level (3)	Moderate Level (2)	Slight Level (1)
CO-1	Describe diverse applications of biomolecules.	-	2,3	1
CO-2	Explain the architecture and functioning of the brain, eye, and heart as integral systems in the human body.	-	2,3	1
CO-3	Explain the structure, functions, and bioengineering approaches related to the lungs, kidneys, muscular system, and skeletal system.	-	2,3	1
CO-4	Describe nature-inspired materials and mechanisms.	-	2,3	1
CO-5	Summarize the latest trends in bioengineering.	-	2,3	1

POs	1	2	3	4	5	6	7	8	9	10	11
Mapping Level	1.0	2.0	2.0	-	-	-	-	-	-	-	-

Pre-requisite: None

Course content:**Unit-I**

Biomolecules and their applications: Carbohydrates, Nucleic acids, Proteins, lipids, and Enzymes. **04Hrs.**

Unit-II

Human organ systems and bio designs - 1: Brain as a CPU system, Eye as a Camera system, Heart as a pump system. **03Hrs.**

Unit-III

Human organ systems and bio-designs - 2: Lungs as purification system, Kidney as a filtration system, Muscular and Skeletal Systems as scaffolds. **02Hrs.**

Unit-IV

Nature-bioinspired materials and mechanisms: Echolocation, Photosynthesis, Bird flying (GPS and aircrafts), Shark skin (Friction reducing swim suits), Kingfisher beak (Bullet train). Human Blood substitutes. **03Hrs.**

Unit-V

Trends in bioengineering: Bioprinting techniques and materials, 3D printing of ear, bone, and skin. Electrical tongue and electrical nose in food science, Bioimaging and Artificial Intelligence for disease diagnosis. **02Hrs.**

Reference Books:

- 1) Human Physiology, Stuart Fox, Krista Romliski, McGraw-Hill eBook. 16/e Edition, 2022
- 2) Biology for Engineers, Thyagarajan S., Selvamurugan N., Rajesh M.P., Nazeer R.A., Thilagaraj W., Barathi S., and Jaganthan M.K., Tata McGraw-Hill, New Delhi, 2012.
- 3) Biomedical Instrumentation, Leslie Cromwell, Prentice Hall 2011.
- 4) Biology for Engineers, Sohini Singh and Tanu Allen, Vayu Education of India, New Delhi, 2014.
- 5) Bioremediation of heavy metals: bacterial participation, by C R Sunilkumar, N Geetha A. C. Udayashankar Lambert Academic Publishing, 2019.
- 6) Electronic Noses and Tongues in Food Science, Maria Rodriguez Mende, Academic Press, 2016

II Semester

26UMATCS21

Mathematics-II for CS Stream

(42-0-28-50)4

Total Hours: 120

Course Learning Objectives (CLOs):

This course focuses on the following learning perspectives:

- 1) Familiarize the fundamental concept of numerical methods and error analysis and apply to Computer Science and Engineering
- 2) Learn to solve differential equations and perform numerical integration and apply to Computer Science and Engineering
- 3) Develop the knowledge of vector space and linear transformation and apply to Computer Science and Engineering

Course Outcomes (COs):

Description of the Course Outcome: At the end of the course the student will be able to:		Mapping to POs(1-11)		
		Substantial Level (3)	Moderate Level (2)	Slight Level (1)
CO-1	Apply error analysis concept and numerical methods to solve transcendental equations.	-	-	1,2,11
CO-2	Analyze finite differences and interpolation in engineering and apply numerical integration and solve differential equations.	-	1,2,11	-
CO-3	Apply the concepts of vector space and solve problems in engineering.	-	1,2,11	-
CO-4	Apply algebra of linear transformation in engineering problems.	-	-	1,2,11
CO-5	Implement solutions for various mathematical problems using Python.	-	5	1,2,11

POs	1	2	3	4	5	6	7	8	9	10	11
Mapping Level	1.4	1.4	-	-	2	-	-	-	-	-	1.4

Pre-requisites: Fundamentals of algebra, calculus, linear algebra and differential equations

Contents:**Unit-I****Introduction to Numerical Methods**

Errors and their computation: Round off error, Truncation error, Absolute error, Relative error and Percentage error. Solution of algebraic and transcendental

equations: Bisection, Regula-Falsi, Secant and Newton-Raphson methods. **08 Hrs.**

Unit-II

Interpolation

Finite differences, interpolation using Newton Gregory forward and Newton Gregory backward difference formulae, Newton's divided difference. Lagrange interpolation formulae, piecewise interpolation-linear and quadratic. **09 Hrs.**

Unit-III

Numerical Integration and Numerical Solution of Differential Equations

Numerical integration: Simpson's 1/3rd and Simpson's 3/8th rule 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 method. **09 Hrs.**

Unit-IV

Vector space

Definition and examples, subspace: definition and examples. linear combination, linear span, linearly independent and linearly dependent sets, basis and dimension. **08 Hrs.**

Unit-V

Linear Transformation

Definition and examples, algebra of linear transformations, Matrix of a linear transformation. Rank and nullity of linear transformations, rank- nullity theorem, inner products and orthogonality. **08 Hrs.**

List of Laboratory experiments (2hours/week 14 lab sessions)

- 1) Errors and approximation.
- 2) Root finding methods.
- 3) Norms, Condition number.
- 4) Forward and Backward interpolation,
- 5) Lagrange's interpolation.
- 6) Numerical integration
- 7) Taylor's method.
- 8) Modified Euler's method,
- 9) Runge-Kutta method of fourth order.
- 10) Milne's method.
- 11) Linearly independence and Dependence sets.
- 12) Basis and dimension.
- 13) Linear transformation-range space and null space.
- 14) Verification of rank-nullity theorem.

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

Software used: Python

Reference 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.
- 3) David C. Lay: "Linear Algebra and its Applications", Pearson Publishers, 4th Ed. 2018.

Course Learning Objectives (CLOs):

- 1) Physics for CSE Stream is designed to deliver optimum knowledge of materials and energy concepts.
- 2) Content explores the fundamental theories, experimental demonstrations and their applications in various engineering fields.
- 3) Scope of the curriculum includes the study of quantum mechanics to analyze microscopic systems, quantized states, and tunneling.
- 4) Electrical conduction in metals and semiconductors, including carrier concentration and Fermi energy.
- 5) Apply the principles and applications of superconductivity, lasers, modulators, and photonic devices.

Course Outcomes (COs):

Description of the Course Outcome: At the end of the course the student will be able to:		Mapping to POs (1-11)		
		Substantial Level (3)	Moderate Level (2)	Slight Level (1)
CO-1	Describe the quantum mechanics to analyze microscopic particles and quantum tunneling	1	2	11
CO-2	Explain and implement the electrical conduction in metals and semiconductors	1	2	11
CO-3	Discuss the superconductivity phenomena and its properties	1	2	11
CO-4	Illustrate and implement the laser, modulators, photonics and optical fibers.	1	2	11
CO-5	Explain and implement the essential properties of superconductors and applications in Quantum Computing.	1	2	11

POs	1	2	3	4	5	6	7	8	9	10	11
Mapping Level	3	2	-	-	-	-	-	-	-	-	1

Pre-requisites: Nil

Contents:**Unit-I****Quantum Mechanics:**

de-Broglie Hypothesis, Heisenberg's Uncertainty Principle and its application (Broadening of Spectral Lines), Principle of Complementarity, Wave Function, Time independent Schrödinger wave equation (Derivation), Physical significance of a wave function and Born Interpretation, Expectation value and its physical significance, Eigen functions and Eigen values of operators, Particle inside one dimensional infinite potential well, Role of higher dimensions (Qualitative), Waveforms and Probabilities, Particle inside a finite potential well and quantum tunneling, Numerical Problems. **08 Hrs**

Unit-II**Electrical Properties of Metals and Semiconductors**

Failures of classical free electron theory, Mechanism of electron scattering in solids, Matheissen's rule, Assumptions of Quantum free electron theory, Density of states, Fermi Dirac statistics, Fermi energy, Variation of Fermi factor with temperature and energy, Expression for carrier concentration in a conductor, Mention of expression for electrical conductivity, Success of quantum free electron theory of metals, Derivation of electron concentration in an intrinsic and extrinsic semiconductors, Expression for electron and hole concentration in extrinsic semiconductor (Qualitative), Fermi level for intrinsic (with derivation) and extrinsic semiconductor (no derivation), Hall effect, Numerical Problems. **08 Hrs**

Unit-III**Superconductivity**

Para-magnetism and Dia-magnetism, Zero resistance state, Persistent current, Meissner effect, Critical temperature, Critical current (Silsbee Effect) – Derivation for a cylindrical wire using ampere's law, Critical field, Formation of Cooper pairs - Mediation of phonons, Two-fluid model, BCS Theory - Phase coherent state, Limitations of BCS theory, examples of systems with low and high electron-phonon coupling, Type-I and Type-II superconductors, Formation of Vortices, Explanation for upper critical field, Cooper pair tunneling (Andreev reflection), Josephson junction, Flux quantization, DC and AC SQUID (Qualitative), Numerical Problems. **08 Hrs**

Unit-IV**Photonics:**

Interaction of radiation with matter – Einstein's A and B coefficients and derivation of expression for energy density, Prerequisites for lasing actions, Types of LASER – Semiconductor diode LASER, Applications of laser Use of attenuators for single photon sources, Optical modulators –Pockel's effect, Kerr effect, Photo detectors –

Single Photon Avalanche Diode. Superconducting Nano wire Single Photon Detector, Optical fiber, Types of optical fiber, Derivation of Numerical aperture, V-number, Number of modes, losses in optical fiber, Mach-Zehnder interferometer, Numerical problems. **10 Hrs**

Unit-V

Quantum Computing:

Moore's law, Classical vs. Quantum Computation, bit, Qubit and its properties, Bloch Sphere, Dirac notation, Brief discussion on types of qubit, Superconducting qubits, Harmonic oscillator (qualitative) – Need for anharmonicity, Charge qubit, Operators and Operations (matrix form), Quantum Gates – Pauli Gates, Phase gate (S, T), Hadamard Gate, Two qubit gates – CNOT gate, Entanglement, Bell States, Predicting the outputs of various combinations of single and two-qubit gates, Introduction to quantum algorithms, Numerical Problems. **08 Hrs**

PRACTICALCOMPONENTS

PART-A: FIXED SET OF EXPERIMENTS

- 1) Determination of wavelength of LASER using Diffraction Grating.
- 2) Determination of acceptance angle and numerical aperture of the given Optical Fiber.
- 3) Study the Characteristics of a Photo-Diode and to determine the power responsivity /Verification of Inverse Square Law of Light.
- 4) Determination of Planck's constant using LEDs/Black-Body.
- 5) Determination of Fermi Energy of Copper.
- 6) Determination of Energy gap of the given Semiconductor.
- 7) Black-Box Experiment(Identification of basic Electronic Components)
- 8) Resonance in LCR circuit and determination of resonating frequency and quality factor.
- 9) Study the I-V Characteristics of a Bipolar Junction Transistor and hence determine α and β .
- 10) Determination of resistivity of a semiconductor by Four Probe Method.
- 11) Predicting the outputs of various combinations of single and two-qubit gates using QUIRK Quantum Simulator.
 - a) <https://www.quirk-e.dev/>
 - b) <https://algassert.com/quirk>
- 12) Predicting the out puts of various combinations of single and two-qubit gates using QISKIT.
- 13) Air-wedge/Newton's to study the interference by the division of amplitude.
- 14) Experimental Data Analysis using Spread Sheet.

Reference books:

- 1) Beiser, A. (2002). Concepts of Modern Physics (6th Ed.). McGraw-Hill Education..
- 2) Griffiths, D. J. (2018). Introduction to Quantum Mechanics (2nd or 3rd Ed.). Pearson.
- 3) Tinkham, M. (2004). Introduction to Superconductivity (2nd Ed.). Dover Publications.
- 4) LASERS and Non-Linear Optics, BBLoud, New Age International.
- 5) Nielsen, M. A., & Chuang, I. L. (2010). Quantum Computation and Quantum Information (10th Anniversary ed.). Cambridge University Press.

Course Learning Objectives (CLOs):

- 1) To understand the basic principles and conventions of engineering drawing
- 2) To use drawing as a communication mode
- 3) To generate pictorial views using CAD software
- 4) To understand the development of surfaces
- 5) To visualize engineering components

Course Outcomes (COs):

Description of the Course Outcome: At the end of the course the student will be able to:		Mapping to POs (1-11)		
		Substantial Level (3)	Moderate Level (2)	Slight Level (1)
CO-1	Generate orthographic projections of points, Lines and planes manually and with Computer-aided tools.	10	1,2,5	6,8,9
CO-2	Generate orthographic projections of solids manually and with Computer-aided tools.	10	1,2,5	6,8,9
CO-3	Develop the lateral surfaces of solids for real-world applications.	10	1,2,5	6,8,9
CO-4	Draw isometric views and convert isometric drawings to orthographic views.	10	1,2,5	6,8,9
CO-5	Create schematics diagrams of models of embedded, networking and IoT devices.	10	1,2,5	9

POs	1	2	3	4	5	6	7	8	9	10	11
Mapping Level	2	2	--	--	2	1	-	1	1	3	--

Course Contents:

Unit - I

Introduction:

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).

6 Hrs**Unit - II****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 & tetrahedrons.

6 Hrs**Unit - III****Section of Solids:**

Introduction, section planes, Sectional views: apparent shapes and true shapes, Sections of right regular prisms, pyramids, cylinders and cones resting with their base on HP. (Concepts only and No problems for practice)

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.

6 Hrs**Unit - IV****Isometric Projections:**

Introduction to isometric views, 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 into orthographic views.

5 Hrs**Unit - V****Multidisciplinary Applications & Practice:****Free hand Sketching:**

Drawing Simple Mechanisms; Bicycles, Gear trains, Ratchet and pawl, wheeler cart.

Electric Wiring and lighting diagrams: Call bell system, Fire alarm circuit.

Basic Building Drawing; 1 BHK Building floor plan.

Electronics Engineering Drawings- Simple Electronics Circuit Drawings, practice on layers concept. **Graphs & Charts:** Column chart, Pie chart, Line charts, Gantt charts, etc..
5 Hrs

Reference Books:

- 1) S.N. Lal, & T Madhusudhan: Engineering Visualisation, 1st Edition, Cengage Publication 2022.
- 2) P.J. Shah, Computer Aided Engineering Drawing, S. Chand Publishing, 2021.
- 3) M. B. Shah & B.C. Rana., Engineering Drawing, Pearson Education, Revised Edition, 2009
- 4) Frederick E. Giesecke, et al., Technical Drawing with Engineering Graphics, Prentice Hall, 2016
- 5) K. R. Gopalakrishna, & Sudhir Gopalakrishna: Textbook of Computer Aided Engineering Drawing, 39th Edition, Subash Stores, Bangalore, 2017
- 6) Bhatt, N.D., Engineering Drawing: Plane and Solid Geometry, 53rd edition, Charotar Publishing House Pvt. Limited, 2019.

Course Learning Objectives (CLOs):

The course focuses on the study of Power Supplies, Amplifiers, Oscillators, Operational Amplifiers, Boolean Algebra and Logic circuits, Embedded Systems, Analog and Digital Communication Schemes.

Course Outcomes (COs):

Description of the Course Outcome: At the end of the course the student will be able to:		Mapping to POs (1-11)		
		Substantial Level (3)	Moderate Level (2)	Slight Level (1)
CO-1	Explain Power Supplies, Half Wave, Full Wave Rectifiers and amplifier circuits.	-	-	1,2
CO-2	Describe the concept of Oscillators and Operational amplifier circuits.	-	-	1,2
CO-3	Explain the concepts of Boolean Algebra and Logic circuits.	-	-	1,2
CO-4	Explain microprocessor, microcontrollers, Embedded Systems and sensor interfacing.	-	1,2	-
CO-5	Describe various modulation schemes and the need for modulation with respect to analog and digital communication.	-	1,2	-

POs	1	2	3	4	5	6	7	8	9	10	11
Mapping Level	1.4	1.4	-	-	-	-	-	-	-	-	-

Pre-requisites: None

Contents:

Unit-I

Power Supplies –Block diagram, Half-wave rectifier, Full-wave rectifier, and Full-wave bridge rectifier and filters, Voltage regulators, Output resistance and voltage regulation, Voltage multipliers (only voltage doublers).

Amplifiers –Types of amplifiers, Transistor amplifier, Gain, Input and output resistance, Frequency response, Bandwidth, Phase shift, Negative feedback.

08 Hrs

Unit-II

Oscillators – Positive feedback, Barkhausen criterion, Ladder network oscillator, Wein bridge oscillator, Multivibrators, Single-stage astable oscillator, Crystal controlled oscillators (Only Concepts, working, and waveforms. No mathematical derivations).

Operational amplifiers -Operational amplifier parameters, Operational amplifier characteristics, Operational amplifier configurations, Operational amplifier circuits.

08 Hrs

Unit-III

Boolean Algebra and Logic Circuits: Binary numbers, Number Base Conversion, Octal & Hexadecimal 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.

Combinational logic: Introduction, Design procedure, Adders- Half adder, Full adder.

09 Hrs

Unit-IV

Embedded Systems – Definition, Embedded systems vs general computing systems, Classification of Embedded Systems, Major application areas of Embedded Systems, Elements of an Embedded System, Core of the Embedded System, Microprocessor vs Microcontroller, RISC vs CISC.

Sensors and Interfacing – Instrumentation and control systems, Transducers, Sensors, Actuators, LED, 7-Segment LED Display.

08 Hrs

Unit-V

Communication Systems: Introduction ,Electromagnetic spectrum, Elements of communication system, Terminologies in communication system, Need for modulation, Types of modulation.

Analog Modulation Schemes : Amplitude Modulation, Frequency modulation, **Phase modulation:** definition, time-domain representation, waveforms.

Digital Modulation Schemes: Advantages of digital communication over analog communication, Amplitude Shift Keying (ASK), Frequency Shift Keying (FSK), **Phase Shift Keying (PSK):** definition, signal representation, waveforms. **09 Hrs**

Reference Books:

- 1) **Mike Tooley**, “Electronic Circuits”, Fundamentals & Applications’, 4th Edition, Elsevier, 2015.
- 2) **M. Morris Mano**, “Digital Logic and Computer Design”, PHI Learning, 2008 ISBN-978-81-203-0417-84..
- 3) **K V Shibu**, “Introduction to Embedded Systems”, 2nd Edition, McGraw Hill Education (India),Private Limited, 2016.
- 4) **S L Kakani and Priyanka Punglia**, “Communication Systems”, New Age International Publisher,2017.
- 5) **George Kennedy, Bernard Davis, SRM Prasanna**,“Electronic Communication Systems”, 6E, McGraw Hill Education, 2018.

Course Learning Objectives (CLOs):

This course focuses on the following learning perspectives:

- 1) Explore user-defined data structures like structures and pointers in implementing solutions to problems.
- 2) Selection of appropriate data structures for solving a given problem

Course Outcomes (COs):

Description of the Course Outcome: At the end of the course the student will be able to:		Mapping to POs (1-11)		
		Substantial Level (3)	Moderate Level (2)	Slight Level (1)
CO-1	Develop C programs using pointers and pointer-based operations to efficiently access, manipulate, and process data through variables, arrays, strings, and functions.	-	1,2,3	-
CO-2	Develop C programs using structures and unions to organize, access, manipulate, and process heterogeneous data for solving computational problems.	-	1,2,3	-
CO-3	Develop C programs using appropriate storage classes and dynamic memory allocation techniques to manage variable scope, lifetime, and memory efficiently.	-	1,2,3	-
CO-4	Develop C programs using file handling and command-line arguments to perform sequential and random data access with appropriate input/output and error handling mechanisms.	-	1,2,3	-
CO-5	Develop C programs using appropriate sorting and searching techniques to efficiently organize and retrieve data.	-	1,2,3	11

POs	1	2	3	4	5	6	7	8	9	10	11
Mapping Level	2.0	2.0	2.0	-	-	-	-	-	-	-	1.0

Pre-requisites: Knowledge of fundamental Principles of Programming

Contents:**Unit-I**

Pointers: Introduction, Understanding Pointers, Accessing the address of a variable, Declaration and Initialization of Pointers, Accessing a variable through its pointer, Chain of pointers, Pointer expressions, Pointer Increments and scale factor, Pointers and arrays, Pointers and character strings, Pointers as Function arguments, Functions returning pointers. **06 Hrs**

Unit-II

Structures and Unions: Introduction, Defining a Structure, Declaring structure variables, Accessing structure members, structure initialization, copying and comparing structure variables, Operations on Individual Members, Arrays of structures, Arrays within structures, Structures within structures, Structures and Functions, Self-referential structures, Unions. **06 Hrs**

Unit-III

Storage Classes: Storage class specifiers, Local variable storage class: auto, register, and static. Global variable storage class: default global variable, extern, and static.

Dynamic Memory allocation: Motivation for dynamic memory requirement, Allocating a block of memory – malloc, allocating multiple blocks of memory – calloc, Releasing the used memory – free, Altering the size of a block – realloc. **06 Hrs**

Unit-IV

File Handling: Introduction, Defining an opening a file, Closing a file, Input and Output Operations on Files, Error Handling during IO operations, Random Access to Files, Command line arguments. **06 Hrs**

Unit-V

Sorting: Introduction, Bubble Sort, Selection Sort, Insertion Sort

Searching: Introduction, Linear Search, Binary Search. **04 Hrs**

Reference Books:

- 1) E Balagurusamy, "Programming in ANSI C", 6th Edition, Tata McGraw Hill, 2012
- 2) Yashavant Kanetkar, "Understanding Pointers in C and C++", 5/E, BPB Publications, 2019.
- 3) Reema Thareja, "Computer fundamentals and Programming in C", Oxford University, 2/E, 2017.
- 4) B A Forouzan and R F Gilberg, "Computer Program: A structured programming approach using C", 3/E, Thomson Learning, 2005
- 5) Brain W. Kernighan and Rob Pike, "The Practice of Programming", Pearson Education Inc. 2008

26UENG26

Communicative English

(14-0-0-16)1

Total Hours: 30

Course Learning Objectives (CLOs): This course focuses on the following learning perspectives:

- 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.

Course Outcomes (COs):

Description of the Course Outcome: At the end of the course the student will be able to:		Mapping to POs(1-11)		
		Substantial Level (3)	Moderate Level (2)	Slight Level (1)
CO-1	Apply the Fundamentals of Communication Skills in their Career.	-	9,11	-
CO-2	Identify the nuances of phonetics, intonation and enhance pronunciation skills.	-	9,11	-
CO-3	Communicate basic English grammar and essentials of language skills as per present requirement.	9,11	-	-
CO-4	Acquire vocabulary and language proficiency.	-	9,11	-
CO-5	Adopt the Techniques of Information Transfer through presentation.	9,11	-	-

POs	1	2	3	4	5	6	7	8	9	10	11
Mapping Level	-	-	-	-	-	-	-	-	2.4	-	2.4

Prerequisites: None

Contents:

Unit-I

Introduction to Communicative English: meaning and Definition, Fundamentals of Communicative English, Process of Communication, Barriers to Effective Communicative English, Different styles and levels in Communicative English. Interpersonal and Intrapersonal Communication Skills.

03 Hrs

Unit-II

Introduction to Phonetics: Sounds- consonants, vowels and diphthongs, Syllables and Structure. Word Accent, Stress Shift and Intonation, Phonetic Transcription, Common Errors in Pronunciation. **03 Hrs**

Unit-III

Vocabulary: Word formation Synonyms, Antonyms, Homophones, Homonyms, Affixes, Abbreviations, Strong and Weak forms of Words, Word pairs, One Word Substitutes and Error identification. **03 Hrs**

Unit-IV

Grammar: Parts of Speech, Articles and Preposition, Tenses, Sentences, Kinds of sentences, Transformation of sentences, Question Tags. **02 Hrs**

Unit-V

Communication Skills for Employment: Presentation Skills, Extempore, Public Speaking, Mother Tongue Influence (MTI), Reading and Listening Comprehensions **03 Hrs**

Reference Books:

- 1) Communication Skills by Sanjay Kumar & PushpLata, 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.
- 3) A Course in Technical English – D Praveen Sam, KN Shoba, Cambridge University Press – 2020.
- 4) Yadugiri, M A. Making Sense of English - A Textbook of Sounds, Words and Grammar, Viva Books, 2020.

ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ - ಕನ್ನಡ ಬಲ್ಲ ಮತ್ತು ಕನ್ನಡ ಮಾತೃಭಾಷೆಯ ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ನಿಗದಿಪಡಿಸಿದ ಪಠ್ಯಕ್ರಮ.
ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ ಪಠ್ಯ ಕಲಿಕೆಯ ಉದ್ದೇಶಗಳು:

- 1) ಪದವಿ ವಿದ್ಯಾರ್ಥಿಗಳಾಗಿರುವುದರಿಂದ ಕನ್ನಡ ಭಾಷೆ, ಸಾಹಿತ್ಯ ಮತ್ತು ಸಂಸ್ಕೃತಿಯ ಪರಿಚಯ ಮಾಡಿಕೊಡುವುದು. ಆಧುನಿಕ ಪೂರ್ವ ಮತ್ತು ಆಧುನಿಕ ಕಾವ್ಯಗಳನ್ನು ಪರಿಚಯಿಸುವುದು.
- 2) ವಿದ್ಯಾರ್ಥಿಗಳಲ್ಲಿ ಸಾಹಿತ್ಯ ಮತ್ತು ಸಂಸ್ಕೃತಿಯ ಬಗ್ಗೆ ಅರಿವು ಹಾಗೂ ಆಸಕ್ತಿಯನ್ನು ಮೂಡಿಸುವುದು. ತಾಂತ್ರಿಕ ವ್ಯಕ್ತಿಗಳ ಪರಿಚಯ ಹಾಗೂ ಅವರು ಸಾಧಿಸಿದ ವಿಷಯಗಳನ್ನು ಪರಿಚಯಿಸುವುದು.

ಘಟಕ-I

ಕನ್ನಡ ಸಂಸ್ಕೃತಿ ಮತ್ತು ಭಾಷೆ ಕುರಿತಾದ ಲೇಖನಗಳು

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

03 Hrs

ಘಟಕ-II

ಆಧುನಿಕ ಪೂರ್ವದ ಕಾವ್ಯ ಭಾಗ

ವಚನಗಳು: ಬಸವಣ್ಣ, ಅಕ್ಕಮಹಾದೇವಿ, ಅಲ್ಲಮಪ್ರಭು, ಆಯ್ದಕ್ಕಿ ಮಾರಯ್ಯ, ಜೇಡರದಾಸಿಮಯ್ಯ, ಆಯ್ದಕ್ಕಿ ಲಕ್ಕಮ್ಮ

- 1) ಕೀರ್ತನೆಗಳು: ಅದರಿದೇನು ಫಲ ಇದರಿದೇನು ಫಲ - ಪುರಂದರದಾಸರು, ತಲ್ಲಣಿಸದಿರು ಕಂಡ್ಯ ತಾಳು ಮನವೇ - ಕನಕದಾಸರು
- 2) ತತ್ವಪದಗಳು: ಸಾವಿರ ಕೊಡಗಳ ಸುಟ್ಟು - ಶಿಶುನಾಳ ಶರೀಫ

03 Hrs

ಘಟಕ-III

ಆಧುನಿಕ ಕಾವ್ಯ ಭಾಗ

- 1) ಡಿವಿಜಿ ರವರ ಮಂಕುತಿಮ್ಮನ ಕಗ್ಗದಿಂದ ಆಯ್ದ ಕೆಲವು ಭಾಗಗಳು
- 2) ಕುರುಡು ಕಾಂಚಾಣ: ದ. ರಾ. ಬೇಂದ್ರೆ

03 Hrs

ಘಟಕ-IV

ತಾಂತ್ರಿಕ ವ್ಯಕ್ತಿಗಳ ಪರಿಚಯ

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

03 Hrs

ಘಟಕ-V

ಸಾಂಸ್ಕೃತಿಕ, ಜನಪದ ಕಥೆ ಮತ್ತು ಪ್ರವಾಸ ಕಥನ

- 1) ಯುಗಾದಿ: ವಸುಧೇಂದ್ರ
- 2) ಮೆಗಾನೆ ಎಂಬ ಗಿರಿಜನ ಪರ್ವತ: ಹಿ. ಜಿ. ಬೋರಲಿಂಗಯ್ಯ

02 Hrs

Course Outcome

ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ 26UKSK17 ಪಠ್ಯ ಕಲಿಕೆಯ ನಂತರ ವಿದ್ಯಾರ್ಥಿಗಳಲ್ಲಿ:

ಅ. ಸಂ	ಪಠ್ಯ ವಿಷಯ	Mapping to POs(1-11)		
		Substantial Level (3)	Moderate Level (2)	Slight Level (1)
ಅ01	ಕನ್ನಡ ಭಾಷೆ, ಸಾಹಿತ್ಯ ಮತ್ತು ಕನ್ನಡದ ಸಂಸ್ಕೃತಿಯ ಕುರಿತು ಅರಿವು ಮೂಡಿರುತ್ತದೆ.	-	9	11
ಅ02	ಕನ್ನಡ ಸಾಹಿತ್ಯದ ಆಧುನಿಕ ಪೂರ್ವ ಮತ್ತು ಆಧುನಿಕ ಕಾವ್ಯಗಳನ್ನು ಸಾಂಕೇತಿಕವಾಗಿ ಕಲಿತು ಹೆಚ್ಚಿನ ಓದಿಗೆ ಮತ್ತು ಜ್ಞಾನಕ್ಕೆ ಸ್ಪೂರ್ತಿ ಮೂಡುತ್ತದೆ.	-	9	11
ಅ03	ವಿದ್ಯಾರ್ಥಿಗಳಲ್ಲಿ ಸಾಹಿತ್ಯ ಮತ್ತು ಸಂಸ್ಕೃತಿಯ ಬಗ್ಗೆ ಅರಿವು ಹಾಗೂ ಆಸಕ್ತಿ ಹೆಚ್ಚಾಗುತ್ತದೆ.	-	9	11
ಅ04	ತಾಂತ್ರಿಕ ವ್ಯಕ್ತಿಗಳ ಪರಿಚಯ ಹಾಗೂ ಅವರು ಸಾಧಿಸಿದ ವಿಷಯಗಳನ್ನು ತಿಳಿದುಕೊಂಡು ನಾಡಿನ ಇನ್ನಿತರೆ ವ್ಯಕ್ತಿಗಳ ಬಗ್ಗೆ ತಿಳಿದುಕೊಳ್ಳಲು ಕೌತುಕತೆ ಹೆಚ್ಚಾಗುತ್ತದೆ.	-	9	11
ಅ05	ಸಾಂಸ್ಕೃತಿಕ, ಜನಪದ ಹಾಗೂ ಪ್ರವಾಸ ಕಥನಗಳ ಪರಿಚಯವಾಗುತ್ತದೆ.	-	9	11

POs	1	2	3	4	5	6	7	8	9	10	11
Mapping Level	-	-	-	-	-	-	-	-	2.0	-	1.0

Reference Books:

- 1) ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ: ಡಾ. ಹಿ.ಚಿ.ಬೋರಲಿಂಗಯ್ಯ ಮತ್ತು ಡಾ. ಎಲ್. ತಿಮ್ಮೇಶ. ಪ್ರಕಟಣೆ: ಪ್ರಸಾರಾಂಗ. ವಿಶ್ವೇಶ್ವರಯ್ಯ ತಾಂತ್ರಿಕ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಬೆಳಗಾವಿ.

26UKBK27

ಬಳಕೆ ಕನ್ನಡ/Balake Kannada

(14-0-0-16) 1

Course Objectives/ಬಳಕೆ ಕನ್ನಡ' ಪಠ್ಯ ಕಲಿಕೆಯ ಉದ್ದೇಶಗಳು:

The course will enable the students,

Description of the Course Outcome: At the end of the course the student will be able to:		Mapping to POs(1-11)		
		Substantial Level (3)	Moderate Level (2)	Slight Level (1)
CO1	To Create the awareness regarding the necessity of learning local language for comfortable and healthy life.	-	9	11
CO2	To enable learners to Listen and understand the Kannada language properly.	-	9	11
CO3	To speak, read and write Kannada language as per requirement.	-	9	11
CO4	To train the learners for correct and polite conservation.	-	9	11
CO5	To know about Karnataka state and its language, literature and General information about this state.	-	9	11

POs	1	2	3	4	5	6	7	8	9	10	11
Mapping Level	-	-	-	-	-	-	-	-	2.0	-	1.0

Unit-I

- 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 conservation, Listening and Speaking Activities, Key to Transcription
- 3) ವೈಯಕ್ತಿಕ, ಸ್ವಾಮ್ಯಸೂಚಕ/ಸಂಬಂಧಿತ ಸರ್ವನಾಮಗಳು ಮತ್ತು ಪ್ರಶ್ನಾರ್ಥಕ ಪದಗಳು-
Personal Pronouns, Possessive Forms, Interrogative words

03 Hrs

Unit-II

- 1) ನಾಮಪದಗಳ ಸಂಬಂಧಾರ್ಥಕ ರೂಪಗಳು, ಸಂದೇಹಾಸ್ಪದ ಪ್ರಶ್ನೆಗಳು ಮತ್ತು ಸಂಬಂಧವಾಚಕ ನಾಮಪದಗಳು-
Possessive forms of nouns, dubitative question and Relative nouns
- 2) ಗುಣ, ಪರಿಮಾಣ ಮತ್ತು ವರ್ಣಬಣ್ಣ ವಿಶೇಷಣಗಳು, ಸಂಖ್ಯಾವಾಚಕಗಳು - Qualitative, Quantitative and Colour Adjectives, Numerals
- 3) ಕಾರಕ ರೂಪಗಳು ಮತ್ತು ವಿಭಕ್ತಿ ಪ್ರತ್ಯಯಗಳು - ಸಪ್ರಮಿ ವಿಭಕ್ತಿ ಪ್ರತ್ಯಯ - (ಅ, ಅದು, ಅವು, ಅಲ್ಲಿ), Predictive forms, Locative case.

03 Hrs

Unit-III

- 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 ಮತ್ತು ವರ್ಣ ಗುಣವಾಚಕಗಳು- Defective/Negative Verbs & Colour Adjectives.

03 Hrs

Unit-IV

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

03 Hrs**Unit-V**

- 1) ಕಾಲ ಮತ್ತು ಸಮಯ ಹಾಗೂ ಕ್ರಿಯಾಪದಗಳ ವಿವಿಧ ಪ್ರಕಾರಗಳು – Different types of Tense, Time and Verbs.
- 2) -ದ್,ತ್, -ತು, -ಇತು, -ಆಗಿ, -ಅಲ್ಲ,ಗ್, ಕ್, 'ಇದೆ' ಮೊದಲಾದ ಕ್ರಿಯಾಪ್ರತ್ಯಯಗಳೊಂದಿಗೆ ಭೂತ, ಭವಿಷ್ಯತ್ ಮತ್ತು ವರ್ತಮಾನ ಕಾಲದ ವಾಕ್ಯರಚನೆ – Formation of Past, Future and Present Tense Sentences with Verb Forms.
- 3) Kannada Vocabulary List – ಸಂಭಾಷಣೆಯಲ್ಲಿ ದಿನೋಪಯೋಗಿ ಕನ್ನಡ ಪದಗಳು Kannada Words in Conversation.

02 Hrs**Reference Books:****ವಿಶ್ವವಿದ್ಯಾಲಯ ನಿಗದಿಪಡಿಸಿದ ಪಠ್ಯಪುಸ್ತಕ**

- 1) ಪಠ್ಯಪುಸ್ತಕ: ಬಳಕೆ ಕನ್ನಡ
ಲೇಖಕರು: ಡಾ. ಎಲ್. ತಿಮ್ಮೇಶ್
ಪ್ರಕಟಣೆ: ಪ್ರಸಾರಾಂಗ, ವಿಶ್ವೇಶ್ವರಯ್ಯ ತಾಂತ್ರಿಕ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಬೆಳಗಾವಿ.

Course Learning Objectives (CLOs):

Apply design thinking and innovation principles to develop efficient systems focusing on product design, process optimization, safety, and sustainability.

Course Outcomes (COs):

Description of the Course Outcome: At the end of the course the student will be able to:		Mapping to POs(1-11)		
		Substantia I Level (3)	Moderate Level (2)	Slight Level (1)
CO-1	Explain various design process procedure.	--	--	3
CO-2	Generate and develop design ideas through different technique.	--	--	3
CO-3	Identify the significance of reverse Engineering to Understand products.	--	--	6
CO-4	Strategize technical drawing for design ideas.	--	--	1
CO-5	Assess design thinking process.	--	--	1

POs	1	2	3	4	5	6	7	8	9	10	11
Mapping Level	1.0	-	1.0	-	-	1.0	-	-	-	-	-

Pre-requisites: None

Contents:

Unit-I

Introduction: Process of Design, Understanding Design thinking concepts Shared model in team-based design process, Theory and practice of Design thinking, Explore major design ideas across globe - MVP or Prototyping. **03Hrs**

Unit-II

Tools for Design Thinking: Real-Time design interaction capture and analysis – Enabling efficient design process collaboration in digital space - Empathy for design, Collaboration in distributed Design. **03Hrs**

Unit-III

Design Thinking in IT Design: Thinking to Business Process modelling Agile processes in design collaboration environment, Scenario based Prototyping. **03Hrs**

Unit-IV

Design Thinking 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. **03 Hrs**

Unit-V

Design thinking process and social pitch: Innovation showcase, poster design, project pitching with impact for assessment, prototype and sustainability plan. **02 Hrs**

Reference 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.
- 5) Yousef Haik and Tamer M.Shahin, "Engineering Design Process", Cengage Learning, Second Edition, 2011.