Deenbandhu Chhotu Ram University of Science & Technology, Murthal (Sonepat)
ORDINANCE FOR CREDIT BASED SYSTEM
for
BACHELOR OF TECHNOLOGY
(w.e.f. the academic session 2008-09)
(Including amendment suggested by 2nd meeting of the Academic Council)

1 Preliminaries

1.1 This ordinances shall apply to UG programme in the University Teaching Departments.

UG Programme

<table>
<thead>
<tr>
<th>Courses</th>
<th>Normal duration</th>
<th>Extended duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>B. Tech.</td>
<td>Four Years (08 semesters)</td>
<td>Seven Years</td>
</tr>
</tbody>
</table>

An academic year shall consist of two semesters (odd & even) of approximately 20 weeks duration inclusive of the period of examination and semester break. The eligibility criteria for admission to each programme, fee structure, academic calendar, scheme of studies and examinations, examination schedule, sports calendar and cultural activity calendar etc. for the academic year shall be published in the prospectus.

2. ORDINANCE: BACHELOR OF TECHNOLOGY

Notwithstanding anything contained in any other ordinance with regard to the matter hereunder, the courses of study for the Degrees of Bachelor of Technology and the conditions for admission thereto shall be as under:

2.1 The Bachelor of Technology Degree courses shall extend over a minimum period of four academic years. However students will be admitted on the basis of 3 years diploma directly in the 2nd year under the LEET scheme. Teaching in each academic year shall be divided into two semesters, each semester extending to 20 weeks including practical, semester examination and semester break. Teaching for odd semesters will normally be from August to December and for even semesters from January to May.

2.2 At the end of the each semester, there shall be an examination wherein candidates shall be examined in the courses studied by them in that semester. Each semester examination shall be designated as First Semester Examination, Second Semester Examination, and Third Semester Examination and so on.

2.3 The Examination for all semester will normally be held in December/January and also in May/June on such dates as may be fixed by the Controller of Examination as per the Schedule provided by the University. The date(s) of commencement of examination as well as the last date(s) for the receipt of examination forms and fees shall also be notified by the controller of Examinations to the concerned University Teaching Departments.

2.4.1.1 The courses of the study and the subjects of examinations shall be as approved by the Academic Council from time to time. The medium of instructions and Examination shall ordinarily be English except otherwise decided by the Academic Council. The question paper will be set in English, except otherwise decided by the board of studies concerned and approved by the Academic Council. Every candidate shall be examined in the subjects as laid down in the syllabus approved by the Academic Council from time to time. The credits for each subject as also the contact hours per week will be mentioned in the scheme of studies approved by the Academic Council.

Evaluation Process:

a. Major Test (Theory Examination):

Written question papers for the semester examination shall be set by an External/ Internal paper setter appointed by the Vice-Chancellor from a panel of examiners submitted by the chairman of the department duly approved by
the BOS of the concerned department and the answer sheets shall generally be evaluated by the internal examiners but can be evaluated from outside experts with the permission of the Vice-Chancellor. At the most 50% question papers can be set by the external examiners. In case a question paper is not received in time from an external examiner or he refuses to set the question paper, the paper can be got set from an internal examiner. The evaluation of answer sheets will be done by the examiners as per the procedure laid down by the University for the purpose.

b. Practical Examination:

Examination in practical and viva-voce shall be conducted jointly by the external and Internal Examiners appointed by the Vice-Chancellor from a panel of examiners submitted by the chairman of the department duly approved by the BOS of the concerned. If an External Examiner is not able to join, alternate examiner (including those of the same University dept) may be appointed by the Chairperson of the concerned dept. with the intimation to the Controller of Examinations in the following preferential order:

i) From outside
ii) from DCRUST Murthal

c. Sesssionals (Internal Assessment):

Sessional (internal assessment) works shall be evaluated by the teachers of the various subjects based on the work done during semester on the basis of the following weightage:

I. For Theory subjects:

i) Minor Test –I  
   30% of the weightage of the sessional

ii) Minor Test-II  
   30% of the weightage of the sessional

iii) Assignment/Performance in the class  
   20% of the weightage of the sessional

iv) Surprise Quiz/Tutorial Tests (2+2=4)  
   20% of the weightage of the sessional

II. For Practical/Project/Seminar/Drawing:

i) Viva-Voce/ Test  
   30% of the weightage of the practical

ii) Laboratory Record/Project Report/Seminar Report/Drawing Sheet  
   40% of the weightage of the practical

iii) Objective Tests/Multiple Choice Questions  
   30% of the weightage of the practical

d. General Proficiency

I. Field Work  
   40% of the weightage

(Technical Activities/ Extra Curricular Activities/ Service/Hostel Activities)  
   (equal weightage of each)

II. Presentation/Viva -Voce  
   40% of the weightage

III. Faculty Counselor Assignment  
   20% of the weightage

The I and II components will be evaluated by a committee, preferably interdisciplinary constituted by the Vice-Chancellor on recommendation of the Dean Academic Affairs. A Faculty Counselor will be attached to group of students which will remain associated with him/her during the entire period of the degree program in the University. Each faculty member will serve as a faculty counselor. They will act like a local guardian for the students associated with him/her and will help them in terms of carrier guidance, personal difficulties.
Every student has to appear in both the minor tests. If a student does not take a minor test, he/she shall be awarded zero marks in that test. The marks obtained in sessional/practical/theory/drawing/general proficiency are to be submitted to the Examination Branch duly signed by the Chairperson of the department before the close of semester examination or a date fixed by the COE. The examination branch/course coordinator shall convert the marks in to equivalent grades as per the grading procedure.

The examination shall be open to a candidate who:

- has attended regularly the prescribed courses of studies for the relevant semester examination in the department recognized by the University for the degree of Bachelor of Technology.
- has his/her name submitted to the Controller of Examinations by the Chairperson of the department.
- has a good moral character (certificate be issued by the chairperson of the department concern if required).
- has attended not less than 75% of the total classes held in each theory / lab/project/seminar/drawing etc. This requirement shall be fulfilled separately for each subject of study. A deficiency up to 10% may be condoned by the Chairman of the department. A further condonation of 5% in attendance may be allowed in severe/Compassionate circumstances by the Vice-Chancellor. However it may not be treated as a matter of right by the students. (In case a student fails to fulfill the necessary requirement of the attendance in any subject(s) in any semester, he/she shall not be promoted to next semester and will have to repeat that academic semester in the next academic session along with regular students.)
- whose result declaration is delayed for no fault of his/her or has applied for revaluation may attend classes of the next higher semester provisionally at his/her own risk and responsibility subject to his/her passing the concerned semester Examination. Such a candidate shall also be governed by the clause 2.6 given below. In case the candidate fails to pass the concerned Semester Examination, his/her attendance and studies in the next higher semester in which he/she was allowed to attend classes provisionally, shall stand cancelled.

2.6 If a candidate, after attending the classes for the course of studies in the Department either not appeared or having appeared in any semester examination has failed in one or more paper(s) for that examination, he/she can appear for such paper(s) at subsequent examinations without attending a fresh course of studies for that semester. Such a candidate may, in the meantime, prosecute his/her studies for the next semester(s) and appear in the examination(s) for the same along with the examination for the lower semester(s).

2.7 The examinations for reappear in any subject(s) in the odd semester and that of in the even semester shall be held in the respective semesters along with the regular students. In addition to above, examination for reappear in the subjects in odd semesters will also be held during the even semesters examinations and vice-versa.

A candidate shall be eligible for promotion to (Effective from session 2009-10)

5th semester if passed all papers of semester 1st semester.

6th semester if passed all papers of 1st and 2nd semesters.

7th semester if passed all papers of 1st, 2nd and 3rd semesters.

8th semester if passed all papers of 1st, 2nd, 3rd and 4th semesters.

A Candidate through LEET Scheme shall be eligible for Promotion to:

5th semester if passed all papers of 3rd semester.

6th semester if passed all papers of 3rd and 4th semesters.
7th semester                                  if passed all papers of 3rd, 4th and 5th semesters.
8th semester                                 if passed all papers of 3rd, 4th, 5th and 6th semesters.

The amount of Exam/Reappear/ Re-evaluation/ Improvement fee to be paid by the candidates shall be as prescribed by the University from time to time. A candidate who has paid dues for the higher class and is dropped for want of fulfillment of any of the above conditions shall not be required to pay his dues again on re-admission after fulfillment of above conditions.

Re-evaluation is permitted only for major tests (Theory course) as per University Rules for Re-evaluation. The Re-evaluation is not permitted in the Studio Examination or in an examination which involve more than one examiner.

A candidate who is unable to pass the Bachelor of Technology Course within a maximum of seven consecutive academic years from the date of his admission shall lose the right to pursue the degree programme. In exceptional cases, mercy chance can be given by the Vice-Chancellor to a candidate if he/she applies.

2.8 The minimum passing marks/grade for passing any semester Examination shall be:

i. 40% in each major test (theory paper).

ii. 40% in each Practical Examination/Viva-Voice Examination

iii. 40% in aggregate of sessionals and end semester theory examinations for each theory and practical subject provided that a candidate, who fails to obtain the requisite marks in aggregate of sessionals and end semester theory examination, shall be required to reappear in the concerned subject in the subsequent theory/practical examination(s) subject to clause 2.7. Such candidates will not be required to repeat the sessional (internal assessment) works.

iv. Minimum pass grade in each course is ‘D’ grade. Grade will be awarded after adding the marks of sessional (internal assessment) and major test/practical examination.

v. Grade D in General Proficiency

vi. SGPA of 4.0

vii Where a course is evaluated on the basis of sessional (internal assessment) marks only i.e. there is no end-semester examination, the candidate will be required to secure at least 40% marks to pass the course.

A candidate who fails to obtain the requisite marks/grade in any course shall be required to appear in the concerned course in the subsequent examination(s) as per the clause 2.6& 2.7.

2.9 If a candidate has completed his/her degree with a CGPA ≤ 6.5 and he/she wants to improve his/her grade, he/she may be allowed to improve by depositing the requisite fee as per the University Rules. He/she is allowed to appear in at the most half of the theory papers only of a semester along with the regular candidates of that semester and the sessional (internal assessment) part will be retained. Such opportunity may be given only twice in succession, subject to the condition that he/she have to complete the degree within 7 consecutive years of his/her registration. If the improved CGPA is less than the original, then the original will be retained.

2.10 The result of a student at the end of each semester Examination and after completion of course shall be declared on the basis of the SGPA & CGPA (cumulative grade point average) obtained by the student. However result of a student admitted through LEET SCHEME for the diploma holders will be declared on the basis of CGPA of the grades obtained by him/ in this University only.
2.11 At the end of each semester examination, the COE shall publish the result, provided that in a case where candidate who was permitted to take examination for higher semester but has not cleared the lower semester examination his result for the higher semester examination will be declared provisionally. Each successful candidate shall be issued a copy of the result card on having passed the semester examination.

2.12 Notwithstanding the integrated nature of the course wherever it is spread over more than one academic year, the Ordinance in force at the time a student joins the course shall hold good only for the examination held during or at the end of the semester and nothing in this Ordinance shall be deemed to debar the University from amending the Ordinance and the amended Ordinance, if any, shall apply to all students whether old or new.

3. **SCHOLARSHIP:**

Scholarship may be awarded to students as per the terms and conditions stipulated by the funding agencies. However, it should be mentioned in the prospectus.

4. **THE CREDIT SYSTEM:**

The University has introduced credit system of study for all the Under Graduate and Post Graduate programs for all the students admitted from the Academic Year 2008-09. The prominent features of the credit system are the process of continuous evaluation of a student’s performance, and a flexibility to allow the student to progress at an optimum pace.

Each Academic Program has a certain number of credits which describe its weightage. A student’s performance is measured by the number of credits that he/she has completed satisfactorily. A minimum grade point average is required to be maintained for satisfactory progress.

Each subject (component) has a certain number of credits which reflect its weightage and is normally decided on the basis of effective contacts hours. It is mentioned in the scheme of studies and examinations.

4.1 The semester examination for the odd semesters shall ordinarily be held in the month of December/January and for the even semesters in the month of May/June, on such dates as may be fixed by University authority. The concerned teacher/course coordinator should ensure that 100% syllabus is covered in each subject before the Semester Examination.

4.2 A faculty member shall be appointed as a course-coordinator by the Chairperson of the department who shall have the full responsibility for conducting the minor tests, coordinating the work of evaluation with other faculty members involved in the course and awarding of grades. A common paper will be set for the minor tests of the common courses.

In case of perceptible deviation in the awards given by different teachers of the same course, the course coordinator will moderate the awards by calling meeting of the teachers associated. However, where a single teacher is associated with the course, moderation of awards will be done in consultation with the chairperson of the department.

4.3 For the time being the existing system of centralized examination will be followed for conducting the Semester Examination. However the system may be reviewed as the University grows and more and more number of departments/courses/students are added to it.

4.4 The marks/grade awarded to a student in any particular subject will be based on the performance of the student evaluated throughout the semester. **The syllabus of the minor tests will be what is covered in that particular term.** The Semester Examination will be based on the entire syllabus.
4.5 The marks/grades will be displayed on the notice board of the department by the Chairperson before forwarding it to the Examination Branch.

4.6 The Chairperson of the department shall forward the awards/grades to the Examination Branch within a week after the semester ends and examination process starts. The evaluated answer sheets of minor tests are to be kept by the course so-ordiantor for at least one year. The Examination Branch will keep the evaluated answer sheets of the semester examination for at least one year.

5. GRADING SYSTEM:

For the award of grades in a subject, all component-wise evaluation shall be done in marks. The marks would be converted to grades as per the guidelines given below:

5.1 Award of Grades Based on Absolute Marks

The University will follow system of grading for all (irrespective of no. of students) based on absolute marks (after applying moderation if any) as given below:

<table>
<thead>
<tr>
<th>Range of Marks (%)</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>90 to 100</td>
<td>A+</td>
</tr>
<tr>
<td>80 to 89</td>
<td>A</td>
</tr>
<tr>
<td>70 to 79</td>
<td>B+</td>
</tr>
<tr>
<td>62 to 69</td>
<td>B</td>
</tr>
<tr>
<td>55 to 61</td>
<td>C+</td>
</tr>
<tr>
<td>46 to 54</td>
<td>C</td>
</tr>
<tr>
<td>40 to 45</td>
<td>D</td>
</tr>
<tr>
<td>Less than 40</td>
<td>F</td>
</tr>
</tbody>
</table>

Note:

(i) The awards/grades shall be submitted by the teacher concerned through course coordinator to the Chairperson of the department. The awards/grades should be finalized within 7 days of the semester examination.

(ii) In case of any difficulty/issue related to courses/conduct/moderation of awards/grades/reconduct of paper, the matter will be referred to a departmental monitoring committee comprising of Chairperson, senior most teachers by rotation, course coordinator and faculty nominee of the Dean of Faculty. The committee will be headed by the chairperson. The committee, on receipt of complaint from student or teacher, shall meet at the earliest and will give its decision within one week. The decision of the committee shall be final.

(iii) The procedure for evaluation and award of grades for professional training shall be decided by the respective Chairman/Chairperson of the department. The candidate shall be required to submit a comprehensive report within one month of completion the training. Training Report will be completed under the supervision of the officer of the company/institution under whose guidance and supervision the training was completed by the candidate in that company/institute. The candidate will add supervisor’s certificate in the beginning of the report stating that the report is an out-come of work done by the candidate during his/her training.

(iv) While calculating percentage of marks to award grades, 0.5 or higher fraction may be raised to the next higher whole number.

5.2 GRADE POINTS:

The grading point of academic performance will be as under:-
### Academic Performance

<table>
<thead>
<tr>
<th>Performance</th>
<th>Grade</th>
<th>Grade Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outstanding</td>
<td>A+</td>
<td>10</td>
</tr>
<tr>
<td>Excellent</td>
<td>A</td>
<td>9</td>
</tr>
<tr>
<td>Very Good</td>
<td>B+</td>
<td>8</td>
</tr>
<tr>
<td>Good</td>
<td>B</td>
<td>7</td>
</tr>
<tr>
<td>Average</td>
<td>C+</td>
<td>6</td>
</tr>
<tr>
<td>Below Average</td>
<td>C</td>
<td>5</td>
</tr>
<tr>
<td>Marginal</td>
<td>D</td>
<td>4</td>
</tr>
<tr>
<td>Very Poor</td>
<td>F</td>
<td>0</td>
</tr>
<tr>
<td>Absent</td>
<td>G</td>
<td>-</td>
</tr>
<tr>
<td>Audit Pass</td>
<td>AP</td>
<td>-</td>
</tr>
<tr>
<td>Audit Fail</td>
<td>AF</td>
<td>-</td>
</tr>
<tr>
<td>Incomplete Dissertation</td>
<td>X</td>
<td>-</td>
</tr>
</tbody>
</table>

**Notes:**
1. Pass Grade is Grade D and higher grades.
2. Grade F is Fail grade.

### ‘F’ Grade

The F grade denotes poor performance, i.e. failing a subject (or subject component). A student has to reappear in the semester examination only, in which he/she obtains ‘F’ grades, until a passing grade is obtained, within the stipulated time of completion of that programme.

### ‘G’ Grade

If any student, who is otherwise eligible for appearing in the semester examination as per the ordinance, but he/she is unable to appear in the semester examination then he/she will be awarded ‘G’ grade. The candidate will be allowed to take up the examination next time along with regular students and he/she will be awarded the grade as per the grade system explained above.

### AP/AF Grade

These grades are awarded to qualifying/Non-Credit subject(s) (as per scheme supplied by concerned departments). The candidate will not be eligible for award of degree without qualifying these courses.

### Continuous Absence

If a student is continuously absent from the Department for more than four weeks without intimation to the Chairperson of Department, his/her name will be struck off from the roll of department. The re-admission shall not be allowed to the candidate during the same academic session.

### ‘X’ Grade

This grade is awarded for incomplete Project work as per guidelines given below and will be converted to a regular grade on the completion of the Project work and its evaluation.

A student who is unable to complete his/her Project may be awarded an ‘X’ grade by the Chairman/Chairperson/chairperson on the recommendation of his/her supervisor.

A student who has been awarded ‘X’ grade shall be required to formally register for the next semester and pay the requisite fee.

‘X’ grade will be awarded in exceptional circumstances beyond student’s/supervisor’s control. Normally, the following grounds may be considered for the award of ‘X’ grade:
(a) Technical reasons/grounds such as Supervisor/equipment not being available.

(b) Any other reason to the satisfaction of supervisor.

5.3 Evaluation of Performance

The performance of a student will be evaluated in terms of Cumulative Grade Point Average (CGPA) which is the Grade Point Average for all the completed semesters at any point of time.

The CGPA is calculated on the basis of all pass grades, except audit courses, obtained in all completed semesters.

- Regarding evaluation of performance.

The formula for calculating SGPA is as mentioned below:

\[
SGPA = \frac{\sum_{\text{SEM}} \text{(Total credits earned in a subject x Grade points out of total marks in a concerned subject)}}{\sum_{\text{SEM}} \text{(Total credits earned in a subject) except audit courses}}
\]

Illustration for calculating SGPA/CGPA:

Ist Semester

<table>
<thead>
<tr>
<th>Course No.</th>
<th>Course Credits</th>
<th>Grade Awarded</th>
<th>Earned Credits</th>
<th>Grade Points</th>
<th>Point Secured</th>
</tr>
</thead>
<tbody>
<tr>
<td>MALXXX</td>
<td>5</td>
<td>C+</td>
<td>5</td>
<td>6</td>
<td>30</td>
</tr>
<tr>
<td>CSLXXX</td>
<td>4</td>
<td>C</td>
<td>4</td>
<td>5</td>
<td>20</td>
</tr>
<tr>
<td>PHLXXX</td>
<td>4</td>
<td>A+</td>
<td>4</td>
<td>10</td>
<td>40</td>
</tr>
<tr>
<td>PHPXXX</td>
<td>1.5</td>
<td>B+</td>
<td>1.5</td>
<td>8</td>
<td>12</td>
</tr>
<tr>
<td>MELXXX</td>
<td>4</td>
<td>F</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>AMLXXX</td>
<td>4</td>
<td>B</td>
<td>4</td>
<td>7</td>
<td>28</td>
</tr>
</tbody>
</table>

Credits registered in the semester (total of column 2) = 22.5
Earned Credits in the semester = 18.5
Total of column 4 (total of column 2 excluding F grade) = 130
Point secured in this semester in passed courses = 130

\[SGPA = \frac{\text{Points secured in passed courses}}{\text{Credits earned}} = \frac{130}{18.5} = 7.027\]

IInd Semester

<table>
<thead>
<tr>
<th>Course No.</th>
<th>Course Credits</th>
<th>Grade Awarded</th>
<th>Earned Credits</th>
<th>Grade Points</th>
<th>Point Secured</th>
</tr>
</thead>
<tbody>
<tr>
<td>MALXXX</td>
<td>5</td>
<td>D</td>
<td>5</td>
<td>4</td>
<td>20</td>
</tr>
<tr>
<td>EELXXX</td>
<td>5</td>
<td>F</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>CYLXXX</td>
<td>4</td>
<td>B</td>
<td>4</td>
<td>7</td>
<td>28</td>
</tr>
<tr>
<td>CYPXXX</td>
<td>1.5</td>
<td>C+</td>
<td>1.5</td>
<td>6</td>
<td>09</td>
</tr>
<tr>
<td>MELXXX</td>
<td>4</td>
<td>A</td>
<td>4</td>
<td>9</td>
<td>36</td>
</tr>
<tr>
<td>HULXXX</td>
<td>2</td>
<td>AP</td>
<td>2</td>
<td>N.A.</td>
<td>00</td>
</tr>
</tbody>
</table>

Credits registered in the semester (total of column 2) = 21.5
Earned Credits in the semester = 14.5
Total of column 4 (total of column 2 excluding F&AP grades)
Cumulative Earned Credits (earned credits in previous semesters and current semester) = 18.5 + 14.5 = 33.0

Points Secured in this semester in passed courses = 93

Cumulative points secured (total of point secured in previous semesters and current semester) = 130 + 93 = 223

CGPA = \frac{\text{Cumulative points secured in all passed courses}}{\text{Cumulative earned credits, excluding audit courses}} = \frac{130 + 93}{18.5 + 14.5} = 6.757

Each successful candidate shall be issued a copy of the result card on having passed the semester examination.

- **Regarding Conversion of CGPA into Marks**

The CGPA if multiplied by 9.5 will give the equivalent marks in %age.

Candidates who pass all the prescribed subjects for all the semesters, but obtained:

(i) Less than CGPA of 5.26 Pass class
(ii) 5.26 ≤ CGPA < 6.32 2nd Division
(iii) 6.32 ≤ CGPA < 7.9 1st Division
(iv) CGPA of 7.9 or more 1st Division with Honours provided that they have passed all the semester examinations in single sitting within the normal period of course and without reappear in any paper throughout the programme.

will be awarded aforesaid division.
SCHEME OF STUDIES AND EXAMINATIONS
<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Course No.</th>
<th>Course Title</th>
<th>Teaching Schedule</th>
<th>Marks of Class Work</th>
<th>Exam. Marks</th>
<th>Total Marks</th>
<th>Credit Duration of Exam.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>HUM-101</td>
<td>ESSENTIALS OF COMMUNICATION</td>
<td>3 1 - 4 50</td>
<td>100 - 150</td>
<td>4 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>MATH-101</td>
<td>MATHEMATICS-I</td>
<td>3 2 - 5 50</td>
<td>100 - 150</td>
<td>5 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>PHY-101</td>
<td>PHYSICS-I</td>
<td>3 1 - 4 50</td>
<td>100 - 150</td>
<td>4 3</td>
<td></td>
<td></td>
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<tr>
<td>4</td>
<td>ME-103</td>
<td>MANUFACTURING PROCESSES (Gr - A)</td>
<td>4 - - 4 50</td>
<td>100 - 150</td>
<td>4 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>CH-101</td>
<td>CHEMISTRY</td>
<td>3 1 - 4 50</td>
<td>100 - 150</td>
<td>4 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>CSE-101</td>
<td>FUNDAMENTALS OF COMPUTER &amp; PROGRAMMING IN C (Gr - A)</td>
<td>3 - - 3 50</td>
<td>100 - 150</td>
<td>3 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>EE-101</td>
<td>ELECTRICAL TECHNOLOGY (Gr - B)</td>
<td>3 1 - 4 50</td>
<td>100 - 150</td>
<td>4 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>GES-101</td>
<td>ENVIRONMENTAL STUDIES (Gr - B)</td>
<td>3 - - 3 - 75 - 75*</td>
<td>0 3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
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*Not included in total marks.

Note:
2. **GROUP A** includes students of branches BME, BT, CSE, ECE. **GROUP B** includes students of branches CE, CHE, EE, ME.
3. Environmental Studies (GES-101) and Environmental Studies Field Work (GES-103) are qualifying courses.
4. Students will be allowed to use non-programmable scientific calculator. However, sharing of calculator will not be permitted in the examination.
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TOTAL (Gr-B/ Gr-A) 19/18 5/6 10/10 34/34 450/425 600/500 100/175 1150/1100 36/33

* Not included in total marks.

**Note:**
1. **GROUP A** will study the subjects (ME-105, CH-101, EE-101, CH-103, EE-103, GES-101, GES-103).
3. Environmental Studies (GES-101) and Environmental Studies Field Work (GES-103) are qualifying courses.
4. Students will be allowed to use non-programmable scientific calculator. However, sharing of calculator will not be permitted in the examination.
**DEENBANDHU CHHOTU RAM UNIVERSITY OF SCIENCE & TECHNOLOGY, MURTHAL (SONEPAT)**

**SCHEME OF STUDIES AND EXAMINATION**

**B. TECH. II YEAR (ELECTRONICS & COMMUNICATION ENGINEERING)**

**SEMESTER III**

Credit Based Scheme w.e.f. 2009-2010

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**Note:**

1. Students will be allowed to use non-programmable scientific calculator. However, sharing of calculator will not be permitted in the examination.

**Subjects to be taught to other departments:**

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Note:
1. Students will be allowed to use non-programmable scientific calculator. However, sharing of calculator will not be permitted in the examination.
2. At the end of 4th semester each student has to undergo four weeks Professional Training of 4 weeks in an Industry/Institute/Professional Organization/Research Laboratory/training centre etc. with the prior approval of the Training and Placement Officer of the University and submit in the department a typed report along with a certificate from the organization & its evaluation shall be carried out in the 5th Semester.

Subjects to be taught to other departments:

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# Scheme of Studies & Examination

**B. Tech. III Year (Electronics & Communication Engineering)**

**Semester – V**

Credit Based Scheme w.e.f. 2010-2011

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**Note:**

1) Students will be allowed to use non-programmable scientific calculator. However, sharing of calculator will not be permitted in the examination.

2) Assessment of professional training-I (ECE-335) will be based on seminar, viva-voca, report and certificate of professional training obtained by the student from the industry / institute / research lab / training centre etc.

**Subjects to be taught to other departments:**

<table>
<thead>
<tr>
<th>Sr. No</th>
<th>Course No.</th>
<th>Course Title</th>
<th>Teaching Schedule</th>
<th>Marks of Class Work</th>
<th>Exam. Marks</th>
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### DEENBANDHU CHHOTU RAM UNIVERSITY OF SCIENCE & TECHNOLOGY, MURTHAL (SONEPAT)
### SCHEME OF STUDIES & EXAMINATION
### B. TECH. III YEAR (ELECTRONICS & COMMUNICATION ENGINEERING)
### SEMESTER – VI
### Credit Based Scheme w.e.f. 2010-2011

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**Note:**

1. Students will be allowed to use non-programmable scientific calculator. However, sharing of calculator will not be permitted in the examination.

2. At the end of 6th semester each student would undergo four weeks Professional Training in an Industry/Institute/Professional/Organization/Research Laboratory/training centre etc. with the prior approval of the Training and Placement Officer of the University and submit in the department a typed report along with a certificate from the organization.

**Subjects to be taught to other departments:**

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Course No.</th>
<th>Course Title</th>
<th>Teaching Schedule</th>
<th>Marks of Class Work</th>
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## DEENBANDHU CHHOTU RAM UNIVERSITY OF SCIENCE & TECHNOLOGY, MURTHAL (SONEPAT)
### SCHEME OF STUDIES & EXAMINATION
#### B. TECH. IV YEAR (ELECTRONICS & COMMUNICATION ENGINEERING)

**SEMESTER – VII**

Credit Based Scheme w.e.f. 2011-2012

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### List of Open Electives

1. **HUM-451** Language Skills for Engineers
2. **HUM-453** Human Resource Management
3. **HUM-455** Entrepreneurship
4. **HUM-457** Business Communication
5. **PHY-451** Nano Technology
6. **PHY-453** Laser Technology
7. **ME-451** Mechatronics Systems
8. **CSE-409** Artificial Intelligence & Expert Systems
9. **CSE-301** Principles of Operating System
10. **EE-455** Intelligent Instrumentation for Engineers
11. **ECE-403** Embedded Systems Design
12. **CH-453** Pollution & Control
13. **CSE-411** Management Information System
14. **CSE-308** Multimedia Technologies

Note:

1. Students will be allowed to use non-programmable scientific calculator. However, sharing of calculator will not be permitted in the examination.
2. *Student will be permitted to opt for any one elective run by the other departments. However, the departments will offer only those electives for which they have expertise. The choice of the students for any elective shall not be a binding for the department to offer, if the department does not have expertise.
3. Assessment of professional training–II (ECE-435) will be based on seminar, viva-voca, report and certificate of professional training obtained by the student from the industry / institute / research lab / training centre etc.
4. Project coordinator will be assigned the project (ECE-431) load of, maximum of 2 hrs. per week including his own guiding load of one hr. However, the guiding teacher will be assigned maximum of one period of teaching load irrespective of number of students/groups under him/her. Project will commence in the 7th semester where the student will identify the project problem, complete design, procure the material, start the fabrication, complete the survey etc. depending upon the nature of problem. Project will continue in next semester.
<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Course No.</th>
<th>Course Title</th>
<th>Teaching Schedule</th>
<th>Marks of Class Work</th>
<th>Examination Marks</th>
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**DEPT. ELECTIVE-I**
- ECE-406 MOBILE COMMUNICATION
- ECE-408 DIGITAL SIGNAL PROCESSORS AND APPLICATIONS
- ECE-410 TELECOMMUNICATION SWITCHING SYSTEMS

**DEPT. ELECTIVE-II**
- ECE-412 IMAGE PROCESSING
- ECE-414 RADAR AND SONAR ENGG.
- ECE-416 RELIABILITY ENGINEERING
- ECE-418 TV ENGINEERING

Note:

1. Students will be allowed to use the non-programmable scientific calculator. However, sharing of calculator will not be permitted in the examination.

2. Project coordinator will be assigned the project (ECE-431) load of, maximum of 2 hrs. per week including his own guiding load of one hr. However, the guiding teacher will be assigned maximum of one period of teaching load irrespective of number of students/groups under him/her. Project involving design, fabrication, testing, computer simulation, case studies etc., which has been commenced by students in VII semester will be completed in VIII semester.

3. For the course ECE-422 (Seminar), a student will select a topic from emerging areas of Engineering & Technology and study it independently. Student will give a seminar / talk on the topic.

4. The evaluation of the student for his / her General Fitness for Profession shall be carried out by a team consisting of Dean Faculty of Engg. & Technology, Chairperson of concerned department and external examiner appointed by University.
HUM - 101  ESSENTIALS OF COMMUNICATION

B. Tech. Semester - I (Common for all Branches)

<table>
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<th>L</th>
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Class Work : 50 Marks
Examination : 100 Marks
Total : 150 Marks
Duration of Examination : 3 Hours

The course aims at inculcating a minimum level of language proficiency among students of Engineering and Technology. The purpose is to sensitize them to the nuances of English and its applications for various communication needs.

**COURSE CONTENT:**

**Unit-I:** Semantics: Synonyms, Antonyms, Homophones, Homonyms, Form and function of words

**Unit-II:** Syntax: Sentence structures, Verb patterns and their usage

**Unit-III:** Phonetics: Basic Concepts – Vowels, Consonants, Phonemes, Syllables; Articulation of Speech Sounds – Place and Manner of Articulation; Transcription of words and simple sentences, using International Phonetic Alphabet.

**Unit-IV:** Comprehension: Listening and Reading comprehension - Note taking, Reviewing, Summarising, Interpreting, Paraphrasing and Précis Writing.

**Unit-V:** Composition: Descriptive, Explanatory, Analytical and Argumentative Writing - description of simple objects like instruments, appliances, places, persons, principles; description and explanation of processes and operations; analysis and arguments in the form of debate and group discussion

**Unit-VI:** Text: *English for Students of Science* by A. Roy and P.L. Sharma (Orient Longman)

**Chapters for Study:**

i) "The year 2050" by Theodore J. Gordon.

ii) "The Mushroom of Death" by A. Bandhopadhyay.

iii) "The Discovery" by Herman Ould.

The prescribed text will be used as a case study for various components of the syllabus.

**Unit-VII (For Internal Evaluation Only): Book Review** – Herein the students will be required to read and submit a review of a book (Literary or non-literary) of their own choice. This will be followed by a presentation of the same in the class.

**TEXT BOOKS:**

2. Spoken English for India by R.K. Bansal and J.B. Harrison, Orient Longman.

**SUGGESTED READING:**

1. English Grammar, Composition and Correspondence by M.A. Pink and S.E. Thomas, S. Chand and Sons Pvt. Ltd., Delhi.
7. Assessing Listening by Buck, Foundation Books (Cambridge University Press), Delhi.
8. Reading Between the Lines by McRae, Foundation Books (Cambridge University Press), Delhi.

SCHEME OF EXAMINATION:

There will be seven questions in all covering all the units, except Unit VII which (besides other modes of internal evaluation) is for internal assessment only.

All questions will be compulsory and will have sufficient internal choice.

Unit-I: 15 Marks
The question will be set so as to evaluate the following: Usage of the words given, Changing the grammatical quality and function of the words, One word Substitutes, synonyms, antonyms, homophones, homonyms.

Unit-II: 20 Marks
There will be one question having different parts. The question should test students’ knowledge of sentence structures and verb patterns. The question can be in the nature of ‘Do as directed’, ‘Tracing and rectifying structural Errors’, ‘Elucidating patterns through sentences and vice-versa’, ‘Changing the word-order’, ‘Synthesizing the sentences’ and ‘Completing the sentences’, etc.

Unit-III: 15 Marks
There will be two questions from this Unit. Question one will be in the nature of short notes testing the basic concepts and articulation of speech sounds. The second question would require transcription of individual words and simple sentences.

Unit-IV: 15 Marks
Comprehension and Interpretation of a passage given (Literary or non-literary, newspaper article, story, extract from a speech etc.), will be judged for its vocabulary, general understanding and interpretation of the content in the form of question answer exercise, culling out important points, suggesting a suitable topic/title, summarising and précis writing etc.

Unit-V: 15 Marks
The question will require the definition, description, analysis, explanation of various objects and processes. Besides, a topic of contemporary relevance may be given for writing a paragraph in any one of the writing forms prescribed in the unit.

Unit-VI: 20 Marks
There will be two questions from the text prescribed. The first question will evaluate the comprehension of the text through short answer questions or a long answer question.

The second question will judge the linguistic aspect of the text such as using a particular word in its various syntactic forms like noun, adjective, verb etc.; matching the lists of words and their explanation; providing opposite/similar meanings, adding suffixes and prefixes etc.
MATH - 101  MATHEMATICS - I  
B. Tech. Semester - I (Common for all Branches)

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Part - A

Infinite series: Convergence and divergence, Comparison, D’ Alembert’s ratio, Integral, Raobes, Logarithmic and Cauchy root tests, Alternating series, Absolute and conditional convergence.

Applications of Differentiation: Taylor's and Maclaurin's series, Asymptotes, Curvature Asymptotes.

Partial Differentiation & its Applications: Functions of two or more variables; partial derivatives, Total differential and differentiability, Derivatives of composite and implicit functions, Jacobians, Higher order partial derivatives.

Homogeneous functions, Euler's theorem, Taylor's series for functions of two variables (without proof), maxima-minima of function of two variables, Lagrange's method of undetermined multipliers, Differentiation under integral sign.

Part - B

Applications of Single & Multiple Integration: Applications of single integration to find volume of solids and surface area of solids of revolution. Double integral, change of order of integration, Double integral in polar coordinates, Applications of double integral to find area enclosed by plane curves and volume of solids of revolution.

Triple integral, volume of solids, change of variables, Beta and gamma functions and relationship between them.

Vector Calculus: Differentiation of vectors, scalar and vector point functions Gradient of a scalar field and directional derivative, divergence and curl of a vector field and their physical interpretations.

Integration of vectors, line integral, surface integral, volume integral, Green, Stoke's and Gauss theorems (without proof) and their simple applications.

TEXT BOOKS:

REFERENCE BOOKS:

Note: Examiner will set eight questions, taking four from Part-A and four from Part-B. Students will be required to attempt five questions taking at least two from each part.
PHYSICS - I
B. Tech. Semester - I (Common for all Branches)

L T P Credits
3 1 -- 4

Class Work : 50 Marks
Examination : 100 Marks
Total : 150 Marks
Duration of Examination : 3 Hours

Part - A

PHYSICAL OPTICS

Interference: Division of wave front-Fresnel's biprism, Division of amplitude – Newton's rings, Michelson interferometer, applications.

Diffraction: Difference between Fraunhofer and Fresnel diffraction. Fraunhofer diffraction through a slit. Plane transmission diffraction grating, its dispersive and resolving powers.

Polarization: Polarised and unpolarized light, double refraction; Nicol prism, quarter and half wave plates, Polarimetry; Biquartz and Laurent's half-shade polarimeters, Simple concepts of photoelasticity.

LASER: Spontaneous and stimulated emissions, Laser action, characteristics of laser beam-concepts of coherence, He-Ne and semiconductor lasers (simple ideas), applications.

FIBRE OPTICS: Propagation of light in fibres, numerical aperture, single mode and multi mode fibres, applications.

Part - B

WAVE AND OSCILLATIONS: Simple concepts of Harmonic Oscillator, resonance, quality factor.

E.M. wave theory-review of basic ideas, Maxwell's equations, simple plane wave equations, simple concepts of wave guides and co-axial cables, Poynting vector.

DIELECTRICS: Molecular theory, polarization, displacement, susceptibility, dielectric coefficient, permitivity & various relations between these, Gauss's law in the presence of a dielectric, Energy stored in an electric field. Behaviour of dielectrics in a.c. field-simple concepts, dielectric losses.

SPECIAL THEORY OF RELATIVITY: Michelson-Moreley experiment, Lorentz transformations, variation of mass with velocity, mass energy equivalence.

NUCLEAR PHYSICS: Neutron Cross-section, Nuclear fission, Moderators, Nuclear reactors, Reactor criticality, Nuclear fusion. Interaction of radiation with matter-basic concepts, radiation detectors-ionisation chamber, G.M. Counter, Scintillation and solid state detectors, cloud chamber and bubble chamber.

TEXT BOOKS:
1. Physics of the Atom - Wehr, Richards & Adair (Narosa)
2. Perspectives of Modern Physics - Arthur Beiser (TMH)
3. Modern Engineering Physics – A.S. Vasudeva (S. Chand)

REFERENCE BOOKS:
1. Electricity and Magnetism – F.W. Sears (Narosa)
3. A Text Book of Optics – Brij Lal & Subramanyam

Note: The Examiners will set eight questions, taking four from each part. The students will be required to attempt five questions in all selecting at least two from each part. All questions will carry equal marks.
**CH - 101 CHEMISTRY**  
B. Tech. Semester – I/II (Common for all Branches)

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**Unit-1: Thermodynamics** - Second law, concept of Entropy, Entropy change for an ideal gas, free energy and work functions, Free energy change, Chemical Potential, Gibb's Helmholtz equation, Clausius - Clapeyron equation, Related numerical problems with above topics.

**Unit-2: Phase-Rule** - Terminology, Derivation of Gibb's Phase Rule Equation, One Component System (H₂O System), Two Components systems, Eutectic system (Pb-Ag), system with congruent m.pt. (Zn-Mg), systems with incongruent m.pt. (Na-K), Applications of above Systems.

**Unit-3: Water & its treatment** : Part I – Sources of water, impurities in water, hardness of water and its determination, units of hardness, alkalinity of water and its determination, Related numerical problems, scale and sludge formation (composition properties and methods of prevention).

**Unit-4: Water and its treatment** : Part II – Treatment of water for domestic use, coagulation, sedimentation, filtration and disinfection, water softening, ion-exchange process, mixed bed demineralisation, Desalination (reverse osmosis) (electrodialysis).

**Unit-5: Corrosion and its prevention** - Galvanic & concentration cell, Dry and wet corrosion, Electrochemical theory of corrosion, Galvanic corrosion, pitting corrosion, water-line corrosion, differential aeration corrosion, stress corrosion, factors affecting corrosion, Preventive measures (proper design, Cathodic protection, protective coatings).

**Unit-6: Lubrication and Lubricants** - Friction, mechanism of lubrication, classification and properties of lubricants, Additives for lubricants, synthetic lubricants, Greases – Preparation & properties (consistency, drop point) and uses.

**Unit-7: Polymers and Polymerization** - Organic polymers, polymerisation, various types of polymerisation, effect of structure on properties of polymers, preparation properties and technical applications of thermoplastics (PVC, PVA), thermosets (PF,UF), & elastomers (SBR,GR-N), Silicones, Introduction to polymeric composites.

**Unit-8: Analytical Methods** - Thermal methods, Principle, method and application of Thermogravimetric analysis, Differential thermal analysis and Differential scanning calorimetry, Experimental details are excluded), Spectroscopic methods, Spectrophotometry, interaction of E.M. radiations with a molecule and origin of spectrum, spectroscopic, techniques-vibrational and electronic spectroscopy (Experimental details are excluded), conductometric titration, elementary discussion on Flame-photometry.

**TEXT BOOKS:**
1. Engineering Chemistry, P.C. Jain, Monica Jain (Dhanpat Rai & Co.).

**REFERENCE BOOKS:**
1. Instrumental methods of Chemical Analysis, MERITT & WILLARD East-West Press).

**Note:** Eight questions are to be set with a fair weightage of all the units. The candidates will be required to attempt five questions in all.
CSE - 101  FUNDAMENTALS OF COMPUTER & PROGRAMMING IN C
B. Tech. Semester – I/II (Common for all Branches)

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Radix number system: Decimal, Binary, Octal, Hexadecimal numbers and their inter-conversions; Representation of information inside the computers.


Unit-3: Internet basics: Introduction to the basic concepts of Networks and Data Communications, How Internet works, Major features of internet, Emails, FTP, Using the internet.


Unit-5: C Programming language: C fundamentals, formatted input/ output, expressions, selection statements, loops and their applications; Basic types, arrays, functions, including recursive functions, program organization: local and external variables and scope; pointers & arrays.

Unit-6: Strings: Strings literals, string variables, I/O of strings, arrays of strings; applications. Preprocessor: preprocessor directives, macro definition, conditional compilation; Structures, Unions and Enumerations: Structure variables and operations on structures; Structured types, nested array structures; unions; enumeration as integers, tags and types.
Declaration: Declaration syntax, storage classes, types qualifiers, declarators, initializers.
Program Design: modules, information hiding, abstract data types, difference between C & C++, Low level programming: Bitwise operators, Bit fields in structures, other low level techniques.

Unit-7: Standard library: Input / output; streams, file operations, formatted I/O, character I/O, line I/O, block, string I/O, Library support for numbers and character data, error handling:

TEXT BOOKS:
2. The C Programming Language by Dennis M Ritchie, Brian W. Kernigham, 1988, PHI.

REFERENCE BOOKS:
1. Information technology, Dennis P. Curtin, Kim Foley, Kunal Sen, Cathleen Morin, 1998, TMH
2. Theory and problem of programming with C, Byron C Gottfried, TMH
3. Teach yourself all about computers by Barry Press and Marcia Press, 2000, IDG Books India.

Note: Eight questions will be set by the examiner (at least 2 questions from unit-1 to 4, 2 each from unit -5 & 6, and one from unit-7). The students will be required to attempt 5 questions in all.

Unit-II: a) A.C. CIRCUITS: Sinusoidal signal, instantaneous and peak values, RMS and average values, phase angle, polar & rectangular, exponential and trigonometric representations; R, L and C components, behaviors of these components in A.C. circuits. Concept of complex power, power factor.

b) TRANSIENT RESPONSE: Transient response of RL, RC and RLC Circuits with step input.

Unit- III: NETWORK THEOREMS: Thévenin’s theorem, Norton’s theorem, superposition theorem, maximum power transfer theorem, Reciprocity theorem, Tellegen’s theorem, Milman’s theorem. Star to Delta & Delta to Star transformation.

Unit-IV: SERIES AND PARALLEL A.C. CIRCUITS: Series and parallel A.C. circuits, series and parallel resonance, Q factor, cut-off frequencies and bandwidth.

Unit-V: THREE PHASE CIRCUITS: Phase and line voltages and currents, balanced star and delta circuits, power equation, measurement of power by two wattmeter method, Importance of earthing.

Unit-VI: TRANSFORMERS: Principle, construction & working of transformer, Efficiency and regulation.


TEXT BOOKS:
1. Basic Electrical Engg (2nd Edition) : Kothari & Nagarath, TMH
2. Electrical Technology (Vol-I) : B.L Theraja & A K Theraja, S.Chand

REFERENCE BOOKS:
1. Electrical Engineering Fundamentals: Deltoro, PHI
2. Network Analysis: Valkenburg, PHI

Note: Eight questions are to be set in all by the examiner taking at least one question from each unit. Students will be required to attempt five questions in all.
ME - 101 ELEMENTS OF MECHANICAL ENGINEERING
B. Tech. Semester – I/II (Common for all Branches)

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Unit-I: Properties of Steam & Boilers: Formation of steam at constant pressure, Thermodynamics properties of steam, Condition of steam, Steam tables, Measurement of dryness fraction by throttling calorimeter, Classification of boilers, Comparison of water and fire tube boilers mounting and accessories with their functions, Constructional and operational details of Cochran and Babcock and Wilcox boilers, Problems.

Unit-II: Steam Turbines and Condensers: Classification of turbines, Working principle of impulse and reaction turbine, Compounding of impulse turbine, Comparison of impulse and reaction turbines, Types of condensers, Cooling ponds and cooling towers, Condenser and vacuum efficiencies.


Unit-IV: Water Turbines, Pumps and Hydraulic Devices: Introduction, Classification, Construction details and working of Pelton, Francis and Kaplan turbines, Specific speed and selection of turbines, Classification of water pumps and their working, Hydraulic jack and lift.


Unit-VI: Power Transmission Methods and Devices: Introduction to Power transmission, Belt drive, Rope drive, Chain drive, Pulley, Gear drive, Types of gears, Gear train, Clutches, Types and function of clutches, Types and function of brakes, Power measurement by dynamometer, Types of dynamometers.

Unit-VII: Stresses and Strains: Introduction, Concept & types of Stresses and strains, Poisson’s ratio, stresses and strains in simple and compound bars under axial loading, Stress-strain diagrams, Hooks law, Elastic constants & their relationships, Principle stresses & strains and principal-planes, Mohr’s circle of stresses. Numerical problems.

Unit-VIII: Bending Moment & Shear Force: Definitions, SF and BM diagrams for cantilever and simply supported beam. Calculation of maximum SF, BM and point of contra-flexure under the loads of (i) concentrated load (ii) uniformly distributed load (iii) combination of concentrated and uniformly distributed loads. Problems.

TEXT BOOKS:
3. Engineering Thermodynamics – C.P. Arora, Pub.- TMH, New Delhi

REFERENCE BOOKS:

Note: In the semester examination, the examiner will set eight questions, at least one question from each unit. The students will be required to attend only 5 questions.
ME - 103 MANUFACTURING PROCESSES
B. Tech. Semester – I/II (Common for all Branches)

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Unit-I Introduction: Introduction to Manufacturing Processes and their Classification. Industrial Safety; Introduction, Types of Accidents, Causes and Common Sources of Accidents, Methods of Safety, First Aid.


Unit-III Foundry: Introduction to Casting Processes, Basic Steps in Casting Process, Pattern, Types of Patterns, Pattern Allowances, Risers, Runners, Gates, Moulding Sand and its composition, Sand Preparation, Molding Methods, Core Sands and Core Making, Core Assembly, Mold Assembly, Melting (Cupola) and Pouring, Fettling, Casting Defects and Remedies.


Unit-VII Plant Layout, Objectives of Layout, Types of Plant Layout and their Advantages.

TEXT BOOKS:

REFERENCE BOOKS:

Note: In the semester examination, the examiner will set eight questions, at least one question from each unit. The students will be required to attend only 5 questions.
LIST OF EXPERIMENTS

The experiments in 1st semester will be based mainly upon optics, electrostatics, wave and oscillations which are the parts of the theory syllabus of 1st semester.

1. To find the wavelength of sodium light by Newton’s rings experiment.
2. To find the wavelength of sodium light by Fresnel's biprism experiment.
3. To find the wavelength of various colours of white light with the help of a plane transmission diffraction grating.
4. To find the refractive index and cauchy's constants of a prism by using spectrometer.
5. To find the wavelength of sodium light by Michelson interferometer.
6. To find the resolving power of a telescope.
7. To find the pitch of a screw using He-Ne laser.
8. To find the specific rotation of sugar solution by using a polarimeter.
9. To compare the capacitances of two capacitors by De'sauty bridge and hence to find the dielectric constant of a medium.
10. To find the flashing and quenching potentials of Argon and also to find the capacitance of unknown capacitor.
11. To study the photoconducting cell and hence to verify the inverse square law.
12. To find the temperature co-efficient of resistance by using platinum resistance thermometer and Callender and Griffith bridge.
13. To find the frequency of A.C. mains by using sonometer.
14. To find the velocity of ultrasonic waves in non-conducting medium by piezo-electric method.

RECOMMENDED BOOKS:

1. Advanced Practical Physics – B.L. Worshnop and H.T. Flint (KPH)

Note: Students will be required to perform at least 10 experiments out of the list in a semester.
LIST OF EXPERIMENTS

1. Determination of Ca\(^{++}\) and Mg\(^{++}\) hardness of water using EDTA solution.
2. Determination of alkalinity of water sample.
3. Determination of dissolved oxygen (DO) in the given water sample.
4. To find the melting & eutectic point for a two component system by using method of cooling curve.
5. Determination of viscosity of lubricant by Red Wood viscometer (No. 1 & No. 2).
6. To determine flash point & fire point of an oil by Pensky - Marten's flash point apparatus.
7. To prepare Phenol-formaldehyde and Urea formaldehyde resin.
8. To find out saponification No. of an oil.
10. Determination of concentration of KMnO\(_4\) solution spectrophotometrically.
11. Determination of strength of HCl solution by titrating it against NaOH solution conductometrically.
12. To determine amount of sodium and potassium in a given water sample by flame photometer.
13. Estimation of total iron in an iron alloy.

SUGGESTED BOOKS:


Note: At least ten experiments are to be performed by the students.
LIST OF EXPERIMENTS

1. To verify KCL and KVL.
2. To verify Thevenin’s & Norton’s Theorems.
3. To verify maximum power transfer theorem in D.C. Circuit & A.C circuit.
4. To verify reciprocity & Superposition theorems.
5. To study frequency response of a series R-L-C circuit and determine resonant frequency & Q-factor for various values of R, L, C.
6. To study frequency response of a parallel R-L-C circuit and determine resonant frequency & Q-Factor for various values of R, L, C.
7. To perform direct load test of a transformer and plot efficiency Vs load characteristic.
8. To perform direct load test of a D.C. shunt generator and plot load voltage Vs load current curve.
9. To plot V-curve of a synchronous motor.
11. To study various type of meters.
13. Measurement of power in a 3 phase system by two watt meter method.

Note: 1. At least 10 experiments are to be performed by students in the semester.
2. At least 7 experiments should be performed from the above list; remaining three experiments may either be performed from the above list or designed and set by the Dept. as per the scope of the syllabus of EE - 101.
CSE - 103  C PROGRAMMING LAB
B. Tech. Semester – I/II (Common for all Branches)

L  T  P  Credits  Class Work  :  25 Marks
--  --  2  2  Examination  :  25 Marks

Total  :  50 Marks
Duration of Examination  :  3 Hours

REPRESENTATIVE PROGRAMMING PROBLEMS:

1. Write a program to find the largest of three numbers. (if-then-else)
2. Write a program to find the largest number out of ten numbers (for-statement)
3. Write a program to find the average male height & average female heights in the class (input is in form of sex code, height).
4. Write a program to find roots of quadratic equation using functions and switch statements.
5. Write a program using arrays to find the largest and second largest no. out of given 50 nos.
6. Write a program to multiply two matrices.
7. Write a program to read a string and write it in reverse order.
8. Write a program to concatenate two strings.
9. Write a program to sort numbers using the Quicksort Algorithm.
11. Write a program to check that the input string is a palindrome or not.

Note: At least 5 to 10 more exercises to be given by the teacher concerned.
ME - 105 ENGINEERING GRAPHICS AND DRAWING
B. Tech. Semester – I/II (Common for all Branches)

<table>
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<tr>
<th>Unit</th>
<th>Description</th>
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<tbody>
<tr>
<td>I</td>
<td>Various types of projections, First and Third angle systems of orthographic projections. Projection of Points in different quadrants.</td>
</tr>
<tr>
<td>II</td>
<td>Projections of Straight Lines – parallel to one or both reference planes, contained by one or both planes, perpendicular to one of the planes, inclined to one plane but parallel to the other planes, inclined to both the planes, true length of a line and its inclination with reference planes, traces of a line.</td>
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<tr>
<td>III</td>
<td>Projections of Planes - parallel to one reference plane, inclined to one plane but perpendicular to the other, inclined to both reference planes.</td>
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<tr>
<td>IV</td>
<td>Projections of Polyhedra Solids and Solids of Revolution - in simple positions with axis perpendicular to a plane, with axis parallel to both planes, with axis parallel to one plane and inclined to the other, Projections of sections of Prisms, Pyramids, Cylinders and Cones. True shape of section. Development of surfaces of various solids.</td>
</tr>
<tr>
<td>V</td>
<td>Isometric projections - introduction, isometric scale, Isometric views of plane figures, prisms, pyramids and cylinders.</td>
</tr>
<tr>
<td>VI</td>
<td>Orthographic drawings of Bolts and Nuts, Bolted Joints, Screw threads, Screwed Joints.</td>
</tr>
<tr>
<td>VII</td>
<td>Free Hand Sketching - Orthographic Views from Isometric, Views of Simple Machine Components such as Brackets, Bearing Blocks, Guiding Blocks and Simple Couplings.</td>
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</table>

Note: Some simple exercises may be attempted with AUTOCAD.

TEXT BOOKS:

REFERENCE BOOKS:
LIST OF EXPERIMENTS / JOBS

1. To study different types of measuring tools used in metrology and determine least counts of vernier calipers, micrometers and vernier height gauges.

2. To study different types of machine tools (lathe, shaper or planer or slotter, milling, drilling machines).

3. To prepare a job on a lathe involving facing, outside turning, taper turning, step turning, radius making and parting-off.

4. To study different types of fitting tools and marking tools used in fitting practice.

5. To prepare lay out on a metal sheet by making and prepare rectangular tray, pipe shaped components e.g. funnel.

6. To prepare joints for welding suitable for butt welding and lap welding.

7. To perform pipe welding.

8. To study various types of carpentry tools and prepare simple types of at least two wooden joints.

9. To prepare simple engineering components/ shapes by forging.

10. To prepare mold and core assembly, to put metal in the mold and fettle the casting.

11. To prepare horizontal surface/ vertical surface/ curved surface/ slots or V-grooves on a shaper/planner.

12. To prepare a job involving side and face milling on a milling machine.

Note: 1. At least ten experiments/jobs are to be performed/prepared by students in the semester.

2. At least 8 experiments/jobs should be performed/prepared from the above list, remaining two may either be performed/prepared from the above list or designed and set as per the scope of the syllabus of Manufacturing Processes.
ME - 109 ELEMENTS OF MECHANICAL ENGINEERING LAB.
B. Tech. Semester – I/II (Common for all Branches)

L T P Credits
-- -- 2 2

Class Work : 25 Marks
Examination : 25 Marks
Total : 50 Marks
Duration of Examination : 3 Hours

LIST OF EXPERIMENTS

1. To study Cochran & Babcock & Wilcox boilers.
2. To study the working & function of mountings & accessories in boilers.
3. To study 2-Stroke & 4-Stroke diesel engines.
4. To study 2-Stroke & 4-Stroke petrol engines.
5. To calculate the V.R., M.A. & efficiency of single, double & triple start worm & worm wheel.
6. To calculate the V.R., M.A. & efficiency of single & double purchase winch crabs.
7. To find the percentage error between observed and calculated values of stresses in the members of a Jib crane.
8. To draw the SF & BM diagrams of a simply supported beam with concentrated loads.
9. To study the simple & compound screw jacks and find their MA, VR & efficiency.
10. To study the various types of dynamometers.
11. To study the constructional features & working of Pelton/Kaplan/Francis.
12. To prepare stress-strain diagram for mild steel & cast iron specimens under tension and compression respectively on a Universal testing machine.
13. To determine the Rockwell / Brinell / Vickers hardness no. of a given specimen on the respective machines.

Note: 1. Total ten experiments are to be performed in the Semester.
2. At least seven experiments should be performed from the above list. Remaining three experiments should be performed as designed & set as per the scope of the syllabus of ME – 101: Elements of Mechanical Engineering.
GES - 101 ENVIRONMENTAL STUDIES
B. Tech. Semester – I/II (Common for all Branches)

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**UNIT – I**

The Multidisciplinary nature of environmental studies, Definition, scope and importance.

Need for Public awareness

**UNIT – II**

Natural Resources:

Renewable and non-renewable resources:

Natural resources and associated problems.

- a) Forest resources: Use and over-exploitation: deforestation, case studies, Timber exploitation, mining, dams and their effects and forests tribal people.
- b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.
- c) Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.
- d) Food resources: World food problems, changes, caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.
- e) Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources; case studies.
- f) Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.
  - Role of an individual in conservation of natural resources.
  - Equitable use of resources for sustainable lifestyles.

**UNIT- III**

Ecosystems:

- Concept of an ecosystem.
- Structure and function of an ecosystem.
- Producers, consumers and decomposers.
- Energy flow in the ecosystem.
- Ecological succession.
- Food chains, food webs and ecological pyramids.
- Introduction, types, characteristic features, structure and function of the following eco-system:
  - a) Forest ecosystem.
  - b) Grassland ecosystem.
  - c) Desert ecosystem.
  - d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries).

**UNIT- IV**

Biodiversity and its conservations:

- Introduction – Definition: Genetic, species and ecosystem diversity.
- Biogeographically classification of India.
- Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values.
- Biodiversity at global, National and local levels.
- India as a mega-diversity nation.
- Hot-spots of biodiversity.
- Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts.
- Endangered and endemic species of India.
UNIT - V  
Environmental Pollution:
Definition, causes, effects and control, measures of:

a) Air pollution  
b) Water pollution  
c) Soil pollution  
d) Marine pollution  
e) Noise pollution  
f) Thermal Pollution  
g) Nuclear hazards
• Solid waste management: Causes effects and control measures of urban and industrial wastes.  
• Role of an individual in prevention of pollution.  
• Pollution case studies.  
• Disaster management: Floods, earthquake, cyclone and landslides.

UNIT - VI  
Social issues and the Environment:

a) From unsustainable to sustainable development  
b) Urban problems related to energy  
c) Water conservation, rain water harvesting, watershed management  
d) Resettlement and rehabilitation of people; its problems and concerns, case studies  
e) Environmental ethics: Issues and possible solutions  
f) Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, Case studies  
g) Wasteland reclamation  
h) Consumerism and waste products  
i) Environment Protection Act  
j) Air (Prevention and Control of Pollution) Act  
k) Water (Prevention and Control of Pollution) Act  
l) Wildlife Protection Act  
m) Forest Conservation Act  
n) Issues involved in enforcement of environmental legislation  
o) Public awareness

UNIT - VII  
Human population and the Environment.  
Population growth, variation among nations.  
Environment and human health.  
Human Rights.  
Value Education.  
HIV/ AIDS.  
Woman and Child Welfare.  
Role of Information Technology in Environment and human health.  
Case Studies.

REFERENCES:
7. Down to Earth, Centre for Science and Environment ®.

(M) Magazine (R) Reference (TB) Textbook

Note: 1. Examiner will set eight questions. Students will be required to attempt five Questions.
   2. The awards of this paper shall not be counted in the award of the Degree/DMC.
GES - 103 ENVIRONMENTAL STUDIES FIELD WORK
B. Tech. Semester – I/II (Common for all Branches)

L  T  P  Credits  Field Work  :  25Marks
--  --  --  0  Total  :  25 Marks

FIELD WORK:

- Visit to a local area to document environmental assets – river/ forest/ grassland/ hill/ mountain.
- Visit to a local polluted site-Urban/ Rural/ Industrial/ Agricultural.
- Study of common plants, insects, birds.
- Study of simple ecosystems – pond, river, hill slopes, etc. (Field work equal to 5 lectures hours).

Note:  The awards of this paper shall not be counted in the award of the Degree/DMC.
This course is designed for the students of Engineering and Technology who need English for specific purposes in specific situations. It aims at imparting the communication skills that are needed in their academic and professional pursuits. This is achieved through an amalgamation of traditional lecture-oriented approach of teaching with the task based skill oriented methodology of learning.

COURSE CONTENT:

Unit-I: Communicative Grammar: Spotting the errors pertaining to nouns, pronouns, adjective and adverbs; Concord - grammatical concord, notional concord and the principle of proximity between subject and verb.

Unit-II: Lexis: Idioms and phrases; Words often confused; One-Word Substitutes; Formation of words (suffixes, prefixes and derivatives); Foreign Words (A selected list).


Part-B: Developing listening and speaking skills through various activities, such as (a) role play activities, (b) Practising short dialogues (c) Group discussion (d) Debates (e) Speeches (f) Listening to news bulletins (g) Viewing and reviewing T.V. programmes etc.

Unit-IV: Written Communication: Developing reading and writing skills through such tasks/activities as developing outlines, key expressions, situations, slogan writing and theme building exercises

Reading verbal and non-verbal texts-like cartoons, Graphs and tabulated data etc.

Unit-V (For Internal Evaluation Only): Book Review – Herein the students will be required to read and submit a review of a book (Literary or non-literary) of their own choice. This will be followed by a presentation of the same in the class

Unit-VI: Technical Writing:

(a) Business Letters, Format of Business letters and Business letter writing

(b) E-mail writing

(c) Reports, Types of Reports and Format of Formal Reports

(d) Press Report Writing

SUGGESTED READING:

1. Language in Use (Upper intermediate Level, Adrian Doff Christopher Jones, Cambridge University Press
5. The sounds of English, Veena Kumar, Makaav Educational Software, New Delhi.
SCHEME OF EXAMINATION:

All questions will be compulsory and will cover all the aspects of the syllabus except unit V. There will be sufficient internal choice.

Unit-I: 20 Marks

Questions No. 1 will require the students to carefully read the sentences given and trace the errors, if any, and then supply the correct alternatives/answers.

Unit-II: 20 Marks

Question No. 2 may have four or five parts testing knowledge of different items of vocabulary.

Unit-III: 20 Marks

Question No. 3 will have two parts of 10 marks each from part A and B of the unit. Part A will have content words, form words and sentences for stress marking, transcription and intonation marking respectively. Part B will test students’ speaking skills through various oral tasks and activities - debate, group discussion and speech - in written form only.

Note: Speaking and listening skills will primarily be tested orally through internal assessment.

Unit-IV: 20 Marks

Question No. 4 may have many parts. The questions will be framed to test students' composition skills on the elements prescribed in the unit. For example, the students may be required to develop a hypothetical situation in a dialogue form, or to develop an outline, key expression, graph etc.

Unit-V is for internal assessment only.

Unit-VI: 20 Marks

Question No. 5 may have two parts. While the one part may require the students to frame either a press/news report for the print media or write the given business letter, or e-mail a message, the second part will have a theory question on the format of formal report and business letter.
BTT – 102  BASICS OF BIOTECHNOLOGY
B. Tech. Semester - II (Only for BIO-TECHNOLOGY)

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Unit – I:

1. **Cell Structure and Function**: Prokaryotes and Eukaryotes: Cell Wall, Membrances, Nucleus, Mitochondria, Chloroplast, Ribosome, Vacuoles, Bacteria and viruses: brief descriptions.

2. **Biomolecules**: A brief account of structure of Carbohydrates, Lipids, Proteins.

3. **Cell Division**: Mitosis and Meiosis.

4. **Genes**: Classical- brief idea about Mendel’s laws and chromosomes, Nature of Genetic material, DNA and RNA, DNA replication.

Unit – II:

5. **Gene Expression**: Central dogma, genetic code, molecular mechanism on mutations, regulation of gene expression, housekeeping genes, differentiation and development mutations and their molecular basis.

6. **Genetic Engineering**: an introduction to genetic engineering: Cloning (vectors, enzymes); DNA and genomic libraries, Transgenics, DNA fingerprinting, Genomics.

Unit – III:

7. **Development of Biotechnology**: Nature and Scope of Biotechnology.

8. **Applications of Biotechnology**: Bioprocess and fermentation technology, Cell Culture, Enzyme technology, Biological fuel generation, Single cell protein, Sewage Treatment, Environmental Biotechnology, Biotechnology and medicine, Biotechnology in agriculture & forestry industry, Food and Beverage Technology Production of Biological inventions, Safety in Biotechnology.

TEXT/REFERENCE BOOKS:

MATH - 102  MATHEMATICS - II  
B. Tech. Semester - II (Common for all Branches) 

<table>
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<th>Credits</th>
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<th>Duration of Examination : 3 Hours</th>
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Part - A  

Matrices & its Applications: Rank of a matrix, elementary transformations, elementary matrices, inverse using elementary transformations, normal form of a matrix, linear dependence and independence of vectors, consistency of linear system of equations, linear and orthogonal transformations, eigen values and eigen vectors, properties of eigen values, Cayley - Hamilton theorem and its applications.

Part - B  


Linear differential equations of second and higher order. Complete solution, complementary function and particular integral, method of variation of parameters to find particular integral, Cauchy’s and Legendre’s linear equations, simultaneous linear equations with constant co-efficients. Applications of linear differential equations to simple pendulum, oscillatory electric circuits.

Part - C  

Laplace Transforms and its Applications: Laplace transforms of elementary functions, properties of Laplace transforms, existence conditions, transforms of derivatives, transforms of integrals, multiplication by t^n, division by t. Evaluation of integrals by Laplace transforms. Laplace transform of Unit step function, unit impulse function and periodic function. Inverse transforms, convolution theorem, application to linear differential equations and simultaneous linear differential equations with constant coefficients.


TEXT BOOKS:
1. Advanced Engg. Mathematics F Kreyszig

REFERENCE BOOKS:

Note: Examiner will set eight questions, taking two from Part-A, three from Part-B and three from Part-C. Students will be required to attempt five question taking atleast one from each part.
PHY - 102  PHYSICS - II
B. Tech. Semester - II (Common for all Branches)

L   T   P   Credits  Class Work : 50 Marks
3   1   --   4   Examination : 100 Marks

Total : 150 Marks
Duration of Examination : 3 Hours

Part - A


FREE ELECTION THEORY: Elements of classical free electron theory and its limitations, Drude’s Theory of Conduction, quantum theory of free electrons, Fermi level, Density of states, Fermi-Dirac distribution function, Thermionic emission, Richardson's equation.

Part - B

BAND THEORY OF SOLIDS: Origin of energy bands, Kronig, Penney Model (qualitative), E-K diagrams, Brillouin Zones, Concept of effective mass and holes, Classification of solids into metals, Semiconductors and insulators, Fermi energy and its variation with temperature. Hall effect and its Applications.

PHOTOCONDUCTIVITY AND PHOTOVOLTAICS: Photoconductivity in insulating crystals, variation with illumination, effect of traps, applications of photoconductivity, photovoltaic cells and their characteristics.

MAGNETIC PROPERTIES OF SOLIDS: Atomic magnetic moments, orbital diamagnetism, Classical theory of paramagnetism, ferro magnetism - molecular fields and domains.

SUPER CONDUCTIVITY: Introduction (experimental survey), Meissner effect, London equation.

TEXT BOOKS:
1. Introduction to Solid State Physics (VII Ed.) – Charles Kittel (John Wiley).
2. Quantum Mechanics – Powell and Crasemann (Oxford & IBH)

REFERENCE BOOKS:

Note: The Examiners will set eight questions, taking four from each part. The students will be required to attempt five questions in all selecting at least two from each part. All questions will carry equal marks.
### PHY - 104 PHYSICS LAB. - II

B. Tech. Semester - II (Common for all Branches)

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<td>25 Marks</td>
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<td>50 Marks</td>
<td>3 Hours</td>
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### LIST OF EXPERIMENTS

The experiments in Second semester will be based upon electricity, Magnetism, Modern Physics and Solid State Physics which are the parts of theory syllabus.

1. To find the low resistance by Carey - Foster's bridge.
2. To find the resistance of a galvanometer by Thomson’s constant deflection method using a post office box.
3. To find the value of high resistances by Substitution method.
4. To find the value of high resistances by Leakage method.
5. To study the characteristics of a solar cell and to find the fill factor.
6. To find the value of e/m for electrons by Helical method.
7. To find the ionisation potential of Argon/Mercury using a thyatron tube.
8. To study the variation of magnetic field with distance and to find the radius of coil by Stewart and Gee's apparatus.
9. To study the characteristics of (Cu-Fe, Cu-Constantan) thermo couple.
10. To find the value of Planck's constant by using a photo electric cell.
11. To find the value of co-efficient of self-inductance by using a Rayleigh bridge.
12. To find the value of Hall Co-efficient of semi-conductor.
13. To study the V-I characteristics of a p-n diode.
14. To find the band gap of intrinsic semi-conductor using four probe method.
15. To calculate the hysteresis loss by tracing a B-H curve.

### RECOMMENDED BOOKS:

1. Advanced Practical Physics – B.L. Worshnop and H.T. Flint (KPH)

**Note:** Students will be required to perform at least 10 experiments out of the list in a semester.
The purpose of this course is to inculcate a sense of professionalism in a student along with personality development in terms of quality such as receiving, responding, temperament, attitude and outlook. The student efforts will be evaluated on the basis of his/ her performance / achievements in different walks of life.

The evaluation will be made by the panel of experts/ teachers, preferably interdisciplinary to be appointed by the Vice-Chancellor of the University on recommendation of the Dean Academic Affairs. A Faculty Counselor will be attached to a group of students which will remain associated with him /her during the entire period of the degree program in the University. Each faculty member will serve as a faculty counselor. They will act like a local guardian for the students associated with him / her and will help them in terms of career guidance, personal difficulties.

A. The student will present a written report before the committee with following in view:

The student will present before the committee his/her achievements during the current academic session in the form of a written report highlighting followings:

I. Academic Performance
   (--------)

II. Extra Curricular Activities
    (4 Marks)

III. Technical Activities
     (4 Marks)

IV. Industrial, Educational tour
    (4 Marks)

V. Sports/games
   (4 Marks)

VI. Community Service, Hostel Activities
    (4 Marks)

NOTE: Report submitted by the students should be typed on both sides of the paper.

B. A student will support his/her achievement and verbal & communicative skill through presentation before the committee.
   (20 Marks)

C. Faculty Counselor Assignment
   (10 Marks)

It will be the duty of the student to get evaluated by respective faculty counselor and to submit the counselor assessment marks in a sealed envelope to the committee.

A counselor will assess the student which reflects his/her learning graph including followings:

1. Discipline throughout the year
2. Sincerity towards study
3. How quickly the student assimilates professional value system etc.
COURSE OBJECTIVE: The purpose of this course is to
1. Acquaint the student in the basic economic concepts and their operational significance and
2. Stimulate him to think systematically and objectively about contemporary economic problems.

UNIT-I
Definition of Economics - various definitions, Nature of Economic problem, Production possibility curve
Economic laws and their nature. Relation between Science, Engineering, Technology and Economics.

UNIT-II
Concepts and measurement of utility, Law of Diminishing Marginal Utility, Law of equi-marginal utility -
its practical application and importance.

UNIT-III
Meaning of Demand, Individual and Market demand schedule, Law of demand, shape of demand curve,
Elasticity of demand, measurement of elasticity of demand, factors effecting elasticity of demand, practical
importance & applications of the concept of elasticity of demand.

UNIT-IV
Meaning of production and factors of production; Law of variable proportions, Returns to scale, Internal and
External economics and diseconomies of scale.
Various concepts of cost - Fixed cost, variable cost, average cost, marginal cost, money cost, real cost
opportunity cost. Shape of average cost, marginal cost, total cost etc. in short run and long run.

UNIT-V
Meaning of Market, Types of Market - Perfect Competition, Monopoly, Oligopoly, Monoplistic Competition (Main
features of these markets)
Supply and Law of Supply, Role of Demand & Supply in Price Determinition and effect of changes in demand and
supply on prices.

UNIT-VI
Nature and characteristics of Indian economy (brief and elementary introduction), Privatization - meaning,
merits and demerits. Globalisation of Indian economy - merits and demerits. Elementary Concepts of VAT, WTO,
GATT & TRIPS agreement.

TEXT BOOKS:

REFERENCE BOOKS:
1. A Text Book of Economic Theory Stonier and Hague (Longman’s Landon)
6. Indian Economy: Rudar Dutt & K.P.M. Sundhram

NOTE: Eight questions are to be set atleast one question from each unit and the students will have to attempt five
questions in all.
MATH-201  MATHEMATICS-III  
(COMMON FOR ALL BRANCHES)

L   T   P   Credit
3   2    0   5

Class Work : 50 Marks  
Exam.       : 100 Marks  
Total       : 150 Marks  
Duration of Exam: 3 Hrs

Part-A

**Fourier Series and Fourier Transforms:** Euler’s formulae, conditions for a Fourier expansion, change of interval, Fourier expansion of odd and even functions, Fourier expansion of square wave, rectangular wave, saw-toothed wave, half and full rectified wave, half range sine and cosine series.
Fourier integrals, Fourier transforms, Shifting theorem (both on time and frequency axes), Fourier transforms of derivatives, Fourier transforms of integrals, Convolution theorem, Fourier transform of Dirac-delta function.

Part-B


Part-C

**Probability Distributions and Hypothesis Testing:** Conditional probability, Bayes theorem and its applications, expected value of a random variable. Properties and application of Binomial, Poisson and Normal distributions. Testing of a hypothesis, tests of significance for large samples, Student’s t-distribution (applications only), Chi-square test of goodness of fit.

**Linear Programming:** Linear programming problems formulation, Solving linear programming problems using (i) Graphical method (ii) Simplex method (iii) Dual simplex method.

**TEXT BOOKS:**

**REFERENCE BOOKS:**
4. Probability and statistics for Engineers: Johnson. PHI.

Note: Examiner will set eight questions, taking two from Part-A, three from Part-B and three from Part-C. Students will be required to attempt five question taking atleast one from each part.
UNIT 1: CONDUCTING MATERIALS:
Review of energy bands, description of materials, drift velocity, collision time, Mean free path, mobility, conductivity, relaxation time, factors affecting conductivity of materials, types of thermal conductivity, Wiedmann-Franz law, superconductivity, effect of magnetic field, conducting materials, applications.

UNIT 2: DIELECTRIC MATERIALS:
Behaviour of dielectric materials in static electric field, Dipole moments, Polarization, Dielectric constant, Polarizability, Susceptibility, mechanisms of polarization, behaviour in alternating field, dielectric loss, loss tangent, types of dielectric & insulating materials, electrostriction, Piezo-electricity, Applications.

UNIT 3: MAGNETIC MATERIALS:
Permeability, Magnetic susceptibility, magnetic moment, Magnetization, Dipole moment, types of magnetic materials, Magnetostriction, eddy current & hysteresis losses, applications.

UNIT 4: SEMICONDUCTORS:
Review of Si and Ge as semiconducting materials, Continuity Equation, P-N junction, Drift & Diffusion, Diffusion & Transition capacitances of P-N junction.

UNIT 5: CONSTRUCTION AND CHARACTERISTICS OF DEVICES:
Brief introduction to Planar Technology for device fabrication, metal-semiconductor junctions (ohmic and non-ohmic), breakdown mechanisms in p-n junction, zener diode, electrical and optical excitation in diodes, LED, solar cells and photo-detectors.

UNIT 6: BIPOLAR AND MOS DEVICES: BJT, UJT, JFET, MOSFETS

UNIT 7: POWER DEVICES: Thyristor, Diac, Triac, GTO, IGBT, VMOS

TEXT BOOKS:
1. Electrical Engineering Materials: A.J. Dekker; PHI.
3. Electronic Devices & Circuits: Millman & Halkias; MGH.

REFERENCE BOOKS:

NOTE: Eight questions are to be set in all by the examiner taking at least one question from each unit. Students will be required to attempt five questions in all.
UNIT I: TRANSIENT RESPONSE:
Transient Response of RC, RL, RLC Circuits to various excitation signals such as step, ramp, impulse and sinusoidal excitations using Laplace transform.

UNIT 2: NETWORK FUNCTIONS:
Terminal pairs or Ports, Network functions for one-port and two-port networks, poles and zeros of Network functions, Restrictions on pole and zero Locations for driving point functions and transfer functions, Time domain behavior from the pole-zero plot.

UNIT 3: CHARACTERISTICS AND PARAMETERS OF TWO PORT NETWORKS:
Relationship of two-port variables, short-circuit Admittance parameters, open circuit impedance, parameters, Transmission parameters, hybrid parameters, relationships between parameter sets, Inter-connection of two port networks.

UNIT 4: TOPOLOGY:
Principles of network topology, graph matrices, network analysis using graph theory.

UNIT 5: TYPES OF FILTERS AND THEIR CHARACTERISTICS:
Filter fundamentals, high-pass, low-pass, band-pass, and band-reject Filters.

UNIT 6: NETWORK SYNTHESIS:
Positive real functions, synthesis of one port and two port networks, elementary ideas of Active networks.

TEXT BOOKS:

REFERENCE BOOKS:
1. Introduction to modern Network Synthesis: Van Valkenburg; John Wiley
2. Network Analysis: Van Valkenburg; PHI
3. Basic circuit theory: Dasoer Kuh; McGraw Hill.
4. A Course in Electrical Circuit Analysis by Soni & Gupta; Dhanpat Rai Publication.

NOTE: Eight questions are to be set in all by the examiner taking at least one question from each unit. Students will be required to attempt five questions in all.
UNIT 1: MAGNETIC CIRCUITS AND INDUCTION:
Magnetic Circuits, Magnetic Materials and their properties, static and dynamic emfs and force on current carrying conductor, AC operation of Magnetic Circuits, Hysteresis and Eddy current losses.

UNIT 2: PRINCIPLES OF ELECTROMECHANICAL ENERGY CONVERSION:
Force and torque in magnetic field system, energy balance, energy and force in singly excited magnetic field system, concept of co-energy, forces and torques in system with permanent magnets, dynamic equation.

UNIT 3: TRANSFORMERS:

UNIT 4: DC MACHINES:
Basic theory of DC generator, brief idea of construction, emf equation, load characteristics, basic theory of DC motor, concept of back emf, torque and power equations, load characteristics, starting and speed control of DC motors, applications.

UNIT 5: INDUCTION MOTOR:
Basic theory, construction, Phasor diagram, Equivalent circuit, Torque equation, Load characteristics, starting and speed control of induction motor, Introduction to single phase Induction motor and its applications, Fractional H.P. Motors, Introduction to stepper, servo reluctance and universal motors.

UNIT 6: SYNCHRONOUS MACHINES:
Construction and basic theory of synchronous generator, emf equation, model of generator, Phasor diagram, Regulation, Basic theory of synchronous motor, v-curves, synchronous condenser, applications.

TEXT BOOK:
1. Electrical Machines: Nagarath and Kothari; TMH

REFERENCE BOOKS:
1. Electrical Machines: P.S. Bimbhra; Khanna
2. Electrical Machines: Mukherjee and Chakravorti; Dhanpat Rai & Sons

NOTE: Eight questions are to be set in all by the examiner taking at least one question from each unit. Students will be required to attempt five questions in all.
Unit-1: Introduction to Data Structures: Definition of data structures and abstract data types, Static and Dynamic implementations, Examples and real life applications; The Stacks : Definition, Array based implementation of stacks, Linked List based implementation of stacks, Examples : Infix, postfix, prefix representation, Conversions, Applications.

Unit-2: Queues and Lists: Definition, Array based implementation of Queues / Lists, Linked List implementation of Queues / Lists, Circular implementation of Queues and Singly linked Lists, Straight / circular implementation of doubly linked Queues / Lists, Priority Queues, Applications.

Unit-3: Trees: Definition of trees and Binary trees, Properties of Binary trees and Implementation, Binary Traversal pre-order, post order, In- order traversal, Binary Search Trees, Implementations, Threaded trees, Balanced multi way search trees, AVL Trees, Implementations


Unit-5: Running time: Time Complexity, Big – Oh - notation, Running Times, Best Case, Worst Case, Average Case, Factors depends on running time, Introduction to Recursion, Divide and Conquer Algorithm, Evaluating time Complexity.

Unit-6: Sorting Algorithms: Introduction, Sorting by exchange, selection, insertions: Bubble sort, Straight selection sort, Efficiency of above algorithms,; Shell sort, Performance of shell sort, Merge sort, Merging of sorted arrays& Algorithms; Quick sort Algorithm analysis,

Heap sort: Heap Construction, Heap sort, bottom – up, Top – down Heap sort approach;

Searching Algorithms: Straight Sequential Search, Binary Search (recursive & non-recursive Algorithms)

TEXT BOOK:


REFERENCE BOOKS:

- Fundamentals of Data structures by Ellis Horowitz & Sartaj Sahni, Pub, 1983,AW
- Fundamentals of computer algorithms by Horowitz Sahni and Rajasekaran.
- Data Structures and Program Design in C By Robert Kruse, PHI,
- Theory & Problems of Data Structures by Jr. Symour Lipschetz, Schaum’s Outline by TMH

Note: Eight questions will be set in all by the examiners taking at least one question from each unit. Students will be required to attempt five questions in all.
LIST OF EXPERIMENTS:

1. To study V-I characteristics of diode, and its use as a capacitance.

2. Study of the characteristics of transistor in Common Base configuration.

3. Study of the characteristics of transistor in Common Emitter configuration.

4. Study of V-I characteristics of a photo-voltaic cell.

5. Study of characteristics of MOSFET/JFET in CS configuration.

6. To plot characteristics of thyristor.

7. To plot characteristics of UJT.

8. To plot characteristics of diac & Triac.

9. Study of loss factor in a dielectric by an impedance bridge.

10. Study of photo-resist in metal pattern for planar technology/PCB technology.

**NOTE:** Ten experiments are to be performed, out of which at least seven experiments should be performed from above list. Remaining three experiments may either be performed from the above list or designed & set by the concerned Department as per the scope of the syllabus.
List of experiments:

1. Transient response of RC circuit.
2. Transient response of RL circuit.
3. To find the resonance frequency, Band width of RLC series circuit.
4. To calculate and verify "Z" parameters of a two port network.
5. To calculate and verify "Y" parameters of a two port network.
6. To determine equivalent parameter of parallel connections of two port network.
7. To plot the frequency response of low pass filter and determine half-power frequency.
8. To plot the frequency response of high pass filter and determine the half-power frequency.
9. To plot the frequency response of band-pass filter and determine the band-width.
10. To calculate and verify "ABCD" parameters of a two port network.
11. To synthesize a network of a given network function and verify its response.
12. Introduction of P-Spice

Note: Ten experiments are to be performed, out of which at least seven experiments should be performed from above list. Remaining three experiments may either be performed from the above list or designed & set by the concerned Department as per the scope of the syllabus.
LIST OF EXPERIMENTS:

1. To find turns ratio and polarity of a single phase transformer.
2. To perform open and short circuit tests on a single phase transformer.
3. To perform Sumpner's back to back test on single phase transformers.
4. Parallel operation of two single phase transformers.
5. Study of construction of a DC machine.
6. To plot O.C.C of a DC shunt generator and find its Critical Resistance.
7. To perform direct load test of a DC motor.
8. Speed control of a DC motor by armature control and field control methods.
9. To perform open circuit and block rotor tests of an induction motor.
10. Star-delta starting of a three phase induction motor.
12. To plot V-curve of a synchronous motor.

NOTE: Ten experiments are to be performed, out of which at least seven experiments should be performed from above list. Remaining three experiments may either be performed from the above list or designed & set by the concerned Department as per the scope of the syllabus.
LIST OF EXPERIMENTS:

1. Introduction of tools, electrical materials, symbols and abbreviations.
2. To study stair case wiring.
3. To study house wiring i.e., batten, cleat, casing-caping and conduit wirings.
4. To study fluorescent tube light.
5. To study high pressure mercury vapour lamp (H.P.M.V).
6. To study Sodium lamp.
7. To study repairing of home appliances such as heater, electric iron, fans etc.
8. To study construction of moving iron, moving coil, electrodynamic & induction type meters.
9. To design & fabricate single phase transformer.
10. To study fuses, relays, contactors, MCBs and circuit breakers.
11. Insulation testing of electrical equipments.
12. To design, fabricate a PCB for a circuit, wire-up and test.

**NOTE:** Ten experiments are to be performed, out of which at least seven experiments should be performed from above list. Remaining three experiments may either be performed from the above list or designed & set by the concerned Department.
HUM-202  FUNDAMENTALS OF MANAGEMENT  

L T P  Credits  Class Work  :  50 Marks  
3 1 - 4  Theory  :  100 Marks  
  Total  :  150 Marks  
  Duration of Exam.  :  3 Hrs.  

UNIT-I  
Principles of Management, The Management Functions, Inter-relationship of Managerial functions.  

UNIT-II  
Nature and Significance of staffing, Personnel management, Functions of personnel management, Manpower planning, Process of manpower planning, Recruitment, Selection; Promotion - Seniority Vs. Merit. Training - objectives and types of training.  

UNIT-III  
Production Management: Definition, Objectives, Functions and Scope, Production Planning and Control; its significance, stages in production planning and control, Brief introduction to the concepts of material management, inventory control; its importance and various methods.  

UNIT-IV  
Marketing Management - Definition of marketing, Marketing concept, objectives & Functions of marketing. 
Marketing Research - Meaning; Definition; objectives; Importance; Limitations; Process. Advertising - meaning of advertising, objectives, functions, criticism.  

UNIT-V  

BOOKS RECOMMENDED:  
TEXT BOOKS:  
1. Principles and Practice of Management - R.S. Gupta, B.D.Sharma, N.S. Bhalla. (Kalyani Publishers)  

REFERENCE BOOKS:  
1. Principles & Practices of Management – L.M. Prasad (Sultan Chand & Sons)  

NOTE: Eight questions are to be set at least one question from each unit and the students will have to attempt five questions in all.
Part-A

Interpolation and curve fitting: Interpolation problem, Lagrangian polynomials, Divided differences, Interpolating with a cubic spline, Bezier curves and B-spline curves, Least square approximations.

Non-Linear Equations: Bisection method, Linear Interpolation methods, Newton's method, Muller's method, fixed-point method.

Simultaneous Linear Equations: Elimination method, Gauss and Gauss-Jordan method, Jacobi's method, Gauss-Seidal method, Relaxation method.

Numerical Differentiation and Integration: Derivatives from differences tables, Higher order derivatives, Extrapolation techniques, Newton-cotes integration formula, Trapezoidal rule, Simpson's rules, Boole's rule and Weddle's rule, Romberg's Integration.

Part-B


Numerical Solution of Partial Differential Equations: Finite difference approximations of partial derivatives, solution of Laplace equation (Standard 5-point formula only), one-dimensional heat equation (Schmidt method, Crank-Nicolson method, Dufort and Frankel method) and wave equation.

TEXT BOOKS:


REFERENCE BOOKS:

2. Introductory Methods of Numerical Analysis S.S. Sastry, P.H.I.

Note: Examiner will set eight questions, taking four from Part-A and four from Part-B. Students will be required to attempt five questions taking atleast two from each part.
UNIT 1: SEMICONDUCTOR DIODE:
P-N junction and its V-I Characteristics, P-N junction as a rectifier, Switching characteristics of Diode.

UNIT 2: DIODE CIRCUITS:
Diode as a circuit element, the load-line concept, half-wave and full wave rectifiers, clipping circuits, clamping circuits, filter circuits, peak to peak detector and voltage multiplier circuits.

UNIT 3: TRANSISTOR AT LOW FREQUENCIES:
Bipolar junction transistor: operation, characteristics, Ebers-moll model of transistor, hybrid model, h-parameters (CE, CB, CC configurations), analysis of a transistor amplifier circuits using h-parameters, emitter follower, Miller's Theorem, frequency response of R-C coupled amplifier.

UNIT 4: TRANSISTOR BIASING:
Operating point, bias stability, collector to base bias, self-bias, emitter bias, bias compensation, thermistor & sensistor compensation.

UNIT 5: TRANSISTOR AT HIGH FREQUENCIES:
Hybrid P model, CE short circuit current gain, frequency response, alpha, cutoff frequency, gain bandwidth product, emitter follower at high frequencies.

UNIT 6: FIELD EFFECT TRANSISTORS:
Junction field effect transistor, pinch off voltage, volt-ampere characteristics, small signal model, MOSFET Enhancement & Depletion mode, V-MOSFET, Common source amplifier, source follower, biasing of FET, applications of FET as a voltage variable resistor (VVR).

UNIT 7: REGULATED POWER SUPPLIES:
Series and shunt voltage regulators, power supply parameters, three terminal IC regulators, SMPS.

TEXT BOOK:
1. Integrated Electronics: Millman & Halkias ; McGrawHill
2. Electronic circuit analysis and design (Second edition): D.A.Neamen; TMH

REFERENCE BOOKS:
1. Electronics Principles: Malvino ; McGrawHill
2. Electronics Circuits: Donald L. Schilling & Charles Belove ; McGrawHill

NOTE: Eight questions are to be set in all by the examiner taking at least one question from each unit. Students will be required to attempt five questions in all.
UNIT 1: FUNDAMENTALS OF DIGITAL TECHNIQUES:

UNIT 2: COMBINATIONAL DESIGN USING GATES:
Design using gates, Karnaugh map and Quine McCluskey methods of simplification.

UNIT 3: COMBINATIONAL DESIGN USING MSI DEVICES
Multiplexers and Demultiplexers and their use as logic elements, Decoders, Adders / Subtractors, BCD arithmetic circuits, Encoders, Decoders / Drivers for display devices.

UNIT 4: SEQUENTIAL CIRCUITS:

UNIT 5: DIGITAL LOGIC FAMILIES:
Switching mode operation of p-n junction, bipolar and MOS devices, Bipolar logic families: RTL, DTL, DCTL, HTL, TTL, ECL, MOS, and CMOS logic families. Tristate logic, Interfacing of CMOS and TTL families.

UNIT 6: A/D AND D/A CONVERTERS:
Sample and hold circuit, weighted resistor and R-2R ladder D/A Converters, specifications for D/A converters, A/D converters: Quantization, parallel-comparator, successive approximation, counting type, dual-slope ADC, specifications of ADCs.

UNIT 7 PROGRAMMABLE LOGIC DEVICES:
ROM, PLA, PAL, FPGA and CPLDs.

TEXT BOOK:

REFERENCE BOOKS:
1. Digital Integrated Electronics: Taub & Schilling; MGH
2. Digital Principles and Applications: Malvino & Leach; McGraw Hill.
3. Digital Design : Morris Mano; PHI.

NOTE: Eight questions are to be set in all by the examiner taking at least one question from each unit. Students will be required to attempt five questions in all.
UNIT 1: INTRODUCTION TO COMMUNICATION SYSTEMS:
The essentials of a Communication system, modes and media’s of Communication, Classification of signals and systems, Fourier Analysis of signals.

UNIT 2: AMPLITUDE MODULATION:
Amplitude modulation, Generation of AM waves, Demodulation of AM waves, DSBSC, Generation of DSBSC waves, Coherent detection of DSBSC waves, single side band modulation, generation of SSB waves, demodulation of SSB waves, vestigial sideband modulation (VSB).

UNIT 3: ANGLE MODULATION:
Basic definitions: Phase modulation (PM) & frequency modulation (FM), narrow band frequency modulation, wideband frequency modulation, generation of FM waves, Demodulation of FM waves.

UNIT 4: PULSE ANALOG MODULATION:
Sampling theory, time division (TDM) and frequency division (FDM) multiplexing, pulse amplitude modulation (PAM), pulse time modulation.

UNIT 5: PULSE DIGITAL MODULATION:
Elements of pulse code modulation, noise in PCM systems, Measure of information, channel capacity, channel capacity of a PCM system, differential pulse code modulation (DPCM). Delta modulation (DM)

UNIT 6: DIGITAL MODULATION TECHNIQUES:
ASK, FSK, BPSK, QPSK, M-ary PSK.

UNIT 7: INTRODUCTION TO NOISE:
External noise, Internal noise, S/N ratio, noise figure.

TEXT BOOKS:
2. Communication systems: Singh & Sapre; TMH.
3. Analog Communication: Manoj Duhan; I.K International.

REFERENCE BOOK:
1. Electronic Communication systems: Kennedy; TMH.
2. Communication Electronics: Frenzel; TMH.
3. Communication system: Taub & Schilling; TMH.

NOTE: Eight questions are to be set in all by the examiner taking at least one question from each unit. Students will be required to attempt five questions in all.
UNIT1: STATIC ELECTRIC FIELDS:
Coulomb’s Law, Gauss’s Law, potential function, field due to a continuous distribution of charge, equi-potential surfaces, Gauss’s Theorem, Poisson’s equation, Laplace’s equation, method of electrical images, capacitance, electro-static energy, boundary conditions, the electro-static uniqueness theorem for field of a charge distribution, Dirac-Delta representation for a point charge and an infinitesimal dipole.

UNIT2: STEADY MAGNETIC FIELDS:
Faraday Induction law, Ampere’s Work law in the differential vector form, Ampere's law for a current element, magnetic field due to volume distribution of current and the Dirac-delta function, Ampere’s Force Law, magnetic vector potential, vector potential (Alternative derivation), far field of a current distribution, equation of continuity.

UNIT3: TIME VARYING FIELDS:
Equation of continuity for time varying fields, inconsistency of Ampere’s law, Maxwell’s field equations and their interpretation, solution for free space conditions, electromagnetic waves in a homogeneous medium, propagation of uniform plane-wave, relation between E & H in a uniform plane-wave, wave equations for conducting medium, Maxwell’s equations using phasor notation, wave propagation in a conducting medium, conductors, dielectrics, wave propagation in good conductor and good dielectric, depth of penetration, polarization, linear, circular and elliptical.

UNIT4: REFLECTION AND REFRACTION OF E M WAVES:
Reflection and refraction of plane waves at the surface of a perfect conductor & perfect dielectric (both normal incidence as well as oblique incidence), Brewester's angle and total internal reflection, reflection at the surfaces of a conductive medium, surface impedance, transmission-line analogy, poymting theorem, interpretation of E x H, power loss in a plane conductor.

UNIT5: TRASMISSION LINE THEORY:
Transmission line as a distributed circuit, transmission line equation, travelling, standing waves, characteristic impedance, input impedance of terminated line, reflection coefficient, VSWR, Smith's chart and its applications.

TEXT BOOK:
1. Electro-magnetic Waves and Radiating System : Jordan & Balmain, PHI.

REFERENCE BOOKS:
1. Engineering Electromagnetics : Hayt; TMH

NOTE: 8 questions are to be set – at least one from each unit. Students have to attempt any five questions.
LIST OF EXPERIMENTS:

1. Study of Half wave & full wave rectifiers.

2. Study of power supply filters.

3. Study of Diode as clipper & clamper.

4. Study of Zener diode as a voltage regulator.

5. Study of CE amplifier for voltage, current & Power gains and input, output impedances.

6. Study of CC amplifier as a buffer.

7. To study the frequency response of RC coupled amplifier.

8. Study of 3-terminal IC regulator.

9. Study of transistor as a constant current source in CE configuration.

10. Study of FET common source amplifier.

11. Study of FET common Drain amplifier.

12. Graphical determination of small signal hybrid parameters of bipolar junction transistor.

13. Study & design of a d.c. voltage doubler.

**NOTE:** At least ten experiments are to be performed, atleast seven experiments should be performed from above list. Remaining three experiments may either be performed from the above list or designed & set by the concerned Department as per the scope of the syllabus.
LIST OF EXPERIMENTS:

1. Study of TTL gates – AND, OR, NOT, NAND, NOR, EX-OR, EX-NOR.

2. Design & realize a given function using K-maps and verify its performance.

3. To verify the operation of multiplexer & Demultiplexer.

4. To verify the operation of comparator.

5. To verify the truth tables of S-R, J-K, T & D type flip flops.

6. To verify the operation of bi-directional shift register.

7. To design & verify the operation of 3-bit synchronous counter.

8. To design and verify the operation of synchronous UP/DOWN decade counter using J K flip-flops & drive a seven-segment display using the same.

9. To design and verify the operation of asynchronous UP/DOWN decade counter using J K flip-flops & drive a seven-segment display using the same.

10. To design & realize a sequence generator for a given sequence using J-K flip-flops.

11. Study of CMOS NAND & NOR gates and interfacing between TTL and CMOS gates.

12. Design a 4-bit shift-register and verify its operation. Verify the operation of a ring counter and a Johnson counter.

NOTE: At least ten experiments are to be performed, at least seven experiments should be performed from above list. Remaining three experiments may either be performed from the above list or designed & set by the concerned Department as per the scope of the syllabus.
LIST OF EXPERIMENTS:


2. Study of Frequency Modulation and determination of Modulation index.

3. Study of Phase Modulation.


5. Study of Pulse Width Modulation.


7. Study of Pulse Code Modulation.

8. Study of frequency Shift Keying.

9. Study of ASK and QASK.

10. Study of PSK and QPSK.

11. Project related to the scope of the course.

NOTE: Atleast ten experiments are to be performed, atleast seven experiments should be performed from above list. Remaining three experiments may either be performed from the above list or designed & set by the concerned Department as per the scope of the syllabus.
WRITE DOWN AND EXECUTE THE FOLLOWING PROGRAMS USING C++/MATLAB

1. To find the roots of non-linear equation using Bisection method.
2. To find the roots of non-linear equation using Newton's method.
3. Curve fitting by least - square approximations.
4. To solve the system of linear equations using Gauss- Elimination method.
5. To solve the system of linear equations using Gauss-Seidal iteration method.
6. To solve the system of linear equations using Gauss-Jorden method.
7. To Integrate numerically using Trapezoidal rule.
8. To Integrate numerically using Simpson's rules.
9. To find the largest eigen value of a matrix by power-method.
10. To find numerical solution of ordinary differential equations by Euler's method.
11. To find numerical solution of ordinary differential equations by Runge-Kutta method.
12. To find numerical solution of ordinary differential equations by Milne's method.
13. To find the numerical solution of Laplace equation.
14. To find numerical solution of wave equation.
15. To find numerical solution of heat equation.

BOOKS SUGGESTED:
2. Numerical Methods: E. Balagurusamy T.M.H.

Note: Ten experiments are to be performed out of which at least seven experiments should be performed from above list. Remaining three experiments may either be performed from the above list or designed by the concerned Department as per the scope of the syllabus.
The purpose of this course is to inculcate a sense of professionalism in a student along with personality development in terms of quality such as receiving, responding, temperament, attitude and outlook. The student efforts will be evaluated on the basis of his/her performance / achievements in different walks of life.

The evaluation will be made by the panel of experts/teachers, preferably interdisciplinary to be appointed by the Vice-Chancellor of the University on recommendation of the Dean Academic Affairs. A Faculty Counselor will be attached to a group of students which will remain associated with him/her during the entire period of the degree program in the University. Each faculty member will serve as a faculty counselor. They will act like a local guardian for the students associated with him/her and will help them in terms of career guidance, personal difficulties.

A. **The student will present a written report before the committee with following in view:**

The student will present before the committee his/her achievements during the current academic session in the form of a written report highlighting following:

<table>
<thead>
<tr>
<th>I.</th>
<th>Academic Performance</th>
<th>-------</th>
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<tbody>
<tr>
<td>II.</td>
<td>Extra Curricular Activities</td>
<td>(4 Marks)</td>
</tr>
<tr>
<td>III.</td>
<td>Technical Activities</td>
<td>(4 Marks)</td>
</tr>
<tr>
<td>IV.</td>
<td>Industrial, Educational tour</td>
<td>(4 Marks)</td>
</tr>
<tr>
<td>V.</td>
<td>Sports/games</td>
<td>(4 Marks)</td>
</tr>
<tr>
<td>VI.</td>
<td>Community Service, Hostel Activities</td>
<td>(4 Marks)</td>
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</tbody>
</table>

**NOTE:** Report submitted by the students should be typed on both sides of the paper.

B. **A student will support his/her achievement and verbal & communicative skill through presentation before the committee.** (20 Marks)

C. **Faculty Counselor Assignment** (10 Marks)

It will be the duty of the student to get evaluated by respective faculty counselor and to submit the counselor assessment marks in a sealed envelope to the committee.

A counselor will assess the student which reflects his/her learning graph including followings:

1. Discipline throughout the year
2. Sincerity towards study
3. How quickly the student assimilates professional value system etc.
UNIT 1: SPECTRAL ANALYSIS:
Fourier Series, Fourier transformations, Convolution Theorem, Correlation, Cross-Correlation and autocorrelation.

UNIT 2: INFORMATION THEORY:
Introduction to information and entropy, channel capacity for discrete and continuous channels, Shannon’s Theorem, Shannon-Hartley Theorem, Noisy channels, coding theory: Shannon-Fano coding, minimum redundancy coding, maximization of entropy of a continuous message transmission rate, effect of medium on the information, selection of channels, effect of noise and its minimization.

UNIT 3: RANDOM SIGNAL THEORY:
Representation of random signals, concept of probability, probability of joint occurrence, conditional probability, discrete probability theory, continuous random variables, probability distribution function, probability density function, joint probability density functions. Statistical average and moments, Ergodic processes, correlation function, power spectral density, central limit theory, response of linear system to random signals. Error function, regularity, covariance relation among the spectral densities of the two input-output random processes. Cross spectral densities, optimum filters.

TEXT BOOK:
1. Principles of Communication Systems: Taub Schiling; TMH

REFERENCE BOOKS:
1. Communication Systems: Singh and Sapre; TMH
2. Communication Systems: A Bruce Carlson; TMH

NOTE: Eight questions are to be set, at least two from each unit. Students have to attempt five questions in all.
UNIT 1: OSCILLOSCOPE:
Block diagram, study of various stages in brief, high frequency CRO considerations, Sampling and storage oscilloscope.

UNIT 2: ELECTRONIC INSTRUMENTS:
Instruments for measurement of voltage, current & other circuit parameters, Q-meters, R.F. power measurements, introduction to digital meters.

UNIT 3: GENERATION & ANALYSIS OF WAVEFORMS:
Block diagram of pulse generators, signal generators, function generators wave analysers, distortion analysers, spectrum analyser, Harmonic analyser, introduction to power analyser.

UNIT 4: FREQUENCY & TIME MEASUREMENT:
Study of decade counting Assembly (DCA), frequency measurements, period measurements, universal counter, introduction to digital meters.

UNIT 5: DISPLAY DEVICES:
Nixie tubes, LED’s LCD’s, discharge devices.

UNIT 6: TRANSDUCERS:
Classification, Transducers of types: RLC photocell, thermocouples etc. basic schemes of measurement of displacement, velocity, acceleration, strain, pressure, liquid level & temperature.

UNIT 7: INTRODUCTION TO SIGNAL CONDITIONING:
DC signal conditioning system, AC signal conditioning system, data acquisition and conversion system

TEXT BOOK:

REFERENCE BOOKS:
1. Electronics Instrumentation & Measurement Techniques: Cooper; PHI.

NOTE: Eight questions are to be set – at least one from each unit. Students have to attempt five questions in all.
UNIT1: SINGLE AND MULTISTAGE AMPLIFIERS:

UNIT2: FEEDBACK AMPLIFIERS:
Feedback concept, transfer gain with feedback, general characteristics of negative feedback amplifiers, input resistance, output resistance, voltage series feedback, current series feedback, current shunt feedback, voltage shunt feedback.

UNIT3: OSCILLATORS:
Sinusoidal oscillators, Barkhausen criteria, R-C phase shift oscillator, general form of oscillator circuit, wien-bridge oscillator, crystal oscillator.

UNIT4: POWER AMPLIFIERS:
Class A, B, and C operations; Class A large signal amplifiers, higher order harmonic distortion, efficiency, transformer coupled power amplifier, class B amplifier : efficiency & distortion; class A and class B push-pull amplifiers; class C power amplifier.

UNIT5: OPERATIONAL AMPLIFIERS:
Ideal and practical operational amplifiers, inverting and non-inverting amplifier, differential amplifier, emitter coupled differential amplifier, transfer characteristics of a differential amplifier, offset error : voltage and current, common mode rejection ratio (CMRR).

UNIT6: LINEAR APPLICATIONS OF OPERATIONAL AMPLIFIERS:
Scale changer, phase shifter, adder, voltage to current converter, current to voltage converter, DC voltage follower, Bridge amplifier, AC coupled amplifier, AC voltage follower, Integrator, differentiator.

UNIT7: NON-LINEAR APPLICATIONS OF OPERATIONAL AMPLIFIERS:
Comparators, sample & hold circuits, Logarithmic amplifier, anti-log amplifier, logarithmic multiplier, waveform generators, Miller & Bootstrap sweep generators, regenerative comparator (Schmitt Trigger), multivibrators, ADC.

TEXT BOOK:
1. Integrated Electronics: Milman Halkias, TMH.

REFERENCE BOOKS:
1. Operational Amplifiers: Gaikwad
2. Electronic Circuit Analysis and Design (Second edition) : D.A.Neamen; TMH

NOTE: Eight questions are to be set – at least one from each unit. Students have to attempt five questions.
UNIT 1: RADIATION OF ELECTROMAGNETIC WAVES:
Retarded potential, field of short dipole, Antenna pattern & antenna parameters.

UNIT 2: ANTENNA PARAMETERS:
Antenna pattern, Gain, Directivity, Radiation resistance, Aperture, Beam-width etc, Reciprocity theorem for antenna.

UNIT 3: ELEMENTAL ANTENNA:
Wave equation for radiated fields from current and voltage sources in terms of electric scalar potential and magnetic vector potential .Fields and pattern of an infinitesimal dipole. Definition of various potentials used in antenna theory .

UNIT 4: PRACTICAL LINEAR ANTENNAS:
Relation between current distribution and field pattern of an antenna, linear antenna, half wave dipole, Antenna impedance, Directivity, Radiation resistance, Directional properties, Effect of ground on antenna pattern, Input impedance Broad band matching, Mutual impedance.

UNIT 5: ANTENNA ARRAYS:
Two element array, broad side, End fired pattern, Beam width pattern multiplication, multi element array and their properties, Synthesis of an array.

UNIT 6: VARIOUS TYPES OF ANTENNA:
parabolic feeds, conical, helix, log periodic, horn, Microwave antenna .

UNIT 7: PROPAGATION:
Ground waves, Space waves, Effect of Earth, Duct formation, Ionosphere, and sky waves.

TEXT BOOKS: 1. Antennas by J.D.Kraus, TMH.

REF. BOOKS : 1. Antenna & Radiowave Propogation by Collin,TMH
2. Electromagnetic Waves & Radiating Systems by Jordan & Balman, PHI.

NOTE: Eight questions are to be set - at least one question from each unit. Students have to attempt five questions in all.
CSE- 210                      COMPUTER ARCHITECTURE & ORGANIZATION

L  T  P  Credits
3   1  0  4

Class Work : 50
Exam : 100
Total : 150
Duration of Exam : 3 HRS

Unit-1: Basic Principles: Boolean algebra and Logic gates, Combinational logic blocks (Adders, Multiplexers, Encoders, de-coder), Sequential logic blocks(Latches, Flip-Flops, Registers, Counters)

Unit-2: General System Architecture: Store program control concept, Flynn’s classification of computers (SISD, MISD, MIMD); Multilevel viewpoint of a machine: digital logic, micro architecture, ISA, operating systems, high level language; structured organization; CPU, caches, main memory, secondary memory units & I/O; Performance metrics; MIPS, MFLOPS.

Unit-3: Instruction Set Architecture: Instruction set based classification of processors (RISC, CISC, and their comparison); addressing modes: register, immediate, direct, indirect, indexed; Operations in the instruction set; Arithmetic and Logical, Data Transfer, Control Flow; Instruction set formats (fixed, variable, hybrid); Language of the machine: 8086; simulation using MSAM.

Unit-4: Basic non pipelined CPU Architecture: CPU Architecture types (accumulator, register, stack, memory/ register) detailed data path of a typical register based CPU, Fetch-Decode-Execute cycle (typically 3 to 5 stage); microinstruction sequencing, implementation of control unit, Enhancing performance with pipelining.

Unit-5: Memory Hierarchy & I/O Techniques: The need for a memory hierarchy (Locality of reference principle, Memory hierarchy in practice: Cache, main memory and secondary memory, Memory parameters: access/ cycle time, cost per bit); Main memory (Semiconductor RAM & ROM organization, memory expansion, Static & dynamic memory types); Cache memory (Associative & direct mapped cache organizations.

Unit-6: Introduction to Parallelism: Goals of parallelism (Exploitation of concurrency, throughput enhancement); Amdahl’s law; Instruction level parallelism (pipelining, super scaling -basic features); Processor level parallelism (Multiprocessor systems overview).

Unit-7: Computer Organization [80x86]: Instruction codes, computer register, computer instructions, timing and control, instruction cycle, type of instructions, memory reference, register reference. I/O reference, Basics of Logic Design, accumulator logic, Control memory, address sequencing, micro-instruction formats, micro-program sequencer, Stack Organization, Instruction Formats, Types of interrupts; Memory Hierarchy.

Text Books:

Reference Books:
- Computer Architecture- Nicholas Carter, 2002, T.M.H.

Note: Eight questions will be set in all by the examiners taking at least one question from each unit. Students will be required to attempt five questions in all.
UNIT1: THE 8085 PROCESSOR:
Introduction to microprocessor, 8085 microprocessor: Architecture, instruction set, interrupt structure, and assembly language programming.

UNIT2: THE 8086 MICROPROCESSOR ARCHITECTURE:
Architecture, block diagram of 8086, details of sub-blocks such as EU, BIU; memory segmentation and physical address computations, program relocation, addressing modes, instruction formats, pin diagram and description of various signals.

UNIT3: INSTRUCTION SET OF 8086:
Instruction execution timing, assembler instruction format, data transfer instructions, arithmetic instructions, branch instructions, looping instructions, NOP and HLT instructions, flag manipulation instructions, logical instructions, shift and rotate instructions, directives and operators, programming examples.

UNIT4: INTERFACING DEVICE:
The 8255 PPI chip: Architecture, control words, modes and examples.

UNIT 5: DMA:
Introduction to DMA process, 8237 DMA controller,

UNIT 6. INTERRUPT AND TIMER:
8259 Programmable interrupt controller, Programmable interval timer chips.

TEXT BOOKS:
1. Microprocessor Architecture, Programming & Applications with 8085: Ramesh S Gaonkar; Wiley Eastern Ltd.
2. The Intel Microprocessors 8086- Pentium processor: Brey; PHI

REFERENCE BOOKS:
1. Microprocessors and interfacing: Hall; TMH
2. The 8088 & 8086 Microprocessors-Programming, interfacing, Hardware & Application: Triebel & Singh; PHI
4. Advanced Microprocessors and Interfacing: Badri Ram; TMH

NOTE: 8 questions are to be set selecting FIVE questions from PART A and THREE questions from PART B. Students have to attempt any five questions.
LIST OF EXPERIMENTS:

1. Measurement of displacement using LVDT.
2. Measurement of distance using LDR.

NOTE:

1. At least ten experiments have to be performed in the semester.
2. At least seven experiments should be performed from above list. Remaining three experiments may either be performed from the above list or designed & set by the concerned Department as per the scope of the syllabus of EE-303-C.
LIST OF EXPERIMENTS:

1. Design & measure the frequency response of an RC coupled amplifier using discrete components.

2. Design a two stage RC coupled amplifier and determine the effect of cascading on gain and bandwidth.

3. Study the effect of voltage series, current series, voltage shunt, and current shunt feedback on amplifier using discrete components.


5. Verify the operation of a differentiator circuit using 741 op amp and show that it acts as a high pass filter.

6. Verify the operation of a integrator circuit using 741 op amp and show that it acts as a low pass filter.

7. Design and verify the operations of op amp adder and subtractor circuits.

8. Plot frequency response of AC coupled amplifier using op amp 741 and study the effect of negative feedback on the bandwidth and gain of the amplifier.


10. To design & realize using op amp 741, square wave generator.

11. To design & realize using op amp 741, logarithmic amplifier & VCCS.

NOTE: At least ten experiments are to be performed. Seven experiments should be performed from the above list and the remaining three experiments can be either from the above list or set by the concerned Department as per the scope of the syllabus of EE-305-C.
LIST OF EXPERIMENTS:

1. Study of 8085 Microprocessor kit.
2. Write a program using 8085 and verify for:
   a. Addition of two 8-bit numbers.
   b. Addition of two 8-bit numbers (with carry).
3. Write a program using 8085 and verify for:
   a. 8-bit subtraction (display borrow)
   b. 16-bit subtraction (display borrow)
4. Write a program using 8085 for multiplication of two 8-bit numbers by repeated addition method. Check for minimum number of additions and test for typical data.
5. Write a program using 8085 for multiplication of two 8-bit numbers by bit rotation method and verify.
6. Write a program using 8085 for division of two 8-bit numbers by repeated subtraction method and test for typical data.
7. Write a program using 8085 for dividing two 8-bit numbers by bit rotation method and test for typical data.
8. Study of 8086 microprocessor kit
9. Write a program using 8086 for division of a defined double word (stored in a data segment) by another double Word division and verify.
10. Write a program using 8086 for finding the square root of a given number and verify.
11. Write a program using 8086 for copying 12 bytes of data from source to destination and verify.
12. Write a program using 8086 and verify for:
   a. Finding the largest number from an array.
   b. Finding the smallest number from an array.
13. Write a program using 8086 for arranging an array of numbers in descending order and verify.
14. Write a program using 8086 for arranging an array of numbers in ascending order and verify.
15. Write a program for finding square of a number using look-up table and verify.
16. Write a program to interface a two digit number using seven-segment LEDs. Use 8085/8086 microprocessor and 8255 PPI.
17. Write a program to control the operation of stepper motor using 8085/8086 microprocessor and 8255 PPI.

NOTE: At least ten experiments have to be performed in the semester out of which seven experiments should be performed from above list. Remaining three experiments may either be performed from the above list or designed & set by the concerned Department as per the scope of the syllabus of EE-309-C.
ECE-331                                  ELECTRONICS CIRCUIT SIMULATION LAB

L  T  P       Credits                        Class Work    :    25
-   2        2                              Exam            :    25

Total        :    50                          Duration of Exam :    3 HRS

LIST OF EXPERIMENTS:

1. Simulate and study half-wave, full-wave, and bridge-rectifier using PSPICE windows
2. Simulate and study diode clipper and clumper circuits using PSPICE windows
3. Simulate and study emitter bias and fixed bias BJT and JFET circuits using PSPICE windows, and determine quiescent conditions.
4. Simulate a common emitter amplifier using self biasing and study the effect of variation in emitter resistor on voltage gain, input and output impedance using PSPICE windows.
5. Determine the frequency response of Vo/Vs for CE BJT amplifier using PSPICE windows. Study the effect of cascading of two stages on band width.
6. Simulate and study Darlington pair amplifier circuit using PSPICE windows and determine dc bias and output ac voltage.
7. Study an operational amplifier using PSPICE windows and find out: CMMR, gain band width product, slew rate, 3-db frequency, and input offset voltage.
8. Simulate and study active low pass, high pass, and band pass filters using PSPICE windows.
10. Study the operation of 555 timer oscillator using PSPICE.
11. Simulate logic expression…………………..and determine its truth table.
12. Simulate logic expression of full adder circuit and determine its truth table.
13. Simulate a synchronous 4-bit counter and determine its count sequence.
14. Simulate a master-slave flip-flop using NAND gates and study its operation. Study the operation of asynchronous preset and clear.

NOTE: At least ten experiments have to be performed in the semester; out of which at least seven experiments should be performed from above list. Remaining three experiments may either be performed from the above list or designed & set by the concerned Department.
At the end of 4th semester each student would undergo four weeks Professional Training in an Industry/ Institute/ Professional Organization/ Research Laboratory etc. with the prior approval of the Training and Placement Officer of the University and submit in the department a typed report along with a certificate from the organization.

The typed report should be in a prescribed format.

The report will be evaluated in the V Semester by a Committee consisting of three teachers from different specialization to be constituted by the Chairperson of the department. The basis of evaluation will primarily be the knowledge and exposure of the student towards different processes and the functioning of the organization.

The student will interact with the committee through presentation to demonstrate his/her learning.

Teachers associated with evaluation work will be assigned 2 periods per week load.
UNIT1: WAVEGUIDES:
Introduction, comparison with transmission lines, propagation in TE & TM mode, rectangular wave guide, TEM mode in rectangular wave guide, characteristic impedance, introduction to circular waveguides and planar transmission lines.

UNIT2: MICROWAVE COMPONENTS:
Directional couplers, tees, hybrid ring, S-parameters, attenuators, cavity resonators, mixers & detectors, matched Load, phase shifter, wave meter, Ferrite devices: Isolators, circulators.

UNIT3: MICROWAVE TUBES:
Limitation of conventional tubes; Construction, operation and properties of Klystron amplifier, reflex Klystron, magnetron, TWT, BWO, crossed field amplifiers.

UNIT4: MICROWAVE SOLID STATE DEVICES:
Varactor diode, Tunnel diode, Schottky diode, GUNN diode, IMPATT, TRAPATT and PIN diodes. MASER, parametric amplifiers.

UNIT5: MICROWAVE MEASUREMENTS:
Power measurement using calorimeter & bolometers, measurement of SWR, frequency, wavelength and impedance. Microwave bridges.

UNIT6. INTRODUCTION TO RADAR:
Block Diagram and operation, Radar Frequencies, Simple form of Radar Equation, Prediction of Range Performance, Pulse Repetition frequency and Range Ambiguities, Applications of Radar

TEXT BOOKS:
1. Microwave devices and circuits: Samuel Liao; PHI
2. Microwave devices & Radar Engg: M. Kulkarni; Umesh

REFERENCE BOOK:
1. Microwaves and Radar: A.K. Maini; Khanna

NOTE: Eight questions are to be set – at least one from each unit. Students have to attempt any five questions.
UNIT1. INTRODUCTORY CONCEPTS:
System/Plant model, types of models, illustrative examples of plants and their inputs and outputs, controller, servomechanism, regulating system, linear time-invariant (LTI) system, time-varying system, causal system, open loop control system, closed loop control system, illustrative examples of open-loop and feedback control systems, continuous time and sampled data control systems. Effects of feedback on sensitivity (to parameter variations), stability, external disturbance (noise), overall gain etc. Introductory remarks about non-linear control systems.

UNIT2. MATHEMATICAL MODELLING:
Concept of transfer function, relationship between transfer function and impulse response, order of a system, block diagram algebra, signal flow graphs: Mason’s gain formula & its application, characteristic equation, derivation of transfer functions of electrical and electromechanical systems, Transfer functions of cascaded and non-loading cascaded elements, Introduction to state variable analysis and design.

UNIT3. TIME DOMAIN ANALYSIS:
Typical test signals, time response of first order systems to various standard inputs, time response of 2nd order system to step input, relationship between location of roots of characteristics equation, \( w \) and \( \omega_n \), time domain specifications of a general and an under-damped 2nd order system, steady state error and error constants, dominant closed loop poles, concept of stability, pole zero configuration and stability, necessary and sufficient conditions for stability, Hurwitz stability criterion, Routh stability criterion and relative stability.

UNIT4. ROOT LOCUS TECHNIQUE:
Root locus concept, development of root loci for various systems, stability considerations.

UNIT5. FREQUENCY DOMAIN ANALYSIS:
Relationship between frequency response and time-response for 2nd order system, polar, Nyquist, Bode plots, stability, Gain-margin and Phase Margin, relative stability, frequency response specifications.

UNIT6. COMPENSATION:
Necessity of compensation, compensation networks, application of lag and lead compensation, basic modes of feedback control, proportional, integral and derivative controllers, illustrative examples.

UNIT7. CONTROL COMPONENTS:
Synchros, AC and DC techo-generators, servomotors, stepper motors, & their applications, magnetic amplifier.

TEXT BOOK:

REFERENCE BOOKS:
1. Automatic Control Systems: B.C.Kuo, PHI.
2. Modern Control Engg.: K.Ogata; PHI.
4. Modern Control Engineering, R.C.Dorl & Bishop; Addison-Wesley

NOTE: Eight questions are to be set - at least one from each unit. Students have to attempt five questions.
UNIT1. REVIEW OF MOS TECHNOLOGY:
Introduction to IC technology, MOS Transistor enhancement mode and depletion mode operations, fabrication of NMOS, CMOS and BiCMOS devices. Equivalent circuit for MOSFET and CMOS.

UNIT2. MOS TRANSISTOR THEORY:
MOS device design equations, MOS transistor, Evaluation aspects of MOS transistor, threshold voltage, MOS transistor transconductance & output conductance, figure of merit, determination of pull-up to pull-down ratio for an n-MOS inverter driven by another n-MOS inverter & by one or more pass transistor, alternative forms of pull-up, CMOS and BiCMOS-inverters. Latch up in CMOS circuitry and BiCMOS Latch up susceptibility.

UNIT3. MOS CIRCUITS AND LOGIC DESIGN:
Basic physical design of simple logic gates using n-MOS, p-MOS and CMOS, CMOS logic gate design considerations, CMOS logic structures, clocking strategies.

UNIT4. CIRCUIT CHARACTERIZATION AND PERFORMANCE ESTIMATION:
Resistance estimation, capacitance estimation, inductance, switching characteristics, CMOS gate transistor sizing, power dissipation.

UNIT5. VLSI FABRICATION:
Crystal growth, wafer preparation, epitaxy, oxidation, lithography, etching, diffusion, dielectric and poly-silicon film deposition, ion implantation, yield and reliability, metalization.

UNIT6. DESIGN EXAMPLE USING CMOS:
Incrementer / decrementer, left/right shift serial/parallel register, comparator for two n-bit number, a two-phase non-overlapping clock generator with buffered output on both phases, design of an event driven element for EDL system.

TEXT BOOKS:
1. Introduction to Digital Integrated Circuits: Rabaey, Chandrakasan & Nikolic.

REFERENCE BOOKS:
1. Introduction to Digital Circuits : Rabaey and LPE (PH)
2. ............................................ S.K.Gandhi.
3. VLSI Technology: S.M. Sze; McGraw-Hill.
4. Integrated Circuits: K.R. Botkar; Khanna

NOTE: Eight questions are to be set - at least one from each unit. Students have to attempt any five questions.
Unit-1: OSI Reference Model and Network Architecture: Introduction to Computer Networks, Example networks ARPANET, Internet, Private Networks, Network Topologies: Bus-, Star-, Ring-, Hybrid -, Tree -, Complete -, Irregular – Topology; Types of Networks: Local Area Networks, Metropolitan Area Networks, Wide Area Networks; Layering architecture of networks, OSI model, Functions of each layer, Services and Protocols of each layer.


Unit-3: Local Area Networks: Introduction to LANs, Features of LANs, Components of LANs, Usage of LANs, LAN Standards, IEEE 802 standards, Channel Access Methods, Aloha, CSMA, CSMA/CD, Token Passing, Ethernet, Layer 2 & 3 switching, Fast Ethernet and Gigabit Ethernet, Token Ring, LAN interconnecting devices: Hubs, Switches, Bridges, Routers, Gateways.

Unit-4: Wide Area Networks: Introduction of WANs, Routing, Congestion Control, WAN Technologies, Distributed Queue Dual Bus (DQDB), Synchronous Digital Hierarchy (SDH)/ Synchronous Optical Network (SONET), Asynchronous Transfer Mode (ATM), Frame Relay, Wireless Links.


Text Book:

Reference Books:
- Business Data Communications, Fitzgerald Jerry.
- Computer Networking – ED Tittel, 2002, T.M.H.

Note: Eight questions will be set in all by the examiners taking at least one question from each unit. Students will be required to attempt five questions in all.
Unit-I: Signals and Systems
Continuous-time and discrete-time Signals, Transformations of the Independent Variable, Exponential and Sinusoidal Signals, Continuous-Time and Discrete-Time LTI Systems and their properties, convolution sum and convolution integrals, LTI System described by differential and difference equation.

Unit-II: Fourier Series and Fourier Transform
The response of LTI Systems to Complex Exponentials, Fourier Series, Representation of Continuous-time Periodic Signals and their Properties, Continuous time and discrete time Fourier Transforms and their properties, System Characterized by Linear Constant Coefficient Differential equations and Difference equation.

Unit-III: Time and Frequency Characterization of Signals and Systems

Unit-IV: Sampling and Laplace Transform
Signal representation by samples, sampling theorem, Impulse train sampling, sampling of discrete time signals, discrete time processing of continuous time signals. Laplace Transform, Region of convergence, inverse Laplace Transform, Analysis and characterization of LTI System, Block diagram representation, Unilateral Laplace transform, Bilateral LT, Regions of convergence (ROC).

Unit-V: Z-Transform
Z-Transform, Region of convergence, Inverse Z-transform, analysis and characterization of LTI system, Block diagram representation, Unilateral Z-transform.

Text Book:

Reference Book:

Note: Eight questions will be set in all by the examiners taking at least one question from each unit. Students will be required to attempt five questions in all.
UNIT 1: INTRODUCTION:
Introduction to Computer-aided design tools for digital systems. Hardware description languages; introduction to VHDL, data objects, classes and data types, Operators, Overloading, logical operators, Types of delays Entity and Architecture declaration. Introduction to behavioural, dataflow and structural models.

UNIT 2: VHDL STATEMENTS:
Assignment statements, sequential statements and process, conditional statements, case statement Array and loops, resolution functions, Packages and Libraries, concurrent statements.
Subprograms: Application of Functions and Procedures, Structural Modelling, component declaration, structural layout and generics.

UNIT 3: COMBINATIONAL CIRCUIT DESIGN:
VHDL Models and Simulation of combinational circuits such as Multiplexers, Demultiplexers, encoders, decoders, code converters, comparators, implementation of Boolean functions etc.

UNIT 4: SEQUENTIAL CIRCUITS DESIGN:
VHDL Models and Simulation of Sequential Circuits Shift Registers, Counters etc.

UNIT 5: DESIGN OF MICROCOMPUTER:
Basic components of a computer, specifications, architecture of a simple microcomputer system, implementation of a simple microcomputer system using VHDL

UNIT 6: DESIGN WITH CPLDs AND FPGAs:
Programmable logic devices: ROM, PLAs, PALs, GAL, PEEL, CPLDs and FPGA. Design implementation using CPLDs and FPGAs

REFERENCE BOOKS:

NOTE: Eight questions are to be set - at least one question from each unit. Students will be required to attempt five questions in all.
LIST OF EXPERIMENTS:

1. To study A.C. servo motor and to plot its torque speed characteristics.

2. To study D.C. servo motor and to plot its torque speed characteristics.

3. To study the magnetic amplifier and to plot its load current v/s control current characteristics for:
   (a) series connected mode
   (b) parallel connected mode.

4. To plot the load current v/s control current characteristics for self exited mode of the magnetic amplifier.

5. To study the synchro & to:
   (a) Use the synchro pair (synchro transmitter & control transformer) as an error detector.
   (b) Plot stator voltage v/s rotor angle for synchro transmitter i.e. to use the synchro transmitter as position transducer.

6. To use the synchro pair (synchro transmitter & synchro motor) as a torque transmitter.

7. (a) To demonstrate simple motor driven closed loop position control system.
   (b) To study and demonstrate simple closed loop speed control system.

8. To study the lead, lag, lead-lag compensators and to draw their magnitude and phase plots.

9. To study a stepper motor & to execute microprocessor or computer-based control of the same by changing number of steps, direction of rotation & speed.

10. To implement a PID controller for level control of a pilot plant.

11. To implement a PID controller for temperature control of a pilot plant.

12. To study the MATLAB package for simulation of control system design.

NOTE: At least ten experiments have to be performed in the semester, at least seven experiments should be performed from above list. Remaining three experiments may either be performed from the above list or designed & set by the concerned Department as per the scope of the syllabus of EE-304-C.
The socket programming can be done on Unix/Linux operating or/and Windows. Socket programming, and the language can be C/VC++ and/or Java

1. Write a program to Create Sockets for sending and receiving data.
2. Write a program to obtain the Local & Remote Socket Address.
3. Write a program to Create Sockets For Handling Multiple Connection
4. Write a program to obtain the information about the (A) Host (B) Network (C) Protocols (D) Domains
5. Write a program to manipulate the IP Address.
6. Write a program to write a Telnet Client.
7. Write a program to make an FTP Client

Note: At least 5 to 10 more exercises to be given by the teacher concerned.
LIST OF EXPERIMENTS:

1. Design all gates using VHDL.

2. Write VHDL programs for the following circuits, check the wave forms and the hardware generated
   a. half adder
   b. full adder

3. Write VHDL programs for the following circuits, check the wave forms and the hardware generated
   a. multiplexer
   b. demultiplexer

4. Write VHDL programs for the following circuits, check the wave forms and the hardware generated
   a. decoder
   b. encoder

5. Write a VHDL program for a comparator and check the wave forms and the hardware generated

6. Write a VHDL program for a code converter and check the wave forms and the hardware generated

7. Write a VHDL program for a FLIP-FLOP and check the wave forms and the hardware generated

8. Write a VHDL program for a counter and check the wave forms and the hardware generated

9. Write VHDL programs for the following circuits, check the wave forms and the hardware generated
   a. register
   b. shift register

10. Implement any three (given above) on FPGA/CPLD kit

**NOTE:** Ten experiments are to be performed out of which at least seven experiments should be performed from above list. Remaining three experiments may either be performed from the above list or designed & set by the concerned department as per the scope of the syllabus.
LIST OF EXPERIMENTS:

1. Study of wave guide components.
2. To study the characteristics of reflex Klystron and determine its timing range.
3. To measure frequency of microwave source and demonstrate relationship among guide dimensions, free space wave length and guide wavelength.
4. To measure VSWR of unknown load and determine its impedance using a smith chart.
5. To match impedance for maximum power transfer using slide screw tuner.
6. To measure VSWR, insertion losses and attenuation of a fixed and variable attenuator.
7. To measure coupling and directivity of direction couplers.
8. To measure insertion loss, isolation of a three port circulator.
9. To measure the Q of a resonant cavity.
10. To study the V-I characteristics of GUNN diode.

NOTE: Ten experiments have to be performed in the semester. At least seven experiments should be performed from above list. Remaining three experiments may either be performed from the above list or designed & set by the concerned Department as per the scope of the syllabus of EE-302-C.
The purpose of this course is to inculcate a sense of professionalism in a student along with personality development in terms of quality such as receiving, responding, temperament, attitude and outlook. The student efforts will be evaluated on the basis of his/her performance/achievements in different walks of life.

The evaluation will be made by the panel of experts/teachers, preferably interdisciplinary to be appointed by the Vice-Chancellor of the University on recommendation of the Dean Academic Affairs. A Faculty Counselor will be attached to a group of students which will remain associated with him/her during the entire period of the degree program in the University. Each faculty member will serve as a faculty counselor. They will act like a local guardian for the students associated with him/her and will help them in terms of career guidance, personal difficulties.

A. The student will present a written report before the committee with following in view:

The student will present before the committee his/her achievements during the current academic session in the form of a written report highlighting followings:

I. Academic Performance
II. Extra Curricular Activities (4 Marks)
III. Technical Activities (4 Marks)
IV. Industrial, Educational tour (4 Marks)
V. Sports/games (4 Marks)
VI. Community Service, Hostel Activities (4 Marks)

NOTE: Report submitted by the students should be typed on both sides of the paper.

B. A student will support his/her achievement and verbal & communicative skill through presentation before the committee. (20 Marks)

C. Faculty Counselor Assignment (10 Marks)

It will be the duty of the student to get evaluated by respective faculty counselor and to submit the counselor assessment marks in a sealed envelope to the committee.

A counselor will assess the student which reflects his/her learning graph including followings:

1. Discipline throughout the year
2. Sincerity towards study
3. How quickly the student assimilates professional value system etc.
UNIT 1: DIGITAL COMMUNICATION:
Introduction, digital communication, Shannon limit for information capacity, digital radio, digital amplitude modulation, frequency shift keying (FSK), phase shift keying (PSK), quadrature amplitude modulation (QAM), bandwidth efficiency, carrier recovery, differential phase shift keying (DPSK), clock recovery, probability of error & bit error rate, trellis encoding.

UNIT 2: DATA COMMUNICATIONS:
Introduction, history of data communication, standard organization for data communication, data communication circuits, data communication codes, error control, synchronization, data communications hardware, serial interfaces: RS-232, RS-449 & RS-530, CCITT X.21, parallel interfaces: centronics parallel interfaces. the telephone network: DDD network, private- line service, the telephone circuit, data modems: synchronous modems, asynchronous modems, modem synchronization.

UNIT 3: DATA COMMUNICATIONS PROTOCOLS AND NETWORK CONFIGURATIONS:
Introduction, open system interconnection (OSI), data transmission mode, asynchronous protocols, synchronous protocols, public data network, integrated services digital network (ISDN), local area networks, token pass ring, Ethernet.

UNIT 4: MULTIPLEXING:
Introduction, time division multiplexing, T1 digital carrier system, CCITT time division multiplexed carrier systems, CODECS, COMBO chips, line encoding, T-CARRIERS, frame synchronization, bit interleaving VS word interleaving, frequency division multiplexing, AT&T’s FDM hierarchy, composite base band signal, formation of a master group.

UNIT 5: INTERNET AND TCP/IP:
Introduction, history, use of Internet, accessing the Internet, Internet addresses, security on the internet, authentication, firewalls, intranet and extranet, TCP/IP reference model, domain name service, world wide web.

TEXT BOOK:

NOTE: Eight questions are to be set at-least one from each unit. Students have to attempt any five questions
UNIT 1: INTRODUCTION
Different types of microcontrollers: Embedded microcontrollers, External memory microcontrollers; Processor Architectures: Harvard V/S Princeton, CISC V/S RISC; microcontrollers memory types; microcontrollers features: clocking, i/o pins, interrupts, timers, peripherals.

UNIT 2: MICROCONTROLLER ARCHITECTURE
Introduction to PIC microcontrollers, Architecture and pipelining, program memory considerations, Addressing modes, CPU registers, Instruction set, simple operations.

UNIT 3: INTERRUPTS AND I/O PORTS
Interrupt logic, Timer2 scalar initialization, IntService Interrupt service routine, loop time subroutine, External interrupts and timers, Synchronous serial port module, Serial peripheral device, O/p port Expansion, I/p port expansion, UART.

UNIT 4: SOFTWARE
Development tools/ environments, Assembly language programming style, Interpreters, High level languages, Intel hex format object files, Debugging.

UNIT 5: PROGRAMMING WITH MICROCONTROLLERS
Arithmetic operations, Bit addressing, Loop control, Stack operation, Subroutines, RAM direct addressing, state machines, Oscillators, Timer Interrupts, Memory mapped I/O.

UNIT 6: DESIGNING USING MICROCONTROLLERS
Music box, Mouse wheel turning, PWM motor control, Aircraft Demonstration, ultra sonic distance measuring, Temperature Sensor, Pressure Sensor, Magnetic Field Sensor.

TEXT BOOK:

REFERENCE BOOKS:
1. Programming and Customizing the 8051 Microcontroller: Predko; TMH.
2. Designing Embedded Hardware: John Catsoulis; SHROFF PUB. & DISTR. ND.
3. Programming Embedded Systems in C and C++: Michael Barr; SHROFF PUB. & DISTR. ND.

NOTE: Eight questions are to be set at-least one from each unit. Students have to attempt any five questions.
UNIT1: INTRODUCTION TO OPTICAL COMMUNICATION SYSTEMS:
Electromagnetic spectrum used for optical communication, block diagram of optical communication system, Basics of transmission of light rays, Advantages of optical fiber communication.

UNIT2: OPTICAL FIBERS:
Optical fibers structures and their types, fiber characteristics: attenuation, scattering, absorption, fiber bend loss, dispersion; fiber couplers and connectors

UNIT3: LED LIGHT SOURCE:
Light emitting diode: recombination processes, the spectrum of recombination radiation, LED characteristics, internal quantum efficiency, external quantum efficiency, LED structure, lens coupling to fiber, behavior at high frequencies.

UNIT4: LASER LIGHT SOURCE:
Basic principles of laser action in semi-conductors, optical gain, lasing threshold, laser structures and characteristics, laser to fiber coupling, comparison with LED source.

UNIT5: AVALANCHE AND PIN PHOTODETECTORS:
Principles of optical detection, quantum efficiency, responsivity, general principles of PIN photodetector, intrinsic absorption, materials and designs for PIN photodiodes, impulse and frequency response of PIN photodiodes, noise in PIN Photodiodes, multiplication process, APD Design, APD bandwidth, APD noise.

TEXT BOOK:
Optical Fiber Communications: John M Senior; PHI.

REFERENCE BOOKS:
1. Optical Communication Systems : John Gowar; PHI.
2. Optical Fiber Communications : Gerd Keiser; TMH
3. Optical fiber Communication : Selvarajan, Kar, Srinivas; TMH.

NOTE: Eight questions are to be set at least one question from each unit. Students have to attempt five question in all.
UNIT1: DISCRETE-TIME SIGNALS:
Signal classifications, frequency domain representation, time domain representation, representation of sequences by Fourier transform, properties of Fourier transform, discrete time random signals, energy and power theorems.

UNIT2: DISCRETE-TIME SYSTEMS:
Classification, properties, time invariant system, finite impulse Response (FIR) system, infinite impulse response (IIR) system.

UNIT3: SAMPLING OF TIME SIGNALS:
Sampling theorem, application, frequency domain representation of sampling, reconstruction of band limited signal from its samples, discrete time processing of continuous time signals, changing the sampling rate using discrete time processing.

UNIT4: Z-TRANSFORM:
Introduction, properties of the region of convergence, properties of the Z-transform, inversion of the Z-transform, applications of Z-transform.

UNIT5: BASICS OF DIGITAL FILTERS:
Fundamentals of digital filtering, various types of digital filters, design techniques of digital filters: window technique for FIR, bi-linear transformation and backward difference methods for IIR filter design, analysis of finite word length effects in DSP, DSP algorithm implementation consideration. Applications of DSP.

UNIT6: MULTIRATE DIGITAL SIGNAL PROCESSING:
Introduction to multirate digital signal processing, sampling rate conversion, filter structures, multistage decimator and interpolators, digital filter banks.

TEXT BOOKS:
1. Digital Signal Processing: Proakis and Manolakis; PHI
2. Digital Signal Processing: Salivahanan, Vallavaraj and Gnanapriya; TMH

REFERENCE BOOKS:
1. Digital Signal Processing: Alon V. Oppenheim; PHI

NOTE: Eight questions are to be set - at least one from each unit. Students have to attempt five questions.
ECE-421                                      DATA COMMUNICATION LAB

L T P  Credits
-  -  2  2

Class Work :    25
Exam        :    25
Total       :    50
Duration of Exam :  3 HRS

LIST OF EXPERIMENTS:

1)  To study different types of transmission media
2)  To study Quadrature Phase Shift Keying Modulation.
3)  To study Quadrature Amplitude Modulation.
4)  To study Quadrature Amplitude Multiplexing.
5)  To Study Serial Interface RS-232 and its applications.
6)  To study the Parallel Interface Centronics and its applications.
7)  To configure the modem of a computer.
8)  To make inter-connections in cables for data communication in LAN.
9)  To install LAN using Tree topology.
10) To install LAN using STAR topology.
11) To install LAN using Bus topology.
12) To install LAN using Token-Ring topology
13) To install WIN NT
14) To configure a HUB/Switch.

NOTE: 1. At least ten experiments have to be performed in the semester; At least seven experiments should be performed from above list. Remaining three experiments may either be performed from the above list or designed & set by the concerned Department as per the scope of the syllabus.
ECE-423  EMBEDDED SYSTEMS DESIGN LAB

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Class Work : 25
Exam : 25
Total : 50
Duration of Exam : 3 HRS

8051 MICRO CONTROLLER

1. Write an Assembly language Programme (ALP) to generate 10kHz square wave.
2. Write an ALP to generate 10 kHz frequency using interrupts.
3. Write an ALP to interface one Microcontroller with other wring serial/parallel communication.
4. Write an ALP for temperature & pressure measurement & to display on intelligent LCD display

PIC MICROCONTROLLER

5. Write an ALP for PWM based speed control of motor.
6. Write an ALP for PWM based regulator of voltage.
7. Write an ALP to send/receive the data from an computer to MC through serial communication

GENERAL

9. Develop an embedded system for traffic light controller using Micro controller
10. Develop an embedded system for the automatic motion of a car (Model of car) & subsequent display on LCD using Microcontroller.
LIST OF EXPERIMENTS:

Perform the experiments using MATLAB:

1. To represent basic signals (Unit step, unit impulse, ramp, exponential, sine and cosine).
2. To develop program for discrete convolution.
3. To develop program for discrete correlation.
4. To understand stability test.
5. To understand sampling theorem.
6. To design analog filter (low-pass, high pass, band-pass, band-stop).
7. To design digital IIR filters (low-pass, high pass, band-pass, band-stop).
8. To design FIR filters using windows technique.
9. To design a program to compare direct realization values of IIR digital filter
10. To develop a program for computing parallel realization values of IIR digital filter.
11. To develop a program for computing cascade realization values of IIR digital filter
12. To develop a program for computing inverse Z-transform of a rational transfer function.

NOTE: At least ten experiments have to be performed in the semester; out of which at least seven experiments should be performed from above list. Remaining three experiments may either be performed from the above list or designed & set by the concerned Department.
The primary objective of this course is to develop in students the professional quality of synthesis employing technical knowledge obtained in the field of Engineering & Technology through a project work involving design, analysis augmented with creativity, innovation and ingenuity.

Project involving design/ fabrication/ testing/ computer simulation/ case studies etc. which commences in the VII Semester will be completed in VIII Semester and will be evaluated through a panel of examiners consisting of the following:

Chairman of Department : Chairperson
Project coordinator : Member Secretary
Respective project supervisor : Member

The student will be required to submit two copies of his/her project report to the department for record (one copy each for the department and participating teacher).

Project coordinator will be assigned the project load of, maximum of 2 hrs. per week including his own guiding load of one hr. However, the guiding teacher will be assigned maximum of one period of teaching load irrespective of number of students/groups under him/her.

The format of the cover page and the organization of the body of the report for all the B.Tech. will be finalized and circulated by the Dean, Faculty of Engineering and Technology.
At the end of 6th semester each student would undergo four weeks Professional Training in an Industry/ Institute/ Professional / Organization/ Research Laboratory etc. with the prior approval of the Training and Placement Officer of the University and submit in the department a typed report along with a certificate from the organization.

The typed report should be in a prescribed format.

The report will be evaluated in the VII Semester by a Committee consisting of three teachers from different specialization to be constituted by the Chairperson of the department. The basis of evaluation will primarily be the knowledge and exposure of the student towards different processes and the functioning of the organization.

The student will interact with the committee through presentation to demonstrate his/her learning.

Teachers associated with evaluation work will be assigned 2 periods per week load.
ECE-402 WIRELESS COMMUNICATION

L T P Credits
3 1 0 4

Class Work : 50
Exam : 100
Total : 150
Duration of Exam : 3 Hrs.

UNIT 1: INTRODUCTION TO WIRELESS COMMUNICATION SYSTEMS:
Evolution of mobile radio communications, examples of wireless comm. systems, paging systems, Cordless telephone systems, comparison of various wireless systems.

UNIT 2: MODERN WIRELESS COMMUNICATION SYSTEMS:
Second generation cellular networks, third generation wireless networks, wireless in local loop, wireless local area networks, Blue tooth and Personal Area networks.

UNIT 3: INTRODUCTION TO CELLULAR MOBILE SYSTEMS:

UNIT 4: CELLULAR SYSTEM DESIGN FUNDAMENTALS:
Frequency Reuse, channel assignment strategies, handoff Strategies, Interference and system capacity, tracking and grade off service, improving coverage and capacity.

UNIT 5: MULTIPLE ACCESS TECHNIQUES FOR WIRELESS COMMUNICATION:
Introduction to Multiple Access, FDMA, TDMA, Spread Spectrum multiple Access, space division multiple access, packet ratio, capacity of a cellular systems.

UNIT 6: WIRELESS NETWORKING:
Difference between wireless and fixed telephone networks, development of wireless networks, fixed network transmission hierarchy, traffic routing in wireless networks, wireless data services, common channel signaling, ISDN (Integrated Services digital Networks), advanced intelligent networks.

UNIT 7: INTELLIGENT CELL CONCEPT AND APPLICATION:
Intelligent cell concept, applications of intelligent micro-cell Systems, in-Building Communication, CDMA cellular Radio Networks.

TEXT BOOKS:

REFERENCE BOOK:
1. Mobile Communications: Jochen Schiller; Pearson

NOTE: Eight questions are to be set -one question from each unit. Students have to attempt any five question.
UNIT 1. PRINCIPLES OF SATELLITE COMMUNICATION:
Evolution & growth of communication satellite, Synchronous satellite, Satellite frequency allocation & Band spectrum, Advantages of satellite communication, Active & Passive satellite, Modem & Codec, Applications of satellite communication.

UNIT 2. COMMUNICATION SATELLITE LINK DESIGN:
Introduction, General link design equations, System noise temperature, C/N & G/T ratio, Atmospheric & Ionospheric effects on link design, Complete link design, Earth station parameters.

UNIT 3. ANALOG SATELLITE COMMUNICATION:
Introduction, Baseband analog(Voice) signal, FDM techniques, S/N & C/N ratio in frequency modulation in satellite link, S/N ratio in FM with multiplexed telephone signal in satellite link, Single channel per carrier(SCPC) systems, Companded single sideband (CSSB) systems, Analog FM/FDM TV satellite link, Intermodulation products & their effects in FM/FDM systems, Energy disposal in FM/FDM systems.

UNIT 4. DIGITAL SATELLITE COMMUNICATION:
Advantages of digital communication, Elements of digital satellite communication systems, Digital baseband signals, Digital modulation techniques, Satellite digital link design, Time Division Multiplexing.

UNIT 5. MULTIPLE ACCESS TECHNIQUES:
Introduction, TDMA, TDMA-Frame structure, TDMA-Burst structure, TDMA-Frame efficiency, TDMA-superframe, TDMA-Frame acquisition & Synchronization, TDMA compared to FDMA, TDMA Burst Time Plan, Multiple Beam (Satellite switched) TDMA satellite system, Beam Hopping(Transponder Hopping) TDMA, CDMA & hybrid access techniques.

UNIT 6. SATELLITE ORBITS:
Introduction, Synchronous orbit, Orbital parameters, Satellite location with respect to earth, Look angles, Earth coverage & slant range, Eclipse effect, Satellite placement in geostationary orbit, station keeping, Satellite stabilization.

UNIT 7. SPECIAL PURPOSE COMMUNICATION SATELLITES:
BDS, INMARSAT, INTELSAT, VSAT(data broadband satellite), MSAT( Mobile Satellite Communication technique), Sarsat( Search & Rescue satellite) & LEOs (Lower earth orbit satellite), Satellite communication with respect to Fiber Optic Communication, LANDSAT, Defense satellite.

UNIT 8. LASER SATELLITE COMMUNICATION:
Introduction, Link analysis, Optical satellite link transmitter, Optical satellite link receiver, Satellite Beam Acquisition, Tracking & Positioning, Deep Space Optical Communication Link.

TEXT BOOK:

REFERENCE BOOK:
1. Satellite Communication: Gagliardi ; CBS

NOTE: Eight questions are to be set - one question from each unit. Students have to attempt any five questions.
LIST OF EXPERIMENTS:

1. To set up a active and passive satellite communication link and study their difference.
2. To measure the base-band analog (voice) signal parameters in the satellite link.
3. To measure C/N ratio.
4. To transmit and receive the function generator waveforms through a Sat.Com. link.
5. To measure the digital baseband signal parameters in Sat.Com. link.
6. To send tele-command and receive the telemetry data.
8. To measure the propagation delay of signal in a Sat. Com. Link.
9. To measure fading of a received signal.
10. To measure the parameters in an analog FM/FDM TV Sat.Com. link.
11. To measure the S/N ratio.
12. To calculate the figure of merit and FM deviation.

NOTE: At least ten experiments are to be performed, atleast seven experiments are to be taken from the above list and the remaining three based on the syllabus of ECE-404-C (Satellite Communication Engineering) be developed at the Department level. The students will be required to perform at least eight experiments in the semester.
The project started in VII Semester will be completed in VIII Semester and will be evaluated through a panel of examiners consisting of the following:

Chairperson of Department : Chairperson
Project coordinator : Member
External expert : To be appointed by the University

The student will be required to submit two copies of his/her project report to the department for record (one copy each for the department and participating teacher).

Project coordinator will be assigned the project load of, maximum of 2 hrs. per week including his own guiding load of one hr. However, the guiding teacher will be assigned maximum of one period of teaching load irrespective of number of students/groups under him/her.

The format of the cover page and the organization of the body of the report for all the B.Tech. will be finalized and circulated by the Dean, Faculty of Engineering and Technology.
The objectives of the course remains
- To learn how to carryout literature search
- To learn the art of technical report writing
- To learn the art of verbal communication with the help of modern presentation techniques

A student will select a topic in emerging areas of Engineering & Technology and will carry out the task under the observation of a teacher assigned by the department.

He/ She will give a seminar talk on the same before a committee constituted by the chairperson the department. The committee should comprise of three faculty members from different specializations. The teacher associated in the committee will be assigned 2 hours teaching load per week.

However, guiding students’ seminar will not be considered towards teaching load.

The format of the cover page and the organization of the body of the seminar report for all the undergraduate programs will be finalized and circulated by the Dean, Faculty of Engineering and Technology.
The purpose of this course is to inculcate a sense of professionalism in a student along with personality development in terms of quality such as receiving, responding, temperament, attitude and outlook. The student efforts will be evaluated on the basis of his/ her performance / achievements in different walks of life.

The evaluation will be made by the committee of examiners constituted as under:

1. Dean, Faculty of Engineering & Technology Chairperson
2. Chairperson of the department Member
3. External expert Appointed by the university

A. The student will present a written report before the committee with following in view:

The student will present before the committee his/her achievements during the current academic session in the Form of a written report highlighting following:

I. Academic Performance ---------
II. Extra Curricular Activities (8 Marks)
III Technical Activities (8 Marks)
IV Industrial, Educational tour (8 Marks)
V Sports/games (8 Marks)
VI Community Service, Hostel Activities (8 Marks)

NOTE: Report submitted by the students should be typed on both sides of the paper.

B. A student will support his/her achievement and verbal & communicative skill through presentation before the examiners. (40 Marks)

C. Faculty Counselor Assignment (20 Marks)

It will be the duty of the student to get evaluated by respective faculty counselor and to submit the counselor assessment marks in a sealed envelope to the committee.

A counselor will assess the student which reflects his/her learning graph including followings:

1. Discipline throughout the year
2. Sincerity towards study
3. How quickly the student assimilates professional value system etc.
DEPARTMENTAL ELECTIVES
ECE-406 MOBILE COMMUNICATION

L T P Credits Class Work : 50
4 - 0 4 Exam : 100

Total : 150 Duration of Exam : 3 Hrs

UNIT 1 MOBILE RADIO SYSTEM:
A reference model, Frequencies for radio transmission, Signals, Antennas, Signal Propagation, Multiplexing, Modulation

UNIT 2 CHARACTERISTICS OF RADIO WAVES:
Multipath Characteristics of radio waves signal fading, time dispersion, Doppler spread, coherence time, LCR, fading statistics, Diversity techniques

UNIT 3 MOBILE RADIO PROPAGATION:
Mechanism, free space path loss, long distance path loss model, Okumura model, Hata model, PCS model, wideband PCS, Microcell model, Indoor propagation model, Jake’s channel model.

UNIT 4 WIRELESS SYSTEMS:
Standards – GSM, signaling & call control, mobility management, location racking wireless data services IS-95, GPRS.

UNIT 5 WIRELESS DATA NETWORKING:
IEEE Standards, Models Different layers, wireless LAN, Hypes LAN, Blue tooth. Performance analysis of link & transport layer protocols over wireless channels.

UNIT 6 MOBILE NETWORK LAYER:
Mobile IP: Goals, assumptions & requirements, IP packet delivery, Agent discovery, Registration, tunneling and encapsulation, optimization, Reverse tunneling, IP-V6, Mobile ad-hoc networks.

UNIT 7 MOBILE TRANSPORT LAYS:
Tradition TCP, Classical TCP improvement, TCP over 2.5G/3G wireless networks. Performance enhancing proxies.

TEXT BOOKS:
Mobile Communication: II nd edition Jochen Schiller Pearson Education

REFERENCE BOOKS:
2. Wireless and Digital Communication: Dr. Kamilo Feher (PHI)

Note: Eight questions are to be set – at least one from each unit. Students have to attempt five questions.
1. **SDP 56002**: Architecture, CPU, ALU, Program Controller, Address Generation Unit, Addressing Modes, Interrupt, Priority register.

2. **DSP 56002**: Instruction Set: Instruction Formats Parallel move operating parallel move types, instructions set, move arithmetic logic, bit manipulation, loop, programmed control instructions.

3. **Applications**: Designing and implementing FIR, IIR filters, implementing Fast Fourier Transforms with DSP 56002.


**TEXT BOOK:**
1. Mohammed EL. Sharkawy: Digital Signal Processor Applications with Motorola's DSP 56002. PTR.

**Note:** Eight questions are to be set – at least one from each unit. Students have to attempt five questions.
1. **EVOLUTION OF SWITCHING SYSTEM:**

2. **CROSSBAR SWITCHING SYSTEM:**
   Introduction, Principle of Common Control, Touch Tone Dial Telephone, Crossbar Switch Mechanism, Principle of Crossbar Switching, Crossbar Switch Configurations, Organisation of a Crossbar Telephone Switch, A General Trunking, Electronic Switching, Classification Crosspoint Technology

3. **SPACE DIVISION SWITCHING:**
   Stored Program control, Centralised SPC, Distributed SPC, Software Architecture, Application software, Enhanced Services, Two Stage Networks, n-Stage Networks.

4. **TIME DIVISION SWITCHING:**
   Introduction, Analog Time Division Switching, Digital Time Division Switching, A Digital Memory Switch, Time Stages in General, Two-Dimensional Switching, Multiple Stage Time and Space Switching

5. **PACKET SWITCHING:**
   Statistical Multiplexing, Local area & wide area networks, Large Scale Networks, Broadband Networks

6. **TELETRAFFIC ENGINEERING:**

7. **CONTROL OF SWITCHING SYSTEMS:**
   Call Processing functions, common control, Reliability, Availability & Security.

8. **SIGNALLING:**
   Customer Line Signalling, Audio frequency junctions & trunk circuits, FDM carrier Systems, PCM signalling, Inter - register signalling, Common channel Signalling Principles.

**TEXT BOOKS:**
1. Thiagarajan Viswanathan, “Telecommunication Switching Systems and Networks”, PHI

**REFERENCE BOOKS:**

**Note:** Eight questions are to be set – at least one from each unit. Students have to attempt five questions.

2. **Image sampling and Quantization**: concept of sampling & quantization, Representation of digital images, spatial and Gray-level resolution, Relationships between pixels-neighbors of pixel, Adjacency, connectivity, regions, and boundaries, distance measures, Image operations on a pixel basis.


4. **Image Enhancement in frequency domain**: Introduction to Fourier Transform and frequency domain, Two dimensional DFT and its inverse, Filtering in the frequency domain, correspondence between filtering in the spatial and frequency domains; Smoothing frequency domain filters: Ideal lowpass filters, butterworth lowpass filters, Gaussian lowpass filters; sharpening frequency domain filters(Ideal, butterworth & Gaussian highpass filters) Homomorphic filtering, Implementation: properties of 2-D Fourier Transform, Computation of inverse Fourier Transform using forward Transform algorithm, Fast Fourier Transform.

5. **Image Restoration**: A model of the image degradation/ restoration process, Noise models: Spatial and frequency properties of noise, Periodic noise, Estimation of noise parameters, Restoration in the presence of noise only spatial filtering: Mean Filters, Order statistics Filters, Adaptive filters; Periodic noise reduction by frequency domain filtering, Estimating the Degradation Function, Inverse Filtering. Minimum Mean Square Error (Wiener) filtering

6. **Image Compression**: Fundamentals, Image Compression Models: The source encoder and decoder, the channel encoder and decoder, elements of information theory: Measuring information, The information channel, Fundamental coding theorems; error free compression, lossy compression.

7. **Image Segmentation**: Detection of Discontinuities: Point detection, Line Detection, Edge detection; Edge Linking and Boundary detection, Thresholding: Role of Illumination, basic global thresholding, basic adaptive thresholding, Regional based segmentation: Basic Formulation, Region growing, region splitting and merging; use of motion in segmentation: Spatial Techniques, Frequency Domain Techniques

**Text Books:**

**Reference Books:**

**NOTE:**
1. In the semester exam., the examiner will set 8 questions in all covering the entire syllabus. Students will be required to attempt any five questions.
2. Use of scientific calculator will be allowed in the exam. However, Pager, Programmable Calculator & Cellular phone etc. will not be allowed.
3. The scheme of awarding the grades to a student in the course will be supplied by the University to the examiner of answer books.
UNIT 1: INTRODUCTION TO RADAR:
Radar Block Diagram & operation, Radar Frequencies, Radar development, Application of Radar.

UNIT 2: RADAR EQUATION:

UNIT 3: CW & FREQUENCY MODULATED RADAR:
The Doppler effect, CW Radar, Frequency-modulated CW Radar, Multiple Frequency CW Radar.

UNIT 4: MTI & PULSE DOPPLER RADAR:
Introduction, Delay Line Cancellors, Multiple or staggered, Pulse repetition frequencies, range-Gated Doppler Filters, Digital Signal Processing, Other MTI delay line, Limitation of MTI performance, Noncoherent MTI, Pulse Doppler Radar, MTI from a moving platform.

UNIT 5: TRACKING RADAR:
Tracking with Radar, Sequential Lobbing, Conical Scan, Monopulse Tracking Radar, Tracking in range, Acquisition.

UNIT 6: RECEIVERS, DISPLAYS & DUPLEXERS:
Radar Receivers, Noise Figure, Mixer, Low-noise Front ends, Displays, Duplexer, Receiver protectors.

UNIT 7: INTRODUCTION TO SONAR

TEXT BOOK:
1. Introduction to Radar Systems: Merrill I. Skolnik, ; MGH

REFERENCE BOOK:
1. Electronic Communication Systems : Kennedy; TMH

NOTE: 8 questions are to be set -at least one from each unit. Students have to attempt any five Questions.


3. **Reliability Prediction**: Objective of reliability Prediction, Classification, information sources for failure rate data, prediction methodologies, general requirement, role and limitations of reliability prediction.

4. **Reliability Allocation**: Subsystems reliability improvement, Apportionment for new units, criticality.

5. **Redundancy Techniques for reliability**: Forms of maintenance, measures of maintainability and availability, maintainability function, availability function, two unit parallel system with repair, Markov model for two unit systems, preventive maintenance, provisioning of spares.

6. **Reliability Testing**: Kinds of testing, component reliability measurements parametric methods, confidence limits, accelerate testing, equipment acceptance testing.

7. **Economics of Reliability Engineering**: Reliability cost, effect of reliability on cost. Reliability achievement cost models, reliability utility cost models, replacement policies.

8. **Integrated performance measures for communication systems**: Integration of reliability and capacity, Delay related reliability.

**Text Books**:  

**Reference Books**  
1. KB Mishra: Reliability Prediction & Analysis: A Methodology oriented treatment ,Elseveir,Netherlands  
2. Ebeling, “Introduction to Reliability & Maintainability”, TMH

**NOTE**: 1. In the semester exam., the examiner will set 8 questions in all covering the entire syllabus. Students will be required to attempt any five questions.  
2. Use of scientific calculator will be allowed in the exam. However, Pager, Programmable Calculator & Cellular phone etc. will not be allowed.  
3. The scheme of awarding the grades to a student in the course will be supplied by the University to the examiner of answer books.
ECE-418 TV ENGINEERING

L T P Credits
3 1 - 4

Class Work : 50 Marks
Theory : 100 Marks
Total : 150 Marks
Duration of Exam. : 3 Hrs.

UNIT1: ELEMENTS OF A TELEVISION SYSTEM:
Picture transmission, sound transmission, picture reception, sound reception synchronization, receiver controls, color television.

Analysis and Synthesis of Television Pictures: Gross structure, image continuity, no. of scanning lines, flicker, fine structure, tonal gradation.

UNIT2: COMPOSITE VIDEO SIGNAL:
Video signal dimensions, horizontal sync details, vertical sync details, scanning sequence details, functions of vertical pulse train, sync details of 525 line system.

UNIT3: SIGNAL TRANSMISSION AND CHANNEL BANDWIDTH:
Amplitude Modulation, channel bandwidth, vestigial side band transmission, Transmission efficiency, complete channel bandwidth, reception of vestigial side band signals, frequency modulation, FM channel bandwidth, channel bandwidth for color transmission, allocation of frequency bands for television signal transmission, television standards.

UNIT4: THE PICTURE TUBE:
Monochrome picture tube, Beam deflection, screen phosphor, face plate, picture tube characteristics, picture tube circuit controls. Television Camera Tubes: Basic principal, Image orthicon, Videocon.

UNIT5: BASIC TELEVISION BROADCASTING:
Television transmitter, positive & negative modulation.
Television Receiver: Receiver sections, vestigial side band correction, choice of intermediate frequencies, picture tube circuitry & controls, sound signal separation, sound section, Sync processing & AFC circuit, vertical Deflection circuit, Horizontal deflection circuit.
Television Signal propagation & Antennas: Television Transmission antennas, television receiver antennas, color television antennas.

UNIT6: ESSENTIALS OF COLOR TELEVISION:
Compatibility, natural light, color perception, three color television camera, the luminance signal, values of Luminance & color difference signals on Colors, color television display tubes (Delta gun, PIL, Trinitron).

UNIT7: COLOR SIGNAL TRANSMISSION AND RECEPTION:
Color signal transmission, bandwidth for color signal transmission.

UNIT8: TELEVISION APPLICATIONS:
Cable television, CCTV, picture phone & fascimile, television via satellite, Remote Control (Electronic control system), Introduction to Digital TV Technology and their merits, HDTV.

TEXT BOOK:

REFERENCE BOOK:
TV and Video Engineering: Dhake ; TMH.

NOTE: Eight questions are to be set – one from each unit. Students have to attempt five questions.
OPEN ELECTIVES
The real challenge before the students starts when they cross the threshold of the college after completing their degree. They, all of a sudden, find themselves competing for job/ P.G. Degrees, through various entrance tests and interviews. Verbal ability forms a major portion of these tests. Without sound language skills and its semantic-syntactic know-how, the students with engineering background find themselves almost under-prepared for such tests. With this difficulty of students in mind, this course is proposed to make them technically proficient in handling the language skills required in competitive exams. The course would expose students to almost all variety of items, the common run of such tests as CAT, GMAT etc. And in the context of LPG, this cutting edge competence becomes imperative, and no professional education can afford to overlook this aspect.

UNIT I Remedial English: Parts of speech; Gerunds, participles and infinitives; Clauses; Sentence-constructions (unity; avoidance of choppy and rambling sentences, logic and consistency, conciseness, sequencing of ideas); Sentence errors - agreement between verb and subject, pronoun and antecedents, sequence of tenses, problems involving modifiers (dangling and misplaced modifiers); Shifts in point of view - consistency of number and person, tense, mood, voice and subject; Parallelism; Omissions and mixed constructions.

UNIT II Vocabulary: Methods of building vocabulary - etymological roots, prefixes and suffixes; Commonly used foreign words and phrases; spelling; words often confused; synonyms and homonyms; one word substitutes; verbal idioms.

UNIT III Punctuation and Mechanics: End Punctuation; Internal Punctuation; Word Punctuation.

UNIT IV Comprehension: Abstracting; Summarising; Observations, Findings and Conclusions; Illustration and Inductive Logic; Deduction and Analogy.

UNIT V Presentation: Oral presentation - Extempore, discussion on topics of contemporary relevance, interviews.

Note: Eight questions will be set and students will be required to attempt five questions in all.

SUGGESTED READING:
4. Examine your English by Margaret M. Maison, Orient Longman, New Delhi.

Unit-II **Motivation**: Meaning, Objectives and importance of motivation. Theories of Motivation, Maslow’s theory, Mc Greger’s Theory Herzberg’s theory.

Morale : Meaning; Factors affecting morale, types of morale morale and productivity, Evaluation of morale, improving morale.

Unit-III **Communication**: Definition & importance of Communication; Formal & informal communication, Barriers in communication.

Unit-IV **Leadership**: Definition & importance, Nature of leadership various approaches to leadership styles.

Unit-V Importance of human resources in industry, Definition of human resource management, mechanical approach towards personnel, Paternalism, Social system approach.

Unit-VI Need for human resource planning, process of human resource planning, Methods of recruitment, Psychological tests and interviewing, Meaning and importance of placement, Meaning and techniques of induction. Training and development : Concepts of training and development, Importance of training and development, Management development its nature, purpose and method.

Unit-VII Significant factors affecting compensation, Methods of wage payment, Wage differentials, Causes of difference in Wages, Types of wage differentials, Wage incentives, Meaning, Objectives, types of incentive plans.

**Text Books:**
3. Organisational Behaviour – Dr. L.M. Prasad (Sultan Chand & Sons).

**Reference Books:**
1. Personnel Management & Industrial Relations : Dr. T.N. Bhagoliwal: Sahitya Bhawan Agra.

**Note:** Eight questions are to be set at least one question from each unit and the students will have to attempt five questions in all.
HUM – 455: ENTREPRENEURSHIP
B. Tech. 4th Year (Semester – VII) Open Elective

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Class Work : 50 Marks
Examination : 100 Marks
Total : 150 Marks
Duration of Examination : 3 Hours

UNIT-I
Promotion of Entrepreneurship: Meaning, definition and functions of an entrepreneur, qualities of a good entrepreneur; Role of Entrepreneur in economic development; Government measures for the promotion of small scale industries with special reference to Haryana; Cultural factors in developing entrepreneurship.

UNIT-II
Ownership and Location of Industrial Units: Different forms of Industrial Organisation. Theories of Industrial location. Process of preparing project reports.

UNIT-III

UNIT-IV
Financing of Small Industries: Importance and need: Commercial Banks and term lending in India; Banks and under-writing of capital issues; Brief description about the role of other financial agencies viz; Industrial Finance Corporation of India. State Financial Corporation, Industrial Development Bank of India; Unit Trust of India.

UNIT-V
Problems Faced by Small Enterprises: Problems connected with Marketing, Management of New Products; Power; Finance; Raw Material; Under-utilization of capacity; Causes of under-utilization; Rehabilitation of Sick Mills.

UNIT-VI
Government and Business: (a) Highlights of Industrial Policy and Licensing Policy. (b) International Marketing with special reference to export documentation.

Recommended Books:
5. Entrepreneur, Banker & Small Scale Industries – Bhattacharya Hrisnikes.

Note: Eight questions are to be set at least one question from each unit and the students will have to attempt five questions in all.
The course proposes to help students develop business and technical communication competence. It focuses on writing skills and strategies for specific purposes. The inevitability of introducing this course to Engineering students is embodied in that it has comparatively a high concentration of certain complex writing techniques and procedures.

COURSE CONTENT:

Unit-I Business correspondence: Characteristics and Formats of Business letter; Quotations, Orders, Tenders, Sales letters, claim and adjustment letters, Credit and Collection letters, Application Letters for vacant situations with emphasis on Resumes and Curriculum Vitae; E-mail and Netiquette – format, style and tone.


Unit-III Meetings: Writing of Memorandum, Notes, Agenda and Minutes of Meeting.

Unit-IV Public Relations and Advertising Documents: Press Releases, Public Service Announcements, Advertising Strategy and its objective, Designing of Classified and Display Advertising copies.

SUGGESTED READING:

6. Written Communication in English by Sarah Freeman, Orient Longman.

Note: Eight questions will be set and students will be required to attempt five questions in all.
**UNIT- 1**

**INTRODUCTION TO NANOTECHNOLOGY**


**UNIT- 2**

**PREPARATION AND CHARACTERIZATION OF NANOPARTICLES**

Nanoscale Lithography, Dip Pen Lithography, E-Beam Lithography, Nanosphere Life off, Lithography; Molecular Synthesis, Nanoscale Crystal Growth, Polymerization Nanobricks and Building blocks:


**UNIT - 3**

**PROPERTIES & APPLICATION OF NANO CRYSTALLINE MATERIALS**


**UNIT- 4**

Synthesis of semiconductor Nanoclusters, Processing of Nanomaterials, Nanobusiness – Boom, Bust and Nano Tech., Nano-ethics

**Reference Books:**

1. Camarata, R.C. Nanomaterials synthesis, properties and application Institute of Physics Publication

**Note:** The question paper will contain 8 questions in all. The student will be required to answer any five. At the most one question will be set from each section.

Inversions and two-level systems, steady-state inversions and three and four-level systems. Transient Population Inversions, Factors effecting population inversion, Laser Amplifiers.

Excitation or Pumping Threshold Requirements, Pumping Pathways, Specific Excitation Parameters Associated with Optical and particle Pumping.


**Recommended Books:**

1. Laser Fundamentals by William T. Silfvast Cambridge University, Press.
2. Introductory University Optics by John Beynon, (PHI)
4. Optics – A.K. Ghatak (TMH)

**Note:** Eight questions will be set and students will be required to attempt any five questions in all. All questions will carry equal marks.
ME - 451: MECHATRONIC SYSTEMS
B. Tech. 4th Year (Semester – VII) Open Elective

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UNIT 1 Introduction to Mechatronics. Integrated design issues in Mechatronics, Conceptual design. Possible design solutions. Integrated approach for combining sensors, actuators, computer and the product. Some examples - like auto focus camera, engine combustion control, washing machine, vehicle suspensions, electro-mechanical brakes, manufacturing machine, industrial robots, air conditioning systems, etc..

UNIT 2 Classification of sensors of various type, resistive, strain gage, thermistor, inductive, capacitive, piezoelectric, optical, photodetectors, encoders, ultrasonic types Silicon sensors, Micro-sensors for various measurements. Consideration for choice of sensors for a given application.

UNIT 3 Signal conditioning and data acquisition using computers. AD and DA converters. Use of plus-in-cards and software for acquiring data from several sensors.

UNIT 4 Mechanical actuation systems – kinematic chains, cams, gear trains, belt and chains drive, ratchet and pawl, bearing, guideways, ball screw and nut, etc. Electrical actuation systems: Operational characteristic and application of electrical actuation components for application like, AC/DC motors, stepper motors, relays, push buttons, switches, solenoids etc.

UNIT 5 Introduction to semiconductor electronics, junction diode, bipolar junction transistor, field effect transistors, digital logic. Number systems. Logic gates Boolean algebra. Application of logic gates. Combinational and sequential logic.

UNIT 6 Sequence control, relay ladder diagrams for sequence control in processes and machines. Programmable Logic Controllers and applications: PLC structures, PLC languages, programming of PLC using Mnemonics, Interfacing PLC with actuators, Sequencing of cylinders. Timers, internal relays and counters. Open loop and closed loop control using PLC.

UNIT 7 Architecture of microprocessors and microcontrollers. Use of suitable software languages for micro controllers and their applications in mechatronic systems. Real time interfacing between computers and measurement or control systems. Introduction to modeling and computer control of process and mechanical systems.

UNIT 8 Communication systems Protocols, Open systems interconnection models. Smart transducers and transmitters. Field buses.

Text Books:

Note: In the semester examination, the examiner will set 8 questions in all, and students will be required to attempt only 5 questions.
1. Introduction to Artificial intelligence: Scope, history & applications: AI as representation and search the predicate calculus inference rules. Logic based financial advisor, structures and strategies for state space search graph theory, strategies for space search, using state space to represent reasoning with the predicate calculus.

2. Heuristic Search: An algorithm for heuristic search, admissibility monotonicity and informed ness heuristics in games, complexity issues, control and implementation of state space search recursion based search, pattern directed search. Production systems, predicate calculus and planning the black board architecture for problems solving.

3. LISP and PROLOG: Knowledge representation languages issues in knowledge representation, network representation language, structured representations, introduction to LISP, Search in LISP: a functional approach to the farmer, Wolf, Goat and cabbage problem, higher order functions & procedural abstraction, search strategies in LISP.

4. Expert systems: Introduction, History basic concepts, structure of expert systems, the human element in ES how ES works, problem areas addressed by ES, ES success factors, types of expert systems, ES and the internet interacts web, knowledge engineering, scope of knowledge, difficulties, in knowledge acquisition methods of knowledge acquisition, machine learning, intelligent agents, selecting an appropriate knowledge acquisition method, knowledge acquisition form multiple experts validation and verification of the knowledge base, analyzing coding, documenting & diagramming.


Text Books:


Note: Eight questions will be set and students will be required to attempt five questions in all.
CSE – 301: PRINCIPLES OF OPERATING SYSTEMS
B. Tech. 4th Year (Semester – VII) Open Elective

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Unit-1: Introduction: Introduction to Operating System Concepts (including Multitasking, multiprogramming, multi user, Multithreading etc), Types of Operating Systems: Batch operating system, Time-sharing systems, Distributed OS, Network OS, Real Time OS; Various Operating system services, architecture, System programs and calls.

Unit-2: Process Management: Process concept, process scheduling, operation on processes; CPU scheduling, scheduling criteria, scheduling algorithms -First Come First Serve (FCFS), Shortest-Job-First (SJF), Priority Scheduling, Round Robin(RR), Multilevel Queue Scheduling.

Unit-3: Memory Management: Logical & Physical Address Space, swapping, contiguous memory allocation, non-contiguous memory allocation paging and segmentation techniques, segmentation with paging; virtual memory management - Demand Paging & Page-Replacement Algorithms; Demand Segmentation.

Unit-4: File System: Different types of files and their access methods, directory structures, various allocation methods, disk scheduling and management and its associated algorithms, Introduction to distributed file system.

Unit-5: Process-Synchronization & Deadlocks: Critical Section Problems, semaphores; methods for handling deadlocks-deadlock prevention, avoidance & detection; deadlock recovery.


Unit-7: Unix System And Windows NT Overview: Unix system call for processes and file system management, Shell interpreter, Windows NT architecture overview, Windows NT file system.

Text Books:

Reference Books:
1. Operating System by Peterson, 1985, AW.
2. Operating System by Milankovic, 1990, TMH.
3. Operating System Incorporating With Unix & Windows By Colin Ritche, 1974, TMH.
4. Operating Systems by Mandrik & Donovan, TMH
5. Operating Systems By Deitel, 1990, AWL.

Note: Eight questions will be set in all by the examiners taking at least one question from each unit. Students will be required to attempt five questions in all.
EE - 455: INTELLIGENT INSTRUMENTATION FOR ENGINEERS

B. Tech. 4th Year (Semester – VII) Open Elective

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1. INTRODUCTION: Intelligence, features characterizing intelligence, intelligent instrumentation system; features of intelligent instrumentation; components of intelligent instrumentation system; Block diagram of an intelligent instrumentation system.

2. SIGNAL PROCESSING, MANIPULATION AND TRANSMISSION: Signal amplification & attenuation (OP-AMP based); Instrumentation Amplifier (circuit diagram, high CMRR & other features); Signal Linearization (different types such as Diode-resistor combination, OP-AMP based, etc.); Bias Removal, Signal filtering (outputs from ideal filters, outputs from constant-k filters, matching of filter sections, active analog filters); OP-AMP based Voltage-to-current converter, Current-to-voltage conversion, Signal integration, Voltage follower (pre-amplifier), voltage comparator, Phase-locked loop, Signal addition, Signal multiplication, Signal Transmission (Signal amplification, Shielding, Current loop transmission, Voltage-to-frequency conversion, Fiber optic transmission); Description of Spike Filter (software-based).

3. SMART SENSORS: Primary sensors; Excitation; Compensation (Nonlinearity: look up table method, polygon interpolation, polynomial interpolation, cubic spline interpolation, Approximation & regression; Noise & interference; Response time; Drift; Cross-sensitivity); Information Coding/Processing; Data Communication; Standards for smart sensor interface.

4. INTERFACING INSTRUMENTS & COMPUTERS: Basic issues of interfacing; Address decoding; Data transfer control; A/D converter; D/A converter; Sample & hold circuit; Other interface considerations.

5. RECENT TRENDS IN SENSOR TECHNOLOGIES: Introduction; Film sensors (Thick film sensors, Thin film sensors); Semiconductor IC technology – standard methods; Microelectro-mechanical systems (Micro-machining, some application examples); Nano-sensors.

Text Books:

Reference Books:

Notes:
1. In the semester examination, the examiner will set 8 questions in all covering the entire syllabus. Students will be required to attempt any five questions.
2. Use of scientific calculator will be allowed in the Exam. However, pager, programmable calculator & cellular phone etc. will not be allowed.
ECE – 403: EMBEDDED SYSTEMS DESIGN
B. Tech. 4th Year (Semester – VII) Open Elective

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UNIT 1:  **INTRODUCTION:** Different types of microcontrollers: Embedded microcontrollers, External memory microcontrollers; Processor Architectures: Harvard V/S Princeton, CISC V/S RISC; microcontrollers memory types; microcontrollers features: clocking, i/o pins, interrupts, timers, peripherals.

UNIT 2:  **MICROCONTROLLER ARCHITECTURE:** Introduction to PIC microcontrollers, Architecture and pipelining, program memory considerations, Addressing modes, CPU registers, Instruction set, simple operations.

UNIT 3:  **INTERRUPTS AND I/O PORTS:** Interrupt logic, Timer2 scalar initialization, IntService Interrupt service routine, loop time subroutine, External interrupts and timers, Synchronous serial port module, Serial peripheral device, O/p port Expansion, I/p port expansion, UART.

UNIT 4:  **SOFTWARE:** Development tools/ environments, Assembly language programming style, Interpreters, High level languages, Intel hex format object files, Debugging.

UNIT 5:  **PROGRAMMING WITH MICROCONTROLLERS:** Arithmetic operations, Bit addressing, Loop control, Stack operation, Subroutines, RAM direct addressing, state machines, Oscillators, Timer Interrupts, Memory mapped I/O.

UNIT 6:  **DESIGNING USING MICROCONTROLLERS:** Music box, Mouse wheel turning, PWM motor control, Aircraft Demonstration, ultra sonic distance measuring, Temperature Sensor, Pressure Sensor, Magnetic Field Sensor.

Text Books:

Reference Books:
4. Programming and Customizing the 8051 Microcontroller: Predko; TMH.
5. Designing Embedded Hardware: John Catsoulis; SHROFF PUB. & DISTR. ND.
6. Programming Embedded Systems in C and C++: Michael Barr; SHROFF PUB. & DISTR. ND.

Note: Eight questions will be set and students will be required to attempt five questions in all.

2 Air Pollution: Classification of air pollutants
Particulates: Physical characteristics, mode of formation, setting properties, Control measures.

3 Hydrocarbons: Nature; sources, control
Carbon Monoxide: Source, harmful effects on human health, control measures.
Oxides of Sulphur and Nitrogen Sources, effects on human health and plants. Control measure.

4 Solid Waste: Types, sources and properties of solid waste, solid waste management – Generation, Collection and techniques for ultimate disposal, Elementary discussion on resource and energy recovery.

5 Elementary treatment of nuclear pollution, metal pollution, noise pollution their effects & control.

Suggested Books:
2. Metacaf – EDDY – Waste-water engineering revised by George Teholonobus (TMH)

Note: Eight questions will be set and students will be required to attempt five questions in all.
CSE – 411: MANAGEMENT INFORMATION SYSTEM
B. Tech. 4th Year (Semester – VII) Open Elective

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Class Work : 50 Marks
Examination : 100 Marks
Total : 150 Marks
Duration of Examination : 3 Hours

Unit-1: **Foundation of Information System**: Introduction to Information System and MIS, Decision support and decision making systems, systems approach, the systems view of business, MIS organization within company, Management information and the systems approach.

Unit-2: **Information Technology**: A manager’s overview, managerial overviews, computer hardware & software, DBMS, RDBMS and Telecommunication.

Unit-3: **Conceptual system design**: Define the problems, set systems objective, establish system constraints, determine information needs determine information sources, develop alternative conceptual design and select one document the system concept, prepare the conceptual design report.

Unit-4: **Detailed system design**: Inform and involve the organization, aim of detailed design, project management of MIS detailed design, identify dominant and trade of criteria, define the sub systems, sketch the detailed operating sub systems and information flow, determine the degree of automation of each operation, inform and involve the organization again, inputs outputs and processing, early system testing, software, hardware and tools propose an organization to operate the system, document the detailed design revisit the manager user.

Unit-5: **Implementation evaluation and maintenance of the MIS**: Plan the implementation, acquire floor space and plan space layouts, organize for implementation, develop procedures for implementation, train the operating personnel, computer related acquisitions, develop forms for data collection and information dissemination, develop the files test the system, cut-over, document the system, evaluate the MIS control and maintain the system. Pitfalls in MIS development.

Unit-6: **Advanced Concepts in Information Systems**: Enterprise Resources Management (ERP), Supply Chain Management, C R M, Procurement Management System.

**Text Books:**


**Reference Books:**

1. Management Information System; O Brian; TMH
2. Management Information System by Davis Olson Mac Graw Hill
4. Information System; a Management Perspective; Alter Addison Wesley
5. Introduction to Information System; McGraw Hill

**Note:** Eight questions will be set in all by the examiners taking at least one question from each unit. Students will be required to attempt five questions in all.
CSE – 308: MULTIMEDIA TECHNOLOGIES
B. Tech. 4th Year (Semester – VII) Open Elective

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Class Work : 50 Marks
Examination : 100 Marks
Total : 150 Marks
Duration of Examination : 3 Hours

Unit-1: Basics of Multimedia Technology: Computers, communication and entertainment; multimedia an introduction; framework for multimedia systems; multimedia devices; CD- Audio, CD-ROM, CD-I, presentation devices and the user interface; multimedia presentation and authoring; professional development tools; LANs and multimedia; internet, World Wide Web & multimedia distribution network-ATM & ADSL; multimedia servers & databases; vector graphics; 3D graphics programs; animation techniques; shading; anti aliasing; morphing; video on demand.

Unit-2: Image Compression & Standards: Making still images; editing and capturing images; scanning images; computer color models; color palettes; vector drawing; 3D drawing and rendering; JPEG-objectives and architecture; JPEG-DCT encoding and quantization, JPEG statistical coding, JPEG predictive lossless coding; JPEG performance; overview of other image file formats as GIF, TIFF, BMP, PNG etc.

Unit-3: Audio & Video: Digital representation of sound; time domain sampled representation; method of encoding the analog signals; subband coding; fourier method; transmission of digital sound; digital audio signal processing; stereophonic & quadraphonic signal processing; editing sampled sound; MPEG Audio; audio compression & decompression; brief survey of speech recognition and generation; audio synthesis; musical instrument digital interface; digital video and image compression; MPEG motion video compression standard; DVI technology; time base media representation and delivery.

Unit-4: Virtual Reality: Applications of multimedia, intelligent multimedia system, desktop virtual reality, VR operating system, virtual environment displays and orientation making; visually coupled system requirements; intelligent VR software systems. Applications of environment in various fields.

Text Books:
2. multimedia: Sound & Video, Lozano, 1997, PHI, (Que)

Reference Books:
2. Multimedia on the PC, Sinclair,BPB
5. Multimedia in Practice by Jeff coate Judith, 1995,PHI.
6. Multimedia Systems by Koegel, AWL
7. Multimedia Making it Work by Vaughan, etl.
9. Multimedia Communications by Halsall & Fred, 2001,AW.

Note: Eight questions will be set in all by the examiners taking at least one question from each unit. Students will be required to attempt five questions in all.