MANGALORE INSTITUTE OF TECHNOLOGY & ENGINEERING
(A Unit of Rajalaxmi Education Trust®, Mangalore)
Autonomous Institute affiliated to VTU, Belagavi, Approved by AICTE, New Delhi
Accredited by NAAC with A+ Grade & ISO 9001:2015 Certified Institution

SCHEME & SYLLABUS
I/II SEMESTER B.E. PROGRAMS

2026 Scheme

(W.E.F 2026 Admission Students)

Vision

*"To attain perfection in providing **Globally Competitive Quality Education** to all our Students and also benefit the global community by using our strength in **Research and Development**"*

Mission

*"To establish world class educational institutions in their respective domains, which shall be C**enters of Excellence** in their stated and implied sense. To achieve this objective we dedicate ourselves to meet the challenges of becoming **Visionary and Realistic**, **Sensitive and Demanding**, **Innovative and Practical,** Theoretical **and Pragmatic;** ALL at the same time"*

Abbreviations

SI. NO.	Abbreviations	Meaning
1	VTU	Visvesvaraya Technological University
2	AI	Artificial Intelligence & Machine Learning
3	AE	Aeronautical Engineering
4	CS	Computer Science & Engineering
5	IC	CS: IoT & Cyber Security with Block chain Technology
6	CI	CSE: Artificial Intelligence & Machine Learning
7	CV	Civil Engineering
8	EC	Electronics & Communication Engineering
9	IS	Information Science & Engineering
10	ME	Mechanical Engineering
11	MT	Mechatronics Engineering
12	RI	Robotics & Artificial Intelligence
12	ESCC	Engineering Science Common Course
13	BSCC	Basic Science Common Course
14	HMCC	Humanity & Social Science Common Course
15	CIE	Continuous Internal Evaluation
16	SEE	Semester End Examination

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MANGALORE INSTITUTE OF TECHNOLOGY & ENGINEERING, MOODABIDRI

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I Semester (Physics Cycle)

Sl. No	Course Code	Course Title	Category	Teaching Dept.	Teaching Hrs /Week				Examination Marks			Duration of Exam in Hrs	Credits
					L	T	P	S	CIE	SEE	Total		
1	26BSCC101	Engineering Physics	Basic Science	Physics	3	0	2	3	50	50	100	3	4
2	26BSCC102	Linear Algebra & Differential Equations	Basic Science	Mathematics	4	0	0	2	50	50	100	3	4
3	26ESCC104	Fundamentals of Electronics Engineering	Engineering Science	Electronics & Communication Engineering	3	0	2	3	50	50	100	3	4
4	26ESCC105	Industrial Systems and Manufacturing Technology	Engineering Science	Mechanical Engineering/ allied department	2	0	2	2	50	50	100	3	3
5	26ESCC106	Modern Computing and Python Programming	Engineering Science	CS&E/allied department/ E&CE	3	0	2	0	50	50	100	3	4
6	26ESCC107	Civil Engineering& Sustainable Infrastructure	Engineering Science	Civil Engineering	2	0	0	2	50	50	100	2.5	2
7	26NMCC108/ 26NMCC109	Balake Kannada/ Samskruthika Kannada	Humanities & Social Science	Humanities & Social Sciences	1	0	0	0	100	-	100	-	-
											Total Credits		**21**

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I SEMESTER (Chemistry Cycle)

Sl. No	Course Code	Course Title	Category	Teaching Dept.	Teaching Hrs /Week				Examination Marks			Duration of Exam in Hrs	Credits
					L	T	P	S	CIE	SEE	Total		
1	26BSCC110	Engineering Chemistry	Basic Science	Chemistry	2	0	2	3	50	50	100	3	3
2	26BSCC102	Linear Algebra & Differential Equations	Basic Science	Mathematics	4	0	0	2	50	50	100	3	4
3	26ESCC111	Computational Thinking & Programming	Engineering Science	CS&E/allied department	3	0	2	3	50	50	100	3	4
4	26ESCC112	Fundamentals of Electrical Engineering	Engineering Science	Electronics & Communication Engineering	3	0	0	3	50	50	100	3	3
5	26ESCC113	Engineering Graphics	Engineering Science	Mechanical Engineering/ allied department	2	0	2	0	50	50	100	3	3
6	26ESCC114	Design Thinking	Engineering Science	Respective Department	1	0	2	0	50	50	100	1.5	2
7	26HMCC115	Professional Communication	Humanities & Social Sciences	Humanities & Social Sciences	0	0	2	2	50	50	100	2.5	1
												Total Credits	**20**

NOTE: Instructions for assessing performance of students in the "DESIGN THINKING" course

CIE		SEE	
Test 1	**15 Marks**	**Model Based Evaluation**	**25 Marks**
Test 2	**15 Marks**	**SEE (Examination to be conducted for 50 marks and scaled down to 25 Marks**	**25 Marks**
ABA1	**10 Marks**		
ABA2	**10 Marks**	**Total**	**50 Marks**
Total	**50 Marks**		

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II Semester (Physics Cycle)

Sl. No	Course Code	Course Title	Category	Teaching Dept.	Teaching Hrs /Week				Examination Marks			Duration of Exam in Hrs	Credits
					L	T	P	S	CIE	SEE	Total		
1	26BSCC101	Engineering Physics	Basic Science	Physics	3	0	2	3	50	50	100	3	4
2	26BSCC103	Probability & Multivariable Calculus	Basic Science	Mathematics	4	0	0	2	50	50	100	3	4
3	26ESCC104	Fundamentals of Electronics Engineering	Engineering Science	Electronics & Communication Engineering	3	0	2	3	50	50	100	3	4
4	26ESCC105	Industrial Systems and Manufacturing Technology	Engineering Science	Mechanical Engineering/ allied department	2	0	2	2	50	50	100	3	3
5	26ESCC106	Modern Computing and Python Programming	Engineering Science	CS&E/allied department/ E&CE	3	0	2	0	50	50	100	3	4
6	26ESCC107	Civil Engineering& Sustainable Infrastructure	Engineering Science	Civil Engineering	2	0	0	2	50	50	100	2.5	2
7	26NMCC108/ 26NMCC109	Balake Kannada/ Samskruthika Kannada	Humanities & Social Science	Humanities & Social Sciences	1	0	0	0	100	-	100	-	-
												Total Credits	**21**

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II SEMESTER (Chemistry Cycle)

Sl. No	Course Code	Course Title	Category	Teaching Dept.	Teaching Hrs /Week				Examination Marks			Duration of Exam in Hrs	Credits
					L	T	P	S	CIE	SEE	Total		
1	26BSCC110	Engineering Chemistry	Basic Science	Chemistry	2	0	2	3	50	50	100	3	3
2	26BSCC103	Probability & Multivariable Calculus	Basic Science	Mathematics	4	0	0	2	50	50	100	3	4
3	26ESCC111	Computational Thinking & Programming	Engineering Science	CS&E/allied department	3	0	2	3	50	50	100	3	4
4	26ESCC112	Fundamentals of Electrical Engineering	Engineering Science	Electronics & Communication Engineering	3	0	0	3	50	50	100	3	3
5	26ESCC113	Engineering Graphics	Engineering Science	Mechanical Engineering/ allied department	2	0	2	0	50	50	100	3	3
6	26ESCC114	Design Thinking	Engineering Science	Respective Department	1	0	2	0	50	50	100	1.5	2
7	26HMCC115	Professional Communication	Humanities & Social Sciences	Humanities & Social Sciences	0	0	2	2	50	50	100	2.5	1
												Total Credits	**20**

NOTE: Instructions for assessing performance of students in the "DESIGN THINKING" course

CIE		SEE	
Test 1	**15 Marks**	**Model Based Evaluation**	**25 Marks**
Test 2	**15 Marks**	**SEE (Examination to be conducted for 50 marks and scaled down to 25 Marks**	**25 Marks**
ABA1	**10 Marks**		
ABA2	**10 Marks**	**Total**	**50 Marks**
Total	**50 Marks**		

Engineering Physics			
Semester	**I/II**	CIE Marks	**50**
Course Code	**26BSCC101**	SEE Marks	**50**
Teaching Hrs/Week (L:T:P:S)	**3:0:2:3**	Exam Hrs	**03**
Total Hrs	**64 (40L + 24P)**	Credits	**04**

Course Description:

This course introduces the fundamental principles of optoelectronic devices, sensing technologies, engineering materials, lasers, optical fiber and quantum mechanics. It develops an understanding of the mechanical, electrical and optical properties of materials and their applications. The course also introduces quantum computing and provides opportunities to apply physical principles through numerical problem-solving and experimental characterization.

Course Objectives:

This course is designed to

1. Familiarize the fundamental concepts of lasers, optical fibres, semiconductor devices and quantum mechanics through analytical formulations and engineering applications
2. Provide insights into the mechanical and electrical properties of materials and their significance in the analysis and design of engineering systems
3. Impart the fundamental principles of optoelectronic devices, sensing technologies and engineering materials relevant to modern engineering applications
4. Introduce the principles of quantum mechanics and quantum computing as the basis for emerging quantum technologies
5. Emphasize experimental methods for characterizing optical, electrical, and material properties and interpreting experimental observations

Module 1: Laser and Fiber Optics	**No. of Hrs: 08L + 06P**

Lasers – Introduction, Expression for Energy Density using Einstein Coefficients, Condition for Laser Action, Requisites for Laser System, Construction and Working of Hetero-Junction Semiconductor Diode Laser, Construction and Working of LIDAR.

Optical Fibers: Introduction, Structure, Principle and Light guiding mechanism, Acceptance Angle and Numerical Aperture, V-number and Modes of Propagation, Attenuation and their Types, Mach-Zehnder Interferometer and its Applications.

Laboratory Components:

1. Determine the Wavelength of a Laser Using Diffraction
2. Estimate the Acceptance Angle and Numerical Aperture of an Optical Fibre Cable (OFC)
3. Determine the Beam Divergence of a Laser Beam

Self-study Content: Application of LIDAR in Landing Guidance Systems, Types of Optical Fibers and Their Engineering Applications.

Textbook 1: 5.1 to 5.11, 7.1 to 7.9

Module 2: Sensors, Transducers and Actuators	**No. of Hrs: 08L + 04P**

Sensors: Introduction, Classification, Examples, Construction and Working of Gyroscope, Construction and Working of Intensity-Based Displacement Fiber Optic Sensor.

Transducers: Introduction, Types, Construction and Working of Linear Variable Differential Transformer

Actuators: Introduction, Types, Construction and Working of Piezoelectric Actuator and its Applications.

Laboratory Components:

1. Determine the Photosensitivity of a Photodiode Under Reverse Bias Conditions
2. Determine the Characteristics of the Given NTC & PTC Thermistors and Estimate its Temperature coefficients

Self-study Content: Characteristics of Sensors, Temperature and light controlled autonomous system based on Thermistor and Photodiode.

Textbook 2: 1.1 to 1.10, 2.1 to 2.8, 4.5, 12.3

Module 3: Mechanical Properties of Materials	**No. of Hrs: 08L + 06P**

Introduction, Elastic Moduli, Poisson's ratio, Relation between Y, η, and σ, Relation between K, Y, and σ, Limiting Values of Poisson's ratio. Bending Moment, Young's Modulus using Uniform Bending, Failure of Engineering Materials – Ductile Fracture, Brittle Fracture, Stress Concentration, & Fatigue, Shape Memory Alloys.

Laboratory Components:

1. Determine the Young's Modulus of a Given Beam Using the Uniform Bending Method
2. Determine the Rigidity Modulus of a Given Metallic Wire
3. Determine the Young's Modulus of a Given Beam Using the Cantilever Method

Textbook 1: 3.1 to 3.12

Module 4: Electrical Properties of Materials	**No. of Hrs: 08L + 08P**

Conductors: Quantum Free Electron Theory of Metals, Fermi-energy and its Importance - Fermi Factor - Variation of Fermi Factor with Temperature, Expression for the Electrical Conductivity Based on QFET.

Semiconductors: Expression for the Electron and Hole Concentrations, Expression for Electrical Conductivity in a Semiconductor, Hall effect and its Applications.

Dielectrics: Polarization and its Mechanisms. Internal field in Solids, Clausius –Mossotti Equation.

Laboratory Components:

1. Determine the Hall Coefficient and Carrier Concentration Using the Hall Effect
2. Determine the Fermi Energy of a Conducting Wire to Assess Its Suitability as an Ohmic Contact
3. Determine the Dielectric Constant of a Given Material

4. Determine the Band Gap of a Given Semiconductor Material

Textbook 1: 8.1 to 8.8, 9.1, 9.9 to 9.13, 10.1 to 10.11

Module 5: Introduction to Quantum Mechanics & Quantum Computing	**No. of Hrs: 08L**

Quantum Mechanics: Heisenberg Uncertainty Principle and Significance, Application: Spectral line broadening, Wave Function: Significance, Born's Interpretation, Dirac Notation and Normalization of Wave Function, Time Independent Schrodinger Wave Equation, Application of Schrödinger Wave Equation for a Particle in 1-D infinite Height Potential Well: Eigen States and Eigenvalues.

Principles of Quantum Information & Quantum Computing: Introduction, Qubit and its Properties, Representation of a Qubit as a Bloch sphere, Quantum Gates: Pauli X-Gate, Hadamard Gate and CNOT Gate. Demonstration of Quantum circuit simulation.

Self-study Content: Comparison of Classical and Quantum Computing, Difference Between Bit & Qubit.

Textbook 1: 6.1, 6.3 to 6.6, 6.8, 6.9
Textbook 3: 1.1 to 1.6, 2.1 to 2.5, 3.1 to 3.6

Course Outcomes:

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

1. Explain the concepts of laser, fiber optics, sensing technologies, engineering materials and quantum mechanics and their applications
2. Derive the expressions relating the physical quantities governing light interaction, elastic behaviour, electrical properties of materials and quantum mechanics
3. Utilize the principles of laser, fiber optics, sensing technologies and engineering materials to solve numerical problems.
4. Characterize the optical, electrical and mechanical properties of materials through suitable experiments

Textbooks

1. S. P. Basavaraju, “A Detailed Textbook of Engineering Physics”, Subhas Publications, 2018
2. D. Patranabis, “Sensors and Transducers”, 2nd Edition, PHI Learning Pvt. Ltd, 2013
3. P. K. Lala, “Quantum Computing: A Beginner's Introduction. McGraw-Hill Education”, New York, 2020

Reference Books

1. B. E. A. Saleh and M. C. Teich, “Fundamentals of Photonics”, 3rd Edition, John Wiley & Sons, 2019
2. Ramon Pallás-Areny and John G. Webster, “Sensors and Signal Conditioning”, 2nd Edition, John Wiley & Sons, 2001
3. William D. Callister Jr. and David G. Rethwisch, “Materials Science and Engineering: An Introduction”, 10th Edition, John Wiley & Sons, 2018
4. G. Aruldhas, “Quantum Mechanics”, 2nd Edition, Prentice-Hall of India, New Delhi, 2009
5. Raymond A. Serway, John W. Jewett, Jr., “PHYSICS for Scientists and Engineers with Modern Physics”, 7th Edition, Thomson Higher Education, 2008

Web links:

1. Laser: Fundamentals and Applications, Prof. Manabendra Chandra, IIT Kanpur: https://nptel.ac.in/courses/104104085
2. Fiber Optics, Prof. Vipul Rastogi, IIT Roorkee: https://onlinecourses.nptel.ac.in/e-learning/preview/noc20_ph07
3. Sensors and Actuators, Prof. Hardik Jeetendra Pandya, IISc Bangalore: https://nptel.ac.in/courses/108108147
4. Mechanics of Materials, Prof. Saravanan U, IIT Madras: https://onlinecourses.nptel.ac.in/e-learning/preview/noc23_ce57
5. Solid State Physics, Prof. Amal Kumar Das, IIT Kharagpur: https://nptel.ac.in/courses/115105099
6. Quantum Information and Computing, Prof. Dipan Ghosh, IIT Bombay, https://nptel.ac.in/courses/115101092

Linear Algebra & Differential Equations			
Semester	**I**	CIE Marks	**50**
Course Code	**26BSCC102**	SEE Marks	**50**
Teaching Hours/Week (L:T:P:S)	**4:0:0:2**	Exam Hrs	**03**
Total Hours	**52**	Credits	**04**

Course Description:

This course introduces Matrix Algebra, Vector Spaces, Linear Transformations, and Ordinary Differential Equations, with emphasis on analytical and numerical methods. It develops students' ability to formulate and solve mathematical problems arising in engineering and scientific applications. The course also develops computational skills and the ability to interpret mathematical solutions in real-world contexts.

Course Objectives:

This course is designed to

1. Impart knowledge of Matrix Methods for solving System of Linear Equations and Ordinary Differential Equations
2. Provide knowledge of Vector Spaces and Linear Transformations
3. Impart a foundational knowledge of modeling dynamic systems

Module 1: Matrix Algebra	**No. of Hrs:10L**

Elementary Row Transformation, Rank of a Matrix, Solution to System of Linear Equations: Test for Consistency, Gauss-Elimination Method, Gauss-Seidel Method, Eigenvalue & Eigenvector of a Matrix.

Textbook 1: 3.34, 3.35, 3.38, 3.39, 3.46, 3.47, 3.49
Textbook 2: 1.3, 7.4(2)

Module 2: Vector Spaces	**No. of Hrs:12L**

Vector Spaces and Subspaces, Linear Independence, Span, Basis, Dimension, Inner Product Spaces, Orthogonality and Projection.

Self-study Component: Solving additional problems
Textbook 2: 2.1 to 2.4, 3.1, 3.2

Module 3: Linear Transformations	**No. of Hrs:10L**

Linear Transformations, Transformation represented by Matrices, Change of Basis, Rank-Nullity Theorem and Rank-Nullity of a Linear Transformation.

Textbook 2: 2.6, 5.6

Module 4: Ordinary Differential Equations	**No. of Hrs:10L**
Differential Equations of first order: Definitions, Geometrical meaning of a Differential Equation of the first order and first degree, Formation of a Differential Equation, Solution of Differential Equations of the first order and first degree: Variable Separable form, Linear Differential Equations, Applications to solve simple Engineering and Scientific problems. **Numerical solution of Ordinary Differential Equations:** Introduction, Euler's method and Modified Euler's method and Runge - Kutta method of fourth order to solve simple Engineering and Scientific problems. **Self-Study Component:** Solving additional problems Textbook 1: 11 to 11.5, 11.8, 12.6, 12.8, 12.9, 24.8, 24.10(a)	
Module 5: Second Order Linear Differential Equations	**No. of Hrs:10L**
Second order Linear Differential Equations with constant coefficients: Solution by Inverse Differential Operator - e^{ax}, $\sin(ax+b)/\cos(ax+b)$, $e^{ax}f(x)$, Applications: Mass Spring System and L-C-R Circuit. **Numerical solution of second order Linear Differential Equations:** Runge-Kutta Method of fourth order and Milne's Predictor-Corrector method. **Self-Study Component:** Solving additional problems Textbook 1: 13.1 to 13.7 (Case I, II, IV), 14.3, 24.10(b)	

Course Outcomes:

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

1. Illustrate the fundamental concepts of Matrix Algebra, Vector Spaces, Linear Transformations, Ordinary Differential Equations and Second Order Linear Differential Equations
2. Solve problems on Matrix Algebra, Vector Spaces and Linear Transformations
3. Determine the solution of Ordinary Differential Equations and Second Order Linear Differential Equations.
4. Solve engineering problems using Ordinary Differential Equations and Second Order Linear Differential Equations.

Textbooks:

1. N. P. Bali and Manish Goyal, "A Textbook of Engineering Mathematics", 10th Edition, Laxmi Publications, 2022
2. Gilbert Strang, "Introduction to Linear Algebra", 6th Edition, Wellesley – Cambridge Press, 2023

Reference Books:

1. James Stewart, "Calculus: Early Transcendentals", 7th Edition, Cengage Learning, 2012
2. E. Kreyszig, "Advanced Engineering Mathematics", 10th Edition, John Wiley & Sons, 2018
3. Gerald Farin and Dianne Hansford, "Practical Linear Algebra", 4th Edition, CRC Press, 2021
4. Steven J. Leon, "Linear Algebra with Applications", 10th Edition, Pearson, 2020
5. Gilbert Strang , "Linear Algebra and Learning from Data", 1st Edition, Wellesley-Cambridge Press, 2019

Web links:

1. Linear Algebra, Prof. R Vittal Rao, IISC, Bangalore : https://www.youtube.com/playlist?list=PLEAYkSg4uSQ1roO8hQ800kSgWxhT5jyl3
2. Differential equations, Dr Srinivasa Rao Manam, IIT Madras, Chennai: https://www.youtube.com/watch?v=ES741wq3APA&list=PLo2fuKadGpUTmZX6ubb3dIB7zrhs8Eyj8&index=1
3. Differential Equations, Gilbert and Cleve: https://www.youtube.com/watch?v=ZvL88xqYSak&list=PLUl4u3cNGP63oTpyxCMLKt_JmB0WtSZfG&index=1

Probability & Multivariable Calculus			
Semester	**II**	CIE Marks	**50**
Course Code	**26BSCC103**	SEE Marks	**50**
Teaching Hrs/Week (L:T:P:S)	**4:0:0:2**	Exam Hrs	**03**
Total Hrs	**52**	Credits	**04**

Course Description:

This course introduces Probability Theory, Partial Differentiation, Vector Differentiation, Partial Differential Equations**,** and Multiple Integrals, with emphasis on analytical methods. It develops students' ability to apply appropriate mathematical techniques to engineering and scientific problems. The course also develops skills to interpret mathematical results in real-world contexts**.**

Course Objectives:

This course is designed to

1. Impart knowledge of Probability and Probability Distributions
2. Provide knowledge of Partial Differentiation, Vector Differentiation and Partial Differential Equations
3. Provide knowledge of Multiple Integrals and their applications

Module 1: Probability	**No. of Hrs:10L**

Introduction, Algebra of Events, Addition Theorem, Conditional Probability, Multiplication Law, Baye's Theorem.

Textbook 1: 1.1 to 1.8

Module 2: Probability Distributions	**No. of Hrs:10L**

Discrete and Continuous Random Variable, Mathematical Expectation, Variance, Binomial, Poisson and Normal Distribution.

Self-study Component: Solving additional problems

Textbook 1: 2.5, 2.6, 3.2 to 3.4, 4.1 to 4.3, 4.7, 4.11.1, 4.11.3

Module 3: Partial Differentiation and Vector Differentiation	**No. of Hrs:12L**

Partial Differentiation: Partial Derivatives, Total Derivative, Maxima and Minima.

Vector Differentiation: Scalar and Vector Fields, Gradient of a Scalar Field, Directional Derivative, Divergence of a Vector Field, Solenoid Vector, Curl of a Vector Field, Irrotational Vector, Physical Interpretation of Gradient, Divergence and Curl.

Self-study Component: Solving additional problems

Textbook 2: 5.1 to 5.4, 5.8, 5.9, 5.13 to 5.15(a), 8.10 to 8.19

Module 4: Partial Differential Equations	**No. of Hrs:10L**

Classification of second order Partial Differential Equations, Solution of One-dimensional Heat Equation using Schmidt Method, One-dimensional Wave Equation using Explicit Method, Solution of Two-dimensional Laplace Equation.

Textbook 2: 25.3 to 25.5, 25.7, 25.8

Module 5: Multiple Integrals	**No. of Hrs:10L**

Double Integrals, Evaluation of Double Integrals: Change of Order of Integration and Changing into Polar Coordinates, Applications: Area, Volume & Total Mass and Triple Integrals.

Self-study Component: Solving additional problems
Textbook 2: 6.1 to 6.5, 6.7, 6.8, 6.11

Course Outcomes:

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

1. Illustrate the fundamental concepts of Probability, Probability Distributions, Partial Differentiation, Vector Differentiation, Partial Differential Equations and Multiple Integrals
2. Apply Probability Theory to solve problems on random phenomena
3. Solve problems on Partial Derivatives, Vector Differentiation, Partial Differential Equations and Multiple Integrals
4. Determine solutions to engineering problems using Partial Differential Equations and Multiple Integrals

Textbooks

1. Oliver C. Ibe, "Fundamentals of Applied Probability and Random Process", 2nd Edition, Elsevier Academic Press, 2005
2. N. P. Bali and Manish Goyal, "A textbook of Engineering Mathematics", 10th Edition, Laxmi Publications, 2022

References

1. James Stewart, "Calculus: Early Transcendentals", 7th Edition, Cengage Learning, 2012
2. E. Kreyszig, "Advanced Engineering Mathematics", 10th Edition, John Wiley & Sons, 2018
3. Dennis G Zill, "Advanced Engineering Mathematics", 7th Edition, Jones-Bartlett, 2022
4. Sheldon Ross, "A First Course in Probability", 10th Edition, Pearson, 2023

Web links:

1. Probability and Probability Distribution, Prof. Prabha Sharma, IIT, Kanpur: https://www.youtube.com/watch?v=mrCrjeqJv6U&list=PLEAYkSg4uSQ2qu-goWslUkq2hiZYlEzFH&index=1
2. Multivariable calculus, Prof. Joydeep Dutta, IIT, Kanpur: https://www.youtube.com/watch?v=0ph5PU3Fsdc&list=PLFW6lRTa1g8174RC1q88PCU7VszfJWfg9&index=1
3. Vector Differentiation, Denis Auroux, Massachusetts Institute of Technology:
4. https://www.youtube.com/watch?v=PxCxlsl_YwY&list=PL4C4C8A7D06566F38&index=1
5. Multiple integrals, Prof. Hari Shankar Mahato, IIT Kharagpur: https://www.youtube.com/watch?v=ksS_yOK1vtk&list=PLbRMhDVUMngfIrZCNOyPZwHUU1pP66vQW&index=1

Fundamentals of Electronics Engineering			
Semester	**I/II**	CIE Marks	**50**
Course Code	**26ESCC104**	SEE Marks	**50**
Teaching Hours/Week (L:T:P:S)	**(3:0:2:3)**	Exam Hrs.	**3**
Total Hours	**64 (40L+24P)**	Credits	**4**

Course Description:
This course provides knowledge of basic concepts of electronics engineering. The course covers basic concepts of diodes, transistors, amplifiers, digital logic, and consumer electronics. This course builds the foundation for further studies in the field of electronics.

Course Objectives:
This course is designed to

1. Familiarize the working principles of electronic devices like semiconductor diodes, bipolar transistors, Op-amp and their applications
2. Impart the knowledge on fundamentals of digital electronics
3. Impart the knowledge on operating principles of consumer electronic devices

Module 1: Semiconductor Diodes and Applications	**No. of Hrs: 8L+6P**

Semiconductor diodes: PN junction diode, Characteristics and Parameters, Diode Rectifiers- Half Wave Rectifier, Full Wave Rectifier, Rectifier Parameters, Zener Diode as Voltage Regulators

Laboratory Components:

1. Familiarization with Basic Electronic components, Usage of Electronics Equipment, and Introduction to EDA Tool
2. Design and Demonstrate the DC Power Supply Circuit

Self-study Component:
Performance Comparison of Rectifiers, DC Power Supply

Textbook 1: 2.1, 2.2, 3.1 to 3.4, 3.6, 3.7

Module 2: Bipolar Junction Transistors and Applications	**No. of Hrs: 8L+6P**

Bipolar Junction Transistors: BJT Operation, BJT Voltages and Currents, FETs – BJT and FET Comparison, BJT Amplification, Base Bias, Voltage Divider Bias, DC Load Line and Bias Point

Amplifiers and Oscillators: Introduction, Concept of Feedback, Negative Feedback, Positive Feedback, Conditions for Oscillations, RC Phase Shift Oscillator

Laboratory Components:

1. Realize the Audio Amplifier using BJT
2. Design and Demonstrate the Operation of the RC Phase Shift Oscillator
3. Experiment to plot the DC load line for BJT using the EDA Tool

Self-Study component:
Types of Amplifiers, Frequency Response of Amplifier, Gain, Cut-off Frequency, Bandwidth, and Phase shift of Amplifier

Textbook 1: 4.1 to 4.3, 5.1, 5.2, 5.4, 13.1, 16.1

Module 3: Operational Amplifier and 555 Timer	**No. of Hrs: 8L+4P**

Operational Amplifier: Block diagram, Ideal Op-amp Characteristics, Op-amp Applications: Inverting and Non-Inverting Amplifiers, Summing Amplifier, Subtractor, Differentiator, Integrator, Comparator, Schmitt trigger, IC 555 Timer and Astable Multivibrator using IC 555

Laboratory Components:

1. Design and Demonstrate the Working of Astable Multivibrator using 555 Timer
2. Design and Demonstrate the Working of Op-Amp Based Circuits using the EDA Tool

Self-Study component:
Op-amp parameters, Voltage Follower

Textbook 2: 1.2, 2.3, 2.6, 6.5, 8.4, 9.4

Module 4: Digital Electronics	**No. of Hrs: 8L+4P**

Number Systems: Introduction, Number systems, Data Representation, Binary Arithmetic (Binary addition, subtraction using complement form)
Logic Gates & Boolean simplification: Boolean Algebra, De-Morgan's Theorems, Logic Gates, Universal Gates
Combinational Circuits: Half Adder, Full Adder, 4:1 Multiplexer, Encoders, Decoders
Sequential Circuits: Introduction to latches and flip flops, RS Flip-Flop

Laboratory Component:

1. Application-based Design and Implementation of Digital Circuits

Textbook 3: 1.1 to 1.5, 2.1 to 2.7, 4.4, 4.8 to 4.10, 5.1, 5.2

Module 5: Electronic Appliances and Applications	**No. of Hrs: 8L+4P**

Simple applications of Electronics- History of Wireless Communications, Introduction to Cellular Mobile, Mobile Handset, Digital TV System, Digital TV Standards, Digital Imaging-Camera System, Scanner-Barcode Scanner and Decoder, Comparison between Barcode Scanner and RFID, Embedded System-General Purpose vs Embedded Computing System, Elements of an Embedded System

Laboratory Components:

1. Demonstrate the Working of Burglar Alarm Circuit.
2. Demonstrate the Working of Water Level Indicator Circuit.

Textbook 4: Chapter 3, 5, 9
Textbook 5: 14.1, 14.2
Textbook 6: 1.1, 1.2, 2.1

Course Outcomes:

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

1. Describe the fundamentals and operations of Semiconductor diode, Bipolar Junction Transistors, Operational amplifiers, 555 timer and digital logics
2. Describe the working principles of consumer electronic devices
3. Design simple electronic circuits using diode, Bipolar Junction Transistors, Operational amplifiers, 555 timer, and logic gates

Textbooks:

1. David A Bell, "Electronic Devices and Circuits" ,5th Edition, Oxford University Press, 2018
2. Ramakanth A Gayakwad, "Op-Amps and Linear Integrated Circuits", 4th Edition, Pearson Education, 2022
3. M. Morris Mano, "Digital Logic and Computer Design", 3rd Edition, PHI Learning, 2008
4. Dhir A, "Digital Consumer Technology Handbook", 1st Edition, Elsevier, 2004
5. S. P. Bali, "Consumer Electronics", Pearson Education, 2018
6. Mike Tooley, "Electronic Circuits, Fundamentals & Application",4th Edition, Elsevier, 2015

Reference Books:

1. Behzad Razavi, "Fundamentals of Microelectronics", 3rd Edition, Wiley 2021
2. D.P. Kothari, I.J. Nagarath, "Basic Electronics", 1st Edition, McGraw Hill, 2014
3. V K Mehta &Rohit Mehta, "Principles of Electronics", 11th Edition, Chand Publications, 2018
4. Albert Malvino, "Electronic Principles", 9th Edition, McGraw Hill Publications, 2021

Web links:

1. Analog Electronic Circuits, Prof. Shouribrata Chatterjee, Department of Electrical engineering, IIT Delhi: https://www.youtube.com/watch?v=c6LfCA6YK-Q
2. Integrated Circuits and Applications, Prof.Shaik Rafi Ahmed, IIT, Guwahati: https://www.youtube.com/watch?v=IuobUzNm6SA&list=PLwdnzlV3ogoUdwipmit62VoN9fr1fP9Re&index=3
3. Digital Circuits, Prof. Santanu Chattopadhayay, IIT Kharagpur: https://www.youtube.com/watch?v=X7M3rUxUpOc&list=PLbRMhDVUMngePP5JcezxImF-FzOC9wstz

MANGALORE INSTITUTE OF TECHNOLOGY & ENGINEERING

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Autonomous Institute affiliated to VTU, Belagavi, Approved by AICTE, New Delhi
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Industrial Systems and Manufacturing Technology			
Semester	**I/II**	CIE Marks	**50**
Course Code	**26ESCC105**	SEE Marks	**50**
Teaching Hrs/Week (L: T: P:S)	**2:0:2:2**	Exam Hrs	**03**
Total Hrs	**50 (26L + 24P)**	Credits	**03**

Course Description :

This course provides an overview of manufacturing systems, organizational structures, conventional manufacturing processes, and machine tool operations. It introduces Computer Numerical Control (CNC) manufacturing, additive manufacturing technologies, and their applications in modern industries. The course also covers industrial robotics, including robot configurations, grippers, and applications, with practical exposure to machining, CNC simulation, 3D printing, and robot programming.

Course Objectives:

This course is designed to

1. Impart the knowledge of organizational structures and functional departments of manufacturing industries
2. Provide knowledge of conventional manufacturing processes and operating machine tools
3. Familiarize CNC machine components, technology, and programming fundamentals
4. Impart the knowledge of additive manufacturing processes and their applications
5. Provide knowledge of industrial robotics and its applications in manufacturing

Module 1: Introduction to Manufacturing Industry	**No. of Hrs: 05L**

Introduction, Objectives, Manufacturing systems, Inputs and outputs, Characteristics, Organizational structures, Functional departments in manufacturing: production, engineering & purchasing, Categories of manufacturing systems: batch & mass, Plant layout: process layout and product layout

Textbook 1: 1.1 to 1.6, 1.8, 1.9, 1.9.3, 1.9.4, 1.11, 1.11.3, 1.11.4

Module 2: Manufacturing Process and Machine Tool Operations	**No. of Hrs: 05L + 06P**

Classification of manufacturing processes: constant mass, metal removing & material addition processes
Lathe operations: turning, facing, taper turning (swiveling the compound tool rest) and thread cutting
Drilling operations: drilling, reaming and boring
Milling operations: plain/slab milling and slot milling

Lab component:

1. Demonstration of facing, plain, stepped and taper turning operations on lathe
2. Demonstration of drilling and milling operations

Self-study component:

Cutting tool materials, Cutting fluids: requirements and types, and Drilling operations: tapping, countersinking & counter-boring

Textbook 2: 1.2.2, 8.15, 8.16, 9.2.4, 9.2.7, 9.8.7, 9.10.15

Module 3: Computer Numerical Control Manufacturing	**No. of Hrs: 06L + 10P**

Introduction to CNC manufacturing, Components/Elements of CNC system, CNC machine tools: working principle, CNC turning center & Vertical machining center, Preparatory functions: G-codes and Miscellaneous functions: M-codes, basic CNC part programming: turning & drilling

Lab component:
1. Simulation of CNC program for facing, plain, stepped and taper turning
2. Simulation of CNC program for drilling and slot milling

Self-study component:
Comparison between Conventional machine tools and CNC machines, Use of CNC machines in modern manufacturing industries

Textbook 3: 9.1, 9.4, 12.1.1, 12.2, 13.1, 13.3, 13.4

Module 4: Additive Manufacturing (AM)	**No. of Hrs: 05L + 04P**

Introduction, Workflow, Classification, AM technologies: Stereolithography, Fused Deposition Modelling, Selective Laser Sintering and Laminated Object Manufacturing

Lab component:
Demonstration of a given model using 3D printer

Self-study component:
AM materials, Applications: medical implants, satellite components and rocket parts

Textbook 4: 1.2, 1.3, 2.1, 2.2.1.1, 2.2.3.3, 2.3.1.1, 2.4.1

Module 5: Robotics	**No. of Hrs: 05L + 4P**

Introduction, Robotic systems, Robot classification/configuration: cartesian, cylindrical, spherical, and jointed arm robots, Types of joints
Grippers: types of grippers - mechanical, vacuum and magnetic
Applications of industrial robots: material handling and assembly operations

Lab component:
Demonstration of basic programming of an industrial robot and execution of pick-and-place task

Textbook 5: 1.10, 1.11.1, 1.13, 1.23, 2.4 to 2.6, 10.3.4, 10.3.6

Course Outcomes:

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

1 Articulate the structure, functional departments, and layout of manufacturing industries
2 Explain the operational principles of conventional machines, CNC machine tools, additive manufacturing & industrial robotics and their applications
3 Develop CNC part programs for turning and drilling operations
4 Demonstrate machining operations, CNC simulation and 3D printing

Textbooks

1. Peter Scallan, "Process Planning", 1st Edition, Butterworth-Heinemann, 2003
2. Rajaput R. K., "A textbook of Manufacturing Technology", 2nd Edition, Laxmi Publications, 2020
3. Rao P. N., "CAD/CAM Principles and Applications", 3rd Edition, Tata McGraw-Hill. 2010
4. D.T. Pham and S.S. Dimov, "Rapid Manufacturing", 1st edition, Springer, 2001
5. Rajput R. K., "Robotics and Industrial Automation", 2nd Edition, S Chand and Company Ltd, 2020

Reference Books

1. K. R Gopala Krishna, "Elements of Mechanical Engineering", 35th Edition, Subash Publication 2015
2. Appu Kuttan K K, "Robotics", 1st Edition, I. K. International Pvt Ltd, 2013
3. David L. Goetsch, "Occupational Safety and Health", 7th Edition, Prentice Hall, 2011

Web Links

1. Introduction to Manufacturing and Machining: https://nptel.ac.in/courses/112105127
2. An Overview of CNC Machines: http://nptel.ac.in/courses/112102103
3. Video demonstration of Machine tool operations: https://www.makino.com/enus/resources/content-library/videos
4. Fundamentals of Additive Manufacturing Technologies: http://www.digimat.in/nptel/courses/video/112103306/L16.html
5. Introduction to Robotics: https://nptel.ac.in/courses/107106090

Modern Computing and Python Programming

Semester	**I/II**	CIE Marks	**50**
Course Code	**26ESCC106**	SEE Marks	**50**
Teaching Hrs./Week (L: T: P: S)	**3:0:2:0**	Exam Hrs.	**03**
Total Hrs	**64 (40L + 24P)**	Credits	**04**

Course Description:

This is an introductory course designed to familiarize students with modern computing approaches and to equip them with the fundamental concepts of Python programming and Artificial Intelligence & Machine Learning. The course begins with the evolution of computing and contemporary computing paradigms such as parallel, distributed, cloud, and edge computing, followed by AI-enabled computing. Consequently, course covers essential Python programming constructs, problem-solving techniques, file processing, and the development of basic applications using appropriate Python libraries. The course concludes with an overview of Artificial Intelligence, intelligent agents, and basic Machine Learning concepts and workflow.

Course Objectives:

This course is designed to

1. Impart knowledge on modern computing approaches including parallel, distributed, Cluster, grid, cloud, edge computing
2. Impart knowledge on Python data types, operators, and input / output statements
3. Provide knowledge of strings, control structures, built-in data structures, functions, and file handling in Python
4. Provide fundamentals of artificial intelligence and machine learning techniques

Module 1: Modern Computing Approaches	**8L**

Evolution of Computing: Scalable computing over the internet, The Age of Internet computing, Scalable Computing Trends and New Paradigms

Parallel and Distributed Computing: Eras of Computing, Parallel vs. Distributed Computing, Parallel Processing, Elements of Distributed Computing

Cluster Computing: Introduction, why clusters exist, Components and Characteristics, Types of Clusters, and Examples

Grid Computing: Definition, The Power Grid Analogy, Virtual Organisation, Characteristics of Grid Computing, Types of Grids, Examples, and Advantages of Limitations

Cloud Computing: Introduction, Cloud Reference Model (IaaS, PaaS, SaaS) and examples, Types of Clouds (Public, Private, Hybrid, Community)

Edge Computing: Introduction, Need for Edge Computing, Edge Computing Architecture, Cloud vs. Edge Computing, Applications.

Text Book 1: 1.1 – 1.1.1, 1.1.2

Text Book 2: 1.1.1– 1.1.6, 1.2.1 – 1.2.5,2.1, 2.2, 2.3.1, 2.3.2, 2.3.4, 2.4.1 – 2.4.2,4.2.1 – 4.2.4, 4.3.1 – 4.3.4

Module 2: Python Fundamentals	**8L+6P**

About Python, Program Structure, Variables, Keywords, Identifiers, Literals, Input and Output statements, Data Types, Operators, Expressions, Operator Precedence, Type Conversion, and Basic Debugging Techniques

Laboratory Component:

1. Write a Python program to:
    a. Read Student Name, USN, and Marks of three courses
    b. Calculate the Total and Average Marks
    c. Display the Student details in a formatted way
2. Write a Python program to:
    a. Read the radius of a circle
    b. Calculate and display the area & circumference
    c. Convert the calculated area into an integer and display
3. Write a Python program that:
    a. Accepts an integer, a floating-point number, a string, and a Boolean value.
    b. Displays their values and corresponding data types
    c. Performs suitable arithmetic and string operations
4. Write a Python program that:
    a. Accepts two numbers from the user.
    b. Performs:
        i. Addition
        ii. Multiplication
        iii. Division
        iv. Floor Division
        v. Modulus
        vi. Exponentiation
    c. Display the results.

Text Book 2: 3.1, 3.2, 3.3, 3.5, 3.6, 3.7, 3.12, 3.16

Module 3: Strings, Flow Control, and Functions	**8L+6P**

Strings: Creating and Storing Strings, Built-in String Functions, String Operators, String Indexing & Slicing, String Formatting (f-strings & format ()),

Flow Control: Conditional Statements (if, if-else, elif), Looping Statements (for, while), Nested Loops, break, continue, pass statements

Functions: Defining & Calling a Function, Types of Function; Built-in Functions, User-defined Functions, Arguments & Parameters, Global and local Variable, Command Line Arguments, Lambda Functions, Importing User-defined Modules

Laboratory Component:

1. Write a python program to:
    a. Create a string and perform indexing and slicing
    b. Convert the uppercase string to lowercase and vice-versa
    c. Count the occurrence of a character or a substring
    d. Replace a word in the string

e. Split and join strings
f. Check whether the string starts or ends with a given substring

2. Develop a menu-driven program to perform the following operations:
   a. Check whether a number is even or odd
   b. Find the largest of three numbers
   c. Generate the multiplication table of a number
   d. Display all prime numbers within a given range
   e. Exit the program
3. Write a Python program to:
   a. Find the factorial of a number using a function
   b. Calculate simple interest using a function with default arguments
   c. Use a lambda function to find the square of a number
   d. Create a module named mymath.py containing functions for addition, subtraction, multiplication, and division. Import the module into another Python program and perform arithmetic operations

Text Book 2: 6.1 - 6.5, 4.2 - 4.7, 5.1- 5.7, 5.11.1

Module 4: Built-in Data Structures and Files	**8L+6P**

Python Data Structures: Mutable and Immutable Objects, Lists, Tuples, Sets, Dictionaries, Common Operations on Lists, Tuples and Dictionaries, Passing Lists to Functions, Tuples and Dictionaries to Functions.

File Handling: Introduction to Files, opening a File, File Modes, Reading from a File, writing to a File, Appending Data to a File, Closing a File.

Laboratory Component:

1. Write the python program to implement the following:
   a. Create a list of n integers entered by the user and perform the following operations:
      i. Insert an element at a specified position
      ii. Delete an element
      iii. Sort the list in ascending order
      iv. Reverse the list
   b. Create a tuple of student names and perform the following:
      i. Display the tuple
      ii. Count the occurrence of a given name
      iii. Find the index of a specified name
   c. Create a dictionary containing student USN as the key and Student Name as the value. Perform the following:
      i. Add a new student
      ii. Update an existing student's name
      iii. Delete a student record
      iv. Display all keys and values
   d. Write three separate functions that accept a List, Tuple, and Dictionary respectively as arguments and display their contents

2. Write a Python program to implement the following:
    a. Create a text file and perform the following operations
        i. Create a new text file and write user-entered content into it.
        ii. Append additional text to the existing file.
        iii. Read and display the entire contents of the file.
        iv. Display the total number of characters, words, and lines in the file.
    b. Perform different file reading operations:
        i. Read the complete file using read ()
        ii. Read the first line using readline ()
        iii. Read all lines using readlines ()
        iv. Display each line with its corresponding line number.
    c. Perform file copy operations:
        i. Copy the contents of one text file into another file
        ii. Verify whether the copied file contains the same contents
        iii. Display the contents of both files
        iv. Display the size of both files
3. Write a Python program to implement the following:
    a. Create a tuple of n integers entered by the user and perform the following operations:
        i. Display the tuple
        ii. Find the maximum and minimum elements in the tuple
        iii. Count the occurrence of a specified element
        iv. Find the index of a specified element
    b. Create two sets of integers entered by the user and perform the following operations:
        i. Display the union of the two sets
        ii. Display the intersection of the two sets
        iii. Display the difference between the two sets
        iv. Display the symmetric difference of the two sets
    c. Create a dictionary containing the Employee ID as the key and Employee Name as the value. Perform the following operations:
        i. Add a new employee record
        ii. Update an existing employee's name
        iii. Delete an employee record
        iv. Search for an employee using the Employee ID and display the corresponding name

Text Book 2:7.1 – 7.5, 8.1.1 - 8.1.6, 8.4.1 – 8.4.8, 8.5, 8.6.1 – 8.6.12

Module 5: Artificial Intelligence and Machine Learning	**8L+6P**

Artificial Intelligence: Introduction, History and Evolution of AI, Applications of AI, Intelligent Agents: Agents and Environments, Structure of Agents

Machine Learning: Introduction, Types of Machine Learning: Supervised Learning, Unsupervised Learning, Reinforcement Learning, Machine Learning Workflow/Pipeline: Structure of a Data, Data Pre-processing, Feature, Feature Selection Process, Model Selection, Training, Testing and Evaluation

Laboratory Component:

1. Write a Python program using NumPy, Pandas, and Scikit-learn to perform the following operations on a dataset. Load the Titanic dataset (Titanic.csv) using Pandas and perform the following operations:
   a. Display the first five records
   b. Display the dataset information
   c. Display the summary statistics
2. Write a Python program using NumPy, Pandas, and Scikit-learn to perform the following operations on a dataset. Load the Titanic dataset (Titanic.csv) using Pandas and perform the following operations:
   a. Select the input features and the target attribute
      i. Display the selected input features
      ii. Display the target attribute
   b. Split the dataset into training and testing sets
   c. Display the number of training and testing samples

Text Book 3:1.1, 1.3, 2.1, 2.4
Text Book 4: 1.1, 1.4, 1.5,2.4, 2.6, 3.2,4.1.1

Course Outcomes:

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

1. Describe modern computing approaches and their characteristics
2. Describe fundamental python programming constructs
3. Describe the basics of artificial intelligence and machine learning
4. Write python programs to solve simple computational problems and perform various file operations
5. Identify suitable python built-in data structures and utilize for problem solving
6. Develop python programs utilizing NumPy, Pandas, and Scikit-Learn to process given datasets

Text Books:

1. Kai Hwang, Geoffrey C. Fox and Jack J. Dongarra, Distributed and Cloud Computing: From Parallel Processing to the Internet of Things, Morgan Kaufmann, Elsevier, 2012.
2. Rajkumar Buyya, Christian Vecchiola, S. Thamarai Selvi, Mastering Cloud Computing, McGraw Hill Education, 2013.
3. Reema Thareja, Python Programming using Problem Solving Approach, Oxford University Press, 3rd Edition, 2024.
4. Stuart Russell and Peter Norvig, Artificial Intelligence: A Modern Approach, 4th Edition, Pearson, 2021.
5. Saikat Dutt, Subramanian Chandramouli, Amit Kumar Das, Machine Learning, Pearson Education India, 1st Edition, 2018.

Reference Books:

1. Perry Lea, IoT and Edge Computing for Architects, Packt Publishing, 2nd Edition, 2020.
2. Eric Matthes, Python Crash Course – A Hands-on, Project-based Introduction to Programming, No Starch Press, 2015.
3. Al Sweigart, Automate the Boring Stuff with Python – Practical Programming for Total Beginners, No Starch Press, 2019.
4. Mark Fenner, Machine Learning with Python for Everyone, Addison-Wesley Professional, 2020.

Web links:

1. Python full course: *https://nptel.ac.in/courses/106106182*
2. Fundamental of AI: *https://nptel.ac.in/courses/112103280*

Civil Engineering & Sustainable Infrastructure

Semester	**I/II**	CIE Marks	**50**
Course Code	**26ESCC107**	SEE Marks	**50**
Teaching Hrs/Week (L:T:P:S)	**2:0:0:2**	Exam Hrs	**2.5**
Total Hrs	**26**	Credits	**02**

Course Description:

This course introduces the fundamentals concepts in Civil Engineering and emphasize on emerging technologies such as Building Information Modeling and Digital Twins. The course also focuses on the Principles of force system, sustainable infrastructure, embodied energy, and green building concepts. Students will gain knowledge of modern Engineering practices and sustainable approaches to infrastructure development.

Course Objectives:

This course is designed to

1. Provide an overview of Civil Engineering and Building materials
2. Familiarize with Emerging technologies used in Infrastructure
3. Impart knowledge of analyzing system of Forces
4. Provide knowledge of Sustainable infrastructure and Green buildings

Module 1: Introduction to Civil Engineering — **No. of Hrs:05**

Overview of Civil Engineering: Brief history of Civil Engineering, Relevance of Civil Engineering in the Infrastructural Development of Nation

Building Materials and Significance: Cement, Aggregates, Concrete, Steel, Sustainable Materials- Compressed Stabilized Earth Blocks, Crumb Rubber Modified Bitumen

Structural Elements of a Building: Foundation, Plinth, Lintel, Masonry Wall, Column, Beam, Slab.

Building Byelaws: Planning regulations, Open space requirements and Floor area ratio

Self-study component:

Scope of different fields of Civil Engineering-Structural, Environmental, Transportation and Geotechnical Engineering

Textbook 1: 1.1 to 1.7

Module 2: Emerging Technologies in Civil Engineering — **No. of Hrs:05**

Building Information Modeling : Building Information Modeling Dimensions, Building Information Modeling Platforms, Impact on Project Stakeholders

Digital Twins in Construction: Overview, Building Information Modeling versus Digital Twins, Architecture, Strategic Planning for Digital Twin Implementation, Applications for Building Energy and Carbon Performance

Textbook 4:1.5, 2.1.1 to 2.1.3, 2.5,6.7 to 6.9,9.3.1 to 9.3.8

Textbook 5:1.1, 2.1.1, 2.2, 5.1,5.2,7.3.3

Module 3: Principles of Force System in Civil Engineering	**No. of Hrs:06**
Force System: Force**,** Moment of force, Concept of idealization, System of forces, Principle of physical independence of forces, Principle of Superposition of forces, Principal of transmissibility of forces, Resolution of a force and Composition of forces**,** Analysis of Coplanar Concurrent Force System **Self-study component:** Explore real-life applications of the moment of force. Identify practical examples of force system Textbook 1:2.1,2.2,2.3,2.4,2.5,2.6,2.7,2.8	
Module 4: Introduction to Sustainable Infrastructure	**No. of Hrs: 05**
Sustainable Infrastructure: Introduction, Importance, Characteristics, Role in sustainable development of country, Sustainable practices in Urban and Rural Infrastructure **Principles of Sustainable Infrastructure:** Resource Efficiency, Resilience and Lifecycle Cycle Assessment **Embodied Energy:** Concept and Significance **Self-study component:** Sustainable Infrastructure for Sustainable Development Goals and Embodied Energy Assessment Textbook 2: 1.1, 2.1, 2.5, 3.1, 5.1, 8.1	
Module 5: Green Buildings and Sustainable Energy Practices	**No. of Hrs: 05**
Green buildings: Introduction, Features, Necessity, Environmental and Economic benefits, Health and Social benefits **Green Building Rating System:** GRIHA (Green Rating for Integrated Habitat Assessment) for new buildings Purpose, Key highlights, Point System with Differential weightage **Energy Performance in Green Buildings**: Concept and need for energy efficiency in buildings, Passive design strategies and Active design strategies Textbook 3:1.1, 7.1.2, 7.2.2, 10.3.1, 12.4.3	

Course Outcomes:

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

1. Explain the relevance of Civil Engineering in Infrastructural Development
2. Describe the concepts of Building Information Modeling and Digital Twins in Civil Engineering
3. Utilize the knowledge of force system to solve problems related to coplanar concurrent forces
4. Describe the principles of sustainable infrastructure and green buildings concepts

Textbooks

1. Ganesh B. Mogaveer and M. N. Sheshaprakash, “Elements of Civil Engineering and Engineering Mechanics”,3rd Edition, PHI Learning Private Limited ,2015
2. S. Bry Sarte, “Sustainable Infrastructure: The Guide to Green Engineering and Design”,John Wiley & Sons, 2020

3. G. Harihara Iyer, "Green Building Fundamentals", 1st Edition, Notion Press, 2022
4. Rafael Sacks, Charles Eastman, Ghang Lee, and Paul Teicholz"A Guide to Building Information Modelling for Owners, Designers, Engineers, Contractors, and Facility Managers", 3rd Edition, John Wiley & Sons, 2018
5. Houtan Jebelli, Somayeh Asadi, Ivan Mutis, Rui Liu, and Jack C. P. Cheng, Digital Twins in Construction and the Built Environment, 1st Edition, 2025

Reference Books

1. Varghese P. C. "Building Materials", 2nd Edition, PHI Learning Private Limited, 2015
2. B. C. Punmia, Ashok Kumar Jain, and Arun Kumar Jain,3rd Edition, "Building Construction" Laxmi Publications, 2017

Web links:

1. NPTEL course on Engineering Mechanics
   https://nptel.ac.in/courses/112103109
2. NPTEL course on Building Information Modeling (BIM)
   https://digitalskills.iitmpravartak.org.in/course_details.php?courseID=48
3. NPTEL course on Sustainable Transportation system
   https://onlinecourses.nptel.ac.in/noc22_ce104/preview
4. NPTEL course on Sustainable Materials and Green Buildings
   https://onlinecourses.nptel.ac.in/noc19_ce40/preview
5. NPTEL course on Architectural Approaches to Decarbonization of Building
   https://onlinecourses.nptel.ac.in/noc24_ar21/preview

MANGALORE INSTITUTE OF TECHNOLOGY & ENGINEERING

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Balake Kannada/ಬಳಕೆ ಕನ್ನಡ			
Semester	**I/II**	CIE Marks	**100**
Course Code	**26NMCC108**	SEE Marks	**-**
Teaching Hrs/Week (L:T:P:S)	**1:0:0:0**	Exam Hrs	**-**
Total Hrs	**13**	Credits	**-**

Course Description:

The aim of the Balake Kannada course is very clearly defined that teaching Kannada language and make sure at the end of the teaching of this course to see the language speaking ability of non-Kannadiga students in speaking Kannada language in their daily life which could mainly help them to interact with the Kannada speakers and to stay happily in Karnataka state without any confusions and language difficulties.

Course Objectives:

This course is designed to

1. Create the awareness regarding the necessity of learning Kannada language
2. Impart Kannada comprehension skills through listening and speaking activities
3. Provide Kannada speaking, reading and writings skills
4. Familiarize Kannada conversational etiquettes

Module 1	**No. of Hrs: 02**

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

Textbook 1: Part - I

Module 2	**No. of Hrs: 02**

1. ನಾಮಪದಗಳ ಸಂಬಂದಾರ್ಥಕ ರೂಪಗಳು, ಸಂದೇಹಾಸ್ಪದ ಪ್ರಶ್ನೆಗಳು ಮತ್ತು ಸಂಬಂದವಾಚಕ ನಾಮಪದಗಳು - Possessive forms of nouns, dubitative question and relative nouns
2. ಗುಣ ಮತ್ತು ಪರಿಮಾಣ ವಿಶೇಷಣಗಳು – Qualitative and Quantitative Adjectives.
3. ಕಾರಕರೂಪಗಳು ಮತ್ತು ವಿಭಕ್ತಿ ಪ್ರತ್ಯಯಗಳು – ಸಪ್ತಮಿ ವಿಭಕ್ತಿಪ್ರತ್ಯಯ (ಅ,ಅದು,ಅವು,ಅಲ್ಲಿ) - Predictive Forms, Locative Case

Textbook 1: Lesson 1, Lesson 2, Lesson 3, Lesson 4

Module 3	**No. of Hrs: 03**

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

4. ಪತ್ರಲೇಖನ/ಖಾಸಗಿ/ವೈಯಕ್ತಿಕಪತ್ರ/ವ್ಯಾಕರಣಭಾಗ/ Letter writing/Grammar Part

Textbook 1: Lesson 5, Lesson 6, Lesson 7

Module 4	**No. of Hrs: 03**

1. ಅಪ್ಪಣೆ/ಒಪ್ಪಿಗೆ, ನಿರ್ದೇಶನ, ಪ್ರೋತ್ಸಾಹ ಮತ್ತು ಒತ್ತಾಯ ಅರ್ಥರೂಪ 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. "ಸಹಾಯಕ ಕ್ರಿಯಾಪದಗಳು 'ಇರು' ಮತ್ತು ನಿಷೇಧಾರ್ಥಕ ಕ್ರಿಯಾಪದ 'ಇರಲ್ಲ'" ಮತ್ತು ಸಂಭಾವ್ಯಸೂಚಕ ಕ್ರಿಯಾಪದಗಳು - Helping Verbs "iru and iralla" and Corresponding Future Verbs.
4. ಹೋಲಿಕೆ (ತರತಮ), ಸಂಬಂಧಸೂಚಕ, ವಸ್ತುಸೂಚಕ ಪ್ರತ್ಯಯಗಳು ಮತ್ತು ನಿಷೇಧಾರ್ಥಕ ಪದಗಳ ಬಳಕೆ - Comparative, Relationship, Identification and Negation Words.

Textbook 1: Lesson 8, Lesson 9, Lesson 10

Module 5	**No. of Hrs: 03**

1. ಕಾಲ ಮತ್ತು ಸಮಯದ ಹಾಗು ಕ್ರಿಯಾಪದಗಳ ವಿವಿಧ ಪ್ರಕಾರಗಳು - Different types of Tense, Time and Verbs
2. "ಕ್ರಿಯಾಪದಗಳ ಪ್ರತ್ಯಯಗಳೊಂದಿಗೆ ಭೂತ, ಭವಿಷ್ಯತ್ತು, ವರ್ತಮಾನಕಾಲದ ವಾಕ್ಯ ರಚನೆ" (ದ್,ತ್,ತು,ಇತು,ಆಗಿ,ಅಲ್ಲ,ಗ್,ಕ್,ಇದೆ) - Formation of Past, Future and Present Tense Sentences with Verb Forms.
3. Kannada Vocabulary List – ಸಂಭಾಷಣೆಯಲ್ಲಿ ದಿನೋಪಯೋಗಿ ಕನ್ನಡ ಪದಗಳು - Kannada Words in Conversation

Textbook 1: Lesson 11, Lesson 12

Course Outcomes:

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

1. Articulate in Kannada language
2. Read and write Kannada language
3. Communicate effectively with Kannada natives
4. Comprehend Kannada language conversations
5. Exhibit Kannada conversational etiquettes

Textbook

1. ಡಾ.ಎಲ್. ತಿಮ್ಮೇಶ. *ಬಳಕೆ ಕನ್ನಡ, ಪ್ರಸಾರಾಂಗ,ವಿಶ್ವೇಶ್ವರಯ್ಯ ತಾಂತ್ರಿಕ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಬೆಳಗಾವಿ.*
   Dr. L Timmesh, Balake Kannada, Prasaraanga, VTU, Belagavi.

Web links:

1. MODULE 1: https://www.youtube.com/watch?v=Ia3gRph2seI
2. MODULE 2: https://www.youtube.com/watch?v=mhjpnb5QgPc
3. MODULE 3: https://www.youtube.com/watch?v=QxSa2UetE-U

4. MODULE 4: https://www.youtube.com/watch?v=lkIlpQAWCs4
5. MODULE 5: https://www.youtube.com/watch?v=5LMk4GBN4as

ಸೂಚನೆ: ಹೊರ ರಾಜ್ಯದ / ವಿದೇಶಿ / ಕನ್ನಡ ಭಾಷೆಯನ್ನು ಹತ್ತನೇ ತರಗತಿಯಲ್ಲಿ ಒಂದು ಭಾಷೆಯನ್ನಾಗಿ ಅಧ್ಯಯನ ಮಾಡಿಲ್ಲದ ವಿದ್ಯಾರ್ಥಿಗಳು ಬಳಕೆ ಕನ್ನಡ ವಿಷಯವನ್ನು ಕಡ್ಡಾಯವಾಗಿ ಕಲಿಯತಕ್ಕದ್ದು.

Note: This course shall be opted by students of other states / foreign countries / students of Karnataka, who did not study Kannada as a Language in 10th Standard/SSLC.

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ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ			
Semester	**I/II**	CIE Marks	**100**
Course Code	**26NMCC109**	SEE Marks	**-**
Teaching Hours/Week (L:T:P:S)	**1:0:0:0**	Exam Hrs	**-**
Total Hours	**13**	Credits	**-**

ಪಠ್ಯಕ್ರಮದ ವಿವರಣೆ:

ಈ ಪಠ್ಯಕ್ರಮವು ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ಕನ್ನಡ ಭಾಷೆ, ಸಂಸ್ಕೃತಿ, ಸಾಹಿತ್ಯ, ಮಾನವೀಯ ಮೌಲ್ಯಗಳು ಹಾಗೂ ಗಣ್ಯ ವ್ಯಕ್ತಿಗಳ ಕೊಡುಗೆಗಳ ಪರಿಚಯವನ್ನು ನೀಡುತ್ತದೆ. ಕರ್ನಾಟಕದ ಸಂಸ್ಕೃತಿ, ಕರ್ನಾಟಕ ಏಕೀಕರಣದ ಇತಿಹಾಸ ಮತ್ತು ಆಡಳಿತ ಭಾಷೆಯಾಗಿ ಕನ್ನಡದ ಮಹತ್ವವನ್ನು ತಿಳಿಸಿಕೊಡುತ್ತದೆ. ವಚನಗಳು, ಕೀರ್ತನೆಗಳು ಹಾಗೂ ಆಧುನಿಕ ಕಾವ್ಯಗಳ ಮೂಲಕ ಕನ್ನಡ ಸಾಹಿತ್ಯದ ವೈವಿಧ್ಯತೆ ಮತ್ತು ಸಾಮಾಜಿಕ ಮೌಲ್ಯಗಳನ್ನು ಅರ್ಥಮಾಡಿಕೊಳ್ಳಲು ಸಹಾಯ ಮಾಡುತ್ತದೆ. ಡಾ. ಸರ್ ಎಂ. ವಿಶ್ವೇಶ್ವರಯ್ಯ ಅವರ ಜೀವನ ಮತ್ತು ಸಾಧನೆಗಳ ಪರಿಚಯದೊಂದಿಗೆ ಕರುಣೆ, ಮಾನವೀಯತೆ, ಸಕಾರಾತ್ಮಕ ಚಿಂತನೆ ಮತ್ತು ಉತ್ತಮ ಜೀವನ ಮೌಲ್ಯಗಳನ್ನು ಬೆಳೆಸುವ ಉದ್ದೇಶವನ್ನು ಹೊಂದಿದೆ.

ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ ಪಠ್ಯ ಕಲಿಕೆಯ ಉದ್ದೇಶಗಳು:

1. ಪದವಿ ವಿದ್ಯಾರ್ಥಿಗಳಾಗಿರುವುದರಿಂದ ಕನ್ನಡ ಭಾಷೆ ಸಾಹಿತ್ಯ ಮತ್ತು ಸಂಸ್ಕೃತಿಯ ಪರಿಚಯ ಮಾಡಿಕೊಡುವುದು.
2. ಕನ್ನಡ ಸಾಹಿತ್ಯದ ಪ್ರಧಾನ ಭಾಗವಾದ ಆಧುನಿಕ ಪೂರ್ವ ಮತ್ತು ಆಧುನಿಕ ಕಾವ್ಯಗಳನ್ನು ಸಂಕೇತಿಕವಾಗಿ ಪರಿಚಯಿಸುವುದು.
3. ತಾಂತ್ರಿಕ ವ್ಯಕ್ತಿಗಳ ಪರಿಚಯವನ್ನು ಹಾಗೂ ಅವರುಗಳು ಸಾಧಿಸಿದ ವಿಷಯವನ್ನು ಪರಿಚಯಿಸುವುದು.
4. ಮಾನವೀಯ ಮೌಲ್ಯಗಳು ಹಾಗೂ ಜೀವನಾನುಭವಗಳನ್ನು ಒಳಗೊಂಡ ಕಥನಗಳ ಪರಿಚಯ ಮಾಡಿಕೊಡುವುದು .

Module 1: ಕನ್ನಡ ಸಂಸ್ಕೃತಿ ಮತ್ತು ಭಾಷೆ ಕುರಿತಾದ ಲೇಖನಗಳು	**No. of Hrs: 03**

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

ಪಠ್ಯ ಪುಸ್ತಕ 1 -ಭಾಗ 1

Module 2:ಆಧುನಿಕ ಪೂರ್ವದ ಕಾವ್ಯ ಭಾಗ	**No. of Hrs: 03**

ವಚನಗಳು : ಬಸವಣ್ಣ , ಅಕ್ಕ ಮಹಾದೇವಿ, ಅಲ್ಲಮ ಪ್ರಭು , ಆಯ್ದಕ್ಕಿ ಲಕ್ಕಮ್ಮ .

ಕೀರ್ತನೆಗಳು: ಅದರಿಂದೇನು ಫಲ ಇದರಿಂದೇನು ಫಲ -ಪುರಂದರ ದಾಸರು , ತಲ್ಲಣಿಸದಿರು ಕಂಡ್ಯಾ ತಾಳು ಮನವೆ - ಕನಕದಾಸರು

ಪಠ್ಯ ಪುಸ್ತಕ 1 -ಭಾಗ 2

Module 3: ಆಧುನಿಕ ಕಾವ್ಯ ಭಾಗ	**No. of Hrs: 03**

ಡಿ.ವಿ.ಜಿ. ಅವರ ಮಂಕುತಿಮ್ಮನ ಕಗ್ಗದಿಂದ ಆಯ್ದ ಕೆಲವು ಭಾಗಗಳು

ಅನಿಕೇತನ : ಕುವೆಂಪು

ಪಠ್ಯ ಪುಸ್ತಕ 1 -ಭಾಗ 3

Module 4: ತಾಂತ್ರಿಕ ವ್ಯಕ್ತಿಗಳ ಪರಿಚಯ	**No. of Hrs: 02**

ಡಾ ಸರ್ ಎಂ ವಿಶ್ವೇಶ್ವರಯ್ಯ : ವ್ಯಕ್ತಿ ಮತ್ತು ಐತಿಹ್ಯ- ಎ.ಎನ್.ಮೂರ್ತಿರಾವ್ .

ಪಠ್ಯ ಪುಸ್ತಕ 1 -ಭಾಗ 4

Module 5: ಮಾನವೀಯ ಮೌಲ್ಯಗಳು ಮತ್ತು ಚಿಂತನೆಗಳು	**No. of Hrs: 02**

ಕರುಣಾಳು ಬಾ ಬೆಳಕೇ ಮಸುಕಿದೀ ಮಬ್ಬಿನಲಿ ಕೈ ಹಿಡಿದು .. - ಎ. ಆರ್. ಮಣಿಕಾಂತ್

ಪಠ್ಯ ಪುಸ್ತಕ 2 -ಭಾಗ 5

Course Outcomes:

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

ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ ಪಠ್ಯ ಕಲಿಕೆಯ ನಂತರ ವಿದ್ಯಾರ್ಥಿಗಳಲ್ಲಿ:

CO1: ಕನ್ನಡ ಭಾಷೆ ಸಾಹಿತ್ಯ ಮತ್ತು ಕನ್ನಡದ ಸಂಸ್ಕೃತಿಯ ಕುರಿತು ಅರಿವು ಮೂಡುತ್ತದೆ .

CO2: ಕನ್ನಡ ಸಾಹಿತ್ಯದ ಆಧುನಿಕ ಪೂರ್ವ ಮತ್ತು ಆಧುನಿಕ ಕಾವ್ಯಗಳನ್ನು ಸಾಂಕೇತಿಕವಾಗಿ ಕಲಿತು ಹೆಚ್ಚಿನ ಓದಿಗೆ ಮತ್ತು ಜ್ಞಾನಕ್ಕೆ ಸ್ಫೂರ್ತಿ ಮೂಡುತ್ತದೆ .

CO3: ತಾಂತ್ರಿಕ ವ್ಯಕ್ತಿಗಳ ಪರಿಚಯ ಹಾಗೂ ಅವರುಗಳು ಸಾಧಿಸಿದ ವಿಷಯಗಳನ್ನು ತಿಳಿದುಕೊಂಡು ನಾಡಿನ ಇನ್ನಿತರ ವ್ಯಕ್ತಿಗಳ ಬಗ್ಗೆ ತಿಳಿದುಕೊಳ್ಳಲು ಕೌತುಕತೆ ಹೆಚ್ಚಾಗುತ್ತದೆ .

CO4: ಮಾನವೀಯ ಮೌಲ್ಯಗಳು,ಜೀವನದ ಸಕಾರಾತ್ಮಕ ಅಂಶಗಳನ್ನು ಒಳಗೊಂಡ ಕಥನಗಳ ಸ್ವರೂಪವು ಅರ್ಥವಾಗುತ್ತದೆ.

TEXT BOOKS

1. ಡಾ.ಎಲ್. ತಿಮ್ಮೇಶ. ಸಾಂಸ್ಕೃತಿಕ *ಕನ್ನಡ, ಪ್ರಸಾರಾಂಗ, ವಿಶ್ವೇಶ್ವರಯ್ಯ ತಾಂತ್ರಿಕ ವಿಶ್ವವಿದ್ಯಾಲಯ,ಬೆಳಗಾವಿ*
2. *ಪ್ರೊ ಸೋಮಣ್ಣ , ವಾಣಿಜ್ಯ ಗಂಗೋತ್ರಿ -2, ಪ್ರಸಾರಾಂಗ ,ಮೈಸೂರು ವಿಶ್ವವಿದ್ಯಾನಿಲಯ.*

Online Web links

MODULE 1: https://www.youtube.com/watch?v=1MT9e2lDwhs

MODULE 2: https://www.youtube.com/watch?v=qpOW3CVSA-Q

MODULE 3: https://www.youtube.com/watch?v=uGd4C0VaMRM,
https://www.youtube.com/watch?v=pP5fotcOp-c

MODULE 4: https://www.youtube.com/watch?v=b8VX2gW3j20

MODULE 5: https://www.youtube.com/watch?v=o_VJJkDA9s0

ಸೂಚನೆ: ಹತ್ತನೇ ತರಗತಿಯಲ್ಲಿ ಕನ್ನಡ ಭಾಷೆಯನ್ನು ಒಂದು ಭಾಷೆಯಾಗಿ ಅಧ್ಯಯನ ಮಾಡಿರುವಂತಹ ವಿದ್ಯಾರ್ಥಿಗಳು ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ ವಿಷಯವನ್ನು ಕಡ್ಡಾಯವಾಗಿ ಕಲಿಯತಕ್ಕದ್ದು.

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ENGINEERING CHEMISTRY			
Semester	**I/II**	CIE Marks	**50**
Course Code	**26BSCC110**	SEE Marks	**50**
Teaching Hrs/Week (L:T:P:S)	**2:0:2:3**	Exam Hrs	**03**
Total Hrs	**50 (26L + 24P)**	Credits	**03**

Course Description:

Engineering Chemistry provides a foundation in chemical principles and their applications in the field of engineering materials, corrosion and environmental sustainability. The course emphasizes practical applications, modern analytical techniques, green chemistry and emerging technologies to enable students to address contemporary engineering challenges.

Course Objectives:

This course is designed to

1. Impart knowledge of energy conversion and environmentally sustainable technologies.
2. Familiarize the importance of organic molecules in display systems and instrumental techniques for quantitative analysis.
3. Impart knowledge of working mechanism of electrochemical energy systems, renewable energy based technologies and solve numerical problems related to electrochemical processes.

Module 1: Battery Technology and Fuel Cells	**No. of Hrs: 05L + 04P**

Battery Technology: Introduction to Galvanic cell and Concentration cell. Classification of Batteries. Solid state battery (Li-polymer battery) and Sodium-ion Batteries.

Fuel Cells: Introduction, difference between conventional battery and fuel cell. Types of fuel cells. Proton exchange membrane fuel cells.

Laboratory components:

1. Determination of EMF of the electrochemical cell by varying the concentration of the electrolyte.
2. Determination of strength of an acid in Pb-acid battery.

Self-Study Content: Recycling of Li-ion batteries by direct cyclic method, Advantages & limitations of fuel cells, Fuel Cell Electric Vehicles (FCEVs): Benefits and Challenges.

Textbook 1: 6.3, 6.6, 6.7
Textbook 2: 7.4, 7.6, 7.11, 7.12, 7.14, 7.15

Module 2: Water Technology and E- Waste Management	**No. of Hrs: 05L + 04P**

Water Technology: Water Technology: Introduction, WHO standards for potable water. Chemical oxygen Demand. Water purification: Membrane filtration -Reverse osmosis. Membrane Separation- Electrodialysis. Drinking water treatment-UV treatment. Graphene membranes for water filtration. Softening of water by ion exchange method.

E-Waste Management: Introduction, sources and composition of E-waste. Methods of disposal. Extraction of copper from E-waste. Role of stakeholders in environmental management of E-waste.

Laboratory components:

1. Analysis of water quality of Industrial effluent/ synthetic waste water.
2. Determination of copper in E-waste by spectrophotometric method.

Self-study content: Membrane filtration - cellulose based water filters, gravimetric estimation of sulphate in industrial waste water, need of e-waste management & effects of e-waste on environment and human health.

Textbook 1: 4.1 to 4.3, 4.7 to 4.8

Textbook 2: Section 19.8, 19.10

Module 3: Organic Electronics and Analytical Techniques	**No. of Hrs: 06L + 04P**

Organic Electronics: Introduction, Materials for organic electronics- Liquid Crystals. Organic Semiconductors-Introduction, principle, working, properties and applications of Organic Light Emitting Diode (OLED). Conducting polymers- mechanism of conduction.

Sensors: Introduction, principle, working and applications of electrochemical sensors.

Analytical Techniques: Introduction, Electrochemical methods of analysis- Conductometry, Potentiometry. Spectrophotometric method- Colorimetry.

Laboratory components:

1. Quantitative estimation of iron by Potentiometric method of analysis and graphical Representation using Excel.
2. Evaluation of acid content in beverages by Conductometric method.

Self-study contents: Comparison of OLED and QLED, Electrochemical glucose sensors, Different types of electrodes used in various analytical techniques.

Textbook 1: 8.18
9.3, 9.5 to 9.6

Textbook 2: 12.1 to 12.2

Module 4: Fuels and Renewable Energy	**No. of Hrs: 05L + 06P**

Fuels: Introduction, definitions of calorific value, Gross and Net Lower Calorific value. Knocking mechanism and octane number, anti-knock additives.

Solar Energy: Introduction, principle, construction, working and applications of Photovoltaic cell and Perovskite solar cell. Advantages and disadvantages of PV cells.

Green fuel: Introduction, Hydrogen-production (photocatalytic water splitting) and applications, Biodiesel, Compressed Natural Gas (CNG), Compressed Bio Gas (CBG)

Laboratory components:

1. Synthesis of biodiesel and systematic explanation of underlying mechanism.
2. Determination of viscosity coefficient of anti-knocking agent by Ostwald's viscometric method.

Textbook 1: 5.2, 5.5, 5.10, 5.14, 5.15
7.2 to 7.3
Textbook 2: 16.2 to 16.3, 16.8 to16.9, 16.11
17.2, 17.8

Module 5: Corrosion Science and Nanomaterials	**No. of Hrs: 05L + 06P**

Corrosion Science: Introduction, methods of corrosion, Types of corrosion: Differential metal, differential aeration. Corrosion control-Design and selection of materials. Corrosion Penetration Rate.

Nanomaterials: Introduction, synthesis of nanomaterials by precipitation method.
Introduction, properties and engineering applications of Graphene.

Laboratory components:

1. Synthesis of Iron Oxide Nanoparticles.
2. Analysis of corrosion penetration rate of Iron by weight loss method.
3. Chemical Structure drawing using ChemDraw software.

Textbook 1: 2.1 to 2.4, 2.6, 2.7
10.5, 10.6
Textbook 2: 18.1, 18.3, 18.4, 18.7

Course Outcomes:

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

1. Explain the fundamentals of galvanic cells, potable water standards, e-waste management, organic electronics, fuels, and corrosion mechanisms and control relevant to engineering applications.
2. Describe the synthesis of biodiesel, nanomaterials, working of organic electronics, sensors, knocking, advanced water treatment, and quantitative chemical analysis.
3. Apply the working principles of energy conversion and storage devices, photovoltaic cells, hydrogen production, mechanism of conduction in a polymer and solve problems related to COD, galvanic cells, fuels, and corrosion.
4. Perform the experiments related to synthesis of engineered materials, alternative fuels, potable water quality, e-waste resource analysis, and quantitative chemical analysis, and present the results in the prescribed format.

Textbooks

1. Gadag R.V. and Nithyananda Shetty, "A Text Book of Engineering Chemistry", 1st Edition, MEDTECH A division of Scientific International Private Limited, 2019
2. Dr. Suba Ramesh & Others, "Wiley Engineering Chemistry", 02 Edition, Wiley India Private Limited, 2022

Reference Books

1. Dr. Dara S.S.& Dr. Umare S.S., "A Textbook of Engineering Chemistry" 12th Edition, S. S. Chand & Company Limited, 2022
2. Douglas A. Skoog, F. James Holler, Stanley R. Crouch, "Principles of Instrumental Analysis", 7th Edition, Cengage Learning, 2022
3. Dr. Hari Krishna S, Dr. Sunitha Rani N, Dr, Shailashree S, "Engineering Chemistry", 1st Edition, Book Rivers Publishers, 2022
4. John Armstrong, "The future of energy", Energy Technology Publishing, 2021
5. Malini S & AnanthaRaju K S, "Chemistry of Engineering Materials", 1st Edition, CBS Publishers & Distributors Pvt. Ltd, 2022

Web links:

1. Comparison of Li-ion battery with Li-Polymer Battery, Prof.James Keeler, University of Cambridge: https://youtu.be/HT21wrGl6oM?si=S9c6nK9lI6Sw05TN
2. OLED display principle, fabrication, Prof C Anand, Pondicherry: https://youtu.be/BuGaDzS7pWo?si=ymBSBd9IKwzZ51tn
3. Construction of pervoskite solar cells, Prof Kaushik Pal, IIT Roorky: https://youtu.be/nqkkVRjp2_4?si=LBnaQpaA6h_G1zSQ
4. Graphene, Dr.Sachin Kadiyan, School of Material Science Engineering Perdue University, USA: https://youtu.be/Y-nZbZzBOPg?si=q8y_gS8RY7Ei6_ce
5. Nanomaterials, Sunita Rattan, Amity Institute of Applied Science, Noida: https://youtu.be/whyIdJab1kM?si=iHcezrvi1Cgpabzg

Computational Thinking & Programming			
Semester	**I/II**	CIE Marks	**50**
Course Code	**26ESCC111**	SEE Marks	**50**
Teaching Hrs/Week (L: T: P: S)	**3:0:2:3**	Exam Hrs	**03**
Total Hrs	**64 (40L +24P)**	Credits	**04**

Course Description:

This course introduces computational thinking and C programming, covering operators, decision-making, loops, arrays, functions, strings, pointers, structures, unions, and file handling. It focuses on problem-solving using tools such as algorithms, flowcharts, and pseudocode, along with hands-on programming exercises to develop logical thinking, programming skills, and the ability to write C programs.

Course Objectives:

This course is designed to

1. Impart the fundamentals of computational thinking and problem-solving strategies through program design tools such as algorithms, flowcharts and pseudocode
2. Familiarize the structure, operators and control constructs in C programming language
3. Impart knowledge of arrays, strings, functions, and pointers
4. Introduce the concepts of structure & union, and file handling

Module 1: Introduction	**No. of Hrs: 07L**

Systemic Thinking: Introduction to Problem Solving and Thinking, Systematic Thinking, Systems and Systems Thinking, Components, Boundaries, Inputs, Processes and Outputs, Stakeholders, Relationships and Dependencies, Cause-and-Effect Relationships, System Hierarchy and Interconnections, Feedback Loops and System Behavior, Patterns and Complex Problems, Systemic Approach to Problem Identification and Analysis.

Computational Thinking Fundamentals: Decomposition, Patterns, Abstraction and Case studies.

Program Design Tools: Algorithm, Flowchart & Pseudocode.

Textbook 4: Chapter 1,2

Textbook 1:1.3 to 1.5

Textbook 3:8.4

Module 2: Introduction to C Programming & Control Structures	**No. of Hrs: 09L+08P**

Introduction to C: Structure of C-Program, Header Files, Comments, Character Set, Tokens, Basic data types, Constants, Declarations and Input/output Statements.

Operators: Arithmetic, Relational, Logical, Increment & Decrement, Bitwise, Assignment and Conditional, Type Conversions, Expressions, Precedence and Order of Evaluation.

Decision Making: if, if-else, nested if-else, else-if ladder and switch statements,

Looping: while loop, do-while loop, for loop, Nested Loops, break, continue, and goto statements.

Laboratory Components:

1. Programming exercises on:
   a. Input and Output statements
   b. if, if- else and nested if statements.
   c. else-if ladder
   d. switch statements.
   e. Loops: while, do-while and for
   f. break, continue and goto

Self-Study Content: Additional programming exercises on Input and Output statements

Textbook 2: 2.1 to 2.12

Textbook 3: 9.1 to 9.11 and 9.14, 10.1 to 10.6

Module 3: Arrays and Functions	**No. of Hrs: 08L+06P**

Arrays: One-Dimensional Array: Declaration, Initialization, Accessing elements, Storing values, Operations, Sorting (Bubble sort & Selection sort) and Searching (Linear Search & Binary Search), Two-Dimensional Array: Declaration, Initialization, Accessing elements, Operations (Addition, Multiplication and Transpose)

Functions: Introduction, Function Declaration/Prototype, Function Definition, Function call Types of Functions, Parameter passing mechanisms Passing individual array elements & an array to a function and Recursive functions.

Laboratory Components:

1. Programming exercises on:
   a. One Dimensional Array
   b. Two Dimensional Array
   c. Functions

Self-Study Content: Additional programming exercises on decision making, one-Dimensional arrays and two-Dimensional arrays.

Textbook 3:12.1 to 12.8, 11.1 to 11.7,11.10

Module 4: Strings and Pointers	**No. of Hrs: 08L+06P**

Strings: Definition, Reading, Writing, Array of Strings, String Manipulation Functions: String Length, String Compare, String Copy, String Concatenate, String Reverse, String Upper, String Lower.

Pointers: Introduction, Declaration & Initialization of pointer variables, Accessing pointer values, pointer expressions and pointer arithmetic, Null pointer, Generic pointers, passing arguments to functions using pointers, pointers and arrays

Laboratory Components:

1. Programming exercises on:
   a. Strings
   b. Pointers

Textbook 3: 13.1 to 13.6, 14.1 to 14.8

Module 5: Structure, Union & Files	**No. of Hrs: 08L+04P**

Structures: Declaration, Initialization, Accessing the members, Nested Structure and Array of structures.

Unions: Declaration, Initialization, Accessing the members.

Files: Types, declaring a file pointer, Opening (modes), Closing and Reading & Writing.

Laboratory Components:

1. Programming exercises on:
   a. Structures
   b. Files

Self-Study Content: Additional programming exercises on File Handling

Textbook 1:15.1 to 15.3,15.6 to 15.7,16.1 to 16.5

Course Outcomes:

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

1. Describe the tools used for program design and steps in computational thinking and systemic thinking
2. Describe C programming constructs, Strings, Arrays and File handling concepts
3. Make use of decision and looping constructs in C programs
4. Implement C programs using strings, arrays, functions, and pointers to solve computational problems.
5. Implement C programs using Structures, Union, and Files

Textbooks:

1. M. Sprankle, “Problem solving & Programming concepts”, 9th Edition, Pearson Education,2012
2. Kernighan and Ritchie, "The C Programming Language", 2nd Edition Prentice Hall., 1988
3. Reema Thareja, “Computer Fundamentals and Programming in C”, 2nd Edition, Oxford Higher Education, 2016
4. Virginia Anderson and Lauren Johnson, “Systems Thinking Basics from Concepts to Causal Loops”, PEGASUS COMMUNICATIONS, INC, Westford, Massachusetts.

Reference Books:

1. R.G. Dromey, "How to Solve it by Computer", Pearson.,1982
2. Byron S. Gottfried, "Program with C", 2nd Edition, Schaums Outline series.
3. E. Balagurusamy, “Programming in ANSI C”, 7th Edition, Mc Graw Hill Education ,2018.

Web links:

1. Complete C https://archive.nptel.ac.in/courses/106/104/106104128/

MANGALORE INSTITUTE OF TECHNOLOGY & ENGINEERING

(A Unit of Rajalaxmi Education Trust®, Mangalore)
Autonomous Institute affiliated to VTU, Belagavi, Approved by AICTE, New Delhi
Accredited by NAAC with A+ Grade & ISO 9001:2015 Certified Institution

Fundamentals of Electrical Engineering			
Semester	**I/II**	CIE Marks	**50**
Course Code	**26ESCC112**	SEE Marks	**50**
Teaching Hours/Week (L:T:P:S)	**(3:0:0:3)**	Exam Hrs.	**3**
Total Hours	**42**	Credits	**3**

Course Description:
This course introduces the fundamental principles of electrical engineering and their applications in engineering systems. It covers the analysis of DC and AC circuits, transformers, electrical machines, and the basics of electrical power generation, transmission, and distribution. The course also emphasizes electrical safety practices, energy conservation techniques, and emerging electrical engineering technologies. Students will develop the foundational knowledge required to understand the operation of electrical systems and perform basic electrical circuit analysis.

Course Objectives:
The course is designed to

1. Introduce the fundamental principles of DC and AC circuits to analyze basic electrical circuits
2. Familiarize the operating principles and applications of transformers, electrical machines, and electrical power systems
3. Impart the knowledge of electrical safety, energy conservation, and emerging electrical engineering technologies for sustainable engineering applications

Module 1: Electrical Power System, Safety and Conservation	**No. of Hrs: 7**

Electrical Power System: General Structure of Electrical Power System using Single-Line Diagram Approach, Electric Power Generation, Overview of Conventional and Renewable Sources of Electrical Energy

Safety Measures: Circuit Protective Devices – Fuse and Miniature Circuit Breaker (MCB), Electric Shock, Pipe and Plate Earthing, Precautions Against Electric Shock, First Aid after an Electric Shock

Conservation: Measurement of Electrical Energy Consumption, Two-Part Electricity Tariff, Block Rate Tariff, Calculation of Energy Consumption for a Given Set of Loads, Concept of Grid-Connected Solar PV Systems

Self-study component:
Types of Domestic Wiring, Service Mains, Meter Board, Distribution Board

Textbook 1: 34.4, 34.7
Textbook 2: 15.3 to 15.4, 15.10, 15.17

Module 2: DC and Single-Phase AC Circuits	**No. of Hrs: 10**
DC Circuits: Ohm's Law, Voltage Division and Current Division in DC Circuits, Analysis of Series, Parallel and Series-Parallel Circuits Excited by Independent Voltage Sources, Kirchhoff's Laws, Mesh and Nodal Analysis **Single-Phase AC Circuits:** Generation of Sinusoidal Voltage, Average Value, RMS Value, Form Factor and Peak Factor, Voltage, Current and Power Analysis of R, L, C, RL and RC using Phasor Diagrams, Concept of Real Power, Reactive Power, Apparent Power and Power Factor Textbook 2: 2.2 to 2.3, 3.1 to 3.3, 6.2, 6.6, 6.7, 7.1 to 7.2	
Module 3: DC Machines	**No. of Hrs: 9**
DC Generator: Principle of Operation, Constructional Details, EMF Equation, Types of Generators **DC Motor:** Principle of Operation, Concept of Back EMF, Series and Shunt Motors, Torque Equation, Speed-Torque Characteristics, Elementary Speed Control and Typical Applications Textbook 1: 36.1 to 36.3, 37.1 to 37.6 Textbook 2: 12.2 to 12.7	
Module 4: Transformers and Three-Phase AC Circuits	**No. of Hrs: 8**
Single-Phase Transformer: Working Principle, Construction, Transformation Ratio, EMF Equation **Three-Phase AC Circuits:** Generation of Three-Phase Voltage, Representation of Balanced Star and Delta Connected Systems for both Source and Load, Relationship Between Phase and Line Values of Voltage and Current **Self-study component:** Advantages of Three-Phase System Over Single Phase, Types of Single-Phase Transformers and their Applications Textbook 1: 28.1 to 28.7, 29.3, 29.4, 33.1, 33.2 Textbook 2: 10.3, 10.4, 10.6, 11.2 to 11.4	
Module 5: Special Machines and Electrical Engineering Applications	**No. of Hrs: 8**
Special Machines: Stepper Motors – Construction, Types, Step-Angle Concept and Applications, DC Servomotors, Brushless DC (BLDC) Motors – Construction, Principle, Characteristics and Applications **Electrical Engineering Applications:** Electrical Appliances – Mixer Grinder, Electric Geyser and Ceiling Fan (BLDC-based), Electric Locomotives, Smart Grid, Micro Grid, Electric Vehicles, Vehicle-To-Grid (V2G) Technology, Battery Energy Storage Systems (BESS) and Battery Management Systems (BMS)	

Self-study component:

Applications for Stepper Motors in Automation and Robotics, BEE Star Rating for Energy-Efficient Appliances, EV Charging Stations

Textbook 3: 1.2 to 1.5, 3.2, 7.1
Textbook 4: Part B
Textbook 5: 2.1
Textbook 6: 1.2

Course Outcomes:

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

1. Describe the principles of power generation, transmission and distribution, electrical safety, energy conservation, DC and single-phase AC circuits, and their significance in engineering applications
2. Explain three-phase AC systems, the construction, operating principles, characteristics, types, and applications of transformers, electrical machines, and modern electrical engineering technologies
3. Apply electrical laws and phasor concepts to determine electrical quantities in DC and AC circuits
4. Determine electrical quantities of transformers, three-phase circuits, electrical machines, and energy consumption

Textbooks:

1. Hughes, John Hiley, Keith Brown, and Ian McKenzie Smith, Electrical & Electronic Technology, 12th Edition, Pearson, 2016
2. D. C. Kulshreshtha, Basic Electrical Engineering, 2nd Edition, McGraw-Hill, 2019
3. E. G. Janardanan, Special Electrical Machines. PHI Learning, 2020
4. S. C. Bhargava, Household Electricity and Appliances, BS Publications, 2020
5. James Larminie, John Lowry and A John, Electrical Vehicle Technology Explained, 2nd Edition, Wiley & Sons, Ltd. Publications, 2012
6. Handbook on Battery Energy Storage System, Asian Development Bank, 2018

Reference Books:

1. A. Mittle and V. N. Mittle, Basic *Electrical Engineering,* Tata McGraw Hill, 2nd Edition, 2017
2. V.K Mehta, Rohit Mehta, Principles *of Electrical Engineering and Electronics,* S Chand and Company, Revised, 2019

Web links:

1. Power Generation: Hydro Power Plant: https://www.youtube.com/watch?v=OC8Lbyeyh-E
2. Power Transmission & Distribution: https://www.youtube.com/watch?v=cQ3-Kdx0kB0
3. Precautions against electric shock: https://www.youtube.com/watch?v=iNpizBLXao8
4. Generation of sinusoidal voltage animation: https://www.youtube.com/watch?v=JQ8h50HpbsY

5. Generation of three-phase voltage animation: https://www.youtube.com/watch?v=tFaDfOap2fs
6. Working principle of single-phase transformer: https://www.youtube.com/watch?v=xuIADO0LJfM
7. Electric Locomotives: https://www.youtube.com/watch?v=GJbUI2D3rLY
8. Vehicle to Grid Technology: https://www.youtube.com/watch?v=wHNFYMPFUv4
9. Special Electric Machines: https://www.youtube.com/watch?v=WIIcmfKfwYY
10. *Bureau of Energy Efficiency (BEE)* – Standards and labelling. https://beeindia.gov.in/show_content.php?lang=1&level=1&ls_id=372&lid=322

Engineering Graphics			
Semester	**I/II**	CIE Marks	**50**
Course Code	**26ESCC113**	SEE Marks	**50**
Teaching Hrs/Week (L:T:P:S)	**2:0:2:0**	Exam Hrs	**3**
Total Hrs	**50 (26 L + 24 P)**	Credits	**3**

Course Description:

This course introduces the principles, conventions, and practices of engineering drawing along with basic Computer-Aided Drafting (CAD) tool. It covers orthographic projections of planes and solids, isometric projections, and conversion of three-dimensional objects into two-dimensional engineering views. The course also develops skills in preparing orthographic and isometric drawings and the development of lateral surfaces of various solids.

Course Objectives:

This course is designed to

1. Familiarize principles and conventions of engineering drawing
2. Familiarize CAD software for creating, editing, and dimensioning engineering drawings
3. Provide the knowledge of orthographic projection of plane surfaces, solids, isometric projection, and development of lateral surfaces of solids
4. Impart the knowledge of conversion of 3-Dimensional objects to 2-Dimensional views

Module 1 : Orthographic Projections of Plane Surfaces	**No. of Hrs: 6L+6P**

Introduction: Significance of Engineering Drawing, BIS Conventions of Engineering Drawing, Geometrical Constructions & Dimensioning, and Orthographic Projection principle, projection of points in first and third quadrants (practice only), projection of lines inclined to both the planes in the first quadrant (practice only)

Computer Aided Drafting: Drawing sheet selection, basic drawing commands (lines, circles, polygons, splines, dimension & text) and editing commands (move, copy, trim, extend, mirror, rotate)

Orthographic Projections of Plane Surfaces: Introduction, orthographic projections of plane surfaces by the change of position method (First angle projection only) - Triangle, square, pentagon, hexagon, and circular lamina

Module 2: Orthographic Projections of Solids	**No. of Hrs: 6L+6P**

Orthographic projections of right regular solids resting on Horizontal Plane and axis inclined to both the planes; Prisms – triangle & hexagon, Pyramids - square, pentagon & hexagon, tetrahedron, hexahedron, and Cones by the change of position method

Module 3: Isometric Projection	**No. of Hrs: 5L+4P**
Isometric scale, Isometric projection of hexahedron (cube), right regular prisms, pyramids, cylinders, cones, and spheres. Isometric projection of a combination of two solids	
Module 4: Orthographic Views of 3D Components	**No. of Hrs: 4L+4P**
Conversion of isometric/pictorial views to orthographic views – front view, top view and side view of simple mechanical components	
Module 5: Development of Lateral Surfaces of Solids	**No. of Hrs: 5L+4P**
Development of lateral surfaces of right regular prisms, cylinders, pyramids, and cones resting with base on the Horizontal Plane. Development of lateral surfaces of frustums and truncated solids	

Course Outcomes:

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

1. Apply the principles of orthographic projection to construct the principal views of planes and solids
2. Draw the isometric projections of combination of two solids
3. Convert isometric views into orthographic projections of engineering components
4. Develop lateral surfaces of solids

Textbooks:

1. Bhatt N. D., "Engineering Drawing: Plane and Solid Geometry", 53rd Edition, Charotar Publishing House Pvt. Limited, 2019
2. K. R. Gopalakrishna & Sudhir Gopalakrishna, "Computer Aided Engineering Drawing", 39th Edition, Subash Stores, Bangalore, 2017

Reference Books:

1. Bhattacharya S. K., "Electrical Engineering Drawing", 2nd Edition, New Age International Publishers, 2005
2. Venugopal K., " Engineering Drawing and Graphics", 1st Edition, New Age International Publishers, 2014

Web links:

1. Introduction to Engineering Drawing - https://nptel.ac.in/courses/112103019
2. Engineering Graphics & Design - https://onlinecourses.nptel.ac.in/noc21_me128/preview

Design Thinking			
Semester	**I/II**	CIE Marks	**50**
Course Code	**26ESCC114**	SEE Marks	**50**
Teaching Hrs/Week (L:T:P:S)	**(1:0:2:0)**	Exam Hrs	**1.5**
Total Hrs	**39 (13L+26P)**	Credits	**2**

Course Description:
This course introduces students to the principles, phases, mindsets, tools, and techniques of human-centered problem solving. It develops skills in empathizing with users, defining problems, generating ideas, prototyping, testing, and iterating solutions. The course also emphasizes ethics and sustainability in developing responsible solutions.

Course Objectives:
This course is designed to:

1. Impart knowledge of Principles and Phases of Design Thinking
2. Impart Knowledge on Processes, Techniques and Tools of Design Thinking
3. Familiarize with importance of Ethics in Design Thinking
4. Foster Ability to Practice Design Thinking Principles, Process for the Development of Sustainable Solutions

Module 1: Introduction	**No. of Hrs: 2L**

Challenges of Rapidly Changing Workplace: Survival Skills, Design Thinking (DT) and Why it Matters: Design and Business, DT Mindsets: Six Key Mindsets, Other Mindsets for Success Evolution, Models and 3Ps of Design Thinking

Textbook 1: Chapter-1, Textbook 2: Chapter 1.8-1.10

Module 2: Phases of Design Thinking	**No. of Hrs: 3L**

Introduction, The 5-Phase model, Empathize, Define, Ideate, Prototype, Test, Flexibility, Feedback and Iteration, Features of Design Thinking, Solving Wicked Problems, DT Aids Lean and Agile Thinking, DT Aids Project Management, Applications of DT, Practicing DT, Attributes of DT Leaders, DT Vs Traditional Thinking

Text book 2: Chapter 5.1-5.8, 2.1-2.9

Module 3: Design thinking Tools and Techniques	**No. of Hrs.: 3L**

Personas, Visualization, Stakeholder Mapping, Mind Mapping, Star Bursting, Divergent Thinking, Convergent Thinking, Ethnography, Brainstorming, Role Playing, User Interviews, The Six Thinking Hats

Textbook 2: Chapter-3

Module 4: Ethics in Design Thinking	**No. of Hrs: 2L**
Ethics in DT, Values and Models, Five Ways of Ethical Thinking, Ethical Issues, Causes of Unethical Practice, Sources of Ethics, Qualitative Needed by Ethical Design Thinkers, Universal Principles of Ethics, Ethical Design Test Text book 2: Chapter-8	
Module 5: Case studies & Sustainability	**No. of Hrs.: 3L**
Case Studies -Karnataka Health Promotion Trust, Netflix, Airbnb, GE health care. Sustainability and Sustainable Futures, Three Pillars of Sustainability, Sustainable Design, The 2030 Agenda for Sustainable Development, Design Thinking for the 2030 agenda, Circular Economy Aids Sustainability. Textbook 2: Chapter-9, 10 (Page No: 145-150)	
Activity	**No. of Hrs.: 26P**
Activity–1: Human - Centered Problem Identification and Solution Design 1.1. Paper Tower Challenge to Demonstrate Creativity, Collaboration, Communication, and Teamwork. 1.2. Identify any Five Poorly Designed Products/Services from the Community, or a Given Scenario and Discuss the Need for Design Thinking to Improve Them. 1.3. Analyze one selected problem and relate it to Design Thinking using the 3Ps perspective 1.4. Conduct user Interviews and Field Observations to Understand User Needs, Challenges, and Expectations for the Selected Problem. 1.5. Prepare an Empathy Map, Persona, Point of View (POV) statement, and "How Might We" (HMW) Questions based on the User Study. 1.6. Generate Alternative Solutions using Brainstorming, Mind Mapping, and Divergent–Convergent Thinking Techniques, and Select the Most Feasible Solution. 1.7. Develop one Low-Fidelity Prototype (Paper Prototype, Storyboard, Mock-up, or Wireframe, etc) of the Selected Solution and Present it for Initial Feedback. **Activity–2: Prototype Validation, Ethical Evaluation and Sustainable Solution Development** 2.1 Apply Design Thinking tools such as SCAMPER, Stakeholder Mapping, Role Playing, and Six Thinking Hats to evaluate the Proposed Solution. 2.2 Test the Prototype with Users, Collect Feedback, Analyze the Results, and Refine the Prototype through one- iteration. 2.3 Evaluate the Refined Solution using the Ethical Design Test and Universal Principles of Ethics, and Recommend Improvements.	

2.4 Assess the solution for sustainability using the Three Pillars of Sustainability, Circular Economy Principles, and Map the Solution to Relevant Sustainable Development Goals (SDGs).

2.5 Present the Final Prototype with Implementation Roadmap, Expected Impact, and Future Scope.

Course Outcomes:

At the end of the course, students will be able to

1 Explain necessity, principles, techniques & phases of design thinking
2 Articulate the importance of ethics and sustainability concepts in the Design Thinking
3 Apply Design Thinking techniques to define problems and provide conceptual solutions
4 Build low fidelity prototypes and validate them through testing

Textbooks

1. David Lee, "Design Thinking in the Classroom", Ulysys press, Berkeley CA, USA, 2018.
2. E Balagurusamy, Bindu Vijayakumar, "Design thinking a beginner's perspective", McGraw-Hill. 2025.

Reference Books

1. Pressman, Andrew, "Design Thinking: A Guide to Creative Problem Solving for Everyone", Routledge, 2019
2. Walter Brenner, Falk Uebernickel, "Design Thinking for Innovation learning (International edition) Springer, 2016

Web links:

1. Stanford d.school - https://dschool.stanford.edu/
2. Design thinking Case studies - https://triangility.com/design-thinking-examples-3-case-studies
4. Design Thinking Tools and Methods:https://www.designorate.com/design-thinking-tools-and-methods/
5. Examples of Design Thinking:https://voltagecontrol.com/blog/8-great-design-thinking-examples/

Professional Communication			
Semester	I/II	CIE Marks	**50**
Course Code	**26HMCC115**	SEE Marks	**50**
Teaching Hrs/Week (L:T:P:S)	**0:0:2:2**	Exam Hrs	**2.5**
Total Hrs	**26**	Credits	**1**

Course Description:
The course covers the fundamentals of English communication, essential grammar, vocabulary development, professional writing, business correspondence, email etiquette, and professional ethics. It also focuses on developing practical communication skills through group discussions, presentations, interviews, and other professional communication activities.

Course Objectives:
This course is designed to

1. Articulate effective communication in English
2. Emphasize on importance of English grammar
3. Impart knowledge on letter-writing formats, email etiquette, and professional ethics
4. Enhance knowledge on vocabulary and professional writing
5. Provide knowledge on professional communication strategies

Module 1: Introduction to Communication	**No. of Hrs: 6P**

Introduction- Importance and types of Communication, Intra and Inter personal Communication, Group Communication, Public Communication, Role and Importance of English in the Corporate world, Importance of professional communication, Listening, Reading, Feedback techniques.

Activity(s)

1. Situational Conversation
2. Story Reconstruction
3. Communication Carousel
4. Communication Escape Challenge

Self-Study Component: Importance of professional communication
Textbook 1: 9.2 to 9.12 & 17.1 to 17.10

Module 2: Communicative Grammar	**No. of Hrs: 4P**

Revisit Parts of Speech: Articles, Subject-Verb Agreement, Tenses & Sequence of tense, Auxiliary verbs, Phrasal verbs, Active and Passive voice, Cloze Test, Use of Idioms and phrases.

Activity(s)

1. Word Sort Game
2. Idiom Scavenger Hunt
3. Grammar Detective
4. Grammar Relay

Self-Study Component: Recognize parts of speech in a passage**.**
Textbook 2: sec: 440 to sec: 674

Module 3: Written Communication	**No. of Hrs: 6P**

Letter Writing: Introduction, Types of letters, Formal/Professional Letters-Forms & Format, Resume and Cover Letter, Personal Letters, Email etiquettes and Professional ethics.

Activity(s)

1. Drafting Resume
2. Letter Writing exercise
3. Email writing

Module 4: Advanced Vocabulary	**No. of Hrs: 4P**

Identifying Errors- Sentences and misspelt words, Jumble sentences, Importance of proper Punctuation, Comprehension passages, Technical report writing- structure.

Activity(s)

1. Error Hunt
2. Reordering Exercise,
3. Punctuation Challenge

Self-Study Component: Identify the sentences carrying error and justify the solution.
Textbook 5: 179,183

Module 5: Professional Communication	**No. of Hrs: 6P**

Presentation Skills-Strategies of Presentation, Key components of pitch deck presentation. Interviews-types and preparation, Mock interviews (Practice and Peer Feedback) , Group Discussion.

Activity(s)

1. Pitch deck presentation practice
2. Mock Interview
3. Group Discussion

Course Outcomes:

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

1. Demonstrate effective verbal and written communication skills
2. Apply appropriate grammar to communicate effectively
3. Demonstrate skills in professional business correspondence, resume writing and e-mail communication
4. Apply appropriate language vocabulary for technical report writing
5. Employ communication skills through presentation, interview, group discussion and other interactions

Textbooks

1. Sanjay Kumar & Pushp Lata.“*Communication Skills”,* Oxford University Press, 2015.
2. Leech, Geoffrey, and Jan Svartvik, “A *communicative grammar of English”,* Routledge, Publication, 2013.

3. Geoffrey Leech, Margaret Deuchar & Robert Hoogenred. "*English Grammar for Today, Macmillan, 1983*.
4. Wren& Martin. "*High School English Grammar and Composition",* S. Chand& Company Ltd, 2002.
5. Rajesh Kumar, English Language Communication Skills, Cengage Learning India Pvt.Ltd, 2014.

Reference Books

1. Leech, Geoffrey, and JanSvartvik. "A *communicative grammar of English",* Routledge, Publication, 2013.
2. Raymond Murphy "*Intermediate English Grammar",* Cambridge University Press, 1994.
3. Martin Hewings. "*Advance Grammarin Use",* Cambridge University Press, 2008.
4. Subroto Bagchi. "*The Professional",* Penguin India, 2009.

Web links:

1. Learn English – English Communication and Language Learning Resources, British Council: **https://learnenglish.britishcouncil.org/.**
2. English Grammar – Grammar Learning Resources, British Council: **https://learnenglish.britishcouncil.org/grammar.**
3. Writing Letters: Formal and Informal English, Emma, English Video: **https://www.youtube.com/watch?v=PgwmAUJx248.**
4. Writing – Professional and Academic Writing Resources, British Council: **British Council Learn English Writing Resources**.
5. Group Discussion Skills and Effective Participation, Talent Sprint: **Talent Sprint YouTube Learning Resources.**
6. Career Preparation and Interview Skills, University of Cambridge – Careers Service: **University of Cambridge Careers Service.**