Academic Program - UG

Syllabus 2023-24

(NEP Scheme)

I & II Semester B.E.

Stream: Computer Science & Engineering

Branch: Artificial Intelligence and Machine Learning

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

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

Ph: **0836-2447465   Fax: 0836-2464638   Web:** www.sdmcet.ac.in

SDM College of Engineering & Technology, Dharwad

It is certified that the scheme and syllabus for I & II semesters of UG program in Artificial Intelligence and Machine Learning is recommended by Board of Studies of Artificial Intelligence and Machine Learning 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 2023-24 till further revision.

Principal   Chairman BoS & HoD

Department of Artificial Intelligence and Machine Learning

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 Artificial Intelligence and Machine Learning

VISION

To develop expert AIML professionals to serve the society by practicing values

MISSION

1. To incorporate relevant Curricula.
2. To practice appropriate Teaching Learning techniques using modern teaching technological tools.
3. To enhance and embrace Research Culture.
4. To involve Industrial Expertise for exposure to the industrial environment.
5. To inculcate Ethical values and provide soft-skill leading to well rounded Personality Development

Program educational Objectives (PEO)

I. Develop into Artificial Intelligence and Machine Learning Professionals with expertise in providing solutions to Artificial Intelligence and Machine Learning problems

II. Pursue higher studies with a sound knowledge of basic concepts and skills in basic science, humanities, Artificial Intelligence and Machine Learning disciplines

III. Exhibit professionalism and teamwork by providing the environment for exploring current technology trends through collaborative and complementary work ethics

PROGRAMME OUTCOMES (POs) and Programme Specific Outcomes (PSOs)

Program Outcomes (POs):

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. An ability to develop logical reasoning, coding skills, analysis and mathematical modeling.

14. An ability to modify, debug, test and adapt software modules for varied applications.

S.D.M. College of Engineering and Technology, Dharwad
Structure and Scheme for 2023-24

SI No	Course	Course Code	Course Title	Teaching Department	Teaching Hrs/Week			Examination				Credits
					Lecture L	Tutorial T	Practical P	Duration in Hrs	CIE Marks	SEE Marks	Total Marks	

Department of Artificial Intelligence and Machine Learning
Scheme for I Semester

SI No	Course	Course Code	Course Title	Teaching Department	Lecture L	Tutorial T	Practical P	Duration in Hrs	CIE Marks	SEE Marks	Total Marks	Credits
1	ASC (IC)	22MATS11	Mathematics – 1 for CSE Stream	BS	2	2	2	3	50	100	100	4
2	ASC (IC)	22CHES12	Chemistry for CSE Stream	BS	2	2	2	3	50	100	100	4
3	ESC	22POP13	Principles of Programming using C	AIML	2	0	2	3	50	100	100	3
4	ESC – I	22ESC142	Introduction to Electrical Engineering	EEE	3	0	0	3	50	100	100	3
5	ETC – I	22ETC15H	Introduction to Internet of Things	ISE	3	0	0	3	50	100	100	3
6	AEC	22PWS16	Professional Writing Skills in English	HU	1	0	0	1	50	50	100	1
7	HSMS	22ICO17	Indian Constitution	HU	1	0	0	1	50	50	100	1
8	HSMS	22SFH18	Scientific Foundations of Health	AIML	1	0	0	1	50	50	100	1
									Total		**800**	**20**

ASC (IC): Applied Science Course (Integrated Course), **AEC:** Ability Enhancement Course, **ESC:** Engineering Science Course, **ETC:** Emerging Technology Course, **PLC:** Programming Language Course, **HSMS:** Humanity and Social Science and Management Course, **CIE:** Continuous Internal Evaluation, **SEE:** Semester End Examination. Semester End Examination conducted for 100 marks will be reduced to 50 marks.

AICTE activity point: Every regular student, who is admitted to the 4-year degree program, is required to earn 100 activity points in addition to the total credits earned for the program. The activity points earned by the student shall be reflected on the students VIII semester grade card. The activities to earn the points can be spread over the duration of the program. However, minimum prescribed duration should be fulfilled. Activity points (non-credit) have no effect on SGPA/CGPA and shall not be considered for vertical progression. In case student fails to earn the prescribed activity points; VIII semester grade card shall be issued only after earning the required activity Points. Students shall be eligible for the award of degree only after the release of the VIII semester grade card.

S.D.M. College of Engineering and Technology, Dharwad
Structure and Scheme for 2023-24

Sl No	Course	Course Code	Course Title	Teaching Department	Teaching Hrs/Week			Examination				Credits
					Lecture L	Tutorial T	Practical P	Duration in Hrs	CIE Marks	SEE Marks	Total Marks	
				Department of Artificial Intelligence and Machine Learning								
				Scheme for II Semester								
1	ASC (IC)	22MATS21	Mathematics – 2 for CSE Stream	BS	2	2	2	3	50	100	100	4
2	ASC (IC)	22PHYS22	Physics for CSE Stream	BS	2	2	2	3	50	100	100	4
3	ESC	22CED23	Computer Aided Engineering and Drawing	ME	2	0	2	3	50	100	100	3
4	ESC – II	22ESC243	Introduction to Electronics Engineering	EC	3	0	0	3	50	100	100	3
5	PLC	22ETC25B	Introduction to Python Programming	AIML	2	0	2	3	50	100	100	3
6	AEC	22ENG26	Communicative English	HU	1	0	0	1	50	50	100	1
7	HSMS	22KSK27/ 22KBK27	Samskrutik Kannada/ Balake Kannada	HU	1	0	0	1	50	50	100	1
8	HSMS	22IDT28	Innovation and Design Thinking	AIML	1	0	0	1	50	50	100	1
									Total		**800**	**20**

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I Semester

22MATS11	Mathematics – 1 for CSE Stream	(2-2-2) 4

Contact Hours: 40 Theory + 12 Lab Sessions

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

- 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.
- Develop the knowledge of Linear Algebra to solve the system of equations.
- Apply the knowledge of modular arithmetic to computer algorithms.

Course Outcomes (COs):

Description of the Course Outcome: At the end of the course the student will be able to:		Mapping to POs(1-12) / PSOs (13-14)		
		Substantial Level (3)	Moderate Level (2)	Slight Level (1)
CO-1	**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	-	-	1, 2,12
CO-2	**Analyze** the solution of linear and nonlinear ordinary differential equations	-	-	1, 2,12
CO-3	**Make** use of matrix theory for solving system of linear equations and **compute** eigenvalues and eigenvectors	-	1, 2	12
CO-4	**Get** acquainted and **apply** modular arithmetic to computer algorithms.	-	-	1, 2,12
CO-5	**Familiarize** with modern mathematical tools namely MATHEMATICA / MATLAB / PYTHON / SCILAB	-	-	1, 2,12

POs/PSOs	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Mapping Level	1.2	1.2	-	-	-	-	-	-	-	-	-	1.0	-	-

Pre-requisites: None

Contents:

Unit-I

Calculus: 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: Computer graphics, Image processing.   **8Hrs**

Unit-II

Series Expansion and Multi variable Calculus: 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 computer programming, Errors and approximations, calculators.   **8 Hrs**

Unit-III

Ordinary Differential Equations (ODE) of first Order: 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 $\frac{1}{M}\left(\frac{\partial N}{\partial x}\right) - \frac{\partial M}{\partial y}$ Applications of ODEs - Orthogonal trajectories (cartesian form), LR – circuits, Problems.

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

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

Applications of ordinary differential equations: Rate of Growth or Decay, RC circuits.   **8 Hrs**

Unit-IV

Linear Algebra: 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. Eigen values and Eigen vectors, Rayleigh's power method to find the dominant Eigen value and Eigen vector. Problems.

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

Applications: Boolean matrix, Network Analysis, Markov Analysis, Critical point of a network system. Optimum solution.   **8Hrs**

Unit-V

Modular Arithmetic: Introduction to Congruences, Linear Congruences, The remainder theorem, Solving Polynomials, Linear Diophantine Equation, System of linear Congruences, Euler's Theorem, Wilson Theorem and Fermat's little theorem. Applications of Congruences-RSA algorithm.

Self-Study: Divisibility, GCD, Properties of Prime Numbers, Fundamental theorem of Arithmetic.

Applications: Cryptography, encoding and decoding, RSA applications in public key encryption.   **8 Hrs**

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. Numerical solutions of system of linear equations, test for consistency and graphical representation.
7. Solution of system of linear equations using Gauss-Seidel iteration
8. Compute Eigen values and Eigen vectors and find the largest and smallest Eigen value by Rayleigh power method.
9. Finding GCD using Euclid's algorithm.
10. Applications of Wilson's theorem

Suggested softwares: Mathematica / MatLab / Python / Scilab

Text Books:
1 B. S. Grewal, "Higher Engineering Mathematics", Khanna publishers, 44/E., 2021.
2 E. Kreyszig, "Advanced Engineering Mathematics", John Wiley & Sons, 10/E, 2018.
3 V. Ramana, "Higher Engineering Mathematics" McGraw-Hill Education, 11/E. 2017

Reference Books:
1 Srimanta Pal and Subodh C. Bhunia, "Engineering Mathematics" Oxford University Press, 3/E., 2016.
2 N.P Bali and Manish Goyal, "A Textbook of Engineering Mathematics" Laxmi Publications, 10/E., 2022.
3 C. Ray Wylie and Louis C. Barrett, "Advanced Engineering Mathematics" McGraw –Hill Book Co., Newyork, 6/E., 2017.
4 Gupta C.B, Sing S.R and Mukesh Kumar, "Engineering Mathematics for Semester I and II", Mc-Graw Hill Education (India) Pvt. Ltd 2015.

| **22CHES12** | **Chemistry for CSE Stream** | **(2-2-2) 4** |

Contact Hours: 40 Theory + 12 Lab Sessions

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

- 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.

Course Outcomes (COs):

Description of the Course Outcome: At the end of the course the student will be able to:		Mapping to POs(1-12) / PSOs(13-14)		
		Substantial Level (3)	**Moderate Level (2)**	**Slight Level (1)**
CO-1	**Identify** the terms and processes involved in scientific and engineering applications.	1	-	2,3,7
CO-2	**Explain** the phenomena of chemistry to describe the methods of engineering processes.	1	-	2,3,7
CO-3	**Solve** for the problems in chemistry that are pertinent in engineering applications.	1	-	2,3,7
CO-4	**Apply** the basic concepts of chemistry to explain the chemical properties and processes.	1	-	2,3,7
CO-5	**Analyze** properties and processes associated with chemical substances in multidisciplinary situations.	1	-	2,3,7

POs/PSOs	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Mapping Level	3.0	1.0	1.0	-	-	-	1.0	-	-	-	-	-	-	-

Pre-requisites: None

Contents:

Unit-I

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

Analytical Techniques: Introduction, principle and instrumentation of Conductometry; its application in the estimation of weak acid. Potentiometry; its application in the estimation of iron.

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), Light emitting electrochemical cells.

Self-study: Nernst equation, Galvanic cell   **8 Hrs**

Unit-II

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.

Metal Finishing: Technological importance, Electroplating of Gold and applications, Electroless plating of Copper and its applications in PCBs.

Self-study: Theory of electroplating   **8 Hrs**

Unit-III

E-Waste: Introduction, sources of e-waste, Composition, Characteristics, and Need of e-waste management. Toxic materials used in manufacturing electronic and electrical products, health hazards due to exposure to e-waste. Recycling and Recovery: Different approaches of recycling (separation, thermal treatments, hydrometallurgical extraction, pyrometallurgical methods, direct recycling). Extraction of gold from E - waste. Role of stakeholders in environmental management of e-waste (producers, consumers, recyclers, and statutory bodies).

Green Fuels: Introduction, construction and working of solar photovoltaic cell, advantages and disadvantages. Generation of energy (green hydrogen) by electrolysis of water and its advantages.

Self-study: Regenerative fuel cells, Impact of heavy metals on environment and human health.   **8 Hrs**

Unit-IV

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

Composites: Preparation, Properties and Applications of Carbon fibres and kevlar.

Self-study: Elastomers & Adhesives, Glass transition temperature   **8 Hrs**

Unit-V

Sensors: Introduction, working principle and applications of Conductometric sensors, Electrochemical sensors and Optical sensors. Sensors for the measurement of dissolved oxygen (DO). Electrochemical sensors for the pharmaceuticals, hydrocarbons. Electrochemical gas sensors for SOx and NOx. Disposable sensors in the detection of biomolecules and pesticides.

Energy Systems: Introduction to batteries, construction, working and applications of Lithium ion and Sodium ion batteries. Quantum Dot Sensitized Solar Cells (QDSSC's)- Principle, Properties and Applications.

Self-study: Types of electrochemical sensor, Gas sensor - O2 sensor, Biosensor – Glucose sensors.   **8 Hrs**

PRACTICAL MODULE
A – Demonstration (any two) offline/virtual:

A1. Chemical Structure drawing using software: ChemDraw or ACD/ChemSketch

A2. Determination of strength of an acid in Pb-acid battery

A3: Synthesis of Iron-oxide Nanoparticles

A4. Electrolysis of water

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: Evaluation of acid content in beverages by using pH sensors and simulation.

D2. Construction of photovoltaic cell.

D3. Design an experiment to Identify the presence of proteins in given sample.

D4. Searching suitable PDB file and target for molecular docking

Reference Books:

1 "Engineering Chemistry", Wiley India Pvt. Ltd. New Delhi, 2/E, 2013.

2 Satyaprakash & Manisha Agrawal, "Engineering Chemistry", Khanna Book Publishing, Delhi

3 Shashi Chawla, "A Text Book of Engg. Chemistry", Dhanpat Rai & Co. (P) Ltd.

4 Bahl & Tuli, "Essentials of Physical Chemistry", S.Chand Publishing

5 Sunita Rattan, Kataria "Applied Chemistry", Wiley

6 D. GrourKrishana, "Engineering Chemistry – I", Vikas Publishing

7 SS Dara & Dr. SS Umare, "A Text book of Engineering Chemistry", S Chand & Company Ltd., 12/E, 2011.

8 R.V. Gadag and Nityananda Shetty, "A Text Book of Engineering Chemistry", I. K. International Publishing house. 2/E, 2016.

9 F.W. Billmeyer, "Text Book of Polymer Science", John Wiley & Sons, 4/E, 1999.

10 G.A. Ozin & A.C. Arsenault, "Nanotechnology A Chemical Approach to Nanomaterials", RSC Publishing, 2005.

11 M. G. Fontana, N. D. Greene, "Corrosion Engineering", McGraw Hill Publications, New York, 3/E, 1996.

12 Kirby W. Beard, "Linden's Handbook of Batteries", 5/E, McGraw Hill, 2019.

13 Takatoshi Tsujimura, "OLED Display Fundamentals and Applications", Wiley–Blackwell , 2012

14 Max Lu, Francois Beguin, Elzbieta Frackowiak, "Supercapacitors: Materials,

Systems, and Applications", Wiley-VCH; 1/E, 2013.

15 Dr. H. Panda, "Handbook on Electroplating with Manufacture of Electrochemicals", ASIA PACIFIC BUSINESS PRESS Inc., 2017.

16 "Expanding the Vision of Sensor Materials". National Research Council 1995, Washington, DC: The National Academies Press. doi: 10.17226/4782.

17 Dr. Mahesh B and Dr. Roopashree B, "Engineering Chemistry", Sunstar Publisher,Bengaluru, ISBN 978-93-85155-70-3, 2022

18 F. H. Froes, et al, "High Performance Metallic Materials for Cost Sensitive Applications", John Wiley & Sons, 2010

19 Dr. K. R. Mahadik and Dr. L. Sathiyanarayanan, "Instrumental Methods of Analysis", Nirali Prakashan, 2020

20 Douglas A. Skoog, F. James Holler, Stanley R. Crouch "Principles of Instrumental Analysis", 7/E, Cengage Learning, 2020

21 V R Gowariker, N V Viswanathan, Jayadev, Sreedhar, "Polymer Science",Newage Int. Publishers, 4/E, 2021

22 P C Jain & Monica Jain, "Engineering Chemistry", Dhanpat Rai Publication, 16/E, 2015.

23 Hari Singh, Nalwa, "Nanostructured materials and nanotechnology", academic press, 1/E, 2002.

24 Sulabha K Kulkarni, "Nanotechnology Principles and Practices",Capital Publishing Company, 3/E, 2014

25 Phanikumar, "Principles of nanotechnology", Scitech publications, 2/E, 2010.

26 B. S. Jai Prakash, R. Venugopal, Sivakumaraiah & Pushpa Iyengar., "Chemistry for Engineering Students", Subash Publications, 5/E, 2014.

27 O. G. Palanna, "Engineering Chemistry", Tata McGraw Hill Education Pvt. Ltd. New Delhi, Fourth Reprint, 2015.

28 Malini S, K S Anantha Raju, "Chemistry of Engineering materials", CBS publishers Pvt Ltd.,

29 Anupma Rajput, "Laboratory Manual Engg. Chemistry", Dhanpat Rai & Co.

22POP13	Principles of Programming Using C	(2-0-2) 3

Contact Hours: 26 Theory + 12 Lab Sessions

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

- 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.

- 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(1-12)/ PSOs (13-14)		
		Substantial Level (3)	Moderate Level (2)	Slight Level (1)
CO-1	**Design** a solution by analyzing the given problem scenario and **represent** it using algorithm / flowchart.	-	1,2,3	-
CO-2	**Explain** the C language primitives, language principles and use them in writing simple programs.	-	1,2,3	-
CO-3	**Write** C programs using proper control structures to solve simple problems.	-	1,2,3	-
CO-4	**Write** a C program using arrays and strings to solve simple problems.	-	2,6	-
CO-5	**Explain** the usage and the need for writing modular programs and demonstrate its use in writing programs.	-	-	1,2,3

POs/PSOs	1	2	3	4	5	6	7	8	9	10	11	12	13	14
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. **6 Hrs**

Unit-II

Decision making and Branching: if statement and its different forms, switch statement. **5 Hrs**

Unit-III

Decision making and Looping: loops and their behavior – entry and exit controlled loops, conditional and unconditional jump statements, Nested loops. **5 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. **5 Hrs**

Unit-V

Modular Programming: Declaration, definition and use of functions, passing parameters to function, Recursion. **5 Hrs**

Laboratory Component:

Programming exercises of varying complexity, to meet the learning results stated in course outcomes for this course.

Working Platform: Linux Operating System

Expected Coding Practices:

1. Use of Good Programming practices: Declaration of variables, Indentation, Documentation, Simplicity of logic, Efficiency of logic, uniformity etc.
2. Generic and Reusable code.
3. Inclusions of exceptional cases.
4. Better usability

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.

22ESC142	Introduction to Electrical Engineering	(3-0-0) 3

Contact Hours: 40

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

- 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 andpersonal 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(1-12)/ PSOs (13-14)		
		Substantial Level (3)	Moderate Level (2)	Slight Level (1)
CO-1	**Understand** the concepts of various energy sources and Electric circuits.	1	2	3, 5, 6,7,8,12
CO-2	**Apply** the basic Electrical laws to solve circuits.	1,2	3	4,5,6,12
CO-3	**Discuss** the construction and operation of various Electrical Machines.	1	2	3,4,5,6,7,8,12
CO-4	**Identify** suitable Electrical machine for practical implementation.	1	2,3	4,6,7,8,12
CO-5	**Explain** the concepts of electric power transmission and distribution, electricity billing, circuit protective devices and personal safety measures.	1	3,6	2,5,7,8,11,12

POs/PSOs	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Mapping Level	3.0	2.0	1.6	1.0	1.0	1.2	1.0	1.0	-	-	1.0	1.0	-	-

Pre-requisites: None

Contents:

Unit-I

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.   **8 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. (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)   **8 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. 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.   **8 Hrs**

Unit-IV

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.   **8 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 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.   **8 Hrs**

Reference Books:
1. D C Kulshreshtha, "Basic Electrical Engineering", Tata McGraw Hill, 1/E, 2019.
2. B.L. Theraja, "A text book of Electrical Technology", S Chand and Company, reprint edition 2014.
3. D. P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill 4/E, 2019.
4. V. K. Mehta, Rohit Mehta, "Principles of Electrical Engineering & Electronics", S. Chand and Company Publications, 2/E, 2015.
5. Rajendra Prasad, "Fundamentals of Electrical Engineering", PHI, 3/E, 2014.

22ETC15H	Introduction to Internet of Things	(3-0-0) 3

Contact Hours: 40

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

Course Outcomes (COs):

Description of the Course Outcome: At the end of the course the student will be able to:	Mapping to POs(1-12) / PSOs (13-14)		
	Substantial Level (3)	Moderate Level (2)	Slight Level (1)
CO-1 Describe the evolution of IoT, IoT networking components, and addressing strategies in IoT.	1,2	-	-
CO-2 Classify various sensing devices and actuator types.	-	3,4	-
CO-3 Explain Associated IOT Technologies	-	3	-
CO-4 Illustrate architecture of IOT Applications.	-	3,6	-
CO-5 Demonstrate the processing in IoT and Develop IoT applications using Arduino by making use of sensors and modules.	4	5	1,9

POs/PSOs	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Mapping Level	2.0	3.0	2.0	2.5	2.0	2.0	-	-	1.0	-	-	-	-	-

Pre-requisites: None

Course Contents:

Unit I

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.   **8 Hrs**

Unit II

IoT Sensing and Actuation: Introduction, Sensors, Sensor Characteristics, Sensorial Deviations, Sensing Types, Sensing Considerations, Actuators, Actuator Types, Actuator Characteristics.   **8 Hrs**

Unit III

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   **8 Hrs**

Unit IV

IoT Case Studies And Future Trends: Vehicular IoT – Introduction Healthcare IoT – Introduction, Case Studies IoT Analytics – Introduction   **8 Hrs**

Unit V

Arduino Programming: Features of Arduino, Arduino UNO, Arduino IDE, Arduino sketch structure, Arduino function libraries, Blinking LED example; Operators, control statements, loops, arrays, string, interrupts, Traffic Control System example. Integration of Sensors, Actuators and modules with Arduino: Sensor Types, Sensor Interface with Arduino, Interfacing DHT, LM35, LDR, Accelerometer and HCSR04 sensors with Arduino; Actuators, Types of Motor Actuators, Servo motor, Servo library on Arduino; HC05 Bluetooth module, Features, Interfacing HC05 with Arduino, Controlling LED using Bluetooth; ESP8266 wifi module, Features, Send LM35 sensor data to cloud using wifi module   **8 Hrs**

Text Books:
1. Sudip Misra, Anandarup Mukherjee, Arijit Roy, "Introduction to IoT", Cambridge University Press 2021.
2. S. Misra, C. Roy, and A. Mukherjee, "Introduction to Industrial Internet of Things and Industry 4.0", CRC Press. 3, 2020
3. Vijay Madisetti and Arshdeep Bahga, "Internet of Things (A Hands-on-Approach)",1/E, VPT, 2014
4. Francis daCosta, "Rethinking the Internet of Things: A Scalable Approach to Connecting Everything", 1/E, Apress Publications, 2013.
5. Ammar Rayes, Samer Salam, "Internet of Things From Hype to Reality – The Road to Digitalization", 2/E, , Springer Nature Switzerland AG 2017, 2019

| 22PWS16 | Professional Writing Skills in English | (1-0-0) 1 |

Contact Hours: 15

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

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

Course Outcomes (COs):

Description of the Course Outcome: At the end of the course the student will be able to:		Mapping to POs(1-12) / PSOs (13-14)		
		Substantial Level (3)	Moderate Level (2)	Slight Level (1)
CO-1	**Identify** the Common Errors in Writing and Speaking.	-	10	-
CO-2	**Achieve** better Technical writing and Presentation skills.	-	10	-
CO-3	**Read** Technical proposals properly and **write** good technical reports.	10	-	-
CO-4	**Acquire** Employment and Workplace communication skills.	-	10	-
CO-5	**Learn** effective presentation skills.	10	-	-

POs/PSOs	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Mapping Level	-	-	-	-	-	-	-	-	-	2.4	-	-	-	-

Pre-requisites: None

Contents:

Unit-I

Identifying Common Errors in Writing and Speaking 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.   **3 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 Correction activities, Misplaced modifers, Contractions, Collocations, Correction of Errors.   **3 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. **3 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. Writing effective resume for employment, Emails, Blog Writing and Memos. **3 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. **3 Hrs**

Reference Books:
1. "Professional Writing Skills in English" published by Fillip 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].
3. N.P.Sudharshana and C.Savitha, "English for Engineers", Cambridge University Press – 2018.
4. Gajendra Singh Chauhan et al, "Technical Communication", Cengage learning India Pvt Limited [Latest Revised Edition] - 2019.
5. Meenakshi Raman and Sangeetha Sharma, "Technical Communication – Principles and Practice", Oxford University Press, 3/E, 2017.
6. Wren and Martin, "High School English Grammar & Composition", S Chandh& Company Ltd – 2015.
7. M Ashraf Rizvi, "Effective Technical Communication", McGraw Hill Education (India) Private, 2/E.
8. Rogers. C, Farson R.E., "Active Listening", Gardon Training Inc
9. Wood, Frederick, "A Remedial English Grammar for Foreign Students", Macmillan Education, India, 1990.
10. Yadugiri. M.A., "Making Sense of English – A Textbook of Sounds, Words, and Grammar", Viva Books, 2020.

22ICO17	Indian Constitution	(1-0-0) 1

Contact Hours: 15

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

- To know about the basic structure of Indian Constitution.
- To know the Fundamental Rights (FR's), DPSP's and Fundamental Duties (FD's) of our constitution.
- To know about our Union Government, political structure & codes, procedures.
- To know the State Executive & Elections system of India.
- 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(1-12) / PSOs (13-14)		
		Substantial Level (3)	Moderate Level (2)	Slight Level (1)
CO-1	**Analyze** the basic structure of Indian Constitution.	-	2	-
CO-2	**Remember** their Fundamental Rights, DPSP's and Fundamental Duties (FD's) of our constitution.	-	1	-
CO-3	**Know** about our Union Government, political structure & codes, procedures.	-	1	-
CO-4	**Understand** our State Executive & Elections system of India.	-	1	-
CO-5	**Remember** the Amendments and Emergency Provisions, other important provisions given by the constitution.	-	1	-

POs/PSOs	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Mapping Level	2.0	2.0	-	-	-	-	-	-	-	-	-	-	-	-

Pre-requisites: None
Contents:

Unit-I

Introduction: 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. **3 Hrs**

Unit-II

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. **3 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. **3 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. **3 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. **3 Hrs**

Reference Books:
1. "Constitution of India" (for Competitive Exams), Naidhruva Edutech Learning Solutions, Bengaluru, 2022.
2. Durga Das Basu, "Introduction to the Constitution of India", (Students Edition.), Prentice –Hall, 2008.
3. Shubham Singles, Charles E. Haries, and et al, "Constitution of India, Professional Ethics and Human Rights", Cengage Learning India, Latest Edition, 2019.
4. Merunandan K B, "The Constitution of India", Merugu Publication, 2/E, Bengaluru.
5. Justice HN Nagamohan Dhas, "SamvidhanaOdu" - for Students & Youths, Sahayana, kerekon.
6. M.Govindarajan, S.Natarajan, V.S.Senthilkumar, "Engineering Ethics", Prentice –Hall, 2004.

22SFH18	Scientific Foundations of Health	(1-0-0) 1

Contact Hours: 15

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

- To know about Health and wellness (and its Beliefs) & its balance for positive mindset.
- To build the healthy lifestyles for good health for their better future.

- To Create a Healthy and caring relationships to meet the requirements of good/social/positive life.
- To learn about Avoiding risks and harmful habits in their campus and outside the campus for their bright future
- To Prevent and fight against harmful diseases for good health through positive mindset

Course Outcomes (COs):

Description of the Course Outcome: At the end of the course the student will be able to:		Mapping to POs(1-12) / PSOs (13-14)		
		Substantial Level (3)	Moderate Level (2)	Slight Level (1)
CO-1	**Explain** and **analyze** about Health and wellness (and its Beliefs) & its balance for positive mindset.	-	1,2	-
CO-2	**Develop** the healthy lifestyles for good health for their better future.	-	1,2	-
CO-3	**Build** a Healthy and caring relationships to meet the requirements of good/social/positive life.	-	1,2	-
CO-4	**Learn** about Avoiding risks and harmful habits in their campus and outside the campus for their bright future.	-	1,2	-
CO-5	**Prevent** and **fight** against harmful diseases for good health through positive mindset.	-	1,2	-

POs/PSOs	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Mapping Level	2.0	2.0	-	-	-	-	-	-	-	-	-	-	-	-

Pre-requisites: None

Contents:

Unit-I

Good Health & Its 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. **3 Hrs**

Unit-II

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. **3 Hrs**

Unit-III

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. **3 Hrs**

Unit-IV

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, how to recovery from addictions. **3 Hrs**

Unit-V

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 chronic illness for Quality of life, Health & Wellness of youth :a challenge for upcoming future, Measuring of health & wealth status. **3 Hrs**

Reference Books:

1. Dr. L Thimmesha, "Scientific Foundations of Health", Published in VTU - University Website.
2. "Scientific Foundations of Health", Infinite Learning Solutions Publishers, Bangalore, 2022.
3. Jane Ogden, "Health Psychology - A Textbook", McGraw Hill Education (India) Private Limited - Open University Press, 4/E.
4. Charles Abraham, Mark Conner, Fiona Jones and Daryl O"Connor, "Health Psychology", Routledge Publishers, 2/E.
5. Shelley E. Taylor, "Health Psychology" McGraw Hill Education (India) Private Limited - Open University Press, 9/E.
6. SWAYAM / NPTEL/ MOOCS/ Web links/ Internet sources/ YouTube videos and other materials / notes.

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: 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 and will be scaled down 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: 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 and will be scaled down 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 maaarks with 1 hour duration. There will be 50 MCQs. The question paper will contain 10 MCQ questions from each module.

II Semester

| 22MATS21 | Mathematics - 2 for CSE Stream | (2-2-2) 4 |

Contact Hours: 40 Theory + 12 Lab Sessions

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

- Develop the knowledge of numerical methods and apply them to solve transcendental and differential equations.
- Familiarize the importance of Integral calculus and Vector calculus.
- Learn vector spaces and linear transformations.

Course Outcomes (COs):

Description of the Course Outcome: At the end of the course the student will be able to:		Mapping to POs(1-12) / PSOs (13-14)		
		Substantial Level (3)	Moderate Level (2)	Slight Level (1)
CO-1	**Apply** the knowledge of numerical methods in analysing the discrete data and solving the physical and engineering problems.	-	-	1,2,12
CO-2	**Apply** the concept of change of order of integration and variables to evaluate multiple integrals and their usage in computing area and volume.	-	-	1,2,12
CO-3	**Understand** the applications of vector calculus refer to solenoidal, and irrotational vectors, Orthogonal curvilinear coordinates.	-	-	1,2,12
CO-4	**Demonstrate** the idea of Linear dependence and independence of sets in the vector space, and linear transformation	-	-	1,2,12
CO-5	**Get** familiarize with modern mathematical tools namely MATHEMATICA / MATLAB / PYTHON / SCILAB	-	-	1,2,12

POs/PSOs	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Mapping Level	1.0	2.0	-	-	-	-	-	-	-	-	-	1.0	-	-

Pre-requisites: Knowledge of fundamentals of calculus.

Course Contents:

Unit I

Numerical methods: Solution of algebraic and transcendental equations - Regula-Falsi and Newton-Raphson methods (only formulae). Problems. Finite differences, Interpolation using Newton's forward and backward difference formulae, Newtons 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.

S**elf-Study:** Bisection method, Lagrange's inverse Interpolation.

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

Errors in finite precision.   **8 Hrs**

Unit II

Numerical Solution of Ordinary Differential Equations (ODE's): 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.   **8 Hrs**

Unit III

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: Center of gravity, Duplication formula.

Applications: Antenna and wave propagation, Calculation of optimum value in various geometries. Analysis of probabilistic models.   **8 Hrs**

Unit IV

Introduction to Vector Calculus in Computer Science & Engineering: Scalar and vector fields. Gradient, directional derivative, curl and divergence – physical interpretation, solenoidal and irrotational vector fields. Problems.

Curvilinear coordinates: Scale factors, base vectors, Cylindrical polar coordinates, Spherical polar coordinates, transformation between cartesian and curvilinear systems, orthogonality. Problems.

Self-Study: Volume integral.

Applications: Conservation of laws, Electrostatics, Analysis of streamlines.
8 Hrs

Unit V

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

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. Problems.

Self-study: Angles and Projections. Rotation, reflection, contraction and expansion.

Applications: Image processing, AI & ML, Graphs and networks, computer graphics.   **8 Hrs**

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

1 Solution of algebraic and transcendental equations by Ramanujan's, Regula-Falsi and Newton-Raphson method
2 Interpolation/Extrapolation using Newton's forward and backward difference formula
3 Computation of area under the curve using Trapezoidal, Simpson's (1/3)rd and (3/8)th rule
4 Solution of ODE of first order and first degree by Taylor's series and Modified Euler's method
5 Solution of ODE of first order and first degree by Runge-Kutta 4th order and Milne's predictor-corrector method.
6 Program to compute area, surface area, volume and centre of gravity
7 Evaluation of improper integrals
8 Finding gradient, divergent, curl and their geometrical interpretation
9 Computation of basis and dimension for a vector space and Graphical representation of linear transformation
10 Computing the inner product and orthogonality

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

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

Reference Books:
1. V. Ramana, "Higher Engineering Mathematics" McGraw-Hill Education, 11/E. 2017
2. Srimanta Pal & Subodh C. Bhunia, "Engineering Mathematics" Oxford University Press, 3/E, 2016.
3. N.P Bali and Manish Goyal, "A textbook of Engineering Mathematics" Laxmi Publications, 10/E, 2022.
4. C. Ray Wylie, Louis C. Barrett, "Advanced Engineering Mathematics" McGraw –Hill Book Co., Newyork, 6/E, 2017.

5. Gupta C.B, Sing S.R and Mukesh Kumar, "Engineering Mathematics 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, 3/E, 2014.
7. James Stewart: **"Calculus"** Cengage Publications, 7/E, 2019.
8. David C Lay: "Linear Algebra and its Applications", Pearson Publishers, 4/E, 2018.
9. Gareth Williams, "Linear Algebra with applications", Jones Bartlett Publishers Inc., 6/E, 2017.
10. William Stallings, "Cryptography and Network Security" Pearson Prentice Hall, 6/E, 2013.
11. David M Burton, "Elementary Number Theory" Mc Graw Hill, 7/E, 2010.

22PHYS22	Physics for CSE Stream	(2-2-2) 4

Contact Hours: 40 Theory + 12 Lab Sessions

Course Learning Objectives (CLOs): The course is designed to deliver optimum knowledge of materials and energy concepts. Content explores the fundamental theories, experimental demonstrations and their applications in various engineering fields. Scope of the curriculam includes the study of special theory of laser, optical fiber, quantum mechanics and quantum computing, electrical properties and physics for computational aspects like design and data analysis.

Course Outcomes (COs):

Description of the Course Outcome: At the end of the course the student will be able to:		Mapping to POs(1-12) / PSOs (13-14)		
		Substantial Level (3)	Moderate Level (2)	Slight Level (1)
CO-1	**Describe** the principles of LASERS and Optical fibers and their relevant applications.	2	1	-
CO-2	**Discuss** the basic principles of Quantum Mechanics and their application in Quantum Computing.	1	2	-
CO-3	**Summarize** the essential properties of superconductors.	1	2	-
CO-4	**Introduction** of Qubit and Pauli's gates in Quantum Computing.	1	2	-
CO-5	**Illustrate** the application of physics in smart sensing technology.	1	-	-
CO-6	**Practice** working in groups to conduct experiments in physics and **perform** precise and honest	1,8,9	2,5,12	3

measurements.														

POs/PSOs	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Mapping Level	2.8	2.3	-	-	-	-	-	-	-	-	-	-	-	-

Pre-requisites: None

Contents:

Unit-I

LASER: Basic properties of a LASER beam, Interaction of Radiation with Matter, Einstein's A and B Coefficients, Laser Action, Population Inversion, Metastable State, Requisites of a laser system, Semiconductor Diode Laser, Applications: Bar code scanner, Laser Printer, Laser Cooling. Numerical problems.

Optical Fiber: Principle and structure, Acceptance angle and Numerical Aperture (NA) and derivation of Expression for NA, Classification of Optical Fibers, Attenuation and Fiber Losses, Applications: Fiber Optic networking, Fiber Optic Communication. Numerical Problems. **8 Hrs**

Unit-II

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 (Nonexistence 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. **8 Hrs**

Unit-III

Quantum Computing:

Wave Function in Ket Notation: Matrix form of wave function, Identity Operator, Determination of I|0> and I|1>, Pauli Matrices and its operations on 0 and 1 states, Mention of Conjugate and Transpose, Unitary Matrix U, Examples: Row and Column Matrices and their multiplication (Inner Product), Probability, Orthogonality

Principles of Quantum Information & Quantum Computing: Introduction to Quantum Computing, Moore's law & its end. Single particle quantum interference, Classical & quantum information comparison. Differences between classical & quantum computing, quantum superposition and the concept of qubit.

Properties of a qubit: Mathematical representation. Summation of probabilities, Representation of qubit by Bloch sphere

Quantum Gates:

<u>Single Qubit Gates:</u> Quantum Not Gate, Pauli -Z Gate Hadamard Gate, Pauli Matrices, Phase Gate (or S Gate), T Gate

<u>Multiple Qubit Gates:</u> Controlled gate, CNOT Gate, (Discussion for 4 different input

states). Representation of Swap gate, Controlled-Z gate, Toffoli gate, Accounting for the extra-ordinary capability of quantum computing, Model Realizations.   **8 Hrs**

Unit-IV

Electrical Properties of Materials and Applications: Electrical conductivity in metals, Resistivity and Mobility, Concept of Phonon, Matthiessen's rule. Introduction to Super Conductors, Temperature dependence of resistivity, Meissner's Effect, Silsbee Effect, Types of Superconductors, Temperature dependence of critical field, BCS theory (Qualitative), Quantum Tunneling, High Temperature superconductivity, Josephson Junction, DC and AC SQUIDs (Qualitative), Applications in Quantum Computing (Mention). Numerical problems.   **8 Hrs**

Unit-V

Applications of Physics in computing:

Physics of Animation: Taxonomy of physics-based animation methods, Frames, Frames per Second, Size and Scale, weight and strength, Motion and Timing in Animations, Constant Force and Acceleration, The Odd rule, Motion Graphs, Numerical Calculations based on Odd Rule, Examples of Character Animation: Jumping, Walking. Numerical problems.

Statistical Physics for Computing: Descriptive statistics and inferential statistics, Poisson distribution and Normal Distributions (Bell Curves), Monte Carlo Method. Numerical problems.   **8 Hrs**

Laboratory Component:
Any Ten Experiments have to be completed from the following list 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. Determination of Magnetic Flux Density at any point along the axis of a circular coil.
4. Determination of resistivity of a semiconductor by Four Probe Method.
5. Study the I-V Characteristics of the Given Bipolar Junction Resistor.
6. Determination of dielectric constant of the material of capacitor by Charging and Discharging Method.
7. Study the Characteristics of a Photo-Diode and to determine the power responsivity / Verification of Inverse Square Law of Intensity of Light.
8. Study the frequency response of Series and Parallel LCR circuits.
9. Determination of Plank's constant using LEDs.
10. Determination of Fermin Energy of Copper.
11. Identification of circuit elements in a Black Box and determination of values of the components.
12. Determination of Energy gap of the given Semiconductor.
13. Step Interactive Physical Simulations.
14. Study of motion using spread Sheets

15. Study of Application of Statistic using Spread Sheets
16. PHET Interactive Simulations.

Reference Books:
1. S O Pillai, "Solid State Physics", New Age International Private Limited, 8/E, 2018.
2. Gupta and Gour, "Engineering Physics", Dhanpat Rai Publications, 2016 (Reprint).
3. S P Basavaraj, "Engineering Physics", 2005 Edition.
4. Michele Bousquet and Alejandro Garcia, "Physics for Animators", CRC Press, Taylor & Francis, 2016.
5. Vishal Sahani, "Quantum Computing", McGraw Hill Education, 2007 Edition.

22CED23	Computer Aided Engineering and Drawing	(2-0-2) 3

Contact Hours: 40 Theory + 12 Lab Sessions

Course Learning Objectives (CLOs): This course focuses on the following learning perspectives:
- To understand the basic principles and conventions of engineering drawing
- To use drawing as a communication mode
- To generate pictorial views using CAD software
- To understand the development of surfaces
- 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(1-12) / PSOs (13-14)		
		Substantial Level (3)	Moderate Level (2)	Slight Level (1)
CO-1	Draw and communicate the objects with definite shape and dimensions	1,5,10	2,12	6,8,9
CO-2	Recognize and Draw the shape and size of objects through different views	1,5,10	2,12	6,8,9
CO-3	Develop the lateral surfaces of the object	1,5,10	2,12	6,8,9
CO-4	Create a Drawing views using CAD software	1,2,5,10	-	6,7,9,12
CO-5	Identify the interdisciplinary engineering components or systems through its graphical representation.	1,5,10	2,12	9

POs/PSOs	1	2	3	4	5	6	7	8	9	10	11	12	13	14

| **Mapping Level** | 3.0 | 2.6 | - | - | 3.0 | 1.0 | 1.0 | 1.0 | 1.0 | 3.0 | - | 1.7 | - | - |

Prerequisites: None

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). Application on projections of Lines & Planes. **8 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 &Tetrahedron. Projections of Frustum of cone and pyramids. **8 Hrs**

Unit-III

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. **8 Hrs**

Unit-IV

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. **8 Hrs**

Unit-V

Multidisciplinary Applications & Practice:

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: Automatic fire alarm, Call bell system, UPS system, Basic power distribution system using suitable software

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

Electronics Engineering Drawings: Simple Electronics Circuit Drawings, practice on layers concept.

Graphs & Charts: Column chart, Pie chart, Line charts, Gantt charts, etc. using Microsoft Excel or any suitable software. **8 Hrs**

Reference Books:

1. S.N. Lal, & T Madhusudhan:, Engineering Visulisation, 1st Edition, Cengage,Publication Parthasarathy N. S., Vela Murali, Engineering Drawing, Oxford University Press, 2015.
2. Bhattacharya S. K., Electrical Engineering Drawing, New Age International publishers, second edition 1998, reprint 2005.
3. Chris Schroder, Printed Circuit Board Design using AutoCAD, Newnes, 1997.
4. K S Sai Ram Design of steel structures, , Third Edition by Pearson
5. Nainan p kurian Design of foundation systems, Narosa publications
6. A S Pabla, Electrical power distribution, 6th edition, Tata Mcgraw hill
7. Bhatt, N.D., Engineering Drawing: Plane and Solid Geometry, 53rd edition, Charotar Publishing House Pvt. Limited, 2019.
8. K. R. Gopalakrishna, & Sudhir Gopalakrishna: Textbook Of Computer Aided Engineering Drawing, 39th Edition, Subash Stores, Bangalore, 2017

22ESC243	Introduction to Electronics Engineering	(3-0-0) 3

Contact Hours: 40

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

- To prepare students with fundamental knowledge/ overview in the field of Electronics and Communication Engineering.
- To equip students with a basic foundation in electronic engineering required for comprehending the operation and application of electronic circuits, logic design, embedded systems, and communication systems.
- Professionalism & Learning Environment: To inculcate in first-year engineering students an ethical and professional attitude by providing an academic environment inclusive of effective communication, teamwork, ability to relate engineering issues to a broader social context, and life-long learning needed for a successful professional career.

Course Outcomes (COs):

Description of the Course Outcome: At the end of the course the student will be able to:	Mapping to POs(1-12) / PSOs (13-14)		
	Substantial Level (3)	Moderate Level (2)	Slight Level (1)
CO-1 **Develop** the basic knowledge on construction and operation of rectifiers and amplifiers.	-	3	1
CO-2 **Apply** the acquired knowledge to construct small scale circuits consisting of oscillators and operational amplifiers.	-	1	-
CO-3 **Develop** the competence knowledge to construct basic digital circuit by making use of basic gates and its function.	-	1	3
CO-4 **Apply** the acquired knowledge to construct small scale embedded circuits.	-	1	12
CO-5 **Study** the conceptual blocks of basic communication system and **acquire** the knowledge of analog and digital communication schemes.	-	1	12

POs/PSOs	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Mapping Level	1.8	-	1.5	-	-	-	-	-	-	-	-	1.0	-	-

Pre-requisites: None

Contents:

Unit-I

Power Supplies: Block diagram, Half-wave rectifier, Full-wave rectifiers and filters, Voltage regulators, Output resistance and voltage regulation, Voltage multipliers.

Amplifiers: CE amplifier with and without feedback, Multi-stage amplifier; BJT as a switch: Cutoff and saturation modes.   **8 Hrs**

Unit-II

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

Operational amplifiers: Ideal op-amp; characteristics of ideal and practical op-amp; Practical opamp circuits: Inverting and non-inverting amplifiers, voltage follower, summer, subtractor, integrator, differentiator.   **8 Hrs**

Unit-III

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

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

8 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.
8 Hrs

Unit-V

Analog Communication Schemes: Modern communication system scheme, Information source, and input transducer, Transmitter, Channel or Medium – Hardwired and Soft wired, Noise, Receiver, Multiplexing, Types of communication systems. Types of modulation (only concepts) – AM , FM, Concept of Radio wave propagation (Ground, space, sky)

Digital Modulation Schemes: Advantages of digital communication over analog communication, ASK, FSK, PSK, Radio signal transmission Multiple access techniques. **8 Hrs**

Reference Books:
1 Mike Tooley, "Electronic Circuits, Fundamentals & Applications", 4/E, Elsevier, 2015.
2 Digital Logic and Computer Design, M. Morris Mano, PHI Learning, 2008
3 D P Kothari, I J Nagrath, 'Basic Electronics', 2/E, McGraw Hill Education (India), Private Limited, 2018.

| 22ETC25B | Introduction to Python Programming | (2-0-2) 3 |

Contact Hours: 26 Theory + 12 Lab Sessions

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

Course Outcomes (COs):

Description of the Course Outcome:	Mapping to POs(1-12) / PSOs (13-14)

At the end of the course the student will be able to:		Substantial Level (3)	Moderate Level (2)	Slight Level (1)
CO-1	**Demonstrate** proficiency in handling loops and creation of functions.	-	1,2,3	-
CO-2	**Identify** the methods to create and manipulate lists, tuples and dictionaries.	-	1,2,3	-
CO-3	**Develop** programs for string processing and file organization.	-	1,2,3	-
CO-4	**Interpret** the concepts of Object-Oriented Programming as used in Python.	-	1,2,3	-
CO-5	**Demonstrate** proficiency in handling loops and creation of functions.	-	1,2,3	-

POs/PSOs	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Mapping Level	2.0	2.0	2.0	-	-	-	-	-	-	-	-	-	-	-

Pre-requisites: Knowledge of fundamental Principles of Programming.

Contents:

Unit-I

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. **5 Hrs**

Unit-II

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. **5 Hrs**

Unit-III

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: Multi clipboard. **5 Hrs**

Unit-IV

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, Backing Up a Folder into a ZIP File.

Debugging: Raising Exceptions, Getting the Traceback as a String, Assertions, logging, IDLE's Debugger.   **5 Hrs**

Unit-V

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.

6 Hrs

List of Experiments:

a) 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.

b) Develop a program to read the name and year of birth of a person. Display whether the person is a senior citizen or not.

2 a) Develop a program to generate Fibonacci sequence of length (N). Read N from the console.

b) Write a function to calculate factorial of a number. Develop a program to compute binomial coefficient (Given N and R).

3 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.

5 Develop a program to print 10 most frequently appearing words in a text file. [Hint: Use dictionary with distinct words and their frequency of occurrences. Sort the dictionary in the reverse order of frequency and display dictionary slice of first 10 items]

6 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 DivExp.

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 >=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 getMarks() method to read marks into the list, and display() method to display the score card details

Reference Books:

1. Al Sweigart, "Automate the Boring Stuff with Python",1/E, No Starch Press, 2015.
2. Allen B. Downey, "Think Python: How to Think Like a Computer Scientist", 2/E, Green Tea Press, 2015.

22ENG26	Communicative English	(1-0-0) 1

Contact Hours: 15

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

- To know about Fundamentals of Communicative English and Communication Skills in general.
- To train to identify the nuances of phonetics, intonation and enhance pronunciation skills for better Communication skills.
- To impart Basic English grammar and essentials of important language skills.
- To enhance with English vocabulary and language proficiency for better communication skills.
- 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(1-12) / PSOs (13-14)		
		Substantial Level (3)	Moderate Level (2)	Slight Level (1)
CO-1	**Apply** the Fundamentals of Communication Skills in their communication skills.	-	10	-
CO-2	**Identify** the nuances of phonetics, intonation and **enhance** pronunciation skills.	-	10	-
CO-3	**Impart** basic English grammar and essentials of language skills as per present requirement.	10	-	-
CO-4	**Acquire** vocabulary and language proficiency.	-	10	-

CO-5	**Adopt** the Techniques of Information Transfer through presentation.	10	-	-

POs/PSOs	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Mapping Level	-	-	-	-	-	-	-	-	-	2.4	-	-	-	-

Pre-requisites: 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.   **3 Hrs**

Unit-II

Introduction to Phonetics: Sounds – consonants, vowels, and dipthongs, Syllables and Structure, Word Accent, Stress Shift and Intonation, Phonetic Transcription, Common Errors in Pronounciation.   **3 Hrs**

Unit-III

Vocabulary: Word formation systems, Antonyms, Homophones, Homonyms, Affixes, Abbreviations, Strong and Weak forms of Words, Word pairs, One Word Substitutes and Error identification.   **3 Hrs**

Unit-IV

Grammar: Parts of Speech, Articles and Preposition Tense, Sentences, Kinds of Sentences, Types of Sentences, Transformation of Sentences, Question Tags and Exercises on it.   **3 Hrs**

Unit-V

Communication Skills for Employment: Presentation Skills, Extempore, Public Speaking, Mother Tongue Influence (MTI), Reading and Listening Comprehensions – Exercises.   **3 Hrs**

Reference Books:

1. Sanjay Kumar & PushpLata, "Communication Skills", Oxford University Press India Pvt Ltd, 2019

2. "A Textbook of English Language Communication Skills", Infinite Learning Solutions Publishers, Bengaluru, 2022.

3. Gajendra Singh Chauhan et al, "Technical Communication", Cengage learning India Pvt Limited [Latest Revised Edition], 2019.

4. N.P.Sudharshana and C.Savitha, "English for Engineers", Cambridge University Press, 2018.

5. "English Language Communication Skills – Lab Manual cum Workbook", Cengage learning India Pvt Limited [Latest Revised Edition], 2019.

6. D Praveen Sam and KN Shoba, "A Course in Technical English", Cambridge University Press, 2020.

7. Michael Swan, "Practical English Usage", Oxford University Press, 2016.

8. Rogers. C, Farson R.E., "Active Listening", Gardon Training Inc.

9. Wood, Frederick, "A Remedial English Grammar for Foreign Students", Macmillan Education, India, 1990.

10. Yadugiri. M.A., "Making Sense of English – A Textbook of Sounds, Words, and Grammar", Viva Books, 2020.

22KSK27 / 22KBK27	Samskrutik Kannada/ Balake Kannada	(1-0-0) 1

Contact Hours: 15

ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ - ಕನ್ನಡ ಬಲ್ಲ ಮತ್ತು ಕನ್ನಡ ಮಾತೃಭಾಷೆಯ ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ನಿಗದಿಪಡಿಸಿದ ಪಠ್ಯಕ್ರಮ

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 ಮಾಡಿಕೊಡುವುದು.

2. ಕನ್ನಡ ಸಾಹಿತ್ಯದ ಪ್ರಧಾನ ಭಾಗವಾದ ಆಧುನಿಕಪೂರ್ವ ಮತ್ತು ಆಧುನಿಕ ಕಾವ್ಯಗಳನ್ನು ಪರಿಚಯಿಸಿವುದು.

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 ಚಾರ್ಟ್ ಗಳನ್ನು ತಯಾರಿಸಲು ವಿದ್ಯಾರ್ಥಿಗಳನ್ನು ಪ್ರೇರೇಪಿಸುವುದು ಮತ್ತು ತರಗತಿಯಲ್ಲಿ ಅವುಗಳನ್ನು ಚರ್ಚಿಸಲು ಅವಕಾಶ ಮಾಡಿಕೊಡುವುದು.

2. ಇತ್ತೀಚಿನ ತಂತ್ರಜ್ಞಾನದ ಅನುಕೂಲಗಳನ್ನು ಬಳಸಿಕೊಳ್ಳುವುದು - ಅಂದರೆ ಕವಿ-ಕಾವ್ಯ ಪರಿಚಯದಲ್ಲಿ ಕವಿಗಳ ಚಿತ್ರಣ ಮತ್ತು ಲೇಖನಗಳು ಮತ್ತು ಕಥೆ ಕಾವ್ಯಗಳ ಮೂಲ ಅಂಶಗಳಿಗೆ ಸಂಬಂಧಪಟ್ಟ ಧ್ವನಿ ಚಿತ್ರಗಳು, ಸಂಭಾಷಣೆಗಳು, ಈಗಾಗಲೇ ಇತರ ವಿಮರ್ಶಕರು ಬರೆದಿರುವ ವಿಮರ್ಶಾತ್ಮಕ ವಿಷಯಗಳನ್ನು ಟಿಪಿಟಿ, 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 ನಾಗರಾಜಯ್ಯ
2. ಕರ್ನಾಟಕದ 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, ಜೇಡರದಾಸಿಮಯ್ಯ, ಆಯ್ದಕ್ಕಿ ಲಕ್ಕಮ್ಮ.
2. ಕೀರ್ತನೆಗಳು : ಅದರಿಂದೇನು ಫಲ ಇದರಿಂದೇನು ಫಲ – ಪುರಂದರದಾಸರು ತಲ್ಲಣಿಸದಿರು ಕಂಡ್ಯ ತಾಳು ಮನವೇ - ಕನಕದಾಸರು
3. ತತ್ವಪದಗಳು : ಸಾವಿರ ಕೊಡಗಳ ಸುತ್ತು - ಶಿಶುನಾಳ ಶರೀಫ

ಘಟಕ -3 ಆಧುನಿಕ ಕಾವ್ಯಭಾಗ (03 hours of pedagogy)
1. ಡಿವಿಜಿ ರವರ ಮಂಕುತಿಮ್ಮನ ಕಗ್ಗದಿಂದ ಆಯ್ದ ಕೆಲವು ಭಾಗಗಳು
2. ಕುರುಡು ಕಾಂಚಾಣ : ಡಾ.ರಾ. ಬೇಂದ್ರೆ
3. ಹೊಸಬಾಳಿನ ಗೀತೆ : ಕುವೆಂಪು

ಘಟಕ - 4 ತಾಂತ್ರಿಕ ವ್ಯಕ್ತಿಗಳ ಪರಿಚಯ (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. ಮೇಗಾನೆ 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:

CO01	ಕನ್ನಡ ಭಾಷೆ, ಸಾಹಿತ್ಯ ಮತ್ತು ಕನ್ನಡದ ಸಂಸ್ಕೃತಿಯ ಕುರಿತು ಅರಿವು ಮೂಡಿರುತ್ತದೆ.
CO2	ಕನ್ನಡ ಸಾಹಿತ್ಯದ ಆಧುನಿಕ ಪೂರ್ವ ಮತ್ತು ಆಧುನಿಕ ಕಾವ್ಯಗಳನ್ನು ಸಾಂಕೇತಿಕವಾಗಿ ಕಲಿತು ಹೆಚ್ಚಿನ ಓದಿಗೆ
	ಮತ್ತು ಜ್ಞಾನಕ್ಕೆ ಸ್ಫೂರ್ತಿ ಮೂಡುತ್ತದೆ.
CO3	ವಿದ್ಯಾರ್ಥಿಗಳಲ್ಲಿ ಸಾಹಿತ್ಯ ಮತ್ತು ಸಂಸ್ಕೃತಿಯ ಬಗ್ಗೆ ಅರಿವು ಹಾಗೂ ಆಸಕ್ತಿಯನ್ನು ಹೆಚ್ಚಾಗುತ್ತದೆ.
CO4	ತಾಂತ್ರಿಕ ವ್ಯಕ್ತಿಗಳ ಪರಿಚಯ ಹಾಗೂ ಅವರುಗಳ ಸಾಧಿಸಿದ ವಿಷಯಗಳನ್ನು ತಿಳಿದುಕೊಂಡು ನಾಡಿನ ಇನ್ನಿತರ ವ್ಯಕ್ತಿಗಳ ಬಗ್ಗೆ ತಿಳಿದುಕೊಳ್ಳಲು ಕೌತುಕತೆ ಹೆಚ್ಚಾಗುತ್ತದೆ.
CO5	ಸಾಂಸ್ಕೃತಿಕ, ಜನಪದ ಹಾಗೂ ಪ್ರವಾಸ ಕಥನಗಳ ಪರಿಚಯ ಮಾಡಿಕೊಡುವುದು.

University Prescribed Textbook :
ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ
ಡಾ. ಹಿ.ಚಿ.ಬೋರಲಿಂಗಯ್ಯ ಮತ್ತು ಡಾ. ಎಲ್. ತಿಮ್ಮೇಶ,
ಪ್ರಕಟಣೆ : ಪ್ರಸಾರಾಂಗ,
ವಿಶ್ವೇಶ್ವರಯ್ಯ ತಾಂತ್ರಿಕ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಬೆಳಗಾವಿ.

ವಿಶೇಷ ಸೂಚನೆ : 1. ಮೇಲಿನ ಪಠ್ಯಕ್ರಮಕ್ಕೆ ಸೀಮಿತವಾಗಿ ಅಂತಿಮ ಪರೀಕ್ಷೆಯ ಪ್ರಶ್ನೆಪತ್ರಿಕೆ 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.

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3. ಹೆಚ್ಚಿನ ಮಾಹಿತಿ ಮತ್ತು ವಿವರಣೆಗಳಿಗೆ ಡಾ. ಎಲ್. ತಿಮ್ಮೇಶ (9900832331) ಇವರನ್ನು ಸಂಪರ್ಕಿಸಿ.
4. ಮಾದರಿ ಪ್ರಶ್ನೆಪತ್ರಿಕೆ, ಕೋರ್ಸ್ ಆಯ್ಕೆ ಮಾಹಿತಿ, ಅಧ್ಯಯನ ಸಾಮಗ್ರಿ & ಬಹು ಆಯ್ಕೆ ಮಾದರಿಯ ಪ್ರಶ್ನೆಗಳ ಕೈಪಿಡಿಗಾಗಿ ವಿಶ್ವವಿದ್ಯಾಲಯದ ವೆಬ್ ಸೈಟ್ ನೋಡುವುದು.

ಬಳಕೆ ಕನ್ನಡ - baLake Kannada (Kannada for Usage)
ಕನ್ನಡ ಕಲಿಕೆಗಾಗಿ ನಿಗದಿಪಡಿಸಿದ ಪಠ್ಯಪುಸ್ತಕ - (Prescribed Textbook to Learn Kannada)

Course Title:	ಬಳಕೆ ಕನ್ನಡ		
Course Code:	22KBK17 / 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 : ಬಳಕೆ ಕನ್ನಡ ಪಠ್ಯ ಕಲಿಕೆಯ ಉದ್ದೇಶಗಳು:

The course (22KBK17/27) will enable the students,

1. To Create the awareness regarding the necessity of learning local language for comfortable and healthy life.
2. To enable learners to Listen and understand the Kannada language properly.
3. To speak, read and write Kannada language as per requirement.
4. To train the learners for correct and polite conservation.
5. To know about Karnataka state and its language, literature and General information about this state.

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

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

1. ಬಳಕೆ ಕನ್ನಡವನ್ನು ತರಗತಿಯಲ್ಲಿ ಶಿಕ್ಷಕರು ಬೋಧಿಸಲು ವಿಟಿಯು ಸೂಚಿಸಿರುವ ಪಠ್ಯಪುಸ್ತಕವನ್ನು ಉಪಯೋಗಿಸಬೇಕು.

2. ಪ್ರಮುಖ ಅಂಶಗಳ ಚಾರ್ಟ್ ಗಳನ್ನು 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 ಡಿಜಿಟಲೀಕರಣ ಗೊಂಡಿರುವ 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 ಭಾಷೆಯನ್ನು ಕಲಿಯಲು ಅನುಕೂಲವಾಗುವಂತೆ ಕಾರ್ಯಚಟುವಟಿಕೆಗಳನ್ನು ಮತ್ತು ಕ್ರಿಯಾ ಯೋಜನೆಗಳನ್ನು ರೂಪಿಸುವುದು.

Module - 1   (03 hours of pedagogy)
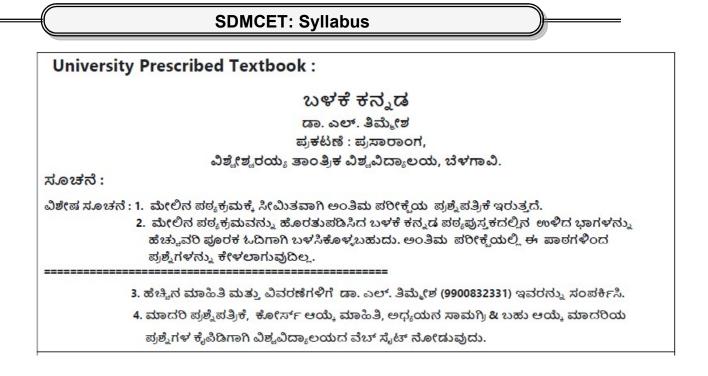
1. Introduction, Necessity of learning a local language. Methods to learn the Kannada language.

2. Easy learning of a Kannada Language: A few tips. Hints for correct and polite conservation, Listening and Speaking Activities, Key to Transcription

3. ವೈಯಕ್ತಿಕ, ಸ್ವಾಮ್ಯಸೂಚಕ/ಸಂಬಂಧಿತ ಸಾರ್ವನಾಮಗಳು ಮತ್ತು ಪ್ರಶ್ನಾರ್ಥಕ ಪದಗಳು - Personal Pronouns, Possessive Forms, Interrogative words

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. ಅದು. 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. ಅಪ್ಪಣೆ / ಒಪ್ಪಿಗೆ, ನಿರ್ದೇಶನ, ಪ್ರೋತ್ಸಾಹ ಮತು 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-
   Comparitive, 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, - ಇತು, - 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:

CO1	To understand the necessity of learning of local language for comfortable life.
CO2	To speak, read and write Kannada language as per requirement.
CO3	To communicate (converse) in Kannada language in their daily life with kannada speakers.
CO4	To Listen and understand the Kannada language properly.
CO5	To speak in polite conservation.

University Prescribed Textbook :

ಬಳಕೆ ಕನ್ನಡ

ಡಾ. ಎಲ್. ತಿಮ್ಮೇಶ

ಪ್ರಕಟಣೆ : ಪ್ರಸಾರಾಂಗ,

ವಿಶ್ವೇಶ್ವರಯ್ಯ ತಾಂತ್ರಿಕ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಬೆಳಗಾವಿ.

ಸೂಚನೆ :

ವಿಶೇಷ ಸೂಚನೆ : 1. ಮೇಲಿನ ಪಠ್ಯಕ್ರಮಕ್ಕೆ ಸೀಮಿತವಾಗಿ ಅಂತಿಮ ಪರೀಕ್ಷೆಯ ಪ್ರಶ್ನೆಪತ್ರಿಕೆ ಇರುತ್ತದೆ.

2. ಮೇಲಿನ ಪಠ್ಯಕ್ರಮವನ್ನು ಹೊರತುಪಡಿಸಿದ ಬಳಕೆ ಕನ್ನಡ ಪಠ್ಯಪುಸ್ತಕದಲ್ಲಿನ ಉಳಿದ ಭಾಗಗಳನ್ನು ಹೆಚ್ಚುವರಿ ಪೂರಕ ಓದಿಗಾಗಿ ಬಳಸಿಕೊಳ್ಳಬಹುದು. ಅಂತಿಮ ಪರೀಕ್ಷೆಯಲ್ಲಿ ಈ ಪಾಠಗಳಿಂದ ಪ್ರಶ್ನೆಗಳನ್ನು ಕೇಳಲಾಗುವುದಿಲ್ಲ.

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3. ಹೆಚ್ಚಿನ ಮಾಹಿತಿ ಮತ್ತು ವಿವರಣೆಗಳಿಗೆ ಡಾ. ಎಲ್. ತಿಮ್ಮೇಶ (9900832331) ಇವರನ್ನು ಸಂಪರ್ಕಿಸಿ.

4. ಮಾದರಿ ಪ್ರಶ್ನೆಪತ್ರಿಕೆ, ಕೋರ್ಸ್ ಆಯ್ಕೆ ಮಾಹಿತಿ, ಅಧ್ಯಯನ ಸಾಮಗ್ರಿ & ಬಹು ಆಯ್ಕೆ ಮಾದರಿಯ ಪ್ರಶ್ನೆಗಳ ಕೈಪಿಡಿಗಾಗಿ ವಿಶ್ವವಿದ್ಯಾಲಯದ ವೆಬ್ ಸ್ಟೇಟ್ ನೋಡುವುದು.

22IDT28	Innovation and Design Thinking	(1-0-0) 1

Contact Hours: 15

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

- 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.

Course Outcomes (COs):

Description of the Course Outcome: At the end of the course the student will be able to:		Mapping to POs(1-12) / PSOs (13-14)		
		Substantial Level (3)	Moderate Level (2)	Slight Level (1)
CO-1	**Appreciate** 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	**Draw** technical drawing for design ideas.	-	-	1

POs/PSOs	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Mapping Level	1.0	-	1.0	-	-	1.0	-	-	-	-	-	-	-	-

Pre-requisites: None

Contents:

Unit-I

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 **3 Hrs**

Unit-II

Tools for Design Thinking: Real-Time design interaction capture and analysis – Enabling efficient collaboration in digital space – Empathy for design – Collaboration in distributed Design **3 Hrs**

Unit-III

Design Thinking in IT Design: Thinking to Business Process modelling – Agile in Virtual collaboration environment – Scenario based Prototyping **3 Hrs**

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. **3 Hrs**

Unit-V

Design thinking workshop: Empathize, Design, Ideate, Prototype and Test **3 Hrs**

Reference Books:

1. John.R.Karsnitz, Stephen O"Brien and John P. Hutchinson, "Engineering Design", Cengage learning (International edition) 2/E, 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, 2/E, 2011.

6. Jeanne Liedtka, Andrew King, and Kevin Bennett, "Solving Problems with Design Thinking - Ten Stories of What Works", Columbia Business School Publishing, 2013.

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: 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 and will be scaled down 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: 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 and will be scaled down 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 unit