VISION OF THE INSTITUTE
To evolve into a premier engineering institute in the country by continuously enhancing the range of our competencies, expanding the gamut of our activities and extending the frontiers of our operation.

MISSION OF THE INSTITUTE
Synergizing knowledge, technology and human resource, we impart the best quality education in Technology and Management. In the process, we make education more objective so that efficiency for employability increases on a continued basis.

VISION OF THE DEPARTMENT
The department of Electrical and Electronics Engineering is committed to innovation and excellence in teaching, research, service and provide programs of the high quality, collaborative efforts with industry to produce world class engineering professionals.

MISSION OF THE DEPARTMENT
1. To inculcate value based, socially committed professionalism to the cause of overall development of students and society.
2. Cultivate the spirit of entrepreneurship and the connection between engineering and business that encourages technology commercialization.
3. Improve continuously the engineering pedagogical methods employed in delivering its academic programs.
4. Evolve thoughtfully in response to the needs of industry, society and the changing world.
PROGRAM EDUCATIONAL OBJECTIVES

PEO1 The graduates would be employed as a practicing engineer in fields such as design, research, development, testing and manufacturing.

PEO2 The graduates would be engaged in lifelong self-directed learning to maintain and enhance professional skills.

PEO3 The graduates will be able to create new methods to meet the society needs or to become an entrepreneur with their gained knowledge and confidence.

PEO4 The graduates will be able to exhibit their communication skills, team spirit, leadership skills and ethics with social responsibility.

PROGRAM OUTCOMES

a. an ability to apply knowledge of mathematics, science, and engineering
b. an ability to design and conduct experiments, as well as to analyse and interpret data
c. an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.
d. an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
e. an ability to identify, formulate, and solve engineering problems
f. an ability to function on multidisciplinary teams
g. an understanding of professional and ethical responsibility
h. an ability to communicate effectively
i. the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
j. a recognition of the need for, and an ability to engage in life-long learning
k. a knowledge of contemporary issues
l. an ability to qualify in competitive examinations like GATE, IES, GRE, CAT etc.
ACADEMIC REGULATIONS- 2016

(Effective for the students admitted into I year from the Academic Year 2016-2017 and onwards)

1. Award of B.Tech. Degree

A student will be declared eligible for the award of the B. Tech. Degree if he/she fulfills the following academic regulations.
(a) Pursued a course of study for not less than four academic years and not more than
(b) Registered for 180 credits and he/she must secure total 180 credits.

2. Students, who fail to complete their Four years Course of study within 8 years or fail to acquire the 180 Credits for the award of the degree within 8 academic years from the year of their admission, shall forfeit their seat in B. Tech course and their admission shall stand cancelled.

3. Courses of study

The following courses of study are offered at present with specialization in the B.Tech. Course.

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Branch Code- Abbreviation</th>
<th>Branch</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>01-CE</td>
<td>Civil Engineering</td>
</tr>
<tr>
<td>02</td>
<td>02-EEE</td>
<td>Electrical and Electronics Engineering</td>
</tr>
<tr>
<td>03</td>
<td>03-ME</td>
<td>Mechanical Engineering</td>
</tr>
<tr>
<td>04</td>
<td>04-ECE</td>
<td>Electronics and Communication Engineering</td>
</tr>
<tr>
<td>05</td>
<td>05-CSE</td>
<td>Computer Science and Engineering</td>
</tr>
<tr>
<td>06</td>
<td>12-IT</td>
<td>Information Technology</td>
</tr>
</tbody>
</table>

And any other course as approved by the authorities of the University from time to time.

4. Credits (Semester system from I year onwards):

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Theory Course</td>
<td>2/2.5/3/3.5/4.5</td>
</tr>
<tr>
<td>2</td>
<td>Open Electives</td>
<td>02</td>
</tr>
<tr>
<td>3</td>
<td>Laboratory Course</td>
<td>1.5</td>
</tr>
<tr>
<td>4</td>
<td>Advanced Laboratory Course</td>
<td>02</td>
</tr>
<tr>
<td>5</td>
<td>Self Study Course/Internship</td>
<td>01</td>
</tr>
<tr>
<td>6</td>
<td>Employability skills</td>
<td>1.5</td>
</tr>
<tr>
<td>7</td>
<td>Project</td>
<td>06</td>
</tr>
</tbody>
</table>

5. Open Electives:

There is one open elective in each semester from 2-1 Semester to 4-1 semester. The student can choose one open elective of respective semester. The pattern of Midterm examinations and end examinations of these courses is similar to regular theory courses and the valuation is purely internal.
6. **MOOCs:**
   Explore all possibilities to run at least one subject in every semester from 2-1 semester onwards as a Moocs.

7. **Evaluation Methodology:**
   The performance of a student in each semester shall be evaluated subject-wise with a maximum of **100** marks for theory course and **75** marks for laboratory and other courses. The project work shall be evaluated for **200** marks.

7.1 **Theory course:**
   For theory courses the distribution shall be **30** marks for internal midterm evaluation and **70** marks for the External End - Examinations.
   Out of 30 internal midterm marks – **25** marks are allotted for descriptive exam and **5** marks for continuous assessment tests.

   **Process of conducting assessment test:** The assessment test will be conducted for 5 marks. Teacher should give 5 questions after completion of **One and half** units to the students, from which the student has to answer any one of the questions suggested by the teacher in the classroom itself. Similarly there will be another two assessment tests after completion of **Three** units and **Four and half** units from prescribed syllabus. The average marks of these **THREE** tests will be considered for 5 marks for the continuous assessment tests finally.

   (i) **Pattern for Internal Midterm Examinations (25 marks):**
   For theory courses of each semester, there shall be **2** Midterm exams. Each descriptive exam is to be held for **25** marks with the duration of **120** minutes.

   For final calculation of internal marks, weightage of 80% will be given to the student who performed well either in first Mid or second Mid and 20% weightage will be given to other Mid term examinations.

   Mid paper contains descriptive type questions for forty marks and contain four questions. The student should answer 3 out of 4 questions. Each question carries 10 marks (3@10=30M).
   The first Midterm examination to be conducted usually after 8 weeks of instruction or after completion of 50 percent syllabus, the second Midterm examination to be conducted usually at the end of instruction after completion of remaining 50 percent syllabus.

   (ii) **Pattern for External End Examinations (70 marks):**
   The question paper shall have descriptive type questions for70 marks. There shall be one question from each unit with internal choice. Each question carries 14 marks. Each course shall consist of five units of syllabus. The student should answer total 5 questions.
   (5x14M=70M)
7.2. Laboratory Course:

(i) (a) For practical subjects there shall be continuous evaluation during the semester for 25 internal marks and 50 semester end examination marks. Out of the 25 marks for internal: 10 marks for day to day work, 5 marks for record and 10 marks to be awarded by conducting an internal laboratory test. The end examination shall be conducted by the teacher concerned and external examiner from outside the college.

(b) For the benefit of the students, two advanced labs are introduced with some specialized areas in each B.Tech. Program.

(ii.) For the course having design and / or drawing, (such as Engineering Drawing, Machine Drawing) and estimation, the distribution shall be 30 marks for internal evaluation (15 marks for day–to–day work, and 15 marks for internal tests) and 70 marks for end examination.

For award of marks for internal tests. weightage of 80% will be given to the student who performed well either in first test or second test and 20% weightage will be given to other test.

7.3 Project Work:

Out of a total of 200 marks for the project work, 60 marks shall be for Project Internal Evaluation and 140 marks for the End Semester Examination. The End Semester Examination (Viva – Voce) shall be conducted by the committee. The committee consists of an external examiner, Head of the Department and Supervisor of the Project. The evaluation of project work shall be made at the end of the IV year. The Internal Evaluation shall be made on the basis of two seminars given by each student on the topic of his project which was evaluated by an internal committee.

7.4 Self Study Course:

Two Periods per week (which includes library, e-learning, Internet and presentation) are allotted for this course. Self Study shall be evaluated for 75 Marks.

Out of 75 Marks, 25 marks for day-to-day evaluation and 50 marks on the basis of end examination conducted by internal committee consisting of Head of the Department, Two Senior faculty Members of the department concerned. There shall be no external examination for self-study.

7.5 Audit Course:

Audit course is one among the compulsory courses and does not carry any credits. The audit courses will start from the II year I- semester onwards. The list of audit courses are shown below:

i) Professional Ethics and Morals
ii) Intellectual Property Rights & Patents
7.6 Employability Skills:

Employability skills shall be evaluated for 75 marks. 25 marks for day-to-day evaluation and 50 marks on the basis of end (internal) examination. There is no external examination for employability skills.

Three Periods per week are allotted for this course and evaluated in 4-1 semester.

7.7 Internship:

All the students shall undergo the internship period of 4 weeks and the students have an option of choosing their own industry which may be related to their respective branch. A self study report for the internship shall be submitted and evaluated during the IV year II-Semester and will be evaluated for a total of 75 marks consists of 25 marks for internal assessment and 50 marks for end examination.

Internal assessment for 25 marks shall be done by the internship supervisor. Semester end examination for 50 marks shall be conducted by committee consists of Head of the Department, internal supervisor and an external examiner.

8. Attendance Requirements:

(i.) A student shall be eligible to appear for End Semester examinations, if he/she acquires a minimum of 75% of attendance in aggregate of all the subjects.

(ii.) Condonation of shortage of attendance in aggregate up to 10% (65% and above and below 75%) in each semester with genuine reasons and shall be approved by a committee duly appointed by the college. The condonation approved otherwise it can be reviewed by the College academic committee.

(iii.) A Student will not be promoted to the next semester unless he satisfies the attendance requirement of the present semester. They may seek re-admission for that semester when offered next.

(iv.) Shortage of Attendance below 65% in aggregate shall in NO case be condoned.

(v.) Students whose shortage of attendance is not condoned in any semester are not eligible to take their end examination of that class and their registration shall stand cancelled.

(vi.) A fee stipulated by the college shall be payable towards condonation of shortage of attendance.
9. Minimum Academic Requirements:

9.1 Conditions for pass and award of credits for a course:

a) A candidate shall be declared to have passed in individual course if he/she secures a minimum of 40% aggregate marks i.e 40 out of 100, 30 out of 75 (Internal & Semester end examination marks put together), subject to a minimum of 35% marks i.e 24 marks out of 70 and 17 out of 50 in semester end examination.

b) On passing a course of a programme, the student shall earn assigned credits in that Course.

9.2 Method of Awarding Letter Grades and Grade Points for a Course.

A letter grade and grade points will be awarded to a student in each course based on his/her performance as per the grading system given below.

Table: Grading System for B.Tech. Programme

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Grade Points</th>
<th>Letter Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>95-100%</td>
<td>10</td>
<td>O</td>
</tr>
<tr>
<td>85-&lt;95%</td>
<td>9</td>
<td>A+</td>
</tr>
<tr>
<td>75-&lt;85%</td>
<td>8</td>
<td>A</td>
</tr>
<tr>
<td>65-&lt;75%</td>
<td>7</td>
<td>B+</td>
</tr>
<tr>
<td>55-&lt;65%</td>
<td>6</td>
<td>B</td>
</tr>
<tr>
<td>45-&lt;55%</td>
<td>5</td>
<td>C</td>
</tr>
<tr>
<td>40%-&lt;45%</td>
<td>4</td>
<td>P</td>
</tr>
<tr>
<td>&lt; 40%</td>
<td>0</td>
<td>F (Fail)</td>
</tr>
</tbody>
</table>

9.3. Calculation of Semester Grade Points Average (SGPA)* for semester

The performance of each student at the end of the each semester is indicated in terms of SGPA. The SGPA is calculated as below:

\[
SGPA = \frac{\Sigma (CR \times GP)}{\Sigma CR} \quad \text{(for all courses passed in semester)}
\]

Where

- CR = Credits of a Course
- GP = Grade points awarded for a course

*SGPA is calculated for the candidates who passed all the courses in that semester.

9.4 Calculation of Cumulative Grade Points Average (CGPA) and Award of Division for Entire Programme.

The CGPA is calculated as below:

\[
CGPA = \frac{\Sigma (CR \times GP)}{\Sigma CR} \quad \text{(For entire programme)}
\]

Where

- CR = Credits of a course
- GP = Grade points awarded for a course
Table: Award of Divisions

<table>
<thead>
<tr>
<th>CGPA</th>
<th>DIVISION</th>
</tr>
</thead>
<tbody>
<tr>
<td>≥ 7.5</td>
<td>First Class with distinction</td>
</tr>
<tr>
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<td>Pass Class</td>
</tr>
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</tr>
</tbody>
</table>

9.5 Supplementary Examinations:

Supplementary examinations will be conducted in every semester.

9.6 Conditions for Promotion:

(i.) A student will be promoted to second year, if he/she put up the minimum attendance requirement.

(ii.) A student shall be promoted from II to III year only if he fulfills the academic requirement of total 50% credits (if number credits is in fraction, it will be rounded off to lower digit) from regular and supplementary examinations of I year and II year examinations, irrespective of whether the candidate takes the examination or not.

(iii.) A student shall be promoted from III year to IV year only if he fulfills the academic requirements of total 50% credits (if number of credits is in fraction, it will be rounded off to lower digit) from regular and supplementary examinations of I Year, II Year and III Year examinations, irrespective of whether the candidate takes the examinations or not.

(iv.) A student shall register and put up minimum attendance in all 180 credits and earn all 180 credits, marks obtained in 180 credits shall be considered for the calculation of percentage of marks.

10. Course pattern:

(i.) The entire course of study is of four academic years and each year will have TWO Semesters (Total EIGHT Semesters).

(ii.) A student is eligible to appear for the end examination in a subject, but absent for it or failed in the end examinations may appear for that subject’s supplementary examinations, when offered.

(iii.) When a student is detained due to lack of credits / shortage of attendance, he may be re-admitted when the semester is offered after fulfillment of academic regulations. Whereas the academic regulations hold good with the regulations he/she first admitted.
11. Minimum Instruction Days:

The minimum instruction days for each semester shall be 95 clear instruction days.

12. There shall be no branch transfer after the completion of admission process.

13. General:

(i.) Where the words “he” “him” “his”, occur in the regulations, they include “she”, “her”, “hers”.

(ii.) The academic regulation should be read as a whole for the purpose of any interpretation.

(iii.) In the case of any doubt or ambiguity in the interpretation of the above rules, the decision of the principal is final.

(iv.) The College may change or amend the academic regulations or syllabi at any time and the changes or amendments made shall be applicable to all the students with effect from the dates notified by the college.
ACADEMIC REGULATIONS 2016 (AR16)  
(LATERAL ENTRY SCHEME)  

(Effective for the students getting admitted into II year from the Academic Year 2017- 2018 and onwards)  

1. Award of B. Tech. Degree  
   A student will be declared eligible for the award of the B. Tech. Degree if he/she fulfills the following academic regulations.  
   (a.) Pursued a course of study for not less than three academic years and not more than six academic years.  
   (b.) Registered for 131 credits and must secure 131 credits.  

2. Students, who fail to complete their three year Course of study within six years or fail to acquire the 131 Credits for the award of the degree within 6 academic years from the year of their admission, shall forfeit their seat in B. Tech course and their admission shall stand cancelled.  

3. Promotion Rule:  
   (a.) A lateral entry student will be promoted to II year to III year if he puts up the minimum required attendance in II year.  
   (b.) A student shall be promoted from III year to IV year only if he fulfills the academic requirements of total 50% of credits (if number of credits is in fraction, it will be rounded off to lower digit) from the II Year and III Year examinations, whether the candidate takes the examinations or not.  

4. Minimum Academic Requirements:  

4.1 Conditions for pass and award of credits for a course:  
a) A candidate shall be declared to have passed in individual course if he/she secures a minimum of 40% aggregate marks (Internal & Semester end examination marks put together), subject to a minimum of 35% marks in semester end examination.  
b) On passing a course of a programme, the student shall earn assigned credits in that Course.  

4.2 Method of Awarding Letter Grades and Grade Points for a Course.  
   A letter grade and grade points will be awarded to a student in each course based on his/her performance as per the grading system given below.  
   
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4.3 Calculation of Semester Grade Points Average (SGPA)* for semester

The performance of each student at the end of each semester is indicated in terms of SGPA. The SGPA is calculated as below:

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SGPA = \frac{\Sigma (CR \times GP)}{\Sigma CR} \quad \text{(for all courses passed in semester)}
\]

Where
- CR = Credits of a Course
- GP = Grade points awarded for a course
*SGPA is calculated for the candidates who passed all the courses in that semester.

4.4 Calculation of Cumulative Grade Points Average (CGPA) and Award of Division for Entire Programme.

The CGPA is calculated as below:

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CGPA = \frac{\Sigma (CR \times GP)}{\Sigma CR} \quad \text{(for entire programme)}
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Where
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<tr>
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<td>Pass Class</td>
</tr>
<tr>
<td>&lt; 4.0</td>
<td>Fail</td>
</tr>
</tbody>
</table>

5. All other regulations as applicable for B. Tech. Four-year degree course (Regular) will hold good for B. Tech. (Lateral Entry Scheme)
<table>
<thead>
<tr>
<th>Nature of Malpractices/Improper conduct</th>
<th>Punishment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (a) If the student possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the student which can be used as an aid in the subject of the examination)</td>
<td>Expulsion from the examination hall and cancellation of the performance in that subject only.</td>
</tr>
<tr>
<td>(b) If the student gives assistance or guidance or receives it from any other student orally or by any other body language methods or communicates through cell phones with any student or students in or outside the exam hall in respect of any matter.</td>
<td>Expulsion from the examination hall and cancellation of the performance in that subject only of all the students involved. In case of an outsider, he will be handed over to the police and a case is registered against him.</td>
</tr>
<tr>
<td>2 If the student has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the student is appearing.</td>
<td>Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the student has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the subjects of that Semester/year.</td>
</tr>
<tr>
<td>3 If the student impersonates any other student in connection with the examination.</td>
<td>The student who has impersonated shall be expelled from examination hall. The student is also debarred and forfeits the seat. The performance of the original student, who has been impersonated, shall be cancelled in all the subjects of the examination (including practicals and project work) already appeared and shall not be allowed to appear for examinations of the remaining subjects of that semester/year. The student is also debarred for two consecutive semesters from class work and all semester end examinations. The continuation of the course by the student is subject to the academic regulations in connection with forfeiture of seat. If the imposter is an outsider, he will be handed over to the police and a case is registered against him.</td>
</tr>
<tr>
<td></td>
<td>If the student smuggles in the Answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination.</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>5</td>
<td>If the student uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.</td>
</tr>
<tr>
<td>6</td>
<td>If the student refuses to obey the orders of the Chief Superintendent/Assistant Superintendent / any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the officer-in-charge or any person on duty in or outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the officer-in-charge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the College campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.</td>
</tr>
<tr>
<td></td>
<td>Clause</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>7</td>
<td>If the student leaves the exam hall taking away answer script or intentionally tears off the script or any part thereof inside or outside the examination hall.</td>
</tr>
<tr>
<td>8</td>
<td>If the student possesses any lethal weapon or firearm in the examination hall.</td>
</tr>
<tr>
<td>9</td>
<td>If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8.</td>
</tr>
<tr>
<td>10</td>
<td>If the student comes in a drunken condition to the examination hall.</td>
</tr>
<tr>
<td>No.</td>
<td>Description</td>
</tr>
<tr>
<td>-----</td>
<td>------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>11</td>
<td>Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.</td>
</tr>
</tbody>
</table>
# COURSE STRUCTURE

## I B.TECH

### I – SEMESTER

<table>
<thead>
<tr>
<th>S.No</th>
<th>Sub. Code</th>
<th>SUBJECT</th>
<th>L</th>
<th>T</th>
<th>P</th>
<th>C</th>
</tr>
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<tbody>
<tr>
<td>01</td>
<td>16HS1001</td>
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<td>Environmental Studies</td>
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<tr>
<td>03</td>
<td>16BS1001</td>
<td>Engineering Mathematics-I</td>
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<tr>
<td>04</td>
<td>16BS1004</td>
<td>Engineering Chemistry</td>
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<tr>
<td>05</td>
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<td>1</td>
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<tr>
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<td>Basic Electric Circuit Analysis</td>
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<tr>
<td>07</td>
<td>16CS1102</td>
<td>Information Technology Workshop Lab</td>
<td>-</td>
<td>-</td>
<td>3</td>
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</tr>
<tr>
<td>08</td>
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**TOTAL PERIODS/TOTAL CREDITS**

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### Elective – III

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<td>Digital Signal Processing</td>
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ENGLISH
(Common to all Branches of I.B.Tech I Sem)

Subject Code: 16HS1001
Credits: 03
Internal Marks: 30
External Marks: 70

Course Objective
- To improve comprehension levels of the students while reading texts in English
- To enable students interpret data and present their perspective on it
- To help students learn the techniques of expanding their vocabulary
- To assist students use grammar effectively in both speech and writing
- To enable students to write formal letters and short essays

Course Outcomes
CO1: Students will be able to read and comprehend seen and unseen passages and answer questions based on them.
CO2: Students will be able to interpret the content of a passage and state their perspective.
CO3: Students will be able to understand words and their meanings, and know prefixes, suffixes, analogies, synonyms, antonyms and one word substitutes.
CO4: Students will be able to use articles, quantifiers, gerunds, infinitives, present participles and tenses appropriately.
CO5: Students will be able to write sentences, paragraphs, formal letters, emails, short essays on any given topic.

Course Syllabus
Unit –I: Read and Proceed: Reading—Vocabulary—Grammar—Writing Sentences
Unit –II: Health: Reading—Vocabulary—Grammar—Types of Writing
Unit –III: Travel: Reading—Vocabulary—Grammar—Paragraph Writing
Unit –IV: Disaster Management: Reading—Vocabulary—Grammar—Writing Letters & Emails
Unit –V: Gender: Reading—Vocabulary—Grammar—Writing an Essay

Course Material:
Textbook

Reference Books
ENVIRONMENTAL STUDIES
(Common to all branches)

Subject Code: 16HS1003
Internal Marks: 30
Credits: 3
External Marks: 70

Course Objective
- Memorize the overall knowledge of the environment; differentiate the resources, reserves, importance and conservation.
- Identify the significance, arrangement, causes of annihilation of ecosystems and biodiversity; recognize the importance of their protection and preservation.
- Discriminate various causes, effects of a range of environmental pollutions and describe the appropriate control methods.
- Identify the sustainable development; evaluate the different environmental management issues and environmental legal issues.
- Describe the variations in population growth, recognizes the human health problems and evaluate the environmental assets.

Course Outcomes
CO1: Recognize the general issues of environment and know how to conserve the environment, speaks well again on various resources, present status and their better usage.
CO2: Explain the interdependency of life in the ecosystem, demonstrate the structural and functional setup, classify and appraise the importance of diversity on the earth and differentiate the conservation methods.
CO3: Examine the various types of pollutants and their impacts along with their control methods; review the different types of solid wastes, impacts and their ecofriendly disposal methods.
CO4: Translate the concept of sustainable development by green technologies, experiment on the environmental management systems for clean, green, safe and healthy environment through clean development mechanisms.
CO5: Evaluate the changing trends of population curves among different nations, discuss how to limit the current population size, collect and compile the information to document the environmental assets.

UNIT I:
Multidisciplinary nature of Environmental Studies: Definition of Environment – Scope, Importance and multidisciplinary nature of the course - Need for Public Awareness

Natural Resources:
Forest Resources - Use and over exploitation - deforestation – consequences – solutions - case studies
Water Resources - Use and over utilization - dams - benefits and problems on Tribes and Environment
Mineral Resources - Use and exploitation - Tribal and environmental effects of extracting and using mineral resources - case studies

Food Resources – Food security concept - changes caused by agriculture and overgrazing - effects of modern agriculture – fertilizer - pesticide problems - water logging - salinity – concept of sustainable agricultural methods - case studies

Energy Resources - Non-renewable energy resources – coal – crude oil - natural gas - use of renewable and alternate energy sources - case studies

Land resources – Reasons for land degradation - Human induced landslides - soil erosion and desertification

UNIT II:


Biodiversity and its conservation: Definition of Biodiversity – genetic, species and ecosystem diversities - Values of biodiversity - Bio-geographical classification of India - India as a mega-diversity nation – Hotspots of biodiversity (India) - Endangered and endemic species of India – Threats to biodiversity - Conservation of biodiversity

UNIT III:

Environmental Pollution: Definition – causes - effects - control measures of Air pollution - Water pollution - Marine pollution - Noise pollution - Nuclear hazards.

Solid waste Management: Causes - effects - disposal methods of urban waste - biomedical wastes - case studies .

Disaster management: floods – earthquakes - cyclones

UNIT IV:

UNIT V:


Field work:
Visit to local area to document environmental assets - River/ forest/ grassland/ hill/ mountain
Visit to local polluted sites Urban/ Rural/ industrial/ Agricultural
Study of common plants/ insects/ birds - Study of simple ecosystems ponds/ rivers/ hill slopes

Text Books:

Reference:
3. Cunningham, W.P., Cunningham, M.A., Principles of Environmental Science, TMH, New Delhi
ENGINEERING MATHEMATICS – I

(Common to all branches)

Subject Code: 16BS1001                   Internal Marks: 30
Credits: 3.5                             External Marks: 70

Course objective

- To identify & solve the 1st order differential equations and apply in Engineering.
- To understand the process of solving a 2nd and higher order differential equation and solve it. Identify a 2nd and higher order differential equation & solve it in engineering topics.
- To understand the generalized mean value theorems & their use to find the series expansions of functions and in turn their application in finding the maxima and minima of two variable functions.
- To solve the multiple integrals and to develop the capacity of a student to understand the applications of multiple integrals.
- Understand the mathematical and physical interpretation of Vector differential operator operating on a vector or scalar point function, the line, surface and volume integrals, vector integral theorems and their applications to find work done, area, and volume.

Course outcomes

CO1: Able to solve the 1st order differential equations in different fields.
CO2: Identify and solve a 2nd and higher order differential equations and perform simple applications in Engineering.
CO3: Estimate the maxima and minima of two variable functions under different constraints.
CO4: Solve a multiple integral and apply to estimate the volume and surface area of the solids.
CO5: Calculate grad, divergence, curl; a line, surface and volume integral. To find work done, area, and volume. Apply the vector integral theorems to evaluate multiple integrals.

UNIT I:
UNIT II:
**Linear Differential Equations of Second and higher order:** Linear differential equations of second and higher order with constant coefficients - Complete solution, Operator D, Rules for finding complementary function, Inverse operator D, Rules for finding particular integral with RHS term of the type $e^{ax}$, Sin ax, Cos ax, polynomials in x, $e^{ax} V(x)$, $xV(x)$. Method of variation of parameters, Cauchy's and Euler's equations.

UNIT III:
**Partial Differentiation:** Introduction - Total derivative - Chain rule - Generalized Mean Value theorem for One variable & two variable functions (without proof) - Taylor's and Mac Laurant's series for two variables – Functional dependence – Jacobian. Maxima and Minima of functions of two variables with constraints and without constraints.

UNIT IV:
**Multiple Integrals:** Multiple integrals - double and triple integrals – change of variables in Double & Triple Integrals – Change of order of integration-Cartesian and Polar coordinates.

UNIT V:

TEXT BOOKS:

REFERENCE BOOKS:
ENGINEERING CHEMISTRY
(Common to all branches)

Subject Code: 16BS1004  Internal Marks: 30
Credits: 3.5          External Marks: 70

Course objective:
- To become familiar in moulding methods of preparation of different types of plastic materials.
- To understand the determination of hardness of water sample by EDTA method.
- To understand the methods of prevention of corrosion of metal.
- To become familiar about different lubrication techniques.
- To understand construction of Photovoltaic cells.

Course outcomes:
CO1: Student will differentiate different moulding techniques of plastic material.
CO2: Students can determine total hardness of water by EDTA method.
CO3: Students can design the metallic materials to prevent corrosion.
CO4: Student will apply suitable lubrication mechanisms for various machinery parts.
CO5: Students will demonstrate the working of Photovoltaic cell.

UNIT I:

UNIT II:
UNIT III:

**Corrosion And Its Control:** Definition, Causes and Effects of Corrosion - Theories of Corrosion (Chemical and Electrochemical Corrosion) - Mechanism of Electrochemical Corrosion (Oxygen Absorption Type and Hydrogen Evolution Type) - Types of Corrosion (Galvanic Corrosion, Differential Aeration Corrosion, Water Line Corrosion, Pitting Corrosion and Stress corrosion) - Galvanic Series - Factors affecting Rate of Corrosion (Nature of Metal and Nature of Environment). Controlling of Corrosion: Proper Designing - Modifying the Environment - Cathodic Protection (Sacrificial Anodic and Impressed Current).

UNIT IV.

**Fuel Technology & Lubricants:** Classification of Crude Oil-Fractional Distillation of Petroleum- Manufacturing Of Synthetic Petrol (Fischer-Tropsch & Bergius Process) - Knocking – Anti Knocking Agents-Octane & Cetane Number.

**Lubricants:** Definition and functions of lubricants – classification of lubricants - mechanism of lubrication – Thick film, Thin film and Extreme pressure lubrication - properties of lubricants - Viscosity, flash and fire points, cloud and pour points, aniline point, neutralization number and mechanical strength.

UNIT V:


TEXT BOOKS:


REFERENCES:

4. “A Text Book of Engineering Chemistry”, S. Nagarajan, R. Gopalan,
ENGINEERING MECHANICS  
(Common to CSE, IT, EEE, ECE & Civil branches)

Credits: 3.5  Until Marks: 30
Subject Code: 16ME1002  External Marks: 70

Course Objectives:
• To provide knowledge on system of forces, free body diagram.
• To provide knowledge on friction between two mating surfaces.
• To provide knowledge on centre of gravity and moment of inertia for different sections.

Course Outcomes:
CO1: Know the system of forces and calculate the resultant of different force system.
CO2: Draw the free body diagram and understand the concept of moment and couple.
CO3: Know the friction between two mating surfaces and calculate centroid of plane areas.
CO4: Determine area and mass moment of inertia for different sections.
CO5: Determine the kinematic relations of particles & rigid bodies.

UNIT I:

UNIT II:

UNIT III:

Centroids And Centre Of Gravity: Centre of gravity – centroids of area and lines – determination of centroids by integration – centroids of composite figures – theorems of Pappus.
UNIT IV:


UNIT V:

Kinetics: Kinetics of rigid bodies – equation of planes motion – fixed axis rotation – rolling bodies (simple examples) - general plane motion (Simple examples).

TEXT BOOKS:

REFERENCES BOOKS:
BASIC ELECTRIC CIRCUIT ANALYSIS

Subject Code: 16EE1001 Internal marks: 30
Credits: 3.5 External Marks: 70

Course objective:
- To introduce electric circuits and its analysis
- To impart knowledge on solving circuits using different laws.
- To provide knowledge on analysis of RLC circuits.
- To become familiar about resonance.
- To provide knowledge on three phase circuits.

Course outcomes:
CO1: Able to estimate different electrical circuits.
CO2: Able to solve circuits using different laws.
CO3: Able to analyze RLC circuits.
CO4: Able to summarize resonance.
CO5: Able to generalize three phase circuits.

UNIT I:
Basic Components And Electrical Circuits: Introduction: charge, current, voltage and power; Voltage and current sources - Independent and dependent sources; Networks and circuits; Ohm’s Laws, power absorption, Voltage and Current Laws: Nodes, paths, loops and branches, Kirchhoff’s current law, Kirchhoff’s voltage law; The single loop circuit; The single-node-pair circuit; series and parallel connected sources; Resistors in series and parallel; Voltage and current division; Source transformations; Star-Delta transformation-Problems.

UNIT II:
Circuit Analysis: Circuit Analysis: Nodal Analysis, Super node; Mesh analysis, super mesh-Problems.

Capacitor, Inductor And Electromagnetic Induction: Capacitor, Integral Voltage-current relationship, energy stored in a capacitor; The inductor, integral voltage-current relationship, energy stored in an inductor; Inductance and Capacitance combinations-inductors in series and parallel; Capacitors in series and parallel; Faradays laws of electromagnetic induction, Types of induced e.m.f’s , Self Inductance, mutual inductance, Dot Convention, coefficient of coupling-Problems.
UNIT III:
**Fundamentals Of Ac And Ac Circuits Power Analysis:** Generation of alternating current, periodic waveforms; Basic definitions- root mean square (RMS) and average values of alternating currents and voltages, form factor and peak factor; effective and average values of different periodic waveforms, effective value with multiple frequency circuits, AC through pure R, L and C; Phasor concepts-Phasor representation of voltage and current through R,L and C; Kirchhoff’s laws using phasors; Impedance- series and parallel combinations; Admittance; Nodal and Mesh analysis for AC circuits; Apparent Power and Power Factor; Complex Power.

UNIT IV:
**Resonance:** Resonance-series, parallel circuits, concept of band width and Q factor - Locus diagrams - series R-L, R-C, R-L-C and parallel combination with variation of various parameters.

UNIT V
**Three Phase Circuits:** Three phase circuits: Phase sequence- Star and delta connection- Relation between line and phase voltages and currents in balanced systems- Analysis of balanced three phase circuits Measurement of Active and Reactive power in balanced three phase systems. Analysis of Three Phase unbalanced circuits- Loop Method- Application of Millman’s Theorem

**TEXT BOOKS:**
3. Electrical Circuits by A. Sudhakar and Shyammohan S Palli, Tata McGraw- Hill.

**REFERENCES:**
2. Engineering network analysis and filter design by Gopal G. Bhise, Umesh Publications.
3. Electrical Engineering fundamentals By Vincent DelTaro, Pearson Publications
ENGINEERING CHEMISTRY LABORATORY
(Common to all branches)

Subject Code: 16BS1102  
Internal Marks: 25  
Credits: 1.5  
External Marks: 50

Course objective:

- To understand the determination of D.O. and Turbidity of water samples.
- To become familiar with the determination of viscosity, flash point and acid value of oil.
- To learn concepts of pH and conductometric titrations.
- To understand the determination of hardness of water by EDTA method.
- To understand the determination of manganese dioxide in manganese ore.

Course outcomes:

CO1: Students are able to determine D.O. and Turbidity of water samples.
CO2: Students can explain the importance of viscosity, Flash point and Acid value of a lubricant.
CO3: Students will determine the amount of acid or base by pH metric and conductometric titrations.
CO4: Students are able to determine the hardness of various water samples.
CO5: Students are able to determine manganese dioxide in manganese ore.

List Of Experiments:  (Any Twelve experiments have to be completed)

1. Determination of acid number of given lubricating oil.
2. Determination of Flash and Fire points of given Oil Samples.
3. Determination of Kinematic Viscosity of a given oil sample by using Viscometer.
5. Determination of Total Hardness of water sample by using EDTA Method.
6. Nephelometric determination of Turbidity present in the given water sample.
8. Preparation and calculation of the yield of Phenol-Formaldehyde Resin (Bakelite).
9. Determination of Strength of a strong acid by pH metric Method.
10. Conductometric determination of Strength of an Acid using strong base.
11. Conductometric determination of mixture of acids using strong base.
13. Potentiometric determination of Mohr’s salt using $K_2Cr_2O_7$.
15. Determination of manganese dioxide in manganese ore (pyrolusite).

**TEXT BOOKS:**

**REFERENCE BOOKS:**
INFORMATION TECHNOLOGY WORKSHOP LAB

Subject Code: 16CS1103
Credits: 1.5

Course objective:
- The IT Workshop for engineers is a 10 training lab course spread over 48 hours. The modules include training on PC Hardware, Internet & World Wide Web and Productivity tools including Word, Excel, Power Point and Publisher.
- PC Hardware introduces the students to a personal computer and its basic peripherals, the process of assembling a personal computer, installation of system software like MS Windows, Linux and the required device drivers. In addition hardware and software level troubleshooting process, tips and tricks would be covered.
- Internet & World Wide Web module introduces the different ways of hooking the PC on to the internet from home and workplace and effectively usage of the internet. Usage of web browsers, email, newsgroups and discussion forums would be covered. In addition, awareness of cyber hygiene, i.e., protecting the personal computer from getting infected with the viruses, worms and other cyber attacks would be introduced.
- Productivity tools module would enable the students in crafting professional word documents, excel spread sheets, power point presentations and personal web sites using the Microsoft suite of office tools.

Course outcomes:

CO1: Students gain knowledge on computer system such as system unit, input devices, output devices connected to the computer.

CO2: Students gain knowledge to understand the booting process that includes switching on the system, execution of POST routine, then bootstrap loader, and loading of the operating system, and getting it ready for use.

CO3: Students gain knowledge to understand the working of the internet that include the use of protocols, domains, IP addresses, URLs, web browsers, web servers, mail-servers, etc.

CO4: Students get familiarize with parts of Word window, To create and save a document, To set page settings, create headers and footers, To use various formatting features such as bold face, italicize, underline, subscript, superscript, line spacing, etc.

CO5: Students get familiarize with parts of Excel window, To create and save a workbook with single and/or multiple worksheets, To apply operations on range of cells using built-in formulae, etc.

CO6: Students get familiarize with parts of PowerPoint win, to create and save a new presentation, apply design templates to a presentation, to insert, edit and delete a slide, etc.

CO7: Students gain knowledge on search information using search engines etc.
PC Hardware

Task 1: Identification of the peripherals of a computer. To prepare a report containing the block diagram of the CPU along with the configuration of each peripheral and its functions.

Task 2: (Optional) : A practice on disassemble the components of a PC and assembling them to working condition.

Task 3 : Installation of WINDOW XP operating system in PC.

Task 4: Introduction to DOS commands

Task 5 : Installation of LINUX operating system in PC.

Internet&WorldWideWeb

Task 6: Surfing the Web using Web Browsers and Search engine: How to access the websites and email. Students customize their web browsers using bookmarks, search toolbars and pop up blockers. And Students should know what search engines are and how to use the search engines. A few topics would be given to the students for which they need to search on Google.

MSWord

Word Orientation : Describe Importance of MS-Word

Task 7 : Using word to create project certificate. Features to be covered:- Formatting Fonts in word, Drop Cap in word, Applying Text effects, Using Character Spacing, Borders and Colors, Inserting Header and Footer, Using Date and Time option in Word.


Task 9 : Creating a Newsletter : Features to be covered:- Table of Content, Newspaper columns, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Textboxes and Paragraphs

Task 10 : Creating a Feedback form - Features to be covered- Forms, Text Fields, Inserting objects, Mail Merge in Word.
MS-Excel

Excel Orientation: The mentor needs to tell the importance of MS/ equivalent (FOSS) tool Excel as a Spreadsheet tool, give the details of the four tasks and features that would be covered in each. Using Excel – Accessing, overview of toolbars, saving excel files, Using help and resources

Task 11: Creating a Scheduler - Features to be covered:- Gridlines, Format Cells, Summation, auto fill, Formatting Text

Task 12: Creating Performance Analysis - Features to be covered:- Split cells, freeze panes, group and outline, Sorting, Boolean and logical operators, Conditional formatting

Task 13: Calculating GPA - Features to be covered:- Cell Referencing, Formulae in excel – average, std. deviation, Charts, Renaming and Inserting worksheets, Hyper linking, Count function,

Task 14: Creating Cricket Score Card - Features to be covered:- Pivot Tables, Interactive Buttons, Importing Data, Data Protection, Data Validation

MS-PowerPoint

Task 15: Students will be working on basic power point utilities and tools which help them create basic power point presentation. Topic covered during this week includes :- PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows, Hyperlinks, Inserting – Images, Clip Art, Tables and Charts in Powerpoint.

Task 16: Concentrating on the in and out of Microsoft power point, Helps them learn best practices in designing and preparing power point presentation. Topic covered during this week includes: - Master Layouts (slide, template, and notes), Types of views (basic, presentation, slide slotter, notes etc), Inserting – Background, textures, Design Templates, Hidden slides.

Text Books:
1. Vikas Gupta, “Comdex Information Technology course tool kit”, WILEY Dreamtech
3. “Introduction to Information Technology”, ITL Education Solutions limited, Pearson Education.
4. Kate J. Chase, “PC Hardware and A+ Handbook” – PHI (Microsoft)

Reference Books:
1 Scott. Mueller, 2008, Upgrading and Repairing PCs, 18/e, QUE, Pearson,
BASIC ELECTRICAL ENGINEERING LAB

Subject Code: 16EE1101
Credits: 1.5
Internals Marks: 25
External Marks: 50

Course Objective:
To introduce the student to study different electrical components and to verify the basic laws related to electrical engineering, electrical wiring system through study, practice, and experiments.

Course Outcomes:
At the end of this lab the student will be able to
CO1: Discuss various types of electrical components.
CO2: Demonstrate various basic laws related to electrical engineering.
CO3: Examine electrical wiring system.
CO4: Describe control of lamps.
CO5: Demonstrate soldering and bread board precautions.

List of Experiments
1. Study of electrical components.
2. To verify ohm’s law
3. To verify (a) Kirchoff’s current law
   (b) Kirchoff’s voltage law
4. To verify the total resistance of the series and parallel connected circuits.
5. To find voltage current relationship for series RL circuit and determine power factor.
6. Determination of peak and average voltage in A.C circuit.
7. Find armature resistance, field resistance and filament lamp resistance using V-I method.
8. Fluorescent tube connection.
   (a) One way control of lamp
   (b) Two way control of lamp
10. Living room wiring.

Additional Experiments:
11. Soldering and bread board precautions.
12. Parameters of a choke coil.
ENGLISH COMMUNICATION PRACTICE
(Common to All Branches of I.B.Tech II Sem)

Subject Code: 16HS1002 Internal Marks: 30
Credits : 03 External Marks: 70

Course Objective:

- To assist students use grammar effectively in both speech and writing
- To improve communication skills of students by making them participate in different language activities
- To help students acquire the study skills of ‘Note taking’ and ‘Note making’
- To assist students to use reading techniques learnt in English for other subjects
- To enable students to summarize, paraphrase and review a piece of writing

Course Outcomes:

CO1: Students will be able to use grammar appropriately in speech and writing.
CO2: Students will be able to describe, discuss, explain and interpret a given situation / context effectively.
CO3: Students will be able to read texts and listen to lectures and make notes on them.
CO4: Students will be able to apply reading techniques in their other subjects.
CO5: Students will be able to summarize, paraphrase and review a piece of writing efficiently.

UNIT I: Grammar: Regular & Irregular Verbs—Tenses—Voice—Reported Speech—Auxiliaries and Modals—If Conditionals— Degrees of Comparison— Simple, Compound, Complex Sentences— Question Tag—Correction of Sentences
UNIT II: Situational Dialogues—Acceptance and Rejection of Invitation—Debate—JAM—Public Speaking
UNIT III: Study Skills: Note taking and Note making
UNIT IV: Intensive and Extensive reading—Skimming and Scanning
UNIT V: Summarising / Paraphrasing / Reviewing an article orally and in writing

TEXTBOOK

REFERENCE BOOKS
ENGINEERING MATHEMATICS – II
(Common to all branches)

Subject Code: 16BS1002
Internal Marks: 30
Credits: 3.5
External Marks: 70

Course objective:
- To Solve the algebraic and transcendental equations, using different numerical method. Estimate the best curve for a given data.
- To estimate the value of derivatives, evaluate the definite integrals using different numerical methods and calculate the numerical solution of an ordinary differential equation i.e IVP.
- To explain Laplace transform of continuous functions using Laplace transform formulae & properties, apply Laplace transform to solve I.V.P &B.V.P.
- Perform the Fourier series and half range series expansion of different functions in different intervals.
- Interpret the methods of solving a linear and non-linear 1st order partial differential equation and evaluate wave equations & heat equations using method of separation of variables.

Course outcomes:
CO1: Solve the algebraic and transcendental equations by different numerical methods, estimate a linear and non-linear curve to the given data by the method of least squares, calculate the value of dependent variable for a particular x by deducing the unknown function y = f(x) for an evenly or unevenly spaced points.
CO2: Estimate the value of derivatives, evaluate the definite integrals using different numerical methods and calculate the numerical solution of an ordinary differential equation i.e IVP.
CO3: Deduce Laplace transform of different continuous functions using different properties and solve an I.V.P & B.V.P applying Laplace transform.
CO4: Deduce the Fourier series and half range series expansion of different functions for different intervals.
CO5: Solve linear and non-linear 1st order partial differential equation and using method of separation of variables evaluate a wave equation/heat equation.

UNIT I:
UNIT II:
**Numerical Differentiation, Integration and solution of Ordinary Differential equations**

UNIT III:

UNIT IV:
**Fourier series:** Determination of Fourier coefficients (without proof) – Fourier series – even and odd functions – Fourier series in an arbitrary interval– Half-range sine and cosine series.

UNIT V:

**TEXT BOOKS:**

**REFERENCE BOOKS:**
ENGINEERING PHYSICS
(Common to all Branches – Offered to CSE, IT, ECE in I SEM and to EEE, CIVIL, MECH in II SEM)

Subject code: 16BS1003  Internal Marks: 30
Credits: 3.5  External Marks: 70

Course objective

- Realize the principles of optics in designing optical devices
- To comprehend the Principles of Lasers and Fiber Optics
- Define the shortcoming of classical physics and describe the need for modifications to classical theory.
- To give an insight into Magnetic Properties and Dielectric Materials for various Engineering applications
- To get acquainted with a curriculum of Interdisciplinary Nature

Course outcomes

CO1: Apply the principles of optics in designing optical devices
CO2: Understand the Principles of Lasers and Fiber Optics
CO3: Will be able to resolve the discrepancies in classical estimates through quantum principles
CO4: Will be able to apply knowledge of Magnetic Properties and Dielectric Materials in Material Fabrication
CO5: Will get acquainted with interdisciplinary concepts in contemporary context

UNIT I:
Wave Optics: Interference - Introduction, Principle of Superposition of Waves, Interference in Plane Parallel Film due to Reflected Light, Newton’s Rings under Reflected Light -etermination of Wavelength of Monochromatic Source of Light, Applications of Interference-Testing of Flatness of Surfaces, Anti Reflecting Coatings
Diffraction - Introduction, Differences between Interference and Diffraction, Fraunhofer Diffraction due to Single Slit – Intensity Distribution

UNIT II:

UNIT III:
Preliminary Quantum Mechanics: Introduction, Waves and Particles, Wave Particle Duality and De-Broglie Hypothesis, Heisenberg’s Uncertainty Principle – Applications (a) Non Existence of Electrons in Nucleus (b) Existence of Protons and Neutrons in Nucleus (c) Radiation of Light from an excited atom, Time independent Schrödinger wave equation, Physical Significance of Wave Function, Particle in One Dimensional Potential Box, Comparison of Maxwell Boltzmann, Bose Einstein and Fermi Dirac Statistics (Qualitative Treatment only).

UNIT IV:

UNIT V:

TEXT BOOKS:
1. A Textbook of Engineering Physics, M N Avadhanulu & P G Kshirsagar, S.Chand Publishers

REFERENCE BOOKS:
1. University Physics by Young and Freedman
2. Fundamentals of Physics by Resnick, Halliday and Walker
5. Engineering Physics, Volume-I&II, P.K.Palani Swamy, Scitech Publications Hyderabad
7. Engineering Physics Dr. S. Mani Naidu, Pearson Publications Chennai
ENGINEERING DRAWING
(Common for all Branches – Sem-I / Sem-II)

Subject Code: 16ME1001  
Credits: 3.0  
Internal Marks: 30  
External Marks: 70

Course objective:
- Able to develop drawing skills and representation of I angle and III angle projection, isometric Projection, Isometric drawing.

Course outcomes:
CO1: Construct polygons, ellipse and scales (plain, diagonal, vernier).
CO2: Draw orthographic projection of points and straight lines in any quadrant, and determine its true length and true inclination.
CO3: Draw projections of plane surfaces inclined to either one or both reference planes.
CO4: Draw projections of simple solids inclined to one reference plane.
CO5: Convert orthographic views into isometric projections and vice-versa.

UNIT I:
Lines, Lettering and Dimensioning: Introduction to Drawing instruments and their uses, Types of lines, Lettering ,Elements of dimensioning and systems of dimensioning.

Construction of scales: Plain Scale, Diagonal & Vernier Scales.


UNIT II:
Orthographic Projections: First and Third Angle Projections: Projections of Points. Projections of Straight Lines inclined to one reference plane only.

UNIT III:
Projections of Planes: Perpendicular planes & planes inclined to one reference plane and both reference planes.

UNIT IV:
Projections of Solids: Classification of solids. Projections of Prism, Cylinder, Pyramid, & Cone inclined to one reference plane only.
UNIT V:

Conversion of Orthographic Projections to Isometric Projections: Conversion of Orthographic Views to Isometric views

Conversion of Isometric Projection to Orthographic Projections: Conversion of Isometric view to Orthographic views

TEXT BOOKS:


REFERENCE BOOKS:

SWITCHING THEORY AND LOGIC DESIGN

Subject Code: 16EC1002  
Credits: 3.5  
Internal Marks: 30  
External Marks: 70

Course Objective:
1. This course enables the students to:
2. To introduce different number systems and their applications.
3. To introduce Boolean algebra, Minimization of Switching functions, Karnaugh map method, Tabulation method, Logic gates.
4. To introduce Combinational Logic circuits, sequential Logic circuits
5. To identify suitable designing procedures for the given problems.

Course Outcomes:
Upon completion of this course the students are able to:
CO1: Distinguish number systems and digital codes.
CO2: Explain the function of various logic functions.
CO3: Become adept at solving logic functions for economical design of logic circuits.
CO4: Learn to analyze and design various types of combinational circuits.
CO5: Learn to analyze and design various types of sequential circuits.

UNIT I:
Review of Number systems: Number systems Base conversion methods, complements of numbers, r’s, r-1’s compliment subtraction. BCD, Excess-3, Alphanumeric code, self complement codes, 2421, gray code, error detection & correction codes, Parity checking codes, Hamming codes.

UNIT II:
Logic operations: Logic Gates, Boolean theorems, complements and dual of logic expressions, standard SOP & standard POS. Minimization of logic functions using theorems. Multi level NAND – NAND, NOR-NOR Realizations.

UNIT III:
Minimization of switching functions: Minimization of switching functions using K-Map up to 5-variables, code converters and binary multiplier using K-Map, Tabular minimization.

UNIT IV:
Combinational logic circuits: Design of Half adder, full adder, half subtractor, full subtractor, applications of full adders, 4-bit binary adder, 4-bit binary subtractor, adder-subtractor circuit, BCD adder circuit, Excess3 adder circuit, look-a-head adder circuit. Design of decoder, Encoder, multiplexer, DE multiplexer, priority encoder, comparator, seven segment display.
UNIT V:

**Sequential logic circuits:** Classification of sequential circuits, flip-flops with truth tables and excitation tables. Conversion of flip-flop to flip-flop. Design of ripple counters, synchronous counters, Johnson counters, ring counters. Design of Buffer register, control buffer register, shift register, bi-directional shift register, universal shift register.

**TEXTBOOKS:**

1. Digital design by Mano 2\textsuperscript{nd} edition PHI.
3. Modern Digital Electronics by RP Jain, TMH.

**REFERENCE BOOKS:**

COMPUTER PROGRAMMING
(Common for All Branches)

Subject Code: 16CS1001 Internal Marks: 30
Credits: 3.5 External Marks: 70

Course objective:

- To impart adequate knowledge on the need of programming languages and problem solving techniques.
- To develop programming skills using the fundamentals and basis of C language.
- To enable effective usage of arrays, structures, functions, pointers and to implement the memory management concepts.
- To teach the issues in the file organization and the usage of file systems.
- To impart the knowledge about pointers this is the backbone of effective memory handling.
- To study the advantages of user defined data type this provides flexibility for application development.

Course outcomes:

At the end of this course the student will be able to

CO1: Understand the fundamentals of C programming.
CO2: Choose the loops and decision making statements to solve the problem.
CO3: Implement different operations on arrays and solve problems using functions.
CO4: Understand pointers, structures and unions.
CO5: Implement file operations in C programming for a given application.

UNIT I:
Computer Languages: Machine, Assembly and High-level, algorithm, flowchart, Program Development Steps.
Introduction to C: Character set, Tokens: Identifiers, keywords, data types, constants, variables, Operators: Arithmetic, relational, logical, assignment, bitwise, conditional and special (increment, decrement, comma)
Basic I/O statements, structure of a program, simple programs

UNIT II:
Control Structures: Decision Making: if, if-else, nested if, switch Iteration: while, for, do-while, nested loops Branching: Break, continue, goto
UNIT III:
Arrays: Definition, Types: 1D, 2D, declaration, initialization, accessing elements, Matrix operations
Functions: Definition, user defined function declaration, types of user defined functions, parameter passing, recursion, library functions, storage classes, passing arrays to function, string manipulations, preprocessor

UNIT IV:
Pointers: Definition, initialization, operations on pointers, functions and pointers, arrays and pointers, pointers to pointers, dynamic memory allocation
Structures: Definition, declaration, initialization, accessing members, array of structures, arrays within structure, functions and structures, pointers to structures, nested structures, unions

UNIT V:
File Handling: Types, operations on files, modes, file I/O functions, Random Access Functions.

TEXT BOOKS:

REFERENCE BOOKS:
2. B. W Kernighan, Dennis M. Ritchie. The C – Programming Language. PHI.
ENGINEERING PHYSICS LAB

Subject Code: 16BS1101
Credits : 1.5
Internal Marks: 25
External Marks: 50

Course objective:

- Demonstrate an ability to understand the precision in physical measurements
- Demonstrate an ability to analyze experimental statistics
- To determine the physical parameters such as Rigidity Modulus, Acceleration due to Gravity, Thickness of a thin film and Radius of Curvature
- To get acquainted with the Techniques and Skills associated with Modern Engineering Tools such as Lasers and Fiber Optics
- To be familiar with characteristics of Solid State devices such as Thermistor and Energy Band Gap

Course outcomes:

CO1: Student will be able to use Screw Gauge, Vernier Calipers and Travelling Microscope etc. effectively with requisite precision

CO2: Will be able to best fit a graph or interpolate and extrapolate from series of data points apart from interpreting errors

CO3: Will be able to measure physical parameters such as Rigidity Modulus, Acceleration due to Gravity, Thickness of a thin film and Radius of Curvature using principles of Mechanics and Wave Optics respectively

CO4: Will demonstrate Techniques and Skills associated with Modern Engineering Tools such as Lasers and Fiber Optics

CO5: Students will be able to characterize Dielectric and Semiconducting materials such as Thermistor and Germanium Diode

LIST OF EXPERIMENTS (Any Ten Experiments have to be completed)

1. Precision Measurements and Instruments
2. Error Analysis and Graph Drawing
3. Determination of Rigidity Modulus of the Material of Wire using Torsional Pendulum
4. Verification of Laws of Transverse vibrations in Stretched Strings using Sonometer
5. Wedge method – Determination of Thickness of Thin Object
6. Determination of Numerical Aperture and Bending Loss of an Optical Fiber
7. Determination of Acceleration due to Gravity (g) using Compound Pendulum
8. Determination of Energy Band Gap using the given Semiconductor Diode
10. Slit Width Determination with Single Slit Diffraction Pattern using LASER
11. Study of Characteristics of Thermistor
12. Determination of Wavelength of Monochromatic Source using LASER Diffraction
13. Determination of the Frequency of the given Tuning Fork using Volume Resonator
14. Study of the variation of Magnetic Field along the axis of a Circular Coil using Stewart and Gee’s Method.
15. Diffraction Grating: Normal Incidence – Determination of Wavelength of Monochromatic Source

Manual / Record Book


2. Lab Manual of Engineering Physics by Dr.Y. Aparna and Dr. K. Venkateswara Rao (VGS books links, Vijayawada)
COMPUTER PROGRAMMING LAB  
(Common for All Branches)

Subject Code: 16CS1101  
Internal Marks: 25

Credits: 1.5  
External Marks: 50

Course objective
- To gain experience about structured programming
- To help students to understand the implementation of C language
- To understand various features in C

Course outcomes
At the end of the course students will be able to
CO1: Solve the given problem using the syntactical structures of C language
CO2: Develop, execute and document computerized solution for various problems using the features of C language
CO3: Design programs involving decision structures and loops.
CO4: Implement modularity and code reusability concepts using functions.
CO4: To read and write C program that uses pointers, structures and files

LIST OF EXPERIMENTS

Ex 1: Write the C programs calculate the following
   a) Area of triangle when sides are given.
   b) Sum of first n numbers.
   c) Interchanging values of two variables.

Ex 2: Write the C programs to perform the following
   a) Read lower case character and convert into upper case.
   b) Find maximum of 3 values using conditional operator.
   c) Calculate area and perimeter of circle.

Ex 3: Write C programs for the following using decision making statements
   a) Check the given number is even / odd.
   b) Find the Largest among 3 values.
   c) Calculate the grades of a student.

Ex 4:
   a) Arithmetical operations using switch-case.
   b) Read a number and display in reverse.
   c) Check for Armstrong number property
Ex 5:
   a)  Check for strong number property
   b)  Generate Fibonacci series.
   c)  Generate Prime numbers between two numbers.

Ex 6:  Implement the following using arrays
   a)  Largest and smallest from a list of elements.
   b)  Find the position of given element from a list.
   c)  Arrange the elements in order.

Ex 7:  Implement the following using arrays
   a)  Matrix addition.
   b)  Matrix Multiplication.
   c)  Transpose of given matrix

Ex 8:  Calculate \( \binom{n}{r} \) value using functions.
       Write functions to perform
       a)  String copy
       b)  String concatenation
       c)  String comparison

Ex 9:
   a)  Factorial using recursion and non recursion.
   b)  GCD using recursion and non recursion.

Ex 10:
   a)  Find the sum and average of list of elements using DMA Functions
   b)  Implementation of call by reference

Ex 11:
   a)  Implementation of array of structure.
   b)  Demonstration of Union.

Ex 12:
   a)  Copy the contents of one file into another.
   b)  Count the number of characters, words and lines in a file.

Text Books:
   2.  “Let Us C”, Yashwant Kanikar

Reference Books:
BASIC ENGLISH COMMUNICATION SKILLS LABORATORY

Subject Code: 16HS1101
Credits: 1.5

Course Objectives

- To get students pronounce words correctly and speak with proper intonation
- To help students understand people speaking with different accents
- To enable students to describe objects and events effectively
- To help students approach a book with effective reading techniques
- To help students comprehend and interpret data provided in graphs, tables etc.

Course Outcome

CO1: Students will be able to pronounce words accurately based on the knowledge of speech sounds and use appropriate intonation patterns in speech.
CO2: Students will be able to comprehend audio and video clips of different accents.
CO3: Students will be able to describe / discuss / explain a given situation / context well.
CO4: Students will be able to read and recall what they have read.
CO5: Students will be able to understand and interpret information provided in graphs, tables etc.

Course Syllabus

Unit I: Received Pronunciation—Speech sounds of English—Intonation
Unit II: Comprehension of Audio and Video Clips of different Accents
Unit III: Greetings—Self-introduction—Introducing others—Story telling—Narrating an incident / event / person / picture
Unit IV: Reading: SQ3R Technique (Survey-Question-Read-Recite/Recall-Review)
Unit V: Interpreting data of graphs, tables etc. orally and in writing

Course Material:

TEXTBOOKS:  

REFERENCE BOOKS:  
ELECTRICAL MACHINES-I

Subject Code: 16EE2007  Internal Marks: 30
Credits: 3.5  External Marks: 70

Course objective
• To analyze the performance of different types of DC machines & Transformers.
• To appreciate the applications of DC machines & Transformers

Course outcomes
CO1: Identify and Define different types of dc generators, interpret their performance under different load conditions.
CO2: Describe the construction and working principle of various types of DC motors.
CO3: Distinguish between different types of transformers and compute their equivalent circuit parameters.
CO4: Analyze the working of any DC machines and transformer under loaded and unloaded conditions
CO5: Determine the performance of DC machine and Transformers by conducting different tests.

UNIT I:
D.C. Machines: Principle of operation, Constructional details, Armature winding terminology, Emf equation, Methods of excitation, Armature Reaction, Commutation.

UNIT II:
Characteristics of D.C. generators: O.C.C, internal-external characteristics, losses-power flow-efficiency calculation
DC MOTORS: Principle of operation of DC motors-Back EMF – Torque equation – Types of DC motors-Speed – Torque characteristics of DC motors

UNIT III:
Speed Control & Testing Of Dc Machines: Starting of DC motors: 3 point starter, 4 point starter – Losses and efficiency – Condition for maximum efficiency, Speed control methods, Brake test, Swinburne’s test, Retardation test, Hopkinson’s test, field test.

UNIT IV:
UNIT V:
**Transformers –II:** Open circuit and short circuit test, Sumpner's test, parallel operation, separation of core losses test – auto transformers.
Three phase transformer connections-Scott connection.

**TEXT BOOKS:**
3. P.S. Bimbhra, “Electrical Machinery”, Khanna Publisher

**REFERENCE BOOKS:**
ELECTRONIC DEVICES AND CIRCUITS

Subject Code: 16EC2005
Credits: 3.0
Internal Marks: 30
External Marks: 70

Course Objectives:
- To study semiconductor physics, junction diode characteristics, special diodes,
- To design of rectifiers, filters
- To learn about transistors, FETs, transistor biasing, small signal low frequency transistor models.
- To know the concepts of feedback amplifiers and oscillators.

Course Outcomes:
CO1: Ability to analyze the structure of different types of semiconductor devices and ability to design rectifiers and filters.
CO2: Ability to demonstrate an understanding of operational amplifiers and their internal device including BJT, CMOS transistors.
CO3: Ability to understanding biasing techniques.
CO4: Ability to analyze Small signal amplifiers.
CO5: Ability to determine the stability of feedback amplifiers and their steady state performance.

UNIT I:
Diode Characteristics: Introduction to semiconductor materials, V-I Characteristics of Diode, Diode current equation, Diode as a switch, Zener Diode Characteristics, Zener Diode as Voltage Regulator, Tunnel diode, LED.
Rectifiers And Filters: Half wave rectifier, Full wave rectifier, Advantages of full wave rectifier over Half Wave rectifier, C- Filter, Inductor filter, LC- Filter.

UNIT II:
Transistor Characteristics: Bipolar junction transistors (BJT) - input & output Characteristics of transistor in CB, CE, CC configurations, Relations between $\alpha, \beta, \gamma$. Characteristics of JFET, MOSFET (Enhancement and depletion), Characteristics of UJT.

UNIT III:
Biasing And Stability: Need for biasing, criteria for fixing the operating point, thermal run away, thermal stability, stabilization techniques.

UNIT IV:
Small Signal Amplifiers: h-parameter representation of a Transistor, Analysis of single stage transistor amplifier using h-parameters, comparison of transistor configurations in terms of $AV, AI, Ri, Ro$. 
UNIT V:
**Feedback Amplifiers:** Concept of feedback, classification of feedback amplifiers, general characteristics of negative feedback amplifiers, effect of negative feedback on input and output Resistances.

**Oscillators:** Condition for oscillations, RC Phase shift oscillator with Transistor, Wein bridge oscillator, Hartley and Colpitts oscillator.

**TEXT BOOKS:**

**REFERENCE BOOKS:**
1. Integrated Electronics – Jacob Millman, Chritos C. Halkies., Tata Mc-Graw Hill, 2009
ELECTRICAL CIRCUIT ANALYSIS

Subject Code: 16EE2008  
Credits: 3.5  
Internal Marks: 30  
External Marks: 70

Course Objective:

- To impart knowledge on solving circuits using network theorems both DC and AC.
- To introduce the phenomenon Two Port Networks and Ladder Networks.
- To educate on obtaining the transient response of both DC and AC circuits.
- To analyze and synthesis networks.
- To able to analyze the Network functions.

Course Outcomes:

CO1: Familiar with Two Port Networks and Ladder Networks.
CO2: Knows how to apply theorems to both DC and AC circuits.
CO3: Knows how to analyze a given AC or DC transient circuit.
CO4: Gains knowledge how to synthesize a circuit.
CO5: Knows how to analyze the Network functions.

UNIT I:
Network theorems – I: Superposition, Thevenin’s, Norton’s and Reciprocity Theorems for D.C and sinusoidal excitations (for independent and dependent sources).

UNIT II:
Network theorems – II: Maximum Power Transfer, Millman’s, Tellegen’s, and compensation Theorems for D.C and sinusoidal excitations (for independent and dependent sources).

UNIT III:
Two Port Networks: Two port network parameters – Z, Y, ABCD (transmission) and hybrid parameters and their relations, inverse of transmission & Hybrid parameters, Series and parallel two-Port Networks.

UNIT IV:

UNIT V:
Network Synthesis: Introduction, Causality and stability, Hurwitz polynomial, Routh’s criterion, Positive real functions, Sturm’s theorem, Elementary synthesis procedures, L-C Impittance functions (Foster form-1, Foster form-2, First Cauer form, Second Cauer form), R-C Impedance functions (Cauer forms of RC networks), R-L Impedance or R-C Admittance functions (Cauer forms of R-L Impedance or R-C Admittance), Problems.

TEXT BOOKS:
2. Network Analysis: Van Valkenburg; Prentice-Hall of India Private Ltd.

REFERENCE BOOKS:
3. Electric circuits in SI units by Joseph A Edminster, MSE, 1st Edition
4. Electrical Circuits by A. Sudhakar and Shyammohan S Palli, Tata McGraw-Hill.
FLUID MECHANICS AND HYDRAULIC MACHINERY

Subject Code: 16ME2008  Internal Marks: 70
30 Credits: 3.5  External Marks: 70

Course objective:
- To provide knowledge on different fluid properties and fluid flow.
- To provide basic knowledge on hydraulic turbines and pumps.

Course outcomes:
CO1: Define various physical properties of fluids, and understand how manometers are used to measure fluid pressure. List various flow classifications.
CO2: Derive and solve problems based on continuity equation. Apply Euler, Bernoulli, Navier-Stokes, Impulse-momentum equations to solve practical fluid flow problems.
CO3: Compute losses in fluid flow using Darcy Weisbach equation. Explain and solve problems based on various flow measurement devices.
CO4: Illustrate mechanism and construction of various Hydraulic Turbines like Pelton wheel, Kaplan and Francis. Compute efficiencies and select suitable turbine using characteristic curves, governing and cavitation.
CO5: Calculate efficiency and performance characteristics of centrifugal and reciprocating pumps.

UNIT I:
Fluid Kinematics: Description of fluid flow: Path line, Stream line, Streak line, Stream tube, Velocity & Acceleration – Classification of fluid flows: Steady & Unsteady, Uniform & Non-uniform, Rotational & Irrotational flows – Reynolds Experiment: Laminar & Turbulent flows - Continuity equation for 1D, 2D and 3D flows – Stream function, Velocity potential function and Flow net analysis

UNIT II:
Fluid dynamics: Surface and Body forces – Euler’s and Bernoulli’s equations for flow along a stream line for 3D flow – Navier-Stokes equations (Explanation only) – Momentum equation and its applications: Force on pipe bend – Flow between parallel plates, Flow through long tubes, Flow through inclined tubes.
UNIT III:
Closed Conduit Flow: Darcy Weisbach equation – Minor losses in pipes: Pipes in series and pipes in parallel – Total energy line and Hydraulic gradient line
Impact of jet on vanes: Impact of jet on Flat, Inclined & Curved vanes (Stationary & Movable), Impact of jet on series of curved vanes

UNIT IV:
Hydraulic Turbines: Classification of turbines: Impulse and Reaction turbines – Pelton Wheel, Francis turbine and Kaplan turbine – working proportions, work done, efficiencies, hydraulic design – Draft tube: Theory, functions and efficiency
Performance of hydraulic turbines: Geometric similarity – Unit and Specific quantities – Characteristic curves – Governing of turbines – Selection of type of turbine – Cavitation – Surge tanks – Water hammer

UNIT V:
Centrifugal pumps: Classification, working, and work done – Manometric head – Losses and efficiencies – Specific speed – Pumps in series and parallel – Performance curves – NPSH
Reciprocating pumps: Working, Discharge, Slip and indicator diagrams

TEXT BOOKS:

REFERENCE BOOKS:
POWER SYSTEMS-I

Subject Code: 16EE2009  Internal Marks: 30
Credits: 2  External Marks: 70

Course objective:

- To impart knowledge about the generation of electrical power to meet the ever increasing demand of electrical power and operation of conventional power plants.
- To impart knowledge about the various aspects and methods of improving Voltage and power factor in distribution systems.

Course outcomes:

CO1: Students are able to draw the line diagrams and identify different components in the conventional and nonconventional power generating stations.
CO2: Students can summarize different distribution systems.
CO3: Students can identify the equipment used in different substations.
CO4: Students can analyze the economic aspects of power generation and different tariff methods.
CO5: Students can estimate the necessity of the underground cables

UNIT I:

**Thermal & Hydel Power Stations:** Site selection, Line diagram of Thermal Power Station showing paths of coal, steam, water, air, ash and flue gasses- Brief description of TPS components: Boilers, Super heaters, Economizers, Turbines, Condensers, Cooling towers, and Chimney, Electro Static Precipitator, Hydro power plants.

UNIT II:


UNIT III:
**Distribution Systems**: Classification of distribution systems, design features of distribution systems, radial distribution, ring main distribution, voltage drop calculations: DC distributors for following cases: radial DC distributor fed at one end and at ends (equal / unequal voltages), ring main distributor, stepped distributor and AC distribution. Comparison of DC and AC distribution.

**Substations**: Classification of substations: Air insulated substations - Indoor & Outdoor substations: Substations layout showing the location of all the substation equipment. 33/11 KV substation line diagram.

UNIT IV:
**Economic Aspects of Power Generation**: Load curve, load duration and integrated load duration curves, discussion on economic aspects: connected load, maximum demand, demand factor, load factor, diversity factor, capacity factor, utilization factor, capacity, utilization and plant use factors- Numerical Problems.

**Tariff Methods**: Costs of Generation and their division into Fixed, Semi-fixed and Running Costs. Desirable Characteristics of a Tariff Method, Tariff Methods: Simple rate, Flat Rate, Block-Rate, two-part, three-part, and power factor tariff methods.

UNIT V:

**Gas insulated substations (GIS)**: Advantages of Gas insulated substations, different types of gas insulated substations, single line diagram of gas insulated substations.

**TEXT BOOKS:**

2. Electrical Power sytem by S.L.Uppal.

**REFERENCE BOOKS:**

1. Generation, Distribution and Utilization of Electric Energy by C.L.Wadhawa New age
ADVANCED ENGLISH COMMUNICATION SKILLS LABORATORY

Subject Code: 16HS2102
Credits: 1.5

Course Objectives:
- To provide students with a wide range of vocabulary to enable them to take language tests for higher education and employment
- To prepare students for making presentations
- To enable students to participate in group discussions
- To prepare students for facing interviews confidently

Course Outcomes:
CO1: Students will be able to state meanings, synonyms, antonyms, analogies, idioms, phrases, one word substitutes, word roots, prefixes and suffixes for words in general.
CO2: Students will be able to present and interpret data on select topics using pre-existing slides.
CO3: Students will be able to contribute proactively and extrapolate in group discussions.
CO4: Students will be able to prepare Résumé / CV and face interview.
CO5: Students will be able to develop communication skills by playing different roles.

Course Syllabus
Unit I: Vocabulary Extension for facing competitive examinations
Unit II: Paper, PowerPoint and Video Presentations
Unit III: Group Discussion
Unit IV: Job Application and Résumé / CV Writing—Interview Preparation
Unit V: Speaking: Role-play

Course Material:
Textbook

Reference Books
ELECTRONIC DEVICES AND CIRCUITS LAB

Subject Code: 16EC2102  Internal Marks: 25
Credits: 1.5  External Marks: 50

Course objective
- The main objective of this curriculum/course is to make the students well versed with basic electronics components and circuits
- The students can understand the nature and scope of modern electronics.
- Describe physical models of basics components.
- Understand their capabilities and limitations and make decisions regarding their best utilization in a specific situation

Course outcomes
CO1: Generalize the working of diodes, transistors and their applications.
CO2: Compute a common emitter/base/collector amplifier and measure its voltage gain.
CO3: Differentiate a bias point in a transistor.
CO4: List to design different types of filters and apply the same to oscillators.
CO5: Design the circuit, which converts an analog signal to digital signal.

List of Experiments (Ten experiments to be done):
1. Frequency measurement using Lissajous Figures
2. PN Junction diode characteristics  A. Forward bias  B. Reverse bias. (cut-in voltage & Resistance calculations)
3. Zener diode characteristics and Zener as a regulator
4. Transistor CB characteristics (Input and Output) & h Parameter calculations
5. Transistor CE characteristics (Input and Output) & h Parameter calculations
6. Rectifier without filters (Full wave & Half wave)
7. Rectifier with filters (Full wave & Half wave)
8. FET characteristics
9. UJT Characteristics
10. CE Amplifier
11. CC Amplifier (Emitter Follower)
FLUID MECHANICS AND HYDRAULIC MACHINERY LAB

Subject Code: 16ME2104
Credits: 1.5

Course objective:
- To give the practical exposure about fundamentals of fluid mechanics and hydraulics.
- To provide practical knowledge about the turbo-machinery.

Course outcomes:
CO1: Conduct impact of jet on vanes, and performance test on Pelton wheel.
CO2: Conduct performance tests on Francis turbine and Kaplan turbine.
CO3: Conduct performance tests on single-stage and multi-stage centrifugal pump and reciprocating pump.
CO4: Calibrate venture-meter and orifice-meter.
CO5: Determine head loss and friction factor for a given pipeline.

LIST OF EXPERIMENTS:
1. Calibration of Venturimeter
2. Calibration of Orificemeter
3. Impact of Jet on Vanes
4. Calibration of Turbine flow meter
5. Determination of Friction factor for give closed conduit
6. Effect of minor losses in closed conduit flow
7. Performance test on Single-stage Centrifugal pump
8. Performance test on Mulit-stage Centrifugal pump
9. Performance test on Reciprocating pump
10. Performance test on Pelton wheel
11. Performance test on Francis turbine

Note: Conduct Any 10 Experiments From The Given List.
PROFESSIONAL ETHICS AND MORALS

Subject Code: 16HS2201
Credits: 0

Course objective:
- To help students regulate their behavior in a professional environment as employees.
- To make students aware of the impact of taking non-ethical engineering decisions.
- To understand that mind and desire control is needed for being ethical.
- To understand organizational culture and to adapt to varying cultures without compromising ethical values.

Course outcomes:
On completion of this course, students should be able
CO1: Realize the importance of human values.
CO2: Understand that excessive desires of the mind make a person unethical and restless, while fewer desires lead to peace and professional progress.
CO3: Assess different types of risks involved in unethical practices. Know various means of protesting against unethical practices.
CO4: Assess the benefits of restraining from unethical practices like bribery, extortion, nepotism, nexus between politicians and industrialists.
CO5: Summarize case studies of ethical violations in Chernobyl meltdown, Challenger disaster, Ford Pinto design, Kingfisher Airlines financial misappropriation.

UNIT I:
Introduction To Terminology In Ethics: Integrity, Honesty, Courage, Empathy, Personality, Character, Self-Confidence, Respect for Others – Work culture, Social responsibility, Responsibilities as a citizen, Cooperation and commitment – Religion vs. Spirituality, Philosophy, Customs and practices – Self-interest, Fear, Deception, Ignorance, Ego, Uncritical acceptance of authority.

UNIT II:

UNIT III:
UNIT IV:
Non-Ethical Practices In Vogue: Conflict of Interest, Occupational crime– How multinational corporations influence government decisions, public policy – Engineers as managers, advisors and experts, Engineers as moral leaders – Problem of bribery, extortion, grease payments, nepotism – Nexus between politicians and industrialists. Case Study: Chinese Minister Sentenced to Death for Corruption.

UNIT V:

TEXT BOOKS:
ELECTROMAGNETIC FIELDS

Subject Code: 16EE2010  
Internal Marks: 30  
Credits: 3.5  
External Marks: 70

Course Objective:

- Will be able to state and apply the Coulombs Law and Gauss’s law to find the Electric filed intensity.
- Will compute capacitance of different configurations and to analyze the behaviour of dielectrics at different boundary conditions.
- Will have an ability to state and apply the Biot-Savart law and Ampere’s circuit law to find the Magnetic field intensity.
- Will gains the knowledge on applying Lorenz force equation and determination of self inductance and mutual inductances for different configurations.
- Will list the Faraday’s laws and to Modify the Maxwell’s equations for time varying fields.

Course Outcomes:

CO1: Able to state and apply the Coulombs Law and Gauss’s law to find the Electric filed intensity.

CO2: To compute capacitance of different configurations and to analyze the behaviour of dielectrics at different boundary conditions.

CO3: An ability to state and apply the Biot-Savart law and Ampere’s circuit law to find the Magnetic field intensity.

CO4: Gains the knowledge on applying Lorenz force equation and determination of self inductance and mutual inductances for different configurations.

CO5: To list Faraday’s laws and to Modify the Maxwell’s equations for time varying fields.

UNIT I:

Fundamentals of electrostatics and its applications: Co-ordinate system-Cartesian, cylindrical,spherical-differential length-area -volume in these co-ordinate system- importance of divergence, curl, grad and Laplacian. Electrostatic fields- coulomb’s law- Electric field intensity- electric field intensity due to a line and a surface charge- Gauss law in integral and point form- applications of Gauss law- stoke’s theorem- Maxwell's first law-work done in moving a point charge in an electric field- properties of potential function and potential gradient.

UNIT II:

Conductors, Dielectrics and Capacitors: Current density- conduction and convention current density- ohm’s law in point form-current continuity equation-conductors and dielectric material- behaviour of conductors in an electric field- boundry conditions-polarization-Electric dipole- Dipole moment- capacitance- capacitance of parallel plate, spherical and co-axial capacitors - composite dielectric- Laplace and poisson’s equations-solution of Laplace equation in one variable.
UNIT III:
Magnetostatics: Static magnetic fields- Biot-savart’s law- oesterd’ 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- Ampere’s circuital law and its applications- MFI due to infinite sheet of current and a long current carrying filament- point form of Ampere’s circuital law- Maxwell’s third equation curl(H)=J- field due to circular loop, rectangular loop, and square loop.

UNIT IV:
Magnetic materials and Inductance: Magnetic force- moving charges in a Magnetic field- Lorentz force equation- force on straight and long current carrying conductor in a magnetic field- force between two straight, long and parallel current carrying conductors- magnetic dipole and dipole and dipole moment-torque on current loop placed in a magnetic field- self and mutual inductance of a solenoid, toroid, co-axial cable.

UNIT V:

TEXT BOOKS:
3. Introduction to Electro-dynamics, David J.Griffiths, PHI.

REFERENCE BOOKS:
2. Electromagnetics with applications, Kraus and Fleisch, McGraw Hill, 1999
POWER SYSTEMS – II

Subject Code: 16EE2011
Credits: 3
Internal Marks: 30
External Marks: 70

Course objective:
- To give the knowledge on modeling and design of electrical transmission line.
- Calculate the performance of transmission in terms of efficiency and regulation.
- Study the various factors affecting the transmission line performance and transients in power systems.
- To learn the different types of insulators and power factor improvement and voltage control.

Course outcomes:
CO1: Solve line parameters for different transmission line conductor configurations.
CO2: Analyze the performance of short, medium and long transmission lines through efficiency and regulation.
CO3: Analyze electrical transients in power systems and concepts of travelling waves on transmission lines.
CO4: Classify the insulators and summarize the issues for better string efficiency.
CO5: Explain basics of corona, sag, tension calculations and other effects arise in transmission lines.

UNIT I:
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 systems.

UNIT II:
Performance of Short and Medium Length Transmission Lines:
UNIT III:

UNIT IV:

UNIT V:

TEXT BOOKS:

REFERENCE BOOKS
ELECTRICAL MACHINES-II

Subject Code: 16EE2012  Internal Marks: 30
Credits: 3.5  External Marks: 70

Course objective:
- Ability to understand the principle of operation, construction and characteristics of three phase induction motor and its application.
- Describe the methods to analyze the construction and performance of synchronous machines and its applications
- Understand the concepts of equivalent circuit.

Course outcomes:
CO1: Describe the construction and working principle of various types of 3-phase induction motor.
CO2: Summarize different techniques related to speed control of 3-phase induction motor.
CO3: Outline different types of Alternators and their performance criteria.
CO4: Identify different types of synchronous motors; interpret their performance under different load conditions.
CO5: Recognize areas of application of synchronous and induction machines

UNIT I:
Three phase Induction Machine – I: Constructional features, Rotating magnetic field, Principle of operation, Torque and power equations, Torque- slip characteristics, Phasor diagram, Equivalent circuit, Cogging & Crawling, double cage rotors.

UNIT II:
Three phase Induction Machine- II: No load & blocked rotor tests-circle diagram, Starting methods, Speed control methods, Induction generator.

UNIT III:

UNIT IV:
UNIT V:

Synchronous Motor: Principle of operation, Starting methods, Effect of varying field current at different loads, V and Λ curves, Hunting & damping, Synchronous condenser.

TEXT BOOKS:

3. P.S. Bimbhra, “Electrical Machinery”, Khanna Publisher

REFERENCE BOOKS:

CONTROL SYSTEMS

Subject Code: 16EE2013  
Internal Marks: 30
Credits: 3.5  
External Marks: 70

Course objective:

- To describe the feedback controls with basic components of control systems.
- To formulate mathematical models of physical systems and block diagram representation.
- To analyze stability of the system from transfer function approach.
- To describe and analyze various time domain and frequency domain tools for analysis and design of linear control systems.
- To Represent physical systems in state space form and analyze them.

Course outcomes:

CO1: Able to understand basic components of feedback control systems; formulate mathematical models of physical systems and represent them in block diagrams and signal flow graphs.

CO2: Able to understand the time-domain specifications; Analyze first and second order control systems in time domain;

CO3: Able to understand the concepts of stability; Analyze stability of the system from transfer functions approach and graphical methods.

CO4: Able to Design controllers, compensators for improve the performance specifications.

CO5: Able to Represent physical systems in state space form and analyze them.

UNIT I:

Introduction: Concepts of Control Systems- Open Loop and closed loop control systems-examples- Classification of control systems- Feedback characteristics- Effects of feedback characteristic.

Mathematical models of physical systems: Differential equations- transfer functions and block diagram representation of systems considering electrical systems as examples -Block diagram algebra – Representation by Signal flow graph - Reduction using Mason’s gain formula - Translational and Rotational mechanical systems.

UNIT II:

Transfer function of elements of control systems: Transfer Function of DC Servo motor - AC Servo motor- Synchro transmitter and Receiver,

UNIT III:

Concept of stability: The concept of stability – Routh’s stability criterion – qualitative stability and conditional 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 plots-Determination of Frequency domain specifications and transfer function from the Bode plot-Phase margin and Gain margin-Stability Analysis from Bode Plots.Polar Plots- Nyquist Plots- Stability Analysis.

UNIT V:


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.

TEXT BOOKS:


REFERENCE BOOKS:

3. B.C.Kuo
COMPLEX VARIABLES AND SPECIAL FUNCTIONS

Subject Code: 16BS2007 Internal Marks: 30
Credits: 2 External Marks: 70

Course objective:

- To test if a function is analytic via the Cauchy-Riemann equations, harmonic and then find a harmonic conjugate.
- To evaluate complex integrals using the Cauchy Integral Theorems.
- To identify, classify zeros and singular points of functions, and find Laurent series expansion of complex functions for suitable region of convergence.
- Calculate the residues by Residue theorem, by Laurent’s series and evaluate contour integrals using the Residue theorem.
- To study the Beta and Gamma functions, their properties and their applications to solve improper integrals.

Course outcomes:

CO1: Analyze whether a function is analytic or not, check for a harmonic function and find a harmonic conjugate via the Cauchy-Riemann equations.
CO2: Evaluate complex integrals using the Cauchy Integral Theorem and formulae.
CO3: Identify, classify zeros and singular points of functions, and find Laurent series expansion of complex functions for different region of convergence.
CO4: Calculate the residues by Laurent Series, residue theorem and use residues to evaluate various contour integrals.
CO5: Apply Beta and Gamma functions to solve improper integrals.

UNIT I:

UNIT II:
Complex Integration: Line Integral in complex plane-Cauchy’s integral theorem-Cauchy’s integral formula-Generalized Cauchy’s integral formula.

UNIT III:
UNIT IV:
**Residues and Contour Integrals:** Residues-Evaluation of residue by formulae and by Laurent series-Residue theorem-evaluation of Integrals using Residue Theorem-evaluations of integrals of the type improper real integrals \( \int_{-\infty}^{\infty} f(x)\,dx \) (b) \( \oint_{C} f(\cos \theta, \sin \theta)\,d\theta \) (c) \( \int_{-\infty}^{\infty} e^{imx} f(x)\,dx \) (d) Integrals by indentation.

UNIT V:
**Special functions:** Gamma and Beta Functions – Properties - Relation between Beta and Gamma functions- Evaluation of improper integrals.

TEXT BOOKS:

REFERENCE BOOKS:
ELECTRICAL MACHINES LAB – I

Subject Code: 16EE2104  Internal Marks: 25
Credits: 1.5  External Marks: 50

Course Objective
• This lab aims to understand the characteristics and performance of DC machines through the conduction of experiments.

Course Outcomes
CO1: Analyze the performance of DC motor under loaded and unloaded conditions.
CO2: Analyze the characteristics of DC generator
CO3: Determine the critical field resistance and critical speed of DC Generator
CO4: Determine the efficiencies of DC Series and Shunt generators
CO5: Examine various speed control methods of DC shunt motor.

Any 10 of the following experiments are to be conducted:
1. Magnetization characteristics of DC shunt generator.
2. Load test on DC shunt generator.
3. Brake test on DC shunt motor.
4. Load test on DC compound generator.
5. Hopkinson’s test on DC shunts machines.
6. Fields test on DC series machines.
7. Swinburne’s test.
8. Speed control of DC shunt motor by Field and armature Control
10. Load test on DC series generator.
11. Retardation test on DC shunt motor.
ELECTRICAL CIRCUIT ANALYSIS LAB

Subject Code: 16EE2105  
Credits: 1.5

Internal Marks: 25  
External Marks: 50

Course Objective:
- To understood and analyze the network theorems
- To understand other network concepts through the conduction of experiments

Course Outcomes:
CO1: Can Understand and verify the network theorems.
CO2: Understood the Locus diagram of RL &RC circuits.
CO3: Understood the Series & Parallel resonance, importance of Quality of factor.
CO4: Know the Calculation of two port network parameters for a given network.
CO5: Able to measure active power for Star & Delta connected loads.

Any 10 of the following experiments are to be conducted:
1) Verification of Thevenin’s Theorem
2) Verification of Norton’s Theorem
3) Verification of Superposition theorem
4) Verification of Compensation Theorem and Maximum Power Transfer Theorem
5) Verification of Reciprocities, Millmann’s Theorems
6) Locus Diagrams of RL and RC Series Circuits
7) Frequency response of Series and Parallel RLC circuit.
8) Determination of Self, Mutual Inductances and Coefficient of coupling of aTransformer.
9) Determination of Z and Y Parameters of Two-Port network.
10) Determination of Transmission and hybrid parameters of Two-Port network.
11) Measurement of Active Power for Star and Delta connected balanced loads
12) Measurement of 3-phase Power by 2 Wattmeter Method for unbalanced loads
CONTROL SYSTEMS LAB

Subject Code: 16EE2106
Credits: 1.5

Course Objective:
- To understand the modelling, simulation, transfer function and implementation of a physical dynamical system by a linear time invariant ordinary differential equation.
- To examine electrical modelling of a second order system and analyze the under-damped, over-damped and critically damped cases.
- To interpret the effects of poles and zeros location in the s-plane on the transient and steady state behaviour.
- To Measure the characteristics of Servo-Motor.
- To Design Lead, Lag and Lag-Lead series compensator on a second order system.

Course Outcomes:

CO1: Students can predict transfer function and implementation of a physical dynamical system by a linear time invariant ordinary differential equation.

CO2: Students can examine electrical modeling of a second order system and analyze the under-damped, over-damped and critically damped cases.

CO3: Students can interpret the effects of poles and zeros location in the s-plane on the transient and steady state behavior.

CO4: Students can measure the characteristics of Servo-Motor.

CO5: Students can design Lead, Lag and Lag-Lead series compensator on a second order system.

ANY TEN OF THE FOLLOWING EXPERIMENTS ARE TO BE CONDUCTED:

1. Time response of Second order system
2. Characteristics of Synchros
3. Effect of feedback on DC servo motor
4. Transfer function of DC motor
5. Effect of P, PD, PI, PID Controller on a second order systems
6. Lag and lead compensation – Magnitude and phase plot
7. Transfer function of DC generator
8. Temperature controller using PID
9. Characteristics of magnetic amplifiers
10. Characteristics of AC servo motor
11. Root locus and bode plot from MATLAB
12. State space model for classical transfer function using MATLAB-verification.
13. Simulation of transfer function using operational amplifiers.

REFERENCE BOOKS:
1. Simulation of Electrical and electronics Circuits using PSPICE – by M.H.Rashid, PHI Publications.
2. MATLAB and its Tool box user’s manual and – Math works, USA.
SELF-STUDY COURSE-I

Subject Code: 16EE2201  
Credits: 1

Course Objective:
- Identify sources of information.
- Collecting relevant information
- Ability to interpret information
- Ability to move from problem to solution.

Course Outcomes:
CO1: Acquires ability to locate sources of information
CO2: Acquires ability to filter and select relevant information
CO3: Apply information to real world problems and solve them.

SYLLABUS

1. Data collection through Internet
2. Data collection from Library and other sources
3. Seminar/ Presentation
4. Group discussion

On Identified topics, Current trends and emerging technologies like Modeling and simulation of different Electrical Engineering systems.