**Department of Electrical and Electronics Engineering**

**Minutes of the Meeting of the Board of studies held on 15th February, 2022 at 11.00 A.M.**

**AGENDA**

The Board of studies Meeting is convened to get the approval for the various activities that are carried out through online to engage the students academically.

|  |  |  |
| --- | --- | --- |
| BOS/EEE-A22 | 1 | Welcome address and Opening Remarks by Chairman, Board of studies in the department of Electrical & Electronics Engineering. |
| 2 | Confirmation of the Minutes of the previous meeting of Board of studies in the department of Electrical & Electronics Engineering held on 2Oth January, 2022 and Action taken report of pervious meeting of Board of studies |
| 3 | Business brought forward by the Chairman, Board of studies |
| 1. Approval of A-22 Regulation for B. Tech. (EEE) course structure (from I year to IV year) and proposed syllabus for I year. (Applicable for the batches admitted from 2022-23). |
| 1. Approval of proposed syllabus for service courses offered by EEE Dept. |
| 4 | Suggestions given by the BOS Members |
| 5 | Any other items |

**Department Electrical and Electronics Engineering (EEE)**

F. No. 1-3/SNIST/EEE Dt: 14/02/2022

**Invitation**

**Sub:** Board of studies in Department of Electrical and Electronics Engineering– Reg

Respected Sir/madam,

Hereby, I would like to inform you that Board of studies meeting will be held on 15th February 2022 through online at 11.00 A.M. Your presence is very important.

I appreciate your acknowledgment of my request and that you will accept my invitation.

The following are the details for Zoom meeting:  
Topic: EEE - BoS Meeting  
Time: Feb 15, 2022 11:00 AM India  
Join Zoom Meeting link:  
https://us06web.zoom.us/j/81434215262?pwd=ZUlsRnJua1hsNCtSaE92L28zSU02dz09

(OR)  
Meeting ID: 814 3421 5262  
Pass code: Eee-BOS123

Yours Sincerely



**(Dr.C.Bhargava)**

**MINUTES OF THE MEETING**

The Meeting of the Board of studies of the Electrical and Electronics Engineering (EEE) was held on 15th February 2022 at 11.00 AM through online mode.

**The following members were present:**

|  |  |  |  |
| --- | --- | --- | --- |
| **S.No** | **Name of the Person** | **Position** | **Signature** |
| 1 | Dr. C. Bhargava,  Associate Professor and Head of EEE, SNIST, 966071825  cbhargava@sreenidhi.edu.in | Chairman | C:\Users\Admin\Desktop\BOS-TODAY\Bhargava-15-02-2022-removebg-preview.png |
| 2 | Dr. K. Bhaskar  Associate Professor,  EEE DEPT, JNTUH, CEH,7680001214  kanna.bhaskar@gmail.com | Academic Expert and  JNTU Nominee  Approved by VC | *C:\Users\Admin\Desktop\BOS-TODAY\Bhaskar-removebg-preview.png* |
| 3 | Dr. PVN Prasad,  Professor of EED,  COE, OU, Hyderabad,9490016133  pvnprasad09@gmail.com | Academic Expert and  Member nominated by Academic Counsel | *20171020131203_00001.jpg* |
| 4 | Dr. D.V.S.S .Siva Sarma,  Professor of EEE,  NIT Warangal,9849434415  sivasarma@gmail.com | Academic Expert and  Member nominated by Academic Counsel |  |
| 5 | Dr. BP Muni,  General Manager,  BHEL( R&D), Vikas Nagar, Hyderabad  9985306582,bpmuni@bhel.in | Industry Nominee | *C:\Users\Admin\Desktop\BOS-TODAY\Muni-removebg-preview.png* |
| 6 | M. Uday Shankar,  Principal Manager,  Qualcomm, Bangalore, 9849397140  m\_udayshankar@yahoo.com | Meritorious Alumnus Nominated by the Principal | *C:\Users\Admin\Desktop\BOS-TODAY\Uday-removebg-preview.png* |
| 7 | Dr.K.Sumanth,  Professor, EEE Dept,  SNIST,9948316222  sumanthk@sreenidhi.edu.in | Internal Member | *C:\Users\Admin\Desktop\BOS-TODAY\Sumanth_15-02-2022-removebg-preview.png* |
| 8 | Dr.P. Ravi Babu,  Professor, EEE Dept, SNIST,9542194252  ravibabup@sreenidhi.edu.in | Internal Member | C:\Users\Admin\Desktop\BOS-TODAY\Ravibabu_15-02-2022-removebg-preview.png |
| 9 | Dr. Pratap ShekerPuhan,  Professor, EEE Dept, SNIST,9437615586  pratapsekhar@sreenidhi.edu.in | Internal Member | C:\Users\Admin\Desktop\BOS-TODAY\Dr. Puhan.png |
| 10 | Dr. S. Ravichandran,  Professor, EEE Dept, SNIST,9486318569  ravichandrans@sreenidhi.edu.in | Internal Member | C:\Users\Admin\Desktop\BOS-TODAY\Dr. Ravichandran.png |
| 11 | Mr. Ch.V. Seshagiri Rao,  Assoc. Prof., EEE Dept, SNIST  9502599900  chvseshagiri@sreenidhi.edu.in | Internal Member | C:\Users\Admin\Desktop\BOS-TODAY\Ch. V. Seshagiri.png |

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| --- | --- | --- | --- |
| 12 | Sri. K.V.V.P.Chari,  Assoc. Prof., EEE Dept, SNIST  9000955217  kvvpchari@sreenidhi.edu.in | Internal Member | C:\Users\Admin\Desktop\BOS-TODAY\Chari.png |
| 13 | Mr.S.Ramu,  Assoc. Prof., EEE Dept, SNIST  8142744233  ramus@sreenidhi.edu.in | Internal Member | C:\Users\Admin\Desktop\BOS-TODAY\Ramu.png |
| 14 | Mr.T. Praveen Kumar,  Assoc. Prof., EEE Dept, SNIST  9490748520,praveent@sreenidhi.edu.in | Internal Member | C:\Users\Admin\Desktop\BOS-TODAY\Praveen.png |
| 15 | Dr. MTL Gayatri,  Assoc. Prof., EEE Dept, SNIST  9866038010,mtlgayatri@sreenidhi.edu.in | Internal Member | C:\Users\Admin\Desktop\BOS-TODAY\Dr. MTL.png |
| 16 | Dr. P. Sharath Kumar  Assoc. Prof., EEE Dept, SNIST  8801067027,sharathkumarp@sreenidhi.edu.in | Internal Member | C:\Users\Admin\Desktop\BOS-TODAY\Dr. Sharath.png |
| 17 | Mr.V. Krishna Murthy,  Asst. Prof., EEE Dept, SNIST  9490089385,krishnamurthyv@sreenidhi.edu.in | Internal Member | C:\Users\Admin\Desktop\BOS-TODAY\VKM-removebg-preview.png |
| 18 | Mr.T. Abhiram,  Asst. Prof., EEE Dept, SNIST  9866307221,abhiramt@sreenidhi.edu.in | Internal Member | C:\Users\Admin\Desktop\BOS-TODAY\Abhiram.png |
| 19 | Mr. PVK Sandeep,  Asst. Prof., EEE Dept, SNIST  9032918676,pvksandeep@sreenidhi.edu.in | Internal Member | C:\Users\Admin\Desktop\BOS-TODAY\PVK.png |

**MINUTES / DISCUSSIONS:**

|  |  |
| --- | --- |
| BOS/EEE-A20 | Welcome address and Opening Remarks by Chairman, Board of studies in the department of Electrical & Electronics Engineering |
| The Chairman, BOS of the Electrical & Electronics Engineering welcomed and introduced the members of Board of Studies and thanked each of them for sparing their valuable time to attend the meeting. |
| To confirm Minutes of Previous BOS Meeting Held On 20 th January, 2022. |
| The minutes of the Previous Board of Studies meeting held on 20 th January, 2022 were communicated to the members. The comments received have been incorporated and placed for confirmation. The same was approved by the Previous Academic council. |
| 1. To confirm and approve the syllabus of new courses in EEE Electrical and Electronics engineering programme under regulation A-22 (applicable for the batches admitted from 2022-23). |
| 1. Resolved to approve the syllabus of new courses in E.E.E Electrical & Electronics Engineering Programme under Regulation A-22 (Applicable for the batches admitted from 2022-23). |
| 1. To confirm and approve syllabus for service courses offered by EEE |
| 1. Resolved to approve syllabus for service courses offered by EEE dept |
|  | **Suggestions given by the Members**   1. Current BOS meeting is held to discuss the Model curriculum (A-22) of Course structure of each course for four years and the syllabus of the first year. 2. In MPMC subject of III-II Sem, Embedded Systems syllabus is suggested to be included and subject is also to be renamed. 3. Measurements and Instrumentation subject as well as lab are required to be shifted to II year from III year. 4. Grading without credits for mandatory courses like Cyber security & AI is to be justified. 5. Minor and Major courses are to be identified and specified in the syllabus at the beginning of the course so that student can opt for specializations along with Core branch. |

On the whole, the members had a brainstorming discussion and interaction among themselves, after which, fruitful suggestions have been given and were incorporated appropriately in the Curriculum and Syllabi. Based on the suggestions given by the members, BOS resolved to recommend the following to the Academic Council for further approval.

1. Syllabus of new courses in B.Tech E.E.E Electrical & Electronics Engineering Programme under Regulation A-22 (Applicable for the batches admitted from 2022-23).
2. Syllabus for service courses offered by EEE Dept.

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**Chairman BOS and HOD-EEE**

**COURSE STRUCTURE**

**B.Tech Four Year Degree Course - (A-22 – Regulation)**

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**Program objective:**

B. Tech in Electrical and Electronics Engineering program emphasizes the fundamentals of electrical & electronics in daily life.

The first two years of this program begins with a set of introductory courses, like Mathematics, physics, English, computer languages (C, C++), circuits and networks, DC machines and introduction to power systems which provide students with a firm foundation in mathematics, Electrical, as well as communication skills. These courses include weekly labs in which students use state-of-the art techniques and equipments to create solutions to interesting problems.

The last two years of study focuses on the concepts and techniques used in the design and development of advanced systems in electrical and electronics. In addition, students choose from a rich set of electives, which covers skills in demand. These advanced courses give broad opening for research and help them to choose specialization in their higher studies. A generous allotment of open electives allows students to learn foreign languages like French, German, Spanish; and it includes computing with a business focus.

Students in this program pursue an inter-disciplinary course of study that combines strong foundation in electrical and electronics with a focus on interdisciplinary areas. This program is designed for students who seek to blend their abilities with skills in demand and skills specific to another domain to solve problems in that domain.

Having completed this course, a student is prepared to work independently within a well structured design frame work in the job and for higher studies.

**VISION**

To emerge as a leading Electrical and Electronics Engineering Department in Technical Education and Research in India with focus to produce professionally competent and socially sensitive engineers capable of working in multidisciplinary global environment.

**MISSION**

1. To empower the students and provide the academic environment to pursue and attain competencies in their studies at undergraduate, post graduate level in Electrical & Electronics Engineering.
2. To develop liaison with academia, R&D institutions and electrical industry for hands-on training which enable the students to design and produce novel products for better society.
3. To inculcate interpersonal skills, team work, leadership qualities and professional ethics in students.
4. To enable the students to pursue higher studies and conduct research which will help them in developing the qualities for life-long learning and for a successful professional career.

**Program Educational Objectives of B. Tech**

**(Electrical and Electronics Engineering)**

**PEO-I**: To empower the students by providing necessary knowledge, critical thinking and problem solving capabilities in the field of Electrical and Electronics Engineering so that they can excel in their profession, in industry, higher studies and Research & Development.

**PEO-II**: To develop competencies in core and allied fields, so as to conduct experiments, comprehend, analyze, design and apply appropriate techniques / tools to arrive at optimal solutions to face real time challenges.

**PEO-III:** To inculcate the sense of responsibility towards ethics, Intellectual Property rights, good communication skills and entrepreneurship with adequate knowledge of project / finance management skills for betterment of society at large.

**PEO-IV:** To motivate the students to be academically excellent and also to be sensitive to Professional ethics, to acquire leadership skills and to be life-long learners for a successful professional career.

**Program Outcomes of EEE Department**

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 analyze 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 modeling 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 (PSO)**

1. Able to demonstrate the applications of knowledge gained into the recent technologies in the areas of Power systems, Power electronics and allied fields.
2. Recognize the need of self learning and ability to get into the advanced fields such as renewable energy systems and smart grids.

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**COURSE COMPONENT WISE CREDIT DISTRIBUTION**

**(SNIST-A22 Regulation Vs AICTE Model Curriculum)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S.No** | **Component** | **AICTE Credits** | **SNIST Credits(A-20)** | **SNIST Credits(A-22)** |
| 1 | HSM | 12 | 13 | 12.5 |
| 2 | BS | 26 | 30 | 25.5 |
| 3 | ES | 20 | 25 | 18.5 |
| 4 | PC | 53 | 61 | 67.5 |
| 5 | PE | 18 | 15 | 15 |
| 6 | OE | 18 | 6 | 9 |
| 7 | PSI | 11 | 14 | 12 |
| 8 | MC | Non-Credit | Non-Credit | Non-Credit |
| **TOTAL CREDITS** | | **158** | **164** | **160** |

**EEE DEPT SEMESTER WISE CREDIT DISTRIBUTION**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| S.No | Dept | I/1 | I/2 | II/1 | II/2 | III/1 | III/2 | IV/1 | IV/2 |
| 1 | EEE | 18 | 19 | 25 | 19 | 20 | 22 | 18 | 19 |
|  | Total | 37 | | 44 | | 42 | | 37 | |

|  |
| --- |
| Note: All End Examinations (Theory and Practical) are of Three hours duration. |
| **T – Tutorial L - Theory P/D – Practical/Drawing** |
| **C - Credits Int. - Internal Exam Ext. - External Exam** |
| **Course code Definitions** |
| BS- Basic Science Courses |
| ES- Engineering Science Courses |
| HS- Humanities and Social Sciences including Management courses |
| PC-EEE Professional core courses |
| PE -EEE Professional Elective courses |
| OE-EEE Open Elective courses |
| PS- Summer Industry Internship, Projects, Comprehensive Viva Voce, Technical Seminars. |

**B.TECH IN ELECTRICAL AND ELECTRONICS ENGINEERING (EEE)**

**Course structure for B. Tech I Year I Semester EEE (2022-23)**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Sl.No** | **Course Category** | **Dept Course** | **Course code** | **Name of the Course** | **L** | **T** | **P** | **C** | **CIE** | **SEE** |
| 1. | BS | S&H | 9HC07 | Engineering Physics | 2 | 1 | 0 | 3 | 40 | 60 |
| 2. | ES | IT | 9FC01 | Problem Solving using C | 3 | 0 | 0 | 3 | 40 | 60 |
| 3. | BS | S&H | 9HC11 | Matrix Algebra and Calculus | 2 | 1 | 0 | 3 | 40 | 60 |
| 4. | HSM | S&H | 9HC01 | Essential English Language Skills | 2 | 0 | 0 | 2 | 40 | 60 |
| 5 | BS | S&H | 9HC66 | Engineering Physics Lab | 0 | 0 | 3 | 1.5 | 40 | 60 |
| 6 | ES | IT | 9FC61 | Problem Solving using C Lab | 0 | 0 | 3 | 1.5 | 40 | 60 |
| 7 | HSM | S&H | 9HC61 | Oral Communication Lab – I | 0 | 0 | 2 | 1 | 40 | 60 |
| 8 | ES | MECH | 9BC01 | Engineering Graphics | 1 | 0 | 4 | 3 | 40 | 60 |
| 9 | HSM | S&H |  | Induction Program | 0 | 0 | 0 | 0 | 0 | 0 |
|  |  |  |  | Total | 12 | 4 | 10 | 18 | 320 | 480 |

**Course structure for B.Tech I Year II Semester EEE**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Sl.No** | **Course Category** | **Dept Course** | **Course Code** | **Name of the Course** | **L** | **T** | **P** | **C** | **CIE** | **SEE** |
| 1. | BS | S&H | 9HC04 | Engineering Chemistry | 2 | 1 | 0 | 3 | 40 | 60 |
| 2. | PC | EEE | 9A201 | Electrical Circuits and Networks-I | 2 | 1 | 0 | 3 | 40 | 60 |
| 3. | BS | S&H | 9HC12 | Advanced Calculus | 2 | 1 | 0 | 3 | 40 | 60 |
| 4. | ES | CSE | 9EC01 | Data Structures | 3 | 0 | 0 | 3 | 40 | 60 |
| 5 | BS | S&H | 9HC64 | Engineering Chemistry Lab | 0 | 0 | 3 | 1.5 | 40 | 60 |
| 6 | HSM | S&H | 9HC62 | Oral communication Lab - II | 0 | 0 | 3 | 1.5 | 40 | 60 |
| 7 | ES | CSE | 9EC61 | Data Structures using C Lab | 0 | 0 | 3 | 1.5 | 40 | 60 |
| 8 | ES | S&H | 9BC61 | Workshop/Manufacturing Processes Lab | 0 | 1 | 3 | 2.5 | 40 | 60 |
| Total | | | | | 15 | 3 |  | 19 | 320 | 480 |

**II Year – I Semester**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **S. No** | **Course Category** | **Dept Course** | **Subject Code** | **Subject** | **L** | **T** | **P/D** | **C** | **CIE** | **SEE** |
| 1 | BS | S&H | 9HC14 | Complex Variables and Transform Techniques | 2 | 1 | 0 | 3 | 40 | 60 |
| 2 | PC | ECE | 9CC05 | Digital Logic Design | 3 | 0 | 0 | 3 | 40 | 60 |
| 3 | PC | ECE | 9CC01 | Electronic Devices and Circuits | 3 | 0 | 0 | 3 | 40 | 60 |
| **4** | PC | EEE | 9A312 | Measurements & Instrumentation | 2 | 0 | 0 | 2 | 40 | 60 |
| 5 | PC | EEE | 9A302 | Electro Magnetic Fields | 2 | 0 | 0 | 2 | 40 | 60 |
| 6 | PC | EEE | 9A303 | Electrical Machines – I | 2 | 0 | 0 | 2 | 40 | 60 |
| 7 | PC | EEE | 9A304 | Electrical Circuits & Networks – II | 2 | 0 | 0 | 2 | 40 | 60 |
| 8 | HSM | MBA | 9ZC01 | Business Economics and Financial Analysis | 3 | 0 | 0 | 3 | 40 | 60 |
| 9 | HSM | S&H | 9HC63 | Soft Skills Lab | 0 | 1 | 2 | 2 | 40 | 60 |
| 10 | PC | ECE | 9CC71 | Electronic Devices and Circuits Lab | 0 | 0 | 3 | 1.5 | 40 | 60 |
| 11 | PC | EEE | 9A371 | Electrical Circuits and Networks Analysis Lab | 0 | 0 | 3 | 1.5 | 40 | 60 |
|  | |  | **Total** | |  |  |  | **25** | **440** | **660** |

**II Year – II Semester**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **S. No.** | **Course Category** | **Dept Course** | **Subject Code** | **Subject** | **L** | **T** | **P/D** | **C** | **CIE** | **SEE** |
| 1 | BS | S&H | 9HC15 | Probability and Statistics | 2 | 1 | 0 | 3 | 40 | 60 |
| 2 | BS | S&H | 9HC16 | Quantitative Aptitude and Logical Reasoning | 3 | 0 | 0 | 3 | 40 | 60 |
| 3 | PC | EEE | 9A405 | Electrical Machines – II | 2 | 0 | 0 | 2 | 40 | 60 |
| 4 | HS | S&H | 9HC05 | Environmental Science | 3 | 0 | 0 | 0 | PASS/FAIL | |
| 5 | PC | EEE | 9A406 | Power System – I | 2 | 0 | 0 | 2 | 40 | 60 |
| 6 | PC | EEE | 9AC07 | Linear Control Systems | 2 | 0 | 0 | 2 | 40 | 60 |
| 7 | PC | ECE | 9CC04 | Analog Circuits | 3 | 0 | 0 | 3 | 40 | 60 |
| **8** | PC | EEE | 9A473 | Electrical Machines Lab – I | 0 | 0 | 3 | 1.5 | 40 | 60 |
| 9 | PC | EEE | 9A482 | Measurements & Instrumentation Lab | 0 | 0 | 3 | 1.5 | 40 | 60 |
| 10 | PC | EEE | 9A491 | Technical Seminar | 0 | 1 | 0 | 1 | **100** | **--** |
|  |  |  |  | Summer Industry Internship-I is to be carried out during the summer vacation between 4th and 5th semesters |  |  |  |  |  |  |
|  | **Total** | | | |  |  |  | **19** | **420** | **480** |

**III Year – I Semester**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **S. No** | **Course Category** | **Dept Course** | **Subject Code** | **Subject** | **L** | **T** | **P/D** | **C** | **CIE** | **SEE** |
| 1 | PC | ECE | 9CC09 | IC Applications | 3 | 0 | 0 | 3 | 40 | 60 |
| 2 | PC | EEE | 9A508 | Electrical Machines – III | 3 | 0 | 0 | 3 | 40 | 60 |
| 3 | PC | EEE | 9A509 | Power Electronics | 3 | 0 | 0 | 3 | 40 | 60 |
| 4 | PC | EEE | 9A510 | Power Systems – II | 3 | 0 | 0 | 3 | 40 | 60 |
| **5** | PE |  |  | Professional Elective – I | 3 | 0 | 0 | 3 | 40 | 60 |
| 6 | ES | CSE | 9EC22 | Python Programming concepts | 2 | 0 | 0 | 2 | 40 | 60 |
| 7 | MC | EEE | 9FC24 | Cyber Security | 2 | 0 | 0 | 0 | PASS/FAIL | |
| 8 | PC | EEE | 9A575 | Linear Control Systems and Simulation Lab | 0 | 0 | 3 | 1.5 | 40 | 60 |
| 9 | PC | ECE | 9CC72 | Analog Circuits Lab | 0 | 0 | 3 | 1.5 | 40 | 60 |
| 10 | PSI | EEE | 9A586 | Summer Industry Internship-I | 0 | 0 | 2 | 1 | 40 | 60 |
|  | **Total** | | | | **18** | **3** | **6** | **20** | **360** | **540** |

**Professional Elective –I**

|  |  |  |
| --- | --- | --- |
| **Subject Code** | **Name of the subject** | **Stream** |
| 9CC02 | Signals and Systems | Electronics |
| 9A725 | Advanced Control Systems | Control Systems |
| 9A731 | Smart Grid | Power Systems |
| 9A734 | HVDC and FACTS | Power Electronics |

**III Year – II Semester**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **S. No** | **Course Category** | **Dept Course** | **Subject Code** | **Subject** | **L** | **T** | **P/D** | **C** | **CIE** | **SEE** |
| 1 | PC | ECM | 9DC05 | Microprocessors and Microcontrollers | 3 | 0 | 0 | 3 | 40 | 60 |
| 2 | PC | EEE | 9A611 | Switch Gear and Protection | 3 | 1 | 0 | 4 | 40 | 60 |
| 3 | HSM | S&H | 9HC03 | Universal Human Values | 3 | 0 | 0 | 3 | 40 | 60 |
| 4 | ES | MECH |  | Elements of Mechanical Engineering | 2 | 0 | 0 | 2 | 40 | 60 |
| 5 | OE |  |  | Open Elective – I | 3 | 0 | 0 | 3 | 40 | 60 |
| 6 | PE |  |  | Professional Elective – II | 3 | 0 | 0 | 3 | 40 | 60 |
| 7 | MC | EEE | 9E645 | Artificial Intelligence | 2 | 0 | 0 | 0 | PASS/FAIL | |
| 8 | PC | EEE | 9A677 | Electrical Machines Lab – II | 0 | 0 | 3 | 1.5 | 40 | 60 |
| 9 | PC | ECE | 9CC76 | IC Applications Lab | 0 | 0 | 3 | 1.5 | 40 | 60 |
| 10 | PC | EEE | 9A686 | Comprehensive Viva Voce | 0 | 1 | 0 | 1 | 40 | 60 |
|  |  |  |  | Summer Industry Internship-I is to be carried out during the summer vacation between 6th and 7th semesters |  |  |  |  |  |  |
|  | **Total** | | | | **16** | **2** | **6** | **22** | **360** | **540** |

**Open Elective – I**

|  |  |  |
| --- | --- | --- |
| **Subject Code** | **Name of the subject** | **Stream** |
| 9ec42 | Programming in Java | Computer |
| 9ZC22 | Basics of Entrepreneurship | Entrepreneurship |
| 9ZC05 | Banking Operations, Insurance and Risk Management | Finance |
| 9ZC25 | Basics of Indian Economy | Social Sciences |
| 9ZC08 | Design literacy and Design Thinking | Innovation and Design Thinking |

**Professional Elective –II**

|  |  |  |
| --- | --- | --- |
| **Subject Code** | **Name of the subject** | **Stream** |
| 9A715 | Renewable Energy Sources | Power Systems |
| 9CC08 | Digital Signal Processing | Electronics |
| 9A724 | Digital Control Systems | Control Systems |
| 9A737 | Advanced Power Electronics | Power Electronics |

**IV Year – I Semester**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| S.No | **Course Category** | **Dept Course** | **Subject Code** | **Subject** | L | T | P/D | C | **CIE** | **SEE** |
| 1 | PC | EEE | 9A714 | Power Systems Analysis and Control | 3 | 0 | 1 | 3.5 | 40 | 60 |
| 2 | PC | EEE | 9A716 | Drives & Utilization of Electrical Energy | 3 | 0 | 0 | 3 | 40 | 60 |
| 3 | PE | EEE |  | Professional Elective -III | 3 | 0 | 0 | 3 | 40 | 60 |
| 4 | OE |  |  | Open Elective – II | 3 | 0 | 0 | 3 | 40 | 60 |
| 5 | PSI | EEE | 9A787 | Summer Industry Internship-II | 0 | 0 | 2 | 1 | 40 | 60 |
| 6 | PC | EEE | 9A781 | Electrical workshop | 0 | 0 | 3 | 1.5 | 40 | 60 |
| 7 | PC | EEE | 9A678 | Power Electronics & Simulation Lab | 0 | 0 | 3 | 1.5 | 40 | 60 |
| 8 | PC | ECM | 9DC71 | Microprocessors and Microcontrollers Lab | 0 | 0 | 3 | 1.5 | 40 | 60 |
|  | **Total** | | | | **17** | **0** | **6** | **18** | **320** | **480** |

**Professional Elective – III**

|  |  |  |
| --- | --- | --- |
| **Subject Code** | **Name of the subject** | **Stream** |
| 9A729 | Power System Deregulation | Power Systems |
| 9A735 | Electric and Hybrid Vehicles | Power Electronics |
| 9A739 | Optimal Control Systems | Control Systems |
|  | Communication Theory | Electronics |

**Open Elective – II**

|  |  |  |
| --- | --- | --- |
| **Subject Code** | **Name of the subject** | **Stream** |
|  | Operating System Concepts | Computer |
| 9ZC23 | Advanced Entrepreneurship | Entrepreneurship |
| 9ZC19 | Entrepreneurship Project Management and Structured Finance | Finance |
| 9ZC26 | Basics of Polity | Social Sciences |
| 9ZC09 | Co-Creation and Product Design | Innovation and Design Thinking |
| \* SWAYAM MOOCS Course: The department will identify the MOOCS Course from the available courses in SWAYAM portal for the semester | | |

**IV Year – II Semester**

|  |  |  |  |  |  |  |  |  |  |  |
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| **S.**  **No.** | **Course Category** | **Dept Course** | **Subject**  **Code** | **Subject** | **L** | **T** | **P/D** | **C** | **CIE** | **SEE** |
| **1** | PE | EEE |  | Professional Elective – IV | 3 | 0 | 0 | 3 | 40 | 60 |
| **2** | PE | EEE |  | Professional Elective – V | 3 | 0 | 0 | 3 | 40 | 60 |
| **3** | OE |  |  | Open Elective - III | 3 |  |  | 3 | 40 | 60 |
| 4 | PSI | EEE |  | Project | 0 | 0 | 20 | 10 | 40 | 60 |
|  | **Total** | | | |  | **0** | **10** | **19** | **160** | **240** |

**Professional Elective – IV**

|  |  |  |
| --- | --- | --- |
| **Subject Code** | **Name of the subject** | **Stream** |
| 9A728 | Power Quality | Power Electronics |
| 9A817 | High Voltage Engineering | Power Systems |
| 9A827 | Reactive Power Control & Management | Control Systems |
|  | Fundamentals of VLSI and Embedded Systems | Electronics |

**Professional Elective – V**

|  |  |  |
| --- | --- | --- |
| **Subject Code** | **Name of the subject** | **Stream** |
| 9A820 | Electrical Distribution Systems | Power Systems |
| 9A826 | Programmable Logic Controllers | Control Systems |
| 9A833 | Switched Mode Power Conversion | Power Electronics |
|  | Artificial Neural Networks | Electronics |

**Open Elective – III**

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| --- | --- | --- |
| **Subject Code** | **Name of the subject** | **Stream** |
|  | Computer Networks | Computer |
| 9ZC24 | Product and Services | Entrepreneurship |
| 9ZC15 | Financial Institutions, Markets and Services | Finance |
| 9ZC27 | Indian History, Culture and Geography | Social Sciences |
| 9ZC10 | Entrepreneurship & Business Design | Innovation and Design Thinking |

**L - Lectures; T - Tutorial; P/D - Practical / Drawing; C – Credit**

Note: All End Examinations (Theory and Practical) are of **Three** hours duration.

**B. Tech EEE A22 REGULATION ELECTIVE STREAMS**

**PROFESSIONAL ELECTIVE STREAMS**

|  |  |  |  |
| --- | --- | --- | --- |
| **L** | **T** | **P/D** | **C** |
| **3** | **0** | **0** | **3** |

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| **Professional Elective Streams** | **Professional Elective – I**  **(3-1)** | **Professional Elective – II**  **(3-2)** | **Professional Elective – III**  **(4-1)** | **Professional Elective – IV**  **(4-2)** | **Professional Elective – V**  **(4-2)** |
| **Power Systems** | Utilization of Electrical Energy | Renewable Energy Sources | Power System Deregulation | High Voltage Engineering | Electrical Distribution Systems |
| **Power Electronics** | HVDC and FACTS | Advanced Power Electronics | Power Semi-Conductor Drives | Electrical and Hybrid Vehicles | Switched Mode Power Conversion |
| **Control Systems** | Advanced Control Systems | Digital Control Systems | Optimal Control Systems | Reactive Power Control and Management | Programmable Logic Controllers |
| **Electronics** | Signals and Systems | Digital Signal Processing | Communication Theory | Fundamentals of VLSI and Embedded Systems | Artificial Neural Networks |

**OPEN ELECTIVES STREAMS**

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| --- | --- | --- | --- |
| **L** | **T** | **P/D** | **C** |
| **3** | **0** | **0** | **3** |

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| **Open Elective Streams** | **Open Elective (OE)** | | | | | |
| **Code** | **OE – I (3-2)** | **Code** | **OE – II (4-1)** | **Code** | **OE – III (4-2)** |
| **Computer** |  | Programming in Java |  | Operating System Concepts |  | Computer Networks |
| **Entrepreneurship Stream** | 8ZC22 | Basics of Entrepreneurship | 8ZC23 | Advanced Entrepreneur ship | 8ZC24 | Product and Services |
| **Social Sciences Stream** | 8ZC25 | Basics of Indian Economy | 8ZC26 | Basics of Polity and Ecology | 8ZC27 | Indian History, Culture and Geography. |
| **Finance Stream** | 8ZC05 | Banking Operations, Insurance and Risk Management | 8ZC19 | Entrepreneur ship Project Management and Structured Finance | 8ZC15 | Financial Institutions, Markets and Services |
| **Innovation and Design Thinking** |  | Design Literacy and Design Thinking |  | Co-Creation and Product Design |  | Entrepreneurs hip & Business Design |

**SWAYAM MOOCS Courses:**

The department will identify the MOOCS Course from the available courses in SWAYAM portal for the semester

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| **Syllabus for B. Tech (E.E.E.) – A22 regulation** | | | | | | |
| **Year/Sem** | **Sub. Code** | **Subject Name** | **L** | **T** | **P** | **C** |
| I – I | **9HC07** | Engineering Physics | 2 | 1 | 0 | 3 |

**Course Objectives**

* Explain about the Quantum Mechanics to understand wave particle duality, necessity of quantum mechanics to explore the behavior of sub atomic particles. Schroedinger’s Time Independent Wave Equation, Physical Significance of the Wave Function – Application of Schroedinger wave equation.
* To understand the basic concepts of normal light, Laser and its applications and to know about the fiber optics, principle (TIR), Numerical Aperture, Types of optical Fibers, Step index and graded index Fibers, attenuation in optical fibers. Applications: optical fiber communication system, fiber optic sensors, medical endoscopy.
* To study the concepts of magnetism and superconductivity, Bohr magneton, Hysteresis nature, domain structure, Meissner effect, types of superconductors, BCS theory and applications of superconductors.
* To understand the concepts of dielectrics, polarizations and its types, internal fields, Clausius-Mossitti equation, Frequency and temperature effect on dielectrics and its applications – Piezo-electricity, Pyro-electricity and ferro-electricity.
* To know about the semiconductors, types, carrier concentration, Thermistor, Hall effect and also to understand the concept of   
  PN-junction, I-V Characteristics, LED, Solar Cell and Photo diode.
* To discuss about the nano-technology, preparation techniques and characterization (XRD, SEM & TEM), CNTs and to know about the fundamentals of radioactivity and its applications.

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| **CO** | **Engineering Physics (8HC07)** | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
| CO1 | Explain semiconductor behavior, types and their applications | 3 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| CO2 | Differentiate the wave and particle, and its application for a particle in one dimension box | 2 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| CO3 | Explain about emission, its types, laser principle and applications of optical fibers (sensors and medical endoscopy) | 3 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| CO4 | Reveals about the magnetism-its origin and types and its applications | 3 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| CO5 | Explain the basic concepts of dielectric materials, polarization and its types, their applications (piezo, ferro and Pyro electricity). | 1 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| CO6 | Summarize nano& bulk concepts, surface to volume ratio and its applications. | 2 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| CO | | 2 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

**Unit:1**

**Wave nature of particles, Schroedinger equation and its application**

Waves and Particles, de Broglie Hypothesis, Matter waves, Davisson and Germer’s Experiment, G.P. Thomson Experiment, Heisenberg’s Uncertainty Principle, Schroedinger’s Time Independent Wave Equation – Physical Significance of the Wave Function – Application of Schroedinger wave equation - Particle in One Dimensional Potential Box.

**Unit:2**

**Lasers**

Characteristics of LASER, Spontaneous and Stimulated Emission of Radiation, Meta-stable State, Population Inversion, Lasing Action, Einstein’s Coefficients and Relation between them and significance, Ruby Laser, Helium-Neon Laser, Semiconductor Diode Laser, Applications of Lasers in engineering and medicine.

**Fiber optics**

Introduction, Principle of Optical Fiber, Acceptance Angle and Acceptance Cone, Numerical Aperture, Types of Optical Fibers, Step index and graded index Fibers Attenuation in Optical Fibers. Applications: Optical Fiber communication system, Fiber Optic Sensors, Medical Endoscopy.

**Unit:3**

**Magnetic and Superconducting materials**

Permeability, Field Intensity, Magnetic Induction, Magnetization, Magnetic Susceptibility, Origin of Magnetic Moment, Bohr Magneton.Hysteresisbehavior of Ferro Magnetic materials based on Domain theory. Hard and Soft Magnetic Materials, Properties of Anti-Ferro and Ferri Magnetic Materials and their applications, **Super conductivity**, effect of Magnetic Field, Critical current density, Meissner effect, Type-I and Type-II superconductors, BCS theory, applications of superconductors.

**Unit:4**

**Dielectric materials and their properties**

Electric Dipole, Dipole Moment, Dielectric Constant, Electric Susceptibility, Electronic and Ionic polarizability (Quantitative) Orientation Polarization (Qualitative), Internal fields in Solids, Clausius - Mossotti equation, Frequency and temperature effect on Dielectrics (Qualitative), Applications - Piezo-electricity, Pyro-electricity and Ferro-electricity.

**Unit:5**

**Semiconductors**

Fermi Level in Intrinsic and Extrinsic Semiconductors, calculation of carrier concentration of Intrinsic Semiconductors (quantitatively) and Extrinsic Semiconductors (qualitatively), Direct & Indirect Band Gap Semiconductors, Thermistor, Hall Effect in semiconductors and applications.

**Semiconductor devices**

Formation of a PN Junction and working of a PN Junction, Energy band Diagram of a open circuited PN Diode, I-V Characteristics of PN Junction, Application - LED, Solar Cell and Photo diode.

**Unit:6**

**Nanotechnology**

Origin of Nanotechnology, Nano Scale, Surface to Volume Ratio, Quantum Confinement, Bottom-up Fabrication, Sol-gel, Precipitation, Chemical vapor Deposition(CVD); Top-down Fabrication; Thermal evaporation, Ball Milling, Characterization of Nano materials (XRD&TEM), carbon nano tubes(CNTs), Applications of Nano Materials.

**Nuclear Energy:** Radioactivity, Nuclear binding energy, Nuclear fission, Nuclear fusion, , β, γ rays decay, Geiger-Muller counter and practical applications of nuclear physics.

**Text Books:**

1. B.K. Pandey& S. Chaturvedi Engineering Physics, Cengage Learning

**Reference Books:**

1. P K Palanisamy, Engineering Physics, Sitech Publications

2. Charles Kittel, Introduction to Solid State Physics, John Wiley Publisher

3. A.S. Vasudeva , Modern engineering Physics, S Chand

4. Dekker, Solid State Physics

5. Dr.M.N. Avadhanulu, Engineering Physics, S Chand

6. Dekker, Solid State Physics

7. Halliday and Resnick, Physics

8. S.O. Pillai, Solid State Physics

9. A. Ghatak - Optics

**Course Outcomes**

After completing the course, students are able to

* Differentiate the wave and particle, de-Broglie matter waves-its experimental evidence, Schroedinger’s wave concept and its application for a particle in one dimension box.
* Explain about emission, its types, laser principle, types, working and its applications and to reveals about TIR principle, optical fiber-types and signal propagation, attenuation, communication system and applications of optical fibers (sensors and medical endoscopy)
* Reveals about the magnetism-its origin and types, Hysteresis, domain theory, Anti-ferro and ferri-magnetism, Superconductivity, experimental facts, theoretical analysis, types of superconductors and its applications.
* Explain the basic concepts of dielectric materials, polarization and its types, local fields, frequency and temperature effect on dielectrics and their applications (piezo, ferro and Pyro electricity).
* Explain semiconductor behavior, types, carrier concentration, Hall effect, Thermistor, demonstrate and analyze semiconductor devices like a PN-junction, I-V characteristics, LED, solar cell, photo diode and their applications.
* Summarize nano& bulk concepts, surface to volume ratio, quantum confinement, CNTs and preparation methods (physical & chemical), analysis the techniques like XRD, SEM, TEM and also to understand the radioactivity, fusion & fission, alpha, beta and gamma rays decay and its applications.

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| **Syllabus for B. Tech (E.E.E.) – A22 regulation** | | | | | | |
| **Year/Sem** | **Sub. Code** | **Subject Name** | **L** | **T** | **P** | **C** |
| I – I | **9FC01** | Problem Solving using C  (Common to All Branches) | 3 | 0 | 0 | 3 |

**Course Objectives**

* To acquire problem solving skills
* To be able to develop flowcharts
* To understand structured programming concepts
* To be able to write programs in C Language

**Course Outcomes:**

**After completion of this course student will learn**

1. To formulate simple algorithms for arithmetic, logical problems and to translate the algorithms to programs(in C language)
2. To test and execute the programs and correct syntax and logical errors, to implement conditional branching, iteration and recursion
3. To decompose a problem into functions and synthesize a complete program using divide and conquer approach.
4. To use arrays, pointers and structures to formulate algorithms and programs.
5. To apply programming to solve matrix addition and multiplication problems and searching and sorting problems.
6. To apply programming to solve simple numerical method problems, namely rot finding of function, differentiation of function and simple integration.

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| **CO** | **PROBLEM SOLVING USING C(8FC01)** | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
| CO1 | Explain basic fundamentals of Computer Systems, computing environments, Computer Languages – Machine Languages | 1 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| CO2 | Describe C language Programs, Structure of a C Program | 1 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| CO3 | Describe write programs using control structures such as Pre-test and post-test loops, while, do while, for, break | 2 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| CO4 | Write programs implementing application on arrays | 2 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| CO5 | Write programs using Pointers and string handling functions | 2 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| CO6 | Write programs using Enumerated, Structure, Union types and files. | 2 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| CO | | 2 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

**UNIT I**

**Introduction to Programming:** Introduction to components of a computer system (disks, memory, processor, where a program is stored and executed, operating system, compilers etc.)

**Idea of Algorithm:** steps to solve logical and numerical problems. Representation of Algorithm: Flowchart/Pseudocode with examples.

From algorithms to programs; source code, variables (with data types) variables and memory locations, Syntax and Logical Errors in compilation, object and executable code

**UNIT II**

**History of C language, Characteristics of C language, Structure of C Language, C Tokens**

Arithmetic expressions, Operator Precedence &**Associativity**Conditional Branching and Loops

Writing and evaluation of conditionals and consequent branching and **Jumping Constructs**

**Pretest and Post test**, Iteration and loops (3 lectures)

**UNIT III**

**Function:** Functions (including using built in libraries), Parameter passing in functions, call by value, passing arrays to functions: idea of call by reference, **Storage Classes**

**Recursion:** Recursion, as a different way of solving problems. Example programs, such as Finding Factorial, Fibonacci series, Ackerman function etc.

***Macros*** – Definition, comparison with functions.

**UNIT IV**

**Arrays:** Arrays (1-D, 2-D), Character arrays **Ragged Arrays and Dynamic Arrays**

Basic Algorithms Searching, Basic Sorting Algorithms (Bubble, Insertion and Selection), Finding roots of equations, notion of order of complexity through example programs (no formal definition required) Quick sort or Merge sort.

**UNIT V**

Pointers Idea of pointers, Defining pointers, Use of Pointers in self-referential structures, notation of linked list (no implementation) **Dynamic Memory allocation Functions**.

**Strings: String Handling Functions.**

**UNIT IV**

Structure: Structures, Defining structures and Array of Structures,

**Nested Structures enum, typedef**

File handling (only if time is available, otherwise should be done as part of the lab)

**File Handling Functions, File Modes, File Operations**

**Suggested Text Books**

1. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill
2. E. Balaguruswamy, Programming in ANSI C, Tata McGraw-Hill Suggested

**Reference Books**

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India

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| **Syllabus for B. Tech (E.E.E.) – A22 regulation** | | | | | | |
| **Year/Sem** | **Sub. Code** | **Subject Name** | **L** | **T** | **P** | **C** |
| I – I | **9HC11** | MATRIX ALGEBRA AND CALCULUS  (Common to All Branches) | 2 | 1 | 0 | 3 |

**Pre Requisites**: Mathematics Knowledge at Pre-University Level

***Course Objectives:*** *To make the students to understand and expected to learn*

1. *Basic operation of matrices and about the linear system and some analytical methods for solution.*
2. *Concept of Eigen value and Eigen vector and their properties and applications.*
3. *Quadratic form and its properties.*
4. *Mean value theorems and their applications to the given functions, series expansions of a function.*
5. *Various analytical methods to solve first order first degree and also the equations not of first degree ordinary differential equations.*
6. *Methods to solve higher order ordinary differential equations.*

***Syllabus***

***UNIT-I: System of Linear Equations:*** Elementary row/column operations -Echelon form, Rank of a matrix, Inverse of a matrix by Gauss Jordan method. Non-Homogenous and Homogenous system of linear equations- consistency or inconsistency of a system, Gauss Elimination method, Rank method and problems.Symmetric, Skew-symmetric and Orthogonal matrices.

***UNIT-II: Eigen values and Eigen vectors:*** Definitions and Properties (without proofs). Evaluation ofEigen values and Eigenvectors for a given matrix.Cayley-Hamilton Theorem (without proof) and its applications in finding higher powers & inverse of a matrix, Diagonalization of a matrix.Hermitian, Skew-Hermitian and Unitary matrices.

***UNIT-III Quadratic forms:*** Quadratic forms, Nature, rank, index and signature of a quadratic form.Reduction of quadratic form to canonical form.

***UNIT-IV: Single Variable Calculus:***Rolle’s Theorem, Lagrange’s and Cauchy’s mean value theorems (without proof); Taylor’s and Maclaurin’s series (without proof) and their application for series expansions of standard functions.

***UNIT-V: First order ODE:***Exact differential equations, equations reduced to exact, Linear and Bernoulli’s equations, Newton’s law of cooling, Law of natural Growth/Decay.

***UNIT-VI: Higher order ODE:*** Higher order linear differential equations with constant coefficients-Complementary function, Particular Integral, Method of variation of parameters.

**Suggested Readings:**

1. R K Jain and S R K Iyengar Advanced Engineering Mathematics, Narosa Publications.

2. B.S. Grewal, Elementary Engineering Mathematics, Khanna Publishers

3. Alan Jeffery, Advanced Engineering Mathematics, Academic Press

4. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010.

5. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.

***Course Outcomes:*** *After the course completion the students will be able to*

1. *Check the consistency or inconsistency of a linear system and can solve the problems.*
2. *Find the Eigen values and Eigen vectors and can solve the problems associated with these concepts.*
3. *Find the nature, index and signature of the quadratic form.*
4. *Verify the applicability of mean value theorems and also can express the givenstandardfunction in series form using Taylor’s and Maclaurin series.*
5. *Find the solutions of first order first degree differential equations and solve the problems on Newton’s law of cooling, Natural growth and decay.*
6. *Solve higher order ordinary differential equations with constant coefficients using some standard methods.*

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| **Year/Sem** | **Sub. Code** | **Subject Name** | **L** | **T** | **P** | **C** |
| I – I | **9HC01** | Essential English Language Skills (EELS)  (Common to All Branches) | 2 | 0 | 0 | 2 |

**Course Objectives:**

**Theory (2 per week)**

**To enable students to:**

* Recognize and distinguish between different parts of speech
* Learn the correct usage of articles in sentences
* Write sentences using tenses
* Identify when each punctuation marks is needed and its correct usage
* Recognize the difference between direct and indirect speech and form statements in them
* Understand the appropriate use of active and passive voice in certain context

**Units**

**1. Vocabulary-1:**

1.1 Root words

1.2 Synonyms and Antonyms

1.3 Homonyms, Homophones and Homographs

1.4 One word substitutes

**2. Vocabulary-2**

2.1 Idioms and Phrases

2.2 Confusables

**3. Grammar-1**

3.1 The Parts of Speech

3.2 Use of Articles

3.3 Omission of Articles

**4. Grammar-2**

4.1 Tenses

4.2 Prepositions

4.3 Concord

**5. Reading & Writing**

5.1 Techniques of Reading, Reading Comprehension

5.2 Kinds of Sentences

5.3 Punctuation

**6. Writing-2**

6.1 Voice – Active voice and Passive Voice

6.2 Speech-Direct & Reported Speech

6.3 Common errors in English

Suggested Reading & References:

1. Word Power Made Easy by Norman Lewis
2. English Grammar In Use: A Self Study Reference And Practice Book Intermediate Learners Book by

Raymond Murphy

3. The Logic of English Words by Logophilia Education

4. English Vocabulary In Use Elementary Book With Ans And Cd-Rom by Felicity Odell (Second

Edition)

5. Effective Technical Communicatioin by M. Ashraf Rizvi

6. Intermediate grammar usage and composition; M.L.Tickoo, A.E.Subramanian, P.R.Subramanyam; OBS

7. An Interactive Grammar to Modern English by Shivendra K. Verma and HemalathaNagarajan,

Frank Bros. & Co.

**Course Learning Outcomes:**

After completion of the course, the student will be able to:

* Demonstrate competence with suitable accuracy in vocabulary, and language fluency.
* State the definition of nouns, verbs, adjectives, and adverbs.
* Identify the differences of each tense and use the tenses accurately.
* Identify specialized reading strategies for specific types of texts
* Produce written work that is substantive, organized, and grammatically accurate.

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| **Syllabus for B. Tech (E.E.E.) – A22 regulation** | | | | | | |
| **Year/Sem** | **Sub. Code** | **Subject Name** | **L** | **T** | **P** | **C** |
| I – I | **9BC01** | Engineering Graphics | 1 | 0 | 4 | 3 |

**Course objectives:**

* + - 1. To teach students the basic principles of Engineering graphics and instruments used
  1. To introduce the concept of projections in drawing and its applications for simple drawing entities
  2. To impart the knowledge of various types of solids and their projections in different position wrt principle planes
  3. To teach the concept of sections of solids and their applications
  4. To develop a clear understanding of the basic principles involved in three dimensional Engineering drawings.
  5. To train the students for the extraction of multiple views from a solid model using AutoCAD

**Course outcomes**

After completing this course, the student will able to:

1. Get familiar to use the instruments to solve the engineering problem and draw various type of curves used in engineering
2. Understand and Implement Orthographic projections and draw projections of simple drawing entities such as points Lines, and Planes
3. Draw projections of different types of regular solids in various positions wrt principal planes of projection
4. Draw Sections of various Solids including Cylinders, cones, prisms and pyramids and draw the developments of these solids and their sections.
5. Construct Isometric Scale, Isometric Projections and Views and convert 3D views to 2D orthographic views
6. Understand from basic sketching through 2D and 3-D solid modeling using computer aided design (CAD) software

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| **CO** | **ENGINEERING GRAPHICS (8BC02)** | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
| CO1 | Get familiar to use the instruments to solve the engineering | 3 |  | 1 |  |  |  |  |  |  |  |  |  |  |  |  |
| CO2 | Understand and Implement Orthographic | 2 |  | 1 |  |  |  |  |  |  |  |  |  |  |  |  |
| CO3 | Draw projections of different types of regular solids | 2 |  | 1 |  |  |  |  |  |  |  |  |  |  |  |  |
| CO4 | Draw Sections of various Solids including Cylinders, cones, prisms and pyramids | 2 |  | 1 |  |  |  |  |  |  |  |  |  |  |  |  |
| CO5 | Construct Isometric Scale, Isometric Projections and Views and convert 3D views to 2D orthographic views | 2 |  | 1 |  |  |  |  |  |  |  |  |  |  |  |  |
| CO6 | Understand from basic sketching through 2D and 3-D solid | 2 |  | 1 |  |  |  |  |  |  |  |  |  |  |  |  |
| CO | | 2 |  | 1 |  |  |  |  |  |  |  |  |  |  |  |  |

**UNIT – I**

Introduction to Engineering Drawing: Drawing Instruments and their uses, types of lines, Lettering, Dimensioning-Terms & notations, placing of dimensions, general rules of dimensioning.

Curves used in Engineering Practice and their Constructions: Conic Sections including Rectangular Hyperbola - General method, Cycloid and Involutes of circles

Scales: Reducing, Enlarging and Full Scales, types of scales, Construction of plain scales and diagonal scales only-simple problems

**UNIT – II**

Orthographic Projection: Principles of Projection – Methods of projection, First angle and third angle projections, Projections of Points, Projections of straight lines –line inclined to one plane and line inclined to both reference planes

**UNIT –III**

Projections of regular Planes: types of planes, plane inclined to one reference plane, Oblique planes

Projections of regular Solids: types of solids, Projections of: Prisms, Cylinders, Pyramids, Cones – simple position and axis inclined to one plane only

**UNIT –IV**

Sections and sectional views of Solids: Sections and Sectional views of Right Regular Solids – Prism, Cylinder, Pyramid, Cone – Auxiliary views.

Development of Surfaces: Methods of development, Development of lateral Surfaces of Right Regular Solids – Prisms, Cylinders, Pyramids, Cones and their sections.

**UNIT – V**

Isometric Projection: Meaning, Isometric axes, lines and planes, Isometric Scale – Isometric drawing or View – Isometric drawing of planes and simple solids such as prisms, pyramids, cylinder, cone

**UNIT –VI**

Conversion of isometric views to orthographic views of simple objects.

Overview of Computer Graphics(Demonstration only) : Demonstrating features of the CAD software - The Menu System, Toolbars, , Dialog boxes and windows, Drawing entities - lines, circles, arcs etc and editing commands, Dimensioning of objects, 2 D drawings-simple exercises , 3D wire-frame and shaded solids- Commands, Boolean operations.

**TextBook:**

Bhatt N.D., Panchal V.M. & Ingle P.R., (2014), Engineering Drawing, Charotar Publishing House (In First-angle Projection Method)

**Reference Books:**

* + - 1. Shah, M.B. &Rana B.C. (2008), Engineering Drawing and Computer Graphics, Pearson Education
      2. Agrawal B. &Agrawal C. M. (2012), Engineering Graphics, TMH Publication
      3. AUTOCAD Software Theory and User Manuals

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| **Year/Sem** | **Sub. Code** | **Subject Name** | **L** | **T** | **P** | **C** |
| I – I | **9HC61** | Oral Communication Lab-I | 0 | 0 | 2 | 1 |

**Course Objectives:**

To enable students to:

* Comprehend the basic tactics to communicate effectively and set a road map to achieve their communication goals.
* Know the importance of pronunciation in effective communication and work on mitigating the MTI in their spoken English;
* Communicate in proper tense with conviction and also frame and pose questions aptly.
* Describe people, objects and situations, using appropriate vocabulary, phrases and sequencing of ideas.
* Use the right English language expressions in varying real life contexts.

Develop skill of narration through listening and coordination of ideas.

**OC LAB (2 per week)**

**Unit 1: Communication Skills**

Communication basics, essential elements of effective communication, barriers to communication, setting SMART communication goals.

**Activities:**

* Ice-breaking activities
* Personal Communication SWOT Analysis
* Communication Case Studies: The Terrible & The Terrific

**Unit 2: Pronunciation Matters**

Importance of pronunciation, neutralizing mother tongue interference (MTI).

**Activities:**

* Odd Word Out
* Minimal Pairs Masti
* Shadow reading

**Unit 3: Use apt expressions in diverse situations**

Self-introduction, Greetings, apologizing, complimenting, inviting, complaining etc.

**Activity:**

Role play in different contexts using the appropriate expressions

**Unit 4:Mind your Tenses**

Describing present and past habits, states, and events.

Talking about actions in progress, relating past to the present, talking about the future.

Framing questions. (confirmation/information questions)

**Activities:**

* Speaking activity on daily routine, how students spent their recent vacation, speaking about their childhood, speaking about future plans.
* Dumb Charades (Present/Past continuous - Present/ Past perfect)
* Guessing game (10/20 yes or no questions)

**Unit 5:**  **Hone your Describing skills**

Describing people, objects, and situations

**Activities:**

* Picture descriptions.
* Guessing games - listening to the descriptions.
* Narrating memorable incidents from life.
* Describe your ideal world
* Once upon a time……

**Unit 6: The Art of Storytelling**

Story telling for career success, the basics of story telling

**Activities:**

* Building stories - chain activity.
* Story prompts activity.
* Narrate the story. (all the hints are given except linking words and tenses)

Suggested Reading & References:

* “An Interactive Grammar of Modern English” by Shivendra K Verma and HemalathaNagarajan, Frank Bros. & Co.
* “Skill Sutras” by JayashreeMohanraj, Prism Books Pvt. Ltd.
* “Better English pronunciation” by J.D. Connor.
* “Effective Communication” John Adair, Pan Macmillan Ltd.
* “Body Language”, by Allan Pease, Sudha Publications.
* “Communicative English”, by Hariprasad M. and Prakasam V, Neel Kamal Publications.

**Course Learning Outcomes:**

After completion of the course, the student will be able to:

* Describe people, objects and situations using simple sentences.
* Use appropriate tenses and expressions in different contexts of conversations.
* Identify major areas of concern in their oral communication and address them.
* Create a SMART plan to enhance their communication skills in English

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| **Year/Sem** | **Sub. Code** | **Subject Name** | **L** | **T** | **P** | **C** |
| I – I | **9HC66** | Engineering Physics Lab | 0 | 0 | 3 | 1.5 |

**Course Objectives**

* Understand the concept of photo electric effect using photo voltaic cell.
* Discuss the dispersive power of prism-minimum deviation method.
* Discussion of diffraction pattern using the grating – LASER.
* To study the concepts (numerical aperture) of an optical fiber.
* To explain about magnetic induction, Biot-Savart principle.
* Study the frequency of AC mains using Sonometer.
* Explaining about the electrical resonance by using the LCR circuit.
* To understand the rigidity modulus, periodicity.
* To discuss the energy gap (Eg) of a semiconductor diode.
* To study the LED characteristics and forward resistance.
* To know the time constant of RC circuit.
* To understand about the [ionizing radiation](https://en.wikipedia.org/wiki/Ionizing_radiation) by using the Geiger–Muller counter.

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| **CO** | **Engineering Physics Lab (8HC66)** | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
| CO1 | Demonstrate the wave length of monochromatic source of light by using Newton’s Rings | 3 | 3 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| CO2 | Analyze refractive index of a material prism and Dispersive power of a glass Prism by using spectrometer | 3 | 3 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| CO3 | Determine the wave length of spectral light and laser Source of light by using Diffraction Grating | 3 | 3 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| CO4 | Design and Analyze RC Circuits | 3 | 3 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| CO5 | Analyze RLC Series circuit and parallel circuit | 3 | 3 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| CO6 | Investigate magnetic Circuits | 3 | 2 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| CO | 3 | 3 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

**List of Experiments**

1. Determination the Planck’s constant using the photo voltaic cell - Photo voltaic cell.
2. Calculation of dispersive power of a given material of prism by using

Spectrometer in minimum deviation method - Light.

1. Determination of wavelength of a given laser source of light by using diffraction grating in normal incidence method - LASER
2. Determination of a Numerical Aperture (NA) of an optical fiber – Fiber optics.
3. Determination of magnetic induction flux density along the axis of a current carrying circular coil using Stewart and Gee’s experiment - Magnetism.
4. Calculating the frequency of AC supply by using the Sonometer – Magnetostriction method.
5. Study of series and parallel resonance of an LCR circuit – Electrical devices.
6. Determination of rigidity modulus of a given wire material using the Torsional pendulum - Vibrations
7. Determination of the energy gap (Eg) of a given semiconductor-Temperature/semiconductor.
8. Studying the characteristics and calculating the forward resistance of a LED – Semiconductor/devices.
9. Determination of time constant of an RC-circuit – Electrical/ Electronics.
10. Studying the characteristics of Geiger–Muller counter and verifying the inverse square law - Nuclear physics

**NOTE**: Any **TEN** of the above experiments are to be conducted.

**Course Outcomes**

After completing the experiment, students are able to

* Understand the concepts of photo electric effect, importance, photo current, colour filters, optical sensors (photo voltaic cell).
* Know about the light properties-dispersion, prism, spectrometer and minimum deviation arrangement.
* Recognize the difference between the interference and diffraction, grating, laser characteristics.
* Analyze the concepts of fiber optics, fundamentals, numerical aperture its importance, attenuation in fiber and applications.
* Understand and search to apply the fundamentals of magnetic induction, Ampere’s law, Oersted’s law and the Biot-Savart law.
* Know the difference between AC and DC fundamentals, Magnetostriction, resonance, air column vibrations.
* Analyze the LCR circuit combination, parallel, series electrical resonance, inductance, reactance, capacitance and electrical and electronic fundamentals.
* Summarize the fundamentals of modulus-types, stress, strain, elasticity, plasticity and Hook’s law.
* Analyze the concept a semiconductors, types, calculation of energy gap of a semiconductor diode and importance.
* Analyze the difference between normal diode, LED, forward bias, reverse bias, I-V characteristics, direct and indirect band gap semiconductors.
* Characterize the RC network, time constant, capacitor functioning and its application.

Understand the concept of radiation, ionizing radiation, [radiological protection](https://en.wikipedia.org/wiki/Radiological_protection) and inverse square law

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| **Year/Sem** | **Sub. Code** | **Subject Name** | **L** | **T** | **P/D** | **C** |
| I – I | **9FC61** | Problem Solving using C Lab  (Common to CSE, ECE and CE) | 0 | 0 | 3 | 1.5 |

**Course Objectives:**

1. To be able to understand the fundamentals of programming in C Language
2. To be able to write, compile and debug programs in C
3. To be able to formulate problems and implement in C.
4. To be able to effectively choose programming components
5. To solve computing problems in real-world.

**Course Outcomes:**

**After completion of this course student will learn**

1. To formulate the algorithms for simple problems
2. To translate given algorithms to a working and correct program
3. To be able to correct syntax errors as reported by the compilers
4. To be able to identify and correct logical errors encountered at run time
5. To be able to write iterative as well as recursive programs
6. To be able to represent data in arrays, strings and structures and manipulate them through a program
7. To be able to declare pointers of different types and use them in defining self referential structures.
8. To be able to create, read and write to and from simple text files.

**[The laboratory should be preceded or followed by a tutorial to explain the approach or algorithm to be implemented for the problem given.]**

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| **CO** | **Problem Solving using C LAB (8FC61 )** | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO 11 | PO 12 | PSO 1 | PSO 2 | PSO 3 |
| CO1 | Explain basic fundamentals of Computer Systems, computing environments, Computer Languages – Machine Languages. Writing/ Drawing simple Algorithms and flowcharts. | 3 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **CO** | Overall | 3 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

1. **Unit I (Cycle 1)**
2. Write an algorithm for converting a given Celsius temperature to its equivalent Fahrenheit temperature and draw a flowchart.
3. Write an algorithm to find the largest of three given numbers and draw a flowchart.
4. Write an algorithm and draw a flowchart for finding the roots and nature of roots of a quadratic equation, given its coefficients.
5. Write an algorithm and flowchart for finding the first n Fibonacci numbers, give n.
6. **Unit II (Cycle 2)**
7. Write an algorithm, flowchart, and C program for:
8. Finding the area and circumference of a circle of given radius.
9. Finding the volume of a sphere of given radius.
10. Finding the lateral surface area of a right circular cone of given base radius and height.
11. Finding selling price of an item, given its cost price and profit percent.
12. Finding the interest on a given principal for a given period of time at a given rate of per year.
13. Write a C program to display all the sizes of data types in C.
14. Write a C program to display a given decimal integer into an equivalent octal number and hexadecimal number using %o and %x in printf function.
15. **Unit II (Cycle 3)**
    1. Write a C program to find the roots and nature of the roots of a quadratic equation, given its coefficients.
    2. Write a C program for finding the largest of three given numbers.
    3. A salesman gets a commission of 5% on the sales he makes if his sales is below Rs.5000/- and a commission of 8% on the sales that exceeds Rs.5000/- together with Rs.250/-. Write an algorithm or a flowchart and develop C program for computing the commission of the salesman, given his sales.
    4. Write a C Program to demonstrate Marcos.
16. **Unit III (Cycle 4)**
17. Write three C programs to print a multiplication table for a given number using while, do-while, and for loops.
18. Write a C program to compute the sum of:
19. 1+x+x2+x3+………….+xn, given x and n.
20. 1! + 2! + 3! + . . . + n!, given n.
21. 1 – x2/2! + x4/4! – x6/6! + x8/8! – x10/10! + … to n terms where the nth term becomes less than 0.0001.
22. **Unit III (Cycle 5)**
    1. Write a C program in the menu driven style to perform the operations +, -, \*, /, % between two given integers.
    2. Write a C program to find the largest and the least of some numbers given by the user.
    3. Write a C program to find the sum of the digits of a positive integer.
23. **Unit III (Cycle 6)**
    1. Write C functions for the following:
       1. A function that takes an integer n as argument and returns 1 if it is a prime number and 0 otherwise.
       2. A function that takes a real number x and a positive integer n as arguments and returns xn.
       3. A function that takes a positive integer n as an argument and returns the nth Fibonacci number.
    2. Using recursion write C functions for the following:
       1. Factorial of a non-negative integer n.
       2. Number of combinations of n things taken r at a time.
       3. Greatest Common Divisor of two integers.
       4. Least Common Multiple of two integers.
24. **Unit III (Cycle 7)**
    * 1. Write a menu driven style program to compute the above functions (cycle 6) on the choice of the function given by the user.
      2. Define macros for the following and use them to find sum of the squares of the minimum and maximum of two given numbers.
         1. Larger of two numbers.
         2. Smaller of two numbers.
         3. Sum of the squares of two numbers.
      3. Write a program to generate Pascal’s triangle.
      4. Write a program to count the number of letters, words, and lines in a given text.
25. **Unit IV (Cycle 8)**
    1. Write a program to store the numbers given by the user in an array, and then to find the

mean, deviations of the given values from the mean, and variance.

* 1. Write a C program to initially store user given numbers in an array, display them and

then to insert a given number at a given location and to delete a number at a given location.

* 1. Write a program to store user given numbers in an array and find the locations of minimum and maximum values in the array and swap them and display the resulting array.

1. **Unit IV (Cycle 9)**
   1. Write a C program to implement the operations of matrices – addition, subtraction,

multiplication.

* 1. Write a program to find whether a given matrix is symmetric, lower triangular, upper

triangular, diagonal, scalar, or unit matrix.

1. **Unit V (Cycle 10)**
   1. Write a function to swap two numbers.
   2. Write a function to compute area and circumference of a circle, having area and

circumference as pointer arguments and radius as an ordinary argument.

1. **Unit VI (Cycle 11)**
2. Define a structure for complex number. Write functions on complex numbers (addition, subtraction, absolute value, multiplication, division, complex conjugate) and implement them in a menu driven style.
3. Define a structure point. Write a program to find the distance between two points.
4. Define a structure student having members roll no., name, class, section, marks. Create an array of 10 students give the data and find the average marks, section-wise.
5. **Unit VI (Cycle 12)**
   1. Write a program to:
      1. Create a file by the name given by the user or by command line argument and add the text given by the user to that file.
      2. Open the file created above and display the contents of the file.
      3. Copy a file into some other file, file names given by the user or by command line arguments.
      4. Append a user mentioned file to another file.
      5. Reverse the first n characters of a file.

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| **Year/Sem** | **Sub. Code** | **Subject Name** | **L** | **T** | **P** | **C** |
| I – II | 9HC04 | ENGINEERING CHEMISTRY  (Common to CSE, ECE and CE) | 2 | 1 | 0 | 3 |

**Course Objectives**:

1. To understand microscopic chemistry in terms of atomic and molecular orbitals
2. To learn the preparation and applications of commercial polymers and lubricant materials
3. To learn the industrial problems caused by water and municipal water treatment
4. To acquire knowledge about different types of batteries and their working mechanism
5. To develop the concepqts and types of corrosion and the factors influence corrosion
6. To understand the control methods and protective coatings for metals and other surfaces

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| **CO** | **Engineering Chemistry(**8HC04**)** | | PO1 | | PO2 | | PO3 | | PO4 | | PO5 | | PO6 | | PO7 | | PO8 | | PO9 | | PO10 | | PO11 | | PO12 | | PSO1 | | PSO2 | | PSO3 | |
| CO1 | To understand microscopic chemistry in terms of atomic and molecular orbitals | | 3 | | 2 | |  | |  | |  | |  | |  | |  | |  | |  | |  | |  | |  | |  | |  | |
| CO2 | To learn the preparation and applications of commercial polymers and lubricant materials | | 2 | | 3 | |  | |  | |  | |  | |  | |  | |  | |  | |  | |  | |  | |  | |  | |
| CO3 | To learn the industrial problems caused by water and municipal water treatment | | 2 | | 1 | |  | |  | |  | |  | |  | |  | |  | |  | |  | |  | |  | |  | |  | |
| CO4 | To acquire knowledge about different types of batteries and their working mechanism | | 3 | | 1 | |  | |  | |  | |  | |  | |  | |  | |  | |  | |  | |  | |  | |  | |
| CO5 | To develop the concepts and types of corrosion and the factors influence corrosion | | 1 | | 1 | |  | |  | |  | |  | |  | |  | |  | |  | |  | |  | |  | |  | |  | |
| CO6 | To understand the control methods and protective coatings for metals and other surfaces | | 1 | | 1 | |  | |  | |  | |  | |  | |  | |  | |  | |  | |  | |  | |  | |  | |
| Overall PO Mapping | | 2 | | 1 | |  | |  | |  | |  | |  | |  | |  | |  | |  | |  | |  | |  | |  | |

**UNIT - I**

**Atomic and molecular structure (6L)**

Molecular orbitals of diatomic molecules and plots of the multicentre orbitals.Equations for atomic and molecular orbitals. Energy level diagrams of diatomics. Pi-molecular orbitals of butadiene and benzene and aromaticity.Crystal field theory and the energy level diagrams for transition metal ions and their magnetic properties.Band structure of solids and the role of doping on band structures.

**UNIT - II**

**Plastics and Lubricants**

**Plastics (8L)**

**Polymerization-**Addition and Condensation polymerization, Plastics – Thermosetting and Thermoplastics, preparation, properties and **engineering applications of plastics:** PVC, Teflon, Bakelite. Fibers: Nylon 6,6 and Dacron.

Rubbers – natural and artificial rubber, vulcanization of natural rubber, Buna-S, Buna-N and their **engineering applications.**

Fabricated Reinforcing Polymers**- engineering applications**

**Lubricants**

Definition, classification and function of lubricants, Types of lubrication and mechanisms – Thick Film or Hydrodynamic Lubrication, Thin Film or Boundary Lubrication, Extreme Pressure Lubrication. Classification and properties of lubricants – Viscosity, flash and fire point, cloud and pour point and acid value.**Engineering applications.**

**UNIT - III**

**Water Technology (8L)**

1. **Introduction: -** Hardness of water – types of hardness (temporary and permanent), calculation of hardness- Numerical problems. Estimation of hardness of water by EDTA Method.
2. **Water for Industrial purpose:** Food, sugar, textile, paper and pharma industries, water for steam making characteristics of boiler feed water, boiler troubles- scale and sludge & Carry over (priming &foaming), boiler corrosion, caustic embrittlement.
3. **Water Treatment:** Internal conditioning- phosphate, carbonate &calgon conditioning. External Treatment: Ion-exchange process. Desalination-reverse osmosis. Municipal water treatment-sedimentation, coagulation, filtration, disinfection-chlorination, ozonization. **Engineering applications: Methodology and working of mineral water plant for drinking purpose.**

**UNIT - IV**

**Electrochemistry (8L)**

Conductance – conductors (metallic and electrolytic), types of conductance – specific, equivalent and molar conductance – effect of dilution on conductance.

Free energy and emf, cell potentials, electrode potential (oxidation and reduction).Types of electrodes - redox electrode (quinhydrode electrode), metal – metal insoluble salt electrode and Ion selective electrode.Cell notation and cell reaction –Nernst equation and applications.**Engineering Applications.**

**Batteries** : Types of batteries

1. Primary batteries – Lechalanche cell (dry cell), Lithium cell
2. Secondary batteries(Accumulators) – Lead acid battery, Lithium-ion battery
3. Fuel cells- H2 – O2 fuel cell and MeOH-O2 fuel cell-advantages and applications.

**Engineering applications – future water powered car, Hydrogen production and storage**.

**UNIT - V**

**Corrosion and its prevention (7L)**

Corrosion – basic concepts –types of corrosion, chemical, electrochemical corrosion (absorption of O2 and evolution of H2). Types of electrochemical corrosion – galvanic corrosion, pitting corrosion, waterline corrosion- factors affecting the rate of corrosion.

**Cathodic protection** – sacrificial anodic protection and impressed current cathodic protection method.

**UNIT-VI**

**Surface treatment (5L)**

Mechanical surface treatment and coatings, casehardening and surface coating, thermal spraying, vapour deposition, Ion implantation, Diffusion coating.

Methods of metallic coatings-hot dipping (tinning and galvanizing), metal cladding (Al cladding), electroplating (copper plating) and electroless plating (nickel plating) and electroforming, ceramic, organic and diamond coating

**TEXT BOOKS:**

1. Engineering Chemistry: PK Jain & MK Jain, Dhanapathrai Publications (2018)
2. Engineering Chemistry: by Thirumala Chary Laxminarayana&Shashikala, Pearson Publications (2020)

**REFERENCE BOOKS:**

1. Textbook of Engineering Chemistry: Jaya Shree Anireddy, Wiley Publications (2019)
2. Engineering Chemistry: by &B.Rama Devi, PrsantaRath& Ch. Venkata Ramana Reddy, Cengage Publications (2018)
3. Engineering Chemistry: Shashi Chawla, Dhanapathrai Publications (2019)
4. Textbook of Engineering Chemistry: SS Dara, SS Umare S. Chand Publications (2004)

**Course Outcomes**

After completion of the course, the student will be able to:

1. Understand and analyse microscopic chemistry in terms of atomic orbitals, molecular orbitals and intermolecular forces.
2. Identify and differentiate polymers, thermoplastic, thermosetting plastics and various lubricants.
3. Recognize and select the domestic and industrial problems caused by hard water and also learn about the municipal water treatment using various methods.
4. Understand and interpret the important fundamental concepts of electrochemistry and solve the problems related to batteries.
5. Differentiate the types of corrosion and methods used to prevent the corrosion.
6. Learn and implement surface coating techniques.

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| I – II | 9A201 | **ELECTRICAL CIRCUITS AND NETWORKS – I** | 2 | 1 | 0 | 3 |

***Course Objectives :***

*To make the students to understand:*

* + - * 1. *The fundamentals of the basic elements and their application in electrical circuits.*
        2. *The importance of network topology in analysis of electrical networks.*
        3. *The basic concepts of magnetic circuits and their applications.*
        4. *The concept of single phase circuits and their analysis.*
        5. *The significance of resonance and its use*
        6. *Verify the network theorem and their application in electrical networks.*

***Course Outcomes:***

*After completion of the course work the student will be able to*

1. *Apply Kirchhoff’s laws for solving electrical circuits.*
2. *Draw the network graph and solve the problems of electrical networks.*
3. *Analyze and solve the problems of composite magnetic circuits.*
4. *Understand the basic concepts of single phase AC circuits and ability to solve the problems related to steady state analysis.*
5. *Compute for parameters like Q factor and bandwidth for resonance circuits.*
6. *Apply and solve the problem associated with electrical networks using network theorems*

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| **C0** | Electrical Circuits & Networks Analysis (**8AC42**) | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO 11 | PO 12 | PSO 1 | PSO 2 | PSO 3 |
| CO1 | Understand the principle of different methods of electrical circuit reduction. | 3 |  |  |  |  |  |  |  |  |  |  |  | 3 |  |  |
| CO2 | Understand the principle of single phase A.C circuits | 2 | 2 |  |  |  |  |  |  |  |  |  |  | 2 |  |  |
| CO3 | Understand the principle of magnetic circuits | 2 |  |  |  |  |  |  |  |  |  |  |  | 2 |  |  |
| CO4 | Understand the principles of network theorems along with its applications |  | 2 |  |  |  |  |  |  |  |  |  |  | 2 |  |  |
| CO5 | Understand the principle two port networks along with its applications | 3 | 2 |  |  |  |  |  |  |  |  |  |  | 3 |  |  |
| CO6 | Understand the principle of transients with both DC and AC excitation | 2 | 3 |  |  |  |  |  |  |  |  |  |  | 3 |  |  |
| CO | Overall | 2 | 2 |  |  |  |  |  |  |  |  |  |  | 3 |  |  |

**UNIT – I: INTRODUCTION TO ELECTRICAL CIRCUITS:**

Circuit concept, R – L – C parameters, Voltage and current sources, Independent and dependent sources, Source transformation, Kirchhoff’s Laws, Network reduction techniques, Series, Parallel, Series - parallel, Star – to – delta and Delta – to – star transformation, Mesh analysis, Nodal analysis, Concept of super mesh and super node. Voltage current relationship for passive elements (for different input signals – square, ramp, saw tooth, triangular)

**UNIT – II: NETWORK TOPOLOGY:**

Definitions, Graph, Tree, Basic cut-set and basic tie-set matrices for planar networks, Loop and Nodal methods of analysis of Networks using graph theory, Duality & dual networks

**UNIT – III: MAGNETIC CIRCUITS**:

Basic terms in Magnetic Circuits, Comparison between electric and magnetic circuits, Composite magnetic circuit, Analysis of series, parallel magnetic circuits, Faraday’s Laws of electromagnetic induction, Concept of self and mutual inductance, Dot convention, Co-efficient of coupling.

**UNIT - IV: SINGLE PHASE A.C. CIRCUITS:**

R.M.S. and Average values, Form factor for different periodic wave forms, j Notation, Complex and polar forms of representation, Steady state analysis of R,L,C circuits (in series, parallel and series parallel combinations) with sinusoidal excitation, Concept of Reactance, Impedance, Susceptance and Admittance, Phase angle, Concept of power factor, Real, Reactive powers and Complex power.

**UNIT – V:**  **LOCUS DIAGRAMS & RESONANCE:**

Locus diagrams of R-L, R-C circuits with variation of various parameters (series and parallel), Resonance in series, parallel circuits, Concept of band width and Q factor.

**UNIT – VI: NETWORK THEOREMS:**

Tellegen’s, Superposition, Reciprocity, Thevenin’s, Norton’s, Maximum Power transfer, Millman’s and Compensation theorems with D.C.& A.C. excitations.

**TEXT BOOKS:**

1. Engineering circuit analysis - William Hayt and Jack E.Kemmerly, Tata McGraw - Hill Company, 6th edition.
2. Circuits & Networks - A. Sudhakar and Shyamamohan S. Palli, Tata Mc Graw Hill, 3rd edition.

**REFERENCES:**

1. Network Analysis - M.E. Vanvalkenberg, Printice Hall of India, 3rd edition
2. Circuit theory (Analysis & Synthesis) - A.Chakravarthy, Dhanpath Rai & Co., 6th edition.
3. Circuits & Networks – M.S. Sukhija, T.K. Nagasarkar, Oxford University Press, 2nd edition.

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| **Syllabus for B. Tech (E.E.E.) – A22 regulation** | | | | | | |
| **Year/Sem** | **Sub. Code** | **Subject Name** | **L** | **T** | **P** | **C** |
| I – II | 9EC01 | DATA STRUCTURES  (Common to all Branches) | 3 | 0 | 0 | 3 |

***Prerequisites: Problem Solving using C***

***Course Objectives:***

1. *To provide the knowledge of structures, unions, enum and typedef.*
2. *To understand and learn the applications of Abstract data Type, linear data structures such as stacks, queues* *and linked list.*
3. *To comprehend different nonlinear data structures.*
4. *To understand and analyze the concepts of various searching and sorting techniques.*

***Course Outcomes:***

*After completion of this course student will be able to:*

1. *Design the programs using structures, unions and enum.*
2. *Demonstrate the concepts of Abstract data type and also applications of stacks and queues.*
3. *Implement basic operations on single, double and circular linked list.*
4. *Solve problems involving Binary Search trees and AVL trees.*
5. *Articulate the concepts of graphs, heaps and hashing.*
6. *Develop algorithms for various searching and sorting techniques and analyze their performance.*

**UNIT I:**

**Structures:** Introduction, types, initialization and accessing, Array of Structures, Nested Structures, Self-referential structures.Unions, enum, typedef, Dynamic Memory allocation.

**UNIT II:**

**Introduction to data structures:** Abstract data type (ADT), Stacks, Queues and Circular queues and their implementation with arrays.

Applications of Stack: infix to post fix conversion, postfix expression evaluation. Applications of Queues.

**UNIT III:**

**Linked list:** introduction, advantages of Linked list over Arrays.

**Single linked list:** creation, insertion, deletion and display operations

**Double linked list:** creation, insertion, deletion and display operations

**Circular linked list:** creation, insertion, deletion and display operations,Implementation of Stacks and Queues with singly linked list.

**UNIT IV:**

**Trees:** Terminology, Binary Tree: types, representation and traversals (in-order, pre-order, post-order).

**Binary Search Tree:** introduction, operations (insertion, deletion, display)

**AVL Trees**: Definition, examples, and operations (insertion, deletion and searching).

**UNIT V:**

**Graphs:** terminology, representation, traversals (DFS and BFS).

**Heaps:** Introduction, Min Heap, Max Heap, Operations on Heaps, Heap Sort.

**Hashing:** Hash Table, Hash functions.

**Collision resolution techniques**: separate chaining, open addressing-linear probing, quadratic probing, double hashing.

**UNIT VI:**

**Searching:** linear and binary search methods.

**Sorting:** Bubble Sort, Insertion Sort, Selection Sort, Quick sort, Merge sortPerformance analysis of Searching and Sorting Algorithms.

**TEXT BOOKS:**

1. Data Structures Using C second edition by [ReemaThareja](https://www.amazon.in/Reema-Thareja/e/B00357V8ME/ref=dp_byline_cont_book_1) Oxford university press

2. Data Structure through C by YashavantKanetkar.

**REFERENCES:**

1. Alfred V. Aho, Jeffrey D. Ullman, John E. Hopcroft. Data Structures and Algorithms. Addison Wesley,1983.
2. Data Structures using c Aaron M.Tenenbaum ,YedidyahLangsam,MosheJAugenstein.
3. Introduction to Data Structures in C ByKamtane
4. Data Structures, A pseudocode Approach with C by Richard F. Gilberg and Behrouz A. Forouzan.

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| **Year/Sem** | **Sub. Code** | **Subject Name** | **L** | **T** | **P** | **C** |
| I – II | 9HC12 | ADVANCED CALCULUS | 2 | 1 | 0 | 3 |

**Pre Requisites**: Mathematics Knowledge at Pre-University Level

***Course Objectives:*** *To make the students to understand and expected to learn*

1. *Basic concepts of multivariable differential calculus.*
2. *Evaluation of double and triple integrals.*
3. *Solutions of first order linear and non-linear partial differential equations.*
4. *Series expansion of a given function in terms of sine and cosine terms.*
5. *Basic Concepts of vector differential calculus.*
6. *Concepts of vector integral calculus,*

**Syllabus**

***UNIT-I: Functions of several variables:*** Limits, Continuity and partial derivative, total derivative, Jacobian, Maxima and minima of two variable functions (without constraints).

***UNIT-II: Multiple Integrals:*** Double integrals, change of order of integration, change of variables (Cartesian to polar), Triple integrals (Cartesian form).

***UNIT-III: Partial Differential Equations:*** Formation of partial differential equations, solutions to first order linear and non-linear partial differential equations-standard Forms,

***UNIT-IV: Fourier series:*** Dirichlet conditions, Fourier series of functions over the intervals of length 2l& 2π. Half range sine and cosine series, Problems on Parseval’s theorem (without proof).

***UNIT-V: Vector Differentiation:*** Vector and scalar point functions, gradient, directional derivatives; divergence and curl of a vector point function and problems.

***UNIT-VI: Vector Integration:*** Line integrals, surface integrals, volume integrals, Green, Gauss divergence and Stokes theorems (without proofs) and problems.

**Suggested Readings:**

1. R K Jain and S R K Iyengar Advanced Engineering Mathematics, Narosa Publications.

2. B.S. Grewal, Elementary Engineering Mathematics, Khanna Publishers

3. Alan Jeffery, Advanced Engineering Mathematics, Academic Press

4. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010.

5. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.

***Course Outcomes:*** *After the course completion the students will be able to*

1. *Find the limits and test for the continuity and differentiability of a function.*
2. *Solve the problems on multiple integrals.*
3. *Solve linear and nonlinear first order partial differential equations.*
4. *Find Series expansion a function defined over the intervals.*
5. *Find directional derivative, gradient, divergence and curl of a function.*
6. *Solve problems of line, surface and volume integrals.*

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| **Year/Sem** | **Sub. Code** | **Subject Name** | **L** | **T** | **P** | **C** |
| I – II | 9HC62 | Oral Communication Lab-II | 0 | 0 | 3 | 1.5 |

**Course Objectives:**

To enable students to:

* Strike a conversation and engage in effective small talk.
* Lose stage fear and confidently interact with others in different roles and tap their creative side.
* Speak for a minute, fluently and cohesively.
* Make official presentations with effective use of PPTs.
* Engage in group discussions in a confident and professional manner.
* Shed fear of questions from the audience and the interviewers.

**Units**

**OC Lab (2 hrs. per week)**

**Unit 1**

**Small talk and conversational techniques**

Tips on enhancing conversation skills.

Conversation starters, small talk questions, how to talk to stranger**s** andpractice activities on initiating informal conversations.

* Talk about your favourite things.
* Interview each other.

**Unit 2**

**Role Play/skit/one act play**

* Role play assuming fictional characters and non-fictional characters.
* One Act plays
* Ad’ Venture: Advertisement creation and enacting.

**Unit 3**

**Just a minute (JAM)**

One-minute speaking activity on topics of students’ choice and Extempore.

**Unit 4**

**Presentation skills**

Introduction to structural talk.Techniques of making effective presentations.

* Five minute PowerPoint presentations.

**Unit 5**

**Group Discussions**

Tips on Dos and Don'ts of Group Discussion (GD).Discussion on evaluation pattern during GD.

* Practice sessions: GDs on different topics.

**Unit 6**

**Facing questions: Mock Interviews**

Strategies of handling Question and Answer sessions after Presentations/seminars.

* Question Toss: Practice on asking and answering questions.

**Suggested Reading:**

* “Effective Technical Communication” by M. Ashraf Rizvi, McGraw Hill.
* “Skill Sutras” by JayashreeMohanraj, Prism Books Pvt. Ltd.
* “Technical Communication: Principles and Practice” by Meenakshi Raman, OUP.
* “Effective Communication” John Adair, Pan Macmillan Ltd.
* “Body Language”, by Allan Pease, Sudha Publications.
* “Business Communication: From Principles to Practice” MM Monippally, TataMcGraw Hill.

**Course Learning Outcomes:**

* Understand the nuances of striking a great conversation in formal and informal situations.
* Gain experience of facing an audience and speaking in public.
* Design a winning presentation and present it with ease.

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| **Year/Sem** | **Sub. Code** | **Subject Name** | **L** | **T** | **P/D** | **C** |
| I – II | 9HC64 | Engineering Chemistry Lab  (Common to CSE, ECE, EEE and CE) | 0 | 0 | 3 | 1.5 |

**Course Objectives**:

The student will be able to learn:

1. To reparation of Inorganic compounds
2. To determine surface tension of a liquid
3. To determine viscosity of lubricant
4. To determine acid value of an oil
5. To estimate hardness of water
6. To analyze the amount of chloride content
7. To determine cell constant and conductance of solutions
8. To determine redox potential and emf of solutions
9. To determine the rate constant of acid
10. To synthesize a polymer (Thiakol rubber / Urea-Formaldehyde resin)
11. To synthesize a drug- Aspirin
12. To estimate of Mn+7 by Colorimetry method

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| **CO** | Engineering Chemistry Lab(**8HC64**) | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO 10 | PO 11 | PO 12 | PSO 1 | PSO 2 | PSO 3 |
| CO1 | Describe the principle and theory in determination of Hardness of a water sample. Experiment the method of preparation for organic compounds. | 2 | 2 |  |  |  | 3 |  |  |  |  |  |  |  |  |  |
| C0 | Overall | 2 | 2 |  |  |  | 3 |  |  |  |  |  |  |  |  |  |

**List of Experiments**

1. Preparation of coordination complex NiDMG Complex
2. Determination of surface tension
3. Determination of viscosity
4. Saponification/acid value of an oil
5. Ion exchange column for removal of hardness of water / Estimation of Hardness of water by EDTA Method
6. Determination of chloride content of water
7. Determination of cell constant and conductance of solutions (HClVsNaOH / Mixture of acid Vs Strong base)
8. Potentiometry - determination of redox potential and emf (FeSO­4Vs KMNO4 / HClVsNaOH)
9. Determination of the rate constant of acid catalyzed hydrolysis of methylacetete
10. Synthesis of a polymer- Thiakol rubber / Urea-Farmaldehyde resin
11. Synthesis of a drug- Aspirin
12. Estimation of Mn+7 by Colorimetry method

**Course Outcomes**

After completion of the course, the student will be able to learn:

1. Preparation of Inorganic compounds
2. Determination surface tension of a liquid
3. Determination viscosity of lubricant
4. Determination acid value of an oil
5. Estimation hardness of water
6. Analysis the amount of chloride content
7. Determination of cell constant and conductance of solutions
8. Determination of redox potential and emf of solutions
9. Determination of the rate constant of acid
10. Synthesis of a polymer (Thiakol rubber / Urea-Farmaldehyde resin)
11. Synthesis of a drug- Aspirin
12. Estimation of Mn+7 by Colorimetry method

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| **Year/Sem** | **Sub. Code** | **Subject Name** | **L** | **T** | **P/D** | **C** |
| I – II | 9EC61 | Data Structures Using C Lab  (Common to all Branches) | 0 | 0 | 3 | 1.5 |

***Prerequisites: Problem Solving using C Lab***

***Course objectives:***

1. *Create programs on structures and unions*
2. *Develop the programs on Linear and Non-Linear data structures*
3. *Write programs on various searching and sorting algorithms.*

#### Course Outcomes:

*After completion of the course, the student will be able to:*

1. *Write programs on structures and unions.*
2. *Implement Stacks, Queues and circular queues using arrays.*
3. *Write programs to implement basic operations on various types of linked list.*
4. *Implement insertion and traversal operations on binary search tree*
5. *Develop programs on various searching, sorting algorithms.*

Note: Lab Projects will be allocated to the students at the beginning of the semester.

**Cycle 1:**

1. Define a structure for complex number. Write functions on complex numbers (addition, subtraction, absolute value, multiplication, division, complex conjugate) and implement them in a menu driven style.
2. Define a structure student having members roll no., name, class, section, marks.

Create an array of 10 students give the data and find the average marks, section-wise.

**Cycle 2:**

1. Write a C program that implement stack and its operations using arrays
2. Write a C program that implement Queue and its operations using arrays.
3. Write a C program that implement Circular Queue and its operations using arrays.

**Cycle 3:**

1. Write a C program that uses Stack operations to perform the following:
2. Converting infix expression into postfix expression
3. Evaluating the postfix expression

**Cycle 4:**

1. Write a C program that uses functions to perform the following operations on singly linked list:
2. Creation ii) Insertion iii) Deletion iv) Traversal

**Cycle 5:**

1. Write a C program that uses functions to perform the following operations on doubly linked list:
2. Creation ii) Insertion iii) Deletion iv) Traversal in both ways

**Cycle 6:**

1. Write a C program using functions to perform the following operations on circular singly linked list:
2. Creation ii) Insertion iii) Deletion iv) Traversal

**Cycle 7:**

1. Write a C program to implement operations on the following Data Structures Using Singly linked list:

i) Stack ii) Queue

**Cycle 8:**

1. Write a C program that uses functions to perform the following:
2. Creating a Binary Search Tree.
3. Traversing the above binary tree in pre-order, in-order and post-order.

**Cycle 9:**

1. Write C programs that use both recursive and non recursive functions to perform the following searching operations for a Key value in a given list of integers:
2. Linear Search ii) Binary Search

**Cycle 10:**

1. Write C programs that implement the following sorting methods to sort a given list of integers in ascending order:
2. Bubble Sort ii) Insertion Sort iii) Selection Sort

**Cycle 11:**

1. Write C programs that implement the following sorting methods to sort a given list of integers in ascending order:
2. Quick sort ii) Merge sort iii) Heap Sort

**Cycle 12:**

15 Lab Projects- Design and Develop Case Studies such as ,Graph Traversal Techniques, Collision Resolution Techniques

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| **Year/Sem** | **Sub. Code** | **Subject Name** | **L** | **T** | **P/D** | **C** |
| I – II | 9BC61 | Workshop/Manufacturing Processes Lab | 0 | 1 | 3 | 2.5 |

**COURSE OBJECTIVES:**

1. To know the different popular manufacturing process
2. To gain a good basic working knowledge required for the production of various engineering products
3. To provide hands on experience about use of different engineering materials, tools, equipment’s and processes those are common in the engineering field
4. To identify and use marking out tools, hand tools, measuring equipment and to work to prescribed tolerances

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

CO-1: Use various types of conventional manufacturing Processes

CO-2: Manufacture components from wood, MS flat, GI Sheet etc. – hands on experience

CO-3: Manufacturing of components by machining like shafts, holes & threaded holes, surface finishing of components etc.

CO-4: Produce small devices / products /appliances by assembling different components

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| **CO** | Workshop/Manufacturing Processes Lab (**8BC61**) | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO 11 | PO 12 | PSO 1 | PSO 2 | PSO 3 |
| CO1 | After completion of the course, the student will be able to **fabricate** components with their own hands | 3 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| CO2 | Assemble different components and produce small devices of their interest. |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **CO** | Overall | 3 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

**LIST OF EXPERIMENTS**

|  |  |  |
| --- | --- | --- |
| **S.No** | **Trades** | **Experiment name** |
| 1 | Fitting Shop | 1. Preparation of T-Shape Work piece  2.Preparation of U-Shape Work piece which contains: Filing, Sawing, Drilling, Grinding. |
| 2 | Carpentry | 3. Cross Half Lap joint  4. Half Lap Dovetail joint |
| 3 | Electrical & Electronics | 5. One lamp one switch  6. Stair case wiring |
| 4 | Welding ( Arc & Gas) & Soldering | 7. Practice of Lap and Butt joint by Arc welding Demonstration: Gaswelding, Resistance welding& Soldering |
| 5 | Casting | 8. Preparation of mouldcavityusing solid pattern  9. Preparation of mouldcavityusing split pattern  Demonstration: pouring of molten metal |
| 6 | Tin Smithy | 10. Preparation of Rectangular Tray  11. Preparation of Square box |
| 7 | Machine Shop | Turning, Drilling and grinding operations on Lathe, Drilling and grinding machines |
| 8 | Plastic molding& Glass Cutting | 12 a) Injection Moulding  b) Glass Cutting with hand tools |
| 9 | Domestic Appliances | Study of internal components & circuit of appliances such as Fans, Mixers, Air blower, Iron box, Rice cooker, Emergency light etc., |
| 10 | Lab project | Making various components and / or assembling the components which can be useful in domestic / engineering applications |

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| **Year/Sem** | **Sub. Code** | **Subject Name** | L | T | P/D | C |
| II – I | 9HC14 | Complex Variable And Transform Techniques | 2 | 1 | 0 | 3 |

**Pre Requisites**: Mathematics Knowledge at Pre-University Level

**Course Objectives:** *To make the students to understand and expected to learn*

*1. Basic concepts of differential calculus of a complex variable function.*

*2. Complex integration and its application to evaluate definite integrals.*

*3. Concepts of conformal mapping and their properties*

*4. Laplace transforms and the contents of this topic.*

*5. Inverse transform, solving ordinary differential equations using Laplace transforms technique.*

*6. Z-Transforms, Its properties, solving difference equations using Z-Transforms*.

**Syllabus**

***UNIT-I: Complex Variable Differentiation:*** Differentiation, analytic functions, Cauchy-Riemann equations, harmonic functions, finding harmonic conjugate and analytic functions.

***UNIT-II: Complex Variable Integration:*** Cauchy- integral theorem and integral formula (without proofs), singularities, zeros of analytic functions, Residues, Cauchy residue theorem (without proof), Evaluation of definite integral involving sine and cosine functions.

***UNIT-III: Conformal Transformation:***Conformal mapping-Translation, Inversion, Rotation and Magnification, Mobius (Bilinear) transformation- Invariant points of bilinear transformation, cross ratio-Determination of bilinear transformation for three given points.

***Unit-IV: Laplace Transform:*** Laplace transform of standard functions, shifting theorems, change of scale property, Laplace Transform of derivatives and integrals, multiplication by powers of ‘t’, divison by ‘t’ (without proofs). Laplace transform of unit step function, impulse function.

***Unit-V: Inverse Laplace Transform:*** Inverse transform**:** properties, partial fraction method and convolution theorem (without proof). Solution of ordinary differential equations with constant coefficients using Laplace Transforms.

***Unit-VI: Z- Transform:*** Z- Transforms and inverse Z-transforms, properties, damping rule, shifting properties, initial and final value theorems convolution theorem (without proofs). Solution of difference equation by Z- transforms

**Suggested Readings:**

1. R K Jain and S R K Iyengar Advanced Engineering Mathematics, Narosa Publications.

2. Alan Jeffery, Advanced Engineering Mathematics, Academic Press

3. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010.

***Course Outcomes:*** *Students will able to*

1. *Solve the problems on differential calculus of complex variable.*
2. *Solve the problems on contour integration.*
3. *Solve problems on bilinear transformation.*
4. *Evaluate the Laplace transform of a given function.*
5. *Find Inverse Laplace of a transform*
6. *Solve problems on Z-Transform.*

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| **Year/Sem** | **Sub. Code** | **Subject Name** | L | T | P/D | C |
| II – I | 9CC05 | Digital Logic Design  (Common to ECE/ECM/EEE) | 3 | 0 | 0 | 3 |

**COURSE OBJECTIVES:**

To learn the different numbering systems, Boolean functions and design of Combinational circuits

To learn design of Sequential Circuits, design using PLDs and digital controllers using Algorithmic State machines

**COURSE OUTCOMES:**

After completing this course, the students will have demonstrated

[CO1]. An ability to understand number systems and apply the rules of Boolean algebra and K-maps to simplify Boolean expressions.

[CO2]. An ability to design MSI combinational circuits such as full adders, multiplexers, decoders, encoders, Code converters.

[CO3]. An ability to design basic memory units (latches and flip-flops) and sequential circuits such as counters and registers

[CO4]. An ability to design digital design using PLD’s such as ROM’s, PLA’s, PALs and digital controllers using Algorithmic State Machine Charts.

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| **CO** | **Digital Logic Design (8CC02)** | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO 11 | PO 12 | PSO 1 | PSO 2 | PSO 3 |
| CO1 | An ability to understand number systems and apply the rules of Boolean algebra | 2 | 2 | 2 | 2 |  |  |  |  |  |  |  |  | 3 |  |  |
| CO2 | An ability to simplify of Boolean expressions using K-map | 1 | 2 | 2 | 2 |  |  |  |  |  |  |  |  | 3 |  |  |
| CO3 | An ability to design MSI combinational circuits | 2 | 2 | 2 | 2 |  |  |  |  |  |  |  | 2 | 3 |  |  |
| CO4 | An ability to design basic memory units | 2 | 2 | 2 | 2 |  |  |  |  |  |  |  | 2 | 3 |  |  |
| CO5 | An ability to design digital design using PLD’s such as ROM’s, PLA’ s,PAL s. | 1 | 2 | 2 | 2 |  |  |  |  |  |  |  | 2 | 3 |  |  |
| CO6 | An ability to design digital controllersusingAlgorithmic State Machine Charts. | 1 | 2 | 2 | 3 |  |  |  |  |  |  |  | 2 | 3 |  |  |
| **CO** | Overall | 2 | 2 | 2 | 2 |  |  |  |  |  |  |  | 2 | 3 |  |  |

**UNIT – I**[Lecture hrs – 9]

**Number System:**Binary, decimal, octal, hexa decimal, weighted and un-weighted codes.

**Boolean Algebra:** Axiomatic definition of Boolean algebra, Binary operators, postulates of and theorems. Boolean addition, subtraction, 1’s complement, 2’s complement. Switching functions, Canonical forms and Standard forms, Simplification of switching functions using theorems.

**UNIT – II**[Lecture hrs – 8]

**Logic gates:** Basic gates and universal gates.

**Minimization of Switching Functions:** simplification rules, Karnaugh map method, Prime implicants, don’t care combinations, Minimal SOP and POS forms, Quine-McCluskey Tabular Method, Prime Implicant chart.

Application: Design of a Basic Calculator Using Logic Gates.

**UNIT – III**[Lecture hrs – 9]

**Combinational Logic Design:**

Single output and multiple output combinational logic circuit design, AND-OR, OR-AND, and NAND/NOR realizations, Exclusive-OR and Equivalence functions, Binary adders/subtractors, Encoder, Decoder, Multiplexer, Demultiplexer, MUX realization of switching functions, Parity bit generator, Code-converters, Concepts of threshold logic and threshold gates.

Applications: Application of Decoder in Seven Segment Display, application of Encoders in Servomotors.

**UNIT - IV** [Lecture hrs – 9]

**Sequential Circuits-1:**

Classification of sequential circuits (Synchronous, Asynchronous Pulse mode, and Level mode with examples).Basic flip-flops-Triggering and excitation tables.Conversion of flip-flops.

Applications: Application of SR Flip Flop in Switch Debounce Circuit.

**UNIT – V**[Lecture hrs – 9]

**Sequential Circuits-2:**

The sequential circuit model, Asynchronous counters, Design of simple synchronous sequential circuits such as counters (Design of modulo-N counter, Ring counter, twisted ring counter) and Shift registers

Applications: Design of 1010 sequence detector, Design of Digital Clock using Counters

**UNIT – VI**[Lecture hrs – 9]

**Programmable LogicDevices:**

Basic PLD’s-ROM, PROM, PLA, and PLD Realization of Switching functions using PLDs. Algorithmic State Machines: State machines and state diagrams.

Applications: Design of a Weighing machine and Binary multiplier.

**Text Books:**

[T1]. Morris Mano-,Digital design –PHI, 2nd Edition.

[T2}. ZviKohavi and Niraj K Jha -Switching & Finite Automata theory – Cambridge, 3rd Edition.

**References:**

[R1]. Fletcher -An Engineering Approach to Digital Design – PHI.

[R2]. Fundamentals of Logic Design, Roth, Kenny, Seventh Edition, Cengage Learning

[R3]. R.P.Jain-Switching Theory and Logic Design- TMH Edition,2003.

[R4]. CVS Rao -Switching Theory and Logic Design –Pearson Education, 2005

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| **Year/Sem** | **Sub. Code** | **Subject Name** | L | T | P/D | C |
| II – I | 9CC01 | Electronic Devices and Circuits | 3 | 0 | 0 | 3 |

**Course Objectives**

* To provide the learners a comprehensive understanding of electronic Components like Diodes, Transistors, Field Effect transistors and their applications.
* To maintain the right blend of theory and practice in analyzing and designing of Amplifiers and Oscillators.

**Course Outcomes**

**After studying this course, the students will be able to**

1. Demonstrate the concepts of pn Diode, Zener Diode, Bipolar Junction Transistor, Field Effect Transistor and their characteristics.
2. Design and Analyze the Amplifier circuits using BJT and FET.
3. Classify and characterize the Feed Back amplifiers and design various Oscillator circuits.
4. Understand the Basic regulator circuits and voltage multipliers.

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| **CO** | **Electronic Devices and Circuits (8CC01)** | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO 11 | PO 12 | PSO 1 | PSO 2 | PSO 3 |
| CO1 | Understand the operation of semiconductor diode | 3 |  |  |  |  |  |  |  |  |  |  |  | 1 |  |  |
| CO2 | Understand the Fundamentals of BJT operation, | 2 | 2 |  |  |  |  |  |  |  |  |  |  | 1 |  |  |
| CO3 | Understand the Fundamentals of SCR, JFET operation . | 3 | 2 | 1 |  |  |  |  |  |  |  |  |  | 2 |  |  |
| CO4 | Understand the Analysis and design of Amplifier and Oscillators | 2 | 2 | 2 |  |  |  |  |  |  |  |  |  | 2 |  |  |
| CO5 | Understand the Basic regulator circuits and voltage multipliers.  . | 2 | 2 | 3 |  |  |  |  |  |  |  |  |  | 2 |  |  |
| CO6 | Explore the various number systems | 1 | 2 | 1 |  |  |  |  |  |  |  |  |  | 2 |  |  |
| **CO** | Overall | 2 | 2 | 2 |  |  |  |  |  |  |  |  |  | 2 |  |  |

**UNIT-I**

**PN JUNCTION DIODE: [CO1]**[T1][Lecture hrs – 10]

P-N Junction diode characteristics and applications under forward & reverse bias.Transition capacitance and Diffusion capacitance. Break down of junctions (Avalanche Break Down and Zener Break down). Zener Diode Characteristics.

P-N junction diode as a Rectifier :Half wave Rectifier, Full wave Rectifier, Bridge Rectifier, Analysis of Rectifier circuits without and with filters (Inductor and Capacitor Filters ).

**UNIT- II**

**BIPOLAR JUNCTION TRANSISTOR:[CO1]**[T1][Lecture hrs – 10]

Fundamentals of BJT& Operation, Minority carrier profiles. I/P and O/P Characteristics CB, CE and CC configurations.Transistor as a switch. Switching characteristics (Rise time, Fall time, Delay Time and Storage time), Design of transistor as switch. Problems on transistor switch. BJT Biasing Methods & Stabilization. - Fixed Bias, Collector to Base Bias, Voltage Divider Bias and Problems, Concept of Thermal runway in BJT.

**UNIT-III**

**Small signal & High frequency analysis of BJT:[CO2]**[T1][Lecture hrs – 8]

Small signal Low frequency Model of BJT, h-parameter representation – Exact analysis of .CE Amplifier-.Approximate analysis of CE, CB and CC Amplifiers. Concept of Multistage amplifier - N-stage cascaded amplifier, equivalent circuits, Frequency response of single & two stage RC coupled Amplifier, Analysis at Low and High frequencies.

Hybrid π model – relationship between high frequency parameters and h- parameters, β cut off Frequency (common Emitter short circuit Current gain), Millers Theorem.

**UNIT-IV**

**FIELD EFFECT TRANSISTOR:[CO1][CO2]**[T1] [Lecture hrs – 9]

Construction & Working of JFET, JFET characteristics, FET Parameters, Construction & Working of MOSFET, MOSFET characteristics,(Enhancement and depletion mode); Comparison of JFET & MOSFET

Biasing of JFET - Self bias and fixed bias. Small signal Analysis of common source, common drain and common gate amplifier configurations

**UNIT- V [CO3]** [T1][Lecture hrs – 8]

**FEED BACK AMPLIFIERS**

Fundamentals-classification- Characteristics of feedback Amplifier effect of feedback in voltage series, voltage shunt, current series and current shunt amplifiers. Problems

**OSCILLATORS**

Classification of Oscillators. Condition for Oscillations. RC Phase shift Oscillator , Wein bridge oscillator- Hartley oscillator, Colpitts oscillator, Quartz crystal Oscillator,

**UNIT-VI**

**VOLTAGE REGULATORS:[CO4]**[T1][T2][Lecture hrs – 9]

Classification of Voltage Regulators - Basic regulator circuit: Zener, Transistor Based: Shunt and Series Voltage regulators. Protection Circuits: Current limiting, Short circuit protection. Specifications of Voltage regulator, Voltage multipliers. Switching Regulators – (boost up, step down (buck) &Flyback)

*Text Books*

[T1]Electronic Devices and Crcuits-J.Millman, C.C.Halkias and satyabrathajit Tata McGraw Hill,2 Ed. 2007

[T2]Electronic Devices AND Circuits-R.L.Boylestad&LouisNashelsky, Pearson/Prentice Hall, 9th edition, 2006.

**References**

[R1]Electronic circuit analysis-K.Lal Kisshore,2004,BSP

[R2] Electronic Devices and Circuits by S.Salivahanan and N.Suresh Kumar, Tata McGraw Hill Publications

[R3] Electronic Devices and Crcuits by SanjeevGuptha,DhapatRai Publications.

[R4] Electronic Devices and Circuits – K.LalKishore, 2 ed., 2005, BSP

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| **Year/Sem** | **Sub. Code** | **Subject Name** | L | T | P/D | C |
| II – I | **9A312** | **MEASUREMENTS & INSTRUMENTATION** | 2 | 0 | 0 | 2 |

**Course Objective:**

The basic principles of all measuring instruments and in measurement of electrical and non-electrical parameters viz., Resistance, Inductance, Capacitance, voltage, current Power factor, Power, Energy, Strain, Temperature, Torque, Displacement etc. and the different types of electrical and non electrical transducers. It introduces the different signal analyzers and oscilloscopes.

**Course Outcomes:** The student should be able to

1. Understand the principle of operation of different types of instruments viz., PMMC, moving iron type of instruments, the required characteristics of an instrument in general. The student demonstrates the ability to compensate for the errors in the instruments and to extend the range of the instruments.
2. Demonstrates the knowledge of Potential and Current transformers; the errors in them and the effect of having an open/short in the secondary circuits; Understand the principle of operation of Dynamometer and Moving-iron type of Power factor meters.
3. Comprehends the principle of operation of dynamometer type of Wattmeter and Induction type of Energy meter; use the wattmeter to measure the Active and Reactive power and demonstrates the ability to extend the range of them.
4. Identify and use different techniques of measurement of Resistance, Inductance and Capacitance values.
5. Understand the principle of operation of Different type of digital voltmeters, wave analyzers, spectrum analyzers and Cathode ray Oscilloscope.
6. Demonstrates the ability in characterizing the different types of transducers and uses them to measure Strain, Gauge Sensitivity, Displacement, Velocity, Acceleration, Force, Torque and Temperature.

**CO-PO MAPPING TABLE (Overall Course Mapping)**

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| **Course Name/ PO** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** |
| **Measurements & Instrumentation (M&I)** |  |  |  |  |  | X | X | X | X | X |  | X |  |  |

**COURSE (UNIT WISE) OUTCOME MAPPING WITH POS**

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| **CO**  **(Unit Wise)** | **Statement** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | PSO 1 | PSO2 |
| Unit – 1 | CO-1 | 3 | 2 | 2 |  |  |  |  |  | 1 |  |  |  |  |  |
| Unit – 2 | CO-2 | 3 | 2 | 2 | 1 |  | 1 |  |  | 1 |  |  |  | 1 |  |
| Unit – 3 | CO-3 | 3 | 2 | 2 |  |  | 1 |  |  | 1 |  |  |  |  |  |
| Unit – 4 | CO-4 | 3 | 2 | 2 |  |  |  |  |  | 1 |  |  |  |  |  |
| Unit – 5 | CO-5 | 3 | 2 | 1 | 1 |  |  |  |  | 1 | 1 |  |  |  |  |
| Unit – 6 | CO-6 | 3 | 2 | 1 |  | 1 |  |  |  | 1 |  |  |  |  |  |

**NOTE:** L, M, H are the Low, Medium and High Levels of contribution

**UNIT-I MEASURING INSTRUMENTS- INSTRUMENT TRANSFORMERS:**

Significance of Measurement, static characteristic of system- Linearity, Sensitivity, Precision, Accuracy - Classification - Deflecting, Control and Damping torques, Ammeters and Voltmeters, PMMC, Moving iron type instruments, Expression for the Deflecting torque and Control torque, Errors and Compensations, Extension of range using Shunts and Series resistance.

**UNIT –II: INSTRUMENT TRANSFORMERS**

Introduction, advantages, burden of instrument transformer, Current Transformer - errors in current transformer, Effect of secondary open circuit, Potential transformer- errors in potential transformer, Testing of current transformers with silsbee’s method.

Power Factor Meters: Type of P.F. Meters, Dynamometer and Moving iron type, 1- ph and 3-ph meters.

**UNIT –III MEASUREMENT OF POWER& ENERGY:**

Single phase dynamometer wattmeter-LPF and UPF-Double element and three element dynamometer wattmeter, Expression for deflecting and control torques, Extension of range of wattmeter using instrument transformers, Measurement of active and reactive powers in balanced and unbalanced systems, Single phase induction type energy meter, Driving and braking torques, Testing by phantom loading, Three phase energy meter .

**UNIT - IV MEASUREMENT OF RESISTANCE - MAGNETIC MEASUREMENTS- A.C. BRIDGES:**

Principle and operation of D.C. Crompton’s potentiometer, Standardization, Measurement of unknown resistance, current, voltage. Method of measuring low- Medium and High resistance, sensitivity of Wheatstone’s bridge, Carey Foster’s bridge, Kelvin’s double bridge for measuring low resistance, Measurement of high resistance, loss of charge method, Measurement of inductance, Quality Factor, Maxwell’s bridge, Hay’s bridge, Anderson’s bridge, Owen’s bridge. Measurement of capacitance and loss angle, Desauty Bridge, Wien’s bridge, Schering Bridge.

**UNIT-V DIGITAL VOLTMETERS- SIGNAL ANALYZERS- CRO:**

Digital voltmeters, Successive approximation, Ramp, Dual slope integration continuous balance type, Wave Analyzers, Frequency selective analyzers, Heterodyne, Application of Wave analyzers, Harmonic Analyzers, Total Harmonic distortion, spectrum analyzers, Basic spectrum analyzers, Spectral displays, Q meter and RMS voltmeters . CRO- Cathode Ray Tube (CRT), Screens, Probes, Applications of CRO, Measurement of frequency and phase using CRO, Block diagram.

**UNIT-VI MEASUREMENT OF NON-ELECTRICAL QUANTITIES:**

Transducers - Classification of transducers, Advantages of Electrical transducers, Characteristics and choice of transducers, Principle operation of Resistor, Inductor, LVDT and Capacitor transducers, LVDT Applications, Strain gauge and its principle of operation, Guage factor- Thermistors, Thermocouples, Piezo electric transducers, Photovoltaic, Photo conductive cells. Measurement of strain, Gauge Sensitivity, Displacement, Velocity, Acceleration, Force, Torque, Measurement of Temperature.

**TEXT BOOKS:**

1. Electrical Measurements and measuring Instruments – E.W. Golding and F.C. Widdis, 5th Edition, Wheeler Publishing.

2. Transducers and Instrumentation– D.V.S Murthy, Prentice Hall of India, 2nd Edition.

3. A course in Electrical and Electronic Measurements and Instrumentation -A.K. Sawhney, Dhanpatrai & Co. 18th Edition.

**REFERENCES:**

1. Measurements Systems, Applications and Design – D O Doeblin- Tata MC Graw-Hill.

2. Principles of Measurement and Instrumentation – A.S Morris, Pearson /Prentice Hall of India.

3. Electronic Instrumentation- H.S. Kalsi Tata MC Graw – Hill Edition, 3rd Edition.

4. Modern Electronic Instrumentation and Measurement techniques – A.D Helfrick and W.D.Cooper, Pearson/Prentice Hall of India.

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| **H** | **M** |  |  | **L** |  |  |  |  |  |  | **L** |

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| **Year/Sem** | **Sub. Code** | **Subject Name** | L | T | P/D | C |
| II – I | **9A302** | **ELECTRO MAGNETIC FIELDS** | 2 | 0 | 0 | 2 |

**Course Objective:** Students learn about fundamental concepts of static and dynamic electric fields.

**Course Outcomes:**

1. Understand the Principle of electrostatics.
2. Understand the principle of dipole and field due to dipole.
3. Understand the Fundamentals of dielectrics and calculation of capacitance.
4. Understand the Fundamentals of Ampere circuital law and force in magnetic field.
5. Understand the magnetic dipole and magnetic potential.
6. Understand the self and mutual inductance and time varying fields.

**UNIT – I ELECTROSTATICS:**

Coordinate systems-Cartesian, Spherical and Cylindrical coordinate systems- Conversion of coordinates to other systems.

Electrostatic Fields – Coulomb’s Law – Electric Field Intensity (EFI) – EFI due to a line and a surface charge – Work done in moving a point charge in an electrostatic field – Electric Potential – Properties of potential function – Potential gradient – Guass’s law – Application of Guass’s Law – Maxwell’s first law, div ( D )=ρv-Laplace’s and Poison’s equations.

**UNIT – II ELECTRIC DIPOLE & CONDUCTORS:**

Electric dipole –Dipole moment – potential and EFI due to an electric dipole – Torque on an Electric dipole in an electric field, Energy stored and energy density in a static electric field.

Behavior of conductors in an electric field, Conductors and Insulators, Current density – conduction and Convection current densities – Ohm’s law in point form – Equation of continuity.

**UNIT – III DIELECTRICS, CAPACITANCE & MAGNETO STATICS:**

Electric field inside a dielectric material – polarization – Dielectric – Conductor and Dielectric – Dielectric boundary conditions, Capacitance – Capacitance of parallel plate and spherical and co-axial capacitors with composite dielectrics.

Static magnetic fields – Biot-Savart’s law – Oesterd’s experiment - Magnetic field intensity (MFI) – MFI due to a straight current carrying filament – MFI due to circular, square and solenoid current – Carrying wire – Relation between magnetic flux, magnetic flux density and MFI – Maxwell’s second Equation, div(B)=0-

**UNIT – IV AMPERE’S CIRCUITAL LAW & FORCE IN MAGNETIC FIELDS:**

Ampere’s circuital law and its applications viz. MFI due to an infinite sheet of current and a long current carrying filament – Point form of Ampere’s circuital law – Maxwell’s third equation, Curl (H)=Jc, Field due to a circular loop, rectangular and square loops.

Magnetic force - Moving charges in a Magnetic field – Lorentz force equation – force on a current element in a magnetic field – Force on a straight and a long current carrying conductor in a magnetic field – Force between two straight long and parallel current carrying conductors –

**UNIT – V MAGNETIC DIPOLE & MAGNETIC POTENTIAL:**

Magnetic dipole and dipole moment – a differential current loop as a magnetic dipole – Torque on a current loop placed in a magnetic field.

Scalar Magnetic potential and its limitations – vector magnetic potential and its properties – vector magnetic potential due to simple configurations – vector Poisson’s equations.

**UNIT – VI SELF & MUTUAL INDUCTANCE AND TIME VARYING FIELDS:**

Self and Mutual inductance – Neumans’s formulae – determination of self-inductance of a solenoid and toroid and mutual inductance between a straight long wire and a square loop wire in the same plane – energy stored and density in a magnetic field.

Time varying fields – Faraday’s laws of electromagnetic induction – Its integral and point forms –Maxwell’s fourth equation, Curl (E)=-∂B/∂t – Statically and Dynamically induced EMFs – Simple problems -Modification of Maxwell’s equations for time varying fields – Displacement current – Poynting Theorem and Poynting vector.

**TEXT BOOKS:**

1. Engineering Electromagnetism - William H. Hayt & John. A. Buck Mc. Graw-Hill Companies, 7th Editon.2006.

2. Electro magnetic Fields - Sadiku, Oxford Publications

**REFERENCES:**

1. “Introduction to Electro Dynamics” - D J Griffiths, Prentice-Hall of India Pvt. Ltd, 2nd edition

2. “Electromagnetics” - J P Tewari.

3. “Electromagnetics” - J. D Kraus Mc Graw-Hill Inc. 4th edition 1992.

4. “Electromagnetic fields”, S. Kamakshaiah, Right Publishers, 2007.

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| **Year/Sem** | **Sub. Code** | **Subject Name** | L | T | P/D | C |
| II – I | **9A303** | **ELECTRICAL MACHINES – I** | 2 | 0 | 0 | 2 |

**Course Objective:** Electrical machines course is one of the important courses of the Electrical discipline. In this course the different types of DC generators and motors which are widely used in industry are covered and their performance aspects will be studied.

**Course Outcomes:**

1. Understand the Electromechanical Energy conversion.
2. Understand the constructional features & Principle of operation of DC machine.
3. Understand the characteristic features of DC machines.
4. Understand the starting & speed control techniques of various types of DC motors.
5. Analyze the various testing procedures of DC machines.
6. Understand the various applications of DC machines.

**UNIT – I: ELECTROMECHANICAL ENERGY CONVERSION:**

Electromechanical Energy conversion – forces and torque in magnetic field systems – energy balance – energy and force in a singly excited magnetic field system, determination of magnetic force - co-energy – multi excited magnetic field systems.

**UNIT – II: D.C. GENERATORS & ARMATURE REACTION:**

D.C. Generators, Principle of operation, Action of commutator, Constructional features, Armature windings, Lap and wave windings, Simplex and multiplex windings, Use of laminated armature, E. M.F Equation, Problems. Armature reaction, Cross magnetizing and de-magnetizing AT/pole, compensating winding, Commutation reactance voltage, Methods of improving commutation, Simple Problems.

## **UNIT – III TYPES OF D.C GENERATORS:**

Methods of Excitation, Separately excited and self excited generators, Build-up of E.M.F, Critical field resistance and critical speed, Causes for failure to self excite and remedial measures, Problems.

## **UNIT –IV LOAD CHARACTERISTICS OF GENERATORS**:

Load characteristics of shunt, Series and compound generators, Parallel operation of d.c shunt and series generators, Load sharing, Problems.

## **UNIT – V D.C. MOTORS AND SPEED CONTROL METHODS:**

D.C Motors, Principle of operation, Back E.M.F, Torque equation, Characteristics and application of shunt, Series and compound motors, Speed control of d.c. Motors: Armature voltage and field flux control methods. Ward-Leonard system, Principle of 3 point and 4 point starters, Protective devices, Problems.

## **UNIT – VI TESTING OF D.C. MACHINES:**

Losses in a D.C. Machines, Calculation of efficiency, Condition for maximum efficiency, Methods of Testing, brake test , Swinburne’s test, Hopkinson’s test and Field’s test, Problems.

**TEXT BOOKS:**

1. Electrical Machines, P.S. Bimbra, Khanna Publishers.
2. Principles of Electrical Machines, V. K. Mehta, Rohit Mehta, S. Chand Publishing.

**REFERENCE BOOKS:**

1. Electric Machines, Mulukutla S. Sarma, Mukesh K. Pathak, Cengage Learning.
2. Electric Machines by I.J. Nagrath & D.P. Kothari, Tata Mc Graw – Hill Publishers.
3. Fundamentals of Electric Machines, B. R. Gupta, Vandana Singhal, New Age International Publishers.
4. Electrical Machines, M. V. Deshpande, PHI Learning Private Limited.
5. Electrical Machines, R. K. Srivastava, Cengage Learning.

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| II – I | **9A304** | **ELECTRICAL CIRCUITS and NETWORKS- II** | 2 | 0 | 0 | 2 |

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| **H** | **M** |  |  |  |  |  |  |  |  |  | **L** |

**H: High M: Medium L: Low**

**Course Objective:** Students learn about fundamental concepts of electrical engineering.

**Course Outcomes:**

1. Understand the three phase circuits.
2. Understand the DC and AC transients.
3. Understand the network functions.
4. Analyze the network parameters.
5. Understand the different types of filters.
6. Understand the Fourier analysis of AC circuits.

**UNIT – I: THREE PHASE CIRCUITS:**

Phase sequence, Star and delta connection, Relation between line and phase voltages and currents in balanced system, Analysis of balanced and unbalanced 3 phase circuits, Measurement of 3Φ active power by two watt meter method and reactive power by one watt meter method.

**UNIT – II: D.C AND A.C. TRANSIENT ANALYSIS:**

Transient response of R- L, R-C, R-L-C circuits (Series and parallel combination) for D.C. excitation, Initial conditions, Solution method using differential equation and Laplace transforms. Transient response of R- L, R-C, R-L-C circuits (Series and parallel combination) for sinusoidal excitations, Initial conditions, Solution method using differential equation and Laplace transforms.

**UNIT – III: NETWORK FUNCTIONS:**

The concept of complex frequency, Physical interpretation of complex frequency, Transform impedance and transform circuits, Series and parallel combination of elements, Terminal pairs or ports, Network functions for the one port and two-port, Poles and zeros of network functions, Significance of poles and zeros, Properties of driving point functions, Properties of transfer Functions, Necessary conditions for driving point functions, Necessary conditions for transfer functions, Time domain response from pole zero plot.

**UNIT – IV: NETWORK PARAMETERS:**

Two port network parameters, Z, Y, ABCD and hybrid parameters and their relations, Series, parallel and cascaded networks, Concept of transformed network, 2 port network parameters using transformed variables.

**UNIT – V: FILTERS:**

Classification of filters, Filter networks, Characteristic impedance in the pass and stop bands, Constant k and m – derived T – Section filters (Low pass, High pass, Band pass and Band stop), illustrative problems.

**UNIT – VI: FOURIER ANALYSIS OF A.C. CIRCUITS:**

The Fourier theorem, Consideration of symmetry, Exponential form of Fourier series, Line spectra and phase angle spectra, Fourier integrals and Fourier transforms, Properties of Fourier transforms.

**TEXT BOOKS:**

1. Circuit theory (Analysis & Synthesis) - A.Chakravarthy, Dhanpath Rai & Co., 6th edition.
2. Circuits & Networks (Analysis, Design & Synthesis) – M.S. Sukhija, T.K. Nagasarkar, Oxford University Press, 2nd edition.

**REFERENCES:**

1. Engineering circuit analysis - William Hayt and Jack E.Kemmerly, Tata McGraw - Hill Company, 6th edition.
2. Circuits & Networks - A.Sudhakar and Shyamamohan S.Palli, Tata McGraw – Hill, 3rd edition.

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| **Syllabus for B. Tech (E.E.E.) – A22 regulation** | | | | | | |
| **Year/Sem** | **Sub. Code** | **Subject Name** | **L** | **T** | **P/D** | **C** |
| II – I | 9ZC01 | Business Economics And Financial Analysis | 3 | 0 | 0 | 3 |

*Co1:TounderstandthenuancesofBusinessanditsrelationtoeconomics*

*Co2:Tounderstandthe production function and cost concepts*

*Co3:Tolearnthebasicmarketstructuresandtheirrelevancetobusiness*

*Co4:Tolearnthefundamentals of financial accounting concepts*

*Co5:Toapplythefundamentalconceptsoffinancialaccountinginpreparationoffinancialstatements.*

*Co6:Tounderstand the financial ratios that are used to analyze the financial performance of the company.*

**UNITI:** **INTRODUCTIONTOBUSINESSECONOMICS:**

Definition, Nature and Scope of Business Economics, Micro and Macro Economics concepts- National Income, Gross domestic product (GDP), Per capita income, Demand Analysis: Demand Determinants,Law of Demand and its exceptions, Elasticity of Demand, Types of Elasticity of Demand andDemandForecasting–StatisticalandNon-Statisticaltechniques.

**UNITII:** **THEORYOFPRODUCTIONANDCOSTANALYSIS:**

Production Function – Isoquants and Isocosts, Internal and External Economies of Scale, Law ofReturns Cost Analysis: Cost concepts, different types of costs,Break-even Analysis (BEA)-DeterminationofBreak-EvenPoint(simpleproblems).

**UNITIII:** **INTRODUCTIONTOMARKETS**

Marketstructures:Typesofcompetition,FeaturesofPerfectcompetition,MonopolyandMonopolisticCompetition,PricingMethods andstrategies.

**UNITIV: FINANCIALACCOUNTING-I:**

Accounting concepts and Conventions, Double-Entry system of Accounting, Accounting Cycle,RulesformaintainingBooks of Accounts,Journal, PostingtoLedger,Preparation of TrialBalance.

**UNITV: FINANCIAL ACCOUNTING –II:**

IntroductiontoFinalaccounts,RevenueandCapitalExpenditure,elementsof FinancialStatements,PreparationofFinalAccountswithsimpleadjustments (simpleproblems)

**UNIT-VI: FINANCIALANALYSISTHROUGHRATIOS:**

Conceptof Ratio Analysis, Various Types ofRatios:Liquidity Ratios (short term solvencyratios), Leverage Ratios (long term solvency ratios), TurnoverRatios and Profitability Ratios(simpleproblems).

**TEXTBOOKS:**

* Aryasri:ManagerialEconomicsandFinancialAnalysis,2/e,TMH,2005.

**REFERENCES:**

* Ambrish Gupta, Financial AccountingforManagement, Pearson Education, New Delhi.
* H.CraigPeterson&W.CrisLewis,ManagerialEconomics,PHI,4thEd.
* Suma Damodaran, Managerial Economics, Oxford University Press.

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| **Year/Sem** | **Sub. Code** | **Subject Name** | L | T | P/D | C |
| II – I | 9HC63 | Soft Skills Lab | 0 | 1 | 2 | 2 |

**Course objectives:**

To enable students to:

make self-assessment.

know the importance of certain soft skills like time management and goal setting.

enhance their team skills and design thinking capabilities for effective critical thinking and creativity.

know their emotional quotient which guides their thinking, behavior and helps them manage stress efficiently.

**Tutorial (1 per week)**

**Unit-1**

* 1. Introduction to soft skills
  2. SWOT / SWOC Analysis
  3. SWOT / SWOC Grid
  4. Johari window

**Unit-2**

* 1. Emotional intelligence
  2. Time management
  3. Goal Setting

**Unit-3**

3.1 Attitude

3.2 Professional etiquette & Grooming

**Unit-4**

4.1 Styles of Communication

4.2 **Inter-personal Skills**

4.3 Team work, Team building

4.4 Leadership Skills

**Unit-5**

5.1 Problem Solving & Decision making

5.2 Critical & Creative thinking

**Unit-6**

6.1 Values : Personal, Social & Cultural

**Lab (2 per week)**

**Unit-1**

* Activities based on Soft skills
* Self-Analysis
* Questionnaire,
* SWOT Practice

**Unit-2**

Activities :

* big picture challenge
* Goal setting charts

**Unit-3**

Practice activities on

* Attitude
* Professional etiquette & Grooming

**Unit-4**

* Activities on social skills
* Role Plays
* Team building activities

**Unit-5**

Practice activities on

* Problem solving situations
* Games and puzzles
* Case Studies and Group Discussions on decision making and problem solving, creativity and innovation.

**Unit-6**

Practice activities

* Role Plays

**Text Book:** SOFT SKILLS – Dr. K. Alex, S. Chand publications  
**Suggested Readings: \*** SOFT SKILLS – MeenakshiRaman ; \* Step Ahead with Soft Skills - Oxford University Press ; \* Skill Sutras- JayashreeMohanraj \* The Power of Soft Skills – Robert A. Johnson ; \* Soft Skills for Everyone – Jeff Butterfield

**Course Learning Outcomes:**

After completion of the course, the student will be able to:

## Determine the significance of soft skills in the working environment

## Understand how to demonstrate empathy in a wide range of situations.

## Effectively communicate through verbal/oral communication and improve the listening

## Become more effective individual through goal/target setting, self motivation and practicing creative thinking.

## Develop a positive and responsible *attitude* to their own well-being

## Identify stress factors and handle stress effectively.

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| **Year/Sem** | **Sub. Code** | **Subject Name** | L | T | P/D | C |
| II – I | 9CC71 | Electronic Devices and Circuits Lab  (Common to ECE/ECM/EEE) | 0 | 0 | 3 | 1.5 |

**Course Objectives:**

This course introduces the characteristics and applications of semiconductor devices; emphasis is placed on characteristics and testing practically to strengthen the knowledge.

**Course Outcomes:**

After studying this course, the students will be able to

1. Understand color coding, operations on Diode, BJT, FET and other electronic components.
2. Correlate theoretical concepts with practical implementation.
3. Apply the knowledge of Diodes, Capacitors and Transistors for the realization of rectifiers, regulators, amplifiers and Oscillator circuits.
4. Adapt effective Communication, presentation and report writing skills

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| **CO** | **Electronic Devices & Circuits Lab (8CC71)** | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO 11 | PO 12 | PSO 1 | PSO 2 | PSO 3 |
| CO1 | Identify, Specify and test R, L, C Components (Colour Codes), Potentiometers, Switches, Coils, Relays |  | 1 |  | 3 |  |  |  |  | 2 |  |  |  | 2 |  |  |
| CO2 | Identify, Specify and test Active Devices, Diodes, BJTs, Low power JFETs, MOSFETs, Power Transistors, LEDs, LCDs, SCR, UJT | 1 | 2 |  | 3 |  |  |  |  | 2 |  |  |  | 2 |  |  |
| CO3 | Describe operation of Multimeters, Function Generator and Regulated Power Supplies | 1 | 1 |  | 3 |  |  |  |  | 2 |  |  |  | 2 |  |  |
| CO4 | Explain and use CRO for experiments | 1 | 2 | 2 | 3 |  |  |  |  | 2 |  |  |  | 2 |  |  |
| CO5 | Explain and demonstrate working of PN Junction diode characteristics | 2 | 2 | 2 | 3 |  |  |  |  | 2 |  |  |  | 2 |  |  |
| CO6 | Explain and demonstrate working Half and Full wave Rectifier with and without filters | 2 | 2 | 2 | 3 |  |  |  |  | 2 |  |  |  | 2 |  |  |
| **CO** | **Overall** | 1 | 2 | 2 | 3 |  |  |  |  | 2 |  |  |  | 2 |  |  |

**PART A**

**Electronic Workshop Practice (in 3 lab sessions):**

1. Identification, Specifications, Testing of R, L, C Components (Colour Codes), Potentiometers, Bread Boards.
2. Identification and Specifications of Active Devices like Diodes, BJTs and JFETs.
3. Study and operation of
   * Digital Multimeters
   * Function Generator
   * Regulated Power Supplies
   * Soldering
   * SMD components

**PART B**

**(For Laboratory examination – Minimum of 10 experiments)**

1. Study and Operation of CRO:Oscilloscope, CRT features, vertical amplifiers, horizontal deflection system, sweep, trigger Pulse, delay line, probes for CRO, Measurement of amplitude and frequency. Time Period measurement, Lissajous patterns.
2. Determination of Cut-in Voltage, Forward and Reverse resistances of PN Junction diode usingV-I Characteristics.
3. Zener diode characteristics and Zener as voltage Regulator.
4. Input and output characteristics of BJT in CB Configuration.
5. Input and output characteristics of BJT in CE Configuration.
6. Half wave rectifier with and without filters.
7. Full wave rectifier (Center trapped and Bridge) with and without filters.
8. Drain and Transfer characteristics of FET in CS Configuration.
9. Common Emitter Amplifier Characteristics
10. Common Collector Amplifier Characteristics (Emitter Follower).
11. FET amplifier (Common Source).
12. RC Phase Shift Oscillator.

**Major Equipment required for Laboratories:**

1. Regulated Power Suppliers, 0-30V

2. 20 MHz, Dual Channel Cathode Ray Oscilloscopes.

3. Functions Generators-Sine and Square wave signals

4. Multimeters

5. Electronic Components

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| **Year/Sem** | **Sub. Code** | **Subject Name** | L | T | P/D | C |
| II – I | **9A371** | **ELECTRICAL CIRCUITS AND NETWORKS ANALYSIS LAB** | 0 | 0 | 3 | 1.5 |

***Course Objectives:***

***To make the student to learn:***

1. *Verification of network theorems experimentally.*
2. *To measure frequency of RLC series and parallel circuits under resonance*
3. *To determine self & mutual inductance and co-efficient of coupling for coupled circuits*
4. *The construction of current locus diagram for a given parallel circuit.*
5. *Simulation for analysis of electrical networks*
6. *Method for determining the parameters of a coil*

***Course Outcomes:***

***At the end of the course, students will be able to***

1. *Perform the test for verification of various network theorems*
2. *Measure the frequency for a RLC series/parallel circuits under resonance.*
3. *Conduct an experiment for determination of self & mutual inductance and coefficient of coupling*
4. *Construct current locus diagram by performing a test on single phase parallel circuits*
5. *Simulate for analysis of electrical circuits.*
6. *Determine the parameters of the coil*

**List of Experiments (ANY 10 Experiments to be conducted)**

1. Verification Thevenin’s Theorem and Norton’s Theorem
2. Verification of Maximum Power Transfer Theorem
3. Verification of Superposition Theorem
4. Verification of Compensation Theorem
5. Verification of Reciprocity Theorem and Millmann’s Theorem
6. Finding resonant frequency in Series and Parallel circuits
7. Determination of Self Inductance, Mutual Inductance and Coefficient of coupling
8. Calculation of Z and Y Parameters
9. Construction of current locus diagram for RL and RC circuit
10. Mesh and Nodal Analysis by simulation
11. Determination of Average value and RMS value of a complex wave
12. Determination of parameters of a coil.
13. Determination of Time constant of RL and RC series circuit.

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| **Year/Sem** | **Sub. Code** | **Subject Name** | L | T | P/D | C |
| II – II | **9HC15** | **PROBABILITY AND STATISTICS** | 2 | 1 | 0 | 3 |

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| **PO’s** | 1 | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** |
| **Level** | **H** | **H** | **M** |  |  |  |  |  |  |  |  |  |

**Pre Requisites**: Mathematics Knowledge at Pre-University Level

## Course Objectives:

1. Concept of random variables and probability distributions.
2. Sampling distributions and their properties and the concepts on estimation.
3. Concepts on testing the hypothesis concerning to large samples.
4. Topics concerned to small size samples and goodness of fit and independence of attributes.
5. Contents of correlation.
6. Method of least squares and regression.

## Course Outcomes:

After completion of the course, the student will be able to:

1. Solve the random variable problems and probability distributions.
2. Simplify the problems on sampling distribution, estimate the parameters using central limit theorem.
3. Solve problems on test the hypothesis related to large size samples
4. Apply and solve the problems using t-test, Chi-square test.
5. Discuss the problems on correlation.
6. Prove the problems on curve fitting using least square method and can solve problems on regression.

## UNIT-I: **Random Variables and Probability Distributions:**

## Random variables – Discrete and Continuous, probability mass and density functions, expectation and variance. Binomial, Poisson and Normal Distributions.

## UNIT-II: **Sampling Distributions and Estimation:**

## Sampling distribution of the mean (σ - known and unknown), sums and differences, Central limit theorem. Estimation: Point estimation and Interval estimation concerning means for large samples.

## UNIT-III:

**Tests of Hypothesis for Large Samples:** Tests of Hypothesis, Type–I and Type-II Errors, Hypothesis testing concerning one mean and two means and test of hypothesis concerning to one Proportion and difference of proportions.

## UNIT-IV:

**Tests of Hypothesis for Small Samples**: Student t-test, Hypothesis testing concerning one mean and two Means, F-test and 2 test-Goodness of fit, Independence of Attributes.

## UNIT-V:

**Correlation:** Types of correlation, coefficient of correlation, Properties. Methods of finding the coefficient of correlation, Scatter diagram, direct method - Karl Pearson’s formula Spearman’s rank correlation,

## UNIT-VI:

**Curve fitting and Regression:** Curve fitting by the method of least squares- fitting of straight lines, second degree parabolas and more general curves. Types of Regression- linear regression, multiple regressions.

## TEXT BOOKS:

* 1. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th

Reprint, 2010.

* 1. Miller and Freund’s, Probability and Statistics for Engineers, 8th Edition, Pearson Educations
  2. S C Gupta and V K Kapoor, Fundamentals of Mathematical statistics, Khanna publications.

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| **Year/Sem** | **Sub. Code** | **Subject Name** | L | T | P/D | C |
| II – II | 9HC16 | Quantitative Aptitude & Logical Reasoning | 3 | 0 | 0 | 3 |

**Pre Requisites**: Nil

**Course objectives:***To answer general problems in his everyday life within in short time and to improves the certain skills of a student such as numerical and logical ability, mental capacity and also in sharpening minds.*

**Syllabus**

**Unit I:**Number System: Test for Divisibility, Test of prime number, Division and Remainders – HCF and LCM of Numbers–Fractions and Decimals -Average-Problems on Ages- Problems on Numbers- Ratio and Proportion.

**Unit II:**Percentage – Profit, Loss and Discount – Partnership and Share-Simple Interest - Compound Interest. Time and Work- Pipes and Cisterns-Time and Distance- Problems on Trains- Boats and Streams.

**Unit III:** Allegation or Mixtures,Clocks & Calendar.Mensuration: Area of Plane Figures, Volume and Surface Area of Solid Figures.Data Interpretation: Tabulation, Bar Graphs, Pie Charts, Line Graphs.

**Unit–IV:**Series Completion: Number Series, Alphabet Series, Alpha – Numeric Series.

Analogy: Completing the Analogous Pair, Simple Analogy, Choosing the Analogous pair, Double Analogy, Word Analogy, and Number Analogy.

Classification: Word Classification, Number Classification and Letter Classification.

Coding & Decoding: Letter Coding, Number Coding, Matrix Coding, Substitution, Deciphering Message Word Codes, Jumbled Coding. Crypt arithmetic-Inequalities-Input Output Tracing

**Unit–V:** Blood Relations– Direction sense test- Number, Ranking & Time Sequence Test –Mathematical Operations-Arithmetical Reasoning. Puzzle Test: Classification Type Questions, Seating Arrangements, Comparison Type Questions, Sequential Order of Things, Selection Based on Given Conditions, Family Based Puzzles, Jumbled Problems.

**Unit –VI:** Logical Venn Diagrams –Cubes and Dice – Analytical Reasoning-Assertions and Reason–Logical Deductions-Syllogism -Statement and Arguments-Statement and Conclusions- -Data Sufficiency.

**Text Books:**

1. Quantitative Aptitude by R.S.Agarwal

2. Verbal and Non Verbal Reasoning by R.S.Agarwal.

**Course outcomes:** *By learning Quantitative Aptitude and Logical Reasoning, a student can answer the questions on*

1. *Number system, HCF and LCM, Averages, Ages and ratio and proportion.*
2. *Various important topics of quantative aptitude.*
3. *Mensuration and data interpretation topics.*
4. *Series Completion, analogy, classification and coding and decoding topics.*
5. *Various topics of logical reasoning.*
6. *Venn-diagrams, cubes and dice and also on clocks and calendar problems.*

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| **Year/Sem** | **Sub. Code** | **Subject Name** | L | T | P/D | C |
| II – II | **9A405** | **ELECTRICAL MACHINES-II** | 2 | 0 | 0 | 2 |

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| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** |
|  | **M** | **H** |  |  |  |  |  |  |  |  | **L** |

**H: High M: Medium L: Low**

**Course Objective:** Students learn about fundamental concepts of transformers and induction motors with applications.

**Course Outcomes:** Students

1. Learn basic concepts of single phase transformer.
2. Study about testing of single phase transformer and auto transformer.
3. Study about poly phase transformer.
4. Study about poly phase induction motors.
5. Study about torque speed characteristics and circle diagram of induction motor.
6. Study about different starting methods of induction motor.

**UNIT-I SINGLE PHASE TRANSFORMERS – CONSTRUCTION, OPERATION AND PERFORMANCE:**

Single phase transformers-types - constructional details-minimization of hystersis and eddy current losses-emf equation - operation on no load and on load - phasor diagrams- Equivalent circuit - losses and efficiency-regulation. All day efficiency - Effect of variations of frequency & supply voltage on iron losses

**UNIT-II - TESTING OF SINGLE PHASE TRANSFORMER AND AUTOTRANSFORMER:**

OC and SC tests - Sumpner’s test - predetermination of efficiency and regulation-separation of losses test-parallel operation with equal and unequal voltage ratios - auto transformers-equivalent circuit - comparison with two winding transformers.

### UNIT-III - POLYPHASE TRANSFORMER:

Polyphase transformers - Polyphase connections - Y/Y, Y/Δ, Δ/Y, Δ/Δ and open Δ, Third harmonics in phase voltages-three winding transformers-tertiary windings-determination of Zp, Zs and Zt transients in switching - off load and on load tap changing; Scott connection.

**UNIT- IV POLYPHASE INDUCTION MOTORS:**

Polyphase induction motors-construction details of cage and wound rotor machines-production of a rotating magnetic field - principle of operation - rotor emf and rotor frequency - rotor reactance, rotor current and pf at standstill and during operation- Rotor power input, rotor copper loss and mechanical power developed and their inter relation.

### UNIT-V - TORQUE- SPEED CHARACTERISTICS AND CIRCLE DIAGRAM OF INDUCTION MOTORS:

Torque equation-deduction from torque equation- expressions for maximum torque and starting torque - torque slip characteristic- Double cage and deep bar rotors - crawling and cogging - equivalent circuit - phasor diagram-Circle diagram-no load and blocked rotor tests-predetermination of performance.

**UNIT-VI METHODS OF STARTING AND SPEED CONTROL OF INDUCTION MOTOR:**

Methods of starting and starting current and torque calculations-Speed control-change of frequency; change of poles and methods of consequent poles; cascade connection. Injection of an emf into rotor circuit (qualitative treatment only)-induction generator-principle of operation.

**TEXT BOOKS:**

* + - 1. Electrical machines- P S Bhimbra, Khanna Publishers.
      2. Theory & Performance of Electrical Machines, J. B. Gupta, S.K. Kataria & Sons.

**REFERENCES:**

1. Performance and Design of AC Machines – MG. Say, BPB Publishers
2. Theory of Alternating Current Machinery – Langsdorf, Tata McGraw-Hill Companies, 2nd edition.
3. Electric Machines – I.J. Nagrath & D.P. Kothari, Tata Mc Graw Hill, 7th Edition, 2005.
4. Electric machinery - A.E. Fitzgerald, C. Kingsley and S. Umans, Mc Graw Hill Companies, 5th edition.

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| **Year/Sem** | **Sub. Code** | **Subject Name** | L | T | P/D | C |
| II – II | **9HC05** | **ENVIRONMENTAL SCIENCE** | 3 | 0 | 0 | 0 |

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***Course Objectives:***

1. *To understand structure and function of ecosystem*
2. *To learn classification and uses of natural resources*
3. *To learn about Understanding the impacts of developmental activities and mitigation measures.*
4. *To know the source, causes and preventive methods of pollution*
5. *To understand the importance of ecological balance for sustainable development.*
6. *To understand the environmental policies and regulations*

**UNIT-I Ecosystems**: Definition, Scope, and Importance of ecosystem. Classification, structure, and function of an ecosystem, Food chains, food webs, and ecological pyramids. Flow of energy, Biogeochemical cycles, Bioaccumulation, Biomagnification, ecosystem value, services and carrying capacity.

**UNIT-II Natural Resources**: Classification of Resources: Living and Non-Living resources, water resources: use and over utilization of surface and ground water, floods and droughts, Dams: benefits and problems. Mineral resources: use and exploitation, environmental effects of extracting and using mineral resources, Land Energy resources: growing energy needs, renewable and non-renewable energy sources, use of alternate energy source.

**UNIT-III Biodiversity and Biotic Resources**: Introduction, Definition, genetic, species and ecosystem diversity. Value of biodiversity; consumptive use, productive use, social, ethical, aesthetic and optional values. India as a mega diversity nation, Hot spots of biodiversity. Field visit. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts; conservation of biodiversity: In-Situ and Ex-situ conservation.

**UNIT-IV Environmental Pollution and Control Technologies**: Environmental Pollution: Classification of pollution, Air Pollution: Primary and secondary pollutants. Acid rain-Threshold limit values of chemicals present in environment, Global warming, Ozone layer depletion, Water pollution: Sources and types of pollution. Soil Pollution: Sources and types, Impacts of modern agriculture, degradation of soil. Noise Pollution: Sources and Health hazards, standards, Solid waste: Municipal Solid Waste management, composition and characteristics of e-Waste and its management. Pollution control technologies: Sewage water Treatment, Kyoto protocol, and Montréal Protocol.

**UNIT-V Sustainable development and Green Technology**: Concept of sustainable development, threats to sustainability population and its explosion, Crazy consumerism, over- exploitation of resources, strategies for achieving sustainable development environmental education, conservation of resources, urban sprawl sustainable cities and sustainable communities, human health , role of IT in Environment, Environmental Ethics, Environmental Economic – Concept of Green Building, Clean Development Mechanism ( CDM ).

**UNIT-VI Environmental Policy, Legislation & Environment Impact Assessment**: Environmental Protection act, Legal aspects Air Act- 1981, Water Act, Forest Act, Wild life Act, Municipal solid waste management and handling rules, biomedical waste management and handling rules, hazardous waste management and handling rules. EIA: EIA structure, methods of baseline data acquisition. Overview on Impacts of air, water, biological and Socio-economicalaspects.Strategies for risk assessment, Concepts of Environmental Management Plan (EMP).

***Course Outcomes***

*After completion of the course, the student will be able to:*

1. *Understand about ecosystem and energy flow among the organisms.*
2. *Know the resources available, use of them and overexploitation of the resources in the nature.*
3. *Learn the value, use and value of biodiversity.*
4. *Understand the causes and effect of pollution and implement measures in control of pollution.*
5. *Understand the sustainable development and implement green technology for sustainable development.*
6. *Learn and implement policy to protect the environment.*

**TEXT BOOKS:**

1. Perspectives in *Environmental Studies*: *Kaushik* A. and *Kaushik*, C.P. New Age International (P) Ltd. (2008)

**REFERENCE BOOKS:**

1. Environmental Studies by ErachBharucha, 2005 University Press.
2. Environmental Science: towards a sustainable future by Richard T. Wright. 2008 PHL Learning Private Ltd. New Delhi.
3. Environmental Engineering and science by Gilbert M. Masters and Wendell P. Ela. 2008 PHI Learning Pvt. Ltd.
4. Environmental Science by Daniel B. Botkin& Edward A. Keller, Wiley INDIA edition.
5. Environmental Studies by AnubhaKaushik, 4th Edition, New age international publishers.
6. Text book of Environmental Science and Technology - Dr. M. Anji Reddy 2007, BS Publications.

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| **Year/Sem** | **Sub. Code** | **Subject Name** | L | T | P/D | C |
| II – II | **9A406** | **POWER SYSTEMS - I** | 2 | 0 | 0 | 2 |

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|  | **M** | **H** |  | **L** |  |  |  |  |  |  | **L** |

**H: High M: Medium L: Low**

**Course Objective:** Students learn about fundamental concepts of different conventional power generation methods and transmission requirements.

**Course Outcomes:** Students

1. Learn basic concepts of hydro electric and thermal power plants.
2. Study about gas and nuclear power plants.
3. Study about transmission line parameters and efficiency.
4. Study about performance of transmission lines.
5. Learn basic about over head insulators and mechanical design.
6. Learn fundamentals of underground cables.

**UNIT -1 HYDROELECTRIC POWER STATION:**

Elements of hydro electric power station, Types, Concept of pumped storage plants, Storage requirements, Mass curve(explanation only) Estimation of power developed from a given catchments area, Heads and efficiencies

**THERMAL POWER STATIONS:**

Line diagram of Thermal Power Station (TPS) showing paths of coal, Steam, Water, Air, ash and flue gasses, Brief description of TPS components, Economizers, Boilers, Super heaters, Turbines, Condensers, Chimney and Cooling towers.

**UNIT -II GAS AND NUCLEAR POWER STATIONS:**

Nuclear Fission and Chain reaction, Nuclear fuels, Principle of operation of Nuclear reactor, Reactor Components, Moderators, Control rods, Reflectors and Coolants, Radiation hazards, Shielding and Safety precautions, Types of Nuclear reactors and brief description of PWR, BWR and FBR.

Gas Power Stations, Principle of Operation and Components (Block Diagram Approach Only).

**BASIC OF PLANT ECONOMICS:**

Connected Load, Average load, Maximum demand, Load factor, Demand factor, Diversity factor, Plant capacity factor, Use factor, Load curve, Load duration curve, Integrated Load duration curve.

**UNIT-III TRANSMISSION LINE PARAMETERS:**

Types of conductors - calculation of resistance for solid conductors - Calculation of inductance for single phase and three phase, single and double circuit lines, concept of GMR & GMD, symmetrical and asymmetrical conductor configuration with and without transposition, Numerical Problems. Calculation of capacitance for 2 wire and 3 wire systems, effect of ground on capacitance, capacitance calculations for symmetrical and asymmetrical single and three phase, single and double circuit lines, Numerical Problems.

**UNIT-IV PERFORMANCE OF SHORT, MEDIUM AND LONG LENGTH TRANSMISSION LINES:**

Classification of Transmission Lines - Short, medium and long line and their model representations -Nominal-T, Nominal-Pie and A, B, C, D Constants for symmetrical & Asymmetrical Networks, Numerical Problems. Mathematical Solutions to estimate regulation and efficiency of all types of lines - Numerical Problems.

Long Transmission Line-Rigorous Solution, evaluation of A,B,C,D Constants, Interpretation of the Long Line Equations, Surge Impedance and SIL of Long Lines, Wave Length and Velocity of Propagation of Waves - Representation of Long Lines - Equivalent-T and Equivalent Pie network models (numerical problems).

**UNIT-V OVERHEAD LINE INSULATORS:**

Types of Insulators, String efficiency and Methods for improvement, Numerical Problems – voltage distribution, calculation of string efficiency, Capacitance grading and Static Shielding.

**SAG AND TENSION CALCULATIONS:**

Sag and Tension Calculations with equal and unequal heights of towers, Effect of Wind and Ice on weight of Conductor, Numerical Problems - Stringing chart and sag template and its applications.

Skin and Proximity effects - Description and effect on Resistance of Solid Conductors -Ferranti effect - Charging Current - Effect on Regulation of the Transmission Line, Shunt Compensation. Corona - Description of the phenomenon, factors affecting corona, critical voltages and power loss, Radio Interference.

**UNIT-VI UNDERGROUND CABLES:**

Types of Cables, Construction, Types of Insulating materials, Calculations of Insulation resistance and stress in insulation, Numerical Problems. Capacitance of Single and 3-Core belted cables, Numerical Problems. Grading of Cables - Capacitance grading, Numerical Problems, Description of Inter-sheath grading.

**TEXT BOOKS:**

1. A Text Book on Power System Engineering - M.L. Soni, P.V. Gupta, U.S. Bhatnagar, A. Chakrabarthy, Dhanpat Rai & Co Pvt. Ltd.

2. Electrical power systems - C.L. Wadhwa, New Age International (P) Limited, Publishers, 1998.

**REFERENCES:**

1. Power system Analysis- John J Grainger William D Stevenson, TMC Companies, 4th edition

2. Power System Analysis and Design - B.R. Gupta, Wheeler Publishing.

3. Power System Analysis - Hadi Saadat – TMH Edition.

4. Modern Power System Analysis - I.J. Nagaraj and D.P. Kothari, Tata McGraw Hill, 2nd Edition.

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| **Syllabus for B. Tech (E.E.E.) – A22 regulation** | | | | | | |
| **Year/Sem** | **Sub. Code** | **Subject Name** | L | T | P/D | C |
| II – II | **9AC07** | **LINEAR CONTROL SYSTEMS** | 2 | 0 | 0 | 2 |

**Course Objective:** Students learn about fundamental concepts of time and frequency domain analysis of a given system.

**Course Outcomes:** Students

1. Learn basic concepts of control systems.
2. Study about time response analysis.
3. Learn basic concepts of stability and root locus method.
4. Study about frequency response analysis.
5. Learn basic concepts stability analysis in frequency domain.
6. Learn fundamentals of state space analysis.

**UNIT – I INTRODUCTION:**

Concepts of Control Systems- Open Loop and closed loop control systems and their differences- Classification of control systems, Feed-Back Characteristics, Effects of feedback. Mathematical models – Differential equations, Impulse Response and transfer functions – Translational and Rotational mechanical systems

**Transfer function representation:**

Transfer Function of Synchro transmitter and Receiver, Block diagram representation of systems considering electrical systems as examples -Block diagram algebra – Representation by Signal flow graph - Reduction using Mason’s gain formula.

**UNIT-II TIME RESPONSE ANALYSIS:**

Standard test signals - Time response of first order systems – Characteristic Equation of Feedback control systems, Transient response of second order systems - Time domain specifications – Steady state response - Steady state errors and error constants – Effects of proportional derivative, proportional integral systems, PID controllers.

**UNIT – III STABILITY ANALYSIS IN S-DOMAIN:**

The concept of stability – Routh’s stability criterion – qualitative stability and conditional stability – limitations of Routh’s stability.

**Root Locus Technique:** The root locus concept - construction of root loci-effects of adding poles and zeros to G(s)H(s) on the root loci.

**UNIT – IV FREQUENCY RESPONSE ANALYSIS:**

Introduction, Frequency domain specifications-Bode diagrams-Determination of Frequency domain specifications and transfer function from the Bode Diagram-Phase margin and Gain margin-Stability Analysis from Bode Plots.

**UNIT – V STABILITY ANALYSIS IN FREQUENCY DOMAIN:**

Polar Plots-Nyquist Plots-Stability Analysis.

**CLASSICAL CONTROL DESIGN TECHNIQUES:** Compensation techniques – Lag, Lead, Lead-Lag Controllers design in frequency Domain.

**UNIT – VI STATE SPACE ANALYSIS OF CONTINUOUS SYSTEMS:**

Concepts of state, state variables and state model, derivation of state models from block diagrams, Diagonalization- Solving the Time invariant state Equations- State Transition Matrix and its Properties.

**TEXT BOOKS:**

1. Automatic Control Systems 8th edition –B. C. Kuo 2003– John wiley and sons.

2. Control Systems Engineering – I. J. Nagrath and M. Gopal, New Age International (P) Limited, Publishers, 2nd edition.

**REFERENCES:**

1. Modern Control Engineering – Katsuhiko Ogata – Prentice Hall of India Pvt. Ltd., 3rd edition, 1998.

2. Control Systems – N.K. Sinha, New Age International (P) Limited Publishers, 3rd Edition, 1998.

3. Control Systems Engg. – NISE 3rd Edition – John wiley.

4. “Modeling & Control of Dynamic Systems” – Narciso F. Macia George J. Thaler, Thomson Publishers.

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| **Syllabus for B. Tech (E.E.E.) – A22 regulation** | | | | | | |
| **Year/Sem** | **Sub. Code** | **Subject Name** | L | T | P/D | C |
| II – II | 9CC04 | Analog Circuits  (Common to ECE, EEE AND ECM) | 3 | 0 | 0 | 3 |

**Course Objectives:**

To understand the basic functioning and applications of the basic building blocks of analog electronic circuits - amplifiers and oscillators.

**Course OUTCOMES:**

After studying this course, the students will be able to

* + - 1. Distinguish between small and large signal amplifier and able to compare the conversion efficiency levels
      2. Analyze and Design tuned RF amplifiers and different types of sweep generators
      3. Understand linear and non-linear wave shaping methods and able to Analyze various types of Logic gates and Sampling gates.
      4. Understand and design various types of multivibrators and applications

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| CO | ANALOG CIRCUITS (8CC05) | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
| CO1 | Distinguish between small and large signal amplifiers. | 3 | 3 | 2 | 2 | 3 |  |  |  | 2 |  |  | 2 | 3 | 3 | 2 |
| CO2 | Analyze and Design tuned and RF amplifiers | 3 | 3 | 3 | 2 | 3 |  |  |  | 2 |  |  | 2 | 3 | 3 | 2 |
| CO3 | Understand linear and non-linear wave shapingmethods | 3 | 3 | 3 | 3 | 3 |  |  |  | 2 |  |  | 2 | 3 | 3 | 2 |
| CO4 | Understand analyze and design various types of multivibrators, their analysis, designing and applications | 3 | 3 | 3 | 3 | 3 |  |  |  | 2 |  |  | 2 | 3 | 3 | 2 |
| CO5 | Explain different sweep generators and their applications | 3 | 3 | 3 | 3 | 3 |  |  |  | 2 |  |  | 2 | 3 | 3 | 2 |
| C06 | Analyze various types of Logic gates and Sampling gates | 3 | 3 | 2 | 2 | 3 |  |  |  | 2 |  |  | 2 | 3 | 3 | 2 |
| Overall |  | 3 | 3 | 3 | 3 | 3 |  |  |  | 2 |  |  | 2 | 3 | 3 | 2 |

**unit i**[Lecture hrs – 9]

**POWER AMPLIFIERS [T1] [CO1]**

Classification of Power Amplifiers - Class A, B, AB & C power amplifiers –push pull configuration, complementary symmetry circuits, Distortion in Amplifiers. Harmonic distortion and Crossover Distortion in Power Amplifiers– Conversion efficiency and relative performance.

**unit iI**[Lecture hrs – 9]

**TUNED AMPLIFIERS [T1] [CO2]**

Introduction to Tuned Amplifiers, Q**-**Factor. single tuned capacitive coupled amplifier, tapped single tuned capacitance coupled amplifier, single tuned inductively coupled amplifier, stagger tuning, synchronous tuned Amplifier.

**unit iII**[Lecture hrs – 9]

**WAVE SHAPING – Linear and Non-linear**: **[T2,T3] [CO3]**

RC high pass, low pass circuit response for sinusoidal, step, pulse, square, ramp & exponential inputs- Differentiator –Integrator. RL, Diode clippers- Transistor clipper- clipping at two independent levels – Emitter coupled clipper- comparator-– Applications of voltage comparators.

Clamping operation – clamping with source, diode resistances- clamping circuits theorem- practical clamping circuits.

**unit iV**[Lecture hrs – 9]

**MULTIVIBRATORS: [T2] [CO4]**

Stable states of BistableMultivibrator A fixed bias transistor BistableMultivibrator -A self biased transistor BistableMultivibrator - commutating capacitor – Unsymmetric triggering of BistableMultivibrator - triggering through a unilateral device- symmetrical triggering – Schmitt trigger circuit.

General operation of monostablemultivibrator, collector coupled monostablemultivibrator - wave forms of collector coupled monostablemultivibrator - Emitter coupled monostablemultivibrator - triggering of monostablemultivibrator. Astablemultivibrator, collector coupled Astablemultivibrator -Emitter coupled Astablemultivibrator. Designing ofBistable, Monostable and AstableMultivibrators.

**unit V**[Lecture hrs – 9]

**TIME BASE GENERATORS: [T2] [CO2]**

General features of time base signals-sweep circuit using a transistor switch-UJT,UJT characteristics, UJT as a sweep circuit, - General considerations & principles of Miller & Boot strap time base generators- the transistor miller time base- the transistor, Boot strap time base generator- A simple current sweep transistor current time base generator.

**unit VI**[Lecture hrs – 9]

**SAMPLING and LOGIC GATES: [T2] [CO3]**

Basic operating principle unidirectional, Bidirectional sampling gates using diodes, transistors- reduction of pedestal effect and sampling oscilloscope.

**LOGIC GATES:** Digital operation of a system- OR, AND, NOT, NAND &NOR gates- DTL Logic– RTL Logic, TTL logic – comparison.

**Text Books:**

[T1] Integrated electronics-J.Milliman and C.C.Halkias, MC Graw –Hill-1972

[T2] Pulse digital and switching wave forms-J. Millman and H. Taub, Tata McGraw-Hill, New Delhi,2001.

[T3] Solid State Pulse circuits - David A. Bell, PHI, 4th Edn., 2002 .

**References:**

[R1] Pulse and Digital Circuits – A. Anand Kumar, PHI, 2005.

[R2] Wave Generation and Shaping - L. Strauss

[R3] Electronic Circuit Analysis-K.Lal Kishore, 2004, BSP

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| **Syllabus for B. Tech (E.E.E.) – A22 regulation** | | | | | | |
| **Year/Sem** | **Sub. Code** | **Subject Name** | L | T | P/D | C |
| II – II | **9A473** | **ELECTRICAL MACHINES LAB – I** | 0 | 0 | 3 | 1.5 |

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|  | **H** | **M** |  |  |  |  |  |  |  |  | **L** |

**H: High M: Medium L: Low**

**Course Objective:**

To understand the basics of Electrical machines concepts and applications

**Course Outcomes:**

After completion of the course, the student will be able to:

1. Understand the principles of DC electrical machines.
2. Understand the load characristics.
3. Understand the principle and operation of DC machine speed control methods.
4. Understand the calculation of losses in DC machines

**The following experiments are required to be conducted:**

1. Magnetization characteristics of DC shunt generator for the calculation of critical field resistance and critical speed.

2. Determination of characteristics from the Load test on DC shunt generator.

3. Determination of characteristics from the Load test on DC series generator.

4. Determination of characteristics from the Load test on DC compound generator.

5. Hopkinson’s test on DC shunt machines for the determination of the efficiency.

6. Fields test on DC series machines for the determination of efficiency.

7. Swinburne’s test and speed control of DC shunt motor and Predetermination of efficiencies.

8. Brake test on DC compound motor for the determination of performance curves.

9. Brake test on DC shunt motor for the determination of performance curves.

10. Separation of losses in DC shunt motor.

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| **Year/Sem** | **Sub. Code** | **Subject Name** | L | T | P/D | C |
| II – II | **9A482** | **MEASUREMENTS AND INSTURMENTATION LAB** | 0 | 0 | 3 | 1.5 |

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| **Course Name/ PO** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** |
| **MEASUREMENTS AND INSTRUMENATATION LAB** | 3 | 3 | 3 | 3 |  | 2 | 2 |  | 1 |  | 1 | 1 | 2 | 1 |

**Objectives of the Course:**

Energy can neither be created nor destroyed; it can be transformed from one form into another. Out of all the forms of energies (which are available) electrical energy occupies top position in the hierarchy. So measurement of electrical quantity plays a vital role in the field of Engineering and Technology. In this lab students will be able to measure practically different electrical parameters and calibrate the meters.

**Course Outcomes:**

1. To draw the graph between the distance and EMF for linear variable differential transformer and to measure the displacement.
2. To measure 3-Ф reactive power using single phase wattmeter.
3. To determine the value of given capacitor and to obtain its dissipation factor, and also the values of the resistance and inductance of a given coil.
4. To determine the percentage of error of a given single phase energy meter.
5. To measure the parameters of a choke coil using 3-voltmeter & 3-ammeter methods
6. To determine the percentage ratio error and the phase angle error of the given transformer by comparison with another current transformer whose errors are known.
7. To determine the value of the resistance of the given wire using Kelvin’s double bridge.
8. To apply Crompton’s DC potentiometer to, Calibrate a PMMC type ammeter. Voltmeter
9. To calibrate a given 1-Ф power factor meter by phantom loading.
10. To calibrate a given LPF watt meter by phantom loading.
11. To measure the 3-phase power with two number of CTs and a single wattmeter.

**The following experiments are required to be conducted**

* + 1. Calibration and Testing of single phase energy Meter
    2. Calibration of dynamometer power factor meter
    3. Crompton D.C. Potentiometer – Calibration of PMMC ammeter and PMMC voltmeter
    4. Kelvin’s double Bridge – Measurement of resistance – Determination of Tolerance.
    5. Measurement of % ratio error and phase angle of given C.T. by comparison.

1. Schering Bridge & Anderson Bridge.
2. Measurement of 3 phases reactive power with single-phase wattmeter.
3. Measurement of parameters of a choke coil using 3 voltmeter and 3 ammeter methods.
4. Calibration LPF wattmeter – by Phantom testing
5. Measurement of 3 phase power with single watt meter and 2 No’s of C.T.
6. LVDT and capacitance pickup – characteristics and Calibration.

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| **Year/Sem** | **Sub. Code** | **Subject Name** | L | T | P/D | C |
| II – II | **9A491** | **TECHNICAL SEMINAR** | 0 | 1 | 0 | 1 |

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**H: High M: Medium L: Low**

**Course objective**

Develop an ability to understand and present the latest technological developments in computer science. Identify one of them, understand its impact on the event/method/society as a whole and present the seminar on the same which enhances oratory and interview facing skills.

**COURSE OUTCOMES:**

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| 1Deliver lecture on emerging technologies.  2 Explain domain knowledge to resolve real time technical issues  3 Demonstrate ability to lead and explain concepts and innovative ideas.  4 Demonstrate team leading qualities.  5 Demonstrate public speaking and lifelong learning skills for higher studies and to pursue professional practice.  6 Exchange new information that would not have been available otherwise.  7 Develop debating and interview skills. |

**Procedure :**

1. Seminar in-charges shall highlight the significance of technical seminar in the first two sessions and enlighten the students on the utility of these seminars.
2. The slots, titles shall be decided upfront and seminar in charge shall take signatures.
3. The same sheet shall be affixed in the respective classrooms and seminar register.
4. If any student fails to present his/her seminar on the given slot, to genuine reasons, they may be asked to present in the subsequent slot/week.
5. Progress of the seminars need to be reviewed by the concerned HOD once in 15 days.
6. The evaluation for technical seminars has to be informed to students and displayed in the classrooms.
7. Report and presentation must contain topic, introduction, explanation, diagrams, tables, applications and conclusions.

There shall be a technical seminar evaluated for 100 marks each from I year   
I Semester to II year II Semester. The evaluation is purely internal and will be as follows:

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| **Sl.No** | **Description** | **Marks** |
| 1 | Literature survey, topic and content | 10 |
| 2 | Presentation including PPT | 10 |
| 3 | Seminar Notes | 05 |
| 4 | Interaction with audience after presentation | 05 |
| 5 | Final Report 3 copies | 10 |
| 6 | Class room participation | 05 |
| 7 | Punctuality in giving seminar as per Scheduled time and date | 10 |
| 8 | Mid Semester Viva (on the seminar topics completed up to the end of 9th week | 15 |
| 9 | End Semester Viva | 30 |
|  | **Total** | **100 Marks** |

Student must secure 40% i.e. 40 marks to be successful in sum total (Hundred Marks) in Technical Seminar.