



**SRI VENKATESWARA COLLEGE OF ENGINEERING,**  
(An Autonomous Institution, Affiliated to Anna University, Chennai – 600025)

# **B.E., Electronics and Communication Engineering**

***CURRICULUM AND SYLLABUS***  
***REGULATION – 2022***  
***CHOICE BASED CREDIT SYSTEM***

|                                   |     |  |            |  |            |
|-----------------------------------|-----|--|------------|--|------------|
| Curriculum<br>Revision No:        | 00  | Board of Studies<br>recommendation<br>date : | 07.10.2022 | Academic<br>Council<br>Approved<br>date: | 08.10.2022 |
| Salient Points of<br>the revision | 01. |  |            |  |            |
|                                   | 02. |  |            |  |            |
|                                   | 03. |  |            |  |            |
|                                   | 04. |  |            |  |            |
|                                   | 05. |  |            |  |            |

**SRI VENKATESWARA COLLEGE OF ENGINEERING,**  
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**REGULATIONS 2022**

**B.E. ELECTRONICS AND COMMUNICATION ENGINEERING**

**CHOICE BASED CREDIT SYSTEM**

**PROGRAM EDUCATIONAL OBJECTIVES (PEOs)**

- I. Create value to organizations as an EMPLOYEE at various levels, by improving the systems and processes using appropriate methods and tools learnt from the programme.
- II. Run an organization successfully with good social responsibility as an ENTREPRENEUR, making use of the knowledge and skills acquired from the programme.
- III. Contribute to the future by fostering research in the chosen area as an ERUDITE SCHOLAR, based on the motivation derived from the programme.

**PROGRAM OUTCOMES (POs)**

**PO GRADUATE ATTRIBUTES**

1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis:** Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/development of solutions:** 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.
4. **Conduct investigations of complex problems:** 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.
5. **Modern tool usage:** 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.
6. **The engineer and society:** 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.
7. **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and team work:** Function effectively as an individual, and as a member or

- leader in diverse teams, and in multidisciplinary settings.
10. **Communication:** 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.
  11. **Project management and finance:** 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.
  12. **Life-long learning:** 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 (PSOs)

13. An ability to apply the concepts of Electronics, Communications, Signal processing, VLSI, Control systems etc., in the design and implementation of application oriented engineering systems.
14. An ability to solve complex Electronics and communication Engineering problems, using latest hardware and software tools, along with analytical and managerial skills to arrive appropriate solutions, either independently or in team.

#### PEO's – PO's & PSO's MAPPING:

| POs | PEOs |    |     |
|-----|------|----|-----|
|     | I    | II | III |
| 1.  | ✓    |    |     |
| 2.  | ✓    |    | ✓   |
| 3.  | ✓    | ✓  |     |
| 4.  | ✓    |    | ✓   |
| 5.  | ✓    |    |     |
| 6.  |      | ✓  | ✓   |
| 7.  |      | ✓  |     |
| 8.  |      | ✓  |     |
| 9.  | ✓    |    | ✓   |
| 10. |      | ✓  |     |
| 11. |      | ✓  |     |
| 12. | ✓    |    | ✓   |
| 13. | ✓    |    | ✓   |
| 14. | ✓    | ✓  |     |

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**REGULATIONS 2022**

**CHOICE BASED CREDIT SYSTEM**

**B.E. ELECTRONICS AND COMMUNICATION ENGINEERING**

**CURRICULUM AND SYLLABI FOR SEMESTERS I AND II**

**SEMESTER I**

| SL. NO.                   | COURSE CODE | COURSE TITLE  | CATEGORY# | PERIODS PER WEEK |          |          |             | TOTAL Hours | Prerequisite | Position |
|---------------------------|-------------|---|-----------|------------------|----------|----------|-------------|-------------|--------------|----------|
|                           |             |   |           | L                | T        | P        | C           |             |              |          |
| 1.                        | IP22151     | Induction Programme<br>(Common to all Branches)                               |           | -                | -        | -        | -           | -           | -            | -        |
| <b>Theory Subjects</b>    |             |   |           |                  |          |          |             |             |              |          |
| 2.                        | HS22151     | Tamil language and Heritage of Ancient Tamil Society (Common to all branches) | HS        | 1                | 0        | 0        | 1           | 1           | Nil          | F        |
| 3.                        | HS22152     | Communicative English (Common to all Branches)                                | HS        | 3                | 0        | 0        | 3           | 3           | Nil          | F        |
| 4.                        | MA22151     | Applied Mathematics I (Common to all Branches except MR)                      | BS        | 3                | 1        | 0        | 4           | 4           | Nil          | F        |
| 5.                        | PH22151     | Applied Physics (Common to AD, CS, EE, EC, IT)                                | BS        | 3                | 0        | 0        | 3           | 3           | Nil          | F        |
| 6.                        | CY22151     | Applied Chemistry (Common to AD, CS, EE, EC, IT)                              | BS        | 3                | 0        | 0        | 3           | 3           | Nil          | F        |
| 7.                        | EE22152     | Basic Electrical Engineering  | ES        | 3                | 0        | 0        | 3           | 3           | Nil          | F        |
| 8.                        | IT22101     | Programming for Problem Solving (Common to IT, AD, CS, EE, EC)                | ES        | 3                | 0        | 0        | 3           | 3           | Nil          | F        |
| <b>Practical Subjects</b> |             |   |           |                  |          |          |             |             |              |          |
| 9.                        | PH22161     | Physics Laboratory (Common to all Branches except BT)                         | BS        | 0                | 0        | 2        | 1           | 2           | Nil          | F        |
| 10.                       | ME22161     | Basic Civil and Mechanical Engineering Laboratory (Common to CE, EE, EC)      | ES        | 0                | 0        | 2        | 1           | 2           | Nil          | F        |
| 11.                       | IT22111     | Programming for Problem Solving Laboratory (Common to IT, AD, CS, EE, EC)     | ES        | 0                | 0        | 3        | 1.5         | 3           | Nil          | F        |
| <b>Total</b>              |             |   |           | <b>19</b>        | <b>1</b> | <b>7</b> | <b>23.5</b> | <b>27</b>   |              |          |

**SEMESTER II**

| SL. NO.                   | COURSE CODE | COURSE TITLE   | CATEGORY# | PERIODS PER WEEK |          |          |             | TOTAL Hours | Prerequisite | Position |
|---------------------------|-------------|--|-----------|------------------|----------|----------|-------------|-------------|--------------|----------|
|                           |             |  |           | L                | T        | P        | C           |             |              |          |
| <b>Theory Subjects</b>    |             |  |           |                  |          |          |             |             |              |          |
| 1.                        | HS22251     | Science and Technology in Ancient Tamil Society (Common to all Branches) | HS        | 2                | 0        | 0        | 2           | 2           | Nil          | F        |
| 2.                        | HS22252     | Technical English (Common to all Branches)                               | HS        | 3                | 0        | 0        | 3           | 3           | Nil          | F        |
| 3.                        | MA22251     | Applied Mathematics II (Common to all Branches except MR)                | BS        | 3                | 1        | 0        | 4           | 4           | Nil          | F        |
| 4.                        | PH22252     | Physics of Materials (Common to EE and EC)                               | BS        | 3                | 0        | 0        | 3           | 3           | Nil          | F        |
| 5.                        | EC22201     | Electron Devices   | PC        | 3                | 0        | 0        | 3           | 3           | Nil          | F        |
| 6.                        | EC22202     | Circuit Theory (Theory cum Practical course)                             | PC        | 3                | 0        | 2        | 4           | 5           | Nil          | F        |
| <b>Practical Subjects</b> |             |  |           |                  |          |          |             |             |              |          |
| 7.                        | CY22161     | Chemistry Laboratory (Common to all Branches except AD, CS, IT)          | BS        | 0                | 0        | 2        | 1           | 2           | Nil          | F        |
| 8.                        | EC22211     | Technical Drawing Laboratory   | ES        | 0                | 0        | 2        | 1           | 2           | Nil          | F        |
| 9.                        | EC22212     | Electron Devices and Electrical Machines Laboratory                      | PC        | 0                | 0        | 3        | 1.5         | 3           | Nil          | F        |
| <b>Total</b>              |             |  |           | <b>17</b>        | <b>1</b> | <b>9</b> | <b>22.5</b> | <b>27</b>   | <b>-</b>     | <b>-</b> |

**SEMESTER I**

|         |   |   |   |   |   |
|---------|---|---|---|---|---|
| HS22151 | தமிழ் மொழியும் தமிழர் மரபும்<br>TAMIL LANGUAGE AND HERITAGE OF TAMILS<br>(Common to all branches) | L | T | P | C |
|         |   | 1 | 0 | 0 | 1 |

**பாடத்தின் நோக்கங்கள்:**

1. தமிழ் மொழியின் தோற்றம் பற்றியும், திணை கருத்துக்கள் வாயிலாக வாழ்வியல் முறைகளை பற்றியும் கற்றுக் கொள்வார்கள்.
2. இந்திய தேசிய சுதந்திர இயக்கத்தில் தமிழர்களின் பங்களிப்பு மற்றும் தமிழர்களின் மேலாண்மை முறைகளை பற்றியும் கற்றுக் கொள்வார்கள்.

**Course Objectives :**

1. They will learn about the origin of the Tamil language and the ways of life through five types of lands.
2. They will also learn about the contribution of Tamils in the Indian National Freedom Movement and the management methods of Tamils.

|               |   |          |
|---------------|---|----------|
| <b>அலகு 1</b> | <b>தமிழுக்கும் தொழில்நுட்பக் கல்விக்கும் உள்ள தொடர்பு</b> | <b>3</b> |
|---------------|---|----------|

மொழி மற்றும் பாரம்பரியம்: இந்தியாவில் உள்ள மொழிக் குடும்பங்கள் – திராவிட மொழிகள் – தமிழ் ஒரு செம்மொழி – தமிழில் செம்மொழி இலக்கியம் - உ.வே. சாமிநாதய்யர். ஆறுமுகநாவலர் ஆகியோரின் பங்களிப்பு – தொழில் நுட்பக் கல்வியில் தமிழ் மொழியின் முக்கியத்துவம்.

**UNIT -1 LANGUAGE AND HERITAGE**

**Language families in India** – Dravidan Languages – Tamil as a Classical language – Classical Literature in Tamil – Contribution of U. Ve. Saminathaiyar. Arumuka Navalar – Importance of Tamil language in technical education.

|               |                          |          |
|---------------|--------------------------|----------|
| <b>அலகு 2</b> | <b>திணை கருத்துக்கள்</b> | <b>9</b> |
|---------------|--------------------------|----------|

**திணை கருத்துக்கள்:** -ஐந்து வகை நிலங்கள், விலங்குகள், கடவுள்கள், தொழில், வாழ்க்கை முறைகள், இசை, நடனம், உணவு முறை, தமிழர்களின் தாவரங்கள் மற்றும் விலங்கினங்கள் – தொல்காப்பியம் மற்றும் சங்க இலக்கியங்களில் இருந்து அகம் மற்றும் புரம் கருத்து – தமிழ் பற்றிய அறம் கருத்து – கல்வி மற்றும் எழுத்தறிவு சங்க காலம் – சங்ககாலத்தின் பண்டைய நகரங்கள் மற்றும் துறைமுகங்கள் – சங்க காலத்தில் ஏற்றுமதி மற்றும் இறக்குமதி – சோழர்களின் வெளிநாட்டு வெற்றி.

**UNIT -2 THINAI CONCEPTS**

Five types of lands, animals, Gods, occupation, life styles, music, dance , food style, Floara and Fauna of Tamils - Agam and puram concept from Tholkappiyam and Sangam Literature – Aram concept of Tamil – Education and Literacy during Sangam Age – Ancient cities and Ports of Sangam Age – Export and Import during Sangam Age - Overseas Conquest of Choloas.

|               |                      |          |
|---------------|----------------------|----------|
| <b>அலகு 3</b> | <b>தமிழரின் மரபு</b> | <b>3</b> |
|---------------|----------------------|----------|

இந்திய தேசிய சுதந்திர இயக்கம் மற்றும் இந்திய கலாச்சாரத்திற்கு தமிழர்களின் பங்களிப்பு:- சுப்ரமணிய பாரதி, வாஞ்சிநாதன், சுப்பிரமணிய சிவா, வீரபாண்டிய கட்ட பொம்மன், வா..ஊ சிதம்பரம் பிள்ளை, தீரன் சின்னமலை, மருது பாண்டிய சகோதரர்கள், பூலி தேவர், திருப்பூர் குமரன், வீரமங்கை வேலு நாச்சியார் - ,தமிழர் இலக்கியங்களில் மேலாண்மை கருத்துக்கள் (கி. மு. 500 முதல் கி. பி 200 வரை) – அகநானூறு, புறநானூறு, திருக்குறள் ஆகியவற்றில் மேலாண்மைக் கருத்துக்கள்..

### UNIT -3 HERITAGE OF TAMILS

**Contribution of Tamils to Indian National Freedom Movement and Indian Culture :**  
Contributions of Subramanya Bharathi, Vanchinathan, Subramaniya Siva, Veerapandiya Kattabomman, V O Chidambaram Pillai, Dheeran Chinnamalai, The Maruthu Pandiyar, Puli Thevar, Tiruppur Kumaran, Veera Mangai Velunachiyar.

#### பாடநூல்கள்:

1. பொன். முத்துகுமாரன் (2002), "தமிழ் மரபு", காந்தளகம், 68, அண்ணா சாலை, சென்னை 600 002
2. பி. டிழீனிவாச ஐயங்கார் (தமிழக்கமும் திறனாய்வும்) புலவர் கா. கோவிந்தன் (1988), "தமிழர் வரலாறு (முதல் பகுதி)", திருநெல்வேலி தென்னிந்திய சைவ சித்தாந்த நூற்பதிப்பு கழகம் ,154, TTK சாலை, சென்னை 18.
3. டாக்டர். கே. கே. பிள்ளை (2009), "தமிழக வரலாறு மக்களும் பண்பாடும்", உலக தமிழாராய்ச்சி நிறுவனம், தரமணி , சென்னை 600113
4. முனைவர். ச. இராஜேந்திரன் (2004), "தமிழில் சொல்லாக்கம்", தஞ்சாவூர் தமிழ் பல்கலைக் கழகம் வெளியீடு

பாடநெறி முடிவுகள் : படிப்பை வெற்றிகரமாக முடித்தவுடன் , மாணவர்கள் பின்வருவனவற்றைச் செய்ய முடியும்.

**COURSE OUTCOMES :** On completion of the course, the student will be able to

| பா .வெ . எண்<br>CO No | பாடத்திட்டத்தின்வெளிப்பாடு<br>Course Outcomes  | RBT level |
|-----------------------|--|-----------|
| 1                     | மாணவர்கள் தமிழ் மொழித் தோற்றம் பற்றித் தெரிந்து கொள்வார்கள்.<br>Students will learn about the origin of the Tamil language   | 1         |
| 2                     | தமிழர்களின் வாழ்வியல் முறைகளைத் தெரிந்து கொள்வார்கள்.<br>They will know the ways of life of Tamils.  | 2         |
| 3                     | தமிழர்களின் சுதந்திர போராட்ட வீரர்களை பற்றியும், மேலாண்மைகளை பற்றியும் தெரிந்து கொள்வார்கள்.<br>They will know about the freedom fighters of Tamils and the management of Tamils | 2         |

| HS22152  | COMMUNICATIVE ENGLISH<br>(Common to all Branches) | L | T | P | C        |
|--|---|---|---|---|----------|
|  |   | 3 | 0 | 0 | 3        |
| <b>COURSE OBJECTIVES:</b>  |   |   |   |   |          |
| <ol style="list-style-type: none"> <li>1. Enable learners to interact fluently on everyday social contexts.</li> <li>2. Train learners to engage in conversations in an academic/scholarly setting.</li> <li>3. Instil confidence in learners to overcome public speaking barriers.</li> <li>4. Develop learners' ability to take notes and in the process, improve their listening skills</li> <li>5. Enhance learners' reading skill through reading text passages for comprehension and contemplation.</li> <li>6. Improve learners' skills to write on topics of general interest and drafting correspondences for general purposes.</li> </ol>                            |   |   |   |   |          |
| <b>UNIT 1</b>  |   |   |   |   | <b>9</b> |
| Listening - short video clips - conversational scenes from movies, celebrities' speeches /interviews. Speaking - several ways of introducing oneself at several situations, introducing others at several situations, inviting people for several occasions, describing people and their places. Reading - short comprehension passages - making inferences, critical analysis. Writing - completing the incomplete sentences - developing hints from the given information. Grammar - Wh-Questions and Yes or No questions - Parts of speech. Vocabulary development - prefixes - suffixes - articles - countable / uncountable nouns.  |   |   |   |   |          |
| <b>UNIT II</b>   |   |   |   |   | <b>9</b> |
| Listening - customer care voice files, short narratives - identifying problems and developing telephone etiquettes. Speaking - speaking over skype/ whatsapp, making business calls, making self-recorded informative videos, inquiring about a concept/activity, describing a concept/activity. Reading - reading the headlines on news magazines - slogans and taglines from advertisements. Writing - free writing - writing - headlines, slogans and taglines individual inspirations. Grammar- conjunctions, idioms, phrases, quotes. Vocabulary development - guessing the meanings of words in different contexts.  |   |   |   |   |          |
| <b>UNIT III</b>  |   |   |   |   | <b>9</b> |
| Listening - courtroom scenes from movies, debates and talks from news channels, notes taking. Speaking - language and tone for arguments, discussion, deliberation, contemplation, expressing opinions, reacting to different situations in an alien country. Reading - language used in instruction manuals of household appliances, cookery and other basic instructions. Writing- understanding the structure of texts - use of reference words, discourse markers- coherence, rearranging the jumbled sentences. Grammar - adjectives - degrees of comparison, framing direct and indirect questions. Vocabulary development - concise approach, single word substitution. |   |   |   |   |          |
| <b>UNIT IV</b>   |   |   |   |   | <b>9</b> |
| Listening - Sports commentaries, advertisements with users' criticisms; Speaking - for social causes, for promoting a concept, negotiating and bargaining; Reading - review of a product, movie, movement or a system; Writing - writing for advertisements, selling a product; Grammar – Tenses - Simple Past, Present and Future, Continuous - Past, Present and Future; Vocabulary Development - synonyms, antonyms and phrasal verbs.  |   |   |   |   |          |
| <b>UNIT V</b>  |   |   |   |   | <b>9</b> |
| Listening - video lectures, video demonstration of a concept; Speaking – presenting papers/concepts, delivering short speeches, discourses on health, suggesting natural home remedies, cleanliness, civic sense and responsibilities; Reading - columns and articles on home science; Writing - correspondences   |   |   |   |   |          |



of requests, basic enquiry/observation and basic complaints; Grammar - modal verbs, perfect tenses - Vocabulary development - collocations.

**TOTAL: 45 PERIODS**

**REFERENCES:**

1. Department of English, Anna University, Mindscapes : English for Technologists and Engineers. Orient Black Swan, Chennai, 2017.
2. Downes and Colm, “Cambridge English for Job-hunting”, Cambridge University Press, New Delhi, 2008.
3. Murphy and Raymond, “Intermediate English Grammar with Answers”, Cambridge University Press, 2000.
4. Thomson, A.J., “Practical English Grammar” Oxford, 1986.

**Websites**

1. <http://www.usingenglish.com>
2. <http://www.uefap.com3>
3. <https://owl.english.purdue.edu/owl/>
4. [www.learnenglishfeelgood.com/esl-printables-worksheets.html](http://www.learnenglishfeelgood.com/esl-printables-worksheets.html)

**Software**

1. Face 2 Face Advance – Cambridge University Press, 2014.
2. English Advance Vocabulary- Cambridge University Press.
3. IELTS test preparation – Cambridge University Press 2017.
4. Official Guide to the TOEFL Test With CD-ROM, 4<sup>th</sup> Edition.
5. Cambridge Preparation for the TOEFL TEST- Cambridge University Press, 2017.

**OUTCOMES:**

Upon successful completion of the course, the students should be able to

| SL.N<br>O. | STATEMENT   | RBT<br>LEVEL |
|------------|---|--------------|
| CO1.       | Acquire adequate vocabulary for effective communication   | 3            |
| CO2.       | Listen to formal and informal communication and read articles and infer meanings from specific contexts from magazines and news papers. | 3            |
| CO3.       | Participate effectively in informal/casual conversations; introduce themselves and their friends and express opinions in English.       | 4            |
| CO4.       | Comprehend conversations and short talks delivered in English.  | 6            |
| CO5        | Write short write-ups and personal letters and emails in English  | 6            |

**COURSE ARTICULATION MATRIX**

| COs | POs |   |   |   |   |   |   |   |   |    |    |    |    |    |    |
|-----|-----|---|---|---|---|---|---|---|---|----|----|----|----|----|----|
|     | 1   | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| 1.  |     |   |   |   |   |   |   |   |   | 3  |    |    |    |    |    |
| 2.  |     |   |   |   |   |   |   |   |   | 3  |    |    |    |    |    |
| 3.  |     |   |   |   |   |   |   |   |   | 3  |    |    |    |    |    |
| 4.  |     |   |   |   |   |   |   |   |   | 3  |    |    |    |    |    |
| 5.  |     |   |   |   |   |   |   |   |   | 3  |    |    |    |    |    |

| MA22151   | APPLIED MATHEMATICS I<br>(Common to all Branches except MR) | L | T | P | C            |
|---|---|---|---|---|--------------|
|   |   | 3 | 1 | 0 | 4            |
| <b>COURSE OBJECTIVES:</b>   |   |   |   |   |              |
| The Student should be made to:  |   |   |   |   |              |
| <ol style="list-style-type: none"> <li>1. Compute eigen values and eigen vectors and use in diagonalization and in classifying real quadratic forms.</li> <li>2. Study differential calculus and its applications to relevant Engineering problems.</li> <li>3. Compute derivatives using the chain rule or total differentials.</li> <li>4. Understand the rotation of two dimensional geometry using definite integrals.</li> <li>5. Acquaint with the Mathematical tools needed in evaluating multiple integrals and their usage.</li> </ol> |   |   |   |   |              |
| <b>UNIT 1</b>   | <b>MATRICES</b>   |   |   |   | <b>(9+3)</b> |
| Eigen values and Eigen vectors of a real matrix – Characteristic equation – Properties of Eigen values and Eigen vectors – Statement and Applications of Cayley-Hamilton Theorem – Diagonalization of matrices– Reduction of a quadratic form into canonical form by orthogonal transformation-Nature of quadratic forms.   |   |   |   |   |              |
| <b>UNIT II</b>  | <b>APPLICATION OF DIFFERENTIAL CALCULUS</b>                 |   |   |   | <b>(9+3)</b> |
| Curvature and radius of Curvature– Centre curvature – Circle of curvature –Evolutes– Envelopes- Evolute as Envelope of Normals.   |   |   |   |   |              |
| <b>UNIT III</b>   | <b>DIFFERENTIAL CALCULUS FOR SEVERAL VARIABLES</b>          |   |   |   | <b>(9+3)</b> |
| Limits and Continuity - Partial derivatives – Total derivatives – Differentiation of implicit functions – Jacobians and properties– Taylor’s series for functions of two variables – Maxima and Minima of functions of two variables –Lagrange’s method of undetermined multipliers.  |   |   |   |   |              |
| <b>UNIT IV</b>  | <b>APPLICATION OF DEFINITE INTEGRALS</b>                    |   |   |   | <b>(9+3)</b> |
| Integration by Parts-Bernoulli’s formula for integration- Definite integrals and its Properties-Solids of Revolution- Disk Method- Washer Method- Rotation about both x and y axis and Shell method.  |   |   |   |   |              |
| <b>UNIT V</b>   | <b>MULTIPLE INTEGRALS</b>                                   |   |   |   | <b>(9+3)</b> |
| Double integrals in Cartesian and polar coordinates – Change of order of integration – Area enclosed by plane curves - Change of variables in double integrals – Triple integrals – Volume of solids.   |   |   |   |   |              |
| <b>TOTAL (L: 45 + T:15): 60 PERIODS</b>   |   |   |   |   |              |
| <b>TEXT BOOKS:</b>  |   |   |   |   |              |
| <ol style="list-style-type: none"> <li>1. Erwin Kreyszing, Herbert Kreyszing, Edward Norminton, “Advanced Engineering Mathematics”, 10<sup>th</sup> Edition, John Wiley, (2015)</li> <li>2. Grewal .B.S, Grewal .J.S “Higher Engineering Mathematics”,43<sup>rd</sup> Edition, Khanna Publications, Delhi, (2015).</li> </ol>   |   |   |   |   |              |
| <b>REFERENCES:</b>  |   |   |   |   |              |
| <ol style="list-style-type: none"> <li>1. Bali N.P and Manish Goyal, “A Text book of Engineering Mathematics”, Ninth Edition, Laxmi Publications Pvt. Ltd., (2014).</li> <li>2. Glyn James, “Advanced Modern Engineering Mathematics”, 4<sup>th</sup> Edition, Pearson Education, (2016).</li> <li>3. Ramana B.V, “Higher Engineering Mathematics”, Tata McGraw Hill Publishing Company, New Delhi, (2013).</li> </ol>  |   |   |   |   |              |

**Web Link:**

1. <https://home.iitk.ac.in/~peeyush/102A/Lecture-notes.pdf>
2. <https://www.sydney.edu.au/content/dam/students/documents/mathematics-learning-entre/integration-definite-integral.pdf>

| Course Outcomes | Upon completion of the course, students will be able to:   | RBT* Level |
|-----------------|--|------------|
| CO1             | Solve the Eigen value problems in matrices.  | 3          |
| CO2             | Apply the basic notion of calculus in Engineering problems and to tackle for different geometries. | 3          |
| CO3             | Perform calculus for more than one variable and its applications in Engineering problems.          | 3          |
| CO4             | Apply definite integrals for design of three dimensional components.                               | 3          |
| CO5             | Evaluate multiple integral in Cartesian and polar coordinates.                                     | 3          |

**COURSE ARTICULATION MATRIX**

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

| PH22151  | APPLIED PHYSICS<br>(Common to AD, CS, EE, EC, IT) | L | T | P | C        |
|--|---|---|---|---|----------|
|  |   | 3 | 0 | 0 | 3        |
| <b>COURSE OBJECTIVES:</b>  |   |   |   |   |          |
| <ul style="list-style-type: none"> <li>To enhance the fundamental knowledge in Physics and its applications relevant to various Streams of Engineering and Technology.</li> </ul>  |   |   |   |   |          |
| <b>UNIT 1</b>  | <b>LASERS AND FIBER OPTICS</b>                    |   |   |   | <b>9</b> |
| Lasers: population of energy levels, Einstein's A and B coefficients derivation – resonant cavity, optical amplification (qualitative) – Nd-YAG laser – CO <sub>2</sub> Laser – Exceimer Laser – Applications. Fiber optics: principle, numerical aperture and acceptance angle - types of optical fibres (material, refractive index, and mode) – losses associated with optical fibers–Fiber optic communication - fibre optic sensors: pressure and displacement - Endoscope.   |   |   |   |   |          |
| <b>UNIT 2</b>  | <b>QUANTUM PHYSICS</b>                            |   |   |   | <b>9</b> |
| Black body radiation – Planck's theory (derivation)- deduction of Wien's and Rayleigh Jean's law – Compton effect: theory and experimental verification – wave particle duality – electron diffraction – concept of wave function and its physical significance – Schrödinger's wave equation – time independent and time dependent wave equations – particle in a one-dimensional - three dimensional potential box–Fermi distribution function – Effect of temperature on Fermi Function – Density of energy states – carrier concentration in metals. |   |   |   |   |          |
| <b>UNIT 3</b>  | <b>CRYSTAL PHYSICS</b>                            |   |   |   | <b>9</b> |
| Single crystalline, polycrystalline and amorphous materials – single crystals: unit cell, crystal systems, Bravais lattices, directions and planes in a crystal, Miller indices – interplanar distances- coordination number and packing factor for SC, BCC, FCC, HCP and Diamond structure (qualitative) - crystal imperfections: point defects, line defects – Burger vectors, stacking faults   |   |   |   |   |          |
| <b>UNIT 4</b>  | <b>WAVES AND OSCILLATIONS</b>                     |   |   |   | <b>9</b> |
| Travelling waves, Wave equation for string ,Energy and momentum , Resonance Superposition & Reflection, Standing waves, Harmonic oscillations, Damped harmonic motion- Forced oscillations, amplitude resonance - Expression for Resonant frequency, Electrical analogy of mechanical oscillations, Quality factor and sharpness of resonance, Electrical analogy of mechanical oscillators  |   |   |   |   |          |
| <b>UNIT 5</b>  | <b>ELECTROMAGNETIC WAVES</b>                      |   |   |   | <b>9</b> |
| Maxwell's Equations. Vector and Scalar Potentials. Plane waves in Dielectric media. Poynting Theorem and Poynting Vector.- Electromagnetic (EM) Energy Density. Physical Concept of Electromagnetic Field Energy Density, EM Wave Propagation in Unbounded Media , Plane EM waves through vacuum and isotropic dielectric medium, transverse nature of plane EM waves, refractive index and dielectric constant.   |   |   |   |   |          |
| <b>Total (L:45): 45 PERIODS</b>  |   |   |   |   |          |
| <b>TEXT BOOKS:</b>   |   |   |   |   |          |
| <ol style="list-style-type: none"> <li>Gaur R.K., Gupta S.L, "Engineering Physics", Dhanput Publications, 2015.</li> <li>Shatendra Sharma, Jyotsna Sharma, "Engineering Physics", Pearson, 2006.</li> <li>Rajendran V, "Engineering Physics", Tata McGraw Hill, 2009.</li> <li>Arumugam M, "Materials Science", Anuradha Publications, 2015.</li> </ol>  |   |   |   |   |          |

**REFERENCES:**

1. David Halliday, Robert Resnick, Jearl Walker, "Principles of Physics", 10<sup>th</sup> Edition, Wiley, 2015.
2. Peter Atkins, Julio De Paula, "Physical Chemistry", 10<sup>th</sup> Edition., Oxford University Press, 2014.
3. Arthur Beiser, Shobhit Mahajan, Rai Choudhury S, "Concepts of Modern Physics", 7<sup>th</sup> Edition, McGraw Hill Education, 2017.
4. Raghavan V, "Materials Science and Engineering", PHI Learning Pvt. Ltd., 2010

**Course outcomes**

|      |   |   |
|------|---|---|
| CO 1 | Develop an understanding about photonics and Fiber Optic communication system | 2 |
| CO 2 | Acquire the knowledge of Quantum mechanics                                    | 3 |
| CO 3 | Classify and demonstrate the fundamentals of crystals and their defects.      | 3 |
| CO 4 | Gain knowledge in waves and oscillations                                      | 2 |
| CO 5 | Enable to explore the theory of electromagnetic waves and its propagation     | 3 |

**COURSE ARTICULATION MATRIX:**

| COs | POs |   |   |   |   |   |   |   |   |    |    |    |    |    |    |
|-----|-----|---|---|---|---|---|---|---|---|----|----|----|----|----|----|
|     | 1   | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| 1.  | 3   |   |   |   | 2 | 2 |   |   |   | 1  |    |    |    |    |    |
| 2.  | 3   | 3 | 2 | 2 | 2 | 2 |   |   |   | 1  |    | 2  |    |    |    |
| 3.  | 3   |   |   |   |   |   |   |   |   | 1  |    |    |    |    |    |
| 4.  | 3   |   | 2 |   |   |   |   |   |   | 1  |    |    |    |    |    |
| 5.  | 3   | 3 | 2 | 2 | 2 |   |   |   |   | 1  |    | 2  |    |    |    |

| CY22151   | APPLIED CHEMISTRY<br>(Common to AD, CS, EE, EC, IT ) | L | T | P | C        |
|---|--|---|---|---|----------|
|   |  | 3 | 0 | 0 | 3        |
| <b>COURSE OBJECTIVES:</b>   |  |   |   |   |          |
| <ol style="list-style-type: none"> <li>To make the students conversant with basic electrochemistry and batteries.</li> <li>To develop an understanding of the laws of photochemistry and basics.</li> <li>To acquaint the students with the basics of nanomaterials, their properties and uses.</li> <li>To acquire the basic knowledge on sensors which are essential for the software engineers for develop new devices.</li> <li>To enable the students to understand the types of instruments for material analysis and their working principle.</li> </ol> |  |   |   |   |          |
| <b>UNIT I</b>   | <b>ELECTROCHEMISTRY</b>                              |   |   |   | <b>9</b> |
| Electrodes and electrochemical cells – electrode potential, standard electrode potential, single electrode potential and its determination, types of electrodes – calomel, quinhydrone and glass electrode. Nernst equation - Determination of pH of a solution by using quinhydrone and glass electrode. Electrochemical series and its applications. Batteries – Primary (dry cell) and secondary batteries (Lead – acid storage battery and Lithium ion battery) and next generation batteries   |  |   |   |   |          |
| <b>UNIT II</b>  | <b>PHOTOCHEMISTRY</b>                                |   |   |   | <b>9</b> |
| Laws of photochemistry – Grotthuss-Draper law, Stark–Einstein law and Lambert Beer Law – determination iron by spectrophotometer. Quantum efficiency – Photo processes - internal conversion, inter-system crossing, fluorescence, phosphorescence and photo-sensitization-quenching of fluorescence and its kinetics, Stern-Volmer relationship. Applications of photochemistry.   |  |   |   |   |          |
| <b>UNIT III</b>   | <b>NANOCHEMISTRY</b>                                 |   |   |   | <b>9</b> |
| Basics and scale of nanotechnology, different classes of nanomaterials, Distinction between molecules, nanoparticles and bulk materials; size-dependent properties. Synthesis of nanomaterials, fabrication (lithography) and its applications – Basics of nanophotonics and quantum confined materials (surface plasmon resonance).  |  |   |   |   |          |
| <b>UNIT IV</b>  | <b>CHEMICAL SENSOR</b>                               |   |   |   | <b>9</b> |
| Sensors, sensor science and technology, types of sensors. Chemical Sensors – characteristics and elements. Electrochemical sensors – voltammetry, potentiometric sensors, amperometric sensors, polarization techniques.  |  |   |   |   |          |
| <b>UNIT V</b>   | <b>INSTRUMENTATION TECHNIQUES</b>                    |   |   |   | <b>9</b> |
| Treatment of analytical data, including error analysis. Classification of analytical methods and the types of instrumental method - Electromagnetic radiation-UV-visible and IR spectroscopy: principles, instrumentation (Block diagram only) and applications. Separation techniques chromatography: Gas chromatography, liquid chromatography - importance of column technology (packing, capillaries), separation based on increasing number of factor (volatility, solubility, interactions with stationary phase, size)                                   |  |   |   |   |          |
| <b>TOTAL (L: 45): 45 PERIODS</b>  |  |   |   |   |          |

**TEXT BOOKS:**

1. Jain P.C. and Monica Jain, "Engineering Chemistry", Dhanpat Rai Publishing Company (P) Ltd., New Delhi, 2010.
2. Dara S.S, Umare S.S, "Engineering Chemistry", S. Chand & Company Ltd., New Delhi 2010
3. B.K.Sharma, "Instrumental Methods of Chemical Analysis", 28<sup>th</sup> Edition, Goel Publishing House, 2012.
4. Skoog, D.A. Holler F.J. & Nieman, T.A. Principles of Instrumental Analysis, Cengage Learning India Ed.

**REFERENCES:**

1. Ozin G. A. and Arsenault A. C., "Nanochemistry: A Chemical Approach to Nanomaterials", RSC Publishing, 2005.
2. B.R. Puri, L.R. Sharma, M.S. Pathania., "Principles of Physical Chemistry" Vishal Publishing Company, 2008.
3. John Vetelino, Aravind Reghu, Introduction to Sensors , Taylor & Francis Group, CRC Press, 1<sup>st</sup> edition, 2010.
4. Peter Gründler, Chemical Sensors, An Introduction for Scientists and Engineers, Springer-Verlag Berlin Heidelberg 2007.

| <b>COURSE OUTCOMES:</b> |  | <b>RBT*Level</b> |
|-------------------------|--|------------------|
| CO1                     | Identify electrochemical cells, corrosion and fundamental aspects of batteries   | 2                |
| CO2                     | Interpret the photochemical reactions and make use of spectroscopic techniques   | 2                |
| CO3                     | Realize the structures, properties and applications of nanoparticles.  | 2                |
| CO4                     | Acquire the basic knowledge on chemical sensors to develop an interdisciplinary approach among the students which are essential for the software engineers | 2                |
| CO5                     | Develop a theoretical principles of UV-visible and IR spectroscopy and separation techniques   | 4                |

**COURSE ARTICULATION MATRIX:**

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

| EE22152  | BASIC ELECTRICAL ENGINEERING                         | L        | T | P | C |
|--|--|----------|---|---|---|
|  |  | 3        | 0 | 0 | 3 |
| <b>COURSE OBJECTIVES:</b>  |  |          |   |   |   |
| <ol style="list-style-type: none"> <li>To introduce basics concepts of electric circuits</li> <li>To impart knowledge in types, construction and working of DC machines and transformers.</li> <li>To study the working principles of AC machines.</li> <li>To introduce the components of low voltage electrical installations and working principles of Power converters.</li> <li>To study the different types of measuring instruments.</li> </ol> |  |          |   |   |   |
| <b>UNIT I</b>  | <b>BASIC CIRCUITS ANALYSIS</b>                       | <b>9</b> |   |   |   |
| Ohm's Law – Kirchoff's laws – DC and AC Circuits – Resistors in series and parallel circuits – Mesh current and node voltage method of analysis for D.C and A.C. circuits – Phasor Diagram – Power, Power Factor and Energy. Network reduction: Voltage and current division rule, Star to delta conversion.   |  |          |   |   |   |
| <b>UNIT II</b>   | <b>DC MACHINES AND TRANSFORMER</b>                   | <b>9</b> |   |   |   |
| Introduction- ideal and practical transformer, equivalent circuit, losses in transformers, regulation and efficiency. Auto-transformer. Construction, working, torque-speed characteristic and speed control of separately excited dc motor – Applications.  |  |          |   |   |   |
| <b>UNIT III</b>  | <b>AC MACHINES</b>                                   | <b>9</b> |   |   |   |
| Overview of three phase circuits, Generation of rotating magnetic fields, Construction and working of a three-phase induction motor, Significance of torque-slip Characteristic, Loss components and efficiency, Single-phase induction motor, Working of synchronous generators.  |  |          |   |   |   |
| <b>UNIT IV</b>   | <b>ELECTRICAL INSTALLATIONS AND POWER CONVERTERS</b> | <b>9</b> |   |   |   |
| Components of LT switch gear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB. Types of Wires and Cables, Earthing. Types of Batteries, Important Characteristics for Batteries. Elementary calculations for energy consumption. DC-DC buck and boost converters, duty ratio control. Introduction to voltage source inverters.  |  |          |   |   |   |
| <b>UNIT V</b>  | <b>MEASURING INSTRUMENTS</b>                         | <b>9</b> |   |   |   |
| Types of instruments, Construction and working principles of PMMC and moving iron type voltmeters, ammeters and ohm meter. Measurement of frequency. Single phase dynamometer wattmeter, Use of shunts and multipliers (Simple numerical problems on shunts and multipliers). Analog Energy meters, Smart digital Energy meter and Net meter.  |  |          |   |   |   |
| <b>TOTAL (L:45): 45 PERIODS</b>  |  |          |   |   |   |
| <b>TEXT BOOKS:</b>   |  |          |   |   |   |
| <ol style="list-style-type: none"> <li>D.P. Kothari and I.J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 3<sup>rd</sup> edition 2010.</li> <li>D.C. Kulshreshtha, "Basic Electrical Engineering", Tata McGraw Hill, 2009.</li> <li>E. Hughes, "Electrical and Electronics Technology", 10<sup>th</sup> Edition, Pearson, 2010.</li> </ol>   |  |          |   |   |   |





| IT22101  | PROGRAMMING FOR PROBLEM SOLVING<br>(Common to IT, AD, CS, EE, EC) | L | T | P | C         |
|--|---|---|---|---|-----------|
|  |   | 3 | 0 | 0 | 3         |
| <b>COURSE OBJECTIVES:</b>  |   |   |   |   |           |
| 1. Learn the organization of a digital computer.<br>2. Learn to think logically and write algorithms or draw flow charts for problems.<br>3. Be exposed to the syntax of C.<br>4. Be familiar with programming in C.<br>5. Learn to use arrays, strings, functions, pointers, structures and unions in C.  |   |   |   |   |           |
| <b>UNIT 1 INTRODUCTION TO PROBLEM SOLVING</b>  |   |   |   |   |           |
| Simple model of a Computer – Hardware – Software – Data Representation, Introduction to Computer Networks and Internet, Problem Solving Techniques – Bottom up design and top down design - applications, Introduction to Algorithms and Flow Chart<br>Suggested Activities:<br>Casestudy – Understanding the analysis and design of the Student Management System (SMS).  |   |   |   |   | <b>6</b>  |
| <b>UNIT 2 C PROGRAMMING BASICS</b>   |   |   |   |   |           |
| Introduction to ‘C’ programming – structure of a ‘C’ program – Conversion of simple algorithm to program. Constants, Variables – Data Types – Expressions using operators in ‘C’ – Managing Input and Output operations – Decision Making and Branching – Looping statements – solving simple scientific and statistical problems.<br>Suggested Activities<br>Casestudy: Dataset creation and Grade calculation in SMS |   |   |   |   | <b>12</b> |
| <b>UNIT 3 ARRAYS AND STRINGS</b>   |   |   |   |   |           |
| Array: declaration, initialization. Multi dimensional arrays. Strings: Strings vs Character arrays, string operations<br>Suggested Activities - Grade sheet generation in SMS  |   |   |   |   | <b>9</b>  |
| <b>UNIT 4 FUNCTIONS AND STRUCTURES</b>   |   |   |   |   |           |
| Need for Modular programming, Functions: definition, call, arguments, call by value. Call by reference, Recursion. structures and unions: Need, declaration, Accessing Structure elements, Arrays of structures<br>Suggested Activities: Redesigning SMS in terms of modules   |   |   |   |   | <b>9</b>  |
| <b>UNIT 5 POINTERS AND FILE HANDLING IN C</b>  |   |   |   |   |           |
| Pointers: Introduction, pointers to primitive datatypes, pointers to user defined datatypes: arrays and structures, array of pointers, Dynamic Memory Allocation. Files: Read/Write of binary and text files. Preprocessor directives<br>Suggested Activities: Mange I/O in SMS using Files  |   |   |   |   | <b>9</b>  |
| <b>TOTAL (L:45): 45 PERIODS</b>  |   |   |   |   |           |
| <b>TEXT BOOKS:</b>   |   |   |   |   |           |
| 1. Pradip Dey, Manas Ghosh, “ Programming in C ”, First Edition, Oxford University Press, 2018.<br>2. R G Dromey, “How to Solve it using Computer”, Pearson,2006   |   |   |   |   |           |

**REFERENCES:**

1. Kernighan,B.W and Ritchie,D.M, “The C Programming language”, Second Edition, PearsonEducation, 2015.
2. Yashavant P. Kanetkar. “Let Us C”, BPB Publications, 2011.
3. Byron S Gottfried, “Programming with C”, Schaum’s Outlines, Third Edition, Tata McGraw Hill, 2010
4. Reema Thareja, “Programming in C”, 2nd ed., Oxford University Press, 2016

**OUTCOMES:**

Upon successful completion of the course, the students should be able to

| CO# | STATEMENT  | RBT LEVEL |
|-----|--|-----------|
| 1   | Identify input and output from the real word problem scenarios.                      | 3         |
| 2   | Represent the design flow using Flow-charts and application logic using pseudo code. | 3         |
| 3   | Apply appropriate programming constructs to implement a given design using C.        | 3         |
| 4   | Debug and customize an existing software developed in C.                             | 5         |
| 5   | Develop a modularised software application In C for the given user requirements      | 6         |

**COURSE ARTICULATION MATRIX:**

| COs | POs |   |   |   |   |   |   |   |   |    |    |    |    |    |
|-----|-----|---|---|---|---|---|---|---|---|----|----|----|----|----|
|     | 1   | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| 1.  | 1   | 3 |   |   |   |   |   | 2 | 3 |    |    | 2  | 2  | 2  |
| 2.  | 1   | 3 |   |   |   |   |   | 2 | 3 |    |    | 2  | 2  | 2  |
| 3.  | 1   |   | 3 | 2 | 1 |   |   | 2 | 3 |    |    | 2  | 2  | 2  |
| 4.  | 1   |   | 3 | 2 | 1 |   |   | 2 | 3 |    |    | 2  | 2  | 2  |
| 5.  | 1   |   | 3 | 2 | 1 |   |   | 2 | 3 |    |    | 2  | 3  | 3  |

| PH22161  | PHYSICS LABORATORY<br>(Common to all Branches except BT) | L | T | P | C |
|--|--|---|---|---|---|
|  |  | 0 | 0 | 2 | 1 |
| <b>COURSE OBJECTIVES:</b>  |  |   |   |   |   |
| <ul style="list-style-type: none"> <li>To introduce different experiments to test basic understanding of physics concepts applied in optics, thermal physics and properties of matter.</li> </ul>  |  |   |   |   |   |
| <b>LIST OF EXPERIMENTS: ( Any EIGHT Experiments)</b>   |  |   |   |   |   |
| 1. a) Determination of Wavelength, and particle size using Laser.<br>b) Determination of acceptance angle in an optical fiber.<br>2. Determination of velocity of sound and compressibility of liquid – Ultrasonic Interferometer.<br>3. Determination of wavelength of mercury spectrum – spectrometer grating.<br>4. Determination of thermal conductivity of a bad conductor – Lee’s Disc method.<br>5. Determination of Young’s modulus by Non uniform bending method.<br>6. Determination of specific resistance of a given coil of wire – Carey Foster’s Bridge.<br>7. Determination of Rigidity modulus of a given wire -Torsional Pendulum<br>8. <b>Energy band gap of a Semiconductor</b><br>9. Determine the Hysteresis loss of a given Specimen<br>10. <b>Calibration of Voltmeter &amp; Ammeter using potentiometer.</b> |  |   |   |   |   |
| <b>Total (P:30): 30 PERIODS</b>  |  |   |   |   |   |
| <b>OUTCOMES:</b>   |  |   |   |   |   |
| The hands on exercises undergone by the students will help them to apply physics principles of optics and thermal physics to evaluate engineering properties of materials  |  |   |   |   |   |
| <b>REFERENCE:</b>  |  |   |   |   |   |
| 1. "Physics Laboratory practical manual", 1 <sup>st</sup> Revised Edition by Faculty members, 2018.  |  |   |   |   |   |

### Course outcomes:

|      |   |   |
|------|---|---|
| CO 1 | Analyze the physical principle involved in the various instruments; also relate the principle to new application.                           | 4 |
| CO 2 | Comprehend the Experiments in the areas of optics, mechanics and thermal physics to nurture the concepts in all branches of Engineering.    | 3 |
| CO 3 | Apply the basic concepts of Physical Science to think innovatively and also improve the creative skills that are essential for engineering. | 3 |
| CO 4 | Evaluate the process and outcomes of an experiment quantitatively and qualitatively   | 3 |
| CO 5 | Extend the scope of an investigation whether or not results come out as expected  | 3 |

### COURSE ARTICULATION MATRIX

| COs | POs |   |   |   |   |   |   |   |   |    |    |    |    |    |    |
|-----|-----|---|---|---|---|---|---|---|---|----|----|----|----|----|----|
|     | 1   | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| 1.  | 3   | 3 | 2 | 3 | 2 |   |   |   | 3 | 1  |    | 2  |    |    |    |
| 2.  | 3   | 3 |   | 3 |   | 2 |   |   | 3 | 1  |    | 2  |    |    |    |
| 3.  | 3   | 3 | 2 | 3 | 2 | 2 |   |   | 3 | 1  |    | 2  |    |    |    |
| 4.  | 3   | 3 |   | 3 |   |   |   |   | 3 | 1  |    | 2  |    |    |    |
| 5.  | 3   | 3 |   | 3 | 2 |   |   |   | 3 | 1  |    | 2  |    |    |    |

| ME22161   | BASIC CIVIL AND MECHANICAL ENGINEERING<br>LABORATORY<br>(Common to CE, EE, EC) | L | T | P | C                        |
|---|--|---|---|---|--------------------------|
|   |  | 0 | 0 | 2 | 1                        |
| <b>COURSE OBJECTIVES:</b>   |  |   |   |   |                          |
| 1. To provide an exposure and hands on experience to the students on various civil and mechanical engineering processes.                                |  |   |   |   |                          |
| <b>LIST OF EXPERIMENTS</b>  |  |   |   |   |                          |
| 1- Carpentry – Preparation of Cross half lap joint and Tee joint using power tools.   |  |   |   |   |                          |
| 2- Plumbing – Basic pipe line connection used in houses with PVC pipes, valves, taps, couplings, unions, reducers, elbows.                              |  |   |   |   |                          |
| 3- Welding - Butt joint and lap joint using Electric Arc welding.   |  |   |   |   |                          |
| 4- Machining – Turning and facing using Centre Lathe.   |  |   |   |   |                          |
| 5- Sheet metal work – Making of a cylinder using GI sheet and finishing using rivets.   |  |   |   |   |                          |
| 6- Fitting – Preparation of metal pieces by grinding and filing to maintain flat sides at right angles  |  |   |   |   |                          |
| 7- Drilling and Tapping – Drilling of holes precisely and making internal threads by Tapping for various sizes.   |  |   |   |   |                          |
| 8- Casting – Mould preparation using simple solid pattern and casting.  |  |   |   |   |                          |
| 9- Automation – Basic pneumatic circuit using single and double acting cylinder.  |  |   |   |   |                          |
| 10- 3D printing – Demonstration of printing of simple solids using Additive Manufacturing/3D printing.  |  |   |   |   |                          |
|   |  |   |   |   | <b>TOTAL: 30 PERIODS</b> |
| <b>OUTCOMES :</b>   |  |   |   |   |                          |
| 1. Students will be able to <i>Prepare</i> various joints used for assembling wooden parts.   |  |   |   |   |                          |
| 2. Students will be able to <i>Make</i> required pipeline connection by selecting the suitable components.  |  |   |   |   |                          |
| 3. Students will be able to <i>Fabricate</i> components by various manufacturing processes.   |  |   |   |   |                          |
| 4. Students will be able to <i>Understand</i> the principles of low-cost automation using pneumatic circuits.   |  |   |   |   |                          |
| 5. Students will be able to <i>Understand</i> the principle of additive manufacturing/3D printing.  |  |   |   |   |                          |
| <b>TEXT BOOKS:</b>  |  |   |   |   |                          |
| 1. Jeyachandran K., Natarajan S. & Balasubramanian S., "A Primer on Engineering Practices Laboratory", Anuradha Publications, 2007.                     |  |   |   |   |                          |
| 2. Jeyapooan T., Saravanapandian M. & Pranitha S., "Engineering Practices Lab Manual", Vikas Publishing House Pvt.Ltd, 2006.                            |  |   |   |   |                          |
| 3. Bawa H.S., "Workshop Practice", Tata McGraw Hill Publishing Company Limited, 2007.   |  |   |   |   |                          |
| 4. Ian Gibson, David W Rosen, Brent Stucker., "Additive Manufacturing Technologies: Rapid Prototyping to Direct Digital Manufacturing", Springer, 2010. |  |   |   |   |                          |
| 5. Anthony Esposito, Fluid Power with Applications, Pearson Education, 7th edition, 2009.   |  |   |   |   |                          |
| 6. Civil & Mechanical engineering practices lab manual, SVCE, 2022.   |  |   |   |   |                          |



| IT22111   | PROGRAMMING FOR PROBLEM SOLVING<br>LABORATORY<br>(Common to IT, AD, CS, EE, EC) | L | T | P | C   |
|---|---|---|---|---|-----|
|   |   | 0 | 0 | 3 | 1.5 |
| <b>COURSE OBJECTIVES:</b>   |   |   |   |   |     |
| <ul style="list-style-type: none"> <li>• Be exposed to the syntax of C.</li> <li>• Be familiar with programming in C.</li> <li>• Learn to use arrays, strings, functions, pointers, structures and unions in C.</li> </ul>  |   |   |   |   |     |
| <b>LIST OF EXERCISES</b>  |   |   |   |   |     |
| <ol style="list-style-type: none"> <li>1. Usage of Basic Linux commands.</li> <li>2. C Programming using Simple statements and expressions.</li> <li>3. Scientific problem solving using decision making and looping.</li> <li>4. Simple programming for one dimensional and two dimensional arrays.</li> <li>5. Solving problems using Strings.</li> <li>6. C Programming using Pointers.</li> <li>7. C Programming using user defined functions (Pass by value and Pass by reference) .</li> <li>8. C Programming using Recursion.</li> <li>9. C Programming using structures and union.</li> <li>10. C Programming using enumerated data types.</li> <li>11. C Programming using macros and storage classes.</li> <li>12. C Programming using Files.</li> <li>13. Develop modularized application for any one of the following scenarios.</li> </ol> |   |   |   |   |     |
| <b>Scenarios:</b>   |   |   |   |   |     |
| <ul style="list-style-type: none"> <li>• Student Management System</li> <li>• Stock Management System</li> <li>• Banking Application</li> <li>• Ticket Reservation System</li> </ul>  |   |   |   |   |     |
| <b>Total (P:45): 45 PERIODS</b>   |   |   |   |   |     |
| <b>Hardware/Software Requirements (For a batch of 30 students)</b>  |   |   |   |   |     |
| Computer with Windows/Linux OS and C compiler -30 No.s  |   |   |   |   |     |
| <b>TEXT BOOKS:</b>  |   |   |   |   |     |
| <ol style="list-style-type: none"> <li>1. Pradip Dey, Manas Ghosh, “ Programming in C ”, First Edition, Oxford University Press, 2018.</li> <li>2. Byron S Gottfried, “Programming with C”, Schaum’s Outlines, Third Edition, Tata McGraw Hill, 2010.</li> </ol>  |   |   |   |   |     |

**OUTCOMES:**

Upon successful completion of the course, the students should be able to

| CO # | STATEMENT  | RBT LEVEL |
|------|--|-----------|
| 1    | Apply appropriate programming constructs to solve problems.                  | 3         |
| 2    | Design, implement, test and debug programs that use the basic features of C. | 5         |
| 3    | Design modularized applications in C to solve real world problems.           | 6         |
| 4    | Use C pointers and dynamically allocated memory to solve complex problems    | 4         |
| 5    | Apply file operations to develop solutions for real-world problems           | 3         |

**COURSE ARTICULATION MATRIX:**

| COs | Pos |   |   |   |   |   |   |   |   |    |    |    |    |    |    |
|-----|-----|---|---|---|---|---|---|---|---|----|----|----|----|----|----|
|     | 1   | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| 1.  | 1   | 3 |   |   |   |   |   | 2 | 3 |    |    | 2  | 2  | 2  | 1  |
| 2.  | 1   | 3 |   |   |   |   |   | 2 | 3 |    |    | 2  | 2  | 2  | 1  |
| 3.  | 1   |   | 3 | 2 | 1 |   |   | 2 | 3 |    |    | 2  | 2  | 2  | 1  |
| 4.  | 1   |   | 3 | 2 | 1 |   |   | 2 | 3 |    |    | 2  | 2  | 2  | 1  |
| 5.  | 1   |   | 3 | 2 | 1 |   |   | 2 | 3 |    |    | 2  | 3  | 3  | 1  |





## SEMESTER II

| HS22251  | அறிவியல் மற்றும் தொழில்நுட்பத்தில் தமிழ்<br>Science and Technology in Ancient Tamil Society<br>(Common to all branches) | L | T | P | C  |
|--|---|---|---|---|----|
|  |   | 2 | 0 | 0 | 2  |
| <p><b>பாடத்தின் நோக்கங்கள் :</b></p> <ol style="list-style-type: none"> <li>1. அறிவியலில் தமிழின் பயன்பாடு பற்றி தெரிந்து கொள்வார்கள்.</li> <li>2. தொழில்நுட்பத்தில் தமிழ் பாரம்பரியத்தின் தாக்கம் பற்றி அறிந்து கொள்வார்கள்.</li> </ol> <p><b>Course Objectives :</b></p> <ol style="list-style-type: none"> <li>1. They will know about the use of Tamil in science.</li> <li>2. Learn about the impact of Tamil heritage on technology.</li> </ol>  |   |   |   |   |    |
| <b>அலகு 1</b>  | <b>அறிவியல் தமிழ்</b>   |   |   |   | 6  |
| <p>கருவி உருவாக்கம் – ஆராய்ச்சி மேம்பாடு – கல்வி வளர்ச்சி – அறிவியல் தமிழ் சொற்கள் உருவாக்கம்.</p> <p><b>UNIT -1 SCIENTIFIC TAMIL</b><br/>Tool Development - Research Development - Educational Development - Scientific Tamil words Creation.</p>   |   |   |   |   |    |
| <b>அலகு 2</b>  | <b>தொழில்நுட்பத்தில் தமிழ்</b>  |   |   |   | 24 |
| <p><b>வடிவமைப்பு மற்றும் கட்டுமான தொழில்நுட்பம் :</b> சங்க காலத்தில் கட்டுமானப் பொருட்கள் – சோழர்களின் பெரியகோவில்கள் மற்றும் பிற வழிபாட்டுதலங்கள் – பல்லவர்களின் சிற்பங்கள் மற்றும் கோவில்கள் (மாமல்லபுரம்) - நாயக்கன் கால கோவில்கள் (மதுரை மீனாட்சி அம்மன் கோவில்), திருமலை நாயக்கர் மஹால், செட்டிநாட்டு வீடுகள்.</p> <p><b>உற்பத்தி தொழில் நுட்பம் :</b> கப்பல் கட்டும் கலை, உலோகவியல் ஆய்வுகள், தங்கம், தாமிரம், இரும்பு பற்றிய அறிவு – தொல்பொருள் சான்றுகள் – சுட்டக் களிமண் மணிகள், சங்கு மணிகள், எலும்பு மணிகள்.</p> <p><b>விவசாயம் மற்றும் நீர்ப்பாசன தொழில்நுட்பம் :</b> அணைகள், ஏரிகள், குளங்கள், மதகுகள், சோழர் கால குழுழி தூம்பு ஆகியவற்றின் முக்கியத்துவம் – கால்நடை பராமரிப்பு, கால்நடைகளின் பயன்பாட்டிற்காக வடிவமைக்கப்பட்ட கிணறுகள். விவசாயம் மற்றும் வேளாண் செயலாக்கம் – கடல் பற்றிய அறிவு – மீன் பிடித்தல், முத்து குளித்தல், சங்கு சேகரித்தல்.</p> <p><b>தமிழ் கணிணி:</b> அறிவியல் தமிழ் வளர்ச்சி – தமிழ் கணிணி, தமிழ் புத்தகங்களின் டிஜிட்டல்மயமாக்கல், தமிழ் டிஜிட்டல் நூலகம், தமிழ் மென்பொருள் உருவாக்கம் – தமிழ் மெய் நிகர் அகாடமி – சொற்குவை திட்டம்.</p> <p>தமிழின் எதிர்காலமும் தகவல் தொழில்நுட்பமும்- உலகமயமாக்கலும் தகவல் தொழில்நுட்பமும் – கணிணிக்கு தமிழ் கற்று கொடுத்தல் – தமிழ்மொழித் தொழில்நுட்பத்தில் வளங்கள்.</p> |   |   |   |   |    |
| <p><b>UNIT -2 TAMIL IN TECHNOLOGY</b></p> <p><b>Design and Construction Technology :</b> Building materials in Sangam age – Great temples of Cholas and other workshop places – Sculptures and Temples of Pallavas (Mamallapuram) – Temples of Nayakas period (Madurai Meenakshi amman temple), Thirumalai Nayakar Mahal, Chetti Nadu Houses.</p>  |   |   |   |   |    |

**Manufacturing Technology** : Art of Ship building, Metallurgical studies, Knowledge about Gold, Copper, Iron – Archeological evidences – Terracotta beads, Shell beads, Bone beads.

**Agriculture and Irrigation Technology**: Dams, Tank, ponds, sluice, Significance of Kumuzhi Thoompu of Cholas period- Animal Husbandry, Wells designed for cattle use. Agriculture and Agro processing, - Knowledge about Sea – Fisheries, Pearl, Conche diving.

**Tamil Computing** : Development of Scientific Tamil – Tamil Computing, Digitization of Tamil books, Tamil Digital Library, Development of Tamil Softwares – Tamil virtual Academy – Sorkuvai project. Future of Tamil and Information Technology- Globalization and Information Technology-Teaching Tamil for Computer-Resources in Tamil Language Technology.

**பாடநூல்கள்:**

1. டாக்டர், வா.செ .குழந்தைசாமி (1985), "அறிவியல் தமிழ்" , பாரதி பதிப்பகம், 126/108, உஸ்மான் சாலை, தியாகராய நகர் , சென்னை 600017
2. சுப. திண்ணப்பன், (1995), "கணினியும் தமிழ் கற்பித்தலும்", புலமை வெளியீடு, 38-B மண்ணத்தநோட்டத் தெரு, ஆழ்வார்பேட்டை, சென்னை 600018
3. மு. பொன்னவைக்கோ, (2003), "வளர்தமிழில் அறிவியல் – இணையத் தமிழ்", அனைத்திந்திய அறிவியல் தமிழ்க் கழகம், தஞ்சாவூர் 615 005.
4. துரை. மணிகண்டன், (2008), "இணையமும் தமிழும்", நல்நிலம் பதிப்பகம், 7-3, சிமேட்லி சாலை, தியாகராய நகர், சென்னை 600 017.

**பாடநெறி முடிவுகள்** : படிப்பை வெற்றிகரமாக முடித்தவுடன், மாணவர்கள் பின்வருவனவற்றைச் செய்ய முடியும்.

**COURSE OUTCOMES** : On completion of the course, the student will be able to

| பா.வெ. எண்<br>CO No | பாடத்திட்டத்தின்வெளிப்பாடு<br>Course Outcomes  | RBT level |
|---------------------|--|-----------|
| 1                   | அறிவியலில் தமிழ் மொழியின் பயன்பாடு பற்றி தெரிந்து கொள்வார்கள்<br>They will know about the use of Tamil language in science                                 | 2         |
| 2                   | பல்வேறு தொழில்நுட்பத்தில் தமிழ்மொழியின் தாக்கம் பற்றி அறிந்து கொள்வார்கள்<br>They will learn about the influence of Tamil language in various technologies | 3         |

| HS22252  | TECHNICAL ENGLISH<br>(Common to all branches) | L | T | P | C                        |
|--|---|---|---|---|--------------------------|
|  |   | 3 | 0 | 0 | 3                        |
| <b>COURSE OBJECTIVES:</b>  |   |   |   |   |                          |
| <ol style="list-style-type: none"> <li>1. Enable learners to define and understand technical communication and scientific writing</li> <li>2. Expose learners to the technicalities of seminar presentation, group discussion, and public speaking</li> <li>3. Develop learners' writing skills for scientific and documenting purposes</li> <li>4. Improve learners' ability to draft correspondences for business purposes</li> <li>5. Cultivate learners' ability to holistically understand the nuances of job interviews and recruiting process.</li> </ol>           |   |   |   |   |                          |
| <b>UNIT I</b>  |   |   |   |   | <b>9</b>                 |
| Listening - AV files pertaining to manufacturing processes of products, scientific documentaries; Speaking - syllable division and word stress, intonation, sharing opinions; Reading - news articles related to science and technology; Writing - definitions, instruction, recommendation, data interpretation, resume; Grammar -tenses and their aspects, sentence connectors – discourse markers, sequential words, active and passive voice, subject-verb agreement.  |   |   |   |   |                          |
| <b>UNIT II</b>   |   |   |   |   | <b>9</b>                 |
| Listening - AV pertaining to marketing strategies, peer reading and pronunciation; Speaking- turn taking, sharing opinions; conducting and attending a meeting, understanding the nuances of spoken communication among internal audience and external audience; Reading - analytical documents, descriptive documents; Writing - fliers, brochures, resume - letter of application, checklists; Grammar - modal verbs, clauses - types and uses, conditional clauses, articles.   |   |   |   |   |                          |
| <b>UNIT III</b>  |   |   |   |   | <b>9</b>                 |
| Listening - AV related to how to use components, scientific description, Speaking - speaking for motivation and initiation, speaking at a seminar presentation; Reading - scientific journals, papers; Writing - Technical descriptions - process description, purpose and function, PowerPoint, Google forms, user manuals; Grammar - phrasal verbs, prepositions, technical and scientific affixes.  |   |   |   |   |                          |
| <b>UNIT IV</b>   |   |   |   |   | <b>10</b>                |
| Listening - scientific debates, crisis management; Speaking - handling conflicts, speaking about the loss of benefits, progress or decline of business, identifying the connotative meanings, Reading- documented evidences of uses and functions of a product, review of a product, Writing - memos, follow-up letters, reports - proposal, project, progress reports, sales reports, reports on industrial visits, executive summary. Grammar - reported speech and tag questions, sentence structure - comparative, imperative, cause and effect, infinitive of result. |   |   |   |   |                          |
| <b>UNIT V</b>  |   |   |   |   | <b>8</b>                 |
| Listening - AV of Group discussions, panel discussions, face to face interviews for recruitment purposes; Speaking- speaking at group discussions, interviewing a personality, answering at the interviews; Reading - WebPages of top notch engineering companies, Writing - blogging, e-mails, letter of complaint, minutes of the meeting; Grammar - one word substitution, collocations, better word/sentence substitution (rephrasing the content/improvising ideas).  |   |   |   |   |                          |
|  |   |   |   |   | <b>TOTAL: 45 PERIODS</b> |

**REFERENCES:**

1. Department of English, Anna University. *Mindscales: English for Technologists and Engineers*. Orient Blackswan, Chennai. 2012.
2. Downes, Colm, *Cambridge English for Job-hunting*, Cambridge University Press, New Delhi. 2008.
3. Murphy, Raymond, *Intermediate English Grammar with Answers*, Cambridge University Press 2000.
4. Thomson, A.J., *Practical English Grammar 1 & 2*, Oxford, 1986.
5. Herbert A J, *The Structure of Technical English*, Longman, 1965.

**Websites**

1. <http://www.usingenglish.com>
2. <http://www.uefap.com>
3. <https://owl.english.purdue.edu/owl/>
4. [www.learnenglishfeelgood.com/esl-printables-worksheets.html](http://www.learnenglishfeelgood.com/esl-printables-worksheets.html)

**Software**

1. Face 2 Face Advance – Cambridge University Press, 2014.
2. English Advance Vocabulary- Cambridge University Press.
3. IELTS test preparation – Cambridge University Press 2017.
4. Official Guide to the TOEFL Test With CD-ROM, 4th Edition.
5. Cambridge Preparation for the TOEFL TEST- Cambridge University Press, 2017.

**OUTCOMES:**

Upon successful completion of the course, the students should be able to

| SL.NO | STATEMENT  | RBT LEVEL |
|-------|--|-----------|
| CO1.  | Understand the nuances of technical communication and scientific writing | 3         |
| CO2.  | Present papers and give seminars   | 6         |
| CO3.  | Discuss in groups and brainstorm   | 6         |
| CO4.  | Draft business correspondences and write for documenting purposes        | 6         |
| CO5.  | Face job interviews with confidence                                      | 6         |

**COURSE ARTICULATION MATRIX**

| COs | POs |   |   |   |   |   |   |   |   |    |    |    |    |    |    |
|-----|-----|---|---|---|---|---|---|---|---|----|----|----|----|----|----|
|     | 1   | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| 1.  |     |   |   |   |   |   |   |   |   | 3  |    |    |    |    |    |
| 2.  |     |   |   |   |   |   |   |   |   | 3  |    |    |    |    |    |
| 3.  |     |   |   |   |   |   |   |   |   | 3  |    |    |    |    |    |
| 4.  |     |   |   |   |   |   |   |   |   | 3  |    |    |    |    |    |
| 5.  |     |   |   |   |   |   |   |   |   | 3  |    |    |    |    |    |

| MA22251   | APPLIED MATHEMATICS II<br>(Common to all Branches except MR) | L            | T | P | C |
|---|--|--------------|---|---|---|
|   |  | 3            | 1 | 0 | 4 |
| <b>COURSE OBJECTIVES:</b>   |  |              |   |   |   |
| The Student should be made to:  |  |              |   |   |   |
| <ol style="list-style-type: none"> <li>1. Acquire the concepts of vector calculus needed for problems in all engineering disciplines and compute different types of integrals using Green's, Stokes' and Divergence theorems.</li> <li>2. Skilled at the techniques of solving ordinary differential equations that model engineering problems.</li> <li>3. Extend their ability of using Laplace transforms to create a new domain in which it is easier to handle the problem that is being investigated.</li> <li>4. Explain geometry of a complex plane and state properties of analytic functions.</li> <li>5. Understand the standard techniques of complex variable theory so as to apply them with confidence in application areas such as heat conduction, elasticity, fluid dynamics and flow of electric current.</li> </ol> |  |              |   |   |   |
| <b>UNIT 1</b>   | <b>VECTOR CALCULUS</b>                                       | <b>(9+3)</b> |   |   |   |
| Gradient, divergence and curl - Directional derivative - Vector identities – Irrotational and solenoidal vector fields - Line integral over a plane curve – Surface integral - Area of a curved surface - Volume integral - Green's theorem in a plane, Gauss divergence theorem and Stokes' theorem (excluding proofs) – Verification and application in evaluating line, surface and volume integrals.  |  |              |   |   |   |
| <b>UNIT II</b>  | <b>ORDINARY DIFFERENTIAL EQUATIONS AND ITS APPLICATIONS</b>  | <b>(9+3)</b> |   |   |   |
| Differential equations of first order – Equations of the first order and first degree – Linear equations – Higher order linear differential equations with constant coefficients - Method of variation of parameters - Cauchy's and Legendre's linear equations - Simultaneous first order linear equations with constant coefficients – Applications of Linear differential equations – Oscillatory electrical circuit – Deflection of beams.  |  |              |   |   |   |
| <b>UNIT III</b>   | <b>LAPLACE TRANSFORM</b>                                     | <b>(9+3)</b> |   |   |   |
| Conditions for existence - Transform of elementary functions - Transforms of unit step function and impulse functions – Basic properties – Shifting theorems - Transforms of derivatives and integrals of functions - Derivatives and integrals of transforms - Initial and final value theorems - Transform of periodic functions. Inverse Laplace transforms - Convolution theorem – Application to solution of linear ODE of second order with constant coefficients using Laplace transformation techniques.  |  |              |   |   |   |
| <b>UNIT IV</b>  | <b>ANALYTIC FUNCTIONS</b>                                    | <b>(9+3)</b> |   |   |   |
| Analytic functions - Necessary and sufficient conditions (Cauchy-Riemann equations) - Properties of analytic function - Harmonic conjugates - Construction of analytic functions - Conformal mapping – Mapping by functions $W = Z + C$ , $CZ$ , $1/Z$ , $Z^2$ – Joukowski's transformation- Bilinear transformation.   |  |              |   |   |   |

|  |                            |              |
|--|----------------------------|--------------|
| <b>UNIT V</b>  | <b>COMPLEX INTEGRATION</b> | <b>(9+3)</b> |
| Cauchy's integral theorem - Cauchy's integral formula - Taylor's and Laurent's series expansions - Singular points - Residues - Cauchy's Residue theorem – Application of residue theorem for evaluation of real integrals – Use of circular contour and semi-circular contour.  |                            |              |
| <b>TOTAL (L:45+T:15): 60 PERIODS</b>   |                            |              |
| <b>TEXT BOOKS:</b>   |                            |              |
| <ol style="list-style-type: none"> <li>Erwin Kreyszing, Herbert Kreyszing, Edward Norminton, “Advanced Engineering Mathematics”, 10<sup>th</sup> Edition, John Wiley, (2015).</li> <li>Grewal .B.S, Grewal .J.S “Higher Engineering Mathematics”, 43<sup>rd</sup> Edition, Khanna Publications, Delhi, (2015).</li> </ol>  |                            |              |
| <b>REFERENCES:</b>   |                            |              |
| <ol style="list-style-type: none"> <li>Dass, H.K., and Rajnish Verma, “Higher Engineering Mathematics”, S.Chand Private Ltd., 2011.</li> <li>Ramana B.V, “Higher Engineering Mathematics”, Tata McGraw Hill Publishing Company, New Delhi, (2013).</li> <li>Bali N. P and Manish Goyal, “A Text book of Engineering Mathematics”, 9<sup>th</sup> edition, Laxmi Publications(p) Ltd., 2014.</li> </ol> |                            |              |
| <b>WEB LINK:</b>   |                            |              |
| <ol style="list-style-type: none"> <li><a href="https://nptel.ac.in/courses/111/105/111105134/">https://nptel.ac.in/courses/111/105/111105134/</a></li> <li><a href="https://nptel.ac.in/courses/111/105/111105121/">https://nptel.ac.in/courses/111/105/111105121/</a></li> </ol>   |                            |              |

| <b>Course Outcomes</b> | <b>Upon completion of the course, students will be able to:</b>  | <b>RBT* Level</b> |
|------------------------|--|-------------------|
| CO1                    | Interpret the fundamentals of vector calculus and execute evaluation of line, surface and volume integrals using Gauss, Stokes and Green's theorems. | 3                 |
| CO2                    | Solve first order linear, homogeneous differential equations and use series solution method to solve second order differential equations.            | 3                 |
| CO3                    | Determine the methods to solve differential equations using Laplace transforms and Inverse Laplace transforms.                                       | 3                 |
| CO4                    | Explain Analytic functions and Categorize transformations.   | 3                 |
| CO5                    | Perform Complex integration to evaluate real definite integrals using Cauchy integral theorem and Cauchy's residue theorem.                          | 3                 |

### COURSE ARTICULATION MATRIX

| COs | POs |   |   |   |   |   |   |   |   |    |    |    |    |    |    |
|-----|-----|---|---|---|---|---|---|---|---|----|----|----|----|----|----|
|     | 1   | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| 1.  | 3   | 3 | 2 | 2 |   |   |   |   |   |    |    | 3  |    |    |    |
| 2.  | 3   | 3 | 3 | 3 |   |   |   |   |   |    |    | 3  |    |    |    |
| 3.  | 3   | 3 | 3 | 3 |   |   |   |   |   |    |    | 3  |    |    |    |
| 4.  | 3   | 3 |   |   |   |   |   |   |   |    |    | 3  |    |    |    |
| 5.  | 3   | 3 |   |   |   |   |   |   |   |    |    | 3  |    |    |    |

| PH22252   | PHYSICS OF MATERIALS<br>(Common to EE and EC)               | L         | T | P | C |
|---|---|-----------|---|---|---|
|   |   | 3         | 0 | 0 | 3 |
| <b>COURSE OBJECTIVES:</b>   |   |           |   |   |   |
| <ol style="list-style-type: none"> <li>1. To understand the physical properties of materials like electrical and thermal conductivity.</li> <li>2. To understand various types of semiconducting materials, their applications in the field of Engineering and understand the concept of Fermi energy.</li> <li>3. To understand the different types of dielectric materials and their applications in Engineering fields.</li> <li>4. To understand the phenomena of superconductor, properties and their applications and the different types of magnetic materials.</li> <li>5. Ability to understand different types of Transistors and its characteristics and to construct Basic Logic Gates and simplification of circuits using K-map.</li> </ol> |   |           |   |   |   |
| <b>UNIT I</b>   | <b>CONDUCTING MATERIALS</b>                                 | <b>9</b>  |   |   |   |
| Introduction – Classification of materials based on the electrical resistivity - Classical Free electron theory – Electrical and thermal conductivity of metal (derivation) – Wiedemann – Franz law – Lorentz number – Drawbacks of Classical Free electron theory – Quantum Free electron theory – Fermi distribution function – Effect of temperature of Fermi function – Density of energy states (derivation) – Carrier concentration in metals – Emission of electrons from metals – Thermionic emission – Photoelectric emission – Field emission   |   |           |   |   |   |
| <b>UNIT II</b>  | <b>SEMICONDUCTING MATERIALS</b>                             | <b>9</b>  |   |   |   |
| Introduction – Classification of materials based on band theory (metals, semiconductors and insulators) – Intrinsic and extrinsic semiconductors – Carrier concentration in intrinsic semiconductor (derivation) - Effect of temperature on Fermi level - Compound semiconductors – Variation of electrical conductivity in intrinsic semiconductors with temperature - Band gap determination of intrinsic semiconductor (derivation and Experiment to determine Band Gap) – Hall effect (derivation and experiment). Tunnel diode, Schottky diode.  |   |           |   |   |   |
| <b>UNIT III</b>   | <b>DIELECTRIC PROPERTIES OF MATERIALS</b>                   | <b>9</b>  |   |   |   |
| Introduction to dielectric materials - Dielectric constant - Polarization of dielectric materials - Types of Polarization (Polarisability) - Equation of internal fields in solid (One- Dimensional) (Derivation) - Clausius – Mossotti Relation for elemental dielectric materials - Dielectric Breakdown - Frequency dependence of dielectric constant, Dielectric Losses - Important applications of dielectric material - Ferro and Piezo electricity (Qualitative).  |   |           |   |   |   |
| <b>UNIT IV</b>  | <b>MATERIALS AT LOW TEMPERATURE AND MAGNETIC PROPERTIES</b> | <b>10</b> |   |   |   |
| Temperature dependence of resistivity in superconducting materials - Meissner effect – Properties of superconductors - Type I and Type II superconductors - BCS theory (Qualitative) – Low T <sub>c</sub> and High T <sub>c</sub> (alloy) superconductors – Ceramic superconductors (oxide superconductors) - LaBaCuO, YBaCuO, BiSrCaCuO - Josephson's effect (AC and DC) – - Applications of Superconductors-SQUIDS – CRYOTRON – MAG LEV.<br>Dia, Para and Ferro magnetic material – Domain theory for Ferro magnetic materials - Phenomena of Hysteresis and its applications –Magnetic Semiconductor- Ferrites and its structures.   |   |           |   |   |   |
| <b>UNIT V</b>   | <b>FUNDAMENTALS OF ELECTRONIC SCIENCE</b>                   | <b>8</b>  |   |   |   |
| JFET-Drain and Transfer Characteristics- Electronic Transistor(SET), Spintronics-Electronic   |   |           |   |   |   |

devices vs Spintronic Devices-Design of Basic Logic gates using transistor, Karnaugh map SoP and PoS forms.

**TOTAL: 45 PERIODS**

**OUTCOMES:**

Upon successful completion of the course, students should be able to:

1. Students will understand various properties of materials and the internal structure of materials.
2. Students will gain the ability to understand the behaviour of electrons in solids.
3. Students will understand the fundamentals of electronic science viz characteristics and applications of JFET, SET and construction of Basic Logic gates using transistors and designing of K-Map.

**TEXT BOOKS:**

1. Arumugam M, "Materials Science", Anuradha Publications, 2015.
2. Rajendran V, "Engineering Physics", Tata McGraw Hill, 2015.
3. Suresh R, Jayakumar V, "Materials Science", Lakshmi Publications 2003.
4. Palanisamy P.K, "Materials Science", SciTech publications, 2015.
5. V.K. Mehta , Rohit Mehta, "Principles of Electronics", 2020
6. M. Morris Mano, "Digital Design", 3rd edition, Pearson Education, 2014.

**REFERENCES:**

1. Gaur R.K , Gupta S.L, "Engineering Physics", Dhanpat Publications, 2015.
2. Avadhnaulu M.N , Kshirsagar P.G, "A Textbook of Engineering Physics", S. Chand, 2006.
3. Kittel C, "Introduction to Solid State Physics", 7<sup>th</sup> Edition, Wiley Eastern Ltd, 2004.
4. Azaroff L.V, Brophy J.J., "Electronic Processes In Materials", McGraw Hill.,1963.
5. A.B. Gupta, Nurul Islam , "Solid State Physics and Electronics", 2017.
6. John F. Wakerley, "Digital Design-Principle & practice", 3<sup>rd</sup> edition, , Pearson, 2008.

**COURSE OUTCOMES**

| CO   | OUTCOMES  | RBT level |
|------|---|-----------|
| CO 1 | Comprehend the behavior of electrons in solids.   | 2         |
| CO 2 | Demonstrate an understanding of various properties of Semiconducting materials and their internal structure | 3         |
| CO 3 | Analyse the properties of dielectric materials and apply them in various fields.                            | 3         |
| CO 4 | Summarize basics of magnetism and superconductivity. Explore a few of their technological applications.     | 2         |
| CO 5 | Develop an understanding the Fundamentals of Electronic Science and its applications.                       | 3         |

**COURSE ARTICULATION MATRIX**

| COs | POs |   |   |   |   |   |   |   |   |    |    |    |    |    |    |
|-----|-----|---|---|---|---|---|---|---|---|----|----|----|----|----|----|
|     | 1   | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| 1.  | 3   |   |   | 1 |   |   |   |   |   | 1  |    | 2  |    |    |    |
| 2.  | 3   |   |   |   |   |   |   |   |   | 1  |    | 2  |    |    |    |
| 3.  | 3   |   |   |   |   |   |   |   |   | 1  |    | 2  |    |    |    |
| 4.  | 3   | 2 | 2 | 1 | 2 |   |   |   | 2 | 1  |    | 2  |    |    |    |
| 5.  | 3   | 2 | 2 | 1 |   | 2 |   |   | 2 | 1  |    | 2  |    |    |    |



| EC22201  | ELECTRON DEVICES                         | L        | T | P | C |
|--|--|----------|---|---|---|
|  |  | 3        | 0 | 0 | 3 |
| <b>COURSE OBJECTIVES:</b>  |  |          |   |   |   |
| <ol style="list-style-type: none"> <li>To provide the necessary skill to understand the basics of semiconductor diode.</li> <li>To provide the basics of bipolar junction transistors.</li> <li>To provide the basics of field effect transistors.</li> <li>To provide comprehensive understanding of special semiconductor diodes.</li> <li>To provide comprehensive understanding of power and display devices.</li> </ol>   |  |          |   |   |   |
| <b>UNIT I</b>  | <b>SEMICONDUCTOR DIODE</b>               | <b>9</b> |   |   |   |
| PN junction diode, Current equations, Diffusion and drift current densities, forward and reverse bias characteristics, Switching Characteristics, Diode as a Rectifier   |  |          |   |   |   |
| <b>UNIT II</b>   | <b>BIPOLAR JUNCTION TRANSISTOR</b>       | <b>9</b> |   |   |   |
| NPN - PNP – Junctions - Early effect - Current equations – Input and Output characteristics of CE, CB, CC – BJT as an amplifier, Hybrid - $\pi$ model - h-parameter model, Ebers Moll Model- Gummel Poon-model, Multi Emitter transistor.  |  |          |   |   |   |
| <b>UNIT III</b>  | <b>FIELD EFFECT TRANSISTORS</b>          | <b>9</b> |   |   |   |
| Review of JFETs – Drain and Transfer characteristics - Current equations - Pinch off voltage and its significance – MOSFET - Characteristics - Threshold voltage - Channel length modulation, D-MOSFET, E-MOSFET- Current equation - Equivalent circuit model and its parameters, FINFET, DUAL GATE MOSFET.  |  |          |   |   |   |
| <b>UNIT IV</b>   | <b>SPECIAL SEMICONDUCTOR DEVICES</b>     | <b>9</b> |   |   |   |
| Metal-Semiconductor Junction- MESFET - Zener diode - Varactor diode - Gallium Arsenide device, LASER diode, LDR, PIN Diode, Point Contact Diode, IGBT.   |  |          |   |   |   |
| <b>UNIT V</b>  | <b>POWER DEVICES AND DISPLAY DEVICES</b> | <b>9</b> |   |   |   |
| UJT, SCR, Diac, Triac, Power BJT, LED, Photo diode, Photo transistor, Opto Coupler, Solar cell, LCD, CCD.  |  |          |   |   |   |
| <b>TOTAL: 45 PERIODS</b>   |  |          |   |   |   |
| <b>TEXT BOOKS:</b>   |  |          |   |   |   |
| <ol style="list-style-type: none"> <li>Donald A Neaman, “Semiconductor Physics and Devices”, Fourth Edition, Tata Mc Graw Hill Inc., 2012.</li> <li>Adel S. Sedre and Kenneth C. Smith, “Microelectronic Circuits: Theory and Applications”, 6<sup>th</sup> Edition, Oxford University Press, 2013</li> <li>Robert Boylestad and Louis Nashelsky, “Electron Devices and Circuit Theory”, Pearson Prentice Hall, 11<sup>th</sup> edition, 2013.</li> <li>Dr. Sanjay Sharma, “Basic Electronics”, First Edition, S.K. Kataria &amp; Sons, 2012.</li> </ol> |  |          |   |   |   |
| <b>REFERENCES:</b>   |  |          |   |   |   |
| <ol style="list-style-type: none"> <li>Jacob Millman &amp; Christos C. Halkias, “Electronic Devices &amp; Circuits”, Fourth Edition, McGraw Hill 2015.</li> <li>Salivahanan. S, Suresh Kumar. N, Vallavaraj.A, “Electronic Devices and circuits”, Third Edition, Tata McGraw Hill, 2012.</li> </ol>  |  |          |   |   |   |

| <b>COURSE OUTCOMES:</b><br>Upon successful completion of the course, students should be able to: |   | <b>RBT Level</b> |
|--|---|------------------|
| <b>CO1</b>   | Gain knowledge of PN diodes.  | <b>2</b>         |
| <b>CO2</b>   | Analyze the characteristics of BJT and use it in designing simple circuits.                         | <b>4</b>         |
| <b>CO3</b>   | Analyze the characteristics of FET and use it in designing simple circuits.                         | <b>4</b>         |
| <b>CO4</b>   | Analyze the working principle of Special diodes and use it in designing simple circuits.            | <b>4</b>         |
| <b>CO5</b>   | Analyze the working principle of power and display devices and use it in designing simple circuits. | <b>4</b>         |

### COURSE ARTICULATION MATRIX

| COs       | POs |   |   |   |   |   |   |   |   |    |    |    | PSOs |    |
|-----------|-----|---|---|---|---|---|---|---|---|----|----|----|------|----|
|           | 1   | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13   | 14 |
| <b>1.</b> | 3   | 3 |   | 2 | 2 |   |   |   |   | 1  |    |    | 3    | 3  |
| <b>2.</b> | 3   | 3 |   | 3 | 2 |   |   |   |   | 1  |    |    | 3    | 3  |
| <b>3.</b> | 3   | 3 |   | 3 | 2 |   |   |   |   | 1  |    |    | 3    | 3  |
| <b>4.</b> | 3   | 2 |   | 1 | 2 |   |   |   |   | 1  |    |    | 3    | 3  |
| <b>5.</b> | 3   | 2 |   | 1 | 2 |   |   |   |   | 1  |    |    | 3    | 3  |

| EC22202   | CIRCUIT THEORY                                   | L         | T | P | C |
|---|--|-----------|---|---|---|
|   |  | 3         | 0 | 2 | 4 |
| <b>COURSE OBJECTIVES:</b>   |  |           |   |   |   |
| <ol style="list-style-type: none"> <li>To analyze electrical network with suitable network theorems.</li> <li>To classify and analyze series and parallel resonance and coupled circuit.</li> <li>To determine the transient response of RL, RC and RLC circuits for AC and DC inputs.</li> <li>To infer the concept two-port networks.</li> <li>To sketch the network topology.</li> <li>To gain hands- on experience in Network theorems, KVL &amp; KCL.</li> <li>To understand the working of RL, RC and RLC circuits.</li> <li>To provide practical exposure in constructing two-port network.</li> </ol> |  |           |   |   |   |
| <b>UNIT I</b>   | <b>NETWORK THEOREMS FOR DC &amp; AC CIRCUITS</b> | <b>12</b> |   |   |   |
| Thevenin Theorem, Norton's Theorem, Superposition Theorem, Reciprocity theorem, Maximum Power transfer Theorem - Analysis using Dependent Current sources and Voltage sources.  |  |           |   |   |   |
| <b>UNIT II</b>  | <b>RESONANCE AND COUPLED CIRCUITS</b>            | <b>9</b>  |   |   |   |
| Resonance: Series and parallel resonance – Frequency response – Quality factor and Bandwidth-Selectivity-Basic filter design.<br>Coupled Circuits: Self and Mutual inductance – Dot rule-Coefficient of coupling – Linear Transformer – Ideal Transformer - Tuned circuits – Single tuned circuits.   |  |           |   |   |   |
| <b>UNIT III</b>   | <b>TRANSIENT ANALYSIS</b>                        | <b>9</b>  |   |   |   |
| Basic RL and RC Circuits, The Source- Free RL Circuit, The Source-Free RC Circuit, The Unit Step Function, Transient response of RL, RC and RLC Circuits using Laplace transform for DC and AC input.   |  |           |   |   |   |
| <b>UNIT IV</b>  | <b>TWO PORT NETWORKS</b>                         | <b>6</b>  |   |   |   |
| Characterization of two port networks in terms of Z, Y, ABCD and h parameters. Interconnection of two port network, Symmetrical properties of T and $\pi$ networks.   |  |           |   |   |   |
| <b>UNIT V</b>   | <b>NETWORK TOPOLOGY</b>                          | <b>9</b>  |   |   |   |
| Network terminology - Graph of a network - Trees and Co-Tree - Twigs and Links - Incidence Matrix (A), Properties of Incidence Matrix (A) - Link Current and Tie-set Matrix (B) - Twig Voltages and Cut-set Matrix (C) - Mesh Analysis and Nodal Analysis.  |  |           |   |   |   |
| <b>L: 45 PERIODS</b>  |  |           |   |   |   |
| <b>Practical Exercises:</b>   |  |           |   |   |   |
| <ol style="list-style-type: none"> <li>Verifications of KVL &amp; KCL.</li> <li>Verifications of Thevenin &amp; Norton's theorem.</li> <li>Verification of Superposition Theorem.</li> <li>Verification of maximum power transfer Theorem</li> <li>Determination of Resonance Frequency of Series &amp; Parallel RLC Circuits.</li> <li>Transient analysis of RL and RC circuits.</li> <li>Determination of Z and Y parameters for the two port network.</li> </ol>   |  |           |   |   |   |
| <b>P: 30 PERIODS</b>  |  |           |   |   |   |
| <b>TOTAL PERIODS: 75</b>  |  |           |   |   |   |



| CY22161  | CHEMISTRY LABORATORY<br>(Common to all Branches except AD, CS & IT) | L | T | P | C |
|--|---|---|---|---|---|
|  |   | 0 | 0 | 2 | 1 |
| <b>COURSE OBJECTIVES</b>   |   |   |   |   |   |
| <p>The objective of the Chemistry Laboratory is to acquaint the students with the basic phenomenon/concepts of chemistry, the student face during course of their study in the industry and Engineering field.</p> <ol style="list-style-type: none"> <li>To appreciate the need and importance of water quality parameters for industrial and domestic use.</li> <li>To gain the knowledge on electrochemical instrumentation techniques like potential and current measuring used in electrochemistry applications</li> <li>To impart knowledge on separation of components using paper chromatography.</li> <li>To enhance the thinking capability about polymer and properties like molecular weight.</li> </ol>   |   |   |   |   |   |
| <b>LIST OF EXPERIMENTS (Minimum 8 Experiments)</b>   |   |   |   |   |   |
| <ol style="list-style-type: none"> <li>Determination of DO content of water sample by Winkler's method.</li> <li>Determination of strength of given hydrochloric acid using pH meter</li> <li>Determination of strength of acids in a mixture using conductivity meter</li> <li>Estimation of iron content of the water sample using spectrophotometer (phenanthroline / thiocyanate method)</li> <li>Determination of total, temporary &amp; permanent hardness of water by EDTA Method.</li> <li>Estimation of iron content of the given solution using potentiometer.</li> <li>Determination of alkalinity in water sample.</li> <li>Determination of Single electrode potential.</li> <li>Separation of components from a mixture of red and blue inks using Paper chromatography.</li> <li>Determination of molecular weight of polymer by using Ostwald's/Ubbelohde viscometer.</li> </ol> |   |   |   |   |   |
| <b>TOTAL: 15 Periods</b>   |   |   |   |   |   |
| <b>REFERENCES:</b>   |   |   |   |   |   |
| <ol style="list-style-type: none"> <li>Daniel R. Palleros, "Experimental organic chemistry" John Wiley &amp; Sons, Inc., New York 2001.</li> <li>Furniss B.S. Hannaford A.J, Smith P.W.G and Tatchel A.R., "Vogel's Textbook of practical organic chemistry", LBS Singapore 1994.</li> <li>Jeffery G.H., Bassett J., Mendham J. and Denny vogel's R.C, "Text book of quantitative analysis chemical analysis", ELBS 5th Edn. Longman, Singapore publishers, Singapore, 1996.</li> <li>Kolthoff I.M., Sandell E.B. et al. "Quantitative chemical analysis", Mcmillan, Madras 1980</li> </ol>  |   |   |   |   |   |

| <b>COURSE OUTCOMES:</b><br>On the successful completion of the course, students will be able to |   | <b>RBT*Level</b> |
|---|---|------------------|
| CO1   | Distinguish hard and soft water, solve the related numerical problems on water, purification and its significance in industry and daily life. | 4                |
| CO2   | Interpret the knowledge of instruments to measure potential and current related parameters.   | 2                |
| CO3   | Demonstrate the basic principle for separation of components using paper chromatography.  | 4                |
| CO4   | Evaluate the molecular weight of polymer using Ostwald's/Ubbelohde viscometer.  | 4                |

**COURSE ARTICULATION MATRIX:**

|            | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO-1 | PSO-2 |
|------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|-------|-------|
| <b>CO1</b> | 3   | 2   |     |     |     | 3   | 3   | 3   | 1   |      | 1    | 2    |       |       |
| <b>CO2</b> | 3   | 2   | 1   |     |     | 3   | 3   | 3   |     |      |      |      |       |       |
| <b>CO3</b> | 3   |     |     |     |     | 3   | 3   |     |     |      |      | 2    |       |       |
| <b>CO4</b> | 3   |     |     | 1   |     | 3   | 3   | 3   |     |      |      |      |       |       |

| EC22211  | TECHNICAL DRAWING LABORATORY | L | T | P | C                        |
|--|------------------------------|---|---|---|--------------------------|
|  |                              | 0 | 0 | 2 | 1                        |
| <b>COURSE OBJECTIVES:</b>  |                              |   |   |   |                          |
| <ol style="list-style-type: none"> <li>To draw free hand sketches of the schematic diagrams of electronic circuits using standard symbols.</li> <li>To prepare the drawing from the rough sketches and/or enlarge/reduce the given drawing to the desired scale.</li> <li>To draw the cables and connectors using CAD tools.</li> <li>To draw exploded views of components &amp; assemblies in preparation of service drawing.</li> <li>To construct and verify the electric circuits using SPICE simulator.</li> <li></li> </ol>  |                              |   |   |   |                          |
| <b>LIST OF EXPERIMENTS</b>   |                              |   |   |   |                          |
| <ol style="list-style-type: none"> <li><b>Drawing Fundamentals on Electronics</b> <ol style="list-style-type: none"> <li>Hand drawing Symbols of all the electronic components.</li> <li>Soldering of resistive components.</li> </ol> </li> <li><b>Drawing of standard symbols of basic electronic components using AutoCAD Electrical</b> <ol style="list-style-type: none"> <li>Resistors, Capacitors, Inductors, Potentiometer, Crystal, Switches and Transformers</li> <li>Active Devices – AC and DC sources, PN diode, Zener Diode, Varactor Diode, LED, BJT, JFET, MOSFET, UJT, SCR, DIAC, TRIAC</li> <li>Telephone components – Transmitter, Receiver, Filter, Hybrid Transformer</li> <li>Logic Gates – NOT, AND, OR, XOR, NAND, NOR</li> </ol> </li> <li><b>Drawing cables and connectors using AutoCAD Electrical</b></li> <li><b>Drawing Electric circuits:</b> <ol style="list-style-type: none"> <li>Circuit diagram of a Wein's bridge oscillator</li> <li>Circuit diagram of a Battery eliminator</li> <li>Circuit of Emergency light</li> <li>Circuit diagram of Voltage stabilizers</li> <li>Circuit diagram of Fan regulator</li> </ol> </li> <li><b>Drawing of electronic components - 2D and 3D view</b></li> <li><b>Construction and Verification of Electric circuits using simulation tools.</b></li> </ol> |                              |   |   |   |                          |
|  |                              |   |   |   | <b>TOTAL: 30 PERIODS</b> |
| <b>LIST OF EQUIPMENTS FOR A BATCH OF 30 STUDENTS:</b>  |                              |   |   |   |                          |
| <b>Description of Items</b>  |                              |   |   |   | <b>Quantity</b>          |
| PC Desktop   |                              |   |   |   | 10                       |
| Soldering Iron with accessories  |                              |   |   |   | 10                       |
| AutoCAD software   |                              |   |   |   | 10                       |
| <b>TEXT BOOKS:</b>   |                              |   |   |   |                          |
| <ol style="list-style-type: none"> <li>Prof. Sham Tickoo, "AutoCAD Electrical 2020 for Electrical Control Designers", 11<sup>th</sup> Edition, Tickoo-CADCIM Series, ISBN: 978-1-64057-079-5.</li> <li>Gaurav Verma, Matt Weber, "AutoCAD Electrical 2016 Black Book.</li> </ol>   |                              |   |   |   |                          |

| <b>COURSE OUTCOMES:</b><br>Upon successful completion of the course, students should be able to: |   | <b>RBT Level</b> |
|--|---|------------------|
| <b>CO1</b>   | Perform free-hand sketching of electronic circuits.                     | <b>3</b>         |
| <b>CO2</b>   | Draw the complete circuit with the correct dimensions.                  | <b>4</b>         |
| <b>CO3</b>   | Demonstrate computer-aided drawing for fabricating electronic products. | <b>4</b>         |
| <b>CO4</b>   | Project the 2D and 3D views of electronic components.                   | <b>3</b>         |
| <b>CO5</b>   | Construct the electric circuit using SPICE simulator.                   | <b>4</b>         |

### COURSE ARTICULATION MATRIX

| COs       | POs |   |   |   |   |   |   |   |   |    |    |    | PSOs |    |
|-----------|-----|---|---|---|---|---|---|---|---|----|----|----|------|----|
|           | 1   | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13   | 14 |
| <b>1.</b> | 3   | 1 |   |   |   |   |   |   | 3 |    |    |    | 2    | 1  |
| <b>2.</b> | 3   | 1 |   |   | 3 |   |   |   | 3 |    |    |    | 2    | 3  |
| <b>3.</b> | 3   | 1 |   |   | 3 |   |   |   | 3 |    |    |    | 2    | 3  |
| <b>4.</b> | 3   | 1 |   |   | 3 |   |   |   | 3 |    |    |    | 2    | 3  |
| <b>5.</b> | 3   | 1 |   |   | 3 |   |   |   | 3 |    |    |    | 2    | 3  |



| EC22212   | ELECTRON DEVICES AND ELECTRICAL MACHINES<br>LABORATORY | L | T | P | C   |
|---|--|---|---|---|-----|
|   |  | 0 | 0 | 3 | 1.5 |
| <b>COURSE OBJECTIVES</b>  |  |   |   |   |     |
| <ol style="list-style-type: none"> <li>To be exposed to the characteristics of basic electronic devices.</li> <li>To be exposed to study the behavior of various passive and active electronic components</li> <li>To be familiar with the working of diodes, transistors and their applications.</li> <li>To impart hands on experience on rudimentary engineering practices in Electrical Engineering</li> <li>To understand the Concepts of Solar PV system</li> <li>To familiarize with the operation of DC machines, AC machines and Transformers equip with experimental skills.</li> </ol> |  |   |   |   |     |
| <b>LIST OF EXPERIMENTS:</b>   |  |   |   |   |     |
| <b>ELECTRON DEVICES</b>   |  |   |   |   |     |
| <ol style="list-style-type: none"> <li>VI Characteristics of PN Diode and PN Diode as a Rectifier</li> <li>Reverse Characteristics of Zener Diode and Zener Diode as a Regulator</li> <li>Input-Output Characteristics of BJT in CE configuration</li> <li>Drain and Transfer Characteristics of JFET</li> <li>VI Characteristics of LED and Photo Diode/Photo Transistor</li> <li>VI Characteristics of UJT and SCR</li> </ol>   |  |   |   |   |     |
| <b>ELECTRICAL MACHINES</b>  |  |   |   |   |     |
| <ol style="list-style-type: none"> <li>Residential house wiring using switches, fuse, indicator, lamps and energy meter</li> <li>Load test on single-phase transformer</li> <li>Load test on DC shunt motor</li> <li>Speed Control of DC shunt motor</li> <li>Load test on three phase Induction motor</li> <li>Load test on single phase Induction motor</li> <li>Study of 1kWp Solar PV System with Net meter</li> </ol>  |  |   |   |   |     |
| <b>TOTAL: 45 PERIODS</b>  |  |   |   |   |     |
| <b>LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS: (ELECTRON DEVICES)</b>   |  |   |   |   |     |
|   | <b>Quantity</b>  |   |   |   |     |
| BC107, BC148, 2N2646, BFW10   | Required   |   |   |   |     |
| 1N4007, Zener diodes  | Required   |   |   |   |     |
| Bread Boards  | 15   |   |   |   |     |
| CRO (30MHz)   | 5  |   |   |   |     |
| Function Generators (3MHz)  | 5  |   |   |   |     |
| Multimeter  | 5  |   |   |   |     |
| Dual Regulated Power Supplies (0 – 30)V   | 10   |   |   |   |     |
| Voltmeter and Ammeter   | Required   |   |   |   |     |
| <b>LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS: (ELECTRICAL MACHINES)</b>  |  |   |   |   |     |
|   | <b>Quantity</b>  |   |   |   |     |
| 1. Assorted electrical components for house wiring  | 2 sets   |   |   |   |     |
| 2. 1Kw Solar PV system  | 1  |   |   |   |     |
| 3. DC Shunt Motor - 1.5kW, 220V, 9A, 1500RPM,   | 1  |   |   |   |     |
| 4. DC Shunt Motor with Loading Arrangement- 3.5kW, 220 Volts, 18.6 Amps, 1500 RPM   | 1  |   |   |   |     |
| 5. Single Phase Transformer- 1 KVA, 230/115V, 50Hz  | 2  |   |   |   |     |

|  |          |
|--|----------|
| 6. Three Phase Induction Motor with Loading Arrangement- 3.7kW, 415V, 7.8A, 1430 RPM | 1        |
| 7. Single Phase Induction Motor with Loading Arrangement-1.5kW, 230V,9.9A,1440rpm    | 1        |
| 8. Single Phase Auto Transformer- 4KVA, 0-270V, 50Hz                                 | 2        |
| 9. Three Phase Auto Transformer - 12KVA, 0-415V, 50Hz                                | 2        |
| 10. MC Voltmeter- (0-300)V   | 3        |
| 11. MC Ammeter- (0-10/20)A   | 2        |
| 12. MC Ammeter - (0-1/2)A  | 2        |
| 13. MI Voltmeter - (0-300/600)V  | 5        |
| 14. MI Voltmeter - (0-75/150)V   | 2        |
| 15. MI Ammeter - (0-10)A   | 5        |
| 16. UPF Wattmeter (300/600V, 5/10A)  | 4        |
| 17. Single Phase Resistive Loading Bank- 5 KW)                                       | 2        |
| 18. Rheostats - 50Ω,5A, 700Ω,1.5A,1000Ω,1A)  | Each 2   |
| 19. Single phase Energy meter  | 1        |
| 20. Net meter  | 1        |
| 21. Fuse various ranges as per the requirement                                       | Required |
| 22. Wires As per the requirement   | Required |

**TEXT BOOKS: (Electronics Part)**

1. Jacob Millman & Christos C. Halkias, “Electronic Devices & Circuits”, Fourth Edition, McGraw Hill, 2015.
2. Salivahanan. S, Suresh Kumar. N, Vallavaraj.A, “Electronic Devices and circuits”, Third Edition, Tata McGraw Hill, 2012.

**TEXT BOOKS: (Electricals Part)**

1. Arora, B.D, “HOUSE WIRING” R.B.Publishers (1999).
2. Uppal, S.L; Laroia, J.M “ELECTRICAL WIRING ESTIMATING AND COSTING “ Khanna Publishers (2003).
3. Theraja, B.L; Theraja A.K , “A TEXTBOOK OF ELECTRICAL TECHNOLOGY VOLUME II: AC AND DC MACHINES “ S.Chand publications,(2015).
4. Rai G.D, “Non-conventional Energy Sources”, Khanna Publishers (2014).

| <b>COURSE OUTCOMES:</b>   |  | <b>RBT Level</b> |
|---|--|------------------|
| Upon successful completion of the course, students should be able to: |  |                  |
| <b>CO1</b>  | Learn the characteristics of basic electronic devices.             | <b>2</b>         |
| <b>CO2</b>  | Construct, analyze and troubleshoot the designed circuits.         | <b>4</b>         |
| <b>CO3</b>  | Implement the various wiring methods.                              | <b>4</b>         |
| <b>CO4</b>  | Analyze the behavior of DC machines, AC machines and Transformers. | <b>4</b>         |
| <b>CO5</b>  | Evaluate the performance of Solar PV system.                       | <b>4</b>         |

**COURSE ARTICULATION MATRIX:**

| COs | POs |   |   |   |   |   |   |   |   |    |    |    | PSOs |    |
|-----|-----|---|---|---|---|---|---|---|---|----|----|----|------|----|
|     | 1   | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13   | 14 |
| 1.  | 3   | 2 |   |   | 3 |   |   |   | 3 |    |    |    | 2    | 3  |
| 2.  | 3   | 2 |   |   | 3 |   |   |   | 3 |    |    |    | 2    | 3  |
| 3.  | 3   | 3 |   |   | 3 |   |   |   | 3 |    |    |    | 2    | 3  |
| 4.  | 3   | 3 |   |   | 3 |   |   |   | 3 |    |    |    | 2    | 3  |
| 5.  | 3   | 3 |   |   | 3 |   |   |   | 3 |    |    |    | 2    | 3  |

