



**GEETHANJALI INSTITUTE OF SCIENCE & TECHNOLOGY:  
NELLORE  
(AUTONOMOUS)**

**NELLORE-524317 (A.P) INDIA**

**B.TECH IN MECHANICAL ENGINEERING  
(ACCREDITED BY NBA)  
COURSE STRUCTURE AND SYLLABI  
UNDER RG 22 REGULATIONS**

## DEPARTMENT VISION

To evolve as a prospective learning centre for producing quality human resources.

## DEPARTMENT MISSION

- DM<sub>1</sub>:** Impart Technical knowledge through effective teaching-learning practices.
- DM<sub>2</sub>:** Provide congenial academic environment for honing technical skills.
- DM<sub>3</sub>:** Develop professional and entrepreneurial skills through collaborations.
- DM<sub>4</sub>:** Promote leadership skills along with social and ethical values.

## Program Educational Objectives (PEOs)

- PEO1:** Analyze Mechanical Engineering problems and provide sustainable solutions.
- PEO2:** Pursue successful professional career in industry, academia or research.
- PEO3:** Engage in continuous learning to keep abreast of emerging technologies with a sense of professional ethics.
- PEO4:** Contribute in multi-disciplinary teams through effective inter personal skills

### Program Outcomes

<b>PO1</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>PO2</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>PO3</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>PO4</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>PO5</b>	<b>Modern tool usage:</b> Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
<b>PO6</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>PO7</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>PO8</b>	<b>Ethics:</b> Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
<b>PO9</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>PO10</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>PO11</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>PO12</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.

### Program Specific Outcomes

- PSO1 Professional Skills:** Utilize the knowledge of materials and manufacturing principles to plan, design and monitor the production operations of an Industry.
- PSO2 Design Skills:** Employ the governing laws of Thermodynamics, Heat transfer and Refrigeration & Air Conditioning to design and develop Thermo Fluid systems.



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RG22 Regulations

## **B.TECH Mechanical Engineering**

**Course Structure (RG22)**

Semester 0

Induction Program: 3 weeks  
(Common for All Branches of Engineering)

<b>S.No</b>	<b>Course No</b>	<b>Course Name</b>	<b>Category</b>	<b>L-T-P-C</b>
1		Physical Activities--Sports, Yoga and Meditation, Plantation	MC	0-0-6-0
2		Career Counseling	MC	2-0-2-0
3		Orientation to all branches—career options, tools, etc.	MC	3-0-0-0
4		Orientation on admitted Branch-corresponding labs, tools and platforms	EC	2-0-3-0
5		Proficiency Modules & Productivity Tools	ESC	2-1-2-0
6		Assessment on basic aptitude and mathematical skills	MC	2-0-3-0
7		Remedial Training in Foundation Courses	MC	2-1-2-0
8		Human Values & Professional Ethics	MC	3-0-0-0
9		Communication Skills—focus on Listening, Speaking, Reading, Writing skills	BSC	2-1-2-0
10		Concepts of Programming	ESC	2-0-2-0



**B.TECH Mechanical Engineering**  
Course Structure (RG22)

<b>Semester - 1 (Theory-5, Lab-3)</b>							
<b>Sl. No.</b>	<b>Category</b>	<b>Course Code</b>	<b>Course Title</b>	<b>Hours per week</b>			<b>Credits</b>
				<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
1	BSC	22A0001T	Linear Algebra and Calculus	2	1	0	3
2	BSC	22A0007T	Engineering Chemistry	3	0	0	3
3	ESC	22A0518T	C-Programming & Data Structures	3	0	0	3
4	ESC	22A0203T	Basic Electrical & Electronics Engineering	3	0	0	3
5	ESC (Lab)	22A0304P	Engineering Workshop Lab	0	0	3	1.5
6	ESC (Lab)	22A0502P	IT Workshop Lab	0	0	3	1.5
7	BSC (Lab)	22A0012P	Engineering Chemistry Lab	0	0	3	1.5
8	ESC (Lab)	22A0519P	C-Programming & Data Structures Lab	0	0	3	1.5
9	ESC (Lab)	22A0204P	Basic Electrical & Electronics Engineering Lab	0	0	3	1.5
<b>Total credits</b>							<b>19.5</b>

<b>Category</b>	<b>Credits</b>
Basic Science Course (BSC)	7.5
Engineering Science Course (ESC)	12
Total	19.5

<b>Linear Algebra &amp; Calculus</b>					
<b>Course Code</b>	<b>L:T:P:S</b>	<b>Credits</b>	<b>Exam marks</b>	<b>Exam Duration</b>	<b>Course Type</b>
<b>22A0001T</b>	<b>2: 1:0 :0</b>	<b>3</b>	<b>CIE:30 SEE:70</b>	<b>3 Hours</b>	<b>BSC</b>
<b>Course Objectives:</b>					
This course will illuminate the students in the concepts of calculus and linear algebra. To equip the students with standard concepts and tools at an intermediate to advanced level mathematics to develop the confidence and ability among the students to handle various real world problems and their applications.					
<b>Syllabus</b>					<b>Total Hours:45</b>
<b>Unit - I</b>	<b>Matrices</b>				<b>9 Hrs</b>
Rank of a matrix by echelon form, normal form. Solving system of homogeneous and non-homogeneous equations linear equations. Applications: Finding the current in electrical circuits Eigen values and Eigenvectors and their properties, Cayley- Hamilton theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton theorem, diagonalisation of a matrix.					
<b>Unit - II</b>	<b>Mean Value Theorems</b>				<b>9 Hrs</b>
Rolle's Theorem (Without Proof), Lagrange's mean value theorem (Without Proof), Cauchy's mean value theorem (Without Proof), related problems, Taylor's and Maclaurin theorems with remainders (without proof) - related problems, Taylor's and Maclaurin series (without proof) Expansions of functions by Taylors and Maclaurin's series.					
<b>Unit - III</b>	<b>Multivariable Calculus</b>				<b>9 Hrs</b>
Partial derivatives, total derivatives, chain rule, change of variables, Jacobians, maxima and minima of functions of two variables, method of Lagrange multipliers.					
<b>Unit - IV</b>	<b>Multiple Integrals</b>				<b>9 Hrs</b>
Double integrals, change of order of integration, change of variables. Evaluation of triple integrals, change of variables between Cartesian, cylindrical and spherical polar co-ordinates. Finding areas and volumes using double and triple integrals.					
<b>Unit - V</b>	<b>Beta and Gamma functions</b>				<b>9 Hrs</b>
Beta and Gamma functions and their properties, relation between beta and gamma functions,evaluation of definite integrals using beta and gamma functions.					
<b>Course Outcomes (CO):</b>					
<b>On completion of this course, student will be able to</b>					
<ul style="list-style-type: none"> <li>• Solving the system of linear equations, find the eigen values and eigenvectors and use this information to facilitate the calculation of matrix characteristics.</li> <li>• Translate the given function as series of Taylor's and Maclaurin's with remainders, analyze the behavior of functions by using mean value theorems.</li> <li>• Acquire the Knowledge maxima and minima functions of several variables. Utilize Jacobian of a coordinate transformation to deal with the problems in change of variables.</li> </ul>					

- Apply multiple integration techniques in evaluating areas and volumes bounded by the region.
- Understand beta and gamma functions and its relations, conclude the use of special function in evaluating definite integrals.

**Textbooks:**

1. Higher Engineering Mathematics, B. S. Grewal , 44/e, Khanna Publishers, 40 edition-2017.
2. Linear Algebra & Calculus by T.K.V. Iyengar, B.Krishna Gandhi, S.Ranganatham and M.V.S.S.N.Prasad S. Chand publication 2019.

**Reference Books:**

1. “Advanced Engineering Mathematics”, Erwin Kreyszig, Wiley India 2016.
2. B.V.Ramana, “Higher Engineering Mathematics”, Mc Graw Hill publishers 2012.
3. Mathematical Methods by T.K.V. Iyengar, B.Krishna Gandhi, S. Ranganatham and M.V.S.S.N. Prasad, S. Chand Publications 2015.

<b>Engineering Chemistry</b> (Common to ME and CE)					
<b>Course Code</b>	<b>L:T:P:S</b>	<b>Credits</b>	<b>Exam marks</b>	<b>Exam Duration</b>	<b>Course Type</b>
<b>22A0007T</b>	<b>3:0:0:0</b>	<b>3</b>	<b>CIE:30 SEE:70</b>	<b>3 Hours</b>	<b>BSC</b>
<b>Prerequisite: Student should know fundamental concepts about Engineering Chemistry</b>					
<b>Course Objectives:</b> This course will enable students to:					
<ul style="list-style-type: none"> <li>➤ To familiarize engineering chemistry and its applications</li> <li>➤ To impart the concept of soft and hard waters, softening methods of hard water</li> <li>➤ To train the students on the principles and applications of electrochemistry, polymers, and cement.</li> </ul>					
<b>Syllabus</b>					<b>Total Hours:</b> <b>48</b>
<b>Unit I - Water and its treatment</b>					<b>10</b>
Introduction - hardness of water - causes of hardness - types of hardness: temporary and permanent - expression and units of hardness - Estimation of hardness of water by EDTA method. Numerical problems, Boiler troubles-Sludges, scales and Caustic embrittlement. Internal treatment of Boiler feed water - Calgon conditioning - Phosphate conditioning - Colloidal conditioning - Softening of water : Zeolite process, ion- exchange process, Desalination of water - Reverse osmosis and Electro dialysis.					
<b>Unit-II Electrochemistry and Applications</b>					<b>10</b>
Electrodes – concepts, electrochemical cell, Nernst equation, cell potential calculations. Primary cells – Zinc-air battery, Secondary cells – Nickel-Cadmium (Ni Cad),and lithium ion batteries- working of the batteries including cell reactions; Fuel cells: hydrogen-oxygen, methanol-oxygen fuel cells – working of the cells.  Corrosion: Introduction to corrosion, electrochemical theory of corrosion, metal oxide formation by dry corrosion-Pilling Bedworth Rule, differential aeration cell corrosion, galvanic corrosion, Factors affecting the corrosion, cathodic and anodic protection, electroplating and electro less plating (Nickel and Copper).					
<b>Unit-III Polymers</b>					<b>10</b>
Introduction to polymers, functionality of monomers, Types of polymerization- Addition , condensation and coordination polymerization with Mechanism. Plastics-Definition and characteristics- thermoplastic and thermosetting plastics. Preparation, properties and applications of PVC and Nylons. Rubbers- Natural rubber and its vulcanization - compounding of rubber. Elastomers-Preparation, properties and applications of Buna S, Buna N, Conducting polymers – polyacetylene, polyaniline, – mechanism of conduction and applications. Bio degradable polymers : poly lactic acid, Nylon-2-Nylon-6					



<b>Unit–IV Fuels and Combustion</b>	<b>8</b>
<p>Fuels – Types of fuels, solid fuels-classification Calorific value of fuel - HCV, LCV and numerical problems based on calorific value, determination of calorific value by bomb calorimeter. Analysis of coal, Liquid Fuels- refining of petroleum, fuels for IC engines, knocking and anti-knock agents, Octane and Cetane values, cracking of oils, synthetic petrol - Fischer-Tropsch's process; Gaseous fuels - composition and uses of natural gas, Producer gas and water gas.</p>	
<b>Unit–V Advanced Engineering Materials</b>	<b>10</b>
<p>Composites: Definition, classification with examples and applications.</p> <p>Cement: Composition, Classification, preparation (Dry and Wet processes), Setting and Hardening of Portland cement</p> <p>Refractories: Classification, characteristics of good refractories, properties- Refractoriness, refractoriness under load, porosity and chemical inertness – applications of refractories.</p> <p>Lubricants: Classification of lubricants with examples-characteristics of a good lubricants - mechanism of lubrication (thick film, thin film and extreme pressure) - properties of lubricants: viscosity, cloud point, pour point, flash point and fire point and Aniline point.</p>	

**Course Outcomes:**

On completion of this course, the students are able to:

- Recognize the basic properties of water and its significance in domestic and industrial purposes.(L2)
- Discuss the principles of electrochemistry in batteries.(L2)
- Discuss the knowledge of corrosion of metals and methods for its prevention towards the technological applications.(L2)
- Explain polymerization and the preparation, properties, and applications of thermoplastics & thermosetting, elastomers, & conducting polymers.(L1)
- Explain calorific values, octane number, refining of petroleum and cracking of oils and Select suitable fuels for IC engines. (L1)
- Describe the various engineering materials.(L1)

**Text Books:**

1. Jain and Jain, Engineering Chemistry, 16/e, DhanpatRai, 2013.
2. Peter Atkins, Julio de Paula and James Keeler, Atkins' Physical Chemistry, 10/e, Oxford University Press, 2010.

**Reference Books:**

1. Skoog and West G.V.Subba Reddy, K.N.Jayaveera and C. Ramachandraiah, Engineering Chemistry, McGraw Hill, 2020.
2. Douglas A. Skoog, Stanley R. Crouch, F. James Holler, Principles of Instrumental Analysis, 6/e, Thomson Books, 2007.
3. H.F.W. Taylor, Cement Chemistry, 2/e, Thomas Telford Publications, 1997.
4. D.J. Shaw, Introduction to Colloids and Surface Chemistry, Butterworth-Heinemann, 1992.

**E-resources:**

1. <https://libguides.humboldt.edu/openedu/chem>
2. <https://libraryguides.unh.edu/oer/chemistry>
3. <https://libraries.etsu.edu/research/guides/chemistry/oer>

<b>C-Programming &amp; Data Structures</b>					
<b>Course Code</b>	<b>L:T:P:S</b>	<b>Credits</b>	<b>Exam marks</b>	<b>Exam Duration</b>	<b>Course Type</b>
<b>22A0502T</b>	<b>2: 1:0 :0</b>	<b>3</b>	<b>CIE:30 SEE:70</b>	<b>3 Hours</b>	<b>ESC</b>
<b>Course Objectives:</b>					
<ul style="list-style-type: none"> <li>• Illustrate the basic concepts of C programming language.</li> <li>• Choose a suitable C-construct to develop C code for a given problem.</li> <li>• Illustrate the fundamental concept of data structures and Arrays</li> <li>• Emphasize the importance of data structures in developing and implementing efficient algorithms</li> <li>• Illustrate a variety of data structures such as linked structures, stacks, queues, trees, and graphs</li> </ul>					
<b>Syllabus</b>					<b>Total Hours:45</b>
<b>Module - I</b>	<b>Introduction to C Language</b>				<b>9 Hrs</b>
Structure of C program, C Tokens, Data types, Operators, Precedence and Associativity of operators, Expressions and its evaluation, control structures – sequence, selection and Iteration statements, unconditional control structures – break, goto, continue. Arrays: Introduction to arrays, types of arrays, applications of arrays, Programming examples					
<b>Module - II</b>	<b>Strings, Functions and Pointers</b>				<b>9 Hrs</b>
<p><b>String:</b> Declaring and Initializing string, Printing and reading strings, string manipulation functions, String input and output functions, array of strings, Programming examples</p> <p><b>Functions:</b> Defining function, user defined functions, standard functions, passing array as argument to function, recursion</p> <p><b>Pointers:</b> declaring and initializing pointers, pointers and arrays, pointer to pointer, pointer arithmetic, dynamic memory allocation,</p> <p>Structures and Unions</p>					
<b>Module - III</b>	<b>Data Structures</b>				<b>9 Hrs</b>
<p><b>Introduction to Data Structures:</b> Definitions, Concept of Data Structures, Overview of Data Structures, Implementation of Data Structures</p> <p><b>Linked Lists:</b> Definition, Single Linked List, Circular Linked List, Double Linked List, Circular Double Linked List, Applications of Linked List</p>					
<b>Module - IV</b>	<b>Stacks &amp; Queues</b>				<b>9 Hrs</b>
<p><b>Stacks:</b> Introduction, Definition, Representation of Stack, Operations on Stacks, Applications of Stacks</p> <p><b>Queues:</b> Introduction, Definition, Representation of Queues, Operations on Queues, Various Queue Structures, Applications of Queues</p>					

Module - V	Trees ,Graphs ,Searching and Sorting	9 Hrs
<p><b>Trees:</b> Basic Terminologies, Definition and Concepts, Binary Tree, Representation of Binary Tree, operations on Binary Tree, Binary Search Tree, Heap Tree</p> <p><b>Graphs:</b> Introduction, Graph Terminologies, Representation of graphs, Operations on Graphs, Graph, Graph Traversal Techniques: BFS and DFS</p> <p><b>Searching and Sorting</b> – sequential search, binary search, exchange (bubble) sort, selection sort, insertion sort.</p>		
<p><b>Course Outcomes (CO):</b></p> <p><b>On completion of this course, student will be able to</b></p> <ul style="list-style-type: none"> <li>• Illustrate and explain the basic computer concepts and programming principles of C language(L2)</li> <li>• Select the best selection and loop construct for solving given problem(L2)</li> <li>• Develop C programs to demonstrate the applications of derived data types such as arrays, pointers, strings.(L2)</li> <li>• Implement basic operations on stack and queue using array representation(L2)</li> <li>• Use linked structures, trees, and Graphs in writing programs(L2)</li> <li>• Demonstrate different methods for traversing Graphs and Trees (L2)</li> </ul>		
<p><b>Textbooks:</b></p>		
<ol style="list-style-type: none"> <li>1. C Programming &amp; Data Structures – Behrouz A. Fourazan, Richard F. Gilberg.</li> <li>2. Programming with C – Byron Gottfried, Third edition, Scham’s Outlines</li> <li>3. C Programming : A Problem Solving Approach- Behrouz A. Fourazan , E.V.Prasad, Richard F. Gilberg</li> <li>4. Classic Data Structures , Second Edition, Debasissamanta, PHI</li> <li>5. Fundamentals of Data Structures in C, 2nd Edition, E. Horowitz, S.Sahni and Susan Anderson Freed, Universities Press</li> </ol>		
<p><b>Reference Books:</b></p>		
<ol style="list-style-type: none"> <li>1. Let us C, Yashwant Kanetkar, 6th Edition , BPB</li> <li>2. C Programming and Data Structures, P.Padmanabham, Third Edition, BS Publications</li> <li>3. C Programming, E.Balagurusamy, 3rd edition, TMHPublishers</li> <li>4. Programming in C, Ashok N. Kamthane, AmitKamthane, Pearson</li> <li>5. Data Structures: A Pseudo code Approach with C, 2nd Edition, R.F.Gilberg and B. A. Forouzan, Cengage Learning.</li> <li>6. “Data Structures and Algorithm Analysis in C” by Weiss</li> <li>7. “Data Structure Through C” by Yashavant P Kanetkar</li> </ol>		
<p>E-resources:</p>		
<ol style="list-style-type: none"> <li>1. <a href="https://www.geeksforgeeks.org/c-programming-language/">https://www.geeksforgeeks.org/c-programming-language/</a></li> <li>2. <a href="http://en.cppreference.com/w/c">http://en.cppreference.com/w/c</a></li> <li>3. <a href="https://onlinecourses.nptel.ac.in/noc19_cs42/">https://onlinecourses.nptel.ac.in/noc19_cs42/</a></li> <li>4. <a href="https://www.linuxtopia.org/online_books/programming_books/gnu_c_programming_tutorial/index.html">https://www.linuxtopia.org/online_books/programming_books/gnu_c_programming_tutorial/index.html</a></li> <li>5. <a href="https://codeforwin.org/">https://codeforwin.org/</a></li> </ol>		

Basic Electrical and Electronics Engineering					
Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
22A0203T	3: 0:0:0	3	CIE:30 SEE:70	3 Hours	ESC
<b>Course Objectives:</b>					
To introduce the concept of electrical circuits and its components. To introduce the characteristics of various electronic devices. To impart the knowledge of various configurations, characteristics and applications of electrical & electronic components.					
<ol style="list-style-type: none"> <li>1) To understand the basic principles of all semiconductor devices.</li> <li>2) To be able to solve problems related to diode circuits, and amplifier circuits.</li> <li>3) To analyze diode circuits, various biasing and small signal equivalent circuits of amplifiers.</li> <li>4) To be able to compare the performance of BJTs and MOSFETs.</li> <li>5) To design rectifier circuits and various amplifier circuits using BJTs and MOSFETs.</li> </ol>					
<b>Syllabus</b>					<b>Total Hours:48</b>
<b>Unit - I</b>	<b>Fundamentals</b>				<b>9 Hrs</b>
<b>DC&amp;AC Circuits :</b> Electrical circuit elements (R - L and C) - Kirchhoff laws - Series and parallel connection of resistances with DC excitation. Superposition Theorem - Representation of sinusoidal waveforms - peak and rms values - phasor representation - real power - reactive power - apparent power - power factor - Analysis of single-phase ac circuits consisting of RL - RC - RLC series circuits, Resonance.					
<b>Unit - II</b>	<b>DC &amp; AC Machines</b>				<b>9 Hrs</b>
<b>DC &amp; AC Machines : A: DC Machines :</b> Principle and operation of DC Generator - EMF equations - OCC characteristics of DC generator – principle and operation of DC Motor – Performance Characteristics of DC Motor - Speed control of DC shut Motor. <b>B: AC Machines:</b> Principle and operation of Single Phase Transformer-EMF equation - OC and SC tests on transformer - Principle and operation of 3-phase induction motor and alternator., [ Elementary treatment only ]					
<b>Unit - III</b>	<b>Basics of Power Systems</b>				<b>10 Hrs</b>
<b>Basics of Power Systems:</b> Layout & operation of Hydro, Thermal, Nuclear Stations - Solar & wind generating stations – Typical AC Power Supply scheme – Elements of Transmission line – Types of Distribution systems: Primary & Secondary distribution systems.					
<b>Unit - IV</b>	<b>P-N Junction Diode</b>				<b>10 Hrs</b>
<b>Basic Electronic Devices : P-N Junction Diode:</b> Diode equation, Energy Band diagram, Volt-Ampere characteristics, Temperature dependence, Ideal versus practical, Static and dynamic resistances, Equivalent circuit, Diffusion and Transition Capacitances. Zener diode operation, Zener diode as voltage regulator. <b>Rectifiers :</b> P-N junction as a rectifier - Half Wave Rectifier, Ripple Factor - Full Wave Rectifier, Bridge Rectifier. <b>Bipolar Junction Transistor (BJT):</b> Construction, Principle of Operation, Symbol, Amplifying Action, Common Emitter, Common Base and Common Collector configurations and Input-Output Characteristics, Comparison of CE, CB and CC configurations					

<b>Junction Field Effect Transistor and MOSFET:</b> Construction, Principle of Operation, Symbol, Pinch-Off Voltage, Volt-Ampere Characteristic, Comparison of BJT and FET.		
<b>Unit - V</b>	<b>Junction Field Effect Transistor&amp; Digital Electronics</b>	<b>10 Hrs</b>
<b>Digital Electronics &amp; Micro processors :</b> <b>Digital Electronics:</b> Logic Gates, Simple combinational circuits–Half and Full Adders, BCD Adder.Latches and Flip-Flops (S-R, JK and D), Shift Registers and Counters <b>8085 Micro processor:</b> 8085 Micro processors architecture		
<b>Course Outcomes (CO):</b> <b>On completion of this course, student will be able to</b> <ul style="list-style-type: none"> <li>• Apply KCL, KVL and network theorems to analyse DC circuit.</li> <li>• Analyze the single-phase AC Circuits, the representation of alternating quantities and determining the power and power factor in these circuits..</li> <li>• Comprehend the construction and Operation of DC and AC machines.</li> <li>• Understand the operation of PN Junction diode and its application in rectifier circuits.</li> <li>• Compare the different configurations of BJT and draw the V-I characteristics of BJT, JFET and MOSFET..</li> </ul>		
<b>Textbooks:</b>		
<ol style="list-style-type: none"> <li>1. M.Surya Kalavathi, Ramana Pilla, Ch. Srinivasa Rao, Gulinindala Suresh, “ <b>Basic Electrical and Electronics Engineering</b>”, S.Chand and Company Limited, New Delhi, 1<sup>st</sup> Edition, 2017.</li> <li>2. R.L.Boylestad and Louis Nashlesky, “<b>Electronic Devices &amp; Circuit Theory</b>”, Pearson Education, 2007.</li> </ol>		
<b>Reference Books:</b>		
<ol style="list-style-type: none"> <li>1. V.K. Mehtha and Rohit Mehta, “Principles of Electrical Engineering and Electronics”, S.Chand &amp; Co., 2009.</li> <li>2. Jacob Milliman, Christos C .Halkias, Satyabrata Jit (2011), “Electronic Devices and Circuits”,</li> </ol>		

<b>Engineering Workshop Lab</b> (Common to All Branches of Engineering)					
<b>Course Code</b>	<b>L:T:P:S</b>	<b>Credits</b>	<b>Exam marks</b>	<b>Exam Duration</b>	<b>Course Type</b>
<b>22A0303</b>	<b>0 :0:3:0</b>	<b>1.5</b>	<b>CIE:30 SEE:70</b>	<b>3 Hours</b>	<b>ESC</b>
<b>Course Objectives:</b>					
To familiarize students with wood working, sheet metal operations, fitting and electrical house wiring skills.					
<b>Syllabus</b>					<b>Total Hours:45</b>
<b>Wood Working:</b>					
Familiarity with different types of woods and tools used in wood working and make following joints					
a) Half – Lap joint					
b) Mortise and Tenon joint					
c) Corner Dovetail joint or Bridle joint					
<b>Sheet Metal Working:</b>					
Familiarity with different types of tools used in sheet metal working, Developments of following sheet metal job from GI sheets					
a) Tapered tray					
b) Conical funnel					
c) Elbow pipe					
d) Brazing					
<b>Fitting:</b>					
Familiarity with different types of tools used in fitting and do the following fitting exercises					
a)V-fit					
b) Dovetail fit					
c) Semi-circular fit					
d) Bicycle tire puncture and change of two wheeler tyre					
<b>Electrical Wiring:</b>					
Familiarities with different types of basic electrical circuits and make the following connections					
a) Parallel and series					
b) Two-way switch					
c) Godown lighting					
d) Tube light					
e) Three phase motor					
f) Soldering of wires					

**Course Outcomes (CO):**

**On completion of this course, student will be able to**

- Apply wood working skills in real world applications. (13)
- Build different objects with metal sheets in real world applications. (13)
- Apply fitting operations in various applications. (13)
- Apply different types of basic electric circuit connections. (13)
- Use soldering and brazing techniques. (12)

**Note: In each section a minimum of three exercises are to be carried out.**



IT Workshop Lab (Common to All Branches of Engineering)					
Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
22A0502P	0: 0: 3:0	1.5	CIE:30 SEE:70	3 Hours	ESC
<b>Course Objectives:</b>					
<ol style="list-style-type: none"> <li>1. To make the students know about the internal parts of a computer, assembling and disassembling a computer from the parts, preparing a computer for use by installing the operating system</li> <li>2. To provide Technical training to the students on Productivity tools like Word processors Spreadsheets, Presentations and LAtEX</li> <li>3. To learn about Networking of computers and use Internet facility for Browsing and Searching</li> </ol>					
<b>Syllabus</b>					<b>Total Hours:45</b>
<p><b>Task 1:</b> Learn about Computer: Identify the internal parts of a computer, and its peripherals. Represent the same in the form of diagrams including Block diagram of a computer. Write specifications for each part of a computer including peripherals and specification of Desktop computer. Submit it in the form of a report.</p> <p><b>Task 2:</b> Assembling a Computer: Disassemble and assemble the PC back to working condition. Students should be able to trouble shoot the computer and identify working and non-working parts. Student should identify the problem correctly by various methods</p> <p><b>Task 3:</b> Install Operating system: Student should install Linux on the computer. Student may install another operating system (including proprietary software) and make the system dual boot or multi boot. Students should record the entire installation process.</p> <p><b>Task 4:</b> Operating system features: Students should record the various features that are supported by the operating system(s) installed. They have to submit a report on it. Students should be able to access CD/DVD drives, write CD/DVDs, access pen drives, print files, etc. Students should install new application software and record the installation process.</p> <p>Networking and Internet</p> <p><b>Task 5:</b> Networking: Students should connect two computers directly using a cable or wireless connectivity and share information. Students should connect two or more computers using switch/hub and share information. Crimping activity, logical configuration etc. should be done by the student. The entire process has to be documented.</p> <p><b>Task 6:</b> Browsing Internet: Student should access the Internet for Browsing. Students should search the Internet for required information. Students should be able to create e-mail account</p>					

and send email. They should get acquaintance with applications like Facebook, skype etc. If Intranet mailing facility is available in the organization, then students should share the information using it. If the operating system supports sending messages to multiple users (LINUX supports it) in the same network, then it should be done by the student. Students are expected to submit the information about different browsers available, their features, and search process using different natural languages, and creating email account.

**Task 7: Antivirus:** Students should download freely available Antivirus software, install it and use it to check for threats to the computer being used. Students should submit information about the features of the antivirus used, installation process, about virus definitions, virus engine etc. Productivity tools

**Task 8: Word Processor:** Students should be able to create documents using the word processor tool. Some of the tasks that are to be performed are inserting and deleting the characters, words and lines, Alignment of the lines, Inserting header and Footer, changing the font, changing the colour, including images and tables in the word file, making page setup, copy and paste block of text, images, tables, linking the images which are present in other directory, formatting paragraphs, spell checking, etc. Students should be able to prepare project cover pages, content sheet and chapter pages at the end of the task using the features studied. Students should submit a user manual of the word processor considered, Image Manipulation tools.

**Task 9: Presentations:** creating, opening, saving and running the presentations, selecting the style for slides, formatting the slides with different fonts, colours, creating charts and tables, inserting and deleting text, graphics and animations, bulleting and numbering, hyperlinking, running the slide show, setting the timing for slide show.

**Task 10: Spreadsheet:** Students should be able to create, open, save the application documents and format them as per the requirement. Some of the tasks that may be practiced are Managing the worksheet environment, creating cell data, inserting and deleting cell data, format cells, adjust the cell size, applying formulas and functions, preparing charts, sorting cells. Students should submit a user manual of the Spreadsheet

**Task 11:** LateX: Introduction to Latex and its installation and different IDEs. Creating first document using Latex, using content into sections using article and book class of LaTeX. Styling Pages: reviewing and customizing different paper sizes and formats. Formatting text (styles, size, alignment, colors and adding bullets and numbered items, inserting mathematical symbols, and images, etc.). Creating basic tables, adding simple and dashed borders, merging rows and columns. Referencing and Indexing: cross-referencing (refer to sections, table, images), bibliography (references).

**Course Outcomes (CO):**

**On completion of this course, student will be able to**

1. Disassemble and Assemble a Personal Computer and prepare the computer ready to use.
2. Prepare the Documents using Word processors and Prepare spread sheets for calculations using excel and also the documents using LAtEX.
3. Prepare Slide presentations using the presentation tool.
4. Interconnect two or more computers for information sharing.
5. Access the Internet and Browse it to obtain the required information.

**Reference Books:**

1. Introduction to Computers, Peter Norton, McGraw Hill
2. MOS study guide for word, Excel, Powerpoint& Outlook Exams, Joan Lambert, Joyce Cox, PHI.
3. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education.
4. Networking your computers and devices, Rusen, PHI
5. Trouble shooting, Maintaining & Repairing PCs, Bigelows, TMH
6. Lamport L. LATEX: a document preparation system: user's guide and reference manual. Addison-wesley; 1994.

**Note: Use open source tools for implementation of the above exercises.**

<b>Engineering Chemistry Lab</b>					
<b>Course Code</b>	<b>L:T:P:S</b>	<b>Credits</b>	<b>Exam marks</b>	<b>Exam Duration</b>	<b>Course Type</b>
<b>22A0012P</b>	<b>0 :0:3:0</b>	<b>1.5</b>	<b>CIE:30 SEE:70</b>	<b>3 Hours</b>	<b>BSC</b>
<b>Course Objectives:</b>					
This course will enable students to:					
<ul style="list-style-type: none"> <li>To Verify the fundamental concepts with experiments</li> </ul>					
<b>Syllabus</b>					<b>Total Hours:45</b>
<b>Note:</b> In the following list, out of 14 experiments conduct any 10 experiments from the below list					
<b>List of Experiments</b>					
<ol style="list-style-type: none"> <li>Determination of Hardness of a groundwater sample and mineral water sample.</li> <li>Determination of Copper by EDTA method.</li> <li>Conductometric estimation of strong acid using standard sodium hydroxide solution.</li> <li>Estimation of iron (II) using diphenylamine indicator (Dichrometry – Internal indicator method).</li> <li>Determination of Corrosion rate and inhibition efficiency of an inhibitor for mild steel in hydrochloric acid medium.</li> <li>pH metric titration of (i) strong acid vs. strong base, (ii) weak acid vs. strong base.</li> <li>Estimation of Dissolved Oxygen by Winkler’s method.</li> <li>Potentiometry - determination of redox potentials and emfs.</li> <li>Determination of Strength of an acid in Pb-Acid battery.</li> <li>Colorometric estimation of manganese.</li> <li>Preparation of a polymer.</li> <li>Determination of Viscosity of lubricating oil by Redwood Viscometer- 1</li> <li>Determination of Viscosity of lubricating oil by Redwood Viscometer -2</li> <li>Determination alkalinity of water sample.</li> </ol>					
<b>Course Outcomes (CO):</b>					
<b>On completion of this course, student will be able to</b>					
<ul style="list-style-type: none"> <li>Measure the strength of an acid present in secondary battery and Determine the rate of corrosion for mild steel in hydrochloric acid medium.(L2)</li> <li>Determine the Hardness of a groundwater sample and estimate the Copper by EDTA method. (L1)</li> <li>Determine the cell constant and conductance of solutions using conductivity meter and different acid-base titrations by pH meter. (L1)</li> <li>Synthesize of advanced polymer materials. (L2)</li> <li>Determine the potentials and EMFs of solutions by Potentiometry and Estimate the iron (II) using diphenylamine indicator. (L1)</li> <li>Determine the viscosity of different lubricants using Redwood Viscometer. (L1)</li> </ul>					

**Textbooks:**

1. Vogel's Text book of Quantitative Chemical Analysis, Sixth Edition – Mendham J et al, Pearson Education, 2012.

**Reference Books:**

1. Chemistry Practical– Lab Manual, First edition, Chandra Sekhar KB, Subba Reddy GV and Jayaveera KN, SM Enterprises, Hyderabad, 2014.
2. Engineering Chemistry Laboratory Manual, For B.Tech. I year (ME, CE) Students, Dr. A. Ravikrishna, Dr. B. Tirumalarao Sri Krishna Hitech Publishing company, Chennai, 2019.

**E-resources:**

1. <https://guides.lib.purdue.edu/chemlabs>.
2. <https://chemcollective.org/>.
3. <http://chemistry.alanearhart.org/Lab/index.html>.
4. <https://www.acs.org/content/acs/en/education/students/highschool/chemistryclubs/activities/simulations.html>.
5. <https://instr.iastate.libguides.com/oer/chemistry>.

<b>C-Programming &amp; Data Structures Lab</b>					
<b>Course Code</b>	<b>L:T:P:S</b>	<b>Credits</b>	<b>Exam marks</b>	<b>Exam Duration</b>	<b>Course Type</b>
<b>22A0519P</b>	<b>0:0:3:0</b>	<b>3</b>	<b>CIE:30 SEE:70</b>	<b>3 Hours</b>	<b>ESC</b>
<b>Course Objectives:</b>					
This course will enable students to: <ul style="list-style-type: none"> <li>• To get familiar with the basic concepts of C programming.</li> <li>• To design programs using arrays, strings, pointers and structures.</li> <li>• To illustrate the use of Stacks and Queues</li> <li>• To apply different operations on linked lists.</li> <li>• To demonstrate Binary search tree traversal techniques.</li> <li>• To design searching and sorting techniques.</li> </ul>					
<b>Syllabus</b>					<b>Total Hours:45</b>
<b>Note:</b> In the following list, out of 12 experiments conduct any 10 experiments from the below list					
<b>List of Experiments</b>					
<b>Week 1</b>					
Write C programs that use both recursive and non-recursive functions					
i) To find the factorial of a given integer.					
ii) To find the GCD (greatest common divisor) of two given integers.					
iii) To solve Towers of Hanoi problem.					
<b>Week 2</b>					
a) Write a C program to find both the largest and smallest number in a list of integers.					
b) Write a C program that uses functions to perform the following:					
i) Addition of Two Matrices ii) Multiplication of Two Matrices					
<b>Week 3</b>					
a) Write a C program that uses functions to perform the following operations:					
i) To insert a sub-string in to a given main string from a given position.					
ii) To delete n characters from a given position in a given string.					
<b>Week 4</b>					
a) Write a C program that displays the position or index in the string S where the string T begins, or - 1 if S doesn't contain T.					
b) Write a C program to count the lines, words and characters in a given text.					
<b>Week 5</b>					
a) Write a C Program to perform various arithmetic operations on pointer variables.					
b) Write a C Program to demonstrate the following parameter passing mechanisms:					
i) call-by-value      ii) call-by-reference					
<b>Week 6</b>					
Write a C program that uses functions to perform the following operations:					
i) Reading a complex number					
ii) Writing a complex number					
iii) Addition of two complex numbers					

iv) Multiplication of two complex numbers

(Note: represent complex number using a structure.)

### **Week 7**

Write C programs that implement stack (its operations) using

- i) Arrays
- ii) Pointers

### **Week 8**

Write C programs that implement Queue (its operations) using

- i) Arrays
- ii) Pointers

### **Week 9**

Write a C program that uses Stack operations to perform the following:

- i) Converting infix expression into postfix expression
- ii) Evaluating the postfix expression

### **Week 10**

Write a C program that uses functions to perform the following operations on singly linked list.

- i) Creation ii) Insertion iii) Deletion iv) Traversal

### **Week 11**

Write a C program that uses functions to perform the following operations on Doubly linkedlist.

- i) Creation ii) Insertion iii) Deletion iv) Traversal

### **Week 12**

Write a C program that uses functions to perform the following operations on circular linkedlist.

- i) Creation ii) Insertion iii) Deletion iv) Traversal

### **Week 13**

Write a C program that uses functions to perform the following:

- i) Creating a Binary Tree of integers
- ii) Traversing the above binary tree in preorder, inorder and postorder.

### **Week 14**

Write C programs that use both recursive and non-recursive functions to perform the following

searching operations for a key value in a given list of integers:

- i) Linear search
- ii) Binary search

### **Week 15**

Write a C program that implements the following sorting methods to sort a given list of integers in

ascending order

- i) Bubble sort
- ii) Selection sort
- iii) Insertion sort

**Course Outcomes (CO):****On completion of this course, student will be able to**

- Demonstrate basic concepts of C programming language. (L2)
- Develop C programs using functions, arrays, structures and pointers. (L6)
- Illustrate the concepts Stacks and Queues. (L2)
- Design operations on Linked lists. (L6)
- Apply various Binary tree traversal techniques. (L3)
- Develop searching and sorting methods. (L6)

**Textbooks:**

1. Programming in C and Data Structures, J.R.Hanly, Ashok N. Kamthane and A. Ananda Rao, Pearson Education.
2. B.A. Forouzon and R.F. Gilberg, "COMPUTER SCIENCE: A Structured Programming Approach Using C", Third edition, CENGAGE Learning, 2016.
3. Richard F. Gilberg & Behrouz A. Forouzan, "Data Structures: A Pseudocode Approach with C", Second Edition, CENGAGE Learning, 2011.

**Reference Books:**

1. PradipDey and ManasGhosh, Programming in C, Oxford University Press, 2nd Edition 2011.
2. E.Balaguruswamy, "C and Data Structures", 4th Edition, Tata Mc Graw Hill.
3. A.K.Sharma, Computer Fundamentals and Programming in C, 2nd Edition, University Press.
4. M.T.Somashekara, "Problem Solving Using C", PHI, 2nd Edition 2009.



# Basic Electrical and Electronics Engineering

(Common for all branches excluding EEE & ECE)

Course Code	L:T:P	Credits	Exam. Marks	Exam Duration	Course Type
22A0240P	0:0:3	1.5	CIE:30 SEE:70	3 Hours	PC

## Course Objectives:

To get practical knowledge about basic electrical circuits, electronic devices like Diodes, BJT, JFET and also analyze the performance of DC Motors, AC Motors and Transformers.

## Syllabus

### LIST OF EXPERIMENTS: (Conduct all experiments).

**Note: All the experiments shall be implemented using both Hardware and Software.**

### Equipment Required:

1. Verification of Kirchoff's Laws.
2. Verification of Superposition Theorem.
3. Magnetization characteristics of DC Shunt Generator.
4. Brake Test on DC-Shunt Motor. Determination of Performance curves.
5. OC & SC Tests on Single Phase Transformer.
6. V-I Characteristics of Solar Cell
7. V-I Characteristics of PN junction Diode
8. V-I Characteristics Zener Diode
9. Half Wave Rectifier and Full Wave rectifier.
10. Input and Output characteristics of BJT with CE configuration
11. Input and Output characteristics of BJT with CB configuration
12. Input and Output Characteristics of JFET.

### Additional Experiments:

13. Speed control of DC Shunt Motor
14. Brake Test on Three Phase Induction Motor.

## Course Outcomes:

After the completion of the course students will able to,

1. Experimentally verify the basic circuit theorems, KCL and KVL
2. Draw the Open circuit characteristics of DC Shunt Generator circuits experimentally.
3. Acquire hands on experience of conducting various tests on dc shunt motor, single phase transformers obtaining their performance indices using standard analytical as well as graphical methods
4. Experimentally verify the V-I characteristics of Solar cell
5. Draw the characteristics of different semiconductor devices like PN junction Diode, Zener Diode, BJT and JFET by conducting suitable experiments.
6. Experimentally verify the working of half and full wave rectifier by using PN Junction diodes



**B.TECH Mechanical Engineering**  
Course Structure (RG22)

<b>Semester - 2 (Theory-4, Lab-5)</b>							
Sl. No.	Category	Course Code	Course Title	Hours per week			Credits
				L	T	P	C
1	BSC	22A0002T	Differential Equations and Vector Calculus	2	1	0	3
2	BSC	22A0004T	Engineering Physics	3	0	0	3
3	HSSC	22A0013T	Communicative English	3	0	0	3
4	ESC	22A0301T	Basics of Mechanical Engineering	3	0	0	3
5	ESC	22A0302T	Engineering Drawing	1	0	4	3
6	ESC (Lab)	22A0303P	Engineering Graphics Lab	0	0	3	1.5
7	HSSC(Lab)	22A0014P	Communicative English Lab	0	0	3	1.5
8	BSC (Lab)	22A0008P	Engineering Physics Lab	0	0	3	1.5
<b>Total credits</b>							<b>19.5</b>

Category	Credits
Basic Science Courses	7.5
Humanities and Social Science Courses	4.5
Engineering Science Courses	7.5
Total	19.5

<b>Differential Equations and Vector Calculus</b>					
<b>Course Code</b>	<b>L:T:P:S</b>	<b>Credits</b>	<b>Exam marks</b>	<b>Exam Duration</b>	<b>Course Type</b>
<b>22A0002T</b>	<b>2: 1:0:0</b>	<b>3</b>	<b>CIE:30 SEE:70</b>	<b>3 Hours</b>	<b>BSC</b>
<b>Course Objectives:</b>					
To enlighten the learners in the concept of differential equations and multivariable calculus, to furnish the learners with basic concepts and techniques at plus two level to lead them into advanced level by handling various real world applications.					
<b>Syllabus</b>					<b>Total Hours:45</b>
<b>Unit - I</b>	<b>Linear differential equations of higher order (Constant Coefficients)</b>				<b>9 Hrs</b>
Definitions, homogenous and non-homogenous, complimentary function, general solution, particular integral, Wronskian, method of variation of parameters. Simultaneous linear equations, Applications to L-C-R Circuit problems and Mass spring system.					
<b>Unit - II</b>	<b>Partial Differential Equations</b>				<b>9 Hrs</b>
Introduction and formation of Partial Differential Equations by elimination of arbitrary constants and arbitrary functions, solutions of first order equations using Lagrange's method. Non linear equations of first order – Type I, II, III, IV.					
<b>Unit - III</b>	<b>Applications of Partial Differential Equations</b>				<b>9 Hrs</b>
Classification of PDE, method of separation of variables for second order equations. Applications of Partial Differential Equations: One dimensional Wave equation (Without Derivation), Solutions one Dimensional Wave equation by the method of separation of variables and related Problems.					
<b>Unit - IV</b>	<b>Vector differentiation</b>				<b>9 Hrs</b>
Scalar and vector point functions, vector operator del, del applies to scalar point functions- Gradient, del applied to vector point functions-Divergence and Curl, vector identities.					
<b>Unit - V</b>	<b>Vector integration</b>				<b>9 Hrs</b>
Line integral-circulation-work done, surface integral-flux, Green's theorem in the plane (without proof), Stoke's theorem (without proof), volume integral, Divergence theorem (without proof) and applications of these theorems.					
<b>Course Outcomes (CO):</b>					
<b>On completion of this course, student will be able to</b>					
<ul style="list-style-type: none"> <li>• Solve the linear differential equations with constant coefficients by appropriate method.</li> <li>• Apply a range of techniques to find solutions of standard partial differential equations.</li> <li>• Calcify the PDE, learn the applications of PDEs</li> <li>• Apply del to Scalar and vector point functions, illustrate the physical interpretation of Gradient, Divergence and Curl.</li> </ul>					

- Apply Green's, Stokes and Divergence theorem in evaluation of double and triple integrals.

**Textbooks:**

1. B.S. Grewal, Higher Engineering Mathematics, 44/e, Khanna publishers, 2017.
2. T.K.V. Iyengar, B.Krishna Gandhi, S.Ranganatham and M.V.S.S.N.Prasad, Differential Equations & Vector Calculus, S. Chand publication.

**Reference Books:**

1. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2011.
2. B.V.Ramana, "Higher Engineering Mathematics", Mc Graw Hill publishers.
3. Engineering Mathematic I & II, by T.K.V. Iyengar, B.Krishna Gandhi, S.Ranganatham and M.V.S.S.N.Prasad S. Chand publication.

<b>Engineering Physics (Common to CE and ME)</b>					
<b>Course Code</b>	<b>L:T:P:S</b>	<b>Credits</b>	<b>Exam marks</b>	<b>Exam Duration</b>	<b>Course Type</b>
<b>22A0004T</b>	<b>3: 0:0:0</b>	<b>3</b>	<b>CIE:30 SEE:70</b>	<b>3 Hours</b>	<b>BSC</b>
<b>Course Objectives:</b>					
<ul style="list-style-type: none"> <li>• To make a bridge between the physics in school and engineering courses.</li> <li>• To impart knowledge in basic concepts of optical phenomenon like interference, diffraction and Polarisation</li> <li>• To understand the mechanisms of emission of light, the use of lasers as light sources for low and high energy applications, study of propagation of light wave through optical fibres along with engineering applications.</li> <li>• To enlighten the periodic arrangement of atoms in crystals, Bragg's law and to provide fundamentals related to structural analysis through powder diffraction method.</li> <li>• To familiarize the basic concepts of acoustics and ultrasonics with their Engineering applications.</li> <li>• To explain the significant concept of magnetic materials leading to the emerging micro device applications.</li> <li>• To familiarize the applications of nano and smart materials relevant to engineering branches.</li> </ul>					
<b>Syllabus</b>					<b>Total Hours:48</b>
<b>Unit - I</b>	<b>Wave Optics</b>				<b>10 Hrs</b>
<p>Interference- Principle of superposition – Interference of light – Types of Interference – Path difference – Phase difference – Conditions for sustained interference- Interference in thin films (Reflection Geometry) – Colors in thin films – Newton's Rings – Determination of wavelength and refractive index of liquid.</p> <p>Diffraction- Introduction – Fresnel and Fraunhofer diffraction – Fraunhofer diffraction due to singleslit, double slit and N-slits (qualitative) – Grating spectrum.</p> <p>Polarization- Introduction – Types of polarization – Polarization by reflection, refraction and doublerefraction - Nicol's Prism - Half wave and Quarter wave plates with applications.</p>					
<b>Unit - II</b>	<b>Lasers and Fiber optics</b>				<b>8 Hrs</b>
<p>Lasers- Introduction – Characteristics of laser – Spontaneous and Stimulated emission of radiation – Einstein's coefficients – Population inversion – Lasing action – Pumping mechanisms – Ruby laser – He-Ne laser – Applications of lasers.</p> <p>Fiber optics- Introduction – Principle of optical fiber – Acceptance Angle – Numerical Aperture – Classification of optical fibers based on refractive index profile and modes – Propagation of electromagnetic wave through optical fibers – Propagation Losses (qualitative) – Applications</p>					

<b>Unit - III</b>	<b>Crystallography and X-ray diffraction</b>	<b>8 Hrs</b>
<p>Crystallography- Space lattice, Basis, unit cell and lattice parameters – Bravais Lattice – Crystal systems – Packing fraction – Coordination number – Packing fraction of SC, BCC &amp; FCC – Miller indices – Separation between successive (hkl) planes.</p> <p>X-Ray Diffraction- Bragg's law – Bragg's X-ray diffractometer – Crystal structure determination by Powder method.</p>		
<b>Unit - IV</b>	<b>Acoustics and Ultrasonics</b>	<b>9 Hrs</b>
<p>Acoustics- Introduction – Requirements of acoustically good hall – Reverberation – Reverberation time – Sabine's formula (Derivation using growth and decay method ) – Absorption coefficient and its determination – Factors affecting acoustics of buildings and their remedies.</p> <p>Ultrasonics- Introduction – Properties – Production by magnetostriction and piezoelectric methods – Detection – Acoustic grating – Non Destructive Testing – Pulse echo system through transmission and reflection modes – Applications.</p>		
<b>Unit - V</b>	<b>Engineering Materials</b>	<b>9 Hrs</b>
<p>Magnetic Materials- Introduction- basic definitions – Origin of permanent magnetic moment – Classification of magnetic materials: Dia, para &amp; Ferro –Hysteresis – Soft and Hard magnetic materials.</p> <p>Nanomaterials- Introduction – Surface area and quantum confinement –Properties of Nanomaterials – Synthesis of nanomaterials: Top-down: Ball Milling – Bottom-up: Chemical Vapour Deposition – Applications of nanomaterials.</p> <p>Smart Materials- Introduction to Smart Materials- Characteristics- Types of smart materials: Smart Memory alloys (SMA)- definition- two stable solid phases: Low temperature phase (martensite transformations) - High temperature phase (austenitic transformations)- Applications of SMA.</p>		
<p><b>Course Outcomes (CO):</b></p> <p><b>On completion of this course, student will be able to</b></p> <ul style="list-style-type: none"> <li>• Describe the importance of Interference, Diffraction and Polarization and the engineering applications as well (L2)</li> <li>• Demonstrate the properties of lasers and fibre optics to various applications in science and technology (L2)</li> <li>• Explain the important properties of crystals like the presence of long-range order and periodicity, structure determination using X-ray diffraction (L2)</li> <li>• Explain the fundamental properties and propagation principles of ultrasonics and acoustics in diverse engineering applications (L2)</li> </ul>		

- Explain the fundamental concepts and theory related to magnetic materials (L1)
- Illustrate diverse principles and theories of nano and smart materials and their technological applications in diverse fields (L2)

**Textbooks:**

1. Engineering Physics – Dr. M.N. Avadhanulu & Dr. P.G. Kshirsagar, S. Chand and Company
2. Engineering physics – D.K. Battacharya and Poonam Tandon, Oxford University press.
3. Applied Physics for Engineers- K.Venkataramanan, R. Raja, M. Sundararajan(Scitech) [3,5] 2014

**Reference Books:**

1. Engineering Physics - Sanjay D. Jain, D. Sahasrambudhe and Girish, University Press
2. Engineering Physics – K. Thyagarajan, McGraw Hill Publishers
3. Engineering Physics – D K Pandey, S. Chaturvedi, Cengage Learning
4. Engineering Physics – M.R. Srinivasan, New Age Publications
4. T.Pradeep “A Text book of Nano Science and Nano Technology”- Tata Mc GrawHill 2013
5. Melton, K. N, Stockel, D. and Wayman, C.M. “Engineering aspects of Shape memory Alloys”, Butterworth – Heinemann, 1990.

**E-resources:**

- <https://www.textbooks.com/Catalog/MG5/Applied-Physics.php>
- [https://edurev.in/courses/9596\\_Electromagnetic-Theory-Notes--Videos--MCQs--PPTs](https://edurev.in/courses/9596_Electromagnetic-Theory-Notes--Videos--MCQs--PPTs)
- <https://libguides.ntu.edu.sg/c.php?g=867756&p=6226561>
- <https://bookauthority.org/books/best-applied-physics-books>
- <https://www.electronicsforu.com/resources/16-free-ebooks-on-material-science/2>

<b>Communicative English</b> <b>(Common to all Branches of Engineering)</b>					
<b>Course Code</b>	<b>L:T:P:S</b>	<b>Credits</b>	<b>Exam marks</b>	<b>Exam Duration</b>	<b>Course Type</b>
<b>22A0013T</b>	<b>3: 0:0:0</b>	<b>3</b>	<b>CIE:30 SEE:70</b>	<b>3 Hours</b>	<b>HSC</b>
<b>Course Objectives:</b>					
<ul style="list-style-type: none"> <li>• Facilitate effective listening skills for better comprehension of academic lectures and English spoken by native speakers</li> <li>• Help improve speaking skills motivating the learners to participate in activities such as role plays, discussions and structured talks/oral presentations</li> <li>• Focus on appropriate reading skills for comprehension of various academic texts and authentic materials</li> <li>• Impart effective strategies for good writing skills in summarizing, writing well organized essays, drafting formal letters and designing well structured reports</li> <li>• Broaden the knowledge base of grammatical structures and vocabulary and encourage their appropriate use in speech and writing</li> </ul>					
<b>Syllabus</b>					<b>Total Hours:48</b>
<b>Unit - I</b>	<b>On the Conduct of Life: William Hazlitt</b>				<b>9 Hrs</b>
<p>Listening: Identifying the topic, the context and specific pieces of information by listening to short audio texts and answering a series of questions.</p> <p>Speaking: Asking and answering general questions on familiar topics such as home, family, work, studies and interests; introducing oneself and others.</p> <p>Reading: Skimming to get the main idea of a text Scanning to look for specific pieces of information.</p> <p>Reading for Writing: Beginnings and endings of paragraphs - introducing the topic, summarizing the main idea and/or providing a transition to the next paragraph.</p> <p>Grammar and Vocabulary: Parts of Speech,  Content words and function words;  Word order in sentences;  Basic sentence structures;  Types of questions - Wh- questions.</p>					
<b>Unit - II</b>	<b>The Brook: Alfred Tennyson</b>				<b>9 Hrs</b>
<p>Listening: Answering a series of questions about main idea and supporting ideas after listening to audio texts.</p> <p>Speaking: Discussion in pairs/small groups on specific topics followed by short structured talks.</p> <p>Reading: Identifying sequence of ideas; recognizing verbal techniques that help to link the ideas in a paragraph together.</p> <p>Writing: Paragraph writing (specific topics) using suitable cohesive devices; mechanics of writing - punctuation, capital letters.</p>					



Grammar and Vocabulary: Use of Articles and zero Article Prepositions Punctuation, capital letters Cohesive devices - linkers		
<b>Unit - III</b>	<b>The Death Trap: Saki</b>	<b>11 Hrs</b>
<p>Listening: Listening for global comprehension and summarizing what is listened to. Speaking: Discussing specific topics in pairs or small groups and reporting what is discussed Reading: Reading a text in detail by making basic inferences -recognizing and interpreting specific context clues; strategies to use text clues for comprehension. Writing: Paragraph Writing , Summarizing Grammar and Vocabulary: Verbs - Tenses Subject-Verb agreement Direct &amp; Indirect speech</p>		
<b>Unit - IV</b>	<b>Innovation: Muhammad Yunus</b>	<b>10 Hrs</b>
<p>Listening: Making predictions while listening to conversations/ transactional dialogues without video; listening with video. Speaking: Role plays for practice of conversational English in academic contexts (formal and informal) - asking for and giving information/directions. Reading: Read and Interpret graphic Information to reveal trends/patterns/relationships, communicate processes or display complicated data. Writing: Letter Writing: Official Letters/Report Writing Grammar and Vocabulary: Adjectives and Adverbs; Comparing and Contrasting Voice - Active &amp; Passive Voice.</p>		
<b>Unit - V</b>	<b>An Astrologer's Day: R. K. Narayan</b>	<b>8 Hrs</b>
<p>Listening: Identifying key terms, understanding concepts and answering a series of relevant questions that test comprehension. Speaking: Formal oral presentations on topics from academic contexts- without the use of PPT slides Reading: Reading for Comprehension Writing: Writing structured essays on specific topics using suitable claims and evidences. Grammar and Vocabulary: Identifying and correcting common errors in grammar and usage (articles, prepositions, tenses, subject verb agreement)</p>		
<b>Course Outcomes (CO):</b>		
<b>On completion of this course, student will be able to</b>		
<ul style="list-style-type: none"> <li>• Retrieve the knowledge of basic grammatical concepts</li> <li>• Understand the context, topic, and pieces of specific information from social or transactional dialogues spoken by native speakers of English</li> <li>• Apply grammatical structures to formulate sentences and correct word forms</li> <li>• Analyze discourse markers to speak clearly on a specific topic in informal discussions</li> </ul>		

- Evaluate listening /reading texts and to write summaries based on global comprehension of these texts.
- Create and develop coherent paragraph interpreting graphical description.

**Textbooks:**

1. Language and Life: English Skills for Engineering Students - Orient Black Swan

**Reference Books:**

1. Bailey, Stephen. Academic writing: A handbook for international students. Routledge, 2014.
2. Chase, Becky Tarver. Pathways: Listening, Speaking and Critical Thinking. Heinley ELT; 2nd Edition, 2018.
3. Raymond Murphy's English Grammar in Use Fourth Edition (2012) E-book
4. Hewings, Martin. Cambridge Academic English (B2). CUP, 2012.
5. Oxford Learners Dictionary, 12<sup>th</sup> Edition, 2011
6. Norman Lewis Word Power Made Easy- The Complete Handbook for Building a Superior Vocabulary (2014)

**Web links:**

1. [www.englishclub.com](http://www.englishclub.com)
2. [www.easyworldofenglish.com](http://www.easyworldofenglish.com)
3. [www.languageguide.org/english/](http://www.languageguide.org/english/)
4. [www.bbc.co.uk/learningenglish](http://www.bbc.co.uk/learningenglish)
5. [www.eslpod.com/index.html](http://www.eslpod.com/index.html)

<b>Basics of Mechanical Engineering</b>					
<b>Course Code</b>	<b>L:T:P:S</b>	<b>Credits</b>	<b>Exam marks</b>	<b>Exam Duration</b>	<b>Course Type</b>
<b>22A0301T</b>	<b>3: 0:0:0</b>	<b>3</b>	<b>CIE:30 SEE:70</b>	<b>3 Hours</b>	<b>ESC</b>
<b>Course Objectives:</b>					
<ul style="list-style-type: none"> <li>• Expose commercially important metals and alloys (both ferrous and non ferrous) with engineering constraints.</li> <li>• Expose to various mechanical property measuring techniques.</li> <li>• Provide insights on various metal cutting processes. (Lathe, drilling, milling).</li> <li>• Expose to various linear and angular measuring techniques.</li> <li>• Introduce to the concepts of fluid statics and dynamics.</li> <li>• Impart the knowledge on selection of various types of fluid machinery.</li> <li>• Impart knowledge on Conservation of energy.</li> <li>• Impart the knowledge on selection of boilers for different operating pressure.</li> <li>• Provide insights on working of IC engines.</li> </ul>					
<b>Syllabus</b>					<b>Total Hours:49</b>
<b>Unit - I</b>	<b>Basics of Mechanical Engineering</b>				<b>12 Hrs</b>
<p>Classification of engineering materials: Cast iron- Classification of cast iron-Grey cast iron-White cast Iron- Ductile cast iron-Malleable cast iron-Carbon steels-Plain carbon steel-Classification of plain carbon steel-Alloy steel-Effect of alloying elements in steel-Classification of alloy steel-Iron carbon diagram</p> <p>Properties of materials: Mechanical properties-Stress: Classification of stress-Strain: Classification of strain- Simple problems on stress and strain</p> <p>Materials testing: Tensile test-stress - strain diagram of mild steel material- Shear test-Brinell's hardness test-Vicker's hardness test-Fatigue failure: factors affecting the fatigue strength-Fatigue testing</p>					
<b>Unit - II</b>	<b>Mechanical Measurements</b>				<b>10 Hrs</b>
<p>Temperature measurement: Temperature measuring Instruments-Thermal expansion-Electrical Resistance thermometers-Thermo-Electric thermometers-Radiation method</p> <p>Pressure Measurement: Moderate pressure measurement using Manometers- Moderate pressure measurement using Elastic Elements-Low pressure or vacuum measurement- High pressure measurement</p> <p>Velocity measurement: Measurement of linear velocity- Measurement of angular velocity</p> <p>Flow measurement: Positive Displacement meter-Differential Pressure Flow meter-Rotameter</p> <p>Strain measurement: Measurement of strain using Electrical resistance strain gauge</p> <p>Torque measurement: Measurement of torque using Transmission dynamometers and</p>					

Absorption dynamometers		
Errors in measurement: Classification of errors-Uncertainties		
<b>Unit - III</b>	<b>Machine Tools and Metrology</b>	<b>9 Hrs</b>
<p>Lathe: Classification of Lathe-Lathe specifications-Lathe accessories-Lathe operations-Drilling machine: Classification of Drilling machines-Drilling machine specifications-Drilling machine operations-Milling machines: Milling machines-Classification of Milling machines- Milling machine specifications-Types of Milling cutters-Milling operations-Shaping machines: Classification of shaping machines- Shaping machine specifications-Construction and main parts- Quick return mechanism</p> <p>Metrology: Accuracy and Precision-Vernier Calipers: Construction-Least count of Vernier calipers-Determination of the length of a rod-Applications-Micrometer: Types of Micrometers-Construction-Pitch of a Micrometer-Least count of a Micrometer-Determination of Zero Error of a micrometer-Determination of diameter of a wire using Micrometer-Applications-Slip gauges-Sine Bar: Construction-Working principle-Applications-Dial gauge: Construction-Applications</p>		
<b>Unit - IV</b>	<b>Fluid Mechanics and Fluid Machinery</b>	<b>9 Hrs</b>
<p>Properties of Fluids: Pressure or intensity of Pressure-Mass density or Density or Specific mass-Weight density or Specific weight-Specific volume-Specific gravity-Viscosity-Newton's law of viscosity-Kinematic viscosity-Pascal's law: Pressure variation with depth-Hydrostatic law-Continuity Equation-Bernoulli's Equation for Incompressible fluids-Viscous flow-Turbulent flow</p> <p>Hydraulic Turbines: Pelton wheel-Francis Turbine-Kaplan Turbine-Pumps: Kinetic Energy Pump-Positive Displacement Pump-Fluid Coupling-Compressors: Positive displacement compressors-Dynamic compressor- Pneumatic Machinery: Pneumatic components-Applications</p>		
<b>Unit - V</b>	<b>Laws of Thermodynamics, Boilers and IC Engines</b>	<b>9 Hrs</b>
<p>First law of thermodynamics: First law of thermodynamics for a closed system undergoing a change of state-Corollaries of first law of thermodynamics-Limitations of first law of thermodynamics-Second law of thermodynamics: The Kelvin-Planck statement-Clasius statement-Equivalence of Kelvin-Planck and Clasius statements-PMM-II</p> <p>Boilers: Classification of Boilers-Cochron Boiler: Construction-Working-Adnatages-Limitations- Lancashire Boiler: Construction-Working-Adnatages-Limitations- Bobcock and Wilcox Boiler: Construction-Working-Adnatages-Limitations-Differences between Water tube and Fire tube boilers</p> <p>IC Engines: Working of Four stroke Diesel Engine- Working of Four stroke Petrol Engine-Working of Two stroke Diesel Engine- Working of Two stroke Petrol Engine-Comparisons of Two stroke and Four stroke engines-Comparisons between External and Internal Combustion Engines.</p>		

**Course Outcomes (CO):****On completion of this course, student will be able to**

- Select steels and cast irons for a given engineering application.
- Determine the simple stresses and deformations due to axial loads in members
- Evaluate the properties of materials.
- List various measuring instruments used in metrology
- Identify the methods of cutting process to generate different types of surfaces.
- Measure force, torque, temperature, pressure and strain.
- Estimate the fluid properties under laminar and turbulent flows.
- Select the type of turbine required for different flow conditions.
- Explain the importance of thermodynamic properties related to conversion of heat energy into work.
- Select the type of boiler required for different operating conditions.
- Explain the working of IC engines relevant to combustion process.

**Textbooks:**

1. Basic Mechanical engineering by Basant Agarwal and CM Agarwal, Wiley India Pvt Limited, 2008
2. Basic Mechanical engineering by R.K Rajput, Lakshmi Publication Pvt Ltd, New Delhi, 2003
3. Basics of Mechanical engineering by Rishi singal and Mridul Singal, IK International Publishing House Pvt Ltd, 2007

**Reference Books:**

1. Basic Mechanical engineering By M. P. Poonia and S.C. Sharma, Kanna Book Publishing company Pvt Ltd, 2019
2. Basic Mechanical Engineering by Pravin Kumar, Person Publications, 2013
3. 3. Basics of Mechanical engineering by R.rajesh Kumar, Jyothis Publishers, 2016

<b>Engineering Drawing</b> (Common to all Branches of Engineering)					
Course Code	L:T:P/D:S	Credits	Exam marks	Exam Duration	Course Type
22A0302T	1: 0: 0/4 :0	3	CIE:30 SEE:70	3 Hours	ESC
<b>Course Objectives:</b>					
<ul style="list-style-type: none"> <li>• Bring awareness that Engineering Drawing is the Language of Engineers.</li> <li>• Familiarize how industry communicates technical information.</li> <li>• Teach the practices for accuracy and clarity in presenting the technical information.</li> <li>• Develop the engineering imagination essential for successful design.</li> </ul>					
<b>Syllabus</b>					<b>Total Hours:50</b>
<b>Unit - I</b>	<b>Introduction to Engineering Drawing</b>				<b>10 Hrs</b>
<p>Introduction to Engineering Drawing: Principles of Engineering Drawing and its significance- Conventions in drawing-lettering - BIS conventions.</p> <p>a) Draw the Conic sections including Ellipse, Parabola, Hyperbola, and the Rectangular hyperbola using general methods,</p> <p>b) Draw the Cycloid, Epicycloids, and Hypocycloid</p> <p>c) Draw the Involutés of circle, square, pentagon, and hexagon</p>					
<b>Unit - II</b>	<b>Projections of points, lines and planes</b>				<b>10 Hrs</b>
<p>Projections of points, lines, and planes: Projection of points in any quadrant, lines inclined to one and both planes, finding true lengths, finding true inclinations, angle made by line. Projections of regular plane surfaces using rotating plane method.</p>					
<b>Unit - III</b>	<b>Projections of Solids</b>				<b>10 Hrs</b>
<p><b>Projections of solids:</b> Projections of regular solids inclined to one and both the principle planes using auxiliary views method.</p>					
<b>Unit - IV</b>	<b>Sections of solids</b>				<b>10 Hrs</b>
<p><b>Sections of solids:</b> Section planes and sectional view of right regular solids- prism, cylinder, pyramid and cone. True shapes of the sections.</p>					
<b>Unit - V</b>	<b>Development of surfaces</b>				<b>10 Hrs</b>
<p><b>Development of surfaces:</b> Development of surfaces of right regular solids-prism, cylinder, pyramid, cone and their sectional parts.</p>					
<b>Course Outcomes (CO):</b>					
<b>On completion of this course, student will be able to</b>					
<ul style="list-style-type: none"> <li>• Draw various curves applied in engineering. (12)</li> <li>• Show projections of solids and sections graphically. (12)</li> <li>• Draw the development of surfaces of solids. (13)</li> </ul>					

**Textbooks:**

1. K.L.Narayana & P.Kannaiah, Engineering Drawing, 3/e, Scitech Publishers, Chennai, 2012.
2. N.D.Bhatt, Engineering Drawing, 53/e, Charotar Publishers, 2016.

**Reference Books:**

1. Dhanajay A Jolhe, Engineering Drawing, Tata McGraw-Hill, Copy Right, 2009
2. Venugopal, Engineering Drawing and Graphics, 3/e, New Age Publishers, 2000
3. Shah and Rana, Engineering Drawing, 2/e, Pearson Education, 2009
4. K.C.John, Engineering Graphics, 2/e, PHI, 2013
5. Basant Agarwal & C.M.Agarwal, Engineering Drawing, Tata McGraw-Hill, Copy Right, 2008.

Engineering Graphics Lab					
Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
22A0303P	0 :0:3:0	1.5	CIE:30 SEE:70	3 Hours	ESC
<b>Course Objectives:</b>					
This course will enable students to: <ul style="list-style-type: none"> <li>• Instruct the utility of drafting &amp; modeling packages in orthographic and isometric drawings.</li> <li>• Train the usage of 2D and 3D modeling.</li> <li>• Instruct graphical representation of machine components.</li> </ul>					
<b>Syllabus</b>					<b>Total Hours:39</b>
Computer Aided Drafting: <b>Introduction to AutoCAD:</b> Basic drawing and editing commands: line, circle, rectangle, erase, view, undo, redo, snap, object editing, moving, copying, rotating, scaling, mirroring, layers, templates, polylines, trimming, extending, stretching, fillets, arrays, dimensions. Dimensioning principles and conventional representations. <b>Orthographic Projections:</b> Systems of projections, conventions and application to orthographic projections - simple objects. <b>Isometric Projections:</b> Principles of isometric projection- Isometric scale; Isometric views: lines, planes, simple solids.					
<b>Course Outcomes (CO):</b>					
<b>On completion of this course, student will be able to</b> <ul style="list-style-type: none"> <li>• Use computers as a drafting tool. (L2)</li> <li>• Draw isometric and orthographic drawings using CAD packages. (L3)</li> </ul>					
<b>Text books</b>					
<ol style="list-style-type: none"> <li>1. K.L. Narayana, Bheemanjaneyulu, Engineering Graphics with Autocad, New age International Publishers, 2018.</li> <li>2. T Jeyapooan , Engineering Graphics Using Autocad, Vikas Publishing House, 2015</li> <li>3. Dr. C. Elanchezhian and Dr. B. Vijaya Ramnath , Engineering Graphics Using AutoCAD, Medtech; 7/e, 2018</li> <li>4. H. M. Allen , Engineering Graphics Using Autocad Course Manual, Ronjon Pub; 2/e,1993</li> <li>5. Dennis E. Maguire , Engineering Drawing from First Principles: Using AutoCAD, Butterworth-Heinemann, 1998</li> </ol>					



<b>Communicative English Lab</b> (Common to all Branches of Engineering)					
<b>Course Code</b>	<b>L:T:P:S</b>	<b>Credits</b>	<b>Exam marks</b>	<b>Exam Duration</b>	<b>Course Type</b>
<b>22A0014P</b>	<b>0 :0:3:0</b>	<b>1.5</b>	<b>CIE:30 SEE:70</b>	<b>3 Hours</b>	<b>HSC</b>
<b>Course Objectives:</b>					
This course will enable students to: <ul style="list-style-type: none"> <li>• Students will be exposed to a variety of self instructional, learner friendly modes of language learning</li> <li>• Students will learn better pronunciation through sounds, stress, intonation and rhythm</li> <li>• Students will be trained to use language effectively to face interviews, group discussions, public speaking</li> <li>• Students will be initiated into greater use of the computer in resume preparation, report writing, format making etc.</li> </ul>					
<b>Syllabus</b>					<b>Total Hours:48</b>
<b>List of Experiments</b>					
<ol style="list-style-type: none"> <li>1. Phonetics</li> <li>2. Describing objects/places/persons</li> <li>3. Role Play or Conversational Practice</li> <li>4. JAM</li> <li>5. Etiquettes of Telephonic Communication</li> <li>6. Group Discussions</li> <li>7. Debates</li> <li>8. Oral Presentations</li> <li>9. Interviews Skills</li> <li>10. Reading comprehension</li> <li>11. E-mail Writing</li> <li>12. Resume Writing</li> </ol>					
<b>Course Outcomes (CO):</b>					
<b>On completion of this course, student will be able to</b>					
<ul style="list-style-type: none"> <li>• Listening and repeating the sounds of English Language</li> <li>• Understand the different aspects of the English language proficiency with emphasis on LSRW skills</li> <li>• Apply communication skills through various language learning activities</li> <li>• Analyze the English speech sounds, syllable division, stress, rhythm, intonation for better Listening and Speaking Comprehension.</li> <li>• Evaluate and exhibit acceptable etiquette essential in social and professional settings</li> <li>• Create awareness on mother tongue influence and neutralize it in order to Improve fluency in spoken English.</li> </ul>					
<b>Suggested Software:</b> Walden InfoTech / Young India Films					

**Reference Books:**

1. Bailey, Stephen. Academic writing: A handbook for international students. Routledge, 2014.
2. Chase, Becky Tarver. Pathways: Listening, Speaking and Critical Thinking. Heinley ELT; 2<sup>nd</sup> Edition, 2018.
3. Skillful Level 2 Reading & Writing Student's Book Pack (B1) Macmillan Educational.
4. Hewings, Martin. Cambridge Academic English (B2). CUP, 2012.
5. A Textbook of English Phonetics for Indian Students by T. Balasubramanyam

**Online Learning Resources/Virtual Labs:**

1. [www.esl-lab.com](http://www.esl-lab.com)
2. [www.englishmedialab.com](http://www.englishmedialab.com)
3. [www.englishinteractive.net](http://www.englishinteractive.net)

Engineering Physics Lab (Common to CE and ME)					
Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
22A0008P	0 :0:3:0	1.5	CIE:30 SEE:70	3 Hours	BSC
<b>Course Objectives:</b>					
This course will enable students to: <ul style="list-style-type: none"> <li>• Understand the role of Optical fiber parameters in engineering applications.</li> <li>• Recognize the significance of laser by studying its characteristics and its application in finding the particle size.</li> <li>• Illustrates the magnetic and dielectric materials applications.</li> </ul>					
<b>Syllabus</b>					<b>Total Hours:48</b>
<b>Note:</b> In the following list, out of 12 experiments, any 2 experiments must be performed in a virtual mode					
<b>List of Experiments</b>					
<ol style="list-style-type: none"> <li>1. Determine the thickness of the wire using wedge shape method</li> <li>2. Determination of the radius of curvature of the lens by Newton's ring method</li> <li>3. Determination of wavelength by plane diffraction grating method</li> <li>4. Determination of dispersive power of prism.</li> <li>5. Determination of wavelength of LASER light using diffraction grating.</li> <li>6. Determination of particle size using LASER.</li> <li>7. To determine the numerical aperture of a given optical fiber and hence to find its acceptance angle</li> <li>8. Determination of dielectric constant by charging and discharging method.</li> <li>9. Magnetic field along the axis of a circular coil carrying current –Stewart Gee's method.</li> <li>10. Study the variation of B versus H by magnetizing the magnetic material (B-H curve)</li> <li>11. Rigidity modulus of material of a wire-dynamic method (Torsional pendulum)</li> <li>12. Sonometer: Verification of the three laws of stretched strings</li> </ol>					
<b>Course Outcomes (CO):</b>					
<b>On completion of this course, student will be able to</b>					
<ul style="list-style-type: none"> <li>• Determine the radius of a curvature and / or thickness of thin wire using microscope with the help of interference concept (L2)</li> </ul>					

- Evaluate the wavelength of various colors of grating and also dispersive power of prism by spectrometer using the principle of diffraction (L2)
- Evaluate wavelength of light source and particle size with He-Ne laser using the principle of diffraction Estimate the numerical aperture of a given optical fiber and hence to find its acceptance angle (L2)
- Estimate the dielectric constant of a given material (L2)
- Examine the hysteresis loss of the magnetic material by B- H curve and Estimate the magnetic field of a circular coil carrying current along the axis (L2)
- Estimate the mechanical properties of given string using Torsional pendulum and sonometer (L2)

**Textbooks:**

1. Engineering Practical Physics B Mallick S Panigrahi, 1st, Edition, Cengage Learning Publishers
2. A Text book of Engineering Physics Practical, Dr. Ruby Das, Dr. Rajesh Kumar, C. S. Robinson, Prashant Kumar Sah, UNIVERSITY SCIENCE PRESS (An Imprint of Laxmi Publications Pvt. Ltd.)

**Reference Books:**

1. S. Balasubramanian, M.N. Srinivasan “A Text book of Practical Physics”- S Chand Publishers, 2017

**E-resources:**

1. <http://vlab.amrita.edu/index.php> -Virtual Labs, Amrita University
2. <https://www.scribd.com/doc/81569075/Physics-Lab-Manual>
3. <http://www.mlritm.ac.in/assets/img/Lab%20manual%20Physics.pdf>
4. [https://bmsit.ac.in/public/assets/pdf/physics/studymaterial/Physics%20lab%20manual\\_c bcs%20%20-%20kavichintu.pdf](https://bmsit.ac.in/public/assets/pdf/physics/studymaterial/Physics%20lab%20manual_c bcs%20%20-%20kavichintu.pdf)