



# **SNS COLLEGE OF TECHNOLOGY**

## **(An Autonomous Institution)**



**Approved by AICTE, Recognized by UGC & Affiliated to Anna  
University Accredited by NBA-AICTE, NAAC-UGC with 'A++' Grade**

**Saravanampatti , Coimbatore -641035**

### **CURRICULA**

### **REGULATION 2023**

### **CHOICE BASED CREDIT SYSTEM**

## **DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

## **B.E. – ELECTRICAL AND ELECTRONICS ENGINEERING**



# SNS COLLEGE OF TECHNOLOGY

(An Autonomous Institution)

Coimbatore- 35



## DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

### VISION

To impart quality education committed to innovation and excellence in teaching, learning and research in Electrical Engineering field to cater the challenges of advance technologies and prepare globally competent Electrical Engineers with ethical values for serving individuals and society.

### MISSION

- To provide innovative and quality education programme for producing qualified Electrical Engineers to serve the nation and society with professional integrity and ethical values
- To provide state of art resources for creating and encouraging teaching and learning experiences.
- To impart with basic knowledge, interdisciplinary problem solving skills, social awareness and confidence required to excel in their chosen profession.
- To establish a conducive atmosphere for collaborative research and consultancy to produce engineers with a spirit of entrepreneurship.
- To produce industry ready graduates through industrial collaboration and other technical activities.

## PROGRAMME EDUCATIONAL OBJECTIVES (PEO)

<b>PEO-I</b>	Graduates will have the capability to succeed in the industry by adapting the contemporary technologies and to cater to the needs of the industry and society.
<b>PEO-II</b>	Graduates will have core engineering knowledge and software skills to understand, analyze and design Electrical and Electronics Engineering products and provide solutions for the real time applications.
<b>PEO-III</b>	Graduates will inculcate professional and ethical attitude, teamwork skills and leadership along with multi disciplinary approach.
<b>PEO-IV</b>	By pursuing higher studies, graduates will practice lifelong learning for continuing professional development.

## PROGRAMME OUTCOMES (PO)

<b>PO – 1</b>	<b>Engineering Knowledge:</b> Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
<b>PO – 2</b>	<b>Problem Analysis:</b> Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
<b>PO – 3</b>	<b>Design/Development of Solutions:</b> Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations
<b>PO – 4</b>	<b>Conduct Investigations of Complex Problems:</b> Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
<b>PO – 5</b>	<b>Modern Tool Usage:</b> Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
<b>PO – 6</b>	<b>The Engineer and Society:</b> Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
<b>PO – 7</b>	<b>Environment and Sustainability:</b> Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
<b>PO – 8</b>	<b>Ethics:</b> Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

<b>PO – 9</b>	<b>Individual and Team Work:</b> Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
<b>PO – 10</b>	<b>Communication:</b> Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
<b>PO – 11</b>	<b>Project Management and Finance:</b> Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
<b>PO – 12</b>	<b>Life-Long Learning:</b> Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

#### PROGRAMME SPECIFIC OUTCOMES (PSO)

<b>PSO-1</b>	Critically evaluate and obtain solutions for Electrical and Electronics Engineering problems by suitable mathematical approaches and procedures.
<b>PSO-2</b>	Design, simulate and develop systems for applications including electrical drives, power systems and control systems using appropriate tools.
<b>PSO-3</b>	Acquire the leadership skill by participating in a team performing laboratory exercise, project works and industry related problems.



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## DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

### R2023 - SUGGESTED CURRICULUM & SYLLABI

### B.E. – ELECTRICAL AND ELECTRONICS ENGINEERING

SUBJECT AREA	AICTE TOTAL CREDITS	SNSCT TOTAL CREDITS	CREDITS PER SEMESTER							
			I	II	III	IV	V	VI	VII	VIII
Humanity Science & Management (HSMC)	12	13	3	4	2	2	0	0	2	0
Basic Science (BSC)	25	26	8	8	5	5	0	0	0	0
Engineering Science (ESC)	24	25	8	9	0	2	4	2	0	0
Program Core (PCC)	48	59	0	0	15	12	12	13	7	0
Professional Elective (PEC)	18	15	0	0	0	0	3	3	3	6
Open Elective (OEC)	18	9	0	0	0	0	3	3	3	0
Project/Seminar/ Internship (EEC)	15	22	3	1	1	1	1	1	2	12
Mandatory Course (MC) -Non Credit	-	-	-	-	-	-	-	-	-	-
<b>TOTAL</b>	<b>160</b>	<b>169</b>	<b>22</b>	<b>22</b>	<b>23</b>	<b>22</b>	<b>23</b>	<b>22</b>	<b>17</b>	<b>18</b>

SEMESTER I										
S No	Course Code	Course Name	L	T	P	Contact hrs/week	Credit	Int/Ext	Category	Co Requisite
<b>Theory Courses</b>										
1.	23MAT101	Matrices and Calculus	3	1	0	4	4	40/60	BSC	-
2.	23PYT101	Physics for Engineers	3	0	0	3	3	40/60	BSC	-
3.	23CST101	Problem Solving and C Programming	3	0	0	3	3	40/60	ESC	-
4.	23GET102	Basic Civil and Mechanical Engineering	3	0	0	3	3	40/60	ESC	-
5.	23GET103	Heritage of Tamils	1	0	0	1	1	40/60	HSMC	-
<b>Theory Integrated Practical Courses</b>										
6.	23GEB101	Design Thinking and Innovation	1	0	4	5	3	50/50	EEC	-
<b>Practical courses</b>										
7.	23ENP101	Professional Communication	0	0	4	4	2	60/40	HSMC	-
8.	23PYP101	Physics Laboratory	0	0	2	2	1	60/40	BSC	23PYT101
9.	23CSP101	C Programming Laboratory	0	0	4	4	2	60/40	ESC	23CST101
<b>Mandatory Course</b>										
10.	23CHT103	Environmental Science and Sustainability	2	0	0	2	0	100/0	MC	-
11.	23HST101	Induction Program	3 Weeks			0	100/0	MC	-	
<b>Total</b>						<b>31</b>	<b>22</b>	<b>900</b>		

SEMESTER II										
S No	Course Code	Course Name	L	T	P	Contact hrs/week	Credit	Int/Ext	Category	Co Requisite
<b>Theory Courses</b>										
1.	23MAT102	Complex Analysis and Laplace Transforms	3	1	0	4	4	40/60	BSC	23MAT101
2.	23CHT101	Engineering Chemistry	3	0	0	3	3	40/60	BSC	-
3.	23ENT101	Communicative English	3	0	0	3	3	40/60	HSMC	23ENP101
4.	23GET104	Tamils and Technology	1	0	0	1	1	40/60	HSMC	23GET103
5.	23EET102	Electric Circuit Analysis	2	1	0	3	3	40/60	ESC	23PYT101
6.	23EET104	Analog Electronic Circuits	2	0	0	2	2	40/60	ESC	23PYT101
<b>Theory Integrated Practical Courses</b>										
7.	23MEB101	Engineering Graphics	1	0	2	3	2	50/50	ESC	23GET102
<b>Practical courses</b>										
8.	23CHP101	Chemistry Laboratory	0	0	2	2	1	60/40	BSC	23CHT101
9.	23GEP101	Workshop Practices	0	0	4	4	2	60/40	ESC	-
10.	23EEP101	Internship- I	2 Weeks			1	100/0	EEC	-	
<b>Mandatory Course</b>										
11.	23HST103	Indian Constitution	2	0	0	2	0	100/0	MC	-
<b>Total</b>						<b>27</b>	<b>22</b>	<b>1000</b>		

**SEMESTER III**

S No	Course Code	Course Name	L	T	P	Contact hrs/week	Credit	Int/Ext	Category	Co Requisite
<b>Theory Courses</b>										
1.	23MAT201	Partial Differential Equations and Transforms	3	0	0	3	3	40/60	BSC	23MAT102
2.	23EET201	Electromagnetic Fields	3	0	0	3	3	40/60	PCC	23EET102
3.	23EET202	Digital Electronics and Linear Integrated Circuits	3	0	0	3	3	40/60	PCC	23EET104
4.	23CST205	Object Oriented Programming using Java	3	0	0	3	3	40/60	PCC	23CST101
5.	23EET203	Electrical Machines- I	3	0	0	3	3	40/60	PCC	23EET102
6.	23GET275	VQAR- I	2	0	0	2	2	40/60	BSC	-
<b>Practical courses</b>										
7.	23GEP275	Personal Branding	0	0	4	4	2	60/40	HSMC	-
8.	23CSP205	Object Oriented Programming using Java Laboratory	0	0	3	3	1.5	60/40	PCC	23CSP101
9.	23EEP201	Electronics Laboratory	0	0	3	3	1.5	60/40	PCC	23GEP101
10.	23EEP202	Mini project- I	0	0	2	2	1	100/0	EEC	-
<b>Total</b>						<b>29</b>	<b>23</b>	<b>1000</b>		

**SEMESTER IV**

S No	Course Code	Course Name	L	T	P	Contact hrs/week	Credit	Int/Ext	Category	Co Requisite
<b>Theory Courses</b>										
1.	23MAT204	Statistics and Numerical Methods	3	0	0	3	3	40/60	BSC	23MAT201
2.	23EET204	Electrical Machines- II	3	0	0	3	3	40/60	PCC	23EET203
3.	23EET205	Control Systems	3	1	0	4	4	40/60	PCC	23EET102
4.	23EET206	Measurements and Instrumentation	2	0	0	2	2	40/60	PCC	23EET102
5.	23GET276	VQAR- II	2	0	0	2	2	40/60	BSC	23GET275
<b>Theory Integrated Practical Courses</b>										
6.		Language Elective	1	0	2	3	2	50/50	HSMC	-
<b>Practical courses</b>										
7.	23ITP204	Programming in Python	0	0	4	4	2	60/40	ESC	23CSP205
8.	23EEP203	Electrical Machines Laboratory	0	0	3	3	1.5	60/40	PCC	23EET204
9.	23EEP204	Measurements and Virtual Instrumentation Laboratory	0	0	3	3	1.5	60/40	PCC	23EET206
10.	23EEP205	Internship- II	2 Weeks				1	100/0	EEC	-
<b>Total</b>						<b>27</b>	<b>22</b>	<b>1000</b>		

SEMESTER V										
S No	Course Code	Course Name	L	T	P	Contact hrs/week	Credit	Int/Ext	Category	Co Requisite
<b>Theory Courses</b>										
1.	23EET301	Generation, Transmission and Distribution	3	0	0	3	3	40/60	PCC	23EET204
2.	23EET302	Power Electronics	3	0	0	3	3	40/60	PCC	23EET104
3.	23EET303	Microcontrollers and IoT	3	0	0	3	3	40/60	PCC	23EET205
4.	23EET304	Communication Engineering	2	0	0	2	2	40/60	PCC	23PYT101
5.	23EEEXXX	Professional Elective- I	3	0	0	3	3	40/60	PEC	-
6.	23EEOXXX	Open Elective- I	3	0	0	3	3	40/60	OEC	-
<b>Theory Integrated Practical Courses</b>										
7.		Career Course- I	2	0	4	6	4	50/50	ESC	-
<b>Practical courses</b>										
8.	23EEP301	Microcontrollers and Applications Lab	0	0	2	2	1	60/40	PCC	23EET205
9.	23EEP302	Mini project- II	0	0	2	2	1	100/0	EEC	-
<b>Total</b>						<b>27</b>	<b>23</b>	<b>900</b>		

SEMESTER VI										
S No	Course Code	Course Name	L	T	P	Contact hrs/week	Credit	Int/Ext	Category	Co Requisite
<b>Theory Courses</b>										
1.	23EET305	Power System Analysis	2	1	0	3	3	40/60	PCC	23EET301
2.	23EET306	Electric Drives and Control	3	0	0	3	3	40/60	PCC	23EET302
3.	23EET307	Electric Vehicle Technology	3	0	0	3	3	40/60	PCC	23EET302
4.	23EET308	AI Techniques for Electrical Engineering	2	0	0	2	2	40/60	PCC	23EET303
5.	23EEEXXX	Professional Elective- II	3	0	0	3	3	40/60	PEC	-
6.	23EEOXXX	Open Elective- II	3	0	0	3	3	40/60	OEC	-
<b>Theory Integrated Practical Courses</b>										
7.		Career Course II	1	0	2	3	2	50/50	ESC	-
<b>Practical courses</b>										
8.	23EEP303	Power System Laboratory I	0	0	2	2	1	60/40	PCC	23EET305
9.	23EEP304	Power Electronics and Drives Laboratory	0	0	2	2	1	60/40	PCC	23EET306
10.	23EEP305	Internship- III	2 Weeks				1	100/0	EEC	-
<b>Mandatory Course</b>										
11.	23HST105	Essence of Indian Traditional Knowledge	2	0	0	2	0	100/0	MC	-
<b>Total</b>						<b>26</b>	<b>22</b>	<b>1000</b>		

**SEMESTER VII**

S No	Course Code	Course Name	L	T	P	Contact hrs/week	Credit	Int/Ext	Category	Co Requisite
<b>Theory Courses</b>										
1.	23EET401	Power System Operation and Control	3	0	0	3	3	40/60	PCC	23EET305
2.	23EET402	Electrical Machines for Industrial Automation	3	0	0	3	3	40/60	PCC	23EET306
3.	23GET401	Universal Human Values	2	0	0	2	2	40/60	HSMC	-
4.	23EEEXXX	Professional Elective- III	3	0	0	3	3	40/60	PEC	-
5.	23EEOXXX	Open Elective- III	3	0	0	3	3	40/60	OEC	-
<b>Practical courses</b>										
6.	23EEP401	Power System Laboratory II	0	0	2	2	1	60/40	PCC	23EET301
7.	23EEP402	Project- I	0	0	4	4	2	60/40	EEC	-
<b>Total</b>						<b>20</b>	<b>17</b>	<b>700</b>		

**SEMESTER VIII**

S No	Course Code	Course Name	L	T	P	Contact hrs/week	Credit	Int/Ext	Category	Co Requisite
<b>Theory Courses</b>										
1.	23EEEXXX	Professional Elective- IV	3	0	0	3	3	40/60	PEC	-
2.	23EEEXXX	Professional Elective- V	3	0	0	3	3	40/60	PEC	-
<b>Practical courses</b>										
3.	23EEP403	Project- II	0	0	24	24	12	60/40	EEC	-
<b>Total</b>						<b>24</b>	<b>18</b>	<b>300</b>		

Professional Elective : Group I ( V SEMESTER)								
S No	Course Code	Course Name	L	T	P	C	Contact hrs/week	Co Requisite
1.	23XXXXXX	Principles of Management	3	0	0	3	3	-
2.	23EEE301	DC Power Supplies	3	0	0	3	3	-
3.	23EEE302	Utilization and Conservation of Electrical Energy	3	0	0	3	3	-
4.	23EEE303	Special Electrical Machines	3	0	0	3	3	-
5.	23EEE304	Renewable Energy Technologies	3	0	0	3	3	-

Professional Elective : Group II ( VI SEMESTER)								
S No	Course Code	Course Name	L	T	P	C	Contact hrs/week	Co Requisite
1.	23XXXXXX	Engineering Economics and Cost Analysis	3	0	0	3	3	-
2.	23EEE305	HVDC and FACTS	3	0	0	3	3	-
3.	23EEE306	Power Electronics for Renewable Energy Systems	3	0	0	3	3	-
4.	23EEE307	Embedded System Design	3	0	0	3	3	-
5.	23EEE308	Design of Motor and Power Converters for Electric Vehicles	3	0	0	3	3	-

Professional Elective : Group III ( VII SEMESTER)								
S No	Course Code	Course Name	L	T	P	C	Contact hrs/week	Co Requisite
1.	23XXXXXX	Total Quality Management	3	0	0	3	3	-
2.	23EEE401	Power Quality	3	0	0	3	3	-
3.	23EEE402	Smart Grid	3	0	0	3	3	-
4.	23EEE403	Energy Storage Systems	3	0	0	3	3	-
5.	23EEE404	Electric Vehicle Design, Mechanics and Control	3	0	0	3	3	-

Professional Elective : Group IV ( VIII SEMESTER)								
S No	Course Code	Course Name	L	T	P	C	Contact hrs/week	Co Requisite
1.	23EEE405	Energy Management and Auditing	3	0	0	3	3	-
2.	23EEE406	Embedded Control for Electric Drives	3	0	0	3	3	-
3.	23EEE407	Power System Economics	3	0	0	3	3	-
4.	23EEE408	Smart System Automation	3	0	0	3	3	-
5.	23EEE409	Design of Electric Vehicle Charging System	3	0	0	3	3	-

Professional Elective : Group V ( VIII SEMESTER)								
S No	Course Code	Course Name	L	T	P	C	Contact hrs/week	Co Requisite
1.	23EEE410	Electrical Safety	3	0	0	3	3	-
2.	23EEE411	Grid Integration of Electric Vehicles	3	0	0	3	3	-
3.	23EEE412	Power System Transients	3	0	0	3	3	-
4.	23EEE413	Biomedical Instruments for Electrical Sciences	3	0	0	3	3	-
5.	23EEE414	Intelligent Control of Electric Vehicles	3	0	0	3	3	-

Open Elective : Group I ( V SEMESTER)								
S No	Course Code	Course Name	L	T	P	C	Contact hrs/week	Co Requisite
1.	23EEO301	Renewable Energy Systems	3	0	0	3	3	-
2.	23EEO302	Electric and Hybrid Vehicles	3	0	0	3	3	-
3.	23EEO303	Energy Storage and Conservation	3	0	0	3	3	-
4.	23EEO304	Intellectual Property Rights	3	0	0	3	3	-
5.	23EEO305	Foundation Skills in Integrated Electrical Product Development	3	0	0	3	3	-

Value Added Courses								
S No	Course Code	Course Name	L	T	P	C	Contact hrs/week	Co Requisite
1.	23VEE101	Automotive Cyber Security and Vehicle Networks	-	-	-	1	-	-
2.	23VEE102	Design and Development of Battery Technology for Electric Vehicle	-	-	-	1	-	-
3.	23VEE103	Automotive Embedded Systems and AUTOSAR	-	-	-	1	-	-
4.	23VEE104	Design of Hybrid Electric Vehicle using MATLAB	-	-	-	1	-	-

23MAT101	MATRICES AND CALCULUS			L	T	P	C	
(Common to all B.E. / B. Tech. Courses)				3	1	0	4	
<b>COURSE OBJECTIVES:</b>								
<ul style="list-style-type: none"> <li>To develop the use of matrix algebra techniques that is needed by engineers for practical applications.</li> <li>To acquaint the student with mathematical tools needed in evaluating differential calculus, multiple integrals and their applications.</li> </ul>								
<b>UNIT I</b>	<b>MATRIX EIGENVALUE PROBLEM</b>						<b>9+</b>	<b>3</b>
Eigenvalues and Eigenvectors of a real matrix – Properties of Eigenvalues and Eigenvectors – Cayley Hamilton Theorem (statement only) and its applications – Eigenvalue problems arising from population models (Leslie model).								
<b>UNIT II</b>	<b>ORTHOGONAL TRANSFORMATION OF A REAL SYMMETRIC MATRIX</b>						<b>9+</b>	<b>3</b>
Diagonalization of a real symmetric matrix – Quadratic form – Canonical form – Nature of the quadratic form – Reduction of quadratic form to canonical form by orthogonal transformation – Applications: Stretching of an elastic membrane.								
<b>UNIT III</b>	<b>DIFFERENTIAL CALCULUS</b>						<b>9+</b>	<b>3</b>
Curvature – Radius of Curvature in Cartesian co-ordinates – Centre of curvature and circle of curvature in Cartesian Co-ordinates – Evolutes – Envelopes.								
<b>UNIT IV</b>	<b>FUNCTIONS OF SEVERAL VARIABLES</b>						<b>9+</b>	<b>3</b>
Partial derivatives – Homogeneous functions and Euler's theorem – Jacobians – Taylor's series for functions of two variables – Applications: Maxima and minima of functions of two variables – Lagrange's method of undetermined multipliers.								
<b>UNIT V</b>	<b>MULTIPLE INTEGRALS</b>						<b>9+</b>	<b>3</b>
Double integrals (Cartesian co-ordinates) – Change of order of integration – Applications of double integrals (Area) – Triple integrals (Cartesian co-ordinates) – Applications: Volume of solids.								
				<b>L:45</b>	<b>T:0</b>	<b>P: 0</b>	<b>Total: 45 Periods</b>	
<b>TEXT BOOKS</b>								
<b>T1</b>	Kreyszig, E., Advanced Engineering Mathematics, John Wiley and Sons, 10 <sup>th</sup> Edition, New Delhi 2016.							
<b>T2</b>	James Stewart, Calculus, Cengage Learning, 8 <sup>th</sup> Edition, New Delhi 2015.							
<b>REFERENCES</b>								
<b>R1</b>	Grewal, B.S., Higher Engineering Mathematics, Khanna Publishers, New Delhi, 44 <sup>th</sup> Edition, 2018.							
<b>R2</b>	Bali, N.P, Goyal, M. and Watkins, C., Advanced Engineering Mathematics, Firewall Media (An imprint of Lakshmi Publications Pvt., Ltd.), New Delhi, 7 <sup>th</sup> Edition, 2009.							
<b>R3</b>	Jain, R.K. and Iyengar, S.R.K., Advanced Engineering Mathematics, Narosa Publications, New Delhi, 5 <sup>th</sup> Edition, 2016.							
<b>R4</b>	Ramana, B.V., Higher Engineering Mathematics, McGraw Hill Education Pvt. Ltd, New Delhi, 2016.							
<b>R5</b>	Thomas, G. B., Hass, J, and Weir, M.D, Thomas Calculus, 14 <sup>th</sup> Edition, Pearson India, 2018.							
<b>COURSE OUTCOMES</b>								



23PYT102	PHYSICS FOR ENGINEERS			L	T	P	C
(Common to AIML,BME,CSE,ECE,EEE & IT)				3	0	0	3
<b>COURSE OBJECTIVES:</b>							
<ul style="list-style-type: none"> <li>To comprehend and classify different crystal structures and impart the knowledge about conductors, superconductors and semiconductors.</li> <li>To build knowledge about magnetism and understand the origin of laser action, fibre optics, and their applications.</li> </ul>							
<b>UNIT I</b>	<b>CRYSTAL STRUCTURE</b>						<b>9</b>
Single crystalline, polycrystalline and amorphous materials – single crystals: unit cell, crystal systems, Bravais lattices, Miller indices, directions and planes in a crystal – inter-planar distances - coordination number and packing factor for SC, BCC, FCC, HCP structures - Crystal imperfections – point, line, surface and volume imperfections.							
<b>UNIT II</b>	<b>CONDUCTING AND SUPERCONDUCTING MATERIALS</b>						<b>9</b>
Conductors: classical free electron theory – electrical conductivity - Success and failures of classical free electron theory - Quantum free electron theory of metals - Fermi distribution function - Density of energy states for a metal – Carrier concentration in a metal. Superconductors: properties – Meissner effect – type I & II superconductors – BCS theory – Applications: Superconducting Quantum Interference Device (SQUID), Magnetic levitation.							
<b>UNIT III</b>	<b>SEMICONDUCTOR PHYSICS</b>						<b>9</b>
Intrinsic Semiconductors – Energy band diagram – direct and indirect bandgap semiconductors – Carrier concentration in intrinsic semiconductors – Fermi level – Variation of Fermi level with temperature – electrical conductivity – band gap determination – extrinsic semiconductors - Hall effect – Determination hall coefficient – Applications – Photo detectors (PIN & Avalanche).							
<b>UNIT IV</b>	<b>MAGNETISM</b>						<b>9</b>
Basic concepts – magnetic moment, susceptibility, permeability - Origin of magnetic moment – Bohr magneton – Dia, Para and Ferro magnetism – Domain theory – Hysteresis – soft and hard magnetic materials – anti ferromagnetic materials – Ferrites and its applications - Magnetic storage devices- magnetic hard disc, bubble memory.							
<b>UNIT V</b>	<b>LASER AND FIBRE OPTICS</b>						<b>9</b>
Spontaneous and stimulated emission - Population inversion - Einstein's A and B coefficients- Types of lasers – CO <sub>2</sub> , Semiconductor lasers - Industrial and Medical Applications. Optics Fibre: Principle and propagation of light in optical fibres – Numerical aperture and Acceptance angle - Types of optical fibres (material, refractive index, mode) – Losses in optical fibre- attenuation, dispersion, bending-Fibre Optical Communication system (Block diagram).							
				<b>L:45</b>	<b>T:0</b>	<b>P: 0</b>	<b>Total: 45 Periods</b>
<b>TEXT BOOKS</b>							
<b>T1</b>	S.O. Pillai, "Solid State Physics", 10 <sup>th</sup> Edition, 2023, New Age International Private Limited.						
<b>T2</b>	Gaur R.K. And Gupta S.L, "Engineering Physics", 2013, Dhanpat Rai publishers.						
<b>T3</b>	M N Avadhanulu, P G Kshirsagar & TVS Arun Murthy, "A Textbook of Engineering Physics", 11 <sup>th</sup> edition, 2020, S. Chand Publishing.						
<b>T4</b>	R Murugesan & Kiruthiga Sivaprasath, "Modern Physics", 18 <sup>th</sup> edition, 2019 S.Chand Publishing.						
<b>T5</b>	Hitendra K. Malik (Author), A.K. Singh (Author), "Engineering Physics", 2 <sup>nd</sup> Edition, 2017, McGraw Hill Education.						
<b>REFERENCES</b>							



23CST101	PROBLEM SOLVING and C PROGRAMMING				L	T	P	C
(Common to CSE/IT/AIIML/EEE)					3	0	0	3
<b>COURSE OBJECTIVES:</b>								
<ul style="list-style-type: none"> <li>To comprehend and classify different crystal structures and impart the knowledge about conductors, superconductors and semiconductors.</li> <li>To build knowledge about magnetism and understand the origin of laser action, fibre optics, and their applications.</li> </ul>								
<b>UNIT I</b>	<b>INTRODUCTION TO PROBLEM SOLVING TECHNIQUES</b>							<b>9</b>
Fundamentals-Computer Hardware-Computer Software-Algorithms-Building blocks of algorithms (statements, state, control flow, functions) – Notation (pseudo code, flowchart, and programming language) -Problem formulation –Algorithmic problem solving-Simple strategies for developing algorithms(iteration,recursion).Illustrative problems.								
<b>UNIT II</b>	<b>C PROGRAMMING BASICS</b>							<b>9</b>
Introduction to ‘C’ Programming –Fundamental rules – Structure of a ‘C’ program – Compilation and Linking processes –Constants, Variables, keywords, Identifier, Delimiters – Declaring and Initializing variables – Data Types – Operators and Expressions–Managing Input and Output operations– Decision Making and Branching–Looping statements–Illustrative programs								
<b>UNIT III</b>	<b>ARRAYS AND STRINGS</b>							<b>9</b>
Arrays – Characteristics, Initialization – Declaration – One dimensional and two dimensional arrays -String-String operations – String Arrays. Simple programs-Sorting - Searching – Matrix operations (Addition, subtraction and Multiplication)–Illustrative programs.								
<b>UNIT IV</b>	<b>FUNCTIONS AND POINTERS</b>							<b>9</b>
Function–Definition of function–User-defined Functions-Declaration of function–Call by reference – Call by value – Recursion – Pointers - Definition – Initialization –Operations on pointers-Pointer arithmetic –Pointers and arrays–Illustrative programs.								
<b>UNIT V</b>	<b>STRUCTURES, UNIONS AND FILES</b>							<b>9</b>
Defining Structures and Unions– Structure declaration – Need for Structure data type-Structure within a structure -Union -Programs using structures and Unions-Pre-processor directives–Files: Opening and Closing a Data File – Reading and writing a data file – Processing a data file - Illustrative programs.								
					<b>L:45</b>	<b>T:0</b>	<b>P: 0</b>	<b>Total: 45 Periods</b>
<b>TEXT BOOKS</b>								
<b>T1</b>	E.Balagurusamy, “Fundamentals of Computing and Computer Programming”, 2nd Edition Tata Mc Graw-Hill Publishing Company Limited, (2019).							
<b>T2</b>	Ashok.N.Kamthane, “Computer Programming”, 3 <sup>rd</sup> Edition, Pearson Education (India) (2015).							
<b>REFERENCES</b>								
<b>R1</b>	Byron Gottfried, “Programming with C”, 2nd Edition, (Indian Adapted Edition), TMH							
<b>R2</b>	Herbert Schildt “C - The Complete Reference” 4th Edition, McGraw Hill, 2017							
<b>R3</b>	P.Sudharson, “Computer Programming”, RBA Publications, 2008							
<b>R4</b>	Yashavant P.Kanetkar. “Let Us C”, BPB Publications, 2014.							
<b>COURSE OUTCOMES</b>								
<b>At the end of the course students should be able to</b>								
<b>CO 1</b>	Develop algorithmic solutions to solve simple computational problems.							
<b>CO 2</b>	Think logically and understand the basic concepts of C and write simple C programs.							



23GET10	BASIC CIVIL AND MECHANICAL ENGINEERING				L	T	P	C
(Common to CSE, ECE, EEE, IT,AIML and BIO)					3	0	0	3
<b>COURSE OBJECTIVES:</b>								
<ul style="list-style-type: none"> <li>To comprehend and classify different crystal structures and impart the knowledge about conductors,superconductors and semiconductors.</li> <li>To build knowledge about magnetism and understand the origin of laser action, fibre optics, and their applications.</li> </ul>								
<b>UNIT I</b>	<b>CIVIL ENGINEERING MATERIALS AND SURVEYING</b>							<b>11</b>
Introduction: Civil engineering-scope of civil engineering-building materials- Brick, stone, cement, concrete, properties-uses Surveying: Objects – types – classification – principles – measurements of distances – angles – Concepts of levelling – determination of areas – illustrative examples.								
<b>UNIT II</b>	<b>BUILDING COMPONENTS</b>							<b>10</b>
Sub Structure: Types of foundation - Bearing capacity – Requirement of good foundations. Superstructure: Types of structure - Types of masonry – beams – columns – lintels – roofing – flooring – plastering.								
<b>UNIT III</b>	<b>OVERVIEW OF MECHANICAL ENGINEERING</b>							<b>8</b>
Basics of Foundry – Welding and its types – 3D Printing – Lathe and its types - Mechanical & Automation - Interdisciplinary concepts in Mechanical Engineering.								
<b>UNIT IV</b>	<b>IC ENGINES AND POWER PLANT ENGINEERING</b>							<b>8</b>
Internal combustion engines as automobile power plant – Working principle of Petrol and Diesel Engines – Four stroke and two stroke cycles –. Introduction, Classification of Power Plants – Working principle of steam, Gas, Diesel, Hydro-electric, Nuclear and Solar Power plants – Merits and Demerits								
<b>UNIT V</b>	<b>REFRIGERATION AND AIR CONDITIONING SYSTEM</b>							<b>8</b>
Terminology of Refrigeration and Air Conditioning. Principle of vapor compression and absorption system–Layout of typical domestic refrigerator–Window and Split type room Air conditioner. Properties of air – water mixture, concepts of psychometric and its process.								
					<b>L:45</b>	<b>T:0</b>	<b>P: 0</b>	<b>Total: 45 Periods</b>
<b>TEXT BOOKS</b>								
<b>T1</b>	Naveen Sait.A., Soundararajan.R., “Basic Civil and Mechanical Engineering”, RP Publications, Coimbatore, (2017).							
<b>T2</b>	Venugopal K and Prahua Raja V, “Basic Mechanical Engineering”, AnuradhaPublishers, Kumbakonam, (2017).							
<b>REFERENCES</b>								
<b>R1</b>	Shanmugam G and Palanichamy M S, “Basic Civil and Mechanical Engineering”,Tata McGraw Hill Publishing Co., New Delhi, (2017).							
<b>R2</b>	Rangwala,S.C., “ Engineering Materials” , Charotar Publishing House, Anand, 2016.							
<b>R3</b>	Rao, P N, —Manufacturing Technology: Foundry, Forming And Welding”, Tata McGraw-Hill, New Delhi, 2016.							
<b>R4</b>	Jonathan Wickert, & Kemper Lewis “An Introduction to Mechanical Engineering”, Jonathan Wickert and Kemper E. Lewis, Third Edition (2017).							
<b>R5</b>	<a href="#">RS Khurmi &amp; JK Gupta</a> , “Refrigeration and Air Conditioning”, S. Chand Publishing 2018.							
<b>COURSE OUTCOMES</b>								
<b>At the end of the course students should be able to</b>								
<b>CO 1</b>	Describe about building materials & surveying equipment’s in real time.							
<b>CO 2</b>	Outline the basic building components and requirements of good foundation.							



23GET103	HERITAGE OF TAMILS				L	T	P	C
(Common to All B.E. / B. Tech. Courses)					1	0	0	1
<b>COURSE OBJECTIVES:</b>								
<ul style="list-style-type: none"> <li>To comprehend and classify different crystal structures and impart the knowledge about conductors, superconductors and semiconductors.</li> <li>To build knowledge about magnetism and understand the origin of laser action, fibre optics, and their applications.</li> </ul>								
<b>UNIT I</b>	<b>LANGUAGE AND LITERATURE</b>							<b>3</b>
Language Families in India - Dravidian Languages – Tamil as a Classical Language - Classical Literature in Tamil – Secular Nature of Sangam Literature – Distributive Justice in Sangam Literature - Management Principles in Thirukural - Tamil Epics and Impact of Buddhism & Jainism in Tamil Land - Bakthi Literature Azhwars and Nayanmars - Forms of minor Poetry - Development of Modern literature in Tamil - Contribution of Bharathiyar and Bharathidhasan.								
<b>UNIT II</b>	<b>HERITAGE - ROCK ART PAINTINGS TO MODERN ART – SCULPTURE</b>							<b>3</b>
Hero stone to modern sculpture - Bronze icons - Tribes and their handicrafts - Art of temple car making - - Massive Terracotta sculptures, Village deities, Thiruvalluvar Statue at Kanyakumari, Making of musical instruments - Mridhangam, Parai, Veenai, Yazh and Nadhaswaram - Role of Temples in Social and Economic Life of Tamils.								
<b>UNIT III</b>	<b>FOLK AND MARTIAL ARTS</b>							<b>3</b>
Therukoothu, Karagattam, Villu Pattu, Kaniyan Koothu, Oyillattam, Leatherpuppetry, Silambattam, Valari, Tiger dance - Sports and Games of Tamils.								
<b>UNIT IV</b>	<b>THINAI CONCEPT OF TAMILS</b>							<b>3</b>
Flora and Fauna of Tamils & Aham and Puram Concept from Tholkappiyam and Sangam Literature - Aram Concept of Tamils - Education and Literacy during Sangam Age - Ancient Cities and Ports of Sangam Age - Export and Import during Sangam Age - Overseas Conquest of Cholas.								
<b>UNIT V</b>	<b>CONTRIBUTION OF TAMILS TO INDIAN NATIONAL MOVEMENT AND INDIAN CULTURE</b>							<b>3</b>
Contribution of Tamils to Indian Freedom Struggle - The Cultural Influence of Tamils over the other parts of India – Self-Respect Movement - Role of Siddha Medicine in Indigenous Systems of Medicine – Inscriptions & Manuscripts – Print History of Tamil Books. TO								
					<b>L:15</b>	<b>T:0</b>	<b>P: 0</b>	<b>Total: 15 Periods</b>
<b>TEXT BOOKS</b>								
<b>T1</b>	தமிழக வரலாறு – மக்களும் பண் பொடும் – கக.கக. பிள்ளை (தவளியீடு: தமிழ்நொடு பொடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).							
<b>T2</b>	கணினித்தமிழ் – முளனவரில. சுந்தரம். (விகடன் பிரசுரம்)							
<b>T3</b>	கீழடி – ளவளக நதிக்களரயில் சங்ககொல நகர நொகரிகம் (ததொல்லியல் துளற தவளியீடு)							
<b>T4</b>	தபொருளந – ஆற்றங்களர நொகரிகம். (ததொல்லியல் துளற தவளியீடு)							
<b>T5</b>	Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)							
<b>T6</b>	Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by:							



23GEB101	DESIGN THINKING AND INNOVATION				L	T	P	C	
(Common to All B.E. / B. Tech. Courses)					1	0	4	3	
<b>COURSE OBJECTIVES:</b>									
<ul style="list-style-type: none"> <li>To comprehend and classify different crystal structures and impart the knowledge about conductors, superconductors and semiconductors.</li> <li>To build knowledge about magnetism and understand the origin of laser action, fibre optics, and their applications.</li> </ul>									
<b>UNIT I</b>	<b>INTRODUCTION TO DESIGN THINKING</b>							<b>3+</b>	<b>12</b>
A brief insight to Design Thinking and Innovation- People Centered Design & Evoking the 'right problem'- Purpose of Design Thinking- Design Thinking Framework.									
<b>UNIT II</b>	<b>PROCESS IN DESIGN THINKING (EMPATHY, DEFINE)</b>							<b>3+</b>	<b>12</b>
Design Thinking Process – Empathy – Uncovering and Investigating Community Concerns Define: Examine and Reflect on the problem.									
<b>UNIT III</b>	<b>CONCEPTING AND BUILDING (IDEA, CREATE)</b>							<b>3+</b>	<b>12</b>
Generating Ideas-Identifying top three ideas-Bundling the Ideas and create concepts-Rapid Prototyping									
<b>UNIT IV</b>	<b>TESTING, REFINING AND PITCHING THE IDEAS</b>							<b>3+</b>	<b>12</b>
Importance & Testing the Design with People-Retest and Redefine Results-Creating a Pitch for the design.									
<b>UNIT V</b>	<b>VALUE PROPOSITION DESIGN</b>							<b>3+</b>	<b>12</b>
Business Vs Startup-Briefing the Problem-Problem Validation and User Discovery- Challenge Brief.									
					<b>L:15</b>	<b>T:0</b>	<b>P:60</b>	<b>Total: 75 Periods</b>	
<b>TEXT BOOKS</b>									
<b>T1</b>	Robert A Curedale, Design Thinking Process & Methods 4th Edition, December 2017, Des Community College Inc.								
<b>T2</b>	Andrew Pressman, Design Thinking: A Guide to Creative Problem Solving for Everyone,								
<b>REFERENCES</b>									
<b>R1</b>	Idris Mootee, Design Thinking for Strategic Innovation - What They Can't Teach You at Business or Design School, First Edition, 2017, Wiley.								
<b>R2</b>	Yves Pigneur, Greg Bernarda, Alan Smith, Trish Papadacos Alex Osterwalder, Value Proposition Design: How to Create Products and Services Customers Want, 2015, Wiley.								
<b>R3</b>	Brown, Tim, and Barry Katz. Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation, 2009, Harper Business.								
<b>COURSE OUTCOMES</b>									
<b>At the end of the course students should be able to</b>									
<b>CO 1</b>	Learn new approach-design thinking that enhances innovation activities in terms of market imp value creation, and speed.								
<b>CO 2</b>	Feel the Empathy and can define their problems based on the Community Concerns								
<b>CO 3</b>	Strengthen their individual and collaborative capabilities to identify customer needs, create sound concept hypotheses, collect appropriate data, and develop a prototype that allows for meaningful feedback in a real-world environment								



23ENP101	PROFESSIONAL COMMUNICATION			L	T	P	C
				0	0	4	2
<b>COURSE OBJECTIVES:</b>							
<ul style="list-style-type: none"> <li>To develop students' verbal communication skills, enabling them to engage in clear, confident, and coherent discussions with one or multiple listeners, using effective communicative strategies.</li> <li>To equip students with a thorough understanding of communication principles, enabling them to apply these effectively in a professional workplace environment.</li> </ul>							
<b>UNIT I</b>	<b>LISTENING SKILLS</b>						<b>10</b>
The process of Listening & Barriers of listening, Listening to TED Talks and note taking, – Listening to conversations for specific information, Listening to classroom lectures/ talks/documentaries.							
<b>UNIT II</b>	<b>READING</b>						<b>10</b>
Cloze exercises, Picture perception, Reading and paraphrasing, Reading and interpreting.							
<b>UNIT III</b>	<b>PROFESSIONAL WRITING</b>						<b>10</b>
Cover letter & Resume preparation, Email writing – formal & Informal, Content writing- planning- writing- editing and proofreading, Report writing- types of report, report format - Fire Accident & Road Accident.							
<b>UNIT IV</b>	<b>COMMUNICATION &amp; SOFT SKILLS</b>						<b>15</b>
Communication & Barriers of Communication- Verbal & Nonverbal Communication, Time Management, Stress Management, Inter & Intra personal skills, Professional ethics, BasicEtiquettes- Social Etiquette- Telephone Etiquettes- Corporate Etiquette.							
<b>UNIT V</b>	<b>SPEAKING</b>						<b>15</b>
Introduction of self and others, Extempore Speech, Public Speaking, Art of Storytelling- Describing and Narrating, Presentation Skills- preparing PPT and Oral presentation, – Group Discussion – Team building- Mock GD, Interview skills- resume based questions-Competency based question- Mock Interview.							
				<b>L:45</b>	<b>T:0</b>	<b>P:60</b>	<b>Total: 60 Periods</b>
<b>TEXT BOOKS</b>							
<b>T1</b>	Raman, Meenakshi & Sangeetha Sharma. Technical Communication: Principles and Practice, Oxford University Press, New Delhi, 2011.						
<b>T2</b>	Rizvi, Ashraf. M. Effective Technical Communication, Tata McGraw-Hill, New Delhi, 2005.						
<b>REFERENCES</b>							
<b>R1</b>	Muralikrishna, & Sunita Mishra. Communication Skills for Engineers. Pearson, New Delhi. 2011						
<b>R2</b>	Mitra K. Barun, —Effective Technical Communication – A Guide for Scientists and Engineers, Oxford University Press, New Delhi, 2006.						
<b>R3</b>	Leo Jones, Richard Alexander, New International Business English, updated Edition, Cambridge University Press, NY, USA.						
<b>R4</b>	Smith—Worthington, Darlene & Sue Jefferson. Technical Writing for Success. Cengage, Mason USA.						
<b>R5</b>	Sharon J. Gerson, Steven M. Gerson, —Technical Writing – Process & Product. 3rd Edition, Pearson Education (Singapore) (P) Ltd., New Delhi.						



23PYP101	PHYSICS LABORATORY			L	T	P	C
(Common to All Branches)			0	0	2	1	
<b>COURSE OBJECTIVES:</b>							
<ul style="list-style-type: none"> <li>To develop the knowledge with an experimental understanding the properties of matter, semiconductors, viscosity and optics.</li> <li>To make the students build knowledge on the practical oriented skills.</li> </ul>							
<b>BASIC MEASURING INSTRUMENT</b>							
<ol style="list-style-type: none"> <li>Screw Gauge</li> <li>Vernier Caliper</li> <li>Travelling Microscope</li> <li>Spectrometer</li> </ol>							
<b>LIST OF EXPERIMENTS - 30 hours</b>							
<ol style="list-style-type: none"> <li>Determination of wavelength of mercury spectrum – Spectrometer grating.</li> <li>Determination of Young’s modulus of the material – uniform bending.</li> <li>Determination of viscosity of liquid – Poiseuille’s method.</li> <li>(a) Determination of the Wavelength of a Laser (b) Particle size determination using Diode Laser.</li> <li>Determination of the Numerical Aperture and the acceptance angle of an optical fiber.</li> <li>Determination of thickness of a thin wire – Air wedge method.</li> <li>Determination of dispersive power of a prism using spectrometer.</li> <li>Determination of Young’s modulus of the material – non uniform bending.</li> <li>Torsional Pendulum - Determination of rigidity modulus of wire and moment of Inertia of disc.</li> <li>Determination of Band gap of semiconductor material.</li> </ol>							
			<b>L:0</b>	<b>T:0</b>	<b>P:60</b>	<b>Total: 60 Periods</b>	
Experiment Beyond Syllabus : Demonstration of Deflection Magnetometer							
<b>TEXT BOOKS</b>							
<b>T1</b>	Physics Laboratory Manual, Department of Physics, 2019, SNSCT.						
<b>REFERENCES</b>							
<b>R1</b>	R.Jayaraman, V.Umadevi, S.Maruthamuthu, B.Saravanakumar, “Engineering Physics Laboratory Manual”, 2013 Pearson Education India.						
<b>COURSE OUTCOMES</b>							
<b>At the end of the course students should be able to</b>							
<b>CO 1</b>	Evaluate the young’s modulus and Rigidity Modulus of the given material.						
<b>CO 2</b>	Realize the concept of diffraction, Interference and dispersive power.						
<b>CO 3</b>	Extend the knowledge on applying the principles of laser, fiber optics.						
<b>CO 4</b>	Analyze the concept of viscosity and its significance on liquids.						
<b>CO 5</b>	Gain practical experience to determine the band gap of a semiconductor.						



<b>23CSP101</b>	<b>C PROGRAMMING LABORATORY</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>(Common to CSE, IT, AIML and EEE)</b>		<b>0</b>	<b>0</b>	<b>4</b>	<b>2</b>
<b>COURSE OBJECTIVES:</b>					
<ul style="list-style-type: none"> <li>• To develop the knowledge with an experimental understanding the properties of matter, semiconductors, viscosity and optics.</li> <li>• To make the students build knowledge on the practical oriented skills.</li> </ul>					
<b>LIST OF EXPERIMENTS</b>					
<b>Simple C Programming 60 hours</b>					
<ol style="list-style-type: none"> <li>1. Solving problems using I/O Statements, Operators &amp; Expressions.</li> <li>2. Programs using Conditional Statements and Looping.</li> <li>3. Programming for one dimensional and two dimensional arrays.</li> <li>4. Solving problems using user defined, pre-defined and Recursive functions</li> <li>5. Programs using Strings</li> <li>6. Programs using Pointers</li> <li>7. Programs using Structures &amp; Union</li> <li>8. Programs using Files</li> </ol> <p>*Flowchart and pseudo code are essential</p> <p><b>HARDWARE/ SOFTWARE REQUIRED FOR A BATCH OF 30 STUDENTS</b></p> <p><b>Hardware</b></p> <ol style="list-style-type: none"> <li>1. LAN System with 33 nodes(OR)Standalone PCs–33 Nos.</li> <li>2. Printers– 3 Nos.</li> </ol> <p><b>Software</b></p> <ol style="list-style-type: none"> <li>1. OS–Windows/UNIXClone Compiler–C</li> </ol>					
		<b>L:0</b>	<b>T:0</b>	<b>P:60</b>	<b>Total: 60 Periods</b>
<b>COURSE OUTCOMES</b>					
<b>At the end of the course students should be able to</b>					
<b>CO 1</b>	Write simple Cprograms using basic C concepts (sequential programs)				
<b>CO 2</b>	Write C programs using concepts in control statements (selection and repetition)				
<b>CO 3</b>	Solve cases applying concept of one-and two - dimensional arrays				
<b>CO 4</b>	Apply the concept of strings, pointers and functions in solving real world problems				
<b>CO 5</b>	Identify various solutions using Unions, Structures and files				



<b>23CHT103</b>	<b>ENVIRONMENTAL SCIENCE &amp; SUSTAINABILITY</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
(Common to all B.E. / B. Tech. Courses)		<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>COURSE OBJECTIVES:</b>					
<ul style="list-style-type: none"> <li>To introduce the basic concepts of environment, ecosystem and biodiversity and to impart knowledge on environmental pollution, renewable and non-renewable resources and causes of degradation.</li> <li>To inculcate and embrace sustainability practices and develop a broad understanding on green materials, concept of carbon credit and changes of environmental management.</li> </ul>					
<b>UNIT I</b>	<b>ENVIRONMENT AND BIODIVERSITY</b>	<b>6</b>			
Definition, scope and importance of environment – need for public awareness. Eco-system and Energy flow– ecological succession. Introduction to biodiversity– Values of biodiversity – threats to biodiversity – endangered and endemic species of India – conservation of biodiversity: In-situ and ex-situ conservation of biodiversity. Field visit on Biodiversity.					
<b>UNIT II</b>	<b>ENVIRONMENTAL POLLUTION</b>	<b>6</b>			
Environmental Pollution -Causes, Effects and Preventive measures of Water, Soil, Air and Noise Pollution. Solid, Hazardous and E-Waste management. Case studies on Occupational Health and Safety Management system (OHASMS). Environmental protection, Environmental protection acts.					
<b>UNIT III</b>	<b>RENEWABLE SOURCES OF ENERGY-NIT (Trichy)</b>	<b>6</b>			
Energy management and conservation, New Energy Sources: Need of new sources. Solar energy, Wind energy, Ocean energy resources, Tidal energy conversion. Concept, origin and power plants of geothermal energy. Case study on Present Energy resources in India and its sustainability.					
<b>UNIT IV</b>	<b>SUSTAINABILITY PRACTICES</b>	<b>6</b>			
Zero waste and R concept, Circular economy, ISO 14000 Series, Material Life cycle assessment, Environmental Impact Assessment. Sustainable habitat: Green buildings, Green materials, Energy efficiency, Sustainable transports. Sustainable energy: Energy Cycles carbon cycle, emission and Sequestration, Sustainable urbanization and technological change.					
<b>UNIT V</b>	<b>SUSTAINABILITY AND MANAGEMENT</b>	<b>6</b>			
Development, GDP, Sustainability - concept, needs and challenges-economic and social aspects of sustainability - millennium development goals and protocols Global, Regional and local environmental issues and possible solutions-case studies. Concept of Carbon Credit, Carbon Footprint. Environmental management in industry- A case study.					
		<b>L:30</b>	<b>T:0</b>	<b>P: 0</b>	<b>Total: 30 Periods</b>
<b>TEXT BOOKS</b>					
<b>T1</b>	Anubha Kaushik and C. P. Kaushik's "Perspectives in Environmental Studies", 6th Edition, New Age International Publishers, 2018.				
<b>T2</b>	Benny Joseph, 'Environmental Science and Engineering', Tata McGraw-Hill, New Delhi, 2016.				
<b>T3</b>	Allen, D. T. and Shonnard, D. R., Sustainability Engineering: Concepts, Design and Case Studies, Prentice Hall.				
<b>REFERENCES</b>					
<b>R1</b>	G.Tyler Miller, "Environmental Science" Cengage Learning India Pvt.Ltd.New Delhi.2011				
<b>R2</b>	R.K. Trivedi, 'Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards', Vol. I and II, Enviro Media. 38 . Edition 2010.				
<b>R3</b>	Gilbert M. Masters and Wendell. P.Ela, "Introduction to Environmental Engineering and Science" PHI Learning Pvt. Ltd. New Delhi.2010.				
<b>R4</b>	Rajagopalan, R, 'Environmental Studies-From Crisis to Cure', Oxford University Press, Third Edition, 2015.				



23MAT102	COMPLEX ANALYSIS AND LAPLACE TRANSFORMS	L	T	P	C
(Common to AEROSPACE,AGRI,AUTO,BME,CIVIL,ECE,EEE,FT,MECH,MCT)		3	1	0	4
<b>COURSE OBJECTIVES:</b>					
<ul style="list-style-type: none"> <li>To develop an understanding of the standard techniques of complex variable theory so as to enable the student to apply them with confidence, in application areas such as heat conduction, elasticity, fluid dynamics and flow the of electric current.</li> <li>To make the student appreciate the purpose of using transforms to create a new domain in which it is easier to handle the problem that is being investigated.</li> </ul>					
<b>UNIT I</b>	<b>VECTOR CALCULUS</b>	<b>9+3</b>			
Derivatives: Gradient and Directional derivatives – Divergence and Curl of a vector field – Solenoidal and Irrotational of a vector – Green’s, Gauss divergence and Stoke’s theorems (statements only) – Verification of theorems and application in evaluating line, surface and volume integrals					
<b>UNIT II</b>	<b>ORDINARY DIFFERENTIAL EQUATIONS</b>	<b>9+3</b>			
Higher order linear differential equations with constant coefficients – Method of variation of parameters – Homogenous equation of Euler’s and Legendre’s type – Solution of system of simultaneous linear first order differential equations with constant coefficients					
<b>UNIT III</b>	<b>COMPLEX DIFFERENTIATION</b>	<b>9+3</b>			
Derivatives of $f(z)$ – Analytic function – Cauchy-Riemann Equations – Harmonic function – Harmonic conjugate – Construction of Analytic function – Conformal Mapping – Mapping by functions: $w = z + c$ , $cz$ , $1/z$ – Bilinear transformations – Application to flow problems.					
<b>UNIT IV</b>	<b>COMPLEX INTEGRATION</b>	<b>9+3</b>			
Cauchy’s integral theorem – Cauchy’s integral formula – Taylor’s series – Zeros of an analytic function – singularities – Laurent’s series – Residues – Cauchy Residue theorem .					
<b>UNIT V</b>	<b>LAPLACE TRANSFORMS</b>	<b>9+3</b>			
Definition, properties, existence conditions – Transforms of elementary functions – Shifting theorem – Transforms of derivatives and integrals – Periodic functions – Initial and final value theorem – Inverse transforms – Application to solution of linear second order ordinary differential equations with constant coefficients.					
		<b>L:45</b>	<b>T:15</b>	<b>P: 0</b>	<b>Total: 60 Periods</b>
<b>TEXT BOOKS</b>					
<b>T1</b>	Kreyszig.E, Advanced Engineering Mathematics, John Wiley and Sons, 10 <sup>th</sup> Edition, New Delhi 2016.				
<b>T2</b>	Grewal.B.S., Higher Engineering Mathematics, Khanna Publishers, New Delhi, 44 <sup>th</sup> Edition, 2018.				
<b>REFERENCES</b>					
<b>R1</b>	Bali. N.P, Goyal. M. and Watkins. C., Advanced Engineering Mathematics, Firewall Media (An imprint of Lakshmi Publications Pvt., Ltd.), New Delhi, 7 <sup>th</sup> Edition, 2009.				
<b>R2</b>	G.B.Thomas, Calculus, 12 <sup>th</sup> Edition, Pearson Education India, 2015.				
<b>R3</b>	Jain. R.K. and Iyengar. S.R.K., Advanced Engineering Mathematics, Narosa Publications, New Delhi, 5 <sup>th</sup> Edition, 2016.				
<b>R4</b>	Peter V.O Neil, “Advanced Engineering Mathematics”, 7 <sup>th</sup> Edition, Cengage learning India Pvt Ltd, New Delhi, 2012.				
<b>R5</b>	Srimanta Pal, Subodh C Bhunia, “Engineering Mathematics”, Oxford University Press,2015.				
<b>COURSE OUTCOMES</b>					
<b>At the end of the course students should be able to</b>					



23CHT101	ENGINEERING CHEMISTRY			L	T	P	C
(Common to CSE,ECE,EEE,IT,AIIML, & BME)				3	0	0	3
<b>COURSE OBJECTIVES:</b>							
<ul style="list-style-type: none"> <li>To develop a deep understanding of electrochemical principles and their applications in modern power sources, focusing on innovative technologies and sustainable solutions.</li> <li>To equip students with advanced knowledge and skills in nanotechnology, polymers, composites, and analytical techniques, enabling them to contribute to cutting-edge research and industrial applications..</li> </ul>							
<b>UNIT I</b>	<b>ELECTROCHEMISTRY</b>						<b>9</b>
Electrode potential- Nernst equation - Reference electrodes - Standard hydrogen electrode - Calomel electrode - Ion selective electrode - Measurement of pH by glass electrode - Electrochemical series - Electrochemical cell - Galvanic cell - measurement of EMF - Electrolytic cell – Electrolysis - Electroplating (Au).							
<b>UNIT II</b>	<b>ELECTROCHEMICAL POWER SOURCES</b>						<b>9</b>
Batteries – Types - Characteristics – Classification - Construction and working of Alkaline battery - Lead acid battery - Modern batteries - Lithium ion battery, Zinc Air Battery, Super capacitors - Fuel cells - construction and working of H <sub>2</sub> -O <sub>2</sub> fuel cell - Hydrogen as fuel - Production and storage							
<b>UNIT III</b>	<b>NANOMATERIALS</b>						<b>9</b>
Nano materials and Bulk materials - Size dependent properties (Optical, Electrical and Mechanical) –Synthesis - Sol gel method - Chemical Vapour Deposition, Solvothermal, laser ablation - Carbon nanotubes – Properties and uses - Applications of Nanotechnology in Electronics, Energy science and Medicine.							
<b>UNIT IV</b>	<b>POLYMERS AND COMPOSITES</b>						<b>9</b>
Polymers – Classification - Degree of Polymerization - Industrially important polymers – Preparation, Properties and uses of PE, PVC and Polypropylene. Engineering polymers- Preparation, Properties and uses of Nylon-6, 6, Teflon & Bakelite. Organic polymers - Preparation, Properties and uses of Poly acetylene and Poly lactide. Composites – Fibre Reinforced Plastics							
<b>UNIT V</b>	<b>ANALYICAL TECHNIQUES AND ELECTRONIC MATERIALS</b>						<b>9</b>
Spectroscopic Techniques-Basic principle and instrumentation of UV-Visible, AAS and Flame photometry. Liquid crystalline displays - Fundamentals, Process and applications. Organic LEDs - their functioning – advantages and disadvantages over conventional LEDs - their commercial uses.							
				<b>L:45</b>	<b>T:0</b>	<b>P: 0</b>	<b>Total: 45 Periods</b>
<b>TEXT BOOKS</b>							
<b>T1</b>	P. C. Jain and Monica Jain, Engineering Chemistry, 17th Edition, DhanpatRai Publishing Company (P) Ltd, New Delhi, 2018						
<b>T2</b>	Wiley, “Engineering Chemistry”, John Wiley &Sins .InC, USA (2014]						
<b>REFERENCES</b>							
<b>R1</b>	B. Sivasankar “Engineering Chemistry” Tata McGraw-Hill Pub. Co. Ltd, New Delhi (2009).						
<b>R2</b>	B. S. Murty, P. Shankar, Baldev Raj, B. B. Rath and James Murday, “Text book of nanoscience and nanotechnology”, Universities Press-IIM Series in Metallurgy and Materials Science, 2018						
<b>R3</b>	Dr.Sivanesan and Nandagopal, “Engineering Chemistry-I” V.K.Pub.Pvt.Ltd. 2011.						
<b>R4</b>	ShikhaAgarwal, Engineering Chemistry-Fundamentals and Applications, Cambridge University Press, Delhi, Second Edition, 2019.						
<b>R5</b>	Dara, S.S.; A Text Book of Engineering Chemistry (Tenth edition); S. Chand, 2003						
<b>COURSE OUTCOMES</b>							



23ENT101	COMMUNICATIVE ENGLISH			L	T	P	C
				3	0	0	3
<b>COURSE OBJECTIVES:</b>							
<ul style="list-style-type: none"> <li>To enhance students in the art of error-free communication, emphasizing the correct use of grammar and punctuation in both professional and social contexts.</li> <li>To develop students' proficiency in formal letter writing, ensuring they can convey messages clearly, concisely, and professionally in various formal scenarios.</li> </ul>							
<b>UNIT I</b>							<b>9</b>
<b>Grammar</b> - Tenses - Verb forms, Spelling and Importance of Punctuation, <b>Vocabulary</b> - Word formation- Prefixes & Suffixes, One word Substitution, <b>Reading</b> -Reading and understanding the Context, <b>Writing</b> - Sentence completion- filling the gap, Instructions- Imperative Instructions							
<b>UNIT II</b>							<b>9</b>
<b>Grammar</b> - Uses of Preposition, Active & Passive Voice- impersonal passive, <b>Vocabulary</b> - Technical Vocabulary- Synonyms-Antonyms-Compound words, <b>Reading</b> -Transfer of information (chart, pictures), <b>Writing</b> - Recommendations- writing suggestions, Preparing Checklist.							
<b>UNIT III</b>							<b>9</b>
<b>Grammar</b> -Concord (Subject & Verb agreement), Definite & Indefinite Article, <b>Vocabulary</b> - Uses of Connectives and Linking words, <b>Reading</b> - Summarizing the given passage - Précis writing, <b>Writing</b> - Paragraph writing – Process writing, Analytical, Argumentative Paragraphs.							
<b>UNIT IV</b>							<b>9</b>
<b>Grammar</b> - Direct and Indirect speech, Cause and Effect Expression, <b>Vocabulary</b> - Logical sequence of words, <b>Reading</b> -Note-making using Linear method, <b>Writing</b> - Formal Letter writing- Permission letter for Industrial Visit & In-plant training.							
<b>UNIT V</b>							<b>9</b>
<b>Grammar</b> - Clauses -If Conditionals, <b>Vocabulary</b> - Words often confused - Verbal Analogy, <b>Reading</b> - Writing a Book Review <b>Writing</b> - Business Letters- Letter of Quotations, Clarification, Placing orders & Complaint letter.							
				<b>L:45</b>	<b>T:0</b>	<b>P: 0</b>	<b>Total: 45 Periods</b>
<b>TEXT BOOKS</b>							
<b>T1</b>	Raman, Meenakshi & Sangeetha Sharma. Technical Communication: Principles and Practice, Oxford University Press, New Delhi, 2011.						
<b>T2</b>	Rizvi, Ashraf. M. Effective Technical Communication, Tata McGraw-Hill, New Delhi, 2005.						
<b>REFERENCES</b>							
<b>R1</b>	Muralikrishna, & Sunita Mishra. Communication Skills for Engineers. Pearson, New Delhi. 2011						
<b>R2</b>	Mitra K. Barun, —Effective Technical Communication – A Guide for Scientists and Engineers, Oxford University Press, New Delhi, 2006.						
<b>R3</b>	Leo Jones, Richard Alexander, New International Business English, updated Edition, Cambridge University Press, NY, USA.						
<b>R4</b>	Smith—Worthington, Darlene & Sue Jefferson. Technical Writing for Success. Cengage, Mason USA.						
<b>R5</b>	Sharon J. Gerson, Steven M. Gerson, —Technical Writing – Process & Product. 3rd Edition, Pearson Education (Singapore) (P) Ltd., New Delhi.						



23GET104	TAMILS AND TECHNOLOGY				L	T	P	C
(Common to All B.E. / B. Tech. Courses)					1	0	0	1
<b>COURSE OBJECTIVES:</b>								
<ul style="list-style-type: none"> <li>To comprehend and classify different crystal structures and impart the knowledge about conductors, superconductors and semiconductors.</li> <li>To build knowledge about magnetism and understand the origin of laser action, fibre optics, and their applications.</li> </ul>								
<b>UNIT I</b>	<b>WEAVING AND CERAMIC TECHNOLOGY</b>							<b>3</b>
Weaving Industry during Sangam Age – Ceramic technology – Black and Red Ware Potteries (BRW) – Graffiti on Potteries								
<b>UNIT II</b>	<b>DESIGN AND CONSTRUCTION TECHNOLOGY</b>							<b>3</b>
Designing and Structural construction House & Designs in household materials during Sangam Age - Building materials and Hero stones of Sangam age – Details of Stage Constructions in Silappathikaram - Sculptures and Temples of Mamallapuram - Great Temples of Cholas and other worship places - Temples of Nayaka Period - Type study (Madurai Meenakshi Temple)- Thirumalai Nayakar Mahal - Chetti Nadu Houses, Indo - Saracenic architecture at Madras during 54 British Period.								
<b>UNIT III</b>	<b>MANUFACTURING TECHNOLOGY</b>							<b>3</b>
Art of Ship Building - Metallurgical studies - Iron industry - Iron smelting, steel - Copper and gold Coins as source of history - Minting of Coins – Beads making - industries Stone beads - Glass beads - Terracotta beads - Shell beads/ bone beads - Archeological evidences - Gem stone types described in Silappathikaram.								
<b>UNIT IV</b>	<b>AGRICULTURE AND IRRIGATION TECHNOLOGY</b>							<b>3</b>
Dam, Tank, ponds, Sluice, Significance of Kumizhi Thoombu of Chola Period, Animal Husbandry - Wells designed for cattle use - Agriculture and Agro Processing - Knowledge of Sea - Fisheries – Pearl - Conche diving - Ancient Knowledge of Ocean - Knowledge Specific Society.								
<b>UNIT V</b>	<b>SCIENTIFIC TAMIL &amp; TAMIL COMPUTING</b>							<b>3</b>
Development of Scientific Tamil - Tamil computing – Digitalization of Tamil Books – Development of Tamil Software – Tamil Virtual Academy – Tamil Digital Library – Online Tamil Dictionaries – Sorkuvai Project.								
					<b>L:15</b>	<b>T:0</b>	<b>P: 0</b>	<b>Total: 15 Periods</b>
<b>TEXT BOOKS</b>								
<b>T1</b>	தமிழக வரலாறு – மக்களும் பண் பொடும் – கக-கக. பிள்ளை (தவளியீடு: தமிழ்நொடு பொடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).							
<b>T2</b>	கணினித்தமிழ் – முளனவரிலு. சுந்தரம். (விகடன் பிரசுரம்)							
<b>T3</b>	கீழடி – எவளக நதிக்களரயில் சங்ககொல நகர நொகரிகம் (ததொல்லியல் துளற தவளியீடு)							
<b>T4</b>	தபொருளந – ஆற்றங்களர நொகரிகம். (ததொல்லியல் துளற தவளியீடு)							
<b>T5</b>	Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)							
<b>T6</b>	Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.							
<b>T7</b>	Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies),v							
<b>T8</b>	The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: 36 International Institute of Tamil Studies.)							



23EET102	ELECTRIC CIRCUIT ANALYSIS			L	T	P	C
				2	1	0	3
<b>COURSE OBJECTIVES:</b>							
<ul style="list-style-type: none"> <li>To comprehend and classify different crystal structures and impart the knowledge about conductors, superconductors and semiconductors.</li> <li>To build knowledge about magnetism and understand the origin of laser action, fibre optics, and their applications.</li> </ul>							
<b>UNIT I</b>	<b>BASIC CIRCUIT ANALYSIS</b>						<b>9</b>
DC circuits: Concept of R, Energy Sources, Ohm's Law - Kirchoff's Laws - Series and parallel circuits - Ideal and Practical sources – Mesh and nodal analysis. AC circuits: Concept of L and C, Energy Sources, Waveforms, instantaneous value, peak value, average value, effective value							
<b>UNIT II</b>	<b>THEOREMS FOR DC CIRCUITS</b>						<b>9</b>
Network reduction: voltage and current division rules, source transformation – star / delta conversion. Theorems: Thevenin's and Norton's Theorem – Superposition Theorem – Maximum power transfer theorem – Reciprocity theorem.							
<b>UNIT III</b>	<b>SINGLE AND THREE PHASE AC CIRCUITS</b>						<b>9</b>
Single phase circuits: RL, RC, RLC series circuit, Complex Impedance, Real and Reactive Power, Power factor calculations. Application to AC load. Three phase circuits: Phase and line values – phasor diagrams- analysis of three phase 3-wire and 4-wire circuits with balanced loads & unbalanced loads.							
<b>UNIT IV</b>	<b>RESONANCE AND COUPLED CIRCUITS</b>						<b>9</b>
Series resonance – frequency response – Quality factor and Bandwidth – Parallel Resonance (RL & RC circuit only) - Self and mutual inductance – Dot Rule - Coefficient of coupling – Single tuned circuits..							
<b>UNIT V</b>	<b>TRANSIENT RESPONSE FOR DC AND AC CIRCUITS</b>						<b>9</b>
Introduction - Transient response of RL, RC and RLC series circuits using Laplace transform for DC input – Transient response of RLC series circuit for AC inp30							
				<b>L:45</b>	<b>T:15</b>	<b>P: 0</b>	<b>Total: 45 Periods</b>
<b>TEXT BOOKS</b>							
<b>T1</b>	Charles K Alexander, and Mathew N O Sadiku, "Fundamentals of Electric Circuits", Tata McGraw Hill Publishing Company, Seventh Edition, 2016						
<b>T2</b>	Sudhakar A and Shyam Mohan SP, "Circuits and Network Analysis and Synthesis", Tata McGraw Hill, 2022						
<b>REFERENCES</b>							
<b>R1</b>	William H. Hayt Jr, Jack E. Kemmerly and Steven M. Durbin, "Engineering Circuits Analysis", Tata McGraw Hill publishers, 8th edition, New Delhi, 2020						
<b>R2</b>	Joseph A. Edminister, Mahmood Nahri, "Electric circuits", Schaum's series, Tata McGraw-Hill, New Delhi, 2019						
<b>R3</b>	Paranjothi SR, "Electric Circuits Analysis," New Age International Ltd., New Delhi, 2015						
<b>R4</b>	Chakrabati A, "Circuits Theory Analysis and synthesis, Dhanpath Rai & Sons, New Delhi, 2020						
<b>R5</b>	Arumugam & M. Prem Kumaran, "Electric Circuit Theory", Khanna Publishers, New Delhi, 2017						
<b>COURSE OUTCOMES</b>							



23EET104	ANALOG ELECTRONIC CIRCUITS			L	T	P	C
				2	0	0	2
<b>COURSE OBJECTIVES:</b>							
<ul style="list-style-type: none"> <li>To comprehend and classify different crystal structures and impart the knowledge about conductors, superconductors and semiconductors.</li> <li>To build knowledge about magnetism and understand the origin of laser action, fibre optics, and their applications.</li> </ul>							
<b>UNIT I</b>	<b>PN JUNCTION DEVICES</b>						<b>6</b>
PN junction diode–Structure, Operation and V-I Characteristics, Diffusion and Transition capacitance, Diode switching times–Zener diode–Characteristics- – Zener diode as regulator. Applications: Half wave and Full wave Rectifier, Filters, Photo diode and PV Cells							
<b>UNIT II</b>	<b>MULTIJUNCTION DEVICES</b>						<b>6</b>
BJT, JFET, MOSFET–Structure, Operation, Characteristics and Biasing of transistor. Applications–Organic Transistors –Memristors.							
<b>UNIT III</b>	<b>AMPLIFIERS</b>						<b>6</b>
Definition and amplifier types –Cascade and Darlington connection, Transformer coupled Class A, Class B, Class C and push-pull configuration –distortion.							
<b>UNIT IV</b>	<b>DIFFERENTIAL AMPLIFIER AND MULTIVIBRATORS</b>						<b>6</b>
Differential amplifier – Common and differential mode analysis. Multivibrator – Monostable, astable multivibrator and bistable multivibrator –Schmitt trigger.							
<b>UNIT V</b>	<b>FEEDBACK AMPLIFIERS AND OSCILLATORS</b>						<b>6</b>
Advantages of negative feedback–voltage / current-series / shunt feedback – positive feedback – Condition for oscillations, RC phase shift oscillator, Wien bridge, Crystal oscillators.							
				<b>L:30</b>	<b>T:0</b>	<b>P: 0</b>	<b>Total: 30 Periods</b>
<b>TEXT BOOKS</b>							
<b>T1</b>	David A. Bell, “Electronic Devices and Circuits”, Prentice Hall of India, 5th Edition, 2017.						
<b>T2</b>	S Salaivahanan and N Suresh kumar, “Electronic Devices and Circuits”, Tata McGraw Hill, 5 <sup>th</sup> Edition, 2022						
<b>REFERENCES</b>							
<b>R1</b>	Floyd, “Electronic Devices” Pearson Asia 7th Edition, 2015.						
<b>R2</b>	Vinoth Kumar Khanna, “Insulated Gate Bipolar Transistor IGBT Theory and Design”, Wiley IEEE Press, 2004.						
<b>R3</b>	Donald A Neamen, “Electronic Circuit Analysis and Design” Tata McGraw Hill, 3 <sup>rd</sup> Edition, 2015.						
<b>R4</b>	Robert L. Boylestad, “Electronic Devices and Circuit theory”, 10th Edition, 2011.						
<b>R5</b>	Robert B. Northrop, “Analysis and Application of Analog Electronic Circuits to Biomedical Instrumentation”, CRC Press, 2012.						
<b>COURSE OUTCOMES</b>							
<b>At the end of the course students should be able to</b>							
<b>CO 1</b>	Recollect the structure and applications of the basic electronic devices						
<b>CO 2</b>	Analyze the structure and characteristics of various types of multi-junction devices						
<b>CO 3</b>	Acquire knowledge of various configurations of BJT and multistage amplifiers						
<b>CO 4</b>	Construct the differential amplifier and multi-vibrator circuits						



23MEB101	ENGINEERING GRAPHICS	L	T	P	C
(Common to CSE, IT, AIML, ECE, EEE and BME) (Use of CAD Software)		1	0	2	2
<b>COURSE OBJECTIVES:</b>					
<ul style="list-style-type: none"> <li>To comprehend and classify different crystal structures and impart the knowledge about conductors, superconductors and semiconductors.</li> <li>To build knowledge about magnetism and understand the origin of laser action, fibre optics, and their applications.</li> </ul>					
<b>UNIT I</b>	<b>INTRODUCTION TO COMPUTER AIDED SKETCHING</b>	<b>3+6</b>			
Introduction - layout of the software – Selection of drawing Sheet - standard tool bar/menu - navigational tools - Co-ordinate system and reference planes - Commands - Tools					
<b>UNIT II</b>	<b>PROJECTION OF POINTS AND LINES</b>	<b>3+6</b>			
Projection of points, Projection of straight lines located in the first quadrant					
<b>UNIT III</b>	<b>PROJECTION AND SECTION OF SOLIDS</b>	<b>3+6</b>			
Projections and Sections of Simple Solids - Prisms, Pyramids, Cylinders and Cones					
<b>UNIT IV</b>	<b>ORTHOGRAPHIC PROJECTIONS</b>	<b>3+6</b>			
Conversion of Isometric Projection to Orthographic Views					
<b>UNIT V</b>	<b>BUILDING DRAWING</b>	<b>3+6</b>			
Drawing of a plan, Elevation, Electrical wiring and Sectioning of security room and Residential building (Two bed rooms, kitchen, hall, etc.)					
		<b>L:15</b>	<b>T:30</b>	<b>P: 0</b>	<b>Total: 45 Periods</b>
<b>TEXT BOOKS</b>					
<b>T1</b>	N.D. Bhatt and V.M. Panchal, “Engineering Drawing” Charotar Publishing House, 53rd Edition, (2016). (Unit II,III,IV)				
<b>T2</b>	K. R. Gopalakrishnan, “Engineering Drawing” (Vol.I & II), Subhas Publications (2014). (Unit II,III,IV)				
<b>REFERENCES</b>					
<b>R1</b>	Computer Aided Engineering Drawing- by Dr. M H Annaiah, Dr C N Chandrappa and Dr. B Sudheer Premkumar, Fifth edition, New Age International Publishers (2019) (Unit I)				
<b>R2</b>	CADD Centre, Solid Edge, Reference Guide 14, 2015 (Unit I)				
<b>R3</b>	K. V. Natarajan, “A text book of Engineering Graphics”, Dhanalakshmi Publishers, Chennai (2016). (Unit II,III,IV)				
<b>R4</b>	M.S. Kumar, “Engineering Graphics”, D.D. Publications, (2016). (Unit II,III,IV)				
<b>R5</b>	M.B. Shah and B.C. Rana, “Engineering Drawing”, Pearson Education (2015). (Unit II,III,IV)				
<b>COURSE OUTCOMES</b>					
<b>At the end of the course students should be able to</b>					
<b>CO 1</b>	Draw projections of points and straight lines				
<b>CO 2</b>	Produce computer generated drawings using CAD software				
<b>CO 3</b>	Illustrate top view and front view of the solids				
<b>CO 4</b>	Exhibit knowledge about orthographic projections				
<b>CO 5</b>	Design simple residential and office buildings.				



<b>23CHP101</b>	<b>CHEMISTRY LABORATORY</b>			<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>(Common to All Branches)</b>			<b>0</b>	<b>0</b>	<b>2</b>	<b>1</b>
<b>COURSE OBJECTIVES:</b>							
<ul style="list-style-type: none"> <li>To inculcate experimental skills to test basic understanding of water quality parameters, such as acidity, alkalinity, hardness, DO, chloride and copper.</li> <li>To induce the students to familiarize with electro analytical techniques such as, pH metry, potentiometry and conductometry in the determination of impurities in aqueous solutions.</li> </ul>							
<b>LIST OF EXPERIMENTS</b>							
<ol style="list-style-type: none"> <li>1. Estimation of alkalinity of water sample by indicator method</li> <li>2. Determination of hardness of water sample by EDTA method</li> <li>3. Estimation of Dissolved oxygen in water sample by Winkler's method</li> <li>4. Estimation of Chloride in water sample by Argentometric method</li> <li>5. Estimation of copper in brass by EDTA method</li> <li>6. Determination of strength of HCl and CH<sub>3</sub>COOH present in a mixture conductometrically</li> <li>7. Estimation of strength of iron by potentiometric titration</li> <li>8. Determination of molecular weight of given polymer by Ostwald's viscometer</li> <li>9. Determination of Strength of HCl by pH metry</li> <li>10. Determination of corrosion rate of mild steel by weight loss method</li> </ol>							
<b>Demo Experiments</b>							
<ol style="list-style-type: none"> <li>11. Synthesis of nanomaterials by chemical precipitation method</li> <li>12. Estimation of strength of iron by spectrophotometry</li> </ol>							
				<b>L:0</b>	<b>T:0</b>	<b>P:30</b>	<b>Total: 30 Periods</b>
<b>TEXT BOOKS</b>							
<b>T1</b>	Department of Chemistry SNSCT "Chemistry Laboratory Manual", 2019						
<b>REFERENCES</b>							
<b>R1</b>	J.Mendham, R.C.Denney, J.D.Bames, M.Thomas and B.Sivasankar, Vogel's "Text book of Quantitative chemical analysis", 6th edition, EBS, 2009.						
<b>COURSE OUTCOMES</b>							
<b>At the end of the course students should be able to</b>							
<b>CO 1</b>	Analyze the quality of water samples through basic techniques						
<b>CO 2</b>	Estimate the amount of metal ions in domestic and industry water						
<b>CO 3</b>	Determine the absolute viscosity and molecular weight of Organic solvents						
<b>CO 4</b>	Interpret the corrosion rate of metals						
<b>CO 5</b>							



23GEP101	WORKSHOP PRACTICES LABORATORY	L	T	P	C
(Common to All B.E. / B. Tech. Courses)		0	0	4	2
<b>COURSE OBJECTIVES:</b>					
<ul style="list-style-type: none"> <li>To comprehend and classify different crystal structures and impart the knowledge about conductors, superconductors and semiconductors.</li> <li>To build knowledge about magnetism and understand the origin of laser action, fibre optics, and their applications.</li> </ul>					
<b>GROUP A (CIVIL &amp; MECHANICAL)</b>					<b>30</b>
<b>CIVIL ENGINEERING</b>					<b>12</b>
<ol style="list-style-type: none"> <li>Study of plumbing tools and Components</li> <li>Preparation of threads in pipes</li> <li>Preparation of single and multi-tap connections for domestic</li> <li>Study of carpentry tools and its applications</li> <li>Preparation of Cross Lap and Dove Tail Joints.</li> </ol>					
<b>MECHANICAL ENGINEERING</b>					<b>18</b>
<ol style="list-style-type: none"> <li>Study of different types of Welding and its applications</li> <li>Preparation of Butt, Lap and Tee joints</li> <li>Study of sheet metal and its applications</li> <li>Preparation of Rectangular, Square Trays and Funnel</li> <li>Demonstration of Lathe and Drilling Operations</li> <li>Demonstration of Smithy and Foundry tools.</li> <li>Power Tool Operations</li> <li>Plastic Moulding and Glass Cutting</li> </ol>					
<b>GROUP B (ELECTRICAL AND ELECTRONICS)</b>					<b>30</b>
<b>ELECTRICAL ENGINEERING PRACTICE</b>					<b>18</b>
<ol style="list-style-type: none"> <li>Residential house wiring using switches, fuse, miniature circuit breaker, indicator, Lamp and energy meter.</li> <li>Fluorescent lamp wiring.</li> <li>Stair-case wiring.</li> <li>Measurement of electrical quantities –voltage, current, power &amp; power factor in RL Circuit.</li> <li>Measurement of energy using single phase energy meter.</li> <li>Measurement of insulation resistance to earth of electrical equipment.</li> <li>Measurement of single and three phase voltages.</li> <li>Study of Iron Box, Emergency Lamp and Fan.</li> </ol>					
<b>ELECTRONICS ENGINEERING PRACTICE</b>					<b>12</b>
<ol style="list-style-type: none"> <li>Study of Electronic components and equipment's –Resistor, colour coding, measurement of AC signal parameter (peak-peak, rms period, frequency) using CRO.</li> <li>Verification of logic gates: AND, OR, Ex-OR and NOT.</li> <li>Generation of Clock Signal.</li> <li>Soldering practice –Components Devices and Circuits Using general purpose PCB.</li> <li>Characteristics of a PN Junction diode</li> </ol>					
		<b>L:0</b>	<b>T:0</b>	<b>P:60</b>	<b>Total: 60 Periods</b>
<b>COURSE OUTCOMES</b>					
<b>At the end of the course students should be able to</b>					
<b>CO 1</b>	Demonstrate plumbing system and Carpentry for the required applications.				



23BMP101	<b>INTERNSHIP - I</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>(Common to All B.E. / B. Tech. Courses)</b>		-	-	-	<b>1</b>
<b>GOALS AND OBJECTIVES</b>					
<ol style="list-style-type: none"> <li>1. Design Thinking/Problem Solving: Exercise sound reasoning to analyze issues, make decisions, and overcome problems. The individual is able to obtain, interpret, and use knowledge, facts, and data in this process, and may demonstrate originality and inventiveness.</li> <li>2. Teamwork/Collaboration: Build collaborative relationships with colleagues and customers representing diverse cultures, races, ages, genders, religions, lifestyles, and viewpoints. The individual is able to work within a team structure, and can negotiate and manage conflict.</li> <li>3. Digital Technology: Leverage existing digital technologies ethically and efficiently to solve problems, complete tasks, and accomplish goals. The individual demonstrates effective adaptability to new and emerging technologies.</li> <li>4. Leadership: Leverage the strengths of others to achieve common goals, and use interpersonal skills to coach and develop others. The individual is able to access and manage his/her emotions and those of others; use empathetic skills to guide and motivate; and organize, prioritize, and delegate work.</li> <li>5. Professionalism/Work Ethic: Demonstrate personal accountability and effective work habits, e.g., punctuality, working productively with others, and time workload management, and understand the impact of non-verbal communication on professional work image. The individual demonstrates integrity and ethical behavior, acts responsibly with the interests of the larger community in mind, and is able to learn from his/her mistakes.</li> <li>6. Global/Intercultural Fluency: Value, respect, and learn from diverse cultures, races, ages, enders, sexual orientations, and religions. The individual demonstrates openness, inclusiveness, sensitivity, and the ability to interact respectfully with all people and understand individuals' differences.</li> </ol>					
					<b>2 Weeks</b>
<b>COURSE OUTCOMES</b>					
<b>At the end of the course students should be able to</b>					
<b>CO 1</b>	Explore career alternatives prior to graduation				
<b>CO 2</b>	Develop communication, interpersonal and other critical skills in the job interview process.				
<b>CO 3</b>	Develop work habits and attitudes necessary for job success.				
<b>CO 4</b>	Acquire employment contacts leading directly to a full-time job following graduation from college.				
<b>CO 5</b>	Identify, write down, and carry out performance objectives (mutually agreed upon by the employer, the MCC experiential learning supervisor, and the student) related to their job assignment.				



23HST103	INDIAN CONSTITUTION			L	T	P	C
(Common to all department)				2	0	0	1
<b>COURSE OBJECTIVES:</b>							
<ul style="list-style-type: none"> <li>To comprehend and classify different crystal structures and impart the knowledge about conductors, superconductors and semiconductors.</li> <li>To build knowledge about magnetism and understand the origin of laser action, fibre optics, and their applications.</li> </ul>							
<b>UNIT I</b>	<b>INTRODUCTION</b>						<b>6</b>
Historical Background – Constituent Assembly of India – Philosophical foundations of the Indian Constitution – Preamble – Fundamental Rights – Directive Principles of State Policy – Fundamental Duties – Citizenship – Constitutional Remedies for citizens.							
<b>UNIT II</b>	<b>STRUCTURE AND FUNCTION OF CENTRAL GOVERNMENT</b>						<b>6</b>
Union Government – Structures of the Union Government and Functions – President – Vice President – Prime Minister – Cabinet – Parliament – Supreme Court of India – Judicial Review.							
<b>UNIT III</b>	<b>STRUCTURE AND FUNCTION OF STATE GOVERNMENT</b>						<b>6</b>
State Government – Structure and Functions – Governor – Chief Minister – Cabinet – State Legislature – Judicial System in States – High Courts and other Subordinate Courts.							
<b>UNIT IV</b>	<b>CONSTITUTION FUNCTIONS</b>						<b>6</b>
Indian Federal System – Center – State Relations – President’s Rule – Constitutional Amendments – Constitutional Functionaries – Assessment of working of the Parliamentary System in India.							
<b>UNIT V</b>	<b>ELECTION COMMISSION</b>						<b>6</b>
Election Commission: Role and Functioning, Chief Election Commissioner and Election Commissioners, State Election Commission: Role and Functioning, Institute and Bodies for the welfare of SC/ST/OBC and women.							
				<b>L:15</b>	<b>T:0</b>	<b>P: 0</b>	<b>Total: 15 Periods</b>
<b>TEXT BOOKS</b>							
<b>T1</b>	Durga Das Basu, “Introduction to the Constitution of India”, Prentice Hall of India, New Delhi.						
<b>T2</b>	R.C. Agarwal, “Indian Political System”, S.Chand and Company, New Delhi. (1997)						
<b>REFERENCES</b>							
<b>R1</b>	Maciver and Page, “Society: An Introduction Analysis”, Mac Milan India Ltd., New Delhi.						
<b>R2</b>	K.L.Sharma, “Social Stratification in India: Issues and Themes”, Jawaharlal Nehru University, New Delhi. (1997)						
<b>R3</b>	Sharma, Brij Kishore, “Introduction to the Constitution of India”, Prentice Hall of India, New Delhi.						
<b>R4</b>	U.R.Gahai, “Indian Political System”, New Academic Publishing House, Jalaendhar.						
<b>R5</b>	R.N. Sharma, “Indian Social Problems”, Media Promoters and Publishers Pvt. Ltd.						
<b>COURSE OUTCOMES</b>							
<b>At the end of the course students should be able to</b>							
<b>CO 1</b>	Understand the functions of the Indian government						
<b>CO 2</b>	Know the structure and functioning of central government.						
<b>CO 3</b>	Understand functioning of Indian constituent.						



23MAT201	<b>PARTIAL DIFFERENTIAL EQUATIONS AND TRANSFORMS</b>			<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
(Common to AEROSPACE,AGRI,AUTO,BME,CIVIL,ECE,EEE,FT,MECH,MCT)				<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>
<b>COURSE OBJECTIVES:</b>							
<ul style="list-style-type: none"> <li>To comprehend and classify different crystal structures and impart the knowledge about conductors, superconductors and semiconductors.</li> <li>To build knowledge about magnetism and understand the origin of laser action, fibre optics, and their applications.</li> </ul>							
<b>UNIT I</b>	<b>PARTIAL DIFFERENTIAL EQUATIONS</b>						<b>9</b>
Formation of partial differential equations – Solutions of standard types of first order partial differential equations – Lagrange’s linear equation – Linear partial differential equations of second order with constant coefficients of homogeneous types – Applications.							
<b>UNIT II</b>	<b>FOURIER SERIES</b>						<b>9</b>
Dirichlet’s conditions – General Fourier series – Odd and even functions – Half range sine series and cosine series – Root mean square value – Parseval’s identity – Harmonic analysis.							
<b>UNIT III</b>	<b>APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS</b>						<b>9</b>
Classification of PDE – Fourier series solutions of one dimensional wave equation – One dimensional equation of heat conduction – Steady state solution of two dimensional equation of heat conduction (Cartesian coordinates only).							
<b>UNIT IV</b>	<b>FOURIER TRANSFORMS</b>						<b>9</b>
Statement of Fourier integral theorem – Fourier transform pair – Fourier sine and cosine transforms – Properties– Transforms of simple functions – Convolution theorem – Parseval’s identity.							
<b>UNIT V</b>	<b>Z - TRANSFORMS AND DIFFERENCE EQUATIONS</b>						<b>9</b>
Z-transforms – Elementary properties –Initial and final value theorems – Inverse Z-transform using partial fraction and convolution theorem – Formation of difference equations – Solution of difference equations using Z- transforms.							
				<b>L:45</b>	<b>T:0</b>	<b>P: 0</b>	<b>Total: 45 Periods</b>
<b>TEXT BOOKS</b>							
<b>T1</b>	Kreyszig.E, Advanced Engineering Mathematics, John Wiley and Sons, 10 <sup>th</sup> Edition, New Delhi 2016.						
<b>T2</b>	Grewal.B.S., Higher Engineering Mathematics, Khanna Publishers, New Delhi, 44 <sup>th</sup> Edition, 2018.						
<b>REFERENCES</b>							
<b>R1</b>	Bali. N.P, Goyal. M. and Watkins. C., Advanced Engineering Mathematics, Firewall Media (An imprint of Lakshmi Publications Pvt., Ltd.), New Delhi, 7 <sup>th</sup> Edition, 2009.						
<b>R2</b>	James. G., "Advanced Modern Engineering Mathematics", 4thEdition, Pearson Education, New Delhi, 2016.						
<b>R3</b>	Ramana. B.V., "Higher Engineering Mathematics", McGraw Hill Education Pvt. Ltd, New Delhi, 2018.						
<b>R4</b>	Wylie. R.C. and Barrett . L.C., “Advanced Engineering Mathematics “Tata McGraw Hill Education Pvt. Ltd, 6th Edition, New Delhi, 2012.						
<b>R5</b>	Andrews. L.C and Shivamoggi. B, "Integral Transforms for Engineers" SPIE Press, 1999.						
<b>COURSE OUTCOMES</b>							
<b>At the end of the course students should be able to</b>							
<b>CO 1</b>	Understand how to solve the given standard partial differential equations.						
<b>CO 2</b>	Solve differential equations using Fourier series analysis which plays a vital role in Engineering applications.						



23EET201	ELECTROMAGNETIC FIELDS - BC			L	T	P	C
				3	0	0	3
<b>COURSE OBJECTIVES:</b>							
<ul style="list-style-type: none"> <li>To comprehend and classify different crystal structures and impart the knowledge about conductors, superconductors and semiconductors.</li> <li>To build knowledge about magnetism and understand the origin of laser action, fibre optics, and their applications.</li> </ul>							
<b>UNIT I</b>	<b>INTRODUCTION</b>						<b>9</b>
Sources and effects of electromagnetic fields (Biological Effects of Electromagnetic interference) – Vector fields – Different co-ordinate systems- vector calculus – Gradient, Divergence and Curl - Divergence theorem – Stoke’s theorem.							
<b>UNIT II</b>	<b>ELECTRO STATICS</b>						<b>9</b>
Coulomb’s Law – Electric field intensity – Field due to point and continuous charges – Gauss’s law and application – Electric potential– Electric field in free space, conductors, dielectric –Dipole, Dielectric polarization – Dielectric strength – Boundary conditions – Capacitance- Energy density, Applications.							
<b>UNIT III</b>	<b>MAGNETO STATICS</b>						<b>9</b>
Lorentz Law of force, magnetic field intensity – Biotsavart’s Law - Ampere’s Law – Magnetic field due to straight conductors, circular loop, infinite sheet of current – Magnetic flux density – B in free space, conductor, magnetic materials – Magnetization – Boundary conditions – Scalar and vector potential – Magnetic force – Torque – Inductance – Energy density, Applications.							
<b>UNIT IV</b>	<b>ELECTRODYNAMIC FIELDS</b>						<b>9</b>
Faraday’s laws, induced emf – Transformer and motional EMF – Maxwell’s equations (differential and integral forms) – Displacement current – Relation between field theory and circuit theory, Applications.							
<b>UNIT V</b>	<b>ELECTROMAGNETIC WAVES</b>						<b>9</b>
Generation – Electro Magnetic Wave equations – Wave parameters; velocity, intrinsic impedance, propagation constant – Waves in free space, lossy and lossless dielectrics, conductors-skin depth, Poynting theorem and Poynting vector – Standing wave ratio and power, Applications – EMI, EMC.							
				<b>L:45</b>	<b>T:0</b>	<b>P: 0</b>	<b>Total: 45 Periods</b>
<b>TEXT BOOKS</b>							
<b>T1</b>	Mathew N. O. Sadiku, ‘Elements of Electromagnetics’, Oxford University press Inc. First Indian Edition, 2021 .						
<b>T2</b>	K.A.Gangathar, P.M. Ramanathan, “ Electromagnetic Field Theory”, Khanna Publishers, 2018						
<b>REFERENCES</b>							
<b>R1</b>	V.V.Sarwate, ‘Electromagnetic fields and waves’, Second Edition, New Age Publishers, 2018						
<b>R2</b>	Joseph. A. Edminister, ‘Theory and Problems of Electromagnetics’, Second Edition, Schaum Series, Tata McGraw Hill, 2016.						
<b>R3</b>	William .H.Hayt, ‘Engineering Electromagnetics’, Tata McGraw Hill, 2015.						
<b>R4</b>	Kraus and Fleish, ‘Electromagnetics with Applications’, McGraw Hill International Editions, Fifth Edition, 2016.						
<b>R5</b>	Ashutosh Pramanik, ‘Electromagnetism – Theory and Applications’, Prentice-Hall of India Private Limited, New Delhi, 2009.						



23EET202	DIGITAL ELECTRONICS AND LINEAR INTEGRATED CIRCUITS			L	T	P	C
				3	0	0	3
<b>COURSE OBJECTIVES:</b>							
<ul style="list-style-type: none"> <li>To introduce basic minimization techniques and to implement the logic gates in combinational and sequential circuits</li> <li>To study the behavior and applications of Operational Amplifier and Timer ICs</li> </ul>							
<b>UNIT I</b>	<b>MINIMIZATION TECHNIQUES AND GATES</b>						<b>9</b>
Boolean Algebra: Postulates and Laws , De-morgan's theorem and Principle of Duality – SOP and POS, K-Map, Tabulation Method, Don't Care Conditions. Digital Logic Gates: Logic Gates , Adders, Subtractors , Multiplexer and De-multiplexer , Encoder and Decoder circuits.							
<b>UNIT II</b>	<b>DESIGN OF COMBINATIONAL AND FLIP FLOPS</b>						<b>9</b>
Design of Combinational Circuits: Code Converters - Binary to Gray, Gray to Binary, Excess3 to BCD, BCD to Excess 3, 2 bit Magnitude Comparator.SR Latch, Flip Flops: SR , JK , D ,T - Characteristic Table and Equation - Edge and Level Triggering.							
<b>UNIT III</b>	<b>DESIGN OF SEQUENTIAL MODELS, PLD AND VERILOG HDL</b>						<b>9</b>
Design of Sequential circuits: Synchronous Counters, Modulo-n Counters, 3 Bit Up/Down Counter. PLDs: Programmable Logic Devices –RAM, ROM, PAL, PLA, FPGA –implementation of design thinking in PLDs. Verilog HDL: Simple codes – implementation of digital functions							
<b>UNIT IV</b>	<b>OPERATIONAL AMPLIFIER</b>						<b>9</b>
Ideal OPAMP characteristics, DC performance characteristics, Inverting and Non Inverting Amplifier, Basic applications of OPAMP: Scale Changer and Phase Shift Circuits, Summer, Integrator and Differentiator, V/I and I/V converters, clipper and clamper, peak detector and S/H circuit							
<b>UNIT V</b>	<b>APPLICATIONS OF OPERATIONAL AMPLIFIER AND TIMERS</b>						<b>9</b>
Instrumentation amplifier, D/A converter (R-2R Ladder type, weighted resistor type), A/D converters using OP AMP (Flash type, Successive approximation type, Dual slope type) IC 555 Timer circuit, Functional block, Characteristics & Case study applications							
				<b>L:45</b>	<b>T:0</b>	<b>P: 0</b>	<b>Total: 45 Periods</b>
<b>TEXT BOOKS</b>							
<b>T1</b>	M. Morris Mano, "Digital Design", 4th Edition, Prentice Hall of India Pvt. Ltd., 2019.						
<b>T2</b>	D.Roy Choudhry, Shail Jain, "Linear Integrated Circuits", New Age International Pvt. Ltd., 2017.						
<b>REFERENCES</b>							
<b>R1</b>	Gray and Meyer, "Analysis and Design of Analog Integrated Circuits", Wiley International, 2015.						
<b>R2</b>	Ramakant A.Gayakwad, "OP-AMP and Linear ICs", Prentice Hall / Pearson Education, 4th Edition, 2017.						
<b>R3</b>	S.Salivahanan and S. Arivazhagan, "Digital Circuits and Design", 3 <sup>rd</sup> Edition, Vikas Publishing House Pvt. Ltd, New Delhi, 2016.						
<b>R4</b>	Charles H.Roth. "Fundamentals of Logic Design", 6 <sup>th</sup> edition, Thomson Learning, 2014.						
<b>R5</b>	John. M Yarbrough, "Digital Logic Applications and Design", Thomson Learning, 2017.						
<b>COURSE OUTCOMES</b>							
<b>At the end of the course students should be able to</b>							
<b>CO 1</b>	Understand basic minimization techniques and logic gates.						
<b>CO 2</b>	Design and implementation of combinational and sequential circuits						
<b>CO 3</b>	Analyze sequential circuits and acquire knowledge on Verilog HDL codes						



<b>23CST205</b>	<b>OBJECT ORIENTED PROGRAMMING USING JAVA</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>
<b>COURSE OBJECTIVES:</b>					
<ul style="list-style-type: none"> <li>To comprehend and classify different crystal structures and impart the knowledge about conductors, superconductors and semiconductors.</li> <li>To build knowledge about magnetism and understand the origin of laser action, fibre optics, and their applications.</li> </ul>					
<b>UNIT I</b>	<b>INTRODUCTION TO OOP</b>	<b>9</b>			
Boolean Algebra: Postulates and Laws, De-morgan's theorem and Principle of Duality – SOP and Object Oriented Programming concepts–Objects–Classes–Inheritance– polymorphism – Abstraction- Encapsulation, Features of Java, Byte code and Java Virtual Machine, JDK					
<b>UNIT II</b>	<b>INTRODUCTION TO JAVA</b>	<b>9</b>			
Basics of Java programming, Data types, Variables, Operators, Control structures including selection, Looping, Java methods, Overloading, Math class, Arrays in java.					
<b>UNIT III</b>	<b>OBJECTS AND CLASS</b>	<b>9</b>			
Basics of objects and classes in java, Constructors, Finalizer, Visibility modifiers, Methods and objects, Inbuilt classes like String, Character, String Buffer, File, this reference.					
<b>UNIT IV</b>	<b>INHERITANCE AND POLYMORPHISM</b>	<b>9</b>			
Inheritance- Super class - Sub class - protected members - constructors in sub class – Overriding –Abstract class-Final methods and classes, Interfaces, Packages.					
<b>UNIT V</b>	<b>MULTI THREADING IN JAVA</b>	<b>9</b>			
Multithreading - Thread life cycle and methods, Thread Creation, Thread synchronization, Inter-thread communication, Exception handling with try-catch-finally					
		<b>L:45</b>	<b>T:0</b>	<b>P: 0</b>	<b>Total: 45 Periods</b>
<b>TEXT BOOKS</b>					
<b>T1</b>	Herbert Schildt, "Java: The Complete Reference", 11 th Edition, McGraw Hill Education, New Delhi, 2019.				
<b>REFERENCES</b>					
<b>R1</b>	Cay S. Horstmann, "Core Java Fundamentals", Volume 1, 11 th Edition, Prentice Hall, 2018.				
<b>COURSE OUTCOMES</b>					
<b>At the end of the course students should be able to</b>					
<b>CO 1</b>	Understand the basic concepts of OOP				
<b>CO 2</b>	Adapt control structures and looping in solving problems				
<b>CO 3</b>	Apply the concepts of classes and objects in real time applications				
<b>CO 4</b>	Develop programs using inheritance, packages and interfaces				
<b>CO 5</b>	Make use of exception handling mechanisms and multithreaded model to solve real world problems				



23EET203	ELECTRICAL MACHINES I - SB			L	T	P	C
				3	0	0	3
<b>COURSE OBJECTIVES:</b>							
<ul style="list-style-type: none"> <li>To introduce basic minimization techniques and to implement the logic gates in combinational and sequential circuits</li> <li>To study the behavior and applications of Operational Amplifier and Timer ICs</li> </ul>							
<b>UNIT I</b>	<b>ELECTROMECHANICAL ENERGY CONVERSION</b>						<b>9</b>
Fundamentals of Magnetic circuits- Statically and dynamically induced EMF - Principle of electromechanical energy conversion forces and torque in magnetic field systems- energy balance in magnetic circuits- magnetic force- co-energy in singly excited and multi excited magnetic field system							
<b>UNIT II</b>	<b>DC GENERATORS AND MOTORS</b>						<b>9</b>
Construction and principle of operation – EMF equation –Types – Methods of excitation – No load and load characteristics of DC generators – Armature reaction and commutation. Principle of operation of DC motor, Significance of back EMF – Torque equation– Characteristics of DC motors							
<b>UNIT III</b>	<b>STARTING AND TESTING OF DC MACHINES</b>						<b>9</b>
Necessity of Starter - Starting methods – Speed control Methods Testing of DC machines- Brake test, Swinburne’s test – Losses and efficiency –Applications of DC Machines							
<b>UNIT IV</b>	<b>SINGLE PHASE AND THREE PHASE TRANSFORMERS</b>						<b>9</b>
Construction and principle of operation of single phase transformer – types – EMF equation – Transformer on no load and load – Phasor diagrams – Equivalent circuit -Auto transformer Construction and principle of operation of three phase transformer-three phase transformers connections							
<b>UNIT V</b>	<b>TESTING AND APPLICATIONS OF TRANSFORMERS</b>						<b>9</b>
Polarity test – Open circuit and Short circuit tests-Voltage regulation-Losses and efficiency – all day efficiency. Applications: Instrument, Isolation, Distribution and Power Transformers							
				<b>L:45</b>	<b>T:0</b>	<b>P: 0</b>	<b>Total: 45 Periods</b>
<b>TEXT BOOKS</b>							
<b>T1</b>	I. J. Nagrath and D. P. Kothari, “Electric Machines”, McGraw Hill Education, 5th Edition, 2017.						
<b>T2</b>	P. S. Bimbhra, “Electric Machinery”, Khanna Publishers, 2nd Edition, 2021.						
<b>T3</b>	K. Murugesh Kumar, “D.C Machines and Transformers” Vikas publishing house private limited, New Delhi. 2010.						
<b>REFERENCES</b>							
<b>R1</b>	A. E. Fitzgerald and C. Kingsley, "Electric Machinery", New York, McGraw Hill Education, 6 <sup>th</sup> Edition 2017.						
<b>R2</b>	A. E. Clayton and N. N. Hancock, “Performance and design of DC machines”, CBS Publishers, 2018.						
<b>R3</b>	Deshpande M. V., “Electrical Machines” PHI Learning Pvt. Ltd., New Delhi, 2011						
<b>R4</b>	P.S. Bimbhra, ‘Electrical Machinery’, Khanna Publishers, 2003.						
<b>COURSE OUTCOMES</b>							
<b>At the end of the course students should be able to</b>							



23GET275	VQAR-I			L	T	P	C
				2	0	0	2
<b>COURSE OBJECTIVES:</b>							
<ul style="list-style-type: none"> <li>To introduce basic minimization techniques and to implement the logic gates in combinational and sequential circuits</li> <li>To study the behavior and applications of Operational Amplifier and Timer ICs</li> </ul>							
<b>UNIT I</b>	<b>QUANTITATIVE ABILITY I</b>						<b>8</b>
Number theory- Shortcuts, Divisibility rule- Unit place deduction-LCM &HCF, Square root and CubeRoot, Decimal & Fraction Percentage, Profit, loss and discount, Simple and compound interest, Ratio & Proportions, Mixtures & Allegation, Partnership.							
<b>UNI II</b>	<b>QUANTITATIVE ABILITY II</b>						<b>6</b>
Problems on Ages, Average, Clocks, Calendar, Data Interpretation- Bar chart- Pie chart- Line chart-Tables chart.							
<b>UNIT III</b>	<b>VERBAL REASONING I</b>						<b>7</b>
Analytical reasoning– Linear and circular arrangement, Blood relation, Direction Problems, Puzzles. Logical reasoning - Number and Alpha series, Odd man out, Element series and Logical series, Codingand decoding, Analogy, Classification, Logical sequence of words.							
<b>UNIT IV</b>	<b>LINGUISTICS SKILLS I</b>						<b>6</b>
Parts of Speech- Noun, Verb, Participle, Articles, Pronoun, Preposition, Adverb, Conjunction. Logicalsequence of words, Tense & Voice, Comparison.							
<b>UNIT V</b>	<b>LINGUISTICS SKILLS II</b>						<b>3</b>
Comprehension - Comprehend and understand a paragraph, Paragraph writing.							
				<b>L:30</b>	<b>T:0</b>	<b>P: 0</b>	<b>Total: 30 Periods</b>
<b>TEXT BOOKS</b>							
<b>T1</b>	Rajesh Varma, “Fast Track Objective Arithmetic”, Arihant Publications.						
<b>T2</b>	M.K.Panday, “Analytical Reasoning”, Magical Series.						
<b>T3</b>	BS Sijwali- Indu Sijwali, A New Approach to “Reasoning Verbal, Non-Verbal & Analytical”, ArihantPublications.						
<b>T4</b>	John Eastwood, “Oxford Practice Grammar”, Oxford.						
<b>REFERENCES</b>							
<b>R1</b>	R.V.Praveen, “Quantitative Aptitude and Reasoning” PHI Publication.						
<b>R2</b>	R.S.Agarwal, “Quantitative Aptitude for Competitive Examinations”, S.Chand& Company Pvt Limited.						
<b>R3</b>	R.S.Agarwal, “A modern approach to Verbal & Non-verbal reasoning”, S.Chand & Company Pvt Limited.						
<b>COURSE OUTCOMES</b>							
<b>At the end of the course students should be able to</b>							
<b>CO 1</b>	Apply the number system for solving application orientated concepts in quantitative aptitude.						
<b>CO 2</b>	Apply the financial ability for solving application orientated concepts in quantitative aptitude and in the data interpretation techniques.						
<b>CO 3</b>	Analyze the analytical reasoning and logical reasoning in verbal aptitude applications.						
<b>CO 4</b>	Apply appropriate grammar in both speaking and writing.						
<b>CO 5</b>	Analyze the given content and write a creative content.						



23GEB275	PERSONAL BRANDING				L	T	P	C
					1	0	2	2
<b>COURSE OBJECTIVES:</b>								
<ul style="list-style-type: none"> <li>To introduce basic minimization techniques and to implement the logic gates in combinational and sequential circuits</li> <li>To study the behavior and applications of Operational Amplifier and Timer ICs</li> </ul>								
<b>UNIT-I</b>	<b>SELF-AWARENESS &amp; PERSONAL DEVELOPMENT</b>							<b>3</b>
<b>Self-Awareness: Key Areas</b> -Personality, Values, Habits, Needs & Emotions, Impact of Self-Awareness on Personal Development <b>Personality</b> –Definition, Elements, Determinants, Needs and Benefits, Personality traits. Personality development skills, Positive traits for effective people, <b>SWOT</b> :Analyzing Strength and weakness (SWOT), Building Esteem & Self-Confidence, Working on attitudes (aggressive, assertive, submissive), Self-Motivation								
<b>UNIT-II</b>	<b>BODY LANGUAGE</b>							<b>3</b>
Body Language and Gestures, Personal Grooming, Personal Hygiene, Social Effectiveness, Business Etiquette								
<b>UNIT-III</b>	<b>INTERVIEW AND LEADERSHIP SKILLS</b>							<b>3</b>
Resume Building, Video Resume, Leadership Styles, Leadership Traits, Group Dynamics-Conflict management								
<b>UNIT-IV</b>	<b>SOCIAL IMAGE TRAITS</b>							<b>3</b>
Social etiquettes -Positive Social Image, Social Graces, Online Etiquettes, Dining Etiquettes, Voice Modulation, – Networking: Case Study and Company website references.								
<b>UNIT-V</b>	<b>PERSONALITY TEST</b>							<b>3</b>
Big Five Personality Test, Open DISC Assessment Test.								
					<b>L:30</b>	<b>T:0</b>	<b>P: 0</b>	<b>Total: 30 Periods</b>
<b>TEXT BOOKS</b>								
<b>T1</b>	Hurlock, E.B (2006). Personality Development, 28th Reprint. New Delhi: Tata McGraw Hill.							
<b>T2</b>	Stephen P. Robbins and Timothy A. Judge (2014), Organizational Behavior 16th Edition: Prentice Hall.							
<b>REFERENCES</b>								
<b>R1</b>	Smith, B. Body Language. Delhi: Rohan Book Company. 2004							
<b>R2</b>	Personality Development and Career management: By R.M.Onkar (S Chand Publications)							
<b>COURSE OUTCOMES</b>								
<b>At the end of the course students should be able to</b>								
<b>CO 1</b>	Apply the number system for solving application orientated concepts in quantitative aptitude.							
<b>CO 2</b>	Apply the financial ability for solving application orientated concepts in quantitative aptitude and in the data interpretation techniques.							
<b>CO 3</b>	Analyze the analytical reasoning and logical reasoning in verbal aptitude applications.							
<b>CO 4</b>	Apply appropriate grammar in both speaking and writing.							
<b>CO 5</b>	Analyze the given content and write a creative content.							



23CSP205	OBJECT ORIENTED PROGRAMMING USING JAVA LABORATORY	L	T	P	C
		0	0	3	1.5
<b>COURSE OBJECTIVES:</b>					
<ul style="list-style-type: none"> <li>• To develop the knowledge with an experimental understanding the properties of matter, semiconductors, viscosity and optics.</li> <li>• To make the students build knowledge on the practical oriented skills.</li> </ul>					
<b>LIST OF EXPERIMENTS</b>					
<b>Simple C Programming 60 hours</b>					
<ol style="list-style-type: none"> <li>1. Solving programs with I/O Statements</li> <li>2. Solving programs using Data types, variables and Operators</li> <li>3. Solving problems using Control structures</li> <li>4. Solving problems using arrays</li> <li>5. Programs using class, methods and objects using overloading</li> <li>6. Programs using class and constructors</li> <li>7. Programs employing in heritage</li> <li>8. Programs employing Polymorphism</li> <li>9. Programs employing Abstract Class</li> <li>10. Solving problems using the concept of Exception Handling</li> <li>11. Solving problems using the concept of Multithreading</li> </ol>					
<b>HARDWARE/ SOFTWARE REQUIRED FOR A BATCH OF 30 STUDENTS</b>					
<b>Hardware</b>					
<ol style="list-style-type: none"> <li>1. LAN System with 33 nodes(OR)Standalone PCs–33 Nos.</li> <li>2. Printers– 3 Nos.</li> </ol>					
<b>Software</b>					
<ol style="list-style-type: none"> <li>1. Java/J2SECompiler, Net Beans</li> </ol>					
		<b>L:0</b>	<b>T:0</b>	<b>P:45</b>	<b>Total: 45 Periods</b>
<b>COURSE OUTCOMES</b>					
<b>At the end of the course students should be able to</b>					
<b>CO 1</b>	Solve simple problems using data types, variables, and operators in Java.				
<b>CO 2</b>	Discover the use of control structures and Looping using classes and methods.				
<b>CO 3</b>	Infer the use constructors in solving real time applications				
<b>CO 4</b>	Apply the concepts of inheritance, polymorphism and packages to solve real world problems				
<b>CO 5</b>	Develop applications using the concept of threads and exceptions.				



23EEP201	ELECTRONICS LABORATORY			L	T	P	C
				0	0	3	1.5
<b>COURSE OBJECTIVES:</b>							
<ul style="list-style-type: none"> <li>To develop the knowledge with an experimental understanding the properties of matter, semiconductors, viscosity and optics.</li> <li>To make the students build knowledge on the practical oriented skills.</li> </ul>							
<b>LIST OF EXPERIMENTS</b>							
<ol style="list-style-type: none"> <li>Characteristics of BJT under CE, CB configurations</li> <li>Characteristics of JFET and MOSFET</li> <li>Design and testing of RC phase shift oscillator</li> <li>Application of 555 Timer IC – Multivibrators (any two)</li> <li>Inverting and non inverting circuit using Operational Amplifier</li> <li>Clipper and clamper using Operational Amplifier</li> <li>Design of Excess-3 to BCD and Binary to Gray code converter and vice-versa.</li> <li>Design of Encoders and Decoder circuits</li> <li>Design and implementation of 4-bit modulo synchronous counters using FFs</li> <li>Study of Verilog HDL – Basic Digital circuit implementation</li> </ol>							
<b>MAJOR EQUIPMENTS / SOFTWARE REQUIRED</b>							
<b>Hardware</b> <ul style="list-style-type: none"> <li>Function Generator</li> <li>CRO</li> <li>RPS</li> <li>Digital Trainer Kit</li> <li>Discrete Electronic Components</li> </ul>							
				<b>L:0</b>	<b>T:0</b>	<b>P:45</b>	<b>Total: 45 Periods</b>
<b>COURSE OUTCOMES</b>							
<b>At the end of the course students should be able to</b>							
<b>CO 1</b>	Practice the design procedure of various electronic circuit configurations						
<b>CO 2</b>	Understand about the operation and practical difficulties of applications of operational amplifiers						
<b>CO 3</b>	Understand the operation of oscillator and multivibrators						
<b>CO 4</b>	Design and implement combinational and sequential digital circuits						
<b>CO 5</b>	Acquire knowledge on Verilog HDL implementation on digital circuits						



23MAT204	STATISTICS AND NUMERICAL METHODS				L	T	P	C
(Common to AEROSPACE,AGRI,AUTO,EEE,FT,MECH)					3	0	0	3
<b>COURSE OBJECTIVES:</b>								
<ul style="list-style-type: none"> <li>To develop the use of matrix algebra techniques that is needed by engineers for practical applications.</li> <li>To acquaint the student with mathematical tools needed in evaluating differential calculus, multiple integrals and their applications.</li> </ul>								
<b>UNIT I</b>	<b>TESTING OF HYPOTHESIS</b>							<b>9</b>
Sampling distributions – Tests for single mean, proportion and difference of means (large and small samples) –Tests for single variance and equality of variances – Chi square test for goodness of fit – Independence of attributes.								
<b>UNIT II</b>	<b>DESIGNS OF EXPERIMENTS</b>							<b>9</b>
One way and two way classifications – Completely randomized design – Randomized block design – Latin square design – Applications of ANOVA.								
<b>UNIT III</b>	<b>SOLUTIONS OF EQUATIONS</b>							<b>9</b>
Newton Raphson method – Solution of linear system of equations – Gauss elimination method – Pivoting Gauss Jordan methods – Iterative methods of Gauss Jacobi and Gauss Seidal.								
<b>UNIT IV</b>	<b>INTERPOLATION, NUMERICAL DIFFERENTIATION AND NUMERICAL INTEGRATION</b>							<b>9</b>
Lagrange’s interpolation – Newton’s forward and backward difference interpolation – Approximation of derivatives using interpolation polynomials – Numerical single integration using Trapezoidal and Simpson’s 1/3 rules.								
<b>UNIT V</b>	<b>NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS</b>							<b>9</b>
Single step methods: Taylor’s series method – Euler’s method – Modified Euler’s Method – Fourth order Runge- Kutta method for solving first order equations – Multi step methods: Milne’s predictor-corrector methods for solving first order equations.								
					<b>L:45</b>	<b>T:0</b>	<b>P: 0</b>	<b>Total: 45 Periods</b>
<b>TEXT BOOKS</b>								
<b>T1</b>	Grewal, B.S., and Grewal, J.S., “Numerical methods in Engineering and Science”, Khanna Publishers, 10th Edition , New Delhi, 2015.							
<b>T2</b>	Johnson, R.A., Miller, I and Freund J., “Miller and Freund’s Probability and statistics for Engineers”,Pearson Education Asia, 9th Edition, 2018.							
<b>REFERENCES</b>								
<b>R1</b>	Walpole. R.E., Myers. R.H., Myers. S.L., and Ye. K., “Probability and Statistics for Engineers and Scientists”,9th Edition, Pearson Education, Asia, 2010.							
<b>R2</b>	Burden, R.L and Faires, J.D, "Numerical Analysis", 9 th Edition, Cengage Learning, 2016.							
<b>R3</b>	Devore. J.L., "Probability and Statistics for Engineering and the Sciences", Cengage Learning, New Delhi, 8 th Edition, 2014.							
<b>R4</b>	Gerald. C.F. and Wheatley. P.O. "Applied Numerical Analysis" Pearson Education, Asia, New Delhi, 7 <sup>th</sup> Edition, 2007.							
<b>R5</b>	Spiegel,M.R., Schiller, J. and Srinivasan,R.A., "Schaum’s Outlines on Probabilty and Statistics”, Tata McGraw Hill edition, 4th Edition, 2012.							
<b>COURSE OUTCOMES</b>								
<b>At the end of the course students should be able to</b>								
<b>CO 1</b>	Know about Eigen values and Eigen vectors and its role in the system of equations.							



23EET204	ELECTRICAL MACHINES II			L	T	P	C
				3	0	0	3
<b>COURSE OBJECTIVES:</b>							
<ul style="list-style-type: none"> <li>To develop the use of matrix algebra techniques that is needed by engineers for practical applications.</li> <li>To acquaint the student with mathematical tools needed in evaluating differential calculus, multiple integrals and their applications.</li> </ul>							
<b>UNIT I</b>	<b>SYNCHRONOUS GENERATOR</b>						<b>9</b>
Constructional details: winding factors (Distributed and concentrated windings), EMF equation – Synchronous reactance – Armature reaction – Phasor diagrams, Synchronizing and parallel operation, Synchronizing torque, Change of excitation and mechanical input, Voltage regulation – EMF, MMF, ZPF methods, Two reaction theory –slip test.							
<b>UNIT II</b>	<b>SYNCHRONOUS MOTOR</b>						<b>9</b>
Principle of operation – Torque equation, Operation on infinite bus bars - V and Inverted V curves, Power input and power developed equations, Starting methods – Current loci for constant power input, constant excitation and constant power developed, Hunting – natural frequency of oscillations – damper windings, synchronous condenser.							
<b>UNIT III</b>	<b>THREE PHASE INDUCTION MOTOR</b>						<b>9</b>
Constructional details– Principle of operation, Cogging and Crawling, Torque- Condition for maximum torque, Torque-Slip characteristics, Losses and efficiency, Load test - No load and blocked rotor tests - Equivalent circuit. Double cage induction motors, Induction generators, Synchronous induction motor- Doubly fed Induction Machines							
<b>UNIT IV</b>	<b>STARTING AND SPEED CONTROL OF THREE PHASE INDUCTION MOTOR</b>						<b>9</b>
Need for starting, Types of starters – DOL, Rotor resistance, Autotransformer and Star delta starters, Speed control: Voltage control, Frequency control and pole changing – Cascaded Connection, Concepts of V/f control and Slip power recovery scheme							
<b>UNIT V</b>	<b>SINGLE PHASE INDUCTION MOTOR</b>						<b>9</b>
Constructional details of single phase induction motor, Double field revolving theory and operation, Starting methods of single-phase induction motors – Capacitor start and capacitor run Induction Motor, No load and blocked rotor test - Equivalent circuit							
				<b>L:45</b>	<b>T:0</b>	<b>P: 0</b>	<b>Total: 45 Periods</b>
<b>TEXT BOOKS</b>							
<b>T1</b>	A.E. Fitzgerald, Charles Kingsley, Stephen. D. Umans, ‘Electric Machinery’, Mc Graw Hill publishing Company Ltd, 6th Edition 2017.						
<b>T2</b>	D.P. Kothari and I.J. Nagrath, ‘Electric Machines’, McGraw Hill Publishing Company Ltd, 5 <sup>th</sup> Edition 2017						
<b>REFERENCES</b>							
<b>R1</b>	Stephen J. Chapman, ‘Electric Machinery Fundamentals’4th edition, McGraw Hill Education Pvt. Ltd, 4th Edition 2017						
<b>R2</b>	P.S. Bhimbhra, ‘Electrical Machinery’, Khanna Publishers, edition 2, 2021.						
<b>R3</b>	K. Murugesh Kumar, “Induction and synchronous machines”, Vikas Publishing House Pvt. Ltd,2016.						
<b>R4</b>	B.R.Gupta, ‘Fundamental of Electric Machines’ New age International Publishers,3rd						



23EET205	CONTROL SYSTEMS			L	T	P	C
				3	1	0	4
<b>COURSE OBJECTIVES:</b>							
<ul style="list-style-type: none"> <li>To teach the fundamental concepts of control systems and the mathematical representation of dynamic systems</li> <li>To analyze the time-domain and frequency domain behavior of control systems and its stability analysis</li> <li>To introduce the concepts of modern control theory, including state-space representation, controllability, and observability, and their applications</li> </ul>							
<b>UNIT I</b>	<b>SYSTEMS AND THEIR REPRESENTATION</b>						<b>6+3</b>
Basic elements in control systems – Open and closed loop systems – Mathematical modelling of electrical and mechanical systems – analogous systems – Transfer function – Synchros – AC and DC servomotors – Block diagram reduction techniques – Signal flow graphs							
<b>UNIT II</b>	<b>TIME RESPONSE ANALYSIS</b>						<b>6+3</b>
Time response - Types of test input - I and II order system response - Time domain specifications – Error coefficients – Generalized error series – Steady state error – Routh Hurwitz stability criterion – Root locus construction							
<b>UNIT III</b>	<b>FREQUENCY RESPONSE ANALYSIS</b>						<b>6+3</b>
Frequency domain Specifications – Bode plot – Polar plot – Determination of closed loop response from open loop response – Correlation between frequency domain and time domain specifications - Nyquist stability criterion							
<b>UNIT IV</b>	<b>COMPENSATORS AND CONTROLLERS</b>						<b>6+3</b>
Basic Compensators – Lag, lead and lag-lead compensators – Lag / Lead compensator design using bode plots – Controllers - P, PI and PID control modes.							
<b>UNIT V</b>	<b>STATE SPACE ANALYSIS</b>						<b>6+3</b>
Concepts of state variable and state model - Solution of State equation - State space to transfer function conversion - state transition matrix - concepts of controllability and observability - Pole placement control - Observers design.							
				<b>L:45</b>	<b>T:15</b>	<b>P: 0</b>	<b>Total: 60 Periods</b>
<b>TEXT BOOKS</b>							
<b>T1</b>	I.J. Nagrath and M. Gopal, ‘Control Systems Engineering’, New Age International Publishers, 7 <sup>th</sup> Edition, 2021.						
<b>T2</b>	Farid Glnaraghi, Benjamin C. Kuo, ‘Automatic Control systems’, 9 <sup>th</sup> Edition, McGraw-Hill Education, 2017.						
<b>REFERENCES</b>							
<b>R1</b>	K. Ogata, ‘Modern Control Engineering’, 5th edition, PHI, New Delhi, 2016.						
<b>R2</b>	R.C.Dorf & R.H. Bishop, ‘Modern Control Systems’, 13 <sup>th</sup> Edition, Pearson, 2017.						
<b>R3</b>	A.Nagoor Kani, ‘Control Systems’, RBA Publication, 2020.						
<b>R4</b>	M. Gopal, ‘Control Systems, Principles and Design’, Tata McGraw Hill, New Delhi, 2012.						
<b>R5</b>	M.Gopal, “Modern Control System Theory”, Newage International, 2010.						
<b>COURSE OUTCOMES</b>							
<b>At the end of the course students should be able to</b>							
<b>CO 1</b>	Understand the methods of representation of systems and their desired transfer function						



23EET206	MEASUREMENTS AND INSTRUMENTATION			L	T	P	C
				2	0	0	2
<b>COURSE OBJECTIVES:</b>							
<ul style="list-style-type: none"> <li>To teach the fundamental concepts of control systems and the mathematical representation of dynamic systems</li> <li>To analyze the time-domain and frequency domain behavior of control systems and its stability analysis</li> <li>To introduce the concepts of modern control theory, including state-space representation, controllability, and observability, and their applications</li> </ul>							
<b>UNIT I</b>	<b>FUNDAMENTALS OF MEASUREMENT</b>						<b>6</b>
Functional Elements of a Measuring Instrument –Types of Measurement systems –Static and Dynamic Characteristics of measurement systems – Types and sources of Errors in measurements – Accuracy, Precision, Resolution, Sensitivity - standards and calibration							
<b>UNIT II</b>	<b>COMPARATIVE METHODS OF MEASUREMENTS</b>						<b>6</b>
DC Potentiometer - DC Bridges: Wheatstone, Kelvin's bridge – AC Bridges: Maxwell, Anderson, Schering Bridge							
<b>UNIT III</b>	<b>ELECTRICAL AND ELECTRONIC MEASUREMENTS</b>						<b>6</b>
Measurements of voltage, current: Moving coil and moving Iron instruments – Measurement of power, energy: Wattmeter, Energy meter – Magnetic measurements: Determination of B-H curve and measurement of iron loss – Instrument Transformers – Storage & Display Devices: CRT display, DSO							
<b>UNIT IV</b>	<b>MEASUREMENT OF NON ELECTRICAL QUANTITIES</b>						<b>6</b>
Classification and selection of Sensors and Transducers – Displacement measurement: LVDT – Biomedical sensors – ECG, EEG sensors – Introduction to Smart sensors							
<b>UNIT V</b>	<b>INSTRUMENTATION SYSTEMS</b>						<b>6</b>
Digital Voltmeters & multi-meters, Virtual Instrumentation - Advantages, Architecture of a virtual instrument, data-flow techniques, graphical programming, Virtual Instruments versus Traditional Instruments, Virtual Instruments use in Engineering Applications –VI Programming tools							
				<b>L:20</b>	<b>T:0</b>	<b>P: 0</b>	<b>Total: 30 Periods</b>
<b>TEXT BOOKS</b>							
<b>T1</b>	A. K. Sawhney, "A Course in Electrical & Electronic Measurements & Instrumentation", Dhanpat Rai & CO., New Delhi, 2022.						
<b>T2</b>	S. Gupta and J. John, "Virtual Instrumentation using Lab VIEW", Tata McGraw-Hill Publishing Company Limited, New Delhi, 2010.						
<b>REFERENCES</b>							
<b>R1</b>	David A. Bell, "Electronic Instrumentation and Measurements", Oxford Higher Education, 2013						
<b>R2</b>	Bouwens A J, "Digital Instrumentation", Tata McGraw Hill, New Delhi 2016						
<b>R3</b>	Martin U. Reissland, "Electrical Measurement – Fundamental Concepts and Applications", NewAge International (P) Ltd., 2015.						
<b>R4</b>	J. B. Gupta, "A Course in Electronic and Electrical Measurements and Instrumentation", S.K. Kataria & Sons, Delhi, 2013						
<b>R5</b>	M. S. Anand, "Electronics Instruments and Instrumentation Technology", Prentice Hall India, New Delhi, 2012.						



23GET276	VQAR-II	L	T	P	C	
		2	0	0	2	
<b>COURSE OBJECTIVES:</b>						
<ul style="list-style-type: none"> <li>To teach the fundamental concepts of control systems and the mathematical representation of dynamic systems</li> <li>To analyze the time-domain and frequency domain behavior of control systems and its stability analysis</li> <li>To introduce the concepts of modern control theory, including state-space representation, controllability, and observability, and their applications</li> </ul>						
<b>UNIT I</b>	<b>QUANTITATIVE ABILITY III</b>					<b>6</b>
Time, speed & distance-Average speed- Relative speed- Train problems- Boats and streams- Races, Chain rule, Time and work -Pipes and cisterns						
<b>UNIT II</b>	<b>QUANTITATIVE ABILITY IV</b>					<b>4</b>
Permutation & Combination, Probability, Mensuration						
<b>UNIT III</b>	<b>VERBAL REASONING II</b>					<b>7</b>
Machine Input and Output, Coded Inequalities, syllogisms, Problems on Cubes, Data sufficiency. <b>Critical Reasoning</b> -Statement and Argument, Statement and Assumption, Statement and Conclusion, Cause and effect, Course of action.						
<b>UNIT IV</b>	<b>NON- VERBAL REASONING</b>					<b>5</b>
Figure series, Odd man out, Mirror Image, Water image, Embedded Image, Cubes and Dices, Insert the Missing Characters, Analytical reasoning.						
<b>UNIT V</b>	<b>LINGUISTICS SKILLS III</b>					<b>8</b>
Sentences - Simple, Compound, Complex & Mixed sentences, Sentence Rearrangement, Idioms & Phrases, Reading Comprehension at higher level, Word Substitution, Synonyms & Antonyms, Error Spotting.						
		<b>L:30</b>	<b>T:0</b>	<b>P: 0</b>	<b>Total: 30 Periods</b>	
<b>TEXT BOOKS</b>						
<b>T1</b>	Rajesh Varma, "Fast Track Objective Arithmetic", Arihant Publications.					
<b>T2</b>	M.K.Panday, "Analytical Reasoning", Magical Series.					
<b>T3</b>	BS Sijwali- Indu Sijwali, A New Approach to "Reasoning Verbal, Non-Verbal & Analytical", Arihant Publications.					
<b>T4</b>	S.P.Bakshi, "Objective English" Arihant Publications.					
<b>REFERENCES</b>						
<b>R1</b>	R.V.Praveen, "Quantitative Aptitude and Reasoning" PHI Publication.					
<b>R2</b>	R.S.Agarwal, "Quantitative Aptitude for Competitive Examinations", S.Chand& Company Pvt Limited.					
<b>R3</b>	R.S.Agarwal, "A modern approach to Verbal & Non-verbal reasoning", S.Chand & Company Pvt Limited.					
<b>COURSE OUTCOMES</b>						
<b>At the end of the course students should be able to</b>						
<b>CO 1</b>	Learn the time and distance for solving application orientated concepts in quantitative aptitude					



23ITP204	PROGRAMMING IN PYTHON	L	T	P	C
(Common to All B.E/B.Tech Programme Except CSE, IT and AIML)		0	0	4	2
<b>COURSE OBJECTIVES:</b>					
<ul style="list-style-type: none"> <li>• To develop the knowledge with an experimental understanding the properties of matter, semiconductors, viscosity and optics.</li> <li>• To make the students build knowledge on the practical oriented skills.</li> </ul>					
<b>LIST OF EXPERIMENTS</b>					
<ol style="list-style-type: none"> <li>1. Program for various base conversion functions.</li> <li>2. Programs to demonstrate the usage of operators and conditional statements</li> <li>3. Programs to demonstrate usage of control structures</li> <li>4. Program using array operation</li> <li>5. Programs to demonstrate the usage of String functions</li> <li>6. Program using classes and functions</li> <li>7. Program to implement recursive function.</li> <li>8. Program to implement lambda function.</li> <li>9. Program on file manipulation</li> <li>10. Programs to demonstrate the usage of lists, sets, dictionaries and tuples.</li> <li>11. Program to implement function template.</li> <li>12. Program to implement class template</li> </ol>					
		<b>L:0</b>	<b>T:0</b>	<b>P:60</b>	<b>Total: 60 Periods</b>
<b>COURSE OUTCOMES</b>					
<b>At the end of the course students should be able to</b>					
<b>CO 1</b>	Write simple programs using built-in data types of Python.				
<b>CO 2</b>	Apply the conditional statements and loops for solving problems.				
<b>CO 3</b>	Implement arrays, strings and functions in Python				
<b>CO 4</b>	Identify the commonly used operations involving lists, sets, dictionaries, tuples and file handling in real time applications.				
<b>CO 5</b>	Implement exemplary applications related to templates for solving real time problems.				



23EEP203	ELECTRICAL MACHINES LABORATORY			L	T	P	C
				0	0	3	1.5
<b>COURSE OBJECTIVES:</b>							
<ol style="list-style-type: none"> <li>1. To provide hands on experience to evaluate the performance characteristics of DC and AC machines by conducting suitable tests</li> <li>2. To expose the students to determine the regulation, synchronization and equivalent circuit parameters of AC machines by performing experiments on the machine</li> </ol>							
<b>LIST OF EXPERIMENTS</b>							
<ol style="list-style-type: none"> <li>1. Load test on DC Series and Shunt Motor</li> <li>2. Swinburne's test and speed control of DC Shunt Motor</li> <li>3. Load test on Single Phase Transformer</li> <li>4. Determination of Equivalent circuit of a Single Phase Transformer</li> <li>5. Regulation of three phase alternator by EMF and MMF methods.</li> <li>6. Load test on three phase alternators.</li> <li>7. Synchronization of alternator with bus bar.</li> <li>8. V and Inverted V curves of Three Phase Synchronous Motor</li> <li>9. Load test on a Single phase and Three phase Induction motor.</li> <li>10. Determination of Equivalent circuit of a Three phase Induction motor</li> </ol>							
<b>MAJOR EQUIPMENTS / SOFTWARE REQUIRED</b>							
<b>Hardware</b> <ul style="list-style-type: none"> <li>▪ DC series motor</li> <li>▪ DC shunt motor</li> <li>▪ DC shunt motor coupled three phase Alternator</li> <li>▪ DC Shunt motor coupled salient pole three phase alternator</li> <li>▪ Three phase Synchronous Motor</li> <li>▪ Three phase induction motors- Squirrel cage</li> <li>▪ Single phase induction motor</li> <li>▪ Single phase auto transformer</li> <li>▪ Three phase auto transformer</li> </ul>							
				<b>L:0</b>	<b>T:0</b>	<b>P:45</b>	<b>Total: 45 Periods</b>
<b>COURSE OUTCOMES</b>							
<b>At the end of the course students should be able to</b>							
<b>CO 1</b>	Analyze the characteristics and performance of DC and AC machines						
<b>CO 2</b>	Understand various speed control techniques of DC machine						
<b>CO 3</b>	Know the concept of V curves in Synchronous motor						
<b>CO 4</b>	Comprehend the knowledge on voltage regulation of alternator						
<b>CO 5</b>	Perform how to synchronize the alternator with bus bar						



23EEP204	MEASUREMENTS AND VIRTUAL INSTRUMENTATION LABORATORY				L	T	P	C
					0	0	3	1.5
<b>COURSE OBJECTIVES:</b>								
<ul style="list-style-type: none"> <li>• To provide hands on experience to evaluate the performance characteristics of DC and AC machines by conducting suitable tests</li> <li>• To expose the students to determine the regulation, synchronization and equivalent circuit parameters of AC machines by performing experiments on the machine</li> </ul>								
<b>LIST OF EXPERIMENTS</b>								
<ol style="list-style-type: none"> <li>1. Calibration of Ammeter, Voltmeter and Wattmeter</li> <li>2. Extension of Voltage and Current ranges</li> <li>3. Wheatstone and Kelvin's bridges</li> <li>4. Anderson and Schering bridges</li> <li>5. Arithmetic and Boolean operations</li> <li>6. Study of loops, structures and array handling</li> <li>7. Case, Flat and Stacked Sequence Structure</li> <li>8. Data plotting and visualization</li> <li>9. Implementation of string functions</li> <li>10. Simple application of VI in medical system</li> </ol>								
<b>MAJOR EQUIPMENTS / SOFTWARE REQUIRED</b>								
<p><b>Hardware</b></p> <ul style="list-style-type: none"> <li>• PCs with Windows OS</li> </ul> <p><b>Software</b></p> <ul style="list-style-type: none"> <li>• LabVIEW or Equivalent Software</li> </ul>								
					<b>L:0</b>	<b>T:0</b>	<b>P:45</b>	<b>Total: 45 Periods</b>
<b>COURSE OUTCOMES</b>								
<b>At the end of the course students should be able to</b>								
<b>CO 1</b>	Calibrate and to extend the ranges of ammeter and voltmeter							
<b>CO 2</b>	Understand principles of various bridges and its applications							
<b>CO 3</b>	Know the basics of Virtual Instrumentation							
<b>CO 4</b>	Impart knowledge on various analysis tools of VI							
<b>CO 5</b>	Implement VI in medical systems							



23EEP105	INTERNSHIP - II	L	T	P	C
<b>(Common to All B.E. / B. Tech. Courses)</b>		-	-	-	<b>1</b>
<b>GOALS AND OBJECTIVES</b>					
<ol style="list-style-type: none"> <li>1. Design Thinking/Problem Solving: Exercise sound reasoning to analyze issues, make decisions, and overcome problems. The individual is able to obtain, interpret, and use knowledge, facts, and data in this process, and may demonstrate originality and inventiveness.</li> <li>2. Teamwork/Collaboration: Build collaborative relationships with colleagues and customers representing diverse cultures, races, ages, genders, religions, lifestyles, and viewpoints. The individual is able to work within a team structure, and can negotiate and manage conflict.</li> <li>3. Digital Technology: Leverage existing digital technologies ethically and efficiently to solve problems, complete tasks, and accomplish goals. The individual demonstrates effective adaptability to new and emerging technologies.</li> <li>4. Leadership: Leverage the strengths of others to achieve common goals, and use interpersonal skills to coach and develop others. The individual is able to access and manage his/her emotions and those of others; use empathetic skills to guide and motivate; and organize, prioritize, and delegate work.</li> <li>5. Professionalism/Work Ethic: Demonstrate personal accountability and effective work habits, e.g., punctuality, working productively with others, and time workload management, and understand the impact of non-verbal communication on professional work image. The individual demonstrates integrity and ethical behavior, acts responsibly with the interests of the larger community in mind, and is able to learn from his/her mistakes.</li> <li>6. Global/Intercultural Fluency: Value, respect, and learn from diverse cultures, races, ages, enders, sexual orientations, and religions. The individual demonstrates openness, inclusiveness, sensitivity, and the ability to interact respectfully with all people and understand individuals' differences.</li> </ol>					
					<b>2 Weeks</b>
<b>COURSE OUTCOMES</b>					
<b>At the end of the course students should be able to</b>					
<b>CO 1</b>	Explore career alternatives prior to graduation				
<b>CO 2</b>	Develop communication, interpersonal and other critical skills in the job interview process.				
<b>CO 3</b>	Develop work habits and attitudes necessary for job success.				
<b>CO 4</b>	Acquire employment contacts leading directly to a full-time job following graduation from college.				
<b>CO 5</b>	Identify, write down, and carry out performance objectives (mutually agreed upon by the employer, the MCC experiential learning supervisor, and the student) related to their job assignment.				

