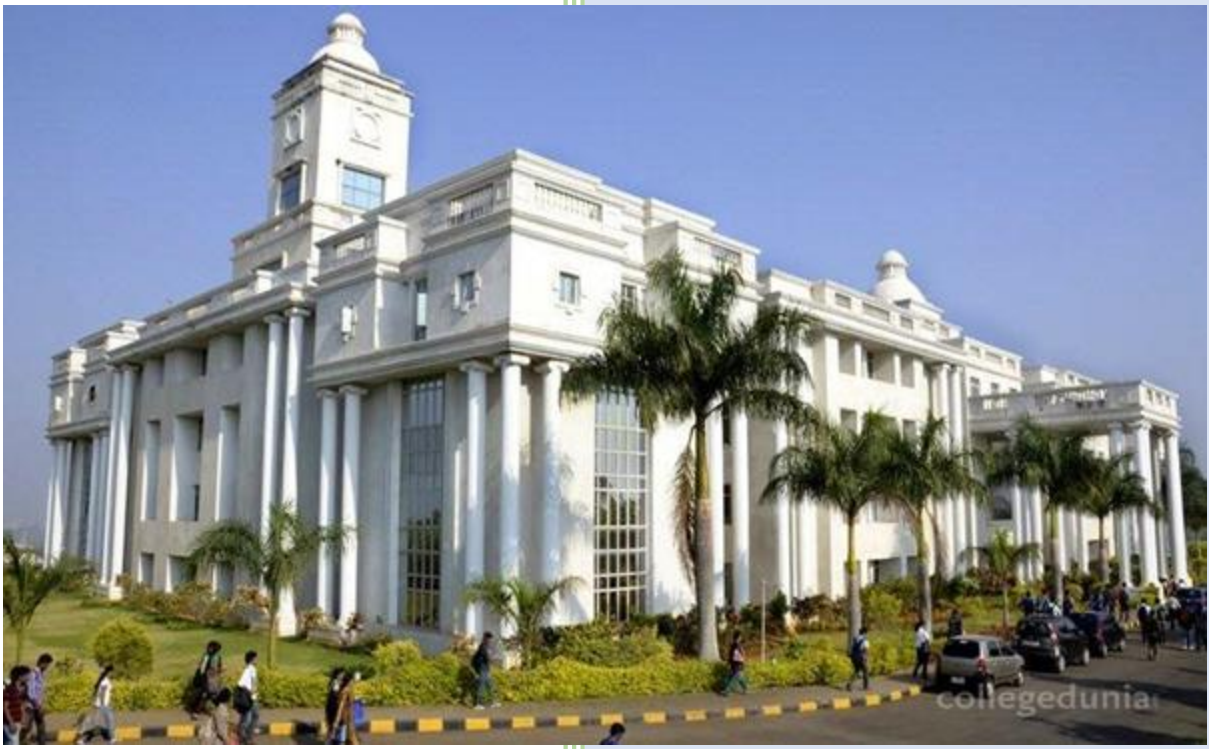
First Year
Scheme & Syllabus
(2022 Scheme)

SCHEME AND SYLLABUS



Electrical & Electronics 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 2022–23 (Effective from the academic year 2022 – 23)

I SEMESTER B.E. (PHYSICS GROUP) – EEE Stream (ECE/EEE)

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	BSC	22MAT 11	LINEAR ALGEBRA AND CALCULUS	MAT	MAT	3	2	0	50	50	100	4
2	BSC	22PHY12	ENGINEERING PHYSICS (INTEGRATED)	PHY	PHY	3	0	2	50	50	100	4
3	ESC	22ELN13	ELEMENTS OF ELECTRONICS ENGINEERING	ECE	ECE	2	2	0	50	50	100	3
4	ESC-1	22CSE14	C PROGRAMMING (INTEGRATED)	CSE	ANY	3	0	2	50	50	100	4
5	ETC-1	22ECE151/ 22EEE151	INTRODUCTION TO EMBEDDED SYSTEM/ RENEWABLE ENERGY SOURCES	ECE/EEE	ECE/EEE	3	0	0	50	50	100	3
6	AEC	22EGH16	COMMUNICATIVE ENGLISH	HUMANITIES	ANY	1	0	0	50	50	100	1
7	HSMC	22KSK17/ 22KBK17	Samskrutika Kannada / Balake Kannada	HUMANITIES	ANY	1	0	0	50	50	100	1
					TOTAL	16	4	4	350	350	700	20

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

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GLOBAL ACADEMY OF TECHNOLOGY (Autonomous Institution Under VTU)

Scheme of Teaching and Examination 2022–23 (Effective from the academic year 2022 – 23)

I SEMESTER B.E. (CHEMISTRY GROUP) – EEE Stream (ECE/EEE)

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	BSC	22MAT 11	LINEAR ALGEBRA AND CALCULUS	MAT	MAT	3	2	0	50	50	100	4
2	BSC	22CHE12	ENGINEERING CHEMISTRY (INTEGRATED)	CHE	CHE	3	0	2	50	50	100	4
3	ESC	22MEG13	COMPUTER AIDED ENGINEERING DRAWING	ME	ME	2	0	2	50	50	100	3
4	ESC-1	22ELE14	FUNDAMENTALS OF ELECTRICAL ENGINEERING	EEE	EEE	2	2	0	50	50	100	3
5	PLC-1	22ISE151	PYTHON PROGRAMMING (INTEGRATED)	ISE	ANY	3	0	2	50	50	100	4
6	HSMC	22IDT16	INNOVATION AND DESIGN THINKING	HUMANITIES	ANY	1	0	0	50	50	100	1
7	HSMC	22CIP17	CONSTITUION OF INDIA AND PROFESSIONAL ETHICS	HUMANITIES	ANY	1	0	0	50	50	100	1
					TOTAL	15	4	6	350	350	700	20

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GLOBAL ACADEMY OF TECHNOLOGY (Autonomous Institution Under VTU)

Scheme of Teaching and Examination 2022–23 (Effective from the academic year 2022 – 23)

II SEMESTER B.E. (PHYSICS GROUP) – EEE Stream (ECE/EEE)

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	BSC	22MAT 21	INTEGRAL CALCULUS AND DIFFERENTIAL EQUATION	MAT	MAT	3	2	0	50	50	100	4
2	BSC	22PHY22	ENGINEERING PHYSICS (INTEGRATED)	PHY	PHY	3	0	2	50	50	100	4
3	ESC	22ELN23	ELEMENTS OF ELECTRONICS ENGINEERING	ECE	ECE	2	2	0	50	50	100	3
4	ESC-2	22CSE24	C PROGRAMMING (INTEGRATED)	CSE	ANY	3	0	2	50	50	100	4
5	ETC-2	22ECE251/ 22EEE251	INTRODUCTION TO EMBEDDED SYSTEM/ RENEWABLE ENERGY SOURCES	ECE/EEE	ECE/EEE	3	0	0	50	50	100	3
6	AEC	22EGH26	COMMUNICATIVE ENGLISH	HUMANITIES	ANY	1	0	0	50	50	100	1
7	HSMC	22KSK27/ 22KBK27	Samskrutika Kannada / Balake Kannada	HUMANITIES	ANY	1	0	0	50	50	100	1
					TOTAL	16	4	4	350	350	700	20

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Scheme of Teaching and Examination 2022–23 (Effective from the academic year 2022 – 23)

II SEMESTER B.E. (CHEMISTRY GROUP) – EEE Stream (ECE/EEE)

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	BSC	22MAT 21	INTEGRAL CALCULUS AND DIFFERENTIAL EQUATION	MAT	MAT	3	2	0	50	50	100	4
2	BSC	22CHE22	ENGINEERING CHEMISTRY (INTEGRATED)	CHE	CHE	3	0	2	50	50	100	4
3	ESC	22MEG23	COMPUTER AIDED ENGINEERING DRAWING	ME	ME	2	0	2	50	50	100	3
4	ESC-2	22ELE24	FUNDAMENTALS OF ELECTRICAL ENGINEERING	EEE	EEE	2	2	0	50	50	100	3
5	PLC-2	22ISE251	PYTHON PROGRAMMING (INTEGRATED)	ISE	ANY	3	0	2	50	50	100	4
6	HSMC	22IDT26	INNOVATION AND DESIGN THINKING	HUMANITIES	ANY	1	0	0	50	50	100	1
7	HSMC	22CIP27	CONSTITUION OF INDIA AND PROFESSIONAL ETHICS	HUMANITIES	ANY	1	0	0	50	50	100	1
					TOTAL	15	4	6	350	350	700	20

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Semester I

Course: Linear Algebra and Calculus

Course Code	22MAT11	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**

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.

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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 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**	
	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										3
CO11.2	3	2										3
CO11.3	3	2										3
CO11.4	3	2										3
Average	3	2										3

Low-1: Medium-2: High-3

Semester I/II

Engineering Chemistry (Integrated)

Subject Code	22CHE12/22	CIE Marks	50
Hours/Week (L: T: P)	3:0:2	SEE Marks	50
Total Hours	64	Examination Hours	03
Semester: I/II		No. of Credits: 04	

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 Systems **Electrochemistry:** Introduction: EMF of cell, Free Energy, Single electrode potential-Nernst equation, Numerical problems. Reference Electrodes: Introduction, Construction, working and applications of Calomel electrode, Ion selective electrodes-Glass electrode, determination of pH using Glass electrode.Concentration Cells: Introduction, numerical problems **Energy Systems:** Introduction, Classification. Construction, working and applications of Li-ion battery and recycling of Lithium batteries. **Fuel Cells**: Introduction, Construction, working and applications of Methanol-Oxygen fuel cell(acid electrolyte-based methanol oxygen fuel cell).	08 Hours/ L2
Module 2 Corrosion Science and Metal finishing **Corrosion Science:**Introduction: Electrochemical theory of corrosion. Types of corrosion-Differential metal corrosion, differential aeration corrosion and stress corrosion. Factors affecting the rate of corrosion-Anodic & Cathode areas, pH of corrosion medium and Nature of corrosion product. Corrosion control: Metal coating. Galvanization. Cathodic protection-sacrificial anode method and impressed current method. **Metal Finishing:** Introduction, Technological importance, Electroplating-Introduction, Electroplating of Chromium,Electroless plating-Introduction, Electroless plating of copper on PCB, Differences between electroplating and electroless plating.	08 Hours/ L2
Module 3 Chemical Energy Sources, Lubricants & Refractories **Chemical Energy Sources**: Fuels - Introduction, Classification, Calorific value-GCV & NCV, Determination of Calorific value by Bomb Calorimeter, Numerical problems. Petroleum cracking-Fluidized bed cracking **Alternative Energy sources**: Bio Diesel, Power alcohol, CNG, Biogas, Hydrogen-as a fuel, Solar energy-PV cell: construction, working and applications. **Lubricants:** Introduction, Classifications, Properties- Viscosity index, Flash point, Drop point test and applications of lubricants. **Refractories**: Introduction, Properties, brief account of steps involved in manufacturing with examples and applications.	08 Hours/ L2,L3
Module 4 Polymers& Water Technology **Polymers:** Introduction, Synthesis and applications of Polyurethane. Polymer composites-Kevlar Fibre and carbon fibre, **Conducting Polymers**: Synthesis & Mechanism of conduction in conducting poly aniline and Photoconductive polymers.	08 Hours/ L2, L3

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Water Technology: Introduction, impurities in water, determination of hardness of water, COD- definition, determination and numerical problem, Softening of water by ion exchange process, Desalination of water-Reverse Osmosis, Sewage treatment.	
Module 5 Instrumental methods of analysis, Chemistry of Nanomaterials and Environmental Chemistry **Instrumental methods of analysis**:Theory, instrumentation and application of Colorimeter, Potentiometer and Conductometer. **Chemistry of Nanomaterials:** Introduction. synthesis of ZnO nano material by solution combustion method & synthesis of TiO_2nano material by sol gel method. Characterization techniques- PXRD and SEM. Applications. Carbon based nanomaterials-Introduction to fullerenesCarbon nano tubes & Graphene **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 Rain water harvesting	08 Hours/ L2, L3

List of Engineering Chemistry Lab Experiments

SL. No.	Experiments	No. of Hours/ RBT levels
	Part- A: Instrumental Experiments	
1	Determination of pKa value of a weak acid using pH meter	2
2	Estimation of FAS present in the given solution by potentiometric method	2
3	Determination of amount of HCl and CH_3COOH present in a mixture by conductometry	2
4	Estimation of copper in the effluent from electroplating industry by colorimetric method.	2
	Part-B: Volumetric Experiments	
1	Determination of Chemical oxygen demand of industrial waste water	2
2	Determination of percentage of copper in brass by Iodometric method	2
3	Determination of percentage of iron in the given rust solution using standard Potassium Dichromate solution (External indicator method)	2
4	Determination of Total hardness of given water sample by rapid EDTA method	2
5	Determination of Nickel using EDTA by complexometric method	2

SL. No.	Experiments	No. of Hours/ RBT levels
	Part-C: Virtual & Demonstration Experiments	
1	Determination of Viscosity coefficient of a liquid using viscometer **(Virtual Experiment)**	2
2	Determination of calorific value of solid fuel using bomb calorimeter **(Demonstration)**	2
3	Synthesis of ZnO nanomaterial by sol-gel method **(Demonstration)**	2

Textbooks:

1. Uppal M.M, Jain and Jain. Engineering Chemistry, Khanna Publishers, 35th Edition, 2013.
2. P.C. Jain and Monica Jain, A test Book of Engineering Chemistry, Dhanpat Rai Publications, New Delhi, 12thEdition, 2012.

3. SS Dara &Dr. SS Umare. -A Text book of Engineering Chemistry, S Chand & Company Ltd., 12th Edition, 2011.
4. R.V. Gadag and Nitthyananda Shetty-A Text Book of Engineering Chemistry, I.K. International Publishing house. 2nd Edition, 2016.
5. B.S. Jai Prakash, R. Venugopal, Sivakumaraiah& Pushpa Iyengar.,- Chemistry for Engineering Students", Subash Publications, Bangalore.5th Edition, 2014
6. Vogel's A.I. A text book of quantitative analysis, 35th edition, 2012.
7. Willard, Merit, Dean and Settle, A text book of Instrumental analysis, 6th edition 2012.

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 Text book of Nanoscience and Nanotechnology, McGraw Hill Education (India) Pvt., Ltd., 1st edition, 2015.

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

CO1	Discuss the electrochemical energy systems such as electrodes, batteries and fuel cells.
CO2	Explain the fundamental concepts of corrosion, its control and surface modification methods namely electroplating and electroless plating.
CO3	Interpret the concepts of nonrenewable (Petroleum), renewable (solar energy) & alternative energy sources, Lubricants and Refractories.
CO4	Enumerate the importance, synthesis and applications of Polymer, water treatment and water analysis by volumetric methods.
CO5	Illustrate the fundamental principles and applications of instrumentations, nanomaterials, environmental pollution and its control measures.
CO6	Evaluate the percentage of copper, Nickel and Iron in the given analyte solution.

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SEMESTER – I/II

COURSE: COMPUTER AIDED ENGINEERING DRAWING

Course Code	22MEG13/23	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**
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**

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**

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

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SEMESTER –I/II

SUBJECT: Fundamentals of Electrical Engineering (Integrated Course)

Subject Code	**22ELE14/24**	CIE Marks	50
Hours /Week	2:2:2	SEE Marks	50
Total Hours	**30**	Examination Hours	03
No. of Credits:4			

Course Learning Objectives:

CLO 1	Analysis of DC circuits.
CLO 2	Analysis of single phase AC circuits.
CLO 3	Explain the three phase circuit and three phase Synchronous Generators .
CLO 4	Understand the principle of operation, construction of single-phase transformer and three phase Induction motor.
CLO 5	Understand the importance of Green energy systems, Electric vehicles and necessity of earthing

Contents	No. of Hours / RBT Levels
Module – 1: DC Circuits: Basics concepts, Ohm's law, Kirchhoff's laws, analysis of series, parallel and series parallel circuits excited by independent voltage sources only. Power and energy in resistor. Analysis of Two loop circuits by Loop or mesh current method. (**Two loop circuits only**)	6/L3
Module – 2: Single Phase AC Circuits **Basics Terminology:** Generation of sinusoidal voltage, frequency of generated voltage, average value, root mean square value, form and peak factors. **Analysis of Circuits:** Voltage and current relationship, with phasor diagrams, inR, L, C, R-L, R-C and R-L-C series circuits. Concept of apparent, real, and reactive powers. Significance of power factor.	6/L4
Module – 3: Three Phase AC Circuits and Synchronous Generator Three Phase AC Circuits: Advantages of three phase systems, Generationof three phase voltages, meaning of phase sequence, Relationship betweenline and phase quantities for balanced star and delta connections for balancedloads. **Synchronous Generator**: Principle of operation and construction ofSynchronous Generator, types and EMF equation (**Excluding the derivation and Calculation of winding factors**).	6/L2
Module – 4: Single-phase Transformer and Three Phase Induction MotorSingle-phase Transformer: Principle of operation and construction, types,EMF equation, losses and efficiency calculations (Condition for maximum efficiency excluded). **Three phase Induction Motor:** Principle of operation and construction, types, concept of rotating magnetic field, slip and significance of slip,Advantages and applications. (**Numerical problems on slip calculations only**)	6/L2
Module – 5: Green Energy Sources and Electric vehicles **Green Energy Sources:** Solar and Wind energy generation systems. **Introduction to Electric vehicles:** Overview and block diagram approach to electric vehicles. **Earthing:** Necessity of Earthing and Types of Earthing.	6/L2

Fundamentals of Electrical Engineering Laboratory:

S. No.	Experiments	No. of Hours/ RBT levels
1	Verification of KCL and KVL for DC circuits.	02 / **L5**
2	Two way Control of Lamp – Verification of Truth Table.	02 / **L4**
3	Measurement of current, power and power factor of series R-L-C circuit.	02 / **L2**
4	To measure the resistance and inductance of a choke coil using three voltmeters	02 / **L3**
5	Determination of phase and line quantities in three phase star and delta connectedloads.	02 / **L5**
6	Measurement of three-phase power using two watt meters.	02 / **L3**
7	Direct load test on transformer.	02 / **L3**
8	Measurement of slip in three phase induction motor.	02 / **L3**
9	Measurement of earth resistance.	02 / **L2**
10	Measurement of voltage, current and power in a Solar panel.	02 / **L2**
	Demonstration Experiments	
1	Demonstration of cut-out sections of electrical machines (induction machines andsynchronous machines).	02 / **L1, L2**
2	Demonstration of fuse, MCB, electrical installation and its safety measures.	02 / **L1, L2**
3	Demonstration and working of domestic energy meters.	02 / **L1, L2**
	Total Hours	**26**

Text Books				
1.	Basic Electrical Engineering	Kulshreshtha. D.C	Tata McGrawHill	2012
Reference Books				
1.	Basic Electrical Engineering	V. K. Mehta, Rohit Mehta	S Chand	2017
2.	Fundamentals of Electrical and Electronics Engineering	Samarjit Ghosh	PHI Learning	2007
3.	Hughes Electrical and ElectronicTechnology	John Hiley, Keith Brown, Ian Mckenzie Smith	Pearson Education	Tenth Edition Revised 2020
4.	Basic Electrical and ElectronicsEngineering	S. K. Bhattacharya	Pearson Education	2011
5.	A Text Book of Electrical Technology – Volume 1 (Basic Electrical Engineering) in SI system of units BL Theraja	BL. Theraja AK. Theraja	S. Chand	1999
6.	Electrical Engineering Fundamentals	Vincent Deltoro	Pearson	2015
7.	Non -Conventional Energy Resources	Sobh Nath Singh	Pearson Education	2017

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COs	Statement	Bloom's Cognitive level	POs/PSOs
CO1	Apply fundamental laws to DC circuits.	Apply	PO1, PO2, PO12
CO2	Analyze the behaviour of single phase AC circuits.	Analyze	PO1, PO2, PO12
CO3	Explain three phase AC circuits and synchronous generator.	Understand	PO1, PO2, PO12
CO4	Explain the constructional features, working of single phase transformer and three phase induction motor.	Understand	PO1, PO2, PO12
CO5	Discuss the working of green energy systems, electric vehicles and types of earthing.	Understand	PO1, PO2, PO12

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

SEMESTER – I/II

Course: Python Programming (Integrated)

Subject Code	22ISE151/	CIE Marks	50
Hours/Week (L: T: P)	3:0:2	SEE Marks	50
Total Hours	50	Examination Hours	03
No. of Credits: 04			

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 andReplication, 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 AssignmentOperators, 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, PrettyPrinting, 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,	08 Hours & L3

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**	
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 theopenpyxl Module, Reading Excel Documents, Project: Reading Data from aSpreadsheet, 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.	Programs on data types, string concatenation and replication
2.	Program on operators and Flow Control Statements
3.	Programs on loops
4.	Programs on Functions
5.	Programs on List and Tuples
6.	Programs on Dictionaries
7.	Programs on String manipulation functions
8.	Programs on Pattern Matching with Regular Expressions
9.	Programs on File Handling
10.	Programs on Excel
11.	Revision/ Practice Lab/ Doubt clearing Lab
12.	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

22ISE151.1	Experiment with the concepts of data types, Operators and Flow Control Statements of Python
22ISE151.2	Write programs using functions and strings.
22ISE151.3	Make use of methods to create and manipulate lists, tuples and dictionaries.
22ISE151.4	Develop programs for Pattern Matching and file handling using python packages
22ISE151.5	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, WileyIndia Pvt Ltd. ISBN-13: 978-8126556014.
3. Wesley J Chun, "Core Python Applications Programming", 3rd Edition, Pearson EducationIndia, 2015. ISBN-13: 978-9332555365.
4. Roberto Tamassia, Michael H Goldwasser, Michael T Goodrich, "Data Structures andAlgorithms in Python", 1st Edition, Wiley India Pvt Ltd, 2016. ISBN-13: 978-8126562176.
5. ReemaThareja, "Python Programming using problem solving approach", OxfordUniversity 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
22ISE151.1	3	3	2	2	3							2				
22ISE151.2	3	3	2	2	3							2				
22ISE151.3	3	3	2	2	3							2				
22ISE151.4	3	3	2	2	3							2				
22ISE151.5	3	3	2	2	3							2				
Average	3	3	2	2	3							2				

Low-1: Medium-2: High-3

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Semester I / II

Innovation & Design thinking

Course Code	22IDT16/26	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.

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
22IDT16.1	2	-	-	-	-	-	-	-	-	-	-	2
22IDT16.2	2	2	2	-	-	-	-	-	-	-	-	2
22IDT16.3	2	2	2	-	-	-	-	-	-	-	-	2
22IDT16.4	2	2	2	-	-	-	-	-	-	-	-	2
22IDT16.5	2	2	2	-	-	-	-	-	-	-	-	2
22IDT16	**2**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**

Low-1: Medium-2: High-3

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SEMESTER –I/II

SUBJECT: Engineering Physics (Integrated)

Semester	**I/II**	**CIE Marks**	**50**
Subject Code	**22PHY12/22**	**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 **Elasticity & Oscillations** **Elasticity** Fundamentals of elasticity: concept of stress, strain, stress-strain curve, modulii of elasticity, Relation between Y, n & σ. Beams, bending moment(no derivation), expression for Young's modulus using single cantilever, torsional oscillations, applications, numerical problems. **Oscillations** 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, numerical problems. Forced oscillation: Theory of forced oscillations and resonance, numerical problems.		9 hrs/L3
Pedagogy	Chalk & Talk, multimedia presentation **Practical topics:** Torsional pendulum, Single cantilever, Spring constant, LCR	
Module 2 Quantum mechanics Wave-particle dualism, de Broglie hypothesis, de Broglie wavelength of an accelerated electron, Heisenberg's uncertainty principle, application of HUP(Non-existence of electrons inside the nucleus), significance and properties of wave function, Schrodinger's time independent wave equation, eigen functions & eigen values for a particle in one dimensional potential well of infinite height, numerical problems.		8hrs/L3
Pedagogy	Chalk & Talk, multimedia presentation Practical topics: Wavelength of LEDs	
Module 3 LASERs & Optical fibers LASERs: Interaction of radiation with matter, Einstein's coefficients, Requisites and condition for laser action, He-Ne LASER, application of lasers in measurement of pollutants in the atmosphere, 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.		8hrs/L3

Pedagogy	Chalk & Talk, multimedia presentation Practical topics: LASER diffraction, numerical aperture

Module 4	8hrs/L3
Electrical properties of solids **Quantum free electron theory**: Assumptions of quantum free electron theory, Density of states(qualitative), expression for Fermi energy, Fermi factor & its temperature dependence, success of quantum free electron theory, numerical problems. **Physics of semiconductors**: Fermi level in intrinsic semiconductor, expression for conductivity, numerical problems. **Dielectrics**: Polar and non-polar dielectrics, types of polarization, expression for internal field in solids & liquids, dielectric constant of a dielectric material, applications, numerical problems.	

Pedagogy	Chalk & Talk, multimedia presentation Practical topics: Fermi energy, energy gap, dielectric constant

Module 5	7 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 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	Young's modulus by single cantilever	2 / L3
10	Wavelength of LASER using diffraction grating	2 / L2

Course Outcomes: The students will be able to:

CO1	Apply the concepts of elasticity, oscillations in various applications.
CO2	Interpret the concepts of quantum mechanics & utilize in LASERs, optical fibers and electrical properties of materials.
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)

Reference books:

3. 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).
4. Pillai S O, Solid State Physics, Multicolour Ed, New Age International publishers (2020).
5. David Griffiths, Introduction to Electrodynamics, 4th Ed. Cambridge Univ. Press (2017).
6. Laud B B, Lasers & non-linear optics, 3rd Ed., New Age International publishers (2011).
7. Engineering Physics lab manual – Department of Physics, Global Academy of Technology

SEMESTER – I/II

Course: ELEMENTS OF ELECTRONICS ENGINEERING

Course Code	22ELN13 / 23	CIE Marks	50
Hours/Week (L: T: P)	3:2:0	SEE Marks	50
Credits	04	Examination Hours	03

Course Learning Objectives: Students will be taught;

CLO1	Operation of Semiconductor diode, Zener diode and Special purpose diodes
CLO2	Biasing circuits for transistor (BJT) as an amplifier and oscillators.
CLO3	Op-amps and its applications.
CLO4	Logic circuits and their optimization.
CLO5	Basic of Communication system and Embedded system.

Content	No. of Hours/ RBT levels
Module 1 **Semiconductor Diode and Applications:** Introduction to semiconductor diode, Block diagram of DC regulated power supply, Half wave rectifier, and full wave rectifier - Centre tapped rectifier, Bridge Rectifier. Performance analysis of rectifiers in terms of ripple factor and efficiency (includes Numerical). **Filters** - Classification of filters, Capacitor filter, Voltage Multiplier - Half waveand Full wave voltage doubler. **Special Purpose Diodes:** Breakdown diode – Working of Zener diode as a Voltage Regulator, Display device – LEDs and Seven segment display. (T1- Chapter: 7, 8 and 31).	10 Hours L3
Module 2 **BJT Biasing:** Introduction, DC operating point and Load Line, Methods of Transistor Biasing - Fixed/Base Bias, Voltage Divider Bias and numerical. (T1- Chapter: 12). **Single Stage BJT amplifier**: Introduction, Classification of amplifier and Transistor as an Amplifier, RC Coupled amplifier- Operation and frequency response. (T1- Chapter: 16 and 18). **Feedback amplifiers:** Introduction, Principles of Feedback, Properties/Advantages of negative feedback. (T1-Chapter: 24)	10 Hours L2
Sinusoidal Oscillators: Introduction, Classification of Oscillators, Tuned Oscillators – Hartley and Colpitts (Using BJT). (T1- Chapter: 25).	
Module 3 **Op-Amps and its Applications:** Introduction, modes of operation, Op-Amp parameters - Gain, Input resistance, Output resistance, CMRR, Slew rate, Bandwidth, Input offset voltage, Input bias Current and Input offset Current. Applications- Inverting amplifier, Non-Inverting Amplifier, Voltage Follower, Summer, Differential/Difference amplifier, Integrator and Differentiator, Numerical. (T1-Chapter:29 and 30)	10 Hours L3

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Module 4	10 Hours L3
Logic Circuits: Boolean Algebra Simplification and realization, Logic gates, **Combinational logic**: Adders- Half adder, Full adder, Implementation of full adder using two half adders, Applications. (T1-Chapter:34 and 36) **Sequential Logic:** Introduction, SR Latch, Flip Flops, Clocked RS - Flip Flop, JK - Flip Flop, D - Flip Flop, T - Flip Flop, Applications. (T2-Chapter:6)	
Module 5	**10 Hours L2**
Communication Systems: Introduction, Radio frequency Spectrum, Modulation, Need for modulation, Methods of Modulation (schemes), Amplitude Modulation - Mathematical analysis of a Modulated Carrier Wave,Power relation in an AM Wave. (T1-Chapter:32) **Embedded Systems:** Definition, Embedded systems vs general computing systems, Classification of Embedded Systems, Major application areas ofEmbedded Systems, Elements of an Embedded System. (T3-Chapter:1 & 2)	

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

CO1	Apply the knowledge of diodes as rectifiers, regulators and voltage multipliers.
CO2	Analyze the biasing circuit for transistor as an amplifier and the importance offeedback.
CO3	Develop Op-Amp circuits for various applications.
CO4	Apply Boolean algebra in logic circuits synthesis.
CO5	Explain the concept of communication system and Embedded system.

Laboratory Activities to be carried out for 10 marks of CIE:

Students should construct and demonstrate the following circuits using DiscreteComponents or simulation tools in a group of 3 to 4 students:

1. Switch ON/OFF an LED using a Diode in forward/ reverse bias using a battery cell.
2. Zener Diode as a voltage regulator.
3. Transistor as a switch to operate relay with switches ON/OFF an LED.
4. Demonstrate the Op-Amp Applications.
5. Realization of Logic circuits for given Boolean expressions/functions.

Textbooks:

1. Dr. R.S. Sedha, "Electronic Circuits", S Chand and Company Pvt Ltd, 3rd Revised edition, Reprint 2020.
2. Morris Mano, "Digital Logic and Computer Design", Prentice Hall India Publication, Eighth Impression-2018.
3. K V Shibu, 'Introduction to Embedded Systems', 2nd Edition, McGraw Hill Education (India), Private Limited, 2016.

Reference books:

1. Robert L. Boylestad, "Electronic Devices and Circuit Theory", Prentice Hall of India Pvt Ltd., 11th edition,2015, 2020 reprint.
2. David A Bell, "Electronic Devices and Circuits", Oxford University Press, Fifth Edition.

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**	
	Quiz 1/AAT	**05**	
	Quiz 2/AAT	**05**	
SEE	Semester End Examination	**50**	**50**
Grand Total			**100**

CO-PO and PSO Mapping:														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	-	-	-	-	-	-	1	-	1	-	-
CO2	3	2	-	-	-	-	-	-	-	1	-	1	-	-
CO3	3	2	-	-	-	-	-	-	-	1	-	1	-	-
CO4	3	2	-	-	-	-	-	-	-	1	-	1	-	-
CO5	3	2	-	-	-	-	-	-	-	1	-	1	-	-
Average	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**1**	**-**	**-**

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SEMESTER – I/II

Course: C Programming (Integrated)

Course Code	22CSE14/24	CIE Marks	50
Hours/Week (L: T: P)	3:0:2	SEE Marks	50
No. of Credits	4	Examination Hours	3

Course Objectives:

CO1	Write algorithms, flowcharts and programs.
CO2	Implement different programming constructs and decomposition of problems intofunctions
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 andIdentifiers, 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 forstatement, 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, ExamplePrograms.	**08 Hours** **L3**
Module 5 **STRUCTURES AND FILE MANAGEMENT** **Structures:** Introduction, Defining a structure, declaring structure variables, accessing structuremembers, structure initialization, array of structures. **File Management in C:** Introduction, Defining and opening a file, closing a file, Input/output andError 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 valuebut 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, findingtrace 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 Libraryfunctions.
8	Write a C program to accept the number as a parameter through a user defined function and find itsfactorial by using recursion.
9	Write a C program to count the number of lines, words and characters in a given text file and writethe 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.

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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/

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 20marks 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 of20 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

SEMESTER – I/II

Course: Introduction to Embedded Systems

Course Code	**22ECE151/251**	**CIE Marks**	**50**
Hours/Week (L: T: P)	**3:0:0**	**SEE Marks**	**50**
No. of Credits	**3**	**Examination Hours**	**03**

Course Objectives: Students will be taught;

CLO1	Components of an embedded system.
CLO2	Characteristics and quality attributes of an embedded system
CLO3	Introduction to 8051 microcontroller
CLO4	Addressing modes and instruction set.
CLO5	I/O Port programming

Content	No. of Hours/ RBT levels
Module 1 **The Typical Embedded System:** Introduction to Embedded system, Core of the Embedded System, Memory, Sensors and Actuator, Communication Interface, Embedded Firmware, Other System Components. (Text 1)	**8 Hours** **L2**
Module 2 **Characteristics and Quality Attributes of Embedded Systems:** Characteristics of an Embedded System, Quality Attributes of Embedded Systems. **Embedded Product Development Life Cycle (EDLC):** Introduction, objectives of EDLC, Different phases of EDLC, EDLC Approaches. **Embedded Systems Application and Domain Specific:** Washing Machine—Application-Specific Embedded System, Automotive - Domain-Specific Examples of Embedded System. (Text 1)	**8 Hours** **L2**
Module 3 **8051 Microcontrollers:** Microcontrollers and Embedded processors, overview of 8051 families. 8051 Assembly Language Programming: Inside the 8051, Introduction to Assembly Programming, Program counter, Data Types and Directives, PSW register, Register banks and stack. (Text 2)	**8 Hours** **L3.**
Module 4 **8051 Addressing Modes and Instructions:** Different addressing modes with sample programming, Arithmetic, logic instructions and Programs, Jump, Loop and Call instructions. (Text 2)	**8 Hours** **L3.**
Module 5 **I/O Port programming:** 8051 I/O Programming, I/O bit manipulation programming, DAC interfacing-square, ramp and triangular waveform generation using ALP, Stepper motor and DC motor interface using ALP. (Text 2)	**8 Hours** **L3**

COURSE OUTCOMES:

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

CO1	Understand the basic components of Embedded System
CO2	Explain the Characteristics and Quality attributes of Embedded System
CO3	Elaborate the microcontrollers and ALP.

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CO4	Learn different instruction set of 8051
CO5	Develop assembly language programs for I/O interface.

Textbooks:

1. Shibu K V, "Introduction to Embedded Systems", 2nd Edition, McGraw Hill Education, 2009.
2. Muhammed Ali Mazidi, Janice Mazidi, and Rolin McKinlay. 2005. 8051 Microcontroller and Embedded Systems, The (2nd Edition). Prentice-Hall, Inc., USA.

Reference books:

1. Kenneth J. Ayala,"The 8051 Microcontroller 3rd Edition, Thomson/Cengage Learning

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

SEMESTER –I/II

SUBJECT: Renewable Energy Sources

Subject Code	**22EEE151/251**	CIE Marks	50
Hours /Week	03	SEE Marks	50
Total Hours	**40**	Examination Hours	03
No. of Credits:3			

Course Objectives:

CLO 1	Understand the basic fundamentals of energy sources, conservation and storage.
CLO 2	Understand the importance and usage of solar energy
CLO 3	Understand the importance and usage of wind energy
CLO 4	Understand the method of generation of energy from waste materials and its conversion processes
CLO 5	Understand the importance of fuel cells and batteries.

Contents	No. of Hours / RBT Levels
Module – 1: Fundamentals of Energy sources: Energy and society, Global Energy Scenario, Classification of energy resources, Conventional and Non-conventional energy sources (NCES), its Importance, Advantages and disadvantages. **Energy conservation and energy storage:** Introduction, Basic terminology, Energy conservation, audit, management, policy and planning. Necessity of energy storage and methods, Principles of Energy conservation and storage.	8/L2
Module – 2: Solar Energy Introduction, Sun-as source of energy, The Earth, Extraterrestrial and Terrestrial radiation, Solar constant and insolation, Spectral energy distribution, Depletion of solar radiation, Measurement of solar radiation, Solar time, Basics of solar radiation geometry, Applications.	8/L 2
Module – 3: Wind energy Introduction, Nature of wind, The power in the wind, Site selection consideration, Basis of wind energy conversion (Lift and Drag), Basic components of wind energy conversion system (WECS), Advantages and disadvantages, Classification, Applications, Effect of wind speed and grid condition, Environmental aspects.	8/L 2
Module – 4: Energy from Biomass Introduction, Selection of site for biogas plants, Materials for bio gas, Advantages and disadvantages, Biomass conversion processes, Bio gas generation, Factors affecting generation of bio gas, Various types of bio gas plants, Comparison between fixed dome and movable drum type plant, Bio gas plants developed in India.	8/L 2
Module 5: Fuel Cells Introduction of fuel cells, Working principle and operations of fuel cell, Types of fuel cells, Performance analysis of fuel cell, Choice of fuel for fuel cells, Advantages and Limitations, Conversion efficiency, Applications. Batteries, Basic concepts, Classification of battery.	8/L2

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

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COs	Statement	Bloom's Cognitive level	POs/PSOs
CO151.1	Explain the importance of NCES, energy conservation ,storage and its importance	Understand	PO1, PO7, PO12
CO151.2	Discuss the basic concepts of solar energy and solar radiation geometry	Understand	PO1, PO7, PO12
CO151.3	Describe the principle of wind energy conversion, classify wind energy conversion system and its applications	Understand	PO1, PO7, PO12
CO151.4	Discuss the principle of bio mass conversion process and factors affecting generation of biomass	Understand	PO1, PO7, PO12
CO151.5	Explain the working principle and operation of fuel cells, its limitations and applications.	Understand	PO1, PO7, PO12

Textbooks:

1. Non-conventional energy resources, B.H Khan, Tata McGrawHill, Second Edition, 2012

Reference books:

1. Non-conventional energy sources, G.D Rai, Khanna Publishers, fifth Edition, 2011
2. Non-conventional energy sources, S.Hasan Saeed, D.K Sharma, S.K. Kataria & sons, 2006-2007

MOOCs

1. https://onlinecourses.nptel.ac.in/noc23_ge04/preview
2. E-learning: www.vtu.ac.in

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. The average of the three tests are taken for computation of CIE final marks.
CIE is executed by way of quizzes / Alternate Assessment Tools (AATs), and three tests.

Some possible AATs: seminar/ assignments/term paper/ open ended experiments/ mini-projects/ concept videos/ partial reproduction of research work/ oral presentation of research work/ group activity/ developing a generic toolbox for problem solving/ report based on participation in create-athon/ make-a-thon/ code-a-thon/ hack-a-thon conducted by reputed organizations/ any other.

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

	Component	Marks	Total Marks
CIE	CIE Test – 1	40	50 (Average of Three CIE(40)+ AAT(10))
	CIE Test – 2	40	
	CIE Test – 3	40	
	Quiz / assignment/group discussion/presentation/mini projects	10	

SEE	Semester End Examination	100	50
Grand Total			100

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO151.1	2	-	-	-	-	-	3	-	-	-	-	3
CO151.2	2	-	-	-	-	-	3	-	-	-	-	3
CO151.3	2	-	-	-	-	-	3	-	-	-	-	3
CO151.4	2	-	-	-	-	-	3	-	-	-	-	3
CO151.5	2	-	-	-	-	-	3	-	-	-	-	3
Average	2	-	-	-	-	-	3	-	-	-	-	3

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Semester I / II

COURSE: COMMUNICATIVE ENGLISH

Course Code	22EGH16/26	CIE Marks	50
Hours/Week (L: T: P)	1:0:0	SEE Marks	50
No. of Credits	1	Examination Hours	1 hour

Course Objectives

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 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	3/L3

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:

CO11.1	Write concisely using effective practices.
CO11.2	Read comprehension effectively and decipher required information.
CO11.3	Listen to audio from various settings and decode information.
CO11.4	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
CO11.1	2	2				2		1		2		2
CO11.2	2	2				2		1		2		2
CO11.3	2	2				2		1		2		2
CO11.4	2	2				2		1		2		2
Average	2	2				2		1		2		2

Low-1: Medium-2: High-3

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Semester II

Course: Integral Calculus and Differential Equations

Course Code	22MAT21	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

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, 1stedition, 2011.
3. A Text Book of Engineering Mathematics, N. P. Bali and Manish Goyal, Laxmi Publications, 6thEdition, 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 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**	
	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										3
CO21.2	3	2										3
CO21.3	3	2										3
CO21.4	3	2										3
CO21.5	3	2										3
Average	3	2										3

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