First Year
Scheme & Syllabus
(2023 Scheme)

SCHEME AND SYLLABUS

Mechanical Engineering
Stream

GLOBAL ACADEMY OF TECHNOLOGY
Autonomous institution affiliated to VTU, Belagavi.
Raja Rajeshwari Nagar, Bengaluru-560098.

GLOBAL ACADEMY OF TECHNOLOGY (Autonomous Institution Under VTU)
Scheme of Teaching and Examination 2023–24 (Effective from the academic year 2023 – 24)

I SEMESTER B.E. (PHYSICS GROUP) – ME Stream (ME/AE)

Sl. No	Course and Course Code		Course title	Offering Department	Teaching Department	Teaching Hours / Week			Examination			Credits
						Theory Lecture	Tutorial	Practical / Drawing	CIE Marks	SEE Marks	Total Marks	
						L	T	P				
1	ASC	23MAT11C	MATHEMATICS I FOR ME STREAM	MAT	MAT	3	2	0	50	50	100	4
2	ASC	23PHY12C	APPLIED PHYSICS FOR ME STREAM (INTEGRATED)	PHY	PHY	3	0	2	50	50	100	4
3	ESC	23MEE13	ELEMENTS OF MECHANICAL ENGINEERING	ME	ME	3	0	0	50	50	100	3
4	ESC-1	23ESC14C	INTRODUCTION TO C PROGRAMMING (INTEGRATED)	CSE	ANY	3	0	2	50	50	100	4
5	ETC-1	23ETC15D/ 23ETC15E	INTRODUCTION TO DRONES / INTRODUCTION TO AUTOMATION & ROBOTICS	AE/ ME	AE/ ME	3	0	0	50	50	100	3
6	AEC	23EGH16	COMMUNICATIVE ENGLISH	HUMANITIES	ANY	1	0	0	50	50	100	1
7	HSMC	23KSK17/ 23KBK17	SAMSKRUTIKA KANNADA / BALAKE KANNADA	HUMANITIES	ANY	1	0	0	50	50	100	1
					TOTAL	17	2	4	350	350	700	20

Note: ASC- Applied Science Course, ESC- Engineering Science Course, ETC – Emerging Technology Course, PLC – Programming Language Course, HSMC- Humanity, Social Science and Management course, AEC – Ability Enhancement Course.

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Scheme of Teaching and Examination 2023–24 (Effective from the academic year 2023 – 24)

I SEMESTER B.E. (CHEMISTRY GROUP) – ME Stream (ME/AE)

Sl. No	Course and Course Code		Course title	Offering Department	Teaching Department	Teaching Hours / Week			Examination			Credits
						Theory Lecture	Tutorial	Practical / Drawing	CIE Marks	SEE Marks	Total Marks	
						L	T	P				
1	ASC	23MAT11C	MATHEMATICS I FOR ME STREAM	MAT	MAT	3	2	0	50	50	100	4
2	ASC	23CHE12C	APPLIED CHEMISTRY FOR ME STREAM (INTEGRATED)	CHE	CHE	3	0	2	50	50	100	4
3	ESC-1	23ESC14D	ENGINEERING MECHANICS	ME	ME	3	0	0	50	50	100	3
4	ESC-1	23ESC14C	INTRODUCTION TO C PROGRAMMING (INTEGRATED)	CSE	ANY	3	0	2	50	50	100	4
5	ESC	23MEG15	COMPUTER AIDED ENGINEERING DRAWING	ME	ME	2	0	2	50	50	100	3
6	HSMC	23IDT16	INNOVATION AND DESIGN THINKING	HUMANITIES	ANY	1	0	0	50	50	100	1
7	HSMC	23CIP17	INDIAN CONSTITUTION	HUMANITIES	ANY	1	0	0	50	50	100	1
					TOTAL	16	2	6	350	350	700	20

Note: ASC- Applied Science Course, ESC- Engineering Science Course, ETC – Emerging Technology Course, PLC – Programming Language Course, HSMC- Humanity, Social Science and Management course, AEC – Ability Enhancement Course.

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Scheme of Teaching and Examination 2023–24 (Effective from the academic year 2023 – 24)

II SEMESTER B.E. (PHYSICS GROUP) – ME Stream (ME/AE)

Sl. No	Course and Course Code		Course title	Offering Department	Teaching Department	Teaching Hours / Week			Examination			Credits
						Theory Lecture	Tutorial	Practical / Drawing	CIE Marks	SEE Marks	Total Marks	
						L	T	P				
1	ASC	23MAT21C	MATHEMATICS II FOR ME STREAM	MAT	MAT	3	2	0	50	50	100	4
2	ASC	23PHY22C	APPLIED PHYSICS FOR ME STREAM (INTEGRATED)	PHY	PHY	3	0	2	50	50	100	4
3	PLC-2	23PLC23B	INTRODUCTION TO PYTHON PROGRAMMING (INTEGRATED)	ISE	ANY	3	0	2	50	50	100	4
4	ESC	23MEE24	ELEMENTS OF MECHANICAL ENGINEERING	ME	ME	3	0	0	50	50	100	3
5	ETC-2	23ETC25D/ 23ETC25E	INTRODUCTION TO DRONES / INTRODUCTION TO AUTOMATION & ROBOTICS	AE/ ME	AE/ ME	3	0	0	50	50	100	3
6	AEC	23EGH26	COMMUNICATIVE ENGLISH	HUMANITIES	ANY	1	0	0	50	50	100	1
7	HSMC	23KSK27/ 23KBK27	SAMSKRUTIKA KANNADA / BALAKE KANNADA	HUMANITIES	ANY	1	0	0	50	50	100	1
					TOTAL	17	2	4	350	350	700	20

Note: ASC- Applied Science Course, ESC- Engineering Science Course, ETC – Emerging Technology Course, PLC – Programming Language Course, HSMC- Humanity, Social Science and Management course, AEC – Ability Enhancement Course.

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Scheme of Teaching and Examination 2023–24 (Effective from the academic year 2023 – 24)

II SEMESTER B.E. (CHEMISTRY GROUP) – ME Stream (ME/AE)

Sl. No	Course and Course Code		Course title	Offering Department	Teaching Department	Theory Lecture	Tutorial	Practical / Drawing	CIE Marks	SEE Marks	Total Marks	Credits
						L	T	P				
1	ASC	23MAT21C	MATHEMATICS II FOR ME STREAM	MAT	MAT	3	2	0	50	50	100	4
2	ASC	23CHE22C	APPLIED CHEMISTRY FOR ME STREAM (INTEGRATED)	CHE	CHE	3	0	2	50	50	100	4
3	PLC-2	23PLC23B	INTRODUCTION TO PYTHON PROGRAMMING (INTEGRATED)	ISE	ANY	3	0	2	50	50	100	4
4	ESC-2	23ESC24D	ENGINEERING MECHANICS	ME	ME	3	0	0	50	50	100	3
5	ESC	23MEG25	COMPUTER AIDED ENGINEERING DRAWING	ME	ME	2	0	2	50	50	100	3
6	HSMC	23IDT26	INNOVATION AND DESIGN THINKING	HUMANITIES	ANY	1	0	0	50	50	100	1
7	HSMC	23CIP27	INDIAN CONSTITUTION	HUMANITIES	ANY	1	0	0	50	50	100	1
					TOTAL	16	2	6	350	350	700	20

Note: ASC- Applied Science Course, ESC- Engineering Science Course, ETC – Emerging Technology Course, PLC – Programming Language Course, HSMC- Humanity, Social Science and Management course, AEC – Ability Enhancement Course.

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Engineering Science Courses (ESC-1 / ESC-2)					Credits	Emerging Technology Courses (ETC-1 / ETC-2)					Credits
Code	Title	L	T	P		Code	Course Title	L	T	P	
23ESC14A/24A	INTRODUCTION TO ELECTRONICS AND COMMUNICATION	3	0	0	3	23ETC15A/25A	INTRODUCTION TO AI	3	0	0	3
23ESC14B/24B	INTRODUCTION TO ELECTRICAL ENGINEERING	3	0	0	3	23ETC15B/25B	INTRODUCTION TO EMBEDDED SYSTEM	3	0	0	3
23ESC14C	INTRODUCTION TO C PROGRAMMING (INTEGRATED)	3	0	2	4	23ETC15C/25C	RENEWABLE ENERGY SOURCES	3	0	0	3
23ESC14D/24D	ENGINEERING MECHANICS	3	0	0	3	23ETC15D/25D	INTRODUCTION TO DRONES	3	0	0	3
						23ETC15E/25E	INTRODUCTION TO AUTOMATION & ROBOTICS	3	0	0	3
						23ETC15F/25F	WASTE MANAGEMENT	3	0	0	3

Programming Language Courses (PLC-1 / PLC-2)					Credits
Code	Title	L	T	P	
23PLC23A	ADVANCED PROGRAMMING IN C (INTEGRATED)	3	0	2	4
23PLC23B	INTRODUCTION TO PYTHON PROGRAMMING (INTEGRATED)	3	0	2	4

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Course: Mathematics I for ME stream

Course Code	23MAT11C	CIE Marks	50
Hours/Week (L: T: P)	3:2:0	SEE Marks	50
No. of Credits	4	Examination Hours	03

Course Objectives

To enable students to apply the knowledge of Mathematics in various fields of engineering by making them to learn the following:

CLO1	Solution of system of equations and Eigen values
CLO2	Polar curves, Curvature and Radius of curvature
CLO3	Partial derivatives and Jacobians
CLO4	Vector differentiation

Content	No. of Hours/ RBT levels
Module 1 Rank of a matrix by elementary row transformations. Eigen values and Eigen vectors. Consistency of linear system of equations. Solution of linear system of equations: Gauss elimination, Gauss Jordan and Gauss-Seidel methods.	**10 Hours** L2, L3
Module 2 Successive Differentiation; standard results. Fundamental Theorems: Rolle's theorem, Lagrange mean value theorem, Cauchy's mean value theorem and Taylor's theorem. Expansion of functions: Maclaurin's series.	**10 Hours** L2, L3
Module 3 Evaluation of indeterminate forms. Polar Curves: Angle between radius vector and tangent, angle between two curves. Pedal equation. Curvature and Radius of Curvature for Cartesian and polar curves.	**10 Hours** L2, L3
Module 4 Function of two or more variables, Partial derivatives, Differentiation of composite functions. Jacobians (direct examples). Taylor's theorem for functions of two variables. Maxima and Minima of functions of two variables.	**10 Hours** L2, L3
Module 5 Differentiation of vectors, velocity and acceleration. Scalar and vector point functions. Gradient, directional derivative; divergence and curl, physical interpretation of divergence and curl.	**10 Hours** L2, L3

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Course Outcomes

Upon completion of this course, student will be able to:

CO11.1	Apply knowledge of matrices to test the consistency and solve system of linear equations.
CO11.2	Demonstrate the understanding of fundamental theorems of calculus.
CO11.3	Solve problems related to curvature, maxima & minima and Jacobians.
CO11.4	Compute Gradient, Divergence and Curl of a scalar/vector field.

Text books:

1. Higher Engineering Mathematics, B.S. Grewal, Khanna Publishers, 44th Edition, 2017.
2. Higher Engineering Mathematics, B.V. Ramana, Tata McGraw-Hill, 2006

References:

1. Advanced Engineering Mathematics, E. Kreyszig, John Wiley & Sons, 10th Edition, 2016.
2. Higher Engineering Mathematics, H.K. Dass and Er. Rajnish Verma, S. Chand publishing, 1st edition, 2011.
3. A Text Book of Engineering Mathematics, N.P.Bali and Manish Goyal, Laxmi Publications, 6th Edition, 2014.
4. Calculus, James Stewart, Cengage Publication, 7th Edition, 2012.

Scheme of Examination:

Semester End Examination (SEE):

SEE Question paper is to be set for 100 marks and the marks scored will be proportionately reduced to 50. There will be two full questions (with a maximum of three sub questions) from each module carrying 20 marks each. Students are required to answer any **five full questions** choosing at least **one full question from each module.**

Continuous Internal Evaluation (CIE):

Three Tests are to be conducted for 40 marks each. Average of Marks scored in all three tests is added to test component. CIE is executed by way of quizzes / Alternate Assessment Tools (AATs), and three tests. **Some possible AATs:** seminar/assignments/ mini-projects/ concept videos/ partial reproduction of research work/ group activity/ any other.

Typical Evaluation pattern for regular courses is shown in Table 1.

Table 1: Distribution of weightage for CIE & SEE of Regular courses

	Component	Marks	Total Marks
CIE	CIE Test-1	40	50
	CIE Test-2	40	
	CIE Test-3	40	
	Assignments	10	
SEE	Semester End Examination	50	50
Grand Total			100

CO/PO Mapping												
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO11.1	3	2	1									3
CO11.2	3	2	1									3
CO11.3	3	2	1									3
CO11.4	3	2	1									3
Average	3	2	1									3

Low-1: Medium-2: High-3

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GLOBAL ACADEMY OF TECHNOLOGY
(Autonomous Institute Affiliated to VTU)
DEPARTMENT OF PHYSICS
APPLIED PHYSICS FOR Mechanical STREAM (INTEGRATED)
(Effective from the academic year: 2023-24)

Semester	I/II	CIE Marks	50
Subject Code	23PHY12C/22C	SEE Marks	50
Hours/Week (L: T: P)	3:0:2	Examination Hours	03
No. of Credits: 04			

Course Objectives: The course will enable the students to

1	Learn the basic concepts in Physics which are very much essential in understanding and solving Engineering related challenges.
2	Make the students gain practical knowledge to correlate with the theoretical studies.
3	Achieve perfectness in experimental skills and ability to develop and fabricate engineering and technical equipment.

Content	No. of Hours/ RBT levels
Module 1	8 hrs/L3
LASERs & Optical fibers	
LASERs: Interaction of radiation with matter, Einstein's coefficients, Requisites and condition for lasing action, He-Ne LASER, application of lasers in measurement of pollutants in the atmosphere, LASER welding, drilling, cutting, numerical problems.	
Optical fibers: Total internal reflection, angle of acceptance and numerical aperture (NA). Modes of propagation, V number and types of optical fibers. Attenuation mechanisms, attenuation coefficient, applications, merits and de-merits, numerical problems.	
Pedagogy — Chalk & Talk, multimedia presentation	
Module 2	8hrs/L3
Oscillations and shock waves	
Oscillations	

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Free oscillation: Introduction, SHM, differential equation of SHM, expression for force constant in series & parallel combination of springs, numerical problems	
Damped oscillation: Theory of damped oscillations with examples, types of damping (graphical approach), numerical problems.	
Forced oscillation: Theory of forced oscillations and resonance, numerical problems.	
Shock waves	
Mach number and Mach angle, characteristics of shock waves, construction and working of Reddy shock tube, applications of shock waves, numerical problems.	
Pedagogy	Chalk & Talk, multimedia presentation	

Module 3	8hrs/L3
Thermo electric materials: Thermo emf & thermo current, Seebeck effect, Peltier effect, Seebeck & Peltier coefficients, laws of thermoelectricity. Expression for thermo emf in terms of T_1 and T_2, thermo couples and thermopile. Applications: Exhaust of automobiles, space program (RTG), numerical problems.	
Modern engineering materials: Types, properties, applications of metallic glasses. Shape Memory Alloys – two phases, advantages & disadvantages, applications. Biomaterials – types & applications.	
Pedagogy	Chalk & Talk, multimedia presentation	

Module 4	8hrs/L3
Acoustics: Introduction to acoustics, types of acoustics, reverberation and reverberation time, absorption power and absorption coefficient, requisites for acoustics in auditorium, Sabine's formula(derivation), measurement of absorption coefficient, Factors affecting acoustics & remedial measures. Noise & its measurements, impact of noise in multistoried buildings.	
Natural hazards & safety: Introduction, earthquake (general characteristics, physics of earthquake, Ritcher scale of measurement & earthquake resistant measures), Tsunami (causes for Tsunami, characteristics, adverse effects, risk, reduction measures, engineering structures to withstand Tsunami).	
Pedagogy	Chalk & Talk, multimedia presentation	

Module 5	8 hrs/L2
Physics of Nanoscience & Material characterization	
Physics of Nanoscience: Introduction, Top-down approach, Bottom-up approach, Density of states 3D, 2D, 1D & 0D. Synthesis: Ball milling, arc discharge method, applications.	

	Material characterization: Principle, construction, working of Fourier Transform Infrared (FTIR) spectroscope, Transmission Electron Microscope (TEM), applications.	
Pedagogy	Chalk & Talk, multimedia presentation	

SL. No.	Experiments	No. of Hours/ RBT levels
1	Spring constants in series and parallel combination	2 /L3
2	Wavelength of light emitted by LEDs	2/L3
3	Frequency response in series and parallel LCR circuits	2/L3
4	Energy gap of a semiconductor	2/ L2
5	Acceptance angle and numerical aperture of an optical fiber	2/ L2
6	Rigidity modulus using Torsional pendulum	2/L2
7	Fermi energy of a conductor	2/ L2
8	Dielectric constant of a dielectric material	2/ L3
9	Photo diode characteristics	2/ L3
10	Wavelength of LASER using diffraction grating	2/ L2

Course Outcomes: The students will be able to:

CO1	Apply the concepts of LASERs, optical fibers, and thermoelectricity in various applications.
CO2	Interpret the concepts of oscillations in acoustics and natural hazards.
CO3	Illustrate the steps involved in the synthesis & characterization of materials.

Textbooks:

1. Avadhanulu M N, Kshirasagar P G & Arun Murthy TVS, A text book of Engineering Physics, 11th edition, S Chand Ltd, New Delhi (2018).
2. Basavaraju S P, A detailed textbook of Engineering Physics, Subhas Publishers (2018).
3. Gaur & Gupta, Engineering Physics, Dhanpath Rai publications (2017)
4. Heat & Thermodynamics and Statistical Physics(XVIII-Edition) – Singhal, Agarwal & Satyaprakash – Pragati Prakashan, Meerut, 2006.
5. Heat and Thermodynamics (I-Edition) – D.S.Mathur - S. Chand & Company Ltd., New-Delhi, 1991
6. Heat and Thermodynamics, Brijlal & Subramanyam,S. Chand & Company Ltd., New-Delhi.

Reference books:

1. Arthur Beiser, Shobhit Mahajan, Rai Choudhury S, Concepts of Modern Physics (SIE) | 7th Edition Paperback Tata Mc Graw Hill Edu Pvt. Ltd, New Delhi (2017).
2. Pillai S O, Solid State Physics, Multicolour Ed, New Age International publishers (2020).
3. David Griffiths, Introduction to Electrodynamics, 4th Ed. Cambridge Univ. Press (2017).
4. Laud B B, Lasers & non-linear optics, 3rd Ed., New Age International publishers (2011).
5. Engineering Physics lab manual – Department of Physics, Global Academy of Technology
6. Building Science: Lighting and Acoustics, B. P. Singh and Devaraj Singh, Dhanpat Rai Publications (P) Ltd.,
7. Building Acoustics: Tor Eric Vigran, Taylor and Francis, 2008 Edition.
8. Shock waves made simple by Chintoo S Kumar, K Takayama and K P J Reddy: Willey India Pvt. Ltd, Delhi 2014
9. An Introduction to Disaster Management, Natural Disastr & Man-Made Hazards, S. Vaidyanathan, IKON Books
10. Natural Hazards, Edward Bryant, Cambridge University, Press, 2nd Edition
11. Natural Hazards by Ramesh.P. Singh, CRC Press, Taylor and Francis group.
12. Disaster Education and Management, Rajendra Kumar Bhandari, Springer, India 2014

Web links and Video Lectures (e-Resources):

Simple Harmonic motion: https://www.youtube.com/watch?v=k2FvSzWeVxQ

Shock waves: https://physics.info/shock/

Shock waves and its applications: https://www.youtube.com/watch?v=tz_3M3v3kxk

Stress- strain curves: https://web.mit.edu/course/3/3.11/www/modules/ss.pdf

Stress curves: https://www.youtube.com/watch?v=f08Y39UiC-o

Fracture in materials: https://www.youtube.com/watch?v=x47nky4MbK8

Thermoelecticity: https://www.youtube.com/watch?v=2w7NBuu5w9c

Thermoelectric generator and coolers: https://www.youtube.com/watch?v=NruYdb31xk8

Virtual lab: https://www.vlab.co.in/participating-institute-amrita-vishwa-vidyapeetham

Material characterization: https://onlinecourses.nptel.ac.in/noc20_mm14/preview

Earthquakes: www.asc-india.org

Earthquakes and Hazards: http://quake.usgs.gov/tsunami

Acoustics: https://www.youtube.com/watch?v=fHBPvMDFyO8

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4

SEMESTER – I/II

COURSE: Elements of Mechanical Engineering

Course Code	23MEE13/24	CIE Marks	50
Hours/Week (L: T: P)	3 : 0 : 0	SEE Marks	50
No. of Credits	3	Examination Hours	03

Overview: The course is intended to be delivered to the I/II semester engineering students of all branches as a basic course. It covers the fundamental concepts and principles of various topics under Mechanical domain involving manufacturing systems, engine systems and advanced manufacturing principles.

Course Objectives: This course enables the students to

CLO1	Learn the fundamental concepts of the manufacturing process
CLO2	Comprehend the basic concepts of Design and Power Transmission
CLO3	Understand the concepts of Internal Combustion engines, Boilers, Turbines and Refrigeration
CLO4	Understand the concepts of Automation and Robotics in Industry
CLO5	Enumerate the knowledge of Materials, Joining process and additive manufacturing

Content	No. of Hours/ RBT levels
Module 1 **Primary Manufacturing Processes:** Forging, rolling, drawing, extrusion, press tool work, plastic moulding and powder metallurgy (Introduction to the process and applications only) **Joining Processes**: Soldering, Brazing and Welding. Definitions. Working principle of Arc Welding, Oxy-Acetylene Welding. Comparison of the Soldering, Brazing and Welding processes **Introduction to additive manufacturing:** Definitions and stages involved in Additive Manufacturing. Applications of Additive Manufacturing. *Demonstration of Additive Manufacturing,* *Practice on metal arc welding (running bead)*	8 Hours L3
Module 2 **Secondary Manufacturing Processes: (Turning, Drilling and Milling)** Lathe – Construction and Specifications of a Centre Lathe, Operations on Lathe Machine - Turning, Facing, Knurling, Thread Cutting, Drilling Principle of a Drilling Process, Operations on Drilling Machine – Drilling, Boring, Counter boring, Countersinking, Reaming. Principle of a Milling Process, Operations on Milling Machine - Plane Milling, End Milling, Slot Milling, Angular Milling, Form Milling, Straddle Milling, and Gang Milling.	8 Hours L3

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Demonstration of handheld and power tools and operations on machine tools, which may include machining of simple turning models, Drilling and/or milling.	

Module 3	
Computer Numerical Control (CNC): Introduction, components of CNC, open-loop and closed-loop systems, advantages of CNC, CNC MachiningCentres and Turning Centres. **Robotics:** Robot anatomy, joints and links, common robot configurations. Applications of Robots in material handling, processing, assembly, and inspection. *Demonstration on CNC Machines,* *Preparation of simple model on robot configurations*	8 Hours L3

Module 4	
Introduction to automotive systems: Classification, I.C. Engines parts, Four-stroke Petrol and Four-stroke DieselEngines, Simple problems on Indicated power, Brake Power and Mechanical Efficiency, GreenFuels (Bio-diesel, CNG), Working principle of Electric and Hybrid vehicles. **Boilers:** Introduction to boilers, classification, Working principle of Water Tube and Fire Tube Boilers, (No sketch of any Boilers). Layout of Thermal Power Plant. **Turbines:** Classification of turbines, Hydraulic Turbines –Introduction, Principles and operation of Pelton Wheel Turbine, Francis Turbine and Kaplan Turbine. **Refrigeration:** Introduction & Definitions, Principle and working of Vapor Compression Refrigeration and Vapour Absorption Refrigeration. Types of Air Conditioners. *Demonstration and identification of Components in Automobile, Demonstration of hydraulic turbines & Demonstration of Components of the refrigerating unit.*	8 Hours L3

Module 5	
Introduction: Design Process: Definition of design, Phases of Design (Shigley Model) **Belt drives:** Open & Cross Belt Drives, Definitions -Slip, Creep, Velocity Ratio, the ratio of Tension in flat belt drives, advantages and disadvantages of V belts and Timing Belts, Simple numerical problems. (No derivations) **Gear drives** Types-Spur, Helical, Bevel, Worm Gears and Rack and Pinion. Velocity Ratio, Advantages and disadvantages over Belt Drives, Simple Numerical Problems on Velocity Ratio. *Demonstration on Belt drives, Demonstration of gears and gear drives*	8 Hours L3

Course Outcomes: Upon completion of this course, students will be able to

CO1	Demonstrate the process of primary manufacturing, joining and additive manufacturing.
CO2	Demonstrate the secondary manufacturing processes such as Turning, milling and drilling.
CO3	Illustrate with applications the working principle of CNC Machines and varied robot configurations.
CO4	Interpret the principles of utilizing water as effective source of power generation with added principles of I.C. Engines and refrigeration.
CO5	Illustrate on the principles and applications of the core concept of power transmission in mechanical elements.

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Textbooks:

1. Rao, P.N. "Manufacturing Technology", Metal Cutting and Machine Tools, Tata McGraw–Hill, New Delhi, Vol 1 and 2, 2019
2. Mikell P Groover, Automation, Production systems and computer-integrated manufacturing, Pearson learning, 4th Edition, 2018
3. K R Gopalkrishna, SudhirGopalakrishna, Dr.Girish H.N, Elements of Mechanical Engineering, Subhas publications, 2019 Edition.

References:

1. R K Rajput, Elements of Mechanical Engineering, Laxmi Publications Pvt Ltd, 2005
2. Pravin Kumar, Basic Mechanical Engineering, Pearson learning, 2013.
3. M. L. Sharma and R. P. Mathur, Internal Combustion Engines, Dhanpat Rai Publications, 2014
4. Dr.P.Radhakrishnan, CAD/CAM/CIM, 3rd edition, New Age International Publishers, New Delhi, 2008
5. V K Manglik, Elements of Mechanical Engineering, PHI Publications, 2013
6. Hajra Choudhry S K, Elements of Workshop Technology, Vol 1 and 2, 2009

CO/PO Mapping												
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1					3							
CO2	2				3		2					
CO3		3		2	2		2					
CO4	3	3		3			2					
CO5	3	2										
Average	3	3		3	3		2					

Low - 1: Medium - 2: High - 3

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Course: Introduction to C Programming (Integrated)

Course Code	23ESC14C	CIE Marks	50
Hours/Week (L: T: P)	3:0:2	SEE Marks	50
No. of Credits	4	Examination Hours	3

Prerequisites: NIL

Course Objectives:

CO1	Write algorithms, flowcharts and programs.
CO2	Implement different programming constructs and decomposition of problems into functions
CO3	Use and implement data structures like arrays and structures to obtain solutions.
CO4	Define and use of pointers with simple applications
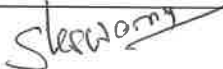
Content	No.of Hours/ RBT levels
Module 1 **INTRODUCTION TO C PROGRAMMING** **Introduction to Computing:** Introduction, Art of Programming through Algorithms and Flowcharts. Basic structure of C program, executing a C program. **Constants, Variable and Data Types:** Introduction, Character Set, C Tokens, Keywords and Identifiers, Constants, Variables, Data Types, Declaration of Variables, Assigning Values to Variables, Defining Symbolic Constants, **Managing I/O functions:** Formatted Input and Formatted Output functions. **Operators and Expressions:** Introduction, Arithmetic Operators, Relational Operators, Logical Operators, Assignment Operators, Increment and Decrement Operators, Conditional Operator, Bitwise Operators, Special Operators, Arithmetic Expressions, Evaluation of Expressions, Precedence of Arithmetic Operators, Type Conversions in Expressions, Operator Precedence and Associativity, Example Programs.	08 Hours L2
Module 2 **CONTROL STRUCTURES** **Decision Making and Branching:** Introduction, Decision Making with IF Statement, Simple IF Statement, the IF-ELSE Statement, Nesting of IF-ELSE Statements, The ELSE IF Ladder, The Switch statement, Example Programs.	08Hours L3

Decision Making and Looping: Introduction, The while Statement, The do statement, The for statement, Jumps in LOOPS, Example Programs.	
Module 3 **INTRODUCTION TO ARRAYS AND STRINGS** **Arrays**: One-dimensional Arrays, Declaration of One-dimensional Arrays, Initialization of One-dimensional Arrays, Example programs. Two-dimensional Arrays, Declaration of Two-dimensional Arrays, Initialization of Two-dimensional Arrays, Example programs. **Character Arrays and Strings**: Declaring and Initializing String Variables, Reading Strings from Terminal, Writing Strings to Screen, Arithmetic Operations on Characters, String-handling Functions, Example Programs.	08 Hours L3
Module 4 **FUNCTIONS AND INTRODUCTION TO POINTERS** **User-defined Functions**: Elements of User-defined Functions Return Values and their Types, Category of Functions, Recursion, Example Programs. **Pointers**: Introduction, Declaring Pointer Variables, Initialization of Pointer variables, accessing a Variable through its Pointer, Pointer Expressions, Pointer Increments and Scale Factor, Example Programs.	08 Hours L3
Module 5 **STRUCTURES AND FILE MANAGEMENT** **Structures**: Introduction, Defining a structure, declaring structure variables, accessing structure members, structure initialization, array of structures. **File Management in C**: Introduction, Defining and opening a file, closing a file, Input/output and Error Handling on Files.	08 Hours L3

Program List	

1	Write a C program to perform swapping of two numbers using
	   i) Repetitive subtraction technique
	   ii) Bitwise operators.

2	Write a C program to find the circumference and area of a circle. The input must be an integer value but the output must be rounded off to 3 decimal digits.

3	Write a C program:
	
	   i) To find roots of a Quadratic equation.
	   ii) Generate the Fibonacci sequence of first N numbers.

4	Write a C program to search for an element in an array using
	   i) Binary Search algorithm
	   ii) Linear Search algorithm

5	Write a C program to arrange the elements of an integer array using Bubble Sort algorithm.
6	Write a C program to input two matrices and perform matrix operations like multiplication, finding trace of a matrix, transpose of a matrix.(Any one operation may be asked in the examination).

7	Write a C program to check whether the given string is palindrome or not without using Library functions.
8	Write a C program to accept the number as a parameter through a user defined function and find its factorial by using recursion.
9	Write a C program to count the number of lines, words and characters in a given text file and write the output to a separate file.
10	Write a C program to maintain a record of n student details using an array of structures with four fields - Roll number, Name, Marks and Grade. Calculate the Grade according to the following conditions. Marks Grade >=80 A >=60 B >=50 C >=40 D.

COURSE OUTCOMES:

Upon completion of this course, student will be able to:

CO14.1/CO24.1	Describe the fundamentals of C programming Language.
CO14.2/CO24.2	Apply appropriate Control structures to solve problems.
CO14.3/CO24.3	Describe the concept of Arrays and Strings
CO14.4/CO24.4	Write User defined functions and apply concept of recursion and files to solve problems
CO14.5/CO24.5	Describe the concept of Pointers and Structures.

Textbooks:

1. E. Balaguruswamy, "Programming in ANSI C", 8th Edition, 2019, McGraw Hill Education, ISBN: 978-93-5316-513-0.

Reference books:

1. Pradip Dey, Manas Ghosh, "Programming in C", 2nd Edition, 2018, Oxford University Press, ISBN: 978-01-9949-147-6.
2. Kernighan B.W and Dennis M. Ritchie, "The C Programming Language", 2nd Edition, 2015, Pearson Education India, ISBN: 978-93-3254-944-9.
3. Yashavant P. Kanetkar, "Let Us C", 16th Edition, 2019, BPB Publications, ISBN: 978- 93- 8728-449- Jacqueline A Jones and Keith Harrow, "Problem Solving with C", Pearson Education. ISBN: 978-93-325-3800-9.
4. Jacqueline A Jones and Keith Harrow, "Problem Solving with C", Pearson Education. ISBN: 978-93-325-3800-9.
5. Dr. Guruprasad Nagraj, "C Programming for Problem Solving", Himalaya Publishing House. ISBN-978-93-5299-361-1.

MOOCs:

1. http://elearning.vtu.ac.in/econtent/courses/video/BS/14CPL16.html
2. https://nptel.ac.in/courses/106/105/106105171/

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Scheme of Examination:
Scheme of Evaluation: (Integrated courses)
Semester End Examination (SEE):

SEE Question paper is to be set for 100 marks and the marks scored will be **proportionately reduced to 50.** There will be two full questions (with a maximum of four sub questions) from each module carrying 20 marks each. Students are required to answer any **five full questions** choosing at least **one full question from each module.**

**The laboratory assessment would be restricted to only the CIE evaluation.**

Continuous Internal Evaluation (CIE):

Three Tests are to be conducted for 40 marks each. The average of the three tests are taken for computation of CIE on a scale of 30, the CIE would also include laboratory evaluation for 20 marks. The laboratory marks of 20 would comprise of 10 marks for regular laboratory assessment to include lab record and observation. 10 marks would be exclusive for laboratory internal assessment test to be conducted at the end of the semester.

Typical Evaluation pattern for integrated courses is shown in the Table below

Table: Distribution of weightage for CIE & SEE of Integrated courses

	Component	Marks	Total Marks
CIE	CIE Test-1	30	50
	CIE Test-2	30	
	CIE Test-3	30	
	Laboratory	20	
SEE	Semester End Examination	100	50
	Grand Total		100

CO/PO Mapping

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO14.1/CO24.1	3	3	2		3			3	3					
CO14.2/CO24.2	3	3	2		3			3	3					
CO14.3/CO24.3	3	3	2		3			3	3					
CO14.4/CO24.4	3	3	2		3			3	3					
CO14.5/CO24.5	3	3	2		3			3	3					
Average	3	3	2		3			3	3					

Low-1: Medium-2: High-3

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SEMESTER – I/II

COURSE: INTRODUCTION TO DRONES

Course Code	23ETC15D/25D	CIE Marks	50
Hours/Week (L: T: P)	3:0:0	SEE Marks	50
No. of Credits	3	Examination Hours	03

Course Objectives: To enable students to understand the drone and its functioning

CLO1	To Identify & select different types of drones, drone rules and regulations
CLO2	Select different drone parts and to understand aerodynamics
CLO3	Understand BLDC motors and different type of batteries
CLO4	Understand different sensors and Flight Control System

Content	No. of Hours/ RBT levels
Module 1 **Introduction:** Different types of Drones, Nomenclatures, History of aerial drones, reputation, airframe, Configurations, basic components, current/future uses of drones. DGCA regulations	**8 Hours** L1, L2
Module 2 **Air vehicle:** Understanding Aerial platforms. Types of drones. Introduction to aerodynamics, Newton's Laws of Motion, Bernoulli's Principle, four forces of Fight, three axes of Fight, how they apply to drone Flight.	**8 Hours** L1, L2
Module 3 **Propulsion system:** Introduction to different electric motors like DC, BLDC, servo motors, working, understanding its functioning, speed torque characteristics, degree of freedom in drone. Introduction Electronic Speed Controller. Performing payload calculation, speed control techniques, thrust to weight ratio.	**10 Hours** L1, L2,L3
Module 4 **Battery System:** Introduction of different types of batteries used in drone. Understand different specifications and their significance of batteries. Different charging circuits or batteries, battery management system (BMS) and Building Blocks of BMS.	**8 Hours** L1, L2
Module 5 **Sensors:** Introduction of different sensors used in drone like accelerometers, inertial measurement units, tilt and lidar sensor, gyro sensor. Principle of operation, their roles and characteristics. Selection of appropriate sensor as per requirement. Introduction to Flight controller system	**8 Hours** L1, L2

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COURSE OUTCOMES:

Upon completion of this course, student will be able to:

CO1	Identify different types of drones and drone rules and regulations
CO2	Explain the forces acting on Drone during flight
CO3	Comprehend the Drone propulsion
CO4	Outline the battery and systems used in Drone Industry
CO5	Describe different sensors and Flight Control System

Textbooks:

1. The Drone Rules, 2021. The Gazette of India: Extraordinary [Part II—Sec. 3(i)].
2. John Baichtal "Building Your Own Drones" A Beginner's Guide to Drones, UAVs, and ROVs Que Publishing, ISBN - 9780789755988
3. Julio Alberto Mendoza "Drones to Go" A Crash Course for Scientists and Makers, Apress ISBN-978-1-4842-6787-5

Reference books:

1. Paul Gerin Fahlstrom, Thomas James Gleason, Introduction to UAV Systems, Wiley Publication John Wiley & Sons, Ltd, 4th Edition 2012.
2. Landen Rosen, Unmanned Aerial Vehicle, Alpha Editions, N.Y., 2012
3. Valavanis, Kimon P, Unmanned Aerial Vehicles, Springer, 2011.
4. Valavanis, K., Vachtsevanos, George J, Unmanned Aerial Vehicles, Springer, 2015.

Scheme of Examination:

Semester End Examination (SEE):
SEE Question paper is to be set for 100 marks and the marks scored will be proportionately reduced to 50. There will be two full questions (with a maximum of four sub questions) from each module carrying 20 marks each. Students are required to answer any **five full questions** choosing at least **one full question from each module.**

Continuous Internal Evaluation (CIE):
Three Tests are to be conducted for 40 marks each. CIE is executed by way of quizzes / Alternate Assessment Tools (AATs) for 10 marks.
Typical Evaluation pattern for regular courses is shown in Table 1.

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Table 1: Distribution of weightage for CIE & SEE of Regular courses

	Component	Marks	Total Marks
CIE	CIE Test-1	40	50
	CIE Test-2		
	CIE Test-3		
	Quiz 1/AAT	10	
SEE	Semester End Examination	50	50
Grand Total			100

CO/PO Mapping

CO/PO Mapping														
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	1	-	-	-	-	1	1	1	-	-	1	1	-
CO2	2	1	-	-	-	-	-	-	1	-	-	1	1	-
CO3	2	2	-	-	-	-	1	-	1	-	-	1	1	-
CO4	2	1	-	-	-	-	1	-	1	-	-	1	1	-
CO5	2	1	-	-	-	-	1	-	1	-	-	1	1	-
Average	2	1					1	1	1			1	1	

Low-1: Medium-2: High-3

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COURSE: Introduction to Automation & Robotics

Course Code	23ETC15E/25E	CIE Marks	50
Hours/Week (L: T: P)	3 : 0 : 0	SEE Marks	50
No. of Credits	4	Examination Hours	03

Course Objectives: This course enables the students to

CLO1	Understand and identify the areas of automation & justify the need for automation
CLO2	Understand robot configuration, structures, basic components, workspace and generations of robots
CLO3	Understand about various types of sensory devices their working and applications.
CLO4	Understand the present &future applications of a robot.
CLO5	Understand the role of AI in robots and various knowledge representation techniques.

Content	No. of Hours/ RBT levels
Module 1 **Introduction to Automation:** Basic elements of production system, Types of Production Machines, classification of production system, Introduction to automation, history of automation, reasons for automation, disadvantages of automation, types of automation.	08 Hours / L3
Module 2 **Industrial Robotics:** Definition of Robotics, robot anatomy, joints and end effectors, Robotic configuration, Work volume, Robot motions, Robot drive system, Precision of movement: Spatial resolution, Accuracy and Repeatability. Degrees of freedom, Asimov's laws of robotics, Robot specifications, **Transformations:** 2D transformations, translation, rotation (Rotation about x, y, z axis) and scaling. Introduction to Direct and inverse kinematics. (only definition)	08 Hours / L3
Module 3 **Robot Actuators & Sensors** Robot actuators and Feedback components: Actuators: Pneumatic actuators, Hydraulic actuators: Single acting, Double acting cylinders, Rotary actuators (gear motors), Electric motors: Brush type & Brushless DC motor, A C motors, Stepper motors. Comparison of all the actuators. Sensors, Position sensors: Potentiometers, Resolvers and Encoders. Velocity sensors: Tactile sensors and Proximity sensors.	08 Hours / L3

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Module 4 **Industrial robot applications:** Material handling Applications: Material transfer, Machine loading and/or Unloading. Processing operations: Spot welding, Arc Welding, Spray coating, Drilling, Routing, Grinding, Wire brushing, Waterjet cutting, Laser cutting, Assembly and Inspection, Characteristics of Robot applications. **Different types of robots:** Industrial robots, Domestic or household robots, Medical robots, Military robots, Space robots, Hobby and competition robots. Various Generations of Robots.	08 Hours / L3
Module 5 **Robot technology of the future:** Robot Intelligence, Artificial Intelligence and Robotics, Knowledge representation in AI, Introduction to Machine Vision, Telepresence and related technologies, Mobility, Locomotion and Navigation: Wheeled Vehicles, Walking Machines, Universal hand, System integration and networking	08 Hours / L3

COURSE OUTCOMES: Upon completion of this course, student will be able to

CO15E.1	Interpret the importance of automation, its progression, pros and cons, forms of automation and applications.
CO15E.2	Demonstrate knowledge of industrial robots, their configurations, anatomy, and their specifications
CO15E.3	Describe working principle of various actuators and sensors
CO15E.4	Appreciate applications of robots in industry
CO15E.5	Explain robot intelligence that balance the information processing power of computational systems with the help of artificial intelligence and decision making.

Textbooks:

1. Automation, Production Systems and Computer-Integrated Manufacturing, Mikell P. Groover, 4th edition, Pearson, Mikell P Groover.
2. Industrial Robotics – Technology, Programming and Applications (SIE) – Nicholas Orday, Mithell Weiss, Mikell Groover, Roger Nagel, 2nd Edition, 2017
3. Introduction to robotics mechanics and control - John J. Craig, Pearson, 3rd edition, 2009

Reference books:

1. Robotics for Engineers - Yoram Koren, McGraw Hill International, 1st edition, 1985.
2. Industrial Robotics - Weiss, Nagel, McGraw Hill International, 2nd edition, 2012.
3. Robotic Engineering - An Integrated approach, Klafter, Chmielewski and Negin, PHI, 1st edition, 2009.
4. Computer Based Industrial Control - Krishna Kant, EEE-PHI, 2nd edition, 2010.
5. An Introduction to Automated Process Planning Systems- Tiess Chiu Chang & Richard A. Wysk.

E-Books / Web References

1. **Fundamentals of Robot Technology:** An Introduction to Industrial Robots, Tele operators and Robot Vehicles: https://www.pdfdrive.com/fundamentals-of-robot-technology-an-introduction-to-industrial-robots-teleoperators-and-robot-vehicles-d157678284.html

2. **Robot Operating System for Absolute Beginners**: Robotics Programming Made Easy: https://www.pdfdrive.com/robot-operating-system-for-absolute-beginners-robotics-programming-made-easy-e176394485.html
3. **Introduction to Robotics:**
   ➢ http://www.mech.sharif.ir/c/document_library/get_file?uuid=5a4bb247-1430-4e46-942c-d692dead831f&groupId=14040
   ➢ https://www.researchgate.net/publication/273697873_Introduction_to_Robotics

MOOCs

1. NPTEL Course: "ROBOTICS" : https://nptel.ac.in/courses/112105249
2. NPTEL Course: "Introduction to Robotics": https://onlinecourses.nptel.ac.in/noc20_de11/preview

Scheme of Examination: (Theory courses)

Semester End Examination (SEE): SEE Question paper is to be set for 100 marks and the marks scored will be proportionately reduced to 50. There will be two full questions (with a maximum of four sub questions) from each module carrying 20 marks each. Students are required to answer any **five full questions** choosing at least **one full question from each module.**

Continuous Internal Evaluation (CIE): Three Tests are to be conducted for 40 marks each. The average of the three tests are taken for computation of CIE on a scale of 40. CIE is executed by way of two quizzes / Other Assessment Tools (OATs), and three tests.

Some possible AATs: Assignments / Oral presentations / Group activity/Projects

Typical Evaluation pattern for regular courses is shown in Table 2.

Table 2: Distribution of weightage for CIE & SEE of Regular courses

	Component	Marks	Total Marks
CIE	CIE Test-1	40	50
	CIE Test-2	40	
	CIE Test-3	40	
	Quiz /AAT	10	
SEE	Semester End Examination	100	50
Grand Total			100

CO/PO Mapping															
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO15E.1	3	2	2	-	-	1	-	-	-	-	-	1	2	-	-
CO15E.2	3	2	2	-	-	1	-	-	-	-	-	1	2	-	-
CO15E.3	3	2	2	-	-	1	-	-	-	-	-	1	2	-	-
CO15E.4	3	2	2	-	-	1	-	-	-	-	-	1	2	-	-
CO15E.5	3	2	2	-	-	1	-	-	-	-	-	1	2	-	-
Average	3	2	2	-	-	1	-	-	-	-	-	1	2	-	-

Low - 1: Medium - 2: High - 3

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COURSE: COMMUNICATIVE ENGLISH

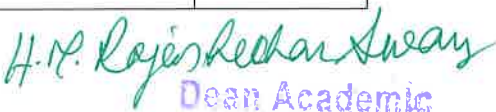| Course Code	23EGH16/26	CIE Marks	50
Hours/Week (L: T: P)	1:0:0	SEE Marks	50
No. of Credits	1	Examination Hours	3 hours

Course Objectives

To enable students to apply the knowledge of various forms of communication of English language in of engineering by making them to learn the following:

CLO1	Enhance the effective writing practices.
CLO2	Incorporate strong reading skills.
CLO3	Demonstrate efficient listening skills.
CLO4	Learn different styles of speaking.

Content	No. of Hours/RBT levels
Module 1- Writing Section Academic writing module: Responses to the academic writing module are short essays or general reports, addressed to an educated non-specialist audience. There are two compulsory tasks. Task 1 requires 150 words, and looking at a diagram, table, or data and to present the information in their own words. Task 2 requires at least 250 words, students to be presented with a point of view, argument, or problem and asked to provide general factual information, present a solution, justify an opinion, evaluate ideas and evidence, etc. It includes two tasks wherein the topics are of general interest and relatable for candidates applying for an undergraduate or postgraduate program. • For your first task, you will be handed a paper that would contain either a diagram, table, or graph. You will be required to recapitulate and define the given data in your own words. You may be asked to explain a certain data entry, process the given information, or a flowchart to logically arrive at a conclusion. • In the next task, you need to write an essay as a response to your deduction from the given data and support your argument with relevant examples, through the given data. Please note that the writing style should be strictly formal.	3/L3
Module 2- Reading Section This includes three long paragraphs which can be either descriptive, factual or analytical. These paragraphs are basically excerpts taken from newspapers, research works, journals, books, or even magazines.	3/L3
Module 3 - Listening Section	3/L3

The Listening module is divided into four sections. The first two conversations are concerned with social needs, while the last two are concerned with situations more closely related to education. **Sections 1 and 2 are about every day, social situations** • Recording 1: The first recording would have a conversation between two people set in an everyday social context. • Recording 2 – The second recording would happen to be a monologue set in an everyday social context. **Sections 3 and 4 are about educational and training situations** • Recording 3 – The following recording would be a conversation between four people set in an educational or training context. • Recording 4 – And the final recording would be a monologue on an academic subject	
Module 4 - Speaking Section The Speaking section is like a structured interview with an emphasis on general speaking skills. **Part 1 introduction and interview (4–5 minutes)** For the first five minutes, you will be asked some mundane questions about yourself such as family, home, studies, hobbies and interests, and so on. **Part 2 long turn (2–3 minutes)** Next, a flash card will be handed over that would contain a certain topic. You will be given a minute or two to familiarize yourself with the topic as you would need to speak on that topic for about two minutes. Post your speech **Part 3 discussions (5–6 minutes)** Deeper questions and abstract discussions would take place based on the given topic and your speech. You will get the opportunity to explore your given topic and delve into deeper issues.	3/L3

Course Outcomes

Upon completion of this course, student will be able to:

CO1	Write concisely using effective practices.
CO2	Read comprehension effectively and decipher required information.
CO3	Listen to audio from various settings and decode information.
CO4	Practically demonstrate good speaking skills.

Text books:
1. The Official Guide to IELTS: https://www.cambridge.org/us/cambridgeenglish/official-exam-preparation-materials/product/official-cambridge-guide-ielts.
2. Barron's IELTS: International English Language Testing System: https://www.worldcat.org/title/barrons-ielts-international-english-language-testing-system/oclc/1080598431?referer=di&ht=edition

References:

1. Check Your English Vocabulary for IELTS: https://www.bloomsbury.com/us/check-your-english-vocabulary-for-ielts-9781472947376/

2. McGraw-Hill Education 6 IELTS Practice Tests With Audio: https://www.mhprofessional.com/test-prep-study-guides/language/9780071845151-usa-mcgraw-hill-education-6-ielts-practice-tests-with-audio-group

CO/PO Mapping

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2				2		1		2		2
CO2	2	2				2		1		2		2
CO3	2	2				2		1		2		2
CO4	2	2				2		1		2		2
Average	2	2				2		1		2		2

Low-1: Medium-2: High-3

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Theory - 01 Credit Course

ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ - ಕನ್ನಡ ಬಲ್ಲ ಮತ್ತು ಕನ್ನಡ ಮಾತೃಭಾಷೆಯ ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ನಿಗದಿಪಡಿಸಿದ ಪಠ್ಯಕ್ರಮ

Course Title:	ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ		
Course Code:	**23KSK17/27**	CIE Marks	50
Course Type (Theory/Practical /Integrated		SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P: S)	1:0:0:0	Exam Hours	01 Theory
Total Hours of Pedagogy	15 hours	Credits	01

Course objectives : ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ ಪಠ್ಯ ಕಲಿಕೆಯ ಉದ್ದೇಶಗಳು:

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

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

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

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

1. ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡವನ್ನು ಬೋಧಿಸಲು ತರಗತಿಯಲ್ಲಿ ಶಿಕ್ಷಕರು ಪ್ರಸ್ತುತ ಪುಸ್ತಕ ಆಧಾರಿಸಿ ಬ್ಲಾಕ್ ಬೋರ್ಡ್ ವಿಧಾನವನ್ನು ಅನುಸರಿಸುವುದು. ಪ್ರಮುಖ ಅಂಶಗಳ ಚಾರ್ಟ್ ಗಳನ್ನು ತಯಾರಿಸಲು ವಿದ್ಯಾರ್ಥಿಗಳನ್ನು ಪ್ರೇರೇಪಿಸುವುದು ಮತ್ತು ತರಗತಿಯಲ್ಲಿ ಅವುಗಳನ್ನು ಚರ್ಚಿಸಲು ಅವಕಾಶ ಮಾಡಿಕೊಡುವುದು.
2. ಇತ್ತೀಚಿನ ತಂತ್ರಜ್ಞಾನದ ಅನುಕೂಲಗಳನ್ನು ಬಳಸಿಕೊಳ್ಳುವುದು - ಅಂದರೆ ಕವಿ-ಕಾವ್ಯ ಪರಿಚಯದಲ್ಲಿ ಕವಿಗಳ ಚಿತ್ರಣ ಮತ್ತು ಲೇಖನಗಳು ಮತ್ತು ಕಥೆ ಕಾವ್ಯಗಳ ಮೂಲ ಅಂಶಗಳಿಗೆ ಸಂಬಂಧಪಟ್ಟ ಧ್ವನಿ ಚಿತ್ರಗಳು, ಸಂಭಾಷಣೆಗಳು, ಈಗಾಗಲೇ ಇತರ ವಿಮರ್ಶಕರು ಬರೆದಿರುವ ವಿಮರ್ಶಾತ್ಮಕ ವಿಷಯಗಳನ್ನು ಟಿಪಿಟಿ, ಡಿಜಿಟಲ್ ಮಾಧ್ಯಮಗಳ ಮುಖಾಂತರ ವಿಶ್ಲೇಷಿಸುವುದು.
3. ನವೀನ ಮಾದರಿಯ ಸಾಹಿತ್ಯ ಬೋಧನೆಗೆ ಸಂಬಂಧಪಟ್ಟ ವಿಧಾನಗಳನ್ನು ಶಿಕ್ಷಕರು ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ಅನುಕೂಲವಾಗುವ ರೀತಿಯಲ್ಲಿ ಅಳವಡಿಸಿಕೊಳ್ಳಬಹುದು.

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

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

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

1. ವಚನಗಳು : ಬಸವಣ್ಣ, ಅಕ್ಕಮಹಾದೇವಿ, ಅಲ್ಲಮಪ್ರಭು, ಆಯ್ದಕ್ಕಿ ಮಾರಯ್ಯ, ಜೇಡರದಾಸಿಮಯ್ಯ, ಆಯ್ದಕ್ಕಿ ಲಕ್ಕಮ್ಮ.
2. ಕೀರ್ತನೆಗಳು: ಅದರಿಂದೇನು ಫಲ ಇದರಿಂದೇನು ಫಲ – ಪುರಂದರದಾಸರು ತಲ್ಲಣಿಸದಿರು ಕಂಡ್ಯ ತಾಳು ಮನವೇ - ಕನಕದಾಸರು
3. ತತ್ವಪದಗಳು : ಸಾವಿರ ಕೊಡಗಳ ಸುಟ್ಟು - ಶಿಶುನಾಳ ಶರೀಫ

ಘಟಕ -3 ಆಧುನಿಕ ಕಾವ್ಯಭಾಗ (03 hours of pedagogy)

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

ಘಟಕ - 4 ತಾಂತ್ರಿಕ ವ್ಯಕ್ತಿಗಳ ಪರಿಚಯ (03 hours of pedagogy)

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

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

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

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Course outcome (Course Skill Set)	
ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ (23KSK17/27 ಪಠ್ಯ ಕಲಿಕೆಯ ನಂತರ ವಿದ್ಯಾರ್ಥಿಗಳಲ್ಲಿ :	
At the end of the course the student will be able to:	
CO1	ಕನ್ನಡ ಭಾಷೆ, ಸಾಹಿತ್ಯ ಮತ್ತು ಕನ್ನಡದ ಸಂಸ್ಕೃತಿಯ ಕುರಿತು ಅರಿವು ಮೂಡಿರುತ್ತದೆ.
CO2	ಕನ್ನಡ ಸಾಹಿತ್ಯದ ಪ್ರಧಾನ ಭಾಗವಾದ ಆಧುನಿಕ ಪೂರ್ವ ಮತ್ತು ಆಧುನಿಕ ಕಾವ್ಯಗಳನ್ನು ಸಾಂಕೇತಿಕವಾಗಿ ಕಲಿತು ಹೆಚ್ಚಿನ ಓದಿಗೆ ಮತ್ತು ಜ್ಞಾನಕ್ಕೆ ಸ್ಫೂರ್ತಿ ಮೂಡುತ್ತದೆ.
CO3	ವಿದ್ಯಾರ್ಥಿಗಳಲ್ಲಿ ಸಾಹಿತ್ಯ ಮತ್ತು ಸಂಸ್ಕೃತಿಯ ಬಗ್ಗೆ ಅರಿವು ಹಾಗೂ ಆಸಕ್ತಿಯನ್ನು ಹೆಚ್ಚಾಗುತ್ತದೆ.
CO4	ತಾಂತ್ರಿಕ ವ್ಯಕ್ತಿಗಳ ಪರಿಚಯ ಹಾಗೂ ಅವರುಗಳ ಸಾಧಿಸಿದ ವಿಷಯಗಳನ್ನು ತಿಳಿದುಕೊಂಡು ನಾಡಿನ ಇನ್ನಿತರ ವ್ಯಕ್ತಿಗಳ ಬಗ್ಗೆ ತಿಳಿದುಕೊಳ್ಳಲು ಕೌತುಕತೆ ಹೆಚ್ಚಾಗುತ್ತದೆ.
CO5	ಸಾಂಸ್ಕೃತಿಕ, ಜನಪದ ಹಾಗೂ ಪ್ರವಾಸ ಕಥನಗಳ ಪರಿಚಯ ಮಾಡಿಕೊಡುವುದು.

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). The minimum passing mark for the SEE is 35% of the maximum marks (18 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation(CIE):

Two Unit Tests each of 30 Marks (duration 01 hour)

- First test after the completion of 30-40 % of the syllabus
- Second test after completion of 80-90% of the syllabus

One Improvement test before the closing of the academic term may be conducted if necessary. However best two tests out of three shall be taken into consideration

Two assignments each of 20 Marks

The teacher has to plan the assignments and get them completed by the students well before the closing of the term so that marks entry in the examination portal shall be done in time. Formative (Successive) Assessments include Assignments/Quizzes/Seminars/ Course projects/Field surveys/ Case studies/ Hands-on practice (experiments)/Group Discussions/ others. The Teachers shall choose the types of assignments depending on the requirement of the course and plan to attain the Cos and POs. (to have a less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course). CIE methods /test question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

The sum of two tests, two assignments, will be out of 100 marks and will be scaled down to 50 marks

Semester End Examinations (SEE)

SEE paper shall be set for **50 questions, each of the 01 mark.** The pattern of the **question paper is MCQ** (multiple choice questions). The time allotted for SEE is **01 hour.** The student must secure a minimum of 35% of the maximum marks for SEE.

University Prescribed Textbook :

ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ

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

ಪ್ರಕಟಣೆ : ಪ್ರಸಾರಾಂಗ,

ವಿಶ್ವೇಶ್ವರಯ್ಯ ತಾಂತ್ರಿಕ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಬೆಳಗಾವಿ.

ಸೂಚನೆ :

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

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

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

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2

Theory - 01 Credit Course   **23KBK17/27**

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

Course Title:	ಬಳಕೆ ಕನ್ನಡ		
Course Code:	23KBK17/27	CIE Marks	50
Course Type (Theory/Practical /Integrated	Theory	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P: S)	1:0:0:0	Exam Hours	01 Theory
Total Hours of Pedagogy	15 hours	Credits	01

Course objectives : ಬಳಕೆ ಕನ್ನಡ ಪಠ್ಯ ಕಲಿಕೆಯ ಉದ್ದೇಶಗಳು:

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

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

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

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

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

2. ಪ್ರಮುಖ ಅಂಶಗಳ ಚಾರ್ಟ್ ಗಳನ್ನು ತಯಾರಿಸಲು ವಿದ್ಯಾರ್ಥಿಗಳನ್ನು ಉತ್ತೇಜಿಸುವುದು ಮತ್ತು ತರಗತಿಯಲ್ಲಿ ಅವುಗಳನ್ನು ಚರ್ಚಿಸಲು ಅವಕಾಶ ಮಾಡಿಕೊಡುವುದು.

3. ಪ್ರತಿ ವಿದ್ಯಾರ್ಥಿ ಪುಸ್ತಕವನ್ನು ತರಗತಿಯಲ್ಲಿ ಬಳಸುವಂತೆ ನೋಡಿಕೊಳ್ಳುವುದು ಮತ್ತು ಪ್ರತಿ ಪಾಠ ಮತ್ತು ಪ್ರವಚನಗಳ ಮೂಲ ಅಂಶಗಳಿಗೆ ಸಂಬಂಧಪಟ್ಟಂತೆ ಪೂರಕ ಚಟುವಟಿಕೆಗಳಿಗೆ ತೊಡಗಿಸತಕ್ಕದ್ದು.

4. ಡಿಜಿಟಲ್ ತಂತ್ರಜ್ಞಾನದ ಮುಖಾಂತರ ಇತ್ತೀಚೆಗೆ ಡಿಜಿಟಲೀಕರಣ ಗೊಂಡಿರುವ ಭಾಷೆ ಕಲಿಕೆಯ ವಿಧಾನಗಳನ್ನು ಪಿಪಿಟಿ ಮತ್ತು ದೃಶ್ಯ ಮಾಧ್ಯಮದ ಮುಖಾಂತರ ಚರ್ಚಿಸಲು ಕ್ರಮಕೈಗೊಳ್ಳುವುದು. ಇದರಿಂದ ವಿದ್ಯಾರ್ಥಿಗಳನ್ನು ತರಗತಿಯಲ್ಲಿ ಹೆಚ್ಚು ಏಕಾಗ್ರತೆಯಿಂದ ಪಾಠ ಕೇಳಲು ಮತ್ತು ಅಧ್ಯಯನದಲ್ಲಿ ತೊಡಗಲು ಅನುಕೂಲವಾಗುತ್ತದೆ.

5. ಭಾಷಾಕಲಿಕೆಯ ಪ್ರಯೋಗಾಲಯದ ಮುಖಾಂತರ ಬಹುಬೇಗ ಕನ್ನಡ ಭಾಷೆಯನ್ನು ಕಲಿಯಲು ಅನುಕೂಲವಾಗುವಂತೆ ಕಾರ್ಯಚಟುವಟಿಕೆಗಳನ್ನು ಮತ್ತು ಕ್ರಿಯಾ ಯೋಜನೆಗಳನ್ನು ರೂಪಿಸುವುದು.

Module - 1   (03 hours of pedagogy)

1. Introduction, Necessity of learning a local language. Methods to learn the Kannada language.

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

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

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Module - 2	(03 hours of pedagogy)

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

Module - 3	(03 hours of pedagogy)

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

Module- 4	(03 hours of pedagogy)

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

Module - 5	(03 hours of pedagogy)

1. ಕಾಲ ಮತ್ತು ಸಮಯದ ಹಾಗೂ ಕ್ರಿಯಾಪದಗಳ ವಿವಿಧ ಪ್ರಕಾರಗಳು -Different types of Tense, Time and Verbs
2. ದ್, -ತ್, - ತು, - ಇತು, - ಆಗಿ, - ಅಲ್ಲ, - ಗ್, -ಕ್, ಇದೆ, ಕ್ರಿಯಾ ಪ್ರತ್ಯಯಗಳೊಂದಿಗೆ ಭೂತ, ಭವಿಷ್ಯತ್ ಮತ್ತು ವರ್ತಮಾನ ಕಾಲ ವಾಕ್ಯ ರಚನೆ - Formation of Past, Future and Present Tense Sentences with Verb Forms
3. **Kannada Vocabulary List** :ಸಂಭಾಷಣೆಯಲ್ಲಿ ದಿನೋಪಯೋಗಿ ಕನ್ನಡ ಪದಗಳು -**Kannada Words in Conversation**

Course outcome (Course Skill Set)
ಬಳಕೆ ಕನ್ನಡ ಪಠ್ಯ ಕಲಿಕೆಯಿಂದ ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ಆಗುವ ಅನುಕೂಲಗಳು ಮತ್ತು ಫಲಿತಾಂಶಗಳು:

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

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

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). The minimum passing mark for the SEE is 35% of the maximum marks (18 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than

26.10.2022

35% (18 Marks out of 50) in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation(CIE):
Two Unit Tests each of 30 Marks (duration 01 hour)
- First test after the completion of 30-40 % of the syllabus
- Second test after completion of 80-90% of the syllabus

One Improvement test before the closing of the academic term may be conducted if necessary. However best two tests out of three shall be taken into consideration

Two assignments each of 20 Marks
The teacher has to plan the assignments and get them completed by the students well before the closing of the term so that marks entry in the examination portal shall be done in time. Formative (Successive) Assessments include Assignments/Quizzes/Seminars/ Course projects/Field surveys/ Case studies/ Hands-on practice (experiments)/Group Discussions/ others.. The Teachers shall choose the types of assignments depending on the requirement of the course and plan to attain the Cos and POs. (to have a less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course). CIE methods /test question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.
The sum of two tests, two assignments, will be out of 100 marks and will be scaled down to 50 marks
Semester End Examinations (SEE)
SEE paper shall be set for **50 questions, each of the 01 mark.** The pattern of the **question paper is MCQ** (multiple choice questions). The time allotted for SEE is **01 hour.** The student must secure a minimum of 35% of the maximum marks for SEE.

University Prescribed Textbook :

ಬಳಕೆ ಕನ್ನಡ

ಡಾ. ಎಲ್. ತಿಮ್ಮೇಶ

ಪ್ರಕಟಣೆ : ಪ್ರಸಾರಾಂಗ,

ವಿಶ್ವೇಶ್ವರಯ್ಯ ತಾಂತ್ರಿಕ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಬೆಳಗಾವಿ.

ಸೂಚನೆ :

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

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

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning
- ✓ Contents related activities (Activity-based discussions)
- ✓ For active participation of students instruct the students to prepare Flowcharts and Handouts
- ✓ Organising Group wise discussions Connecting to placement activities
- ✓ Quizzes and Discussions,
- ✓ Seminars and assignments

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3

GLOBAL ACADEMY OF TECHNOLOGY
(Autonomous Institute Affiliated to VTU)
DEPARTMENT OF CHEMISTRY
APPLIED CHEMISTRY FOR ME STREAM (INTEGRATED) FOR I/II SEM
(Effective from the academic year: 2023-24)

Course Code	23CHE12C/22C	CIE Marks	50
Hours/Week (L: T: P)	3:0:2	SEE Marks	50
No of Credits	04	Examination Hours	03

Course Learning Objectives: The course will enable the students to

CLO1	Know the fundamental concepts of Chemistry which are very much **essential in** day-to-day life, in industries and in research and development **to solve Engineering related challenges.**
CLO2	Impart **Practical skills** for better understanding of theoretical concepts.

Content	No. of Hours/ RBT levels
Module-1: Electrochemical Energy conversions and Energy devices **Electrochemistry:** Introduction, Electrode potential, EMF, expression of Nernst equation, numerical problems on Electrode potential. Classification of cells - primary, secondary and concentration cells. Reference Electrodes – Calomel electrode, Ion selective electrodes-Glass electrode. Application of glass electrode in P^H determination. Numerical problems on concentration Cells. **Energy Devices:** Basic concepts, classification, Battery operation, and characteristics of battery(Voltage, Capacity & Shelf life). Construction, working and applications of Lithium-ion batteries. Battery Recycling process.	08 Hours/ L2
Pedagogy: Chalk and talk method, power point presentation, Videos. Display of electrodes model in class.	
Self study: Construction & working of Zinc Air battery	
Module-2: Corrosion and Polymer Chemistry **Corrosion:** Introduction, Electrochemical theory of corrosion. Types of corrosion-Differential metal corrosion (Galvanic corrosion), differential aeration corrosion (Pitting and water line corrosion) and stress corrosion, Corrosion control: Metal coating–Galvanization and Tinning, Inorganic coating –Anodization, Corrosion inhibitors, Cathodic Protection-sacrificial anode method and impressed current method.	08 Hours/ L2

Polymer Chemistry: Introduction, polymerization – addition and condensation polymerisation. Synthesis, properties, and applications of PMMA and Polyurethane. Polymer composites -Kevlar Fibre and carbon fibre-Synthesis & applications. Conducting Polymers: Mechanism of conduction in conducting poly aniline. Applications of polymer nanocomposites in injection moulded products, paints and 3D printing.	
Pedagogy: Chalk and talk method, power point presentation.	
Sefl study: Galvanic series & Concept of biosensors	08 Hours/ L2,L3
Module 3: Structural Materials and Environmental Chemistry	
Structural Materials: Metals and Alloys: Introduction, Properties and application of Iron and its alloys, Aluminium, and its alloys, Copper, and its alloys.	
Refractories and Cement: Introduction, classification, properties, Manufacturing, and application of refractory materials. Manufacturing of Portland cement and its applications.	
Glass: Introduction, Composition, Types, Preparation of Soda-lime glass, properties, and applications of glass.	
Lubricants: Introduction, Classifications, Properties- Viscosity index, Flash point, Drop point test and industrial applications of lubricants.	
Environmental Chemistry: Air Pollutants: Sources, effects and control of Primary air pollutants-Carbon monoxide, Oxides of nitrogen and Sulphur. Waste Management: e-waste & Biomedical waste (scientific land filling, composting, and recycling). Recycling of water and Rainwater harvesting.	
Pedagogy: Chalk and talk method, power point presentation. Seminar by students on topic Environmental Chemistry.	
Self study: Composition, properties & industrial applications of Alnico,g un metal & bell metal.	08 Hours/ L2, L3
Module 4: Chemical Energy Sources and Alternative Energy sources	
Chemical Energy Sources: Fuels - Introduction, Classification, Calorific value-GCV & NCV, Determination of Calorific value by Bomb Calorimeter, Numerical problems. Petroleum cracking-Fluidized bed cracking. Knocking- Mechanism of knocking in IC- engine, Octane number and cetane number.	
Alternative Energy sources: Biodiesel -Production & applications of Biodiesel, Power alcohol-importance of ethanol blended gasoline, Hydrogen as a fuel - advantages, production, and storage, CNG, Biogas, Solar cells (PV cell): construction working, and applications of Si based PV cell.	
Pedagogy: Chalk and talk method, power point presentation. Display of bomb calorimeter model in class	
Self study: Preparation & utilization of methanol blended diesel in automobile industry.	

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Module 5: Analytical Techniques, Nanomaterials and Water technology	08 Hours/
Analytical Techniques: Potentiometric sensors: Theory, Principle, instrumentation, working and their application in the estimation of iron. Conductometric sensors: Theory, Principle, instrumentation, working and its application (weak acid v/s strong base). Colorimeter: Theory, Principle, instrumentation, working and its application in the estimation of Cu ions. **Nanomaterials:** Introduction (Definition of Nanomaterials), and size dependant properties of nanomaterials (surface area and catalytic). synthesis of ZnO nano material by solution combustion method & synthesis of TiO_2 nano material by sol gel method. Introduction, properties and applications of graphene, carbon nanotubes, and fullerenes. **Water technology:** Introduction,, hardness of water (Definition), Determination of total hardness by EDTA method. Softening of water by ion exchange method, Desalination (definition), Reverse osmosis (Definition, Process, Diagram, and explanation). Chemical oxygen Demand – definition, Determination of COD, numerical problems.	L2, L3
Pedagogy: Chalk and talk method, power point presentation. Conduction of live experiments in laboratory.	
Self study:Concept of Polymer nano composites & ceramic metal composites-	

PRACTICAL MODULE

SL. No.	Experiments	No. of Hours/ RBT levels
	Part- A: Instrumental Experiments	
1	Determination of pKa of vinegar using pH sensor (Membrane electrode - Glass electrode)	2/L3
2	Estimation of FAS in the given solution potentiometrically	2/L3
3	Determination of amount HCl present in the given sample by conductometry.	2/L3
4	Estimation of Copper in the effluent from Electroplating industry by colorimetric method.	2/L3
	Part-B: Volumetric Experiments	
1	Determination of Chemical oxygen demand of industrial waste water.	2/L3
2	Determination of percentage of copper in brass by Iodometric method.	2/L3
3	Determination of Total hardness of given water sample by rapid EDTA method.	2/L3
4	Determination of percentage of Calcium Oxide in Cement solution.	2/L3

SL. No.	Experiments	No. of Hours/ RBT levels
	Part-C: Demonstration (any Three) - Offline/ Virtual	
1	Determination of Viscosity coefficient of a liquid using viscometer.	2/L3
2	Determination of calorific value of solid fuel using bomb calorimeter	2/L3
3	Synthesis of Biodiesel	2/L3
4	Synthesis of ZnO Nanomaterial by Sol-Gel/Solution combustion method	2/L3
5	Determination of pH of the given Soil Sample.	2/L3

Course Outcomes: Upon successful completion of this course, student will be able to:

CO1	**Understand** the concept of electrochemical energy systems, Corrosion and applications of Polymers in engineering filed.
CO2	**Investigate** chemical properties of materials and conventional & non-conventional energy systems for environmental issues.
CO3	**Analyze** the knowledge of sensors, Nano materials & concept of water for various technological applications.
CO4	**Apply** the knowledge of chemistry to investigate engineering materials by volumetric and instrumental methods

<u>**Textbooks:**</u>

1. Wiley Engineering Chemistry, Wiley India Pvt. Ltd. New Delhi,2013-2nd Edition.

2. Engineering Chemistry, Satya Prakash &Manisha Agrawal, Khanna Book Publishing, Delhi

3.A Textbook of Eng. Chemistry, Shashi Chawla, Dhanpat Rai &Co.(P)Ltd.

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

5. Applied Chemistry, Sunita Rattan, Kataria 5. Engineering Chemistry, Baskar, Wiley

6. Engineering Chemistry-I,D. Grour Krishana, Vikas Publishing

7.A Textbook of Engineering Chemistry, SS Dara & Dr. SS Umare, S Chand &Company Ltd., 12th Edition, 2011.

8.A Textbook of Engineering Chemistry, R.V. Gadag and Nityananda Shetty, I.K. International Publishing house. 2nd Edition,2016.

9.Text Book of Polymer Science, F.W.Billmeyer, John Wiley & Sons, 4th Edition,1999.

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10.Nanotechnology A Chemical Approach to Nanomaterials, G.A.Ozin & A.C.Arsenault,RSC Publishing,2 005.

11.Corrosion Engineering, M.G. Fontana,N.D. Greene, McGraw Hill Publications, NewYork,3rd Edition, 1996.

12. Linden's Handbook of Batteries, Kirby W. Beard, Fifth Edition, McGrawHill,2019.

13. OLED Display Fundamentals and Applications, Takatoshi Tsujimura, Wiley–Blackwell,2012
14. Supercapacitors: Materials, Systems, and Applications, MaxLu, Francois Beguin, Elzbieta Frackowiak, Wiley-VCH;1st edition,2013.

15."Handbook on Electroplating with Manufacture of Electrochemicals", ASIAPACIFICBUSINESSPRE SS Inc., 2017.

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

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

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

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

20.Polymer Science, VR Gowariker, NV Viswanathan, Jayadev, Sreedhar, NewageInt.Publishers,4th

Edition, 2021

22. Engineering Chemistry, PC Jain & Monica Jain, Dhanpat Rai Publication,2015-16th Edition.

23. Nanostructured materials and nanotechnology, Hari Singh, Nalwa, academic press, 1st Edition,2002.

24. Nanotechnology Principles and Practices, SulabhaK Kulkarni, Capital Publishing Company,3rd

Edition 2014.

25. Principles of nanotechnology, Phanikumar, Sci tech publications, 2nd Edition,2010.

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

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

28. Chemistry of Engineering materials, MaliniS, KS Anantha Raju, CBS publishers Pvt Ltd., 29. Laboratory Manual Engg. Chemistry, Anupma Rajput, Dhanpat Ra I &Co.

Reference books:

1. F.W. Billmeyer, Text Book of Polymer Science, John Wiley & Sons, 4th Edition, 1999.

2. M.G. Fontana, N.D. Greene, Corrosion Engineering, McGraw Hill Publications, New York, 3rd Edition, 1996.

3. Principles of Physical Chemistry, B.R. Puri, L.R. Sharma & M.S. Pathania, S. Nagin Chand & Co., 41 Edition, 2004.

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

5. Bansal R.K., A Text Book of Engineering Mechanics, Laxmi Publications; 6th edition, 2015.

6. G.H Jeffery, J Bassett, J Mendham and R.C. Denney Vogel's A.I. A text book of quantitative analysis, Dorling Kindersley (India) Pvt., Ltd. 35th edition, 2012.

7. Gary D Christian, Analytical Chemistry, Wiley India, 6th edition, 2015.

8. T. Pradeep, A Textbook of Nanoscience and Nanotechnology, McGraw Hill Education (India) Pvt., Ltd., 1st edition, 2015.

Weblinks and Video Lectures (e-Resources):

- http://libgen.rs/
- https://nptel.ac.in/downloads/122101001/
- https://nptel.ac.in/courses/104/103/104103019/
- https://ndl.iitkgp.ac.in/
- https://www.youtube.com/watch?v=faESCxAWR9k
- https://www.youtube.com/watch?v=j5HmI6KN4TI
- https://www.youtube.com/watch?v=X9GHBdyYcyo
- https://www.youtube.com/watch?v=1xWBPZnEJk8
- https://www.youtube.com/watch?v=wRAo-M8xBHM

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COURSE: Engineering Mechanics

Course Code	23ESC14D/24D	CIE Marks	50
Hours/Week (L: T: P)	3 : 0 : 0	SEE Marks	50
No. of Credits	4	Examination Hours	03

Overview: The course is designed for I/II semester engineering students of all branches. It covers fundamental concepts and principles of Engineering Mechanics, application of these basics principles to solve static equilibrium problems related to Mechanical, Civil, Automobile, Aeronautical, Mechatronics, Robotics, and other allied Engineering branches where analysis for forces and displacement of particles or rigid bodies is involved. It also introduces the real-life problems involving forces and computer applications to solve Engineering Mechanics problems. Knowledge of basic mathematics and physics is essential for the course.

Course Objectives: This course enables the students to

CLO1	Understand the scalar presentation of forces and moments, apply the principles of engineering mechanics to particles and rigid bodies in equilibrium subjected to coplanar system of forces.
CLO2	Realize the mechanical and sectional properties of engineering materials.
CLO3	Analyze the forces in the members of trusses.

Content	No. of Hours/ RBT levels
Module 1: Statics of particles **Introduction to Engineering Mechanics:** Basic idealization and principles in Engineering Mechanics. Newton's laws of motion, units and dimensions, scalar, and vectors. Force and Systems of Forces, Moment of a force and couple, Varignon's theorem, Resolution, and composition of forces – Coplanar concurrent and non-concurrent force system.	08 Hours / L3
Module 2: Equilibrium of Rigid bodies **Equilibrium of Forces:** Free body diagrams, Vector representation of forces., Lami's theorem, equations of equilibrium for coplanar concurrent and non-concurrent force systems, Resultant and equilibrium of forces, Support reactions for statically determinate beams at different loading conditions. *Exercise: Demonstration of physical models*	08 Hours / L3
Module 3: Centroid and Moment of Inertia **Centroid and Moment of Inertia:** of planar and built-up sections and simple problems.	08 Hours / L3

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Work and Energy: Work done by force. Kinetic and potential energy. Conservation of energy. **Impulse and Momentum**: Impulse and momentum, Conservation of momentum, Applications in collisions and impact.	
Module 4: Friction **Friction:** Introduction, Frictional force, Types of friction-Static friction and Dynamic friction, Limiting friction, Laws of friction – Laws of Static friction and Laws of Dynamic friction, Angle of friction, Angle of Repose, Ladder friction. Problems on Static friction –Inclined plane and ladder friction.	08 Hours / L3
Module 5: Analysis of trusses **Trusses:** Types of trusses, Assumptions in analysis, Analysis of determinate trusses by method of joints. **Simple Machines:** Introduction to Simple machines (levers, pulleys, inclined planes). Mechanical advantage and efficiency. *Exercise: Demonstration of principles with real life examples.*	08 Hours / L3

COURSE OUTCOMES: Upon completion of this course, student will be able to

CO1	Categorize the system of forces and analyze for resultant of forces acting on structural elements.
CO2	Write the equations of equilibrium and analyze the determinate structure for forces and moments.
CO3	Evaluate centroid and moment of inertia of plane and composite sections and discuss work and energy principles.
CO4	Apply equations of equilibrium in analyzing frictional forces.
CO5	Determine the forces in the members of trusses by method of joints and understand mechanical advantage of simple machines.

Textbooks:
1. Kumar, K. L., Kumar, V. Engineering Mechanics, Tata McGraw Hill, 4th edition, 2017
2. Bansal R. K., Rakesh Ranjan Beohar and Ahmad Ali Khan, Basic Civil Engineering and Engineering Mechanics, 2015, Laxmi Publications.
3. Kolhapure B K, Elements of Civil Engineering and Engineering Mechanics, 2014, EBPB

Reference books:
1. S. Rajasekharan, G. Sankarsubramanian, "Engineering Mechanics- Statics and Dynamics" - Vikas Publishing House, 2011
2. F. P. Beer and E. R. Johnston et.al., Vector Mechanics for Engineers - Statics and Dynamics, McGraw-Hill; 12th edition, 2019
3. R. C. Hibbler, Engineering Mechanics: Statics and Dynamics, Pearson Education; 14th edition, 2017
4. S. Timoshenko, D.H. Young, J.V. Rao, Sukumar Patil, Engineering Mechanics (In SI Units), McGraw Hill Education; 5th edition, 2017.

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E-Books / Web References

1. https://nptel.ac.in/courses/112106286

Scheme of Examination: (Theory courses)

Semester End Examination (SEE):

SEE Question paper is to be set for 100 marks and the marks scored will be proportionately reduced to 50. There will be two full questions (with a maximum of four sub questions) from each module carrying 20 marks each. Students are required to answer any **five full questions** choosing at least **one full question from each module.**

Continuous Internal Evaluation (CIE): Three Tests are to be conducted for 40 marks each. The average of the three tests are taken for computation of CIE on a scale of 40. CIE is executed by way of two quizzes / Other Assessment Tools (OATs), and three tests.

Some possible AATs: Assignments / Oral presentations / Group activity/Projects

Typical Evaluation pattern for regular courses is shown in Table 2.

Table 2: Distribution of weightage for CIE & SEE of Regular courses

	Component	Marks	Total Marks
CIE	CIE Test-1	40	50
	CIE Test-2	40	
	CIE Test-3	40	
	Quiz /AAT	10	
SEE	Semester End Examination	100	50
Grand Total			100

CO/PO Mapping												
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	-	-	-	-	-	-	-	-	-	1
CO2	2	2	-	-	-	-	-	-	-	-	-	1
CO3	3	2	1	-	-	-	-	-	-	-	-	1
CO4	2	2	1	-	-	-	-	-	-	-	-	1
CO5	2	2	1	-	-	-	-	-	-	-	-	1
Average	3	2	1	-	-	-	-	-	-	-	-	1

Low - 1: Medium - 2: High - 3

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SEMESTER – I/II

COURSE: COMPUTER AIDED ENGINEERING DRAWING

Course Code	23MEG15/25	CIE Marks	50
Hours/Week (L: T: P)	2 : 0 : 2	SEE Marks	50
No. of Credits	3	Examination Hours	03

Overview: The course is designed for the I/II Semester Engineering students of all branches. It covers fundamental concepts and principles of engineering drawing with the emphasis on use of drafting software. Engineering drawing is a graphical medium of expression of technical details without the barrier of a language and termed as universal language of engineers. Engineering drawings are important in conveying useful information to other engineers with standardized conventions, rules, and regulations. The end goal of an engineering drawing is to convey all the required technical information that will allow a manufacturer to produce any kind of component in all the fields of engineering.

Course Objectives: At the end of the course, the student should be able to

CLO1	Understand the concept of BIS conventions in Engineering drawing.
CLO2	Apply the theoretical concepts to sketch orthographic projections in different positions.
CLO3	Understand the concepts of isometric projections of combination of solids.
CLO4	Use CAD tools for creation of Engineering drawings.

CONTENT	No. of Hours/ RBT levels
Module 1: Introduction to Engineering Drawing & Orthographic Projections of points and lines BIS conventions and standards. Introduction to drafting software, Planes of projection, reference line, Quadrants and conventions employed. **Projections of points** in all the four quadrants. **Projections of straight lines (First angle projection only):** Introduction, Line inclined to both the planes, true and apparent lengths, true and apparent inclinations to reference planes. *Application problems as demonstration only.*	10 Hours L3
Module 2: Projections of plane surfaces (First angle projection only): Introduction, Projections of regular plane surfaces–triangle, square, rectangle, pentagon, hexagon and circle - inclined to both the planes (change of position method only).	09 Hours L3

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Module 3: Projections of Solids	
Introduction, Type of solids, Projections of right regular prisms like square, hexahedron(cube), pentagon, hexagon and pyramids like square, pentagon, hexagon, cone & tetrahedron in different positions (Inclined to both HP and VP).	**12 Hours** **L3**
Module 4: Isometric Projection (using isometric scale only)	
Introduction, Isometric scale, Isometric projection of combinations of solids (Maximum of two solids) like cube, regular prisms, cylinders, pyramids, cone, tetrahedron, frustum of pyramids, cone & sphere. *Demonstration of 3D solid models of prisms and pyramids using modelling software.*	**09 Hours** **L3**

*Problems from the above modules must be practiced on computer aided drafting software.

COURSE OUTCOMES: The students will be able to

CO1:	Demonstrate competence in the basics of orthographic projections of points, lines and planes.
CO2:	Sketch the orthographic projections of solids inclined to both horizontal & vertical planes.
CO3:	Generate isometric projections of various combinations of solids.
CO4:	Demonstrate 2D drafting of lines, planes & solids using solid edge software.

Textbooks:

1. K.R. Gopala Krishna, Sudhir Gopalakrishna, Engineering Graphics, Subhas Publishers, Bangalore, 40th edition, 2018-19.
2. N.D. Bhatt, Engineering Drawing, Charotar Publishing House, Gujarat, 53rd edition, 2014

References:

1. Luzadder Warren J., Duff John M., Fundamentals of Engineering Drawing with an Introduction to Interactive Computer Graphics for Design and Production, Pearson India, 2015.
2. P. L. Varghese, Engineering Graphics McGraw Hill Education (India) Pvt. Ltd, and New Delhi, 2013.
3. N.S. Parthasarathy & Vela Murali, Engineering Drawing, Oxford University Press, 2015.

ASSESSMENT: CIE Assessment:

Particulars	Marks
Test 1 (Module 1 and Module 2) - @ 8 week	30
Test 2 (Module 3 and 4) - @ 14 weeks	30
Average of Test 1 & Test 2	30
Periodic Evaluation of Sketch Book	20
Total Marks	50

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SEE Assessment:

Maximum of **THREE QUESTIONS** will be set for **SEE** as per the pattern given below:

Scheme of Evaluation:

Modules	Marks Allocated
Module 1 & 2: Projection of Points, Lines **Or** Projection of Planes	30
Module 3: Answer any **ONE** question out of **TWO** Questions from Projection of solids	40
Module 4: Answer any **ONE** question out of **TWO** Questions from Isometric Projections	30
Total Marks	100

Question No.	Solutions and sketching in the sketch book	Computer Printout	Total Marks
1	15	15	30
2	20	20	40
3	15	15	30
Total Marks	**50**	**50**	**100**

Note: Students have to submit the computer printouts and the hand drawn sketches at the end of the examination for evaluation.

CO/PO Mapping												
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	-	-	2	-	-	-	-	1	-	-
CO2	3	-	-	-	2	-	-	-	-	1	-	-
CO3	3	-	-	-	2	-	-	-	-	1	-	-
CO4	3	-	-	-	2	-	-	-	-	1	-	-

Low - 1: Medium - 2: High - 3

Semester I / II
Innovation & Design thinking

Course Code	23IDT16/26	CIE Marks	50
Hours/Week (L: T: P)	1:0:0	SEE Marks	50
No. of Credits	1	Examination Hours	1 hour

Course Objectives

CLO1	To explain the concept of customer-oriented innovation approach
CLO2	To generate and develop creative ideas
CLO3	To understand various approaches and methods onto business process

Content	No. of Hours/RBT levels
Module - 1 **Design Thinking** Introduction, Principles of Design Thinking, process of Design Thinking, problem space and solution space. Understand the problem statement: PESTEL Analysis, Trend Impact Analysis, Delphi method, Ishikawa diagram, Root conflict analysis, Field maps. Empathetic design: Nine dimensions of descriptive observations, methods for Empathetic design - Artifact Analysis, Cognitive Walkthrough, Empathy map, Heuristic Evaluation, Customer Journey, Mystery Shopping, Behavioural Mapping & Tracking	6 / L3
Module -2 Defining the problem – Persona, jobs- to-be-done methods Ideate phase, stages, Internal and external sources of information, Creative principles, Intuitive Creative Techniques, Systematic Analytical Techniques, Evaluation of Ideas. Prototype phase, Minimum viable product, Methods to analyse prototypes. Testing Phase, methods of testing, conducting interviews, Conduct surveys, Kano model, desirability testing.	6 / L3

Course Outcomes
Upon completion of this course, student will be able to:

CO 1	Describe design thinking process used to solve problems by focusing on the needs of the customer.
CO 2	Analyse the problem to ascertain its context and origins and gain a better understanding of the prospective customers
CO 3	Analyse the data gathered during understand and observation stages to define the problem statement
CO 4	Create ideas and solutions for the problem that has been specified
CO 5	Create a prototype by validating assumptions and ideas that can be tested by the user.

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Textbooks:

1. Handbook of Design Thinking: Tips & Tools for how to design thinking by Christian Mueller-Roterberg, Kindle Direct Publishing
2. John.R.Karsnitz, Stephen O'Brien and John P. Hutchinson, "Engineering Design", Cengage learning (International edition) Second Edition, 2013.
3. Roger Martin, "The Design of Business: Why Design Thinking is the Next Competitive Advantage", Harvard Business Press, 2009.

References:
1. Yousef Haik and Tamer M.Shahin, "Engineering Design Process", Cengage Learning, Second Edition, 2011.

Web links and Video Lectures (e-Resources)
1. www.tutor2u.net/business/presentations/./productlifecycle/default.html
2. https://docs.oracle.com/cd/E11108_02/otn/pdf/. /E11087_01.pdf
3. https://www.mindtools.com/brainstm.html
4. https://designthinkingforeducators.com/design-thinking/

CO – PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	2	-	-	-	-	-	-	-	-	-	-	2
CO 2	2	2	2	-	-	-	-	-	-	-	-	2
CO 3	2	2	2	-	-	-	-	-	-	-	-	2
CO 4	2	2	2	-	-	-	-	-	-	-	-	2
CO 5	2	2	2	-	-	-	-	-	-	-	-	2
Average	**2**	**2**	**2**	-	-	-	-	-	-	-	-	**2**

Low-1: Medium-2: High-3

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Theory - 01 Credit Course

Indian Constitution

Course Title:		Indian Constitution		
Course Code:		**23CIP17/27**	CIE Marks	50
Course Type (Theory/Practical /Integrated)			SEE Marks	50
			Total Marks	100
Teaching Hours/Week (L:T:P: S)		1:0:0:0	Exam Hours	01 Theory
Total Hours of Pedagogy		15 hours	Credits	01

Course objectives :

The course **INDIAN CONSTITUTION (23CIP17/27 ')** will enable the students,

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

Teaching-Learning Process

These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes and make Teaching –Learning more effective: Teachers shall adopt suitable pedagogy for effective teaching - learning process. The pedagogy shall involve the combination of different methodologies which suit modern technological tools.

(i)   Direct instructional method (Low/Old Technology), (ii) Flipped classrooms (High/advanced Technological tools), (iii) Blended learning (Combination of both), (iv) Enquiry and evaluation based learning, (v) Personalized learning, (vi) Problems based learning through discussion.

(ii) Apart from conventional lecture methods, various types of innovative teaching techniques through videos, animation films may be adapted so that the delivered lesson can progress the students In theoretical applied and practical skills.

Module-1	(03 hours of pedagogy)

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

Module-2	(03 hours of pedagogy)

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

Module-3	(03 hours of pedagogy)

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

Module-4	(03 hours of pedagogy)

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

Module-5	(03 hours of pedagogy)

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

Course outcome (Course Skill Set)

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

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

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Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). The minimum passing mark for the SEE is 35% of the maximum marks (18 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation(CIE):

Two Unit Tests each of 30 Marks (duration 01 hour)

- First test after the completion of 30-40 % of the syllabus
- Second test after completion of 80-90% of the syllabus

One Improvement test before the closing of the academic term may be conducted if necessary. However best two tests out of three shall be taken into consideration

Two assignments each of 20 Marks

The teacher has to plan the assignments and get them completed by the students well before the closing of the term so that marks entry in the examination portal shall be done in time. Formative (Successive) Assessments include Assignments/Quizzes/Seminars/ Course projects/Field surveys/ Case studies/ Hands-on practice (experiments)/Group Discussions/ others..   The Teachers shall choose the types of assignments depending on the requirement of the course and plan to attain the Cos and POs. (to have a less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course). CIE methods /test question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

The sum of two tests, two assignments, will be out of 100 marks and will be scaled down to 50 marks

Semester End Examinations (SEE)

SEE paper shall be set for **50 questions, each of the 01 mark**. The pattern of the **question paper is MCQ** (multiple choice questions). The time allotted for SEE is **01 hour**. The student must secure a minimum of 35% of the maximum marks for SEE.

Suggested Learning Resources:
Textbook:

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

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

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning
- ✓ Contents related activities (Activity-based discussions)
- ✓ For active participation of students instruct the students to prepare Flowcharts and Handouts
- ✓ Organising Group wise discussions Connecting to placement activities
- ✓ Quizzes and Discussions
- ✓ Seminars and assignments

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2

SEMESTER - II

Course: Introduction Python Programming (Integrated)

Subject Code	23PLC23B	CIE Marks	50
Hours/Week (L: T: P)	3:0:2	SEE Marks	50
Total Hours	50	Examination Hours	03
No. of Credits: 04			

Prerequisites: C - Programming

Course Objectives: The course will enable students to:

CLO1	Learn the syntax and semantics of Python Programming Language.
CLO2	Write Python functions to facilitate code reuse and optimization.
CLO3	Illustrate the process of structuring the data using lists, tuples and dictionaries.
CLO4	Demonstrate the use of built-in functions related regular expression, strings and to navigate the file system.
CLO5	Appraise the need for working with various documents like Excel

CONTENTS	No. of Hours & RBT levels
Module 1 **Introduction and Flow Control** **Introduction, Python Basics:** Entering Expressions into the Interactive Shell, The Integer, Floating-Point, and String Data Types, String Concatenation and Replication, Storing Values in Variables, Your First Program, Dissecting Your Program. **Flow control:** Boolean Values, Comparison Operators, Boolean Operators, Mixing Boolean and Comparison Operators, Elements of Flow Control, Program Execution, Flow Control Statements, Importing Modules, Ending a Program Early with sys. exit(). **Text Book 01: Chapters - 1, 2**	08 Hours & L3
Module 2 **Functions and List** **Functions:** def Statements with Parameters, Return Values and return Statements, The None Value, Keyword Arguments and print(), Local and Global Scope, The global Statement, Exception Handling, A Short Program: Guess the Number **Lists:** The List Data Type, Working with Lists, Augmented Assignment Operators, Methods, List-like Types: Strings and Tuples, References **Text Book 01: Chapters - 3, 4**	08 Hours & L3

Module 3 **Dictionaries and String** **Dictionaries and Structuring Data:** The Dictionary Data Type, Pretty Printing, Using Data Structures to Model Real-World Things, Nested Dictionaries and Lists **Manipulating Strings** - Working with Strings, Useful String Methods Project: Password Locker **Text Book 01: Chapters - 5, 6**	**08 Hours** **&** **L3**
Module 4 **Regular Expressions and Files** **Pattern Matching with Regular Expressions:** Finding Patterns of Text without Regular Expressions, Finding Patterns of Text with Regular Expressions, More Pattern Matching with Regular Expressions, Greedy and Nongreedy Matching, The findall() Method, Character Classes, Making YourOwn Character Classes, The Caret and Dollar Sign Characters, The WildcardCharacter, Review of Regex Symbols, Case-Insensitive Matching, Substituting Strings with the sub() Method, Managing Complex Regexes, Combining re.IGNORECASE, re. DOTALL, and re. VERBOSE. **Reading and Writing Files:** Files and File Paths, The os.path Module, The File Reading/Writing Process, Saving Variables with the shelve Module, Saving Variables with the pprint.pformat() Function. **Text Book 01: Chapters - 7, 8**	**08 Hours** **&** **L3**
Module 5 **Files and Spreadsheets** **Organizing Files:** The shutil Module, Walking a Directory Tree, Compressing Files with the zipfile Module. **Working with Excel Spreadsheets:** Excel Documents, Installing the openpyxl Module, Reading Excel Documents, Project: Reading Data from a Spreadsheet, Writing Excel Documents, Project: Updating a Spreadsheet, Setting the Font Style of Cells, Font Objects, Formulas, Adjusting Rows and Columns, Charts. **Text Book 01: Chapters - 9, 12**	**08 Hours** **&** **L3**

PROGRAMMING EXERCISES

Lab No.	PROGRAMMING EXERCISES ON
1.	Introduction lab session – Sample Programs
2.	Programs on data types, string concatenation and replication
3.	Program on operators and Flow Control Statements
4.	Programs on loops
5.	Programs on Functions
6.	Programs on List and Tuples
7.	Programs on Dictionaries
8.	Programs on String manipulation functions
9.	Programs on Pattern Matching with Regular Expressions
10.	Programs on File Handling
11.	Programs on Excel
12.	Revision/ Practice Lab/ Doubt clearing Lab
13.	Continuous Internal Evaluation (CIE) Test

Note: The sample set of programs are provided on each topic for the reference only.

The course instructor/ Lab in-chargers are given a liberty to ask any kind of questions in the laboratory on the specified the topic and encourage students to write program by themselves.

Course Outcomes: Upon successful completion of this course, student will be able to

23PLC23B. 1	Experiment with the concepts of data types, Operators and Flow Control Statements of Python
23PLC23B. 2	Write programs using functions and strings.
23PLC23B. 3	Make use of methods to create and manipulate lists, tuples and dictionaries.
23PLC23B .4	Develop programs for Pattern Matching and file handling using python packages
23PLC23B. 5	Utilize python packages to work on Spread Sheets

Recommended Tools: Linux. Liclipse, PyCharm, Visual Studio 2019,

Text Books:

1. Al Sweigart, "Automate the Boring Stuff with Python", William Pollock, 2015,ISBN: 978-1593275990.

Reference Books:

1. Allen B. Downey, "Think Python: How to Think Like a Computer Scientist", 2nd Edition, Green Tea Press, 2015, ISBN: 978-9352134755.
2. Charles Dierbach, "Introduction to Computer Science Using Python", 1st Edition, Wiley India Pvt Ltd. ISBN-13: 978-8126556014.
3. Wesley J Chun, "Core Python Applications Programming", 3rd Edition, Pearson Education India, 2015. ISBN-13: 978-9332555365.
4. Roberto Tamassia, Michael H Goldwasser, Michael T Goodrich, "Data Structures and Algorithms in Python", 1st Edition, Wiley India Pvt Ltd, 2016. ISBN-13: 978-8126562176.
5. ReemaThareja, "Python Programming using problem solving approach", Oxford University press, 2017. ISBN-13: 978-0199480173
6. Charles R. Severance, "Python for Everybody: Exploring Data Using Python- 3",1st Edition, Shroff Publishers, 2017. ISBN: 978-9352136278.

Web Reference:

https://infytq.infosys.com/
https://www.learnbyexample.org/python/
https://www.learnpython.org/
https://pythontutor.com/visualize.html#mode=edit

Scheme of Examination:

Scheme of Evaluation: (Integrated courses)

Semester End Examination (SEE):

SEE Question paper is to be set for 100 marks and the marks scored will be proportionately reduced to 50. There will be two full questions (with a maximum of four sub questions) from each module carrying 20 marks each. Students are required to answer any five full questions choosing at least one full question from each module.

The laboratory assessment would be restricted to only the CIE evaluation.

Continuous Internal Evaluation (CIE):

Three Tests are to be conducted for 40 marks each. The average of the three tests are taken for computation of CIE on a scale of 30, the CIE would also include laboratory evaluation for 20 marks. The laboratory marks of 20 would comprise of 10 marks for regular laboratory assessment to include lab record and observation. 10 marks would be exclusive for laboratory internal assessment test to be conducted at the end of the semester. Typical Evaluation pattern for integrated courses is shown in the Table below

Table: Distribution of weightage for CIE & SEE of Integrated courses

	Component	Marks	Total Marks
CIE	CIE Test-1	30	50
	CIE Test-2	30	
	CIE Test-3	30	
	Laboratory	20	
SEE	Semester End Examination	50	50
Grand Total			100

CO/PO Mapping

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
23PLC23B.1	3	3	2	2	3							2				
23PLC23B.2	3	3	2	2	3							2				
23PLC23B.3	3	3	2	2	3							2				
23PLC23B.4	3	3	2	2	3							2				
23PLC23B.5	3	3	2	2	3							2				
Average	**3**	**3**	**2**	**2**	**3**							**2**				

Low-1: Medium-2: High-3

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Course: Mathematics II for ME Stream

Course Code	23MAT21C	CIE Marks	50
Hours/Week (L: T: P)	3:2:0	SEE Marks	50
No. of Credits	4	Examination Hours	03

Course Objectives

To enable students to apply the knowledge of Mathematics in various fields of engineering by making them to learn the following:

CLO1	Multiple integrals and Beta-Gamma functions
CLO2	Vector integration
CLO3	First and higher order ordinary differential equations
CLO4	Partial differential equations

Content	No. of Hours/ RBT levels
Module 1 Multiple integrals: Evaluation of double integrals by direct evaluation, change of order and change of variables. Evaluation of triple integrals. Beta and Gamma functions; relation between beta and gamma functions - simple problems.	10 Hours L2, L3
Module 2 Line integrals, Green's theorem in the plane, Stoke's theorem: Relation between line and surface integrals, Gauss Divergence theorem: Relation between surface and volume integrals- simple problems.	10 Hours L2, L3
Module 3 Differential Equations of first order and first degree: Variable separable, Linear equations, Bernoulli's equation, Exact and reducible to exact differential equations. Equations of first order and higher degree (solvable for p only).	10 Hours L2, L3
Module 4 Linear differential equations with constant coefficients -Inverse differential operators, method of variation of parameters. Cauchy's and Legendre's Linear differential equations.	10 Hours L2, L3
Module 5 Formation of partial differential equations. Solution by direct integration, linear equations of first order. Homogeneous linear equations with constant coefficients. Method of separation of variables.	10 Hours L2, L3

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Course Outcomes

Upon completion of this course, student will be able to:

CO21.1	Evaluate double and triple integrals
CO21.2	Evaluate definite integrals using beta and gamma functions

CO21.3	Evaluate integrals using Green's, Stokes and Gauss divergence theorem
CO21.4	Solve linear and nonlinear ordinary differential equations
CO21.5	Solve partial differential equations

Text books:

1. Higher Engineering Mathematics, B.S. Grewal, Khanna Publishers, 44th Edition, 2017.
2. B.V. Ramana, Higher Engineering Mathematics, Tata McGraw-Hill, 2006

References:

1. Advanced Engineering Mathematics, E. Kreyszig, John Wiley & Sons, 10th Edition, 2016.
2. H.K. Dass and Er. Rajnish Verma: Higher Engineering Mathematics, S. Chand publishing, 1st edition, 2011.
3. A Text Book of Engineering Mathematics, N. P. Bali and Manish Goyal, Laxmi Publications, 6th Edition, 2014.
4. Calculus, James Stewart, Cengage Publication, 7th Edition, 2012.

Scheme of Examination:

Semester End Examination (SEE):
SEE Question paper is to be set for 100 marks and the marks scored will be proportionately reduced to 50. There will be two full questions (with a maximum of three sub questions) from each module carrying 20 marks each. Students are required to answer any **five full questions** choosing at least **one full question from each module.**

Continuous Internal Evaluation (CIE):
Three Tests are to be conducted for 40 marks each. Average of Marks scored in all three tests is added to test component. CIE is executed by way of quizzes / Alternate Assessment Tools (AATs), and three tests. **Some possible AATs:** seminar/assignments/ mini-projects/ concept videos/ partial reproduction of research work/ group activity/ any other.
Typical Evaluation pattern for regular courses is shown in Table 1.

Table 1: Distribution of weightage for CIE & SEE of Regular courses

	Component	Marks	Total Marks
CIE	CIE Test-1	40	
	CIE Test-2	40	50
	CIE Test-3	40	
	Assignments	10	
SEE	Semester End Examination	50	50
Grand Total			100

CO/PO Mapping												
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO21.1	3	2	1									3
CO21.2	3	2	1									3
CO21.3	3	2	1									3
CO21.4	3	2	1									3
CO21.5	3	2	1									3
Average	3	2	1									3

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Course: Mathematics II for EEE Stream

Course Code	23MAT21D	CIE Marks	50
Hours/Week (L: T: P)	3:2:0	SEE Marks	50
No. of Credits	4	Examination Hours	03

Course Objectives

To enable students to apply the knowledge of Mathematics in various fields of engineering by making them to learn the following:

CLO1	Multiple integrals and Beta-Gamma functions
CLO2	Vector integration
CLO3	First and higher order ordinary differential equations
CLO4	Partial differential equations

Content	No. of Hours/ RBT levels
Module 1 Multiple integrals: Evaluation of double integrals by direct evaluation, change of order and change of variables. Evaluation of triple integrals. Beta and Gamma functions; relation between beta and gamma functions - simple problems.	10 Hours L2, L3
Module 2 Line integrals, Green's theorem in the plane, Stoke's theorem: Relation between line and surface integrals, Gauss Divergence theorem: Relation between surface and volume integrals- simple problems.	10 Hours L2, L3
Module 3 Differential Equations of first order and first degree: Variable separable, Linear equations, Bernoulli's equation, Exact and reducible to exact differential equations. Equations of first order and higher degree (solvable for p only).	10 Hours L2, L3
Module 4 Linear differential equations with constant coefficients -Inverse differential operators, method of variation of parameters. Cauchy's and Legendre's Linear differential equations.	10 Hours L2, L3
Module 5 Formation of partial differential equations. Solution by direct integration, linear equations of first order. Homogeneous linear equations with constant coefficients. Method of separation of variables.	10 Hours L2, L3

Course Outcomes

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Upon completion of this course, student will be able to:

CO21.1	Evaluate double and triple integrals
CO21.2	Evaluate definite integrals using beta and gamma functions

CO21.3	Evaluate integrals using Green's, Stokes and Gauss divergence theorem
CO21.4	Solve linear and nonlinear ordinary differential equations
CO21.5	Solve partial differential equations

Text books:

1. Higher Engineering Mathematics, B.S. Grewal, Khanna Publishers, 44th Edition, 2017.
2. B.V. Ramana, Higher Engineering Mathematics, Tata McGraw-Hill, 2006

References:

1. Advanced Engineering Mathematics, E. Kreyszig, John Wiley & Sons, 10th Edition, 2016.
2. H.K. Dass and Er. Rajnish Verma: Higher Engineering Mathematics, S. Chand publishing, 1st edition, 2011.
3. A Text Book of Engineering Mathematics, N. P. Bali and Manish Goyal, Laxmi Publications, 6th Edition, 2014.
4. Calculus, James Stewart, Cengage Publication, 7th Edition, 2012.

Scheme of Examination:

Semester End Examination (SEE):
SEE Question paper is to be set for 100 marks and the marks scored will be proportionately reduced to 50. There will be two full questions (with a maximum of three sub questions) from each module carrying 20 marks each. Students are required to answer any **five full questions** choosing at least **one full question from each module.**

Continuous Internal Evaluation (CIE):
Three Tests are to be conducted for 40 marks each. Average of Marks scored in all three tests is added to test component. CIE is executed by way of quizzes / Alternate Assessment Tools (AATs), and three tests.
Some possible AATs: seminar/assignments/ mini-projects/ concept videos/ partial reproduction of research work/ group activity/ any other.
Typical Evaluation pattern for regular courses is shown in Table 1.

Table 1: Distribution of weightage for CIE & SEE of Regular courses

	Component	Marks	Total Marks
CIE	CIE Test-1	40	50
	CIE Test-2	40	
	CIE Test-3	40	
	Assignments	10	
SEE	Semester End Examination	50	50
Grand Total			100

CO/PO Mapping

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO21.1	3	2	1									3
CO21.2	3	2	1									3
CO21.3	3	2	1									3
CO21.4	3	2	1									3
CO21.5	3	2	1									3
Average	3	2	1									3

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