REGULATIONS
AND
SYLLABUS
(REGULATIONS 2000)

B.TECH. DEGREE PROGRAMME
(8 Semesters)

ELECTRICAL AND ELECTRONICS
ENGINEERING

ANNA UNIVERSITY
CHENNAI - 600 025
APRIL 2000
REGULATIONS 2000
(Based on Credit System)
(APPROVED IN THE 42nd MEETING OF THE ACADEMIC COUNCIL HELD ON 25.09.1999)

DEGREE OF BACHELOR OF ENGINEERING / TECHNOLOGY
(Eight Semesters)

PRELIMINARY DEFINITIONS & NOMENCLATURE

In these Regulations, unless the context otherwise requires:

i) "Programme" means Degree Programme, that is B.E. / B.Tech. Degree Programme

ii) "Branch" means specialisation or discipline of B.E./B.Tech. Degree Programme, like Civil Engineering, Textile Technology, etc.

iii) "Course" means a theory or practical subject that is normally studied in a semester, like Mathematics, Physics, Engineering Graphics, Computer Practice, etc.

iv) "Faculty" means a Faculty of the University, like Faculty of Civil Engineering, Faculty of Technology, etc. Each Faculty is headed by a Dean.

ADMISSION

R1a Candidates for admission to the first semester of the eight semester B.E./B.Tech. Degree Programme shall be required to have passed

i) the Higher Secondary Examination of the (10+2) curriculum (Academic stream) prescribed by the appropriate authority of Government of Tamil Nadu with Mathe-
matics, Physics and Chemistry as three of the four subjects of study prescribed under Part III. In the case of B.Tech. Industrial Bio-Technology, the subjects are Physics, Chemistry, Mathematics and/or Biology.

OR

i) any other examination of any University or authority accepted by the Syndicate of the University as equivalent thereto.

R.1b Candidates for admission through lateral entry into the third semester of the eight semester B.Tech. Degree Programme at M.I.T. Campus shall be required to have passed

i) the examination of a B.Sc. Degree of 10 + 2 + 3 or 11 + 1 + 3 pattern of a recognised University in any one of the following B.Sc. Degree Programmes having Mathematics and Physics as subjects of study:

   OR

   any other examinations of any University or authority accepted by the Syndicate of the University as equivalent thereto.

R.1c Sponsored/deputed candidates (Diploma holders) for admission to the 1st Semester of 8 Semester B.E. Degree programme in Printing Technology shall be required to have passed the 3-year Diploma in Printing Technology (Letterpress/Lithography/Integrated) awarded by the State Board of Technical Education of Government of Tamil Nadu or any other examination of any authority accepted by the Syndicate of the University as equivalent thereto. The institutions eligible to sponsor/depute the candidates and the minimum experience to be possessed by such candidates shall be as prescribed by the Syndicate of the University from time to time.

R.2a Notwithstanding the qualifying examination the candidate might have passed, the candidate shall also write an entrance examination for admission. The entrance examination shall test the proficiency of the candidate in Mathematics, Physics and Chemistry on the standards prescribed for plus two academic stream of the Tamil Nadu Board of Higher Secondary Education.

R.2b Notwithstanding the qualifying examination the lateral entry candidate might have passed, the candidate shall also write an entrance examination for admission. The entrance examination shall test the proficiency of the candidate in Mathematics, Physics, Chemistry, Applied Sciences, Electronics, Instrumentation and Computer Science at B.Sc. Degree level.

R.2c Sponsored/deputed candidates satisfying Rule 1c shall also write the entrance examination as per Rule 2a.

R.3. The eligibility criteria such as marks, number of attempts and physical fitness shall be as prescribed by the Syndicate of the University from time to time.

R.4a The candidate shall not have completed 21 years of age as on first of July of the year of application. In the case of lateral entry, the candidate shall not have completed 22 years of age as on 1st July of the year of application. For candidates belonging to SC/ST, the age limit is relaxable by 3 years.

R.4b There is no age limit for sponsored/deputed candidates satisfying Rule 1c, seeking admission to B.E. Printing Technology.

BRANCHES OF STUDY AND STRUCTURE OF THE PROGRAMME

R.5a Regulations 2000 is applicable to B.E./B.Tech. Degree Programme in various branches of Engineering and Technology, each distributed over 8 semesters with 2 semesters per Academic Year.
Faculty of Civil Engineering
1. B.E. Civil Engineering
2. B.E. Geo-Informatics.

Faculty of Electrical Engineering
1. B.E. Computer Science and Engineering
2. B.E. Electrical and Electronics Engineering
3. B.E. Electronics and Communications Engineering.

Faculty of Engineering (MIT)
1. B.Tech. Aeronautical Engineering
2. B.Tech. Automobile Engineering
3. B.Tech. Electronics Engineering
4. B.Tech. Instrumentation Engineering
5. B.Tech. Production Engineering
6. B.Tech. Rubber and Plastics Technology

Faculty of Mechanical Engineering
1. B.E. Industrial Engineering
2. B.E. Manufacturing Engineering
3. B.E. Mechanical Engineering
4. B.E. Mining Engineering
5. B.E. Printing Technology.

Faculty of Technology
1. B.Tech. Ceramic Technology
2. B.Tech. Chemical Engineering
3. B.Tech. Industrial Bio-Technology

R.5b Every Programme will have a curriculum with syllabi consisting of theory and practicals such as
i) General core courses comprising mathematics, basic sciences, engineering sciences, humanities and engineering arts.

R.5c Each course is normally assigned certain number of credits with 1 credit per lecture period per week, 1 credit per tutorial period per week, 1 credit for 2 periods of laboratory or practical or seminar or project work per week (2 credits for 3 or 4 periods of practical) and 1 or 2 credits for 4 weeks of industrial training during semester vacations.

R.5d Each semester curriculum shall normally have a blend of lecture courses not exceeding 6 and practical courses not exceeding 4.

R.5e For the award of the degree, a student has to earn certain minimum total number of credits specified in the curriculum of the relevant branch of study. This minimum will lie between 181 and 190 credits depending on the branch.

R.5f The medium of instruction, Examinations and project report will be English, except for courses on languages other than English.

DURATION OF THE PROGRAMME
R.6 A student is ordinarily expected to complete the B.E./B. Tech. Programme in 8 semesters (6 semesters in the case of lateral entry student), but in any case not more than 12 semesters (10 semesters in the case of lateral entry student).

FACULTY ADVISER
R.7 To help the students in planning their courses of study and for general advice on the academic programme, the Head
of the Department of the student will attach a certain number of students to a teacher of the Department who shall function as Faculty Adviser for those students throughout their period of study. Such Faculty Adviser shall advise the students and approve the courses to be taken by the students during each semester.

CLASS COMMITTEE

R.8a For all branches of study during first semester, a common Class Committee will be constituted by the Dean of Academic Courses. During other semesters, separate Class Committees will be constituted by the respective Heads of the Departments of the students.

R.8b Each common theory course offered to more than one discipline or group, shall have a “Course Committee” comprising all the teachers teaching the common course with one of them as nominated as Course Coordinator. The nomination of the course Coordinator shall be made by the Head of the Department/ Dean of Faculty / Dean of Academic Courses depending upon whether all the teachers teaching the common course belong to a Department / a Faculty / different Faculties.

R.8c The first semester Class Committee composition will be as follows:

i) Course Co-ordinators of all common courses.

ii) Teachers of all other individual courses.

iii) One Professor, preferably not teaching first semester class, appointed as Chairman, by Dean of Academic Courses.

iv) One male and one female first semester student from each Faculty to be nominated by the Dean of Academic Courses.

v) All first semester Faculty Advisers and all the Deans may opt to be special invitees.

R.8d The composition of the Class Committee for each branch from 2nd to 6th semester will be as follows:

i) Teachers of individual courses.

ii) One Professor or Assistant Professor preferably not teaching to the concerned class, appointed as Chairman by the Head of the Department.

iii) 2 students, preferably 1 male and 1 female student of the class per group of 30 students or part thereof, to be nominated by the Head of the Department in consultation with the Faculty Advisers.

iv) All Faculty Advisers of the Class, Teacher in-charge of UG Programme and Head of the Department may opt to be special invitees.

R.8e The Class Committee shall meet at least thrice during the semester. The first meeting will be held within two weeks from the date of class commencement, in which the type of assessments, like test, assignment, assignment based test etc., will be decided for the first second and third assessments. The second meeting will be held with in a week after the date of first assessment report, to review the students performance and for follow up action. The Third meeting will be held within a week after the second assessment report, to review the students performance and for follow up action.

During these three meetings the student members representing the entire class, shall meaningfully interact and express the opinions and suggestions of the class students to improve the effectiveness of the teaching - learning process.

R.8f The Class committee, excluding the student members and the invited members, shall meet within two weeks from the last day of the End-Semester Examination to
analyse the performance of the students in all the components of assessments and decide the grade ranges for each course. The grading ranges for a common course shall be decided by the concerned course committee and shall be presented to the class committee(s) by the concerned teacher.

REGISTRATION AND ENROLLMENT

R.9a Every student shall submit a completed Registration form indicating the list of courses intended to be credited during the next semester. This Registration will be done a week before the last working day of the current semester. Late registration with the approval of Dean of Faculty along with a late fee will be done up to the last working day.

R.9b At the beginning of the semester, before the date of class commencement, every student shall confirm the Registration by paying the prescribed fees for the semester and enroll for the courses. Late enrolment, with the approval of Dean of Faculty along with a late fee, will be done up to 2 weeks from the date of commencement of classes. If a student does not enroll, his/her name will be removed from rolls.

R.9c The students of first semester shall register and enroll at the time of admission by paying the prescribed fees.

WITHDRAWAL FROM A COURSE

R.9d A student can withdraw from a course at any time before the second assessment with the approval of Dean of Faculty on the recommendation of the Head of the Department of the student.

TEMPORARY BREAK OF STUDY FROM A PROGRAMME

R.9e A student can take a one time temporary break of study covering the current semester and/or next semester period with the approval of the Dean of Academic Courses, at any time before the start of third assessment of current semester, within the maximum period of 12 or 10 Semesters as the case may be.

CREDIT LIMIT FOR ENROLMENT AND MOVEMENT TO HIGHER SEMESTER

R.10a A student can enroll only for a maximum of 30 credits during a Semester period including arrears courses.

R.10b The following minimum credits should be earned by a student to register for the higher semester courses.

<table>
<thead>
<tr>
<th>To register Courses of</th>
<th>Minimum credits to be earned</th>
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</thead>
<tbody>
<tr>
<td>2nd Semester</td>
<td>No minimum</td>
</tr>
<tr>
<td>3rd Semester</td>
<td>10 in 1st Semester Courses alone</td>
</tr>
<tr>
<td>4th Semester</td>
<td>12 in 2nd Semester Courses alone</td>
</tr>
<tr>
<td>5th Semester</td>
<td>12 in 3rd Semester Courses alone</td>
</tr>
<tr>
<td>6th Semester</td>
<td>12 in 4th Semester Courses alone</td>
</tr>
<tr>
<td>7th Semester</td>
<td>12 in 5th Semester Courses alone</td>
</tr>
<tr>
<td>8th Semester</td>
<td>12 in 6th Semester Courses alone</td>
</tr>
</tbody>
</table>

Those who do not satisfy the above minimum credit requirements, may register and enroll for arrears courses only.
R.10c A Student who has not completed the NCC/NSS/NSO requirements, will not be eligible to register for 5th semester (7th Semester for Mining Engineering and for lateral entry student) courses, although satisfying other requirements.

R.10d Rule 10c is not applicable to the sponsored/deputed candidates satisfying Rule 1c admitted to B.E. in Printing Technology.

SUMMER TERM COURSES

R.11a A student can register for a maximum of two courses only during Summer Term, if such courses are offered by the concerned department.

R.11b The Head of the Department, in consultation with the Department Consultative Committee and with the approval of Dean (Academic Courses) may arrange for the conduct of a few courses during summer term, depending on availability of teachers during summer and subject to a minimum of five students registering for such courses.

R.11c However in the case of a student completing 8th semester and having arrears in the earlier semesters in a maximum of two courses, summer courses may be offered, even if less than five students are registering for the course.

R.11d The number of contact hours and the assessment procedure for any course during summer term will be the same as those during regular semesters except that there is no provision either for withdrawal from a summer term course or for substitute examination.

ASSESSMENT PROCEDURE AND PERCENTAGE WEIGHTAGE OF MARKS

R.12a Every theory course shall have a total of four assessments during a semester as given below,

<table>
<thead>
<tr>
<th>Assessment No.</th>
<th>Course coverage in weeks</th>
<th>Duration</th>
<th>Weightage of max. marks %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test 1</td>
<td>1 to 4</td>
<td>50 min.</td>
<td>16 2/3</td>
</tr>
<tr>
<td>Test 2</td>
<td>5 to 8</td>
<td>50 min.</td>
<td>16 2/3</td>
</tr>
<tr>
<td>Test 3</td>
<td>9 to 12</td>
<td>50 min.</td>
<td>16 2/3</td>
</tr>
<tr>
<td>End-Sem. Exam</td>
<td>1 to 16</td>
<td>3 hours</td>
<td>50</td>
</tr>
</tbody>
</table>

(Full Course)

R.12b The pattern of question for at least one of the Tests shall be the same as stipulated for the End-Semester Examination by the Board of Studies/Academic Council. Teachers handling course in the third to eighth semesters are given the option to substitute a maximum of two tests with other suitable alternate type of evaluation approved in the class committee. The details of such a scheme shall be announced to the students and informed to the Dean of Academic courses at the beginning of the Semester. However, for the first and second semester, all assessments will be in the form of tests.

R.12c Every practical course will have 75% weightage for continuous assessment and 25% for End-Semester examination.

R.12d In the case of Industrial Training, the student shall submit a report which will be evaluated along with an oral exami-
nation by a Committee of Teachers constituted by the Head of the Department. A progress report from the industry will also be taken into account for evaluation.

R.12e In the case of project work and mini project work, a committee of Teachers constituted by the Head of the Department will carry out continuous assessment. Based on the project report submitted by the student, an oral examination (Viva-Voce) will be conducted as the End-Semester examination, for which one External Examiner will also be included in the Committee of Teachers.

R.12f Assessment of seminars and comprehension will be carried out by a committee of teachers constituted by the Head of the Department.

SUBSTITUTE EXAMINATIONS

R.13a A student who has missed, for valid reasons, an assessment test/examination may be permitted to write a substitute test/examination. However, permission to take up a substitute test/examination will be given under exceptional circumstances, such as accident or admission to a hospital due to illness.

R.13b A student who misses any assessment test/examination in a course should apply for the substitute test/examination within a week from the date of missed assessment, using the prescribed application form for the purpose. Late applications will not be entertained. The decision on the application will be taken by the Head of the Department offering the course in the case of first three assessments and by the Dean of Faculty in the case of End-Semester examination (fourth assessment). However, if a student applies for the substitute test/examination for the second time in a semester, the decision will be taken by the Dean of Faculty. The Head of the Department/Dean of Faculty can use his discretion in granting permission, recording reasons for his decision. If permitted, the substitute test/examination for any assessment will be held in about two weeks from the date of missed assessment. The substitute test (from missed assessments 1 to 3) will be conducted by the concerned teacher. However, the substitute examination (for missed end-semester examination) will be conducted centrally.

PASSING AND DECLARATION OF EXAMINATION RESULTS AND GRADE SHEET

R.14a All assessments of a course will be done on absolute marks basis. However, the Class Committee which shall meet within 2 weeks after the End-Semester examinations, shall analyse the relative performance of students in all assessments of a course and decide the letter grade ranges for that course. The letter grades and the corresponding grade points are as follows:

<table>
<thead>
<tr>
<th>Letter Grade</th>
<th>S</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>U</th>
<th>I</th>
<th>W</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade Points</td>
<td>10</td>
<td>9</td>
<td>8</td>
<td>7</td>
<td>6</td>
<td>5</td>
<td>0</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

"W" denotes withdrawal from the course.
"I" denotes inadequate attendance and hence prevention from End-Semester examination.
"U" denotes failure in the course.

R.14b A student who earns a minimum of 5 grade points in a course is declared to have successfully completed the course. Such a course cannot be repeated by the student.

R.14c The results, after awarding of grades, shall be signed by the Class Committee Chairman, Head of the Department and Dean of Faculty and declared by the Dean of Faculty.

R.14d Within 2 weeks from the commencement of classes for the next semester a student can apply for revaluation of his/her end-semester examination answer papers in a course, on payment of a prescribed fee, through proper application to the Dean of Faculty. The Dean shall constitute a revaluation committee consisting of Chairman of Class Committee
as convenor, the teacher of the course and a senior member of faculty knowledgeable in that course. The Committee shall meet within a week, revalue the answer paper and submit its report to the Dean of Faculty for consideration and decision.

**R.14e** After results are declared, Grade Sheets will be issued to each student which will contain the following details. The list of courses enrolled during the semester including summer term courses, if any, and the grade scored. The Grade Point Average (GPA) for the semester and the Cumulative Grade Point Average (CGPA) of all courses enrolled from first semester onwards. GPA is the ratio of the sum of the products of the number of credits of courses registered and the points corresponding to the grades scored in those courses, taken for all the courses, to the sum of the number of credits of all the courses in the semester, including summer courses if any.

\[
\text{GPA} = \frac{\text{Sum of } [C \times GP]}{\text{Sum of } C}
\]

CGPA will be calculated in a similar manner, considering all the courses enrolled from first semester. "U", "I" and "W" grades will be excluded for calculating GPA and CGPA.

**R.14f** After successful completion of the programme, the Degree will be awarded with the following classifications based on CGPA.

<table>
<thead>
<tr>
<th>CLASSIFICATION</th>
<th>CGPA</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Class with Distinction</td>
<td>8.50 and above</td>
</tr>
<tr>
<td>First Class</td>
<td>6.50 and above but below 8.50</td>
</tr>
<tr>
<td>Second Class</td>
<td>below 6.50</td>
</tr>
</tbody>
</table>

**ATTENDANCE REQUIREMENT AND COURSE REPETITION**

**R.15a** A student shall attend a minimum of 75% of the contact periods offered in any registered course, to become eligible to appear for the end-semester examination in that course, failing which the student shall be prevented from taking the end-semester examination and shall be awarded "I" grade in that course. If the course is a core course, the candidate should register for and repeat the course when it is offered next.

**R.15b** Instructor of each course shall take attendance till five calendar days prior to the last instruction day in the semester and report through the Head of the Department to the Dean of Faculty the names of students who have attendance less than 75% in that course. The Dean shall then announce the names of all students prevented from writing the end-semester examinations in various courses.

**R.15c** A student should repeat a core course wherein "U" or "I" or "W" grade was awarded. If the student is awarded "U" or "I" or "W" grade in an elective course either the same elective course may be repeated or a new elective course may be taken.

**ELECTIVE CHOICE: OPTION TO DO PROJECT ALONE IN FINAL SEMESTER**

**R.16a** Apart from the various elective courses listed in the curriculum for each branch of specialisation, the student can choose a maximum of 2 electives from any other specialisation under any Faculty, during the entire period of study, with the approval of the Head of the Parent Department and the Head of the other Department offering the course.

**R.16b** In the curriculum of 8th Semester, along with the project work, if 2 elective courses alone are listed, then the Dean of Faculty may permit a student, as per approved guidelines, on the recommendation of the Head of the Depart-
ment, to do a full semester major industrial project work. In such a case, the above 2 elective courses or any other 2 elective courses in lieu thereof have to be enrolled during any semester including the summer, preceeding or succeeding the project work.

INDUSTRIAL VISIT
R.16c Every student is required to undergo one Industrial visit for every theory course offered, starting from the third semester of the Programme.

PERSONALITY AND CHARACTER DEVELOPMENT
R.17a All students shall enroll, on admission, in any one of the personality and character development programmes the NCC/NSS/NSO and undergo practical training for about 80 hours and attend a camp of about ten days.

National Cadet Corps (NCC) will have about 20 parades

National Service Scheme (NSS) will be social service activities in and around Chennai.

National Sports Organisation (NSO) will have Sports, Games, Drills and Physical exercises.

While the training activities will normally be during week ends, the camp will normally be during vacation period.

R.17b Every student shall put in a minimum of 80% attendance in the practical training and attend the camp compulsorily. Normally this is to be completed during the first year. For valid reasons, the Dean of Students may permit a student to complete this requirements in the second year. However, before enrolling for 5th Semester (7th Semester in the case of Mining Engineering and of lateral entry), a student should have completed the training and produced a certificate from the appropriate authority of NCC/NSS/NSO for having satisfactorily completed the prescribed training and camp.

R.17c Rule 17a and 17b are not applicable to the sponsored/deputed Candidates satisfying Rule 1c admitted to B.E. in Printing Technology.

DISCIPLINE
R.18.a Every student is required to observe disciplined and decorous behaviour both inside and outside the campus and not to indulge in any activity which will tend to bring down the prestige of the University.

R.18b Any act of indiscipline of student reported to the Dean of Faculty will be referred to a Discipline and Welfare Committee nominated by the Syndicate from time to time, for taking appropriate action.

ELIGIBILITY FOR THE AWARD OF DEGREE
R.19a A student shall be declared to be eligible for the award of the B.E./B.Tech. Degree provided the student has:

i) Successfully completed all the required courses in the programme curriculum and earned the number of credits prescribed for the specialisation within a maximum period of 12 semester (10 semesters for Lateral Entry) from the date of admission, including break of study.

ii) Completed the NCC/NSS/NSO requirements.

iii) No dues to the Institution, Library, Hostels, NCC, NSS, NSO, etc.

iv) No disciplinary action pending against the student.

R.19b The award of the Degree must have been approved by the Syndicate of the University.

POWER TO MODIFY
R.20 Notwithstanding all that has been stated above, the University has the right to modify the above regulations from time to time.

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# ELECTRICAL AND ELECTRONICS ENGINEERING

**B.E. DEGREE PROGRAMME (8 Semesters)**

Regulation 2000 - CURRICULUM and DETAILED SYLLABUS
(Courses and Credits)

## SEMESTER - I

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Code</th>
<th>Course Title</th>
<th>L</th>
<th>T</th>
<th>P</th>
<th>C</th>
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<tbody>
<tr>
<td>1</td>
<td>HS</td>
<td>LANGUAGE ELECTIVE - I</td>
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<td>PHYSICS - I</td>
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<td>1</td>
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<td>CM 131</td>
<td>CHEMISTRY - I</td>
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<td>1</td>
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<td>5</td>
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<td>ENGINEERING MECHANICS</td>
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<td>1</td>
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**PRACTICAL**

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Code</th>
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<tbody>
<tr>
<td>6</td>
<td>GE 132</td>
<td>COMPUTER PRACTICE - I</td>
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<td>WORKSHOP PRACTICE</td>
<td>0</td>
<td>0</td>
<td>4</td>
<td>2</td>
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**SEMESTER - II**

**THEORY**

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<th>S. No.</th>
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<td>SOLID MECHANICS</td>
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<tr>
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<td>EE 131</td>
<td>ELECTRIC CIRCUIT ANALYSIS</td>
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**PRACTICAL**

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Code</th>
<th>Course Title</th>
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<tr>
<td>6</td>
<td>GE 134</td>
<td>ENGINEERING GRAPHICS</td>
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| 2 |
### SEMESTER - VI

**THEORY**

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**TOTAL CREDITS:** 25

### SEMESTER - VIII

**THEORY**

1. EE ELECTIVE - III  
2. EE ELECTIVE - IV

**PRACTICAL**

3. EE 444 PROJECT WORK  

**TOTAL CREDITS:** 183

### LIST OF ELECTIVE COURSES

**ELECTIVES**

1. EE 031 SPECIAL ELECTRICAL MACHINES  
2. EE 032 COMPUTER AIDED DESIGN OF ELECTRICAL APPARATUS  
3. EE 033 POWER ELECTRONIC INSTRUMENTATION  
4. EE 034 ADVANCED P E SYSTEMS  
5. EE 035 EHV AC & DC TRANSMISSION ENGG.
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**LANGUAGE ELECTIVES**

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Branch: ELECTRICAL AND ELECTRONICS ENGINEERING
Regulation 2000 - DETAILED SYLLABUS

SEMESTER - I

MA 131 MATHEMATICS - I

1. MATRICES:
The characteristic equation - eigen values and eigen vectors of a real matrix - some properties of eigen values - Cayley-Hamilton theorem - reduction of a real matrix to a diagonal form, orthogonal matrices, properties - reduction of a quadratic form to a canonical form by orthogonal transformation.

2. GEOMETRICAL APPLICATIONS OF DIFFERENTIAL CALCULUS:
Curvature - Cartesian and polar co-ordinates - circle of curvature - involutes and evolutes, envelopes - properties of the envelopes - envelope of normal to a curve.

3. FUNCTIONS OF SEVERAL VARIABLES:
Total differential - Derivative of implicit functions - partial derivative of a function of two functions, Taylor's expansion for a function of two variables, maxima and minima, Jacobians, differentiation under the integral sign.

4. MULTIPLE INTEGRALS:
Double integration in Cartesian and polar co-ordinates, change of order of integration, triple integration in Cartesian co-ordinates, Gamma and Beta functions - Properties, Area as a double integral.

5. DIFFERENTIAL EQUATIONS:
Simultaneous linear equations with constant coefficients, Homogeneous linear equations of Euler type - equations reducible to homogeneous form, linear equations of second order with variable coefficients, method of reduction of order, transformation of the equation by changing the dependent variable, method of variation of parameters.

L = 45     T = 15     Total = 60

TEXT BOOK:

REFERENCES:

PH 131 PHYSICS - I

1. PROPERTIES OF MATTER:
Elasticity - stress - strain diagram - Factors affecting elasticity twisting couple on a wire, shaft torsion pendulum depression of a cantilever-young's modulus by cantilever - uniform and Non-uniform bending - I shape girder production and measurement of high vacuum - rotary pump - diffusion pump - Penning gauge viscosity Oswald Viscometer - comparison of viscosity.

2. ACOUSTICS:
Acoustics of buildings - Absorption coefficient - Intensity loudness Reverberation time Sabine' formula noise pollution, noise control in a machine - ultrasonic production - magnetostriction and piezoelectric methods - applications of ultrasonic in engineering and medicine.
3. HEAT AND THERMODYNAMICS:


4. OPTICS:


5. LASER AND FIBRE OPTICS:

Principle of lasers - Laser characteristics - Ruby - NdYAG, He-Ne, CO2 and semiconductor lasers - propagation of light through optical fibers - types of optical fibers - applications of optical fibers as optical waveguides and sensors.

6. PRACTICALS:

1. Young's modulus by nonuniform bending
2. Rigidity modulus and moment of inertia using Torsion pendulum
3. Viscosity of a liquid by Poiseuille's method
4. Wavelength determination using grating by spectrometer
5. Particle size determination by laser
6. Thermal conductivity by Lees disc
7. Thickness of wire by Air wedge
8. Thermo EMF measurement by potentiometer

\[ L = 30 \quad T = 15 \quad P = 30 \quad \text{Total} = 75 \]

TEXT BOOK:


REFERENCE:


CM 131 CHEMISTRY - I

1. CHEMICAL THERMODYNAMICS:

Definition of free energy and spontaneity - Maxwell relations - Gibbs - Helmholtz equation - Van't hoff equations - stoichiometry and energy balances in chemical reactions.

2. DYNAMICS OF CHEMICAL PROCESS:

Basic concepts - composite reactions (opposing, parallel and consecutive reactions) - collision theory - thermodynamic formulation of reaction rates - unimolecular reactions - chain reactions (stationary and non-stationary) - enzyme kinetics - Michael's - Mention equation.

3. ELECTRODICS:

Types of electrodes and cells - Nerst equation - EMF measurement and its applications - Principles of chemical and electrochemical corrosion - corrosion control (sacrificial anode and impressed current methods).
4. WATER:

Water quality parameters - definition and expression - estimation of hardness (EDTA method) and alkalinity (titrimetry) - water softening (zeolite) - demineralisation (ion-exchangers and desalination (RO) - domestic water treatment.

5. POLYMERS:

Monomer - functionality - degree of polymerisation - classification based on source and applications - addition, condensation and copolymerisation - mechanism of free - radical polymerisation - thermoplastics and thermosetting plastics - processing of plastics - injection molding, blow molding and extrusion processes.

6. PRACTICAL:

1. Water analysis: Determination of hardness, alkalinity, DO, Fe (spectrophotometer) and Na & K (Flame photometry)
2. Electrochemistry and corrosion experiments.
3. Polymer experiments.

\[ L = 30 \quad T = 15 \quad P = 30 \quad \text{Total} = 75 \]

TEXT BOOK:

REFERENCE:


GE131 ENGINEERING MECHANICS

1. BASICS:

Introduction - units and dimensions - law of mechanics - vectors - vectorial representation of forces and moments - vector operations.

2. STATICS OF PARTICLES

Coplanar forces - Resolution and Composition of forces - Equilibrium of a particles - forces in space - equilibrium of a particle in space - equivalent systems of forces - principle of transmissibility - single equivalent force.

3. EQUILIBRIUM OF RIGID BODIES

Free body diagram types of supports and their reactions - requirements of stable equilibrium - equilibrium of rigid bodies in two dimensions - equilibrium of rigid bodies in three dimensions.

4. PROPERTIES OF SURFACES AND SOLIDS

Determination of areas and volumes - first moment of area and the centered second and product moments of plane area - parallel axis theorems and perpendicular axis theorems - polar moment of inertia - principal moments of inertia of plane areas - principal axes of inertia - mass moment of inertia - relation to area moments of inertia.

5. FRICTION

Frictional force - laws of Coulomb friction - simple contact friction - rolling resistance - belt friction.
6. **DYNAMICS OF PARTICLES**


7. **ELEMENTS OF RIGID BODY DYNAMICS**

Translation and rotation of rigid body - velocity and acceleration - general plane motion - moment of momentum equation - rotation of rigid body - work-energy equation.

L = 45  T = 15  Total = 60

**TEXT BOOK:**


**REFERENCE:**


**GE 132 COMPUTER PRACTICE - I**

1. **FUNDAMENTALS OF COMPUTERS AND OPERATING SYSTEMS:**

Evolution of computers-organization of modern digital computers - single user operating system - multitasking OS-GUI.

2. **OFFICE AUTOMATION:**

Word processing - data base management system - spreadsheet package - presentation software.

L = 15  P = 45  Total = 60

**TEXT BOOK:**


**REFERENCE:**


**GE 133 WORKSHOP PRACTICE**

Tools and equipment used in Smithy, Carpentry, Fitting, Foundry, Welding and Sheet Metal.

**LIST OF EXPERIMENTS:**

1. **Sheet Metal:**

   Fabrication of tray, cone etc. with sheet metal.
2. **Welding:**
Arc welding of butt joint, lap joint, Tee fillet etc. Demonstration of gas welding.

3. **Fitting:**
Practice in chipping, filing, drilling - making Vee square and dove tail joints.

4. **Carpentry:**
Planning practice - making halving joint and dove tail joint models.

5. **Foundry:**
Preparations of simple moulds like flange, gear, V-grooved pulley etc.

6. **Smithy:**
Demonstrations for making simple parts like keys, bolts etc.

\[
P = 60 \quad \text{Total} = 60
\]

**SEMESTER II**

**MA 132 MATHEMATICS - II**

1. **VECTOR CALCULUS:**
Gradient, Divergence, Curl - line and surface integrals - Green's, Gauss divergence and Stokes theorems - verification and applications.

2. **ANALYTIC FUNCTIONS:**
C-R equations - properties and analytic functions - determination of harmonic conjugates and analytic function - conformal mappings - mapping properties of \( w = z + a, \frac{1}{z}, az, z^2 \) and bilinear transformation.

3. **COMPLEX INTEGRATION:**
Cauchy's theorem - Cauchy's integral formula - Taylor and Laurent's series - singularities and classification - residues, Cauchy's residue theorem - contour integration around circular and semi-circular contours (excluding poles on the real axis).

4. **EMPIRICAL STATISTICS:**

5. **STATISTICAL INFERENCE:**
Sampling distribution - testing of hypothesis - level of significance - confidence limits - tests based on normal distribution, t-distribution, F-distribution and Chi-square distribution.

\[
L = 45 \quad T = 15 \quad \text{Total} = 60
\]

**TEXT BOOK:**

**REFERENCE:**
PH 133 PHYSICS - II (for EEE)  

1. ELECTROSTATICS AND ELECTROMAGNETISM:  
Electric field and potential - Gauss theorem - applications - dielectrics - capacitance - energy stored in a dielectric medium - types of capacitors - loss of energy due to sharing of charges by the capacitors - electrical conductivity in conductors - Carey Foster's bridge - Maxwell's equations - free space wave equation - characteristic impedance.

2. QUANTUM PHYSICS:  

3. ATOMIC AND NUCLEAR PHYSICS:  

4. ELEMENTARY CRYSTALLOGRAPHY:  
Symmetry elements - Miller Indices for cubic crystals - packing factor calculations for cubical structures - Bragg's law and X-ray diffraction methods to study crystal structures - crystal imperfections - crystal growth (Basic ideas only)

5. NONDESTRUCTIVE TESTING:  

L = 45  Total = 45

TEXT BOOK:

REFERENCE:

CE 151 SOLID MECHANICS  2002

1. ANALYSIS OF PLANE TRUSSES:

2. STRESS, STRAIN AND DEFORMATION OF SOLIDS:
Rigid bodies and deformable solids - Stability strength and stiffness - Tension, compression and shear stresses - Deformation of simple and compound bars - Elastic constants - stresses at a point stresses on inclined planes - principal stresses and principal planes.

3. TRANSVERSE LOADING ON BEAMS
Beams - Types and transverse loading on beams - shear force and bending moment in beams - Cantilevers - Simply supported beams and over-hanging beams.

4. STRESSES IN BEAMS
Theory of simple bending - Analysis of stresses - load carrying capacity - Proportioning sections - leaf springs - Sheer stress distribution.
5. TORSION:
Stresses and deformation in circular and hollow shafts - stresses in helical springs - Deflection of springs - Design of buffer springs.

L = 30  Total = 30

TEXT BOOK:

REFERENCE:

EE 131 ELECTRIC CIRCUIT ANALYSIS 3104

1. BASIC CIRCUIT CONCEPTS: 9

2. SINUSOIDAL STEADY STATE ANALYSIS: 9
Phasor - sinusoidal steady state response - concepts of impedance and admittance - analysis of simple circuits - power and power factor - series resonance and parallel resonance - bandwidth and Q factor. Solution of three-phase balanced circuits - power measurements by two-wattmeter methods - solution of three-phase unbalanced circuits.

3. MESH-CURRENT AND NODE-VOLTAGE METHODS: 9

4. NETWORK THEOREMS AND APPLICATIONS: 9
Superposition theorem - reciprocity theorem - compensation theorem - substitution theorem - maximum power transfer theorems - Thevenin's theorem - Norton's theorem and Millman's theorem with applications.

5. TRANSIENT ANALYSIS: 9
Forced and free response of RL, RC and RLC circuits with D.C. and sinusoidal excitations.

L = 45  T = 15  Total = 60

TEXT BOOK:

REFERENCE:
GE 134 ENGINEERING GRAPHICS

1. PRINCIPLES OF GRAPHICS: 4
   Two-dimensional geometrical construction - conic sections, involutes and cycloids - Representation of three-dimensional objects - principles of projections - standard codes of principles.

2. ORTHOGRAPHIC PROJECTIONS: 7
   Projections of points, straight lines and planes - auxiliary projections - projection and sectioning of solids - intersection of surfaces - development of surfaces.

3. PICTORIAL PROJECTIONS: 2
   Isometric projections - Perspectives - free hand sketching.

4. COMPUTER GRAPHICS: 2
   Hardware - display technology - software - introduction to drafting software.

L = 15   P = 45   Total = 60

TEXT BOOK:

REFERENCE:

GE 135 COMPUTER PRACTICE - II

1. MULTI USER OPERATING SYSTEM: 4
   Unix: Introduction - basic commands - vi editor - filters - input/output redirection - piping - transfer of data between devices - shell scripts.

2. FUNDAMENTALS OF NETWORKING: 3
   Working on a network environment - accessing different machines from one node - concept of E-mail - uses of Internet.

3. HIGH LEVEL LANGUAGE PROGRAMMING: 8
   C language: Introduction - operator - expressions - variables - input output statements - control statements - function - arrays - pointer - structures - unions - file handling - case studies

L = 15   P = 45   Total = 60

TEXT BOOK:

23
3. LAPLACE TRANSFORMS:
Transforms of simple functions - basic operational properties - transforms of derivatives and integrals - periodic functions - convolution theorem - inverse transforms - initial and final value theorems - applications of Laplace transforms to linear ordinary differential equations.

4. PARTIAL DIFFERENTIAL EQUATIONS:
Formation - solution of standard types of first order equation and LaGrange's Linear Equation - linear partial differential equations of second and higher order with constant coefficients.

5. BOUNDARY VALUE PROBLEMS:
Classification of second order partial differential equations - transverse vibrations of a string - one-dimensional heat equation and two-dimensional heat flow - Fourier series solutions in Cartesian coordinates.

L = 45  \( T = 15 \)  Total = 60

TEXT BOOK:

REFERENCE:
1. CONDUCTING MATERIALS:

2. SEMICONDUCTING MATERIALS:
Elemental and compound semiconductors and their properties - carrier concentration in intrinsic semiconductors - carrier concentration in n type and p type semiconductors - variation of carrier concentration with temperature - variation of Fermi level with carrier concentration and temperature and its influence - Hall effect - experimental arrangement - applications of Hall effect.

3. MAGNETIC AND DIELECTRIC MATERIALS:
Different types of magnetic material and their properties - Heisenberg and domain theory of ferromagnetism - hysteresis - energy product of a magnetic material - Ferrite and their applications - magnetic recording materials - tapes and disks - metallic glasses - active and passive dielectrics and their frequency and temperature dependence - internal field and deduction of Clausius Mosotti equation - dielectric loss - different types of dielectric breakdown - classification of insulating materials and their applications.

4. OPTICAL MATERIALS:
Optical properties of metals, insulators and semiconductors - excitons, traps, colour centres and their importance - phosphorescence and fluorescence - different phosphors used in CRO screens - liquid crystal as display material - twisted nematic display - construction and working of LED - LED materials - thermography and its applications - photo conductivity and photo conducting materials.

5. MODERN ENGINEERING MATERIALS:
Metallic glasses as transformer core material - nanophase material - shape memory alloys - advance ceramic materials - polymers - biomaterials - non-linear materials and their applications.

L = 45 Total = 45

TEXT BOOK:

REFERENCE:
diffusion currents - continuity equation - Hall effect - PN junction - current equation-junction capacitance - breakdown characteristics - Varactor, tunnel, fast recovery, Schottky and zener diodes.

3. BIPOLAR JUNCTION TRANSISTOR:
Ebers-Moll equation - input output characteristics - switching characteristics - \( h^* \) parameters - Low frequency and high frequency equivalent circuits - RF transistors - Power transistors.

4. FET, UJT and SCR:
Theory and characteristics of JFET and MOSFET - low frequency and high frequency equivalent circuits - Theory and characteristics of UJT, SCR and TRIAC.

5. CCD AND OPTOELECTRONIC DEVICES:
Charge transfers and charge coupled devices-theory and applications. Semiconductor Opto electronic devices - LED, LASER diode, LCD, Photo diode Solar Cell.

\[ L = 45 \quad \text{Total} = 45 \]

TEXT BOOK:

REFERENCE:


CE25 FLUID MECHANICS 2002

1. FLUID PROPERTIES:
Fundamental units - mass density - specific weight - viscosity - surface tension - capillary - compressibility.

2. FLUID KINEMATICS AND DYNAMICS:
Streamline - streak line - pathline - continuity equation - stream and potential functions - Bernoulli’s equation - Darcy’s equation - Moody’s diagram.

3. FLOW THROUGH PIPES:
Pipes in series and parallel - major and minor losses - hydraulic grade line - venturi meter - orifice meter - manometer.

4. HYDRAULIC MACHINERY:
Classification of turbines - efficiency and performance of turbines - specific speed - rotodynamic and positive displacement pumps - pumps in series and parallel.

\[ L = 30 \quad \text{Total} = 30 \]
REFERENCE:

ME 251 THERMODYNAMICS

1. SYSTEMS AND LAWS OF THERMODYNAMICS: 9
   Closed and open systems-equilibrium - first law - second law - reversibility - entropy - processes - heats and work transfers - entropy change - Carnot cycle.

2. POWER CYCLES AND INTERNAL COMBUSTION ENGINES: 9
   Carnot cycle - Otto cycle - diesel cycle - dual cycle - Brayton cycle - air standard efficiency - two stroke and four-stroke engines - SI and CI Engines - gas turbine operation.

3. STEAM BIOLERS AND TURBINES: 9
   Steam properties - use of steam tables and charts - steam power cycle-boilers and accessories - boiler testing - layout of thermal power station - steam turbines - impulse and reaction turbines - compounding of turbines - simple velocity diagrams.

4. AIR COMPRESSORS, REFRIGERATION AND AIR CONDITIONING: 9
   Reciprocating and rotary compressors - staging compressor work - vapour compression - refrigeration cycle - applications - air-conditioning system layout - selection.

5. HEAT TRANSFER: 9
   Conduction - plane wall, cylinder, sphere, composite walls - critical insulation thickness - simple fins - convection - free convection and forced convection flow over flat plates and flow through pipes - empirical relations - radiation - black body, grey body radiation exchanges - cooling of machines.

L = 45  Total = 45

TEXT BOOK:

REFERENCE:

EE 231 ELECTROMAGNETIC THEORY 3 1 0 4

1. GENERAL PRINCIPLES: 3
   The field concept - sources of electromagnetic fields.

2. ELECTROSTATICS: 8
   Charges - Coulomb's Law - electric field intensity - electric flux - Gauss's law - potential - boundary value problems - Laplace and Poisson's equations - electrostatic energy - dielectrics - capacitance.

3. MAGNETOSTATICS: 8
4. ELECTROMAGNETIC FIELDS: 8

5. ELECTROMAGNETIC WAVES: 9
   Generation - propagation of waves in dielectrics - conductors and transmission lines - Poynting vector - skin effect.

6. FIELD MODELLING AND COMPUTATION: 9

7. TUTORIAL PROBLEMS: 15
   Field plotting of electrostatic, magnetostatic and electromagnetic configurations using standard software.

L = 45  T = 15  Total = 60

TEXT BOOK:

REFERENCE:

EE 232  ELECTRICAL MACHINES - I  3 1 0 4

1. INTRODUCTION:
   Electrical machine types - magnetic circuits - inductance - induced EMF and force - core losses - AC operation of magnetic circuits.

2. TRANSFORMERS:

3. ELECTROMECHANICAL ENERGY CONVERSION:
   Energy in magnetic systems - field energy and mechanical force - singly and multiply excited systems.

4. BASIC CONCEPTS IN ROTATING MACHINES:
   MMF of distributed windings - magnetic fields in rotating machines - rotating MMF waves in AC machines - generated voltages - torque.

5. DC MACHINES:
   Construction - EMF and torque - circuit model - armature reaction - commutation - methods of excitation - characteristics of generators - characteristics of motors - starting and speed control - testing and efficiency - parallel operation.

L = 45  T = 15  Total = 60

33
REFERENCES:

EE 241 ELECTRIC MACHINES LABORATORY - I 0 0 3 2

1. Open Circuit and load characteristics of a separately excited DC Generator.
2. Open Circuit and load characteristics of DC Shunt generator
3. Load characteristics of DC compound generator
4. Load test on DC shunt motor
5. Load test on DC series motor
6. Speed control of DC Shunt motor
7. Swinburne's Test
8. Study of DC motor starters
9. Load test on single phase transformer
10. Open circuit and short circuit test on single phase transformer
11. Separation of no load losses in a single phase transformer
12. Sumpner's Test
13. Three Phase connection
14. Scott connection

P = 45 Total = 45

SEMESTER - IV

EC 254 ELECTRONICS CIRCUITS 3 0 0 3

1. AMPLIFIERS: 10
   Biasing circuits for transistors - FET and their analysis - CE, CC and CB amplifiers - FET amplifiers-frequency response - cascade and Darlington connections - analysis of class A and B power amplifiers - complementary symmetry amplifiers - class C power amplifier.

2. DIFFERENTIAL AND TUNED AMPLIFIERS: 8
   Differential amplifiers - common mode and difference mode analysis-Drift compensation - FET input stages - chopper stabilizer amplifier - introduction to tuned amplifiers.

3. FEEDBACK AMPLIFIERS AND OSCILLATORS: 9
   Advantages of negative feedback-voltage/current, series/shunt feedback-positive feedback-condition for oscillations; phase shift - Wien bridge, Hartley, Colpits and crystal oscillators.

4. PULSE CIRCUITS: 9
   RC wave shaping circuits-Diode clamps and clippers-Multivibrators-Schmitt triggers - UJT and transistor sawtooth oscillators.

5. RECTIFIERS AND POWER SUPPLIERS: 9
   Single and polyphase rectifiers and analysis of filter circuits - Design of zener and Transistor series voltage regulators - switched mode power suppliers.

L = 45 Total = 45

TEXT BOOK:
REFERENCE:

EC 256 COMMUNICATION ENGINEERING

1. RADIO COMMUNICATION SYSTEMS: 15
   Frequency spectrum - Principle of AM and FM - AM and FM transmitters and receivers - Introduction to microwave communication systems - principle of satellite communication.

2. PULSE COMMUNICATION SYSTEMS: 5
   PAM, PPM, PDM, PCM - delta modulation - differential PCM - merit and demerits - comparison of pulse modulation schemes.

3. DATA TRANSMISSION: 10
   Base band signal receiver - error probability - optimum and matched filter techniques - coherent reception - digital modulation systems - FS, PSK - comparison of data transmission systems.

4. TRANSMISSION MEDIUM: 10
   Characteristics of cables - optical fibers - effects of EM radiation - bandwidth and noise restrictions - statistical measurements of random noise - concept of multiplexing - FDM and TDM.

5. TELEVISION: 5
   Scanning methods - B/W and colour systems - camera and picture tubes - synchronisation - transmitters and receivers.

L = 45
Total = 45

TEXT BOOK:

EE 234 ELECTRICAL MACHINES - II

1. SYNCHRONOUS MACHINES: 15

2. THREE PHASE INDUCTION MACHINES: 15

3. FRACTIONAL HORSEPOWER MOTORS: 15
series motor - repulsion motor - linear motor - permanent magnet
DC and AC motors.

\[ L = 45 \quad T = 15 \quad \text{Total} = 60 \]

**TEXT BOOK:**

1. Nagrath, I.J. and Kothari, D.P., 'Electric Machines', T.M.H.

2. Fitzgerald, A.E. Charles Kingsley Jr. Stephen D. Umans,

3. Syed A. Nassar, 'Electric Machines and Power Systems',

**EE 235 CONTROL SYSTEMS**

1. **BASIC CONCEPTS AND SYSTEM REPRESENTATION:**
   Terminology and basic structure-feedback control theory-
multivariable systems-dynamic models-state variable models-
impulse response models and transfer function models-
application to mechanical, thermal, hydraulic, pneumatic and
electromechanical systems. Block diagram representation
and signal flow graphs-control system components.

2. **TIME RESPONSE ANALYSIS AND DESIGN:**
   I and II order systems-performance specifications-feed
   back analysis-P, PI, PID controllers design-effect of pole, zero
   addition-desired closed loop pole location-root locus plot
   and applications-steady state and dynamic error coefficients-
   robust control.

3. **FREQUENCY RESPONSE ANALYSIS AND DESIGN:**
   Performance specifications-correlation to time domain
   specifications-bode plots and polar plots-gain and phase
   margin-constant M and N circles and Nichols chart-all pass
   and non-minimum phase systems.

4. **STABILITY:**
   BIBO stability - Routh-Hurwitz criterion - stability ranges
   for a parameter - Nyquist stability criterion - relative stability
   assessment using Routh and Nyquist criterion and bode
   plots.

5. **COMPENSATION DESIGN:**
   Design concepts-realization of basic compensation-cascade
   compensation in time domain and frequency domain (Simple
   MATLAB applications to analysis and compensators design
   problems.)

\[ L = 45 \quad T = 15 \quad \text{Total} = 60 \]

**TEXT:**

1. M. Gopal, 'Control System Principles and Design', Tata

**REFERENCES**

1. Ogatta, 'Modern Control Engineering', Tata McGraw-Hill,
   1997. [MATLAB reference]

2. C.J. Chesmond, 'Basic Control System Technology', Viva low


4. K. Dalton, W. Baraclough and S. Thompson, 'The Art of
   Control Engineering', Addison Wesley.

5. R.C. Dorf and R.H. Bishop, 'Modern Control Systems', Addison-
   Wesley, 1995 (MATLAB Reference)

6. N.E. Leonard and William Levine, 'Using MATLAB to
   Analyse and Design Control Systems', Addison Wesley,
   1995.
EE 236 NETWORK ANALYSIS AND SYNTHESIS 3 1 0 4

1. s-DOMAIN ANALYSIS:
   s-domain network - driving point and transfer impedances and their properties - transform network analysis - poles and zeros of network functions - time response from pole-zero plots.

2. FREQUENCY DOMAIN ANALYSIS:
   Immittance loci of RLC networks - Frequency response of RLC networks - frequency response from pole-zero - Bode plots.

3. NETWORK TOPOLOGY:
   Network graph, tree and cut-sets - tie set and cut-set schedules - v-shift and l-shift - Primitive impedance and admittance matrices - Application to network solutions.

4. TWO-PORT NETWORKS:

5. ELEMENTS OF NETWORK SYNTHESIS:

6. DESIGN OF FILTERS:
   Filters and attenuators - Design of constant -k, m-derived and composite filters - qualitative treatment of active filters - Butterworth and Chebyshev filters.

L = 45  T = 15  Total = 60

TEXT BOOK:

REFERENCE:

EE 237 OBJECT ORIENTED PROGRAMMING AND APPLICATION TO ELECTRICAL ENGINEERING 2 0 2 3

1. OBJECTED ORIENTED PROGRAMMING PARADIGM: 2
   Introduction - reusability - security - object oriented programming fundamental - abstraction - encapsulation - derivation - object oriented languages and packages.

2. CLASSES AND OBJECTS:
   Introduction to C++ - procedural oriented approach to C++ - data types - control structures - problem solving - standard input output streams - C++ enhancements - function prototypes - default reference variables - constants - classes - construction - destructs - constraint objects - member objects - member functions.

3. ADVANCED FEATURES:
   Dynamic memory allocation pointers - new and delete operators - classes with pointers - copy constructor - static members - friend classes - friend functions - operator overloading.
4. POLYMORPHISM AND INHERITANCE:
    Function over loading - connection classes - derived classes -
    class conversion - protected members - virtual function -
    dynamic binding - abstract classes - multiple inheritance -
    templates - error handling.

5. CASE STUDIES:
    Over view of typical object oriented systems - case studies -
    application to electrical engineering.

L = 30  L = 30  Total = 60

TEXT BOOK:
2. K.R.Dittrich et al, 'On Object Oriented Database System',

REFERENCE:

EC 258 ELECTRONICS LABORATORY  0 0 3 2
1. Common Emitter and common collector amplifier
2. FET amplifier
3. Class B amplifier
4. Differential amplifier
5. Feed back amplifier
6. Phase shift and Wein bridge Oscillator
7. Hartley and Colpitt oscillator

8. Astable multivibrator
9. Monostable and Bistable multivibrator
10. Series voltage regulator

P = 45  Total = 45

EE 242 ELECTRICAL MACHINES LABORATORY - II  0 0 3 2
1. Regulation of 3 Phase alternator by EMF and MMF methods.
2. Regulation of 3 Phase alternator by ZPF and ASA Method.
3. Slip Test
4. Load characteristics of 3 Phase alternator by busbar loading.
5. V and Inverted V curves of synchronous motor.
6. Load test on 3 phase induction motor
7. No Load and blocked rotor test on three-phase induction
   motor.
8. Synchronous induction motor
9. Study of induction motor starters
11. Equivalent circuit and pre-determination of performance
    characteristics of single-phase induction motor.

P = 45  Total = 45

SEMESTER - V

EE 331 MEASUREMENTS AND INSTRUMENTATION  3 0 0 3
1. INTRODUCTION:
    Functional elements of an instrument - static and dynamic
    characteristics - errors in measurement - statistical evalua-
    tion of measurement data - standard and calibration.

P = 6  Total = 58
2. **TRANSDUCERS:**

Classification of transducers - selection of transducers - resistive, capacitive and inductive transducers - piezo electric transducers - optical and digital transducers. pH electrodes - transducers for measurement of displacement, temperature, level, flows, pressure, velocity and acceleration.

3. **SIGNAL CONDITIONING CIRCUITS:**


4. **STORAGE AND DISPLAY DEVICES:**

Magnetic disc and tape recorders - digital plotters and printers - CRT displays - digital CRO - LED, LCD and Dot matrix displays.

5. **ELECTRICAL AND ELECTRONICS INSTRUMENTS:**

Principle and types analog and digital ammeters and volt-meters - single and three phase Wattmeters and Energy meter - magnetic measurements - instrument transformers - instruments for measurement of torque, speed frequency, phase, viscosity and moisture.

**TEXT BOOK:**


**REFERENCE:**


**EE332 POWER ELECTRONICS**

1. **POWER SEMICONDUCTOR DEVICES:**

Principle of operation - characteristics and modelling of power diodes, SCR, TRIAC, GTO, power BJT, power MOSFET and IGBT.

2. **PHASE CONTROLLED CONVERTERS:**

2 pulse, 3 pulse and 6-pulse converters- inverter operation - input power factor- effect of source inductance and firing circuits.

3. **DC TO DC CHOPPERS:**

Voltage, current and load-commutated choppers - step up chopper and firing circuits.

4. **INVERTERS:**

Series inverter- voltage source inverters- current source inverters - PWM inverters.

5. **AC VOLTAGE CONTROLLERS:**

Single phase AC voltage controller - multi stage sequence control - step up and step down cycloconverters - three phase to single phase and three phase to three phase cycloconverters.

\[
L = 45 \quad \text{Total = 45}
\]
TEXT BOOK:

REFERENCE:

EE 333 DIGITAL SYSTEMS 3104

1. NUMBER SYSTEM AND CODES:
Efficiency of a number system - Radix conversion - Arithmetic with base other than ten - Alphanumeric codes - various codes - error detection and correction.

2. BOOLEAN ALGEBRA AND COMBINATIONAL LOGIC DESIGN:

3. LOGIC FAMILIES AND DIGITAL ICs:
RTL, DTL, TTL, ECL and MOS families and their characteristics - internal circuits of basic gates AND, OR, NOT and XOR using Bipolar, MOS and CMOS families - multiplexer and demultiplexer - encoder and decoder - half-adder and full-adder - subtractor and magnitude comparators.

4. SEQUENTIAL LOGIC CIRCUITS:
Synchronous and asynchronous operation - SR, JK, D and T flip-flops - Analysis of synchronous and asynchronous sequential circuits - Memories.

5. DESIGN OF DIGITAL SYSTEMS:
Examples for combinational logic circuit design - sequential logic circuit design - State minimisation - design of counters using flip-flops - system design using multiplexer and demultiplexer - encoder - decoder - memory based design - design using PAL and PLA.

L = 45     T = 15     Total = 60

TEXT BOOK:

REFERENCE:

EE 334 INTEGRATED CIRCUITS 3003

1. FABRICATION OF INTEGRATED CIRCUITS:
diffusion enhancements and retardation - ion implementation - metallisation - packing - realisation of passive and active devices like R, C, diodes, transistors in ICs.

2. **LINEAR INTEGRATED CIRCUITS:**

   Introduction to Linear IC - operational amps - characteristics - application of op amp - arithmetic circuits, amplifier, rectifiers, op amp circuits using diodes - I, II order filters, waveform generators using op amps - square, triangular and sinewave generations. Basic functional internal block diagram, characteristics and applications of following. ICs: 555, 565, 566, LM723 voltage regulator and current regulators.

3. **DIGITAL INTEGRATED CIRCUIT:**

   Designing combinational logic gates in CMOS - very high performance - Design of sequential logic circuits - arithmetic building blocks - design of memory and array structures.

4. **VLSI INTEGRATED CIRCUITS:**

   Fundamental consideration - NMOS, CMOS, Bipolar IC technology - IC fabrication - assembly technique and packaging of VLSI devices - reliability requirements for VLSI - failure mechanisms & rates - future trends.

5. **SPECIAL APPLICATION ICs:**

   Functional block, characteristics and applications of ADC/DAC ICs - Optical ICs - DSP IC - video and audio ICs - IC transducers - Function generator and filter ICs.

   **TEXT BOOK:**


   **REFERENCE:**


**EE 335 TRANSMISSION AND DISTRIBUTION**

1. **INTRODUCTION:**

   Structure of electric power system - transmission and distribution systems - recent trends in power transmission - EHV AC and HVDC transmission.

2. **TRANSMISSION LINE PARAMETERS:**

   Resistance, inductance and capacitance of single and three phase transmission lines - stranded and bundled conductors - symmetrical and unsymmetrical spacing - transposition - application of self and mutual GMD - skin and proximity effect - inductive interference with neighbouring circuits.

3. **CHARACTERISTICS AND PERFORMANCE OF TRANSMISSION LINES:**

   Equivalent circuits for short, medium and long lines - attenuation constant, phase constant, surge impedance - transmission efficiency and voltage regulation - real and reactive power flow in lines - power angle diagram - receiving end power circle diagram - limiting factors of transmission line loadability - shunt and series compensation - Ferranti effect and corona loss.
4. INSULATORS AND CABLES: 9
Insulators: Types of insulators for overhead lines, voltage distribution in insulator string and grading - string efficiency.
Underground cables: Constructional features of LT and HT cables - capacitance - dielectric stress and grading - thermal characteristics.

5. GENERAL ASPECTS: 9
Mechanical design of transmission lines - tariff and economic utilisation and conservation of energy.

L = 45  Total = 45

TEXT BOOK:

REFERENCE:

EE 336 DESIGN OF ELECTRICAL APPARATUS 3 1 0 4

1. INTRODUCTION: 9
Basic concept of design - standard specifications - classification of materials - electric and magnetic circuits - leakage reactance calculation - thermal rating of electrical apparatus - performance prediction from thermal rating.

2. DC MACHINES: 9
DC Machines - constructional details - output equation - main dimensions - choice of number of poles - armature and field coil design - design of commentator and brushes - performance calculation.

3. TRANSFORMERS: 9
Constructional details - output rating - output equation - design of core windings - single and three-phase transformers - determination of no-load current and equivalent circuit parameters - design of tank and cooling tubes for distribution transformers - performance calculations.

4. INDUCTION MOTORS: 9
Constructional details - output equation - main dimensions - design of stator - design of squirrel cage and slip ring rotor - determination of no-load current and equivalent circuit parameters - performance prediction using circle diagram.

5. COMPUTER AIDED DESIGN: 9
Computer in design, flow-chart, magnetic field calculations using finite difference and finite element methods. Determination of equipotential lines.

L = 45  T = 15  Total = 60

TEXT BOOK:

EE 341 CONTROL SYSTEMS LABORATORY 0 0 3 2
1. Transfer function of separately excited DC Generator.
2. Transfer function of Armature controlled DC Motor.
3. Transfer function of AC Servomotor.
4. Compensating networks
5. Study of Synchros.
6. DC Stepper Motor
7. DC Position Control system.
8. Digital control of first order plant (P, PI and PID).
9. Digital control of second orders liquid level system (state variable feedback).
10. Study of transducers

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EE 342 POWER ELECTRONICS LABORATORY 0 0 3 2
1. SCR Characteristics.
2. UJT Relaxation oscillator circuits.
3. SCR trigger circuits.
4. Forced commutation circuits.
5. Voltage and current commutation.
6. SCR phase control circuits.
7. Triac phase control circuits.
8. SCR converters.
9. SCR regulated power supply.
10. Speed control of DC shunt motor.
11. SCR DC circuit breaker.

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SEMESTER VI
MG 331 PRINCIPLES OF MANAGEMENT 3 0 0 3

1. THE BASIC OF MANAGEMENT THEORY AND SCIENCE: 3
   Management: Science, theory and practice - management and society - social responsibility and ethics.

2. PLANNING: 8
   The nature and purpose of planning - objectives, strategies, policies and planning premises - decision-making.

3. ORGANIZING: 8
   The nature and purpose of organising - basic departmentation - line/staff authority and decentralisation effective organising and organisational culture.

4. STAFFING: 8
   Human resource management and selection - performance appraisal and career strategy - manager and organizational development.

5. LEADING: 8
   Management and the human factor - motivation - leadership - communication.

6. CONTROLLING: 8
   The system and process of controlling control techniques and information technology-productivity and operations management - over all and preventive control.

7. INTERNATIONAL MANAGEMENT AND THE FUTURE: 2
   Towards a unified, global management theory.

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TEXT BOOK:

REFERENCE:

EE337 DIGITAL SIGNAL PROCESSING 3 1 0 4

1. INTRODUCTION:

2. DISCRETE TIME SYSTEMS:
Representations-classifications - time domain and frequency domain characterization - transfer functions - Z-transform and applications.

3. FREQUENCY ANALYSIS OF SIGNALS:
Analysis of analog and discrete signals-using Fourier series, Fourier transform, Fourier transform of discrete sequence and discrete Fourier transform-properties of transforms-computation of discrete Fourier transforms-Radix 2. FFT algorithms

4. DIGITAL PROCESSING OF CONTINUOUS SIGNALS: 9
Sampling of continuous signals-analog filter design-anti

5. DIGITAL FILTERS: 9
Discretization of analog filters-direct discrete design -IIR and FIR structures-window functions-filter realization - introduction to digital signal architecture.

L = 45  P = 15  Total = 60

TEXT BOOK:

REFERENCE:

EE338 PROTECTION AND SWITCHGEAR 3 0 0 3

1. INTRODUCTION: 3
Need for protection - essential qualities of protective relays.

2. RELAY CHARACTERISTICS: 9
Over current relays - directional, distance and differential, under frequency, negative sequence relays - static relays - microprocessor-based relays.
3. APPARATUS PROTECTION:  
Generator and Transformer Protection, Protection of busbars, transmission lines, CT's & PT's and their application in protective schemes.

4. THEORY ARC QUENCHING:  
Theory of arcing and arc quenching - RRRV - current chopping and capacitive current breaking - D.C. circuit breaking.

5. CIRCUIT BREAKERS:  
Switchgear - fault clearing and interruption of current - various types of circuit breakers - selection of circuit breakers - intelligent circuit breakers.

6. PROTECTION AGAINST OVER VOLTAGES:  
Different methods of protection against overvoltages - lighting arresters.

\[ L = 45 \quad \text{Total} = 45 \]

TEXT BOOK:


REFERENCE:


EE 339 POWER SYSTEM ANALYSIS  

1. INTRODUCTION:  
Need for system analysis in planning and operation of power system - distinction between steady state and transient state - per phase analysis of symmetrical three-phase system. General aspects relating to power flow, short circuit and stability analysis - per unit representation.

2. NETWORK MODELLING:  

3. SHORT CIRCUIT ANALYSIS:  

4. POWER FLOW ANALYSIS:  
Problem definition - bus classification - derivation of power flow equation - solution by Gauss-Seidel and Newton-Raphson methods -- P-V bus adjustments for both methods - computation of slack bus power, transmission loss and line flow.

5. STABILITY ANALYSIS:  

\[ L = 45 \quad T = 15 \quad \text{Total} = 60 \]
3. **INTERFACING BASICS:**

On controlling/monitoring continuous varying (analog) non-electrical signal using microprocessor/microcontroller need for interfacing ICs - DIP switch - thumb wheel switch as input devices - single LED, seven segment LED as output devices - interfacing these using both memory mapped I/O and peripheral mapped I/O - D/A, A/D ICs and their signals - sample and hold IC and its usage.

4. **INTERFACING ICs:**

1) 8255 - Programmable peripheral Interface along with 8085 - Both Mode 0 and Mode 1, detailed study.

2) 8254 - Programmable Interval Timer along with Intel 8086 - Both Mode 0 and Mode 3 to be studied.

3) Need for the following ICs: (a) 8251 - USART; (b) 8257 - Direct Memory Access Controller; (c) 8259 - Programmable Interrupt Controller; (d) 8279 - Keyboard / Display Interface.

**TEXT BOOK:**


**REFERENCE:**


EE 341 COMPUTER ARCHITECTURE  

1. INTRODUCTION:  5
   Generation of computer systems - basics of computer architecture - stored program organization - instruction formats and types - addressing modes - stack organization

2. ARITHMETIC AND LOGIC UNIT:  10
   Fixed-point arithmetic operations - addition, subtraction, multiplication and division - floating point arithmetic operations - design of ALU - bits slice processors.

3. CONTROL UNIT:  10
   Instruction sequencing and interpretation - hardwired control - micro-programmed control - nano-programming.

4. MEMORY AND I/O UNITS:  10
   Memory hierarchy - organization and design - interleaved memories - memory management and virtual memory - Cache and associated memories. Basic concepts of input/output - program I/O - Interrupts and DMA - I/O processors

5. ADVANCED COMPUTER ARCHITECTURE:  10
   RISC concepts - RISC Vs CISC architecture - recent developments - an example RISC architecture - parallel processors - pipe line processors - multi-processors - vector and array processors - data flow computers.

TEXT BOOK:

L = 45  Total = 45

REFERENCE:

EE 343 MEASUREMENT AND INSTRUMENTATION LABORATORY  0 0 3 2

1. Study of temperature measuring transducers (RTD, Thermocouples, and IC 590).
2. Study of displacement and pressure transducers (LVDT, I/P and P/I).
3. Active filters.
4. Instrumentation amplifiers.
5. Linearisation using microprocessors.
6. A/D and D/A converters.
7. Digital Oscilloscopes.
8. Data acquisition system.
9. Torque and angle measurement.

P = 45  Total = 45

EE 344 IC AND MICROPROCESSOR LABORATORY  0 0 3 2

1. IC EXPERIMENTS:
   2. Code converters.
   3. Shift registers; Counters
4. Encoders, Decoders, Multiplexers and Demultiplexers
5. Memory devices
7. Application circuits of NE 555.

2. MICROPROCESSOR EXPERIMENTS:
1. Programming exercises involving looping loop with counting indexing.
2. Multiplication and Division of signed and unsigned numbers.
3. Interfacing LED, DIP and Thumb wheel switches.
5. Design and implementation of temperature control loop
6. Study of serial interface and interfacing of VDU

P = 45  Total = 45

SEMESTER VII

MG 431 ENGINEERING ECONOMICS AND FINANCIAL ACCOUNTING  3 0 0 3

1. INTRODUCTION:
Factors influencing managerial decision - managerial economics and other disciplines - objectives of the firm - managerial decisions - theoretical concepts.

2. DEMAND ANALYSIS AND FORECASTING:
Meaning of demand - types of demand - determinants of demand-demand function - demand elasticity - demand forecasting - forecasting methods.

3. PRODUCTION AND COST ANALYSIS:
Production function - least cost combination of inputs - factor productivities and return to scale - statistical production function - managerial uses of production function-cost concepts accounting cost and economic costs - determination of cost - cost output relationship - estimation of cost-output relationship

4. PRICING:
Determinants of price - pricing under different objectives - pricing under different market structures - price discrimination - pricing methods in practice.

5. FINANCIAL ACCOUNTING (Elementary treatment only):
The balance sheet and related concepts - the profit and loss statement and related concepts - financial ratio analysis - cash flow analysis - fund flow analysis.

6. CAPITAL BUDGETING:
Investments - risks and return evaluation of investment decision - average rate of return - playback period - net present value and internal rate of return.

L = 45  Total = 45

TEXT BOOK:

EE 431 POWER SYSTEM CONTROL  3 1 0 4

1. INTRODUCTION:
Need for voltage and frequency regulation in power system - system load characteristics - basic P-f and Q-v control loops
- cross coupling between control loops - plant level and system level controls - recent trends of real-time control of power systems.

2. REAL POWER AND FREQUENCY CONTROL: 15
Fundamentals of speed governing mechanisms and modelling - speed load characteristics - regulation of two synchronous machines in parallel - control areas - LFC control of a single area - static and dynamic analysis of uncontrolled and controlled cases - multi-area systems - two area system modelling - static analysis - uncontrolled case - tie line with frequency bias control of two-area and multi-area system - steady state instabilities.

3. REACTIVE POWER - VOLTAGE CONTROL: 8
Typical excitation system - modelling - static and dynamic analysis - stability compensation - effect of generator loading - static shunt capacitor/reactor VAR compensator; synchronous condenser, tap-changing transformer - static VAR system - modelling - system level voltage control.

4. COMPUTER CONTROL OF POWER SYSTEM: 10
Energy control center functions - system hardware configuration SCADA system - functional aspects - security monitoring and control - system states and their transition - various controls for secure operation.

5. ECONOMIC DISPATCH CONTROL: 7
Incremental cost curve - co-ordination equations with loss and without losses, solution by iteration method. (No derivation of loss coefficients). Base point and participation factors. Economic controller added to LFC control.

L = 45
Total = 45

TEXT BOOK:
1. Olle I. Elderd, 'Electric Energy and System Theory - An


REFERENCE:

EE 432 SOLID STATE DRIVES 3003

1. DRIVE CHARACTERISTICS: 9
Mechanical characteristics - constant torque and constant HP operations - Four quadrant operation - Rating of motors - selection of drives.

2. DC DRIVES: 9
Single phase and three-phase converter fed drives - continuous and discontinuous conduction modes - chopper fed drives - four quadrant operation - closed loop drive system.

3. STATOR CONTROLLED INDUCTION MOTOR DRIVES: 9
Voltage controlled drive - V/f control - VSI and CSI fed drives - closed loop control - braking - energy saving.

4. ROTOR CONTROLLED INDUCTION MOTOR DRIVES: 9
Rotator resistance control - slip power recovery scheme - sub synchronous and super synchronous operations - power factor improvement - closed loop control.

5. SYNCHRONOUS MOTOR DRIVES: 9
Adjustable frequency and controlled current operation - self
controlled synchronous motor - closed loop control - power factor control - brushless excitation

L = 45 Total = 45

TEXT BOOK:

REFERENCE:

EE 433 HIGH VOLTAGE ENGINEERING

1. OVER VOLATGES AND INSULATION COORDINATION: 6
   Natural causes of overvoltages - lightning phenomena - overvoltages due to switching surges - system faults and other abnormal conditions - principles of insulation co-ordination.

2. ELECTRICAL BREAKDOWN IN GASES, SOLIDS AND LIQUIDS: 10

3. GENERATION OF HIGH VOLTAGES AND HIGH CURRENTS: 8
   Generation of high DC voltage, alternating voltage, impulse voltages and impulse currents.

4. MEASUREMENT OF HIGH VOLTAGE AND HIGH CURRENTS: 8
   Measurement of high voltages and high currents - digital techniques in high voltage measurement.

5. ELECTROSTATIC FIELD STRESS CONTROL: 4
   Electrical field distribution and breakdown strength of insulating materials - fields in multidielectric materials - dielectric refraction - stress control by floating screens.

6. HIGH VOLTAGE TESTING: 9
   High voltage testing of electrical power apparatus - power frequency, Impulse voltage and DC, International and Indian Standards.

TEXT BOOK:

REFERENCES:

EE 439 COMPREHENSION

0 0 3 2

The objective of comprehension is to provide opportunity for the student to apply the knowledge acquired during the academic programme to real-life problems that he/she may have to face in future as an engineer.
Three periods per week shall be allotted in the time table for this activity and this time shall be utilized by the student to receive guidance from the members of faculty on solving real-life problems, practice solving these problems and on group discussions, seminar presentations, library reading as assigned by the faculty member in-charge. The continuous assessment and semester evaluation may be carried out as specified in the guidelines to be issued from time to time.

Total: 45

SEMESTER VIII

EE 444 PROJECT WORK 0 0 12 6

The objective of project work is to enable the students, to work in convenient groups of not more than four members in a group, on a project involving some design and fabrication work or theoretical and experimental studies related to the respective engineering discipline.

Every project work shall have a Guide who is a member or the faculty of the University, twelve periods per week shall be allotted in the time table for this important activity and this time shall be utilized by the students to receive directions from the Guide, on library reading, laboratory work, computer analysis, or field work as assigned by the Guide and also to present in periodical seminars or viva to review the progress made in the project.

Each student shall finally produce a comprehensive report covering background information, literature - survey, problem statement, project work details, estimation of cost and conclusions. The final report shall be in typewritten form as specified in the guidelines.

The continuous assessment and semester evaluation any is carried out as specified in the guidelines to be issued from time to time.

Total: 183

ELECTIVES

EE 031 SPECIAL ELECTRICAL MACHINES 3 0 0 3

1. SYNCHRONOUS RELUCTANCE MOTORS: 9
   Constructional features - types - axial and radial air gap motors - operating principle - reluctance - phasor diagram - characteristics - Vernier motor.

2. STEPPING MOTORS: 9

3. SWITCHED RELUCTANCE MOTORS: 9
   Constructional features - principle of operation - torque prediction - power controllers - Nonlinear analysis - Microprocessor based control - characteristics - computer control.

4. PERMANENT MAGNET BRUSHLESS D.C. MOTORS: 9
   Principle of operation - types - magnetic circuit analysis - EMF and Torque equations - Power Controllers - Motor characteristics and control.

5. PERMANENT MAGNET SYNCHRONOUS MOTORS: 9
   Principle of operation - EMF and torque equations - reactance - phasor diagram - power controllers - converter - volt-ampere requirements - torque speed characteristics - microprocessor based control.

L = 45  Total = 45

TEXT BOOK:


REFERENCE:

EE 032 COMPUTER AIDED DESIGN OF ELECTRICAL APPARATUS

1. INTRODUCTION:
Conventional design methodology - computer aided design aspects - Advantages.

2. ELECTROMAGNETICS AND ELECTROSTATICS:
Basic field equations - calculation of field distribution - flux linkages - voltage induced - inductance - capacitance - force / torque.

3. CAD PACKAGES:
Recent developments - preprocessing - modeling - boundary conditions - material characteristics - problem formulation - solution - postprocessing.

4. FINITE ELEMENT ANALYSIS:
Mathematical formulation - discretisation - shape functions - stiffness matrix - solution techniques - postprocessing.

5. DESIGN EXAMPLES (PRACTICALS):

L = 30  P = 30  Total = 60

TEXT BOOK:

REFERENCES:

EE 033 POWER ELECTRONIC INSTRUMENTATION

1. INTRODUCTION:
Importance of measurement and sensing - measurement techniques for thyristorised DC and AC circuits - measurement of voltage, current, power, power factor, speed, etc.

2. ANALOG MEASUREMENT TECHNIQUES:
Analog systems - characteristics of operational amplifiers - fundamental circuits using OPAMPs, PLL, 555 timer and applications - application of these analog circuits in measurement and sensing of voltage, current, frequency, speed, power and power factor - isolation techniques - isolation buffer amplifier.

3. DIGITAL MEASUREMENT TECHNIQUES:
Digital systems - digital circuits - Boolean algebra - combinational and sequential logic circuits - analysis, design using memories, multiplexers, PLAs and PAL Sensing and measurement of voltage, current, frequency, speed, power and power factor using digital circuits. Study of digital storage oscilloscope.
4. CONTROL OF POWER ELECTRONIC CONVERTERS USING ANALOG AND DIGITAL CIRCUITS:
Firing Schemes for DC chopper - single-phase and three-phase electronic converters, inverters employing PWM techniques. ADC and DAC, types and principle of operation - use of ADCs and DACs in sensing schemes in power electronic systems - closed loop current and speed control schemes.

L = 45 Total = 45

TEXT BOOK:

REFERENCES:

EE 034 ADVANCED POWER ELECTRONIC SYSTEMS 3 0 0 3

3. EXCITATION CONTROL:
Solid state excitation of synchronous generators - static brushless excitation systems and governor excitation system and control strategies.

L = 45 Total = 45

TEXT BOOK:

REFERENCE:

EE 035 EHV AC AND DC TRANSMISSION ENGINEERING 3 0 0 3

4. UPS SYSTEMS:
Quasi-resonant converters, resonant inverters, parallel redundant and non-redundant UPS using resonant power converters, switched mode power supply.

L = 45 Total = 45

5. OTHER APPLICATIONS:
HVDC system, FACTS, induction heater control using phase control and resonant inverters.

L = 45 Total = 45

TEXT BOOK:

REFERENCE:

EE 035 EHV AC AND DC TRANSMISSION ENGINEERING 3 0 0 3

1. TRANSMISSION ENGINEERING:
Transmission line trends - standard transmission voltages - Power handling capacity and line losses - cost of transmission lines and equipment - Mechanical consideration - Transmission Engineering principles.

2. LINE PARAMETERS:
Calculation of Line and ground parameters - Resistance,
Capacitance and inductance calculation - Bundle conductors - Modes of propagation - Effect of earth.

3. POWER CONTROL:
Power Frequency and Voltage control - Over voltages - Power Circle diagram - Voltage control using shunt and series compensation - static VAR compensation - higher phase order system - FACTS.

4. EHV AC TRANSMISSION:
Design of EHV lines based on steady state limits and transient over voltages - Design of extra HV cable transmission - XLPE cables - Gas insulated cable Corona and RIV.

5. HVDC TRANSMISSION:
HVDC transmission principles - Comparison of HVAC and HVDC Transmission - Economics - Types of converters - HVDC Links - HVDC Control - Harmonics - Filters - Multi terminal DC system - HVDC cables and HVDC circuit breakers.

L = 45 Total = 45

TEXT BOOK:

REFERENCE:

EE 036 POWER SYSTEM OPERATION

1. INTRODUCTION:
Methods adopted in utilities for providing reliable, good quality and economic electric power supply - system load variation. Practical operating problems. Load dispatching - system load characteristics, load curves, load duration curves. Energy curves load factor, diversity factor, coincidence factor, demand factor reserve requirements, Installed reserves, spinning reserves, cold reserves, hot reserves - operation restrictions, types of outages.

2. LOAD FORECASTING AND UNIT COMMITMENTS:

3. STATE ESTIMATION:
Least square estimation - sequential form of solution - static state emission in power system by different algorithm. Tracking state estimation in Power system - External equivalencing. Treatment of bad data.

4. ECONOMIC DISPATCH PROBLEM:

5. POWER SYSTEM SECURITY:
Operating states of power system. Normal, secure, insecure emergency and restorative states. Evaluation of system
state by contingency analysis. Preventive emergency and restorative control strategies.

L = 45 Total = 45

TEXT BOOK:

REFERENCE:

EE 037 'POWER SYSTEM TRANSIENTS' 3 0 0 3

1. INTRODUCTION AND SURVEY:
Various types of power system transients - effects of transients on power systems.

2. LIGHTNING AND SWITCHING SURGES:
12

3. MODELLING OF POWER SYSTEM EQUIPMENT:
9
Surge parameters of power systems equipment, equivalent circuit representation, lumped and distributed circuit transients.

4. COMPUTATION OF TRANSIENT OVERVOLTAGES:
12
Computation of transients - travelling wave method, Bewley's

lattice diagram - analysis in time and frequency domain, EMTP for transient computation.

5. INSULATION COORDINATION:
7
Insulation co-ordination - overvoltage protective devises principles of recent co-ordination and design of EHV lines.

L = 45 Total = 45

TEXT BOOK:

REFERENCE:

EE 038 NEURAL NETWORKS AND ITS APPLICATION TO POWER SYSTEMS 3 0 0 3

1. BACK PROPAGATION:
9
Introduction to ANS technology - principles and promises - perceptron - representation - linear separability - learning - training algorithm - the back-propagation network - the generalized delta rule - practical consideration - BPN applications.

2. STATISTICAL METHODS:
9
Hopfield nets - Cauchy training - simulated annealing - the Boltzmann machine - associative memory - bi-directional associative memory - application.
3. COUNTER PROPAGATION NETWORK AND SELF-ORGANIZING MAPS: 9
   CPN building blocks - CPN data processing - An image classification example. SOM data processing - application of SOMs.

4. ADAPTIVE RESONANCE THEORY AND SPATIO TEMPORAL PATTERN CLASSIFICATION: 9
   ART network description - ART 1 - ART 2 - application - the formal avalanche - architectures of spatio-temporal networks - the sequential competitive avalanche field - Applications of STNS.

5. NEOCOGNITRON: 9
   Cognitron - structure and training - the Neo-cognitron architecture - neocognitron data processing - performance - addition of lateral inhibition and feedback to the neocognitron - Optical neural networks.

L = 45  Total = 45

REFERENCE:
3. IEEE tutorial on application of Neural Network to Power systems 1996.

EE 039 FUZZY SET THEORY AND ITS APPLICATION TO POWER SYSTEMS 3 0 0 3

1. INTRODUCTION TO FUZZY SETS: 5
   Crispness - vagueness - Fuzziness - uncertainty - fuzzy set theory.

2. FUZZY MATHEMATICS: 10
   Fuzzy set - Basic definition - Extension Fuzzy Measures - Measures of Fuzziness -The extension principles and applications.

3. FUZZY THEORY: 10
   Fuzzy relations - Fuzzy graphs - Fuzzy analysis - Probability theory - Possibility theory - Fuzzy set theory.

4. FUZZY APPLICATIONS: 10
   Fuzzy logic and approximate reasoning Expert system and Fuzzy control - Pattern recognition.

5. FUZZY APPLICATIONS IN POWER SYSTEMS: 10
   Decision making in Power system control through fuzzy set theory - Use of Fuzzy set models of LP in Power systems scheduling problems.

L = 45  Total = 45

REFERENCE:

EE 040 KNOWLEDGE BASED SYSTEM 3 0 0 3

1. INTRODUCTION: 3
   Definition-architecture - difference between conventional and expert system programs.

2. KNOWLEDGE REPRESENTATION AND FORMAL LOGIC: 10
   Knowledge components -levels of representation -knowledge
representation schemes - formal logic - knowledge engineering and inference - process - Semantic networks-frames - scripts - production systems.

3. KNOWLEDGE ACQUISITION: 5
Knowledge engineer-knowledge acquisition techniques - concept formalisation - knowledge representation development - knowledge acquisition for core problems-knowledge acquisition without knowledge

4. PROBLEM SOLVING STRATEGIES: 5
Exhaustive search - Large search spaces - planning - least commitment - principle and constraint propagation- classification and black board models.

5. EXPERT SYSTEM TOOLS: 10
Languages for Expert system development - Expert system shells-lisp machines - PC-based Expert system tools.

6. EXPERT SYSTEM DEVELOPMENT PROCESS AND APPLICATIONS: 12
Expert system and software engineering - problem selection - problem selection - prototype construction, formalisation, implementation and evaluation. Diagnostic and control applications in high voltage - power systems - control problems

L = 45    Total = 45

TEXT BOOK:

REFERENCE:

EE041 ELECTRIC ENERGY UTILISATION AND CONSERVATION 3 0 0 3

1. ELECTRIC HEATING: 9
Resistance heating - induction heating - dielectric heating - arc furnace - energy conservation in arc furnace industry and welding - electro-chemical processes.

2. ELECTRIC LIGHTING: 9
Definition of terms - types of lamp - types of lighting - design of illumination - residential - commercial - industrial - energy saving measures.

3. ELECTRIC VEHICLE: 9
Railway electrification - definition and analysis of traction effort - speed - time curve - traction motors - battery driven vehicles - energy efficiency drives - advanced speed control measures.

4. ENERGY STORAGE: 9
Modes of storage for mechanical, electrical, magnetic and chemical engines.

5. ENERGY ECONOMICS AND CONSERVATION: 9
Cost benefit - risk analysis - depreciation methods - energy auditing - energy costing - energy conservation in utility and industries.

L = 45    Total = 45

TEXT BOOK:

REFERENCE:

EE 042 ADVANCED CONTROL SYSTEMS 3 0 0 3

1. STATE VARIABLE ANALYSIS AND DESIGN: 10
   State models - solution of state equations - controllability and observability - pole assignment by state feedback - full and reduced order observers.

2. NONLINEAR SYSTEMS: 10

3. OPTIMAL CONTROL: 10

4. DIGITAL CONTROL SYSTEM: 7

5. ALGORITHM AND STRATEGY FOR COMPUTER CONTROL: 8
   Scaling data - linearisation of input data - arithmetical operations and functions - integration - control law algorithm - PID control law - self-tuning strategy.

   \[ L = 45 \quad \text{Total} = 45 \]

TEXT BOOK:

REFERENCE:
1. R.C. Dorf and R.H. Bishop, 'Modern Control Systems', Addison-Wesley, 1995 (MATLAB Reference)

EE 043 PRINCIPLES OF ROBOTICS 3 0 0 3

1. TYPES AND BASIC COMPONENTS OF ROBOTS: 12
   Automation and Robotics - Robot Anatomy - Classification of Robots by DOF motion, platform, power, source, intelligence and application area - manipulators, wrists, end effectors, control units - robot sensors, proximity sensors, range sensors, tactile sensors, visual sensors, sensors for mobile robots.

2. ROBOT MOTION ANALYSIS AND CONTROL: 9
   Introduction to manipulator Kinematics - Homogeneous transformation and Robot Kinematics - manipulator path control - robot dynamics - configuration of a Robot controller - obstacle avoidance.

3. ARTIFICIAL INTELLIGENCE: 12
   AI techniques - LISP Programming - AI and Robotics - LISP in the factory - sensing and digitizing function in machine vision - image processing and analysis - training and vision system

4. **ROBOT PROGRAMMING AND APPLICATIONS:**

Methods of Robot programming - lead through programming methods - A robot program as a path in space - motion interpolation - weight, signal and delay commands - Branching capabilities and limitations of lead through methods - Application of robots in material handling, processing operations and assembly and inspection - future applications of robots.

\[ L = 45 \quad \text{Total} = 45 \]

**TEXT BOOK:**


**REFERENCE:**


**EE044 INTELLIGENT CONTROLLERS**

1. **INTRODUCTION:**

Definition - architecture - difference between conventional and expert system.

2. **KNOWLEDGE ACQUISITION:**

Knowledge representation and formal logic-knowledge engineer - knowledge acquisition techniques - concept formalisation - knowledge representation development - knowledge acquisition for core problem knowledge acquisition without knowledge engineers.

3. **EXPERT SYSTEM TOOLS:**

Problem solving start engines - languages for expert system development - expert system shells - LISP machines - PC-based expert system tools

4. **FUZZY MODELING AND CONTROL:**

Fuzzy sets -Fuzzy set operators -Fuzzy Reasoning -Fuzzy propositions - Linguistic variable - Decomposition and Defuzzification -Fuzzy systems - case studies

5. **NEURAL CONTROLLERS:**


**REFERENCE:**

EE 045 BIOMEDICAL INSTRUMENTATION 3 0 0 3

1. INTRODUCTION: 9
   Cell structure - electrode - electrolyte interface, electrode potential, resting and action potential - electrodes for their measurement, ECG, EEG, EMG - machine description - methods of measurement - three equipment failures and trouble shooting.

2. TRANSDUCERS FOR BIO-MEDICAL INSTRUMENTATION: 9
   Basic transducer principles - source of bioelectric potentials - resistive, inductive, capacitive, fiber-optic, photoelectric, piezo-electric and chemical transducers - their description and feature applicable for biomedical instrumentation.

3. SIGNAL CONDITIONING, RECORDING AND DISPLAY: 9
   Input isolation, DC amplifier, power amplifier, differential amplifier - feedback, op Amp-electrometer amplifier, carrier Amplifier - instrument power supply. Oscillographic - galvanometric - X-Y, magnetic recorder, storage oscilloscopes - electron microscope-PMMC writing systems.

4. CARDIAC MEASUREMENTS: 9

5. COMPUTERS IN BIO-MEDICAL INSTRUMENTATION: 9
   Introduction - computers in medicine - basics of signal conversion and digital filtering - data reduction technique - time and frequency domain technique - ECG Analysis systems VLSI in Digital Signal Processing.

L = 45    Total = 45

TEXT:

REFERENCE:

EE 046 MICRO-CONTROLLER BASED SYSTEM DESIGN 3 0 0 3

1. THE ROLE OF MICRO-CONTROLLERS: 6
   Types and selection-Application example.

2. MICRO-CONTROLLER RESOURCES: 9
   Family members, bus widths program and data memory parallel ports, D/A and A/D converters, reset circuitry, watchdog timers, power-down considerations

3. REAL-TIME CONTROL: 9
   Interrupt Structures programmable timers, real-time clock, latency, interrupt, density and interval constraints.

4. PROGRAMMING FRAMEWORK: 9
   CPU register, Structure, addressing modes, instruction sets, assembly languages, assemblers.

5. SOFTWARE BUILDING BLOCKS: 12
   Queues, tables and strings, program organization, micro-
controller expansion methods, I/O hardware alternatives, development tools, Motorola and Intel microcontroller details

$$L = 45 \quad \text{Total} = 45$$

TEXT BOOK:

REFERENCE:
3. Motorola manual on 8 and 16 bit microcontrollers.

EE 047 DATABASE MANAGEMENT SYSTEMS 3 0 0 3

1. INTRODUCTION: 5
Need for Database systems - Data Models - Overall System structure - Entities and Entity sets - Relationships and Relationship sets - Mapping Constraints - Design of an E-R database scheme Structure of relational databases - Relational Algebra and Relational Calculus.

2. RELATIONAL MODEL: 10
Relational Commercial Languages-Integrity constraints pitfalls in Relational Database Design - Normalization using functional dependencies, multi-valued dependencies and join dependencies - Domain - key normal form - Alternative approaches to database design.

3. INDEXING AND HASHING: 10
Overall system structure - Physical storage media - File organization - Sequential files - Indexing - B+ Tree index files - B-Tree index files - Static hash functions - Dynamic hash functions.

4. QUERY PROCESSING: 10
Query Interpretation - Equivalence of expressions - Join strategies - Structure of the Query optimizer - Failure classification - Storage hierarchy - Transaction model - Log based recovery - Buffer Management - Shadow paging - Control.

5. SECURITY AND INTEGRITY: 10
Security and Integrity Violations - Authorization and views - security specification in SQL - encryption - case studies - system R - IMS system architecture - DBTG codasyl model.

L = 45 Total = 45

TEXT BOOK:

REFERENCE:

EE 048 VISUAL LANGUAGE AND ITS APPLICATION TO E E 3 0 0 3

1. HISTORICAL DEVELOPMENT OF PROGRAMMING: 5
Procedural programming - structural programming - object oriented programming - Windows programming - event driven programming - conceptual comparison.
2. WINDOWS PROGRAMMING: 10
Overview of windows programming - Data types - Resources controls - Windows messages - Devices contexts - Document interfaces - Dynamic link libraries - SDK (Software development kit tools) - Context help.

3. VISUAL BASIC PROGRAMMING 10
Form design - Overview - Programming fundamentals - VBX controls - Graphics applications - Animation - Interface - File system control - Data control - Database application.

4. VISUAL C++ PROGRAMMING: 10
Frame work classes - VC++ components - Resources handling - Event handling - Message dispatch system model and model-less dialogues - Importing VBX controls - Document view architecture - Sterilization - Multiple document - Splitter windows - Co-ordination between controls - Sub classing.

5. CASE STUDIES: 10
Application to Electrical Engineering problems.

L = 45 Total = 45

REFERENCE:
2. Holznak, 'Visual C++ Programming', Heavy metal
3. Microsoft Visual C++ and Visual Basic Manuals
4. Plewold, 'Windows Programming'.

EE 049 COMPUTER NETWORKS 3 0 0 3

1. PROTOCOLS AND ARCHITECTURE: 5

2. NETWORKS ACCESS PROTOCOLS AND INTERNET WORKING: 10

3. TRANSPORT AND SESSION SERVICE PROTOCOLS: 10
Transport services protocol mechanisms - Networks Services - ISO Transport standards - DOD transport protocols - session characteristics - ISO session service definition - ISO session protocol definition - other session approaches.

4. PRESENTATION APPLICATION PROTOCOLS: 10

5. NETWORK MANAGEMENT: 10

L = 45 Total = 45

TEXT BOOK:

REFERENCE:
GE 034 CREATIVITY, INNOVATION & NEW PRODUCT DEVELOPMENT

1. CREATIVITY:
   - Questioning mind - novel ideas - The need for creativity and innovation - Creativity and problem solving - Brain storming techniques - process of technological invention - Factors contributing to successful innovation and design.

2. IDEA GENERATION AND SCREENING:
   - Process of generating original ideas and products/services - group brain storming project selection and evaluation - problem-solving techniques.

3. NEW PRODUCT DEVELOPMENT:
   - Selection criteria - Goal definition - Successful methods of invention and design, invention notebook.

4. NEW PRODUCT PLANNING:
   - Prototype design - use of CAD (basics) - Fabrication - Testing - Quality standards - Market survey - Introducing new products.

5. PATENTS AND INTELLECTUAL PROPERTY RIGHTS (IPR):

6. LABORATORY:
   - Creative idea generation - Product selection - Prototype design - model fabrication - Testing - Cost evaluation - Patent application.

L = 30  P = 30  Total = 60

REFERENCE:

WEB SITES:
2. Http://www.virginia.edu/ltcc315
3. Http://www.wipo.int

LANGUAGE ELECTIVES

HS 034 TECHNICAL TAMIL

1. REVIEW OF BASIC GRAMMER:
   - Sentence structure, tense, case gender, voice and number - common errors in usage and their corrections - errors in conjunction - spelling and traditional usage.

2. READINGS FROM TECHNICAL WRITINGS IN TAMIL:
   - Critical study of selected passages from technical writings in Tamil (selected articles from Kalarjiam may be prescribed from time to time)

3. TRANSLATION FROM ENGLISH TO TAMIL:
   - Principles of translation coinage of technical terms and exercises in translation.

4. TAMIL AND COMPUTERS:
   - Issues in DTP - keyboard layout - typewriter, phonetic keyboards - internal coding - ISCII and other formats - advantages and disadvantages - sorting morphological analysis -
difficulties in spell checking - research in computerization of Tamil Practical: word processing in Tamil, spelling corrections and sorting.

5. CREATIVE WRITING IN TECHNICAL TAMIL: 4
Style of Technical language, Exercises in writing technical passages in Tamil articles, description of technical matters.

L = 30  P = 30  Total = 60

TEXT BOOK:

REFERENCE:
1. 'Valar Tamilil Arivial ' Vols. I to III, Indian Society for Scientific Tamil, Tamil University Campus, Tanjavur
2. 'Kalanjiam', Quarterly of Anna University, Chennai (Journal articles)
3. 'Tamil and computers' Seminar Proc., Anna University, 1994
4. Dr. Radha Chellapan, "Kalaichollakam".

HS 035 TECHNICAL GERMAN - I 3 1 0 4

1. INTRODUCTION 5
Special and comparative features of German with English, Hindi and Tamil. German Alphabets, pronunciation

2. THEMA 10
? Name, Land, Wohnort
? Sudium, Beruf
? Familie, Geschwister, Alter
? Tagesablauf, Termine
? Einladung
? Stellensuche, Berufswahl
? Einkauf

3. GRAMMATIK 10
? Personalpronomen, Verb, Wortstellung, Ort
? Possessivpronomen, Verb - 'Sein'
? Verb - 'Haben', Unbestimmter Artikel, Negation - 'Nicht' - 'Kein'
? Zeit, Bestimmter Artikel, Starke Verben
? Trennbare Verben, Imperativ
? Modal Verben
? Akkusativ

4. UEBUNGEN 10
? Partner uebungen
? Schriftliche Uebungen
? Aussprache Uebungen
? Kontrolluebungen
? Text generation

5. DIALOGUE 5
? Oral
? Written

6. GLOSSARY 5
Technical words

TEXT BOOK
1. Lernziel Deutsch (Deutsch als Fremdsprache) - Grundstufe I from Max Hueber Variag

HS 036 TECHNICAL GERMAN - II 3 1 0 4

1. INTRODUCTION 5
German Idioms and Phrases
2. **THEMA**

- Geschenke, Auf der Post
- Auskunft-Fest
- Heirat, Kinder
- Stadium
- Ausbuilding
- Erziehung, Jugend
- Deutschsprachige Länder, Europa
- Arbeitswelt, Urlaub

3. **GRAMMATIK**

- Dativ
- Ort und Richtung
- Reflexive Verben, Verben mit Präpositional object
- Perfect
- Präteritum
- Adjective
- Komparation, Genitiv, Wortbildung
- Nebensätze

4. **UEBUNGEN**

- Partner uebungen
- Schriftliche Uebungen
- Aussprache Uebungen
- Kontrolluebungen
- Text Generation

5. **DIALOGUE**

- Oral
- Written

6. **GLOSSARY**

Technical words

| Total | 45 |

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**TEXT BOOK**

1. Lernziel Deutscon (Deutsch als Fremdsprache) - Grundstufe I from Max Hueber Verlag

2. Introduction to Japanese Alphabets - Hiragana, Katakana and Kanji - Group 1, 2, 3 & 4 syllables - Writing practice - Pronunciation - Word order - Greetings - Receiving a visitor and exchange of pleasantries - Kanji practice.


5. Desu as a substitute for a verb - demonstrative pronouns - sono and sore - Group 1 particles - De, O, Made and Ka - conjection - soshite - Question words - dare, nani, doko, itsu, dore, dochira, doyatte, ikatsu, ikura - Words for degrees - gurai or kurai - Phrase - Saa - Anoo - numerals - counters and numbers - humble form of desu and arimasu - Kanji practice.

6. Verbs ending in -te or de - classification of Te forms and Masu forms - verb modifiers - koo, soo, aa and doo - Set phrase - Onegaishimasu - Sumimasen - Adverbs - Mazu, sore kara and salgo ni - formation of the -Te form of I adjective and desu - Kanji practice.

| Total | 45 |
TEXT BOOKS

3. Yan-san Serial, Video tapes, Japan.

HS 038 TECHNICAL JAPANESE - II

1. Demonstrative pronouns: - Are - Interjection: - Ee - Quoted sentences-omoimusu - Non-polite form of verbs - Group I ending in -eru or iru, group 2 verbs ending in -u - Non polite forms of 1-adjectives - non polite form if desu, deshoo, daroo - Suffix - sugiru - expression of reason-tame (ni) - Counters - Hon and -Do - Kanji practice.
5. Comparative sentences - no hoo ga and yori - Negative comparative sentences - Negative request - Adverbs of extent - konna ni, sonna ni and anna ni - Te form of transitive verb and -arul - Passive sentence - neutral passive sentence - technical vocabulary related to Engineering and Technology - Preparation of technical reports.

Total 45

HS 039 TECHNICAL FRENCH - I

1. Alphabets - Pronunciation - Masculine and Feminine Genders only - Numbers - Indefinite and definite articles - Plurals - Verbs to be and to have.

Total 45

TEXT BOOKS

REFERENCE BOOKS

HS 040 TECHNICAL FRENCH - II 3104
1. Group III Verbs - Conjugations - Adjectives - Adverbs - Sentences - Present - Past compound - Simple past - Future. 9
2. Comparative, superlative sentences - Recent past - Immediate future - Grammatical analysis. 9
3. Translation from English to French - Translation from French to English - Texts from Physics and Chemistry. 9
4. Translation from English to French - Translation from French to English - Texts from Basic Engineering. 9

Total 45

TEXT BOOKS

REFERENCE BOOKS

HS 041 ENGLISH I 3104
1. LISTENING

Listening comprehension - listening for specific information - note - taking - use of charts and diagrams.

2. SPEAKING

Defining - describing objects - describing uses/functions - comparing - offering suggestions - analysing problems and providing solutions - expressing opinions (agreement/disagreement) - predicting - expressing possibility/certainty - framing questions - providing answers - pronunciation practice (word stress).

3. READING

Skimming - scanning - detailed reading - predicting content - interpreting charts and tables - identifying stylistic features in texts - evaluating texts - understanding discourse coherence - guessing meaning from the context - note-making/transfering information.

4. WRITING

Sentence definition - static description - comparison and contrast - classification of information - recommendations - highlighting problems and providing solutions - formal and informal letter writing - using flow-charts/diagrams - paragraph writing - editing.
5. **FOCUS ON LANGUAGE**

Word formation with prefixes and suffixes - discourse markers and their functions - degrees of comparison - expressions relating to recommendations and comparisons - active and passive voice - antonyms - tense forms - gerunds - condition sentences - modal verbs of probability and improbability - acronyms and abbreviations - compound nouns and adjectives - spelling - punctuation.

L = 45  T = 15  Total  60

**TEXT BOOK**

1. "English for Engineers and Technologists", Volume I. Authors: Humanities and Social Science Department, Anna University, Published by Orient Longman Ltd., 1990.

**REFERENCE BOOKS FOR ENGLISH**


**HS 042 ENGLISH II**

3 1 0 4

1. **LISTENING**

Listening comprehension - listening for specific information - note-taking - using non-verbal devices.

2. **SPEAKING**

Describing processes - stating purpose - offering opinions, suggestions and recommendations - summarising - reporting - free discussion of chosen topics - pronunciation practice (word stress, consonant clusters - homonyms).

3. **READING**

Skimming - scanning - note-making - understanding the organisation of texts - discourse cohesion - predicting and evaluating content - evaluating style - inferring meaning - study-reading - interpreting tables, flow-charts.

4. **WRITING**

Extended definition - process description - cause and effect analysis - stating choice and justifying it - safety instructions - check list - letter of application - data sheet/resume.

5. **FOCUS ON LANGUAGE AND FUNCTIONS**

Word formation - synonyms - prepositions - adverbs - passive voice - sequence words/discourse markers - connective adverbs - numerical expressions - expansion of abbreviations - rules for writing SI units - language of instructions, checklists, cause and effect, purpose and means - indefinite adjectives of number and quantity - spelling and punctuation.

L = 45  T = 15  Total  60

**TEXT BOOK**


Authors: Humanities and Social Sciences Department, Anna University, Published by Orient Longman Ltd., 1990.
REFERENCE BOOKS FOR ENGLISH II


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REGULATIONS AND SYLLABUS (REGULATIONS 2000)

B.TECH. DEGREE PROGRAMME (8 Semesters)

ELECTRICAL AND ELECTRONICS ENGINEERING

ANNA UNIVERSITY CHENNAI - 600 025

APRIL 2000
REGULATIONS 2000
(Based on Credit System)

(APPROVED IN THE 42nd MEETING OF THE ACADEMIC
COUNCIL HELD ON 25.09.1999)

DEGREE OF BACHELOR OF
ENGINEERING / TECHNOLOGY
(Eight Semesters)

PRELIMINARY DEFINITIONS & NOMENCLATURE

In these Regulations, unless the context otherwise requires:

i) "Programme" means Degree Programme, that is B.E. / B.Tech. Degree Programme

ii) "Branch" means specialisation or discipline of B.E./B.Tech. Degree Programme, like Civil Engineering, Textile Technology, etc.

iii) "Course" means a theory or practical subject that is normally studied in a semester, like Mathematics, Physics, Engineering Graphics, Computer Practice, etc.

iv) "Faculty" means a Faculty of the University, like Faculty of Civil Engineering, Faculty of Technology, etc. Each Faculty is headed by a Dean.

ADMISSION

R1a Candidates for admission to the first semester of the eight semester B.E./B.Tech. Degree Programme shall be required to have passed

i) the Higher Secondary Examination of the (10 +2) curriculum (Academic stream) prescribed by the appropriate authority of Government of Tamil Nadu with Mathe-
matics, Physics and Chemistry as three of the four subjects of study prescribed under Part III. In the case of B.Tech. Industrial Bio-Technology, the subjects are Physics, Chemistry, Mathematics and/or Biology.

OR

i) any other examination of any University or authority accepted by the Syndicate of the University as equivalent thereto.

R.1b Candidates for admission through lateral entry into the third semester of the eight semester B.Tech. Degree Programme at M.I.T. Campus shall be required to have passed

i) the examination of a B.Sc. Degree of 10 + 2 + 3 or 11 + 1 + 3 pattern of a recognised University in any one of the following B.Sc. Degree Programmes having Mathematics and Physics as subjects of study:

OR

any other examinations of any University or authority accepted by the Syndicate of the University as equivalent thereto.

R.1c Sponsored/deputed candidates (Diploma holders) for admission to the 1st Semester of 8 Semester B.E. Degree programme in Printing Technology shall be required to have passed the 3-year Diploma in Printing Technology (Letterpress/Lithography/Integrated) awarded by the State Board of Technical Education of Government of Tamil Nadu or any other examination of any authority accepted by the Syndicate of the University as equivalent thereto. The institutions eligible to sponsor/depute the candidates and the minimum experience to be possessed by such candidates shall be as prescribed by the Syndicate of the University from time to time.

R.2a Notwithstanding the qualifying examination the candidate might have passed, the candidate shall also write an entrance examination for admission. The entrance examination shall test the proficiency of the candidate in Mathematics, Physics and Chemistry on the standards prescribed for plus two academic stream of the Tamil Nadu Board of Higher Secondary Education.

R.2b Notwithstanding the qualifying examination the lateral entry candidate might have passed, the candidate shall also write an entrance examination for admission. The entrance examination shall test the proficiency of the candidate in Mathematics, Physics, Chemistry, Applied Sciences, Electronics, Instrumentation and Computer Science at B.Sc. Degree level.

R.2c Sponsored/deputed candidates satisfying Rule 1c shall also write the entrance examination as per Rule 2a.

R.3. The eligibility criteria such as marks, number of attempts and physical fitness shall be as prescribed by the Syndicate of the University from time to time.

R.4a The candidate shall not have completed 21 years of age as on first of July of the year of application. In the case of lateral entry, the candidate shall not have completed 22 years of age as on 1st July of the year of application. For candidates belonging to SC/ST, the age limit is relaxable by 3 years.

R.4b There is no age limit for sponsored/deputed candidates satisfying Rule 1c, seeking admission to B.E. Printing Technology.

BRANCHES OF STUDY AND STRUCTURE OF THE PROGRAMME

R.5a Regulations 2000 is applicable to B.E./B.Tech. Degree Programme in various branches of Engineering and Technology, each distributed over 8 semesters with 2 semesters per Academic Year.
Faculty of Civil Engineering
1. B.E. Civil Engineering
2. B.E. Geo-Informatics.

Faculty of Electrical Engineering
1. B.E. Computer Science and Engineering
2. B.E. Electrical and Electronics Engineering
3. B.E. Electronics and Communications Engineering.

Faculty of Engineering (MIT)
1. B.Tech. Aeronautical Engineering
2. B.Tech. Automobile Engineering
3. B.Tech. Electronics Engineering
4. B.Tech. Instrumentation Engineering
5. B.Tech. Production Engineering
6. B.Tech. Rubber and Plastics Technology

Faculty of Mechanical Engineering
1. B.E. Industrial Engineering
2. B.E. Manufacturing Engineering
3. B.E. Mechanical Engineering
4. B.E. Mining Engineering
5. B.E. Printing Technology.

Faculty of Technology
1. B.Tech. Ceramic Technology
2. B.Tech. Chemical Engineering
3. B.Tech. Industrial Bio-Technology
4. B.Tech. Leather Technology

R.5c Each course is normally assigned certain number of credits with 1 credit per lecture period per week, 1 credit per tutorial period per week, 1 credit for 2 periods of laboratory or practical or seminar or project work per week (2 credits for 3 or 4 periods of practical) and 1 or 2 credits for 4 weeks of industrial training during semester vacations.

R.5d Each semester curriculum shall normally have a blend of lecture courses not exceeding 6 and practical courses not exceeding 4.

R.5e For the award of the degree, a student has to earn certain minimum total number of credits specified in the curriculum of the relevant branch of study. This minimum will lie between 181 and 190 credits depending on the branch.

R.5f The medium of instruction, Examinations and project report will be English, except for courses on languages other than English.

DURATION OF THE PROGRAMME
R.6 A student is ordinarily expected to complete the B.E./B. Tech. Programme in 8 semesters (6 semesters in the case of lateral entry student), but in any case not more than 12 semesters (10 semesters in the case of lateral entry student).

FACULTY ADVISER
R.7 To help the students in planning their courses of study and for general advice on the academic programme, the Head
of the Department of the student will attach a certain number of students to a teacher of the Department who shall function as Faculty Adviser for those students throughout their period of study. Such Faculty Adviser shall advise the students and approve the courses to be taken by the students during each semester.

CLASS COMMITTEE

R.8a For all branches of study during first semester, a common Class Committee will be constituted by the Dean of Academic Courses. During other semesters, separate Class Committees will be constituted by the respective Heads of the Departments of the students.

R.8b Each common theory course offered to more than one discipline or group, shall have a "Course Committee" comprising all the teachers teaching the common course with one of them as nominated as Course Coordinator. The nomination of the course Coordinator shall be made by the Head of the Department/Dean of Faculty/Dean of Academic Courses depending upon whether all the teachers teaching the common course belong to a Department/a Faculty/different Faculties.

R.8c The first semester Class Committee composition will be as follows:

i) Course Co-ordinators of all common courses.
ii) Teachers of all other individual courses.
iii) One Professor, preferably not teaching first semester class, appointed as Chairman, by Dean of Academic Courses.
iv) One male and one female first semester student from each Faculty to be nominated by the Dean of Academic Courses.
v) All first semester Faculty Advisers and all the Deans may opt to be special invitees.

R.8d The composition of the Class Committee for each branch from 2nd to 6th semester will be as follows:

i) Teachers of individual courses.
ii) One Professor or Assistant Professor preferably not teaching to the concerned class, appointed as Chairman by the Head of the Department.
iii) 2 students, preferably 1 male and 1 female student of the class per group of 30 students or part thereof, to be nominated by the Head of the Department in consultation with the Faculty Advisers.
iv) All Faculty Advisers of the Class, Teacher in-charge of UG Programme and Head of the Department may opt to be special invitees.

R.8e The Class Committee shall meet at least thrice during the semester. The first meeting will be held within two weeks from the date of class commencement, in which the type of assessments, like test, assignment, assignment based test etc., will be decided for the first second and third assessments. The second meeting will be held with in a week after the date of first assessment report, to review the students performance and for follow up action. The Third meeting will be held within a week after the second assessment report, to review the students performance and for follow up action.

During these three meetings the student members representing the entire class, shall meaningfully interact and express the opinions and suggestions of the class students to improve the effectiveness of the teaching-learning process.

R.8f The Class committee, excluding the student members and the invited members, shall meet within two weeks from the last day of the End-Semester Examination to
analyse the performance of the students in all the compon-
ents of assessments and decide the grade ranges for
each course. The grading ranges for a common course
shall be decided by the concerned course committee
and shall be presented to the class committee(s) by
the concerned teacher.

REGISTRATION AND ENROLMENT

R.9a Every student shall submit a completed Registration
form indicating the list of courses intended to be credited
during the next semester. This Registration will be done a
week before the last working day of the current semester.
Late registration with the approval of Dean of Faculty
along with a late fee will be done up to the last working day.

R.9b At the beginning of the semester, before the date of
class commencement, every student shall confirm the
Registration by paying the prescribed fees for the
semester and enroll for the courses. Late enrollment,
with the approval of Dean of Faculty along with a late fee,
will be done up to 2 weeks from the date of commence-
ment of classes. If a student does not enroll, his/her name
will be removed from rolls.

R.9c The students of first semester shall register and enroll at
the time of admission by paying the prescribed fees.

WITHDRAWAL FROM A COURSE

R.9d A student can withdraw from a course at any time before
the second assessment with the approval of Dean of
Faculty on the recommendation of the Head of the
Department of the student.

TEMPORARY BREAK OF STUDY FROM
A PROGRAMME

R.9e A student can take a one time temporary break of study
covering the current semester and/or next semester
period with the approval of the Dean of Academic
Courses, at any time before the start of third assessment
of current semester, within the maximum period of 12
or 10 Semesters as the case may be.

CREDIT LIMIT FOR ENROLMENT AND MOVEMENT
TO HIGHER SEMESTER

R.10a A student can enroll only for a maximum of 30 credits
during a Semester period including arrears courses.

R.10b The following minimum credits should be earned by a
student to register for the higher semester courses.

<table>
<thead>
<tr>
<th>To register Courses of</th>
<th>Minimum credits to be earned</th>
</tr>
</thead>
<tbody>
<tr>
<td>2nd Semester</td>
<td>No minimum</td>
</tr>
<tr>
<td>3rd Semester</td>
<td>10 in 1st Semester Courses alone</td>
</tr>
<tr>
<td>4th Semester</td>
<td>12 in 2nd Semester Courses alone</td>
</tr>
<tr>
<td>5th Semester</td>
<td>12 in 3rd Semester Courses alone</td>
</tr>
<tr>
<td>6th Semester</td>
<td>12 in 4th Semester Courses alone</td>
</tr>
<tr>
<td>7th Semester</td>
<td>12 in 5th Semester Courses alone</td>
</tr>
<tr>
<td>8th Semester</td>
<td>12 in 6th Semester Courses alone</td>
</tr>
</tbody>
</table>

Those who do not satisfy the above minimum credit require-
ments, may register and enroll for arrears courses only.
R.10c A Student who has not completed the NCC/NSS/NSO requirements, will not be eligible to register for 5th semester (7th Semester for Mining Engineering and for lateral entry student) courses, although satisfying other requirements.

R.10d Rule 10c is not applicable to the sponsored/deputed candidates satisfying Rule 1c admitted to B.E. in Printing Technology.

SUMMER TERM COURSES

R.11a A student can register for a maximum of two courses only during Summer Term, if such courses are offered by the concerned department.

R.11b The Head of the Department, in consultation with the Department Consultative Committee and with the approval of Dean (Academic Courses) may arrange for the conduct of a few courses during summer term, depending on availability of teachers during summer and subject to a minimum of five students registering for such courses.

R.11c However in the case of a student completing 8th semester and having arrears in the earlier semesters in a maximum of two courses, summer courses may be offered, even if less than five students are registering for the course.

R.11d The number of contact hours and the assessment procedure for any course during summer term will be the same as those during regular semesters except that there is no provision either for withdrawal from a summer term course or for substitute examination.

ASSESSMENT PROCEDURE AND PERCENTAGE WEIGHTAGE OF MARKS

R.12a Every theory course shall have a total of four assessments during a semester as given below,

<table>
<thead>
<tr>
<th>Assessment No.</th>
<th>Course coverage in weeks</th>
<th>Duration</th>
<th>Weightage of max. marks %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test 1</td>
<td>1 to 4</td>
<td>50 min.</td>
<td>16 2/3</td>
</tr>
<tr>
<td>Test 2</td>
<td>5 to 8</td>
<td>50 min.</td>
<td>16 2/3</td>
</tr>
<tr>
<td>Test 3</td>
<td>9 to 12</td>
<td>50 min</td>
<td>16 2/3</td>
</tr>
<tr>
<td>End-Sem. Exam</td>
<td>1 to 16 (Full Course)</td>
<td>3 hours</td>
<td>50</td>
</tr>
</tbody>
</table>

R.12b The pattern of question for at least one of the Tests shall be the same as stipulated for the End-Semester Examination by the Board of Studies/Academic Council. Teachers handling course in the third to eighth semesters are given the option to substitute a maximum of two tests with other suitable alternate type of evaluation approved in the class committee. The details of such a scheme shall be announced to the students and informed to the Dean of Academic courses at the beginning of the Semester. However, for the first and second semester, all assessments will be in the form of tests.

R.12c Every practical course will have 75% weightage for continuous assessment and 25% for End-Semester examination.

R.12d In the case of Industrial Training, the student shall submit a report which will be evaluated along with an oral exami-
nation by a Committee of Teachers constituted by the Head of the Department. A progress report from the industry will also be taken into account for evaluation.

R.12e In the case of project work and mini project work, a committee of Teachers constituted by the Head of the Department will carry out continuous assessment. Based on the project report submitted by the student, an oral examination (Viva-Voce) will be conducted as the End-Semester examination, for which one External Examiner will also be included in the Committee of Teachers.

R.12f Assessment of seminars and comprehension will be carried out by a committee of teachers constituted by the Head of the Department.

SUBSTITUTE EXAMINATIONS

R.13a A student who has missed, for valid reasons, an assessment test/examination may be permitted to write a substitute test/examination. However, permission to take up a substitute test/examination will be given under exceptional circumstances, such as accident or admission to a hospital due to illness.

R.13b A student who misses any assessment test/examination in a course should apply for the substitute test/examination within a week from the date of missed assessment, using the prescribed application form for the purpose. Late applications will not be entertained. The decision on the application will be taken by the Head of the Department offering the course in the case of first three assessments and by the Dean of Faculty in the case of End-Semester examination (fourth assessment). However, if a student applies for the substitute test/examination for the second time in a semester, the decision will be taken by the Dean of Faculty. The Head of the Department/Dean of Faculty can use his discretion in granting permission, recording reasons for his decision. If permitted, the substitute test/examination for any assessment will be held in about two weeks from the date of missed assessment. The substitute test (from missed assessments 1 to 3) will be conducted by the concerned teacher. However, the substitute examination (for missed End-Semester examination) will be conducted centrally.

PASSING AND DECLARATION OF EXAMINATION RESULTS AND GRADE SHEET

R.14a All assessments of a course will be done on absolute marks basis. However, the Class Committee which shall meet within 2 weeks after the End-Semester examinations, shall analyse the relative performance of students in all assessments of a course and decide the letter grade ranges for that course. The letter grades and the corresponding grade points are as follows:

<table>
<thead>
<tr>
<th>Letter Grade</th>
<th>S</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>U</th>
<th>I</th>
<th>W</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade Points</td>
<td>10</td>
<td>9</td>
<td>8</td>
<td>7</td>
<td>6</td>
<td>5</td>
<td>0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"W" denotes withdrawal from the course
"I" denotes inadequate attendance and hence prevention from End-Semester examination.
"U" denotes failure in the course.

R.14b A student who earns a minimum of 5 grade points in a course is declared to have successfully completed the course. Such a course cannot be repeated by the student.

R.14c The results, after awarding of grades, shall be signed by the Class Committee Chairman, Head of the Department and Dean of Faculty and declared by the Dean of Faculty.

R.14d Within 2 weeks from the commencement of classes for the next semester a student can apply for revaluation of his/her end semester examination answer papers in a course, on payment of a prescribed fee, through proper application to the Dean of Faculty. The Dean shall constitute a revaluation committee consisting of Chairman of Class Committee
as convenor, the teacher of the course and a senior member of faculty knowledgeable in that course. The Committee shall meet within a week, revalue the answer paper and submit its report to the Dean of Faculty for consideration and decision.

R.14e After results are declared, Grade Sheets will be issued to each student which will contain the following details. The list of courses enrolled during the semester including summer term courses, if any, and the grade scored. The Grade Point Average (GPA) for the semester and the Cumulative Grade Point Average (CGPA) of all courses enrolled from first semester onwards. GPA is the ratio of the sum of the products of the number of credits of courses registered and the points corresponding to the grades scored in those courses, taken for all the courses, to the sum of the number of credits of all the courses in the semester, including summer courses if any.

\[
GPA = \frac{\text{Sum of } [C \times GP]}{\text{Sum of C}}
\]

CGPA will be calculated in a similar manner, considering all the courses enrolled from first semester. "U", "I" and "W" grades will be excluded for calculating GPA and CGPA.

R.14f After successful completion of the programme, the Degree will be awarded with the following classifications based on CGPA:

<table>
<thead>
<tr>
<th>CLASSIFICATION</th>
<th>CGPA</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Class with Distinction</td>
<td>8.50 and above</td>
</tr>
<tr>
<td>First Class</td>
<td>6.50 and above but below 8.50</td>
</tr>
<tr>
<td>Second Class</td>
<td>below 6.50</td>
</tr>
</tbody>
</table>

ATTENDANCE REQUIREMENT AND COURSE REPETITION

R.15a A student shall attend a minimum of 75% of the contact periods offered in any registered course, to become eligible to appear for the end-semester examination in that course, failing which the student shall be prevented from taking the end-semester examination and shall be awarded "I" grade in that course. If the course is a core course, the candidate should register for and repeat the course when it is offered next.

R.15b Instructor of each course shall take attendance till five calendar days prior to the last instruction day in the semester and report through the Head of the Department to the Dean of Faculty the names of students who have attendance less than 75% in that course. The Dean shall then announce the names of all students prevented from writing the end-semester examinations in various courses.

R.15c A student should repeat a core course wherein "U" or "I" or "W" grade was awarded. If the student is awarded "U" or "I" or "W" grade in an elective course either the same elective course may be repeated or a new elective course may be taken.

ELECTIVE CHOICE: OPTION TO DO PROJECT ALONE IN FINAL SEMESTER

R.16a Apart from the various elective courses listed in the curriculum for each branch of specialisation, the student can choose a maximum of 2 electives from any other specialisation under any Faculty, during the entire period of study, with the approval of the Head of the Parent Department and the Head of the other Department offering the course.

R.16b In the curriculum of 8th Semester, along with the project work, if 2 elective courses alone are listed, then the Dean of Faculty may permit a student, as per approved guidelines, on the recommendation of the Head of the Depart-
ment, to do a full semester major industrial project work. In such a case, the above 2 elective courses or any other 2 elective courses in lieu thereof have to be enrolled during any semester including the summer, preceding or succeeding the project work.

INDUSTRIAL VISIT

R.16c Every student is required to undergo one Industrial visit for every theory course offered, starting from the third semester of the Programme.

PERSONALITY AND CHARACTER DEVELOPMENT

R.17a All students shall enroll, on admission, in any one of the personality and character development programmes the NCC/NSS/NSO and undergo practical training for about 80 hours and attend a camp of about ten days.

National Cadet Corps (NCC) will have about 20 parades

National Service Scheme (NSS) will be social service activities in and around Chennai.

National Sports Organisation (NSO) will have Sports, Games, Drills and Physical exercises.

While the training activities will normally be during week ends, the camp will normally be during vacation period.

R.17b Every student shall put in a minimum of 80% attendance in the practical training and attend the camp compulsorily. Normally this is to be completed during the first year. For valid reasons, the Dean of Students may permit a student to complete this requirements in the second year. However, before enrolling for 5th Semester (7th Semester in the case of Mining Engineering and of lateral entry), a student should have completed the training and produced a certificate from the appropriate authority of NCC/NSS/NSO for having satisfactorily completed the prescribed training and camp.

R.17c Rule 17a and 17b are not applicable to the sponsored/deputed Candidates satisfying Rule 1c admitted to B.E. in Printing Technology.

DISCIPLINE

R.18a Every student is required to observe disciplined and decorous behaviour both inside and outside the campus and not to indulge in any activity which will tend to bring down the prestige of the University.

R.18b Any act of indiscipline of student reported to the Dean of Faculty will be referred to a Discipline and Welfare Committee nominated by the Syndicate from time to time, for taking appropriate action.

ELIGIBILITY FOR THE AWARD OF DEGREE

R.19a A student shall be declared to be eligible for the award of the B.E./B.Tech. Degree provided the student has:

i) Successfully completed all the required courses in the programme curriculum and earned the number of credits prescribed for the specialisation within a maximum period of 12 semester (10 semesters for Lateral Entry) from the date of admission, including break of study.

ii) Completed the NCC/NSS/NSO requirements.

iii) No dues to the Institution, Library, Hostels, NCC, NSS, NSO, etc.

iv) No disciplinary action pending against the student.

R.19b The award of the Degree must have been approved by the Syndicate of the University.

POWER TO MODIFY

R.20 Notwithstanding all that has been stated above, the University has the right to modify the above regulations from time to time.

* * *
# ELECTRICAL AND ELECTRONICS ENGINEERING

**B.E. DEGREE PROGRAMME (8 Semesters)**

Regulation 2000 - CURRICULUM and DETAILED SYLLABUS

(Courses and Credits)

## SEMESTER - I

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### SEMESTER - VI

#### THEORY

1. MG 331 PRINCIPLES OF MANAGEMENT 3 0 0 3  
2. EE 337 DIGITAL SIGNAL PROCESSING 3 1 0 4  
3. EE 338 PROTECTION & SWITCHGEAR 3 0 0 3  
4. EE 339 POWER SYSTEM ANALYSIS 3 1 0 4  
5. EE 340 MICROPROCESSOR & APPLICATIONS 3 1 0 4  
6. EE 341 COMPUTER ARCHITECTURE 3 0 0 3

#### PRACTICAL

1. EE 343 MEASUREMENT & INSTRUMENTATION LABORATORY 0 0 3 2
2. EE 344 IC & MICROPROCESSOR LABORATORY 0 0 3 2

**TOTAL CREDITS:** 25

### SEMESTER - VII

#### THEORY

1. MG 431 ENGINEERING ECONOMICS AND FINANCIAL ACCOUNTING 3 0 0 3  
2. EE 431 POWER SYSTEM CONTROL 3 1 0 4  
3. EE 432 SOLID STATE DRIVES 3 0 0 3  
4. EE 433 HIGH VOLTAGE ENGINEERING 3 0 0 3  
5. EE ELECTIVE - I 3 0 0 3  
6. EE ELECTIVE - II 3 0 0 3

### SEMESTER - VIII

#### THEORY

1. EE ELECTIVE - III 3 0 0 3  
2. EE ELECTIVE - IV 3 0 0 3

#### PRACTICAL

1. EE 444 PROJECT WORK 0 0 12 6

**TOTAL CREDITS:** 183

### LIST OF ELECTIVE COURSES

#### ELECTIVES

1. EE 031 SPECIAL ELECTRICAL MACHINES 3 0 0 3  
2. EE 032 COMPUTER-AIDED DESIGN OF ELECTRICAL APPARATUS 2 0 2 3  
3. EE 033 POWER ELECTRONIC INSTRUMENTATION 3 0 0 3  
4. EE 034 ADVANCED P & E SYSTEMS 3 0 0 3  
5. EE 035 EHV AC & DC TRANSMISSION ENGG. 3 0 0 3
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**LANGUAGE ELECTIVES**

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Branch: ELECTRICAL AND ELECTRONICS ENGINEERING  
Regulation 2000 - DETAILED SYLLABUS

SEMESTER - I

MA 131 MATHEMATICS - I  

1. MATRICES:  
The characteristic equation - eigen values and eigen vectors of a real matrix - some properties of eigen values - Cayley-Hamilton theorem - reduction of a real matrix to a diagonal form, orthogonal matrices, properties - reduction of a quadratic form to a canonical form by orthogonal transformation.

2. GEOMETRICAL APPLICATIONS OF DIFFERENTIAL CALCULUS:  
Curvature - Cartesian and polar co-ordinates - circle of curvature - involutes and evolutes, envelopes - properties of the envelopes - envelope of normal to a curve.

3. FUNCTIONS OF SEVERAL VARIABLES:  
Total differential - Derivative of implicit functions - partial derivative of a function of two functions, Taylor’s expansion for a function of two variables, maxima and minima, Jacobians, differentiation under the integral sign.

4. MULTIPLE INTEGRALS:  
Double integration in Cartesian and polar co-ordinates, change of order of integration, triple integration in Cartesian co-ordinates, Gamma and Beta functions - Properties, Area as a double integral.

5. DIFFERENTIAL EQUATIONS:  
Simultaneous linear equations with constant coefficients, Homogeneous linear equations of Euler type - equations reducible to homogeneous form, linear equations of second order with variable coefficients, method of reduction of order, transformation of the equation by changing the dependent variable, method of variation of parameters.

L = 45  
T = 15  
Total = 60

TEXT BOOK:

REFERENCES:

PH 131 PHYSICS - I  

1. PROPERTIES OF MATTER:  
Elasticity - stress - strain diagram - Factors affecting elasticity twisting couple on a wire, shaft torsion pendulum depression of a cantilever-young's modulus by cantilever - uniform and Non-uniform bending - I shape girder production and measurement of high vacuum - rotary pump - diffusion pump - Penning gauge viscosity Oswald Viscometer comparison of viscosity.

2. ACOUSTICS:  
Acoustics of buildings - Absorption coefficient - Intensity loudness Reverberation time Sabin's formula noise pollution, noise control in a machine - ultrasonic production - magnetostriction and piezoelectric methods - applications of ultrasonic in engineering and medicine.
3. **HEAT AND THERMODYNAMICS:**

4. **OPTICS:**

5. **LASER AND FIBRE OPTICS:**
Principle of lasers - Laser characteristics - Ruby - NdYAG, He-Ne, CO2 and semiconductor lasers - propagation of light through optical fibers - types of optical fibers-applications of optical fibers as optical waveguides and sensors.

6. **PRACTICALS:**
1. Young's modulus by nonuniform bending
2. Rigidity modulus and moment of inertia using Torsion pendulum
3. Viscosity of a liquid by Poiseuille's method
4. Wave length determination using grating by spectrometer
5. Particle size determination by laser
6. Thermal conductivity by Lees disc
7. Thickness of wire by Air wedge
8. Thermo EMF measurement by potentiometer

\[ L = 30 \quad T = 15 \quad P = 30 \quad \text{Total} = 75 \]

**TEXT BOOK:**

**REFERENCE:**

**CM 131 CHEMISTRY - I**

1. **CHEMICAL THERMODYNAMICS:**
Definition of free energy and spontaneity - Maxwell relations - Gibbs - Helmholtz equation - Van't Hoff equations - stoichiometry and energy balances in chemical reactions.

2. **DYNAMICS OF CHEMICAL PROCESS:**
Basic concepts - composite reactions (opposing, parallel and consecutive reactions) - collision theory - thermodynamic formulation of reaction rates - unimolecular reactions - chain reactions (stationary and non-stationary) - enzyme kinetics - Michael's - Mention equation.

3. **ELECTRODICS:**
Types of electrodes and cells - Nerst equation - EMF measurement and its applications - Principles of chemical and electrochemical corrosion - corrosion control (sacrificial anode and impressed current methods).
4. WATER:

Water quality parameters - definition and expression - estimation of hardness (EDTA method) and alkalinity (titrimetry) - water softening (zeolite) - demineralisation (ion-exchangers and desalination (RO) - domestic water treatment.

5. POLYMERS:

Monomer - functionality - degree of polymerisation - classification based on source and applications - addition, condensation and copolymerisation - mechanism of free - radical polymerisation - thermoplastics and thermosetting plastics - processing of plastics - injection molding, blow molding and extrusion processes.

6. PRACTICAL:

1. Water analysis: Determination of hardness, alkalinity, DO, Fe (spectrophotometer) and Na & K (Flame photometry)
2. Electrochemistry and corrosion experiments.
3. Polymer experiments.

L = 30  T = 15  P = 30  Total = 75

TEXT BOOK:


REFERENCE:


GE131 ENGINEERING MECHANICS

1. BASICS:

Introduction - units and dimensions - law of mechanics - vectors - vectorial representation of forces and moments - Vector operations.

2. STATICS OF PARTICLES

Coplanar forces - Resolution and Composition of forces - Equilibrium of a particles -forces in space equilibrium of a particle in space - equivalent systems of forces - principle of transmissibility - single equivalent force.

3. EQUILIBRIUM OF RIGID BODIES

Free body diagram types of supports and their reactions - requirements of stable equilibrium - equilibrium of rigid bodies in two dimensions - equilibrium of rigid bodies in three dimensions.

4. PROPERTIES OF SURFACES AND SOLIDS

Determination of areas and volumes - first moment of area and the centered second and product moments of plane area - parallel axis theorems and perpendicular axis theorems - polar moment of inertia - principal moments of inertia of plane areas - principal axes of inertia - mass moment of inertia - relation to area moments of inertia.

5. FRICTION

Frictional force - laws of Coulomb friction - simple contact friction - rolling resistance - belt friction.
6. DYNAMICS OF PARTICLES


7. ELEMENTS OF RIGID BODY DYNAMICS

Translation and rotation of rigid body - velocity and acceleration - general plane motion - moment of momentum equation - rotation of rigid body - work energy equation.

L = 45  T = 15  Total = 60

TEXT BOOK:

REFERENCE:

GE 132 COMPUTER PRACTICE - I 1 0 3 3

1. FUNDAMENTALS OF COMPUTERS AND OPERATING SYSTEMS:

Evolution of computers-organization of modern digital computers - single user operating system - multitasking OS-GUI.

2. OFFICE AUTOMATION:

Word processing - data base management system - spreadsheet package - presentation software.

L = 15  P = 45  Total = 60

TEXT BOOK:

REFERENCE:

GE 133 WORKSHOP PRACTICE 0 0 4 2

Tools and equipment used in Smithy, Carpentry, Fitting, Foundry, Welding and Sheet Metal.

LIST OF EXPERIMENTS:

1. Sheet Metal:
   Fabrication of tray, cone etc. with sheet metal.
2. Welding:
Arc welding of butt joint, lap joint, Tee fillet etc. Demonstration of gas welding.

3. Fitting:
Practice in chipping, filing, drilling - making Vee square and dovetail joints.

4. Carpentry:
Planning practice - making halving joint and dovetail joint models.

5. Foundry:
Preparations of simple moulds like flange, gear, V-grooved pulley etc.

6. Smithy:
Demonstrations for making simple parts like keys, bolts etc.

P = 60  Total = 60

SEMESTER II
MA 132 MATHEMATICS - II

1. VECTOR CALCULUS:
Gradient, Divergence, Curl - line and surface integrals - Green's, Gauss divergence and Stokes theorems - verification and applications.

2. ANALYTIC FUNCTIONS:
C-R equations - properties and analytic functions - determination of harmonic conjugates and analytic function - conformal mappings - mapping properties of \( w = z + a, \frac{1}{z}, az, z^2 \) and bilinear transformation.

3. COMPLEX INTEGRATION:
Cauchy's theorem - Cauchy's integral formula - Taylor and Laurent's series - singularities and classification - residues, Cauchy's residue theorem - contour integration around circular and semi-circular contours (excluding poles on the real axis).

4. EMPIRICAL STATISTICS:

5. STATISTICAL INference:
Sampling distribution - testing of hypothesis - level of significance - confidence limits - tests based on normal distribution, t-distribution, F-distribution and Chi-square distribution.

L = 45  T = 15  Total = 60

TEXT BOOK:

REFERENCE:
1. ELECTROSTATICS AND ELECTROMAGNETISM: 9
Electric field and potential - Gauss theorem - applications -
dielectrics - capacitance - energy stored in a dielectric
medium - types of capacitors - loss of energy due to sharing
of charges by the capacitors - electrical conductivity in
conductors - Carey Foster's bridge - Maxwell's equations -
free space wave equation - characteristic impedance.

2. QUANTUM PHYSICS: 9
Development of quantum theory - dual nature of matter and
radiation - Compton effect - pair production - uncertainty
principle - equivalence of mass and energy Schrodinger's
wave equation - particle in a box - electrons in a metal.

3. ATOMIC AND NUCLEAR PHYSICS: 9
Characteristics of atomic spectra-molecular spectra - vector
atom model - Stern and Gerlach experiment - Raman effect
and its applications - liquid drop model - explanation for nuclear
fission - shell model - chain reaction - criticality - four factor
formula - Q value - power reactors - Laser induced nuclear
fusion.

4. ELEMENTARY CRYSTALLOGRAPHY: 9
Symmetry elements - Miller Indices for cubic crystals - pack-
ing factor calculations for cubical structures - Bragg's law and
X-ray diffraction methods to study crystal structures - crystal
imperfections - crystal growth (Basic ideas only)

5. NONDESTRUCTIVE TESTING: 9
Liquid penetrant, magnetic particle and eddy current methods
- X-ray radiography - fluoroscopy -gamma ray radiography
- ultrasonic scanning methods - ultrasonic flaw detector
- thermography.

L = 45  Total = 45

TEXT BOOK:
1. Arumugam, M., 'Engineering Physics', Anuradha Publica-
tions, 1998

REFERENCE:
3. Vasudeva, D.N., 'Fundamentals of Electricity and Magnetism',

CE 151 SOLID MECHANICS 2002

1. ANALYSIS OF PLANE TRUSSES: 8
   Stability and equilibrium of plane frames - perfect frames
   types of trusses - analysis of forces in truss members - method
   of joints - method of joints - method of tension coefficients
   method of sections.

2. STRESS, STRAIN AND DEFORMATION
   OF SOLIDS: 5
   Rigid bodies and deformable solids - Stability strength and
   stiffness - Tension, compression and shear stresses - Defor-
   mation of simple and compound bars - Elastic constants
   stresses at a point stresses on inclined planes - principal
   stresses and principal planes.

3. TRANSVERSE LOADING ON BEAMS 6
   Beams - Types and transverse loading on beams - sheer force
   and bending moment in beams - Cantilevers - Simply
   supported beams and over-hanging beams.

4. STRESSES IN BEAMS 6
   Theory of simple bending - Analysis of stresses - load carry-
   ing capacity - Proportioning sections - leaf springs - Sheer
   stress distribution.
5. **TORSION:**

Stresses and deformation in circular and hollow shafts - stresses in helical springs - Deflection of springs - Design of buffer springs.

\[ L = 30 \quad \text{Total} = 30 \]

**TEXT BOOK:**


**REFERENCE:**


**EE131 ELECTRIC CIRCUIT ANALYSIS**

| 3 | 1 | 0 | 4 |

1. **BASIC CIRCUIT CONCEPTS:**


2. **SINUSOIDAL STEADY STATE ANALYSIS:**

Phasor- sinusoidal steady state response - concepts of impedance and admittance - analysis of simple circuits - power and power factor - series resonance and parallel resonance - bandwidth and Q factor. Solution of three-phase balanced circuits - power measurements by two-wattmeter methods - solution of three-phase unbalanced circuits.

3. **MESH-CURRENT AND NODE-VOLTAGE METHODS:**


4. **NETWORK THEOREMS AND APPLICATIONS:**

Superposition theorem - reciprocity theorem - compensation theorem - substitution theorem - maximum power transfer theorems - Thevenin's theorem - Norton's theorem and Millman's theorem with applications.

5. **TRANSIENT ANALYSIS:**

Forced and free response of RL, RC and RLC circuits with D.C. and sinusoidal excitations.

\[ L = 45 \quad T = 15 \quad \text{Total} = 60 \]

**TEXT BOOK:**


**REFERENCE:**

GE 134 ENGINEERING GRAPHICS 1033

1. PRINCIPLES OF GRAPHICS: 4
   Two-dimensional geometrical construction - conic sections, involutes and cycloids - Representation of three-dimensional objects - principles of projections - standard codes of principles.

2. ORTHOGRAPHIC PROJECTIONS: 7
   Projections of points, straight lines and planes - auxiliary projections - projection and sectioning of solids - intersection of surfaces - development of surfaces.

3. PICTORIAL PROJECTIONS: 2
   Isometric projections - Perspectives - free hand sketching.

4. COMPUTER GRAPHICS: 2
   Hardware - display technology - software - introduction to drafting software.

L = 15  P = 45  Total = 60

TEXT BOOK:

REFERENCE:

GE 135 COMPUTER PRACTICE - II 1033

1. MULTI USER OPERATING SYSTEM: 4
   Unix: Introduction - basic commands - vi editor - filters - input/output redirection - piping - transfer of data between devices - shell scripts.

2. FUNDAMENTALS OF NETWORKING: 3
   Working on a network environment - accessing different machines from one node - concept of E-mail - uses of Internet.

3. HIGH LEVEL LANGUAGE PROGRAMMING: 8
   C language: Introduction - operator - expressions - variables - input/output statements - control statements - function - arrays - pointer - structures - unions - file handling - case studies

L = 15  P = 45  Total = 60

TEXT BOOK:

23
3. LAPLACE TRANSFORMS: 9
Transforms of simple functions - basic operational properties - transforms of derivatives and integrals - periodic functions - convolution theorem - inverse transforms - initial and final value theorems - applications of Laplace transforms to linear ordinary differential equations.

4. PARTIAL DIFFERENTIAL EQUATIONS: 9
Formation - solution of standard types of first order equation and Lagrange's Linear Equation - linear partial differential equations of second and higher order with constant coefficients.

5. BOUNDARY VALUE PROBLEMS: 9
Classification of second order partial differential equations - transverse vibrations of a string - one-dimensional heat equation and two-dimensional heat flow - Fourier series solutions in Cartesian coordinates.

P = 45  Total = 45

SEMMESTER - III

MA 231 MATHEMATICS III 3104

1. FOURIER SERIES: 8
Dirichlet's conditions - general Fourier series - half range sine and cosine series - Parseval's identity - harmonic analysis.

2. FOURIER TRANSFORMS: 10
Fourier integral representation - Fourier transform pairs, properties - Fourier sine and cosine transforms - transforms of simple functions - transforms of derivatives - the convolution integrals of Fourier - application to one-dimensional wave and diffusion equations.

L = 45  T = 15  Total = 60

TEXT BOOK:

REFERENCE:
1. **CONDUCTING MATERIALS:**


2. **SEMI CONDUCTING MATERIALS:**

Elemental and compound semiconductors and their properties - carrier concentration in intrinsic semiconductors - carrier concentration in n type and p type semiconductors - variation of carrier concentration with temperature - variation of Fermi level with carrier concentration and temperature and its influence - Hall effect - experimental arrangement - applications of Hall effect.

3. **MAGNETIC AND DIELECTRIC MATERIALS:**

Different types of magnetic material and their properties - Heisenberg and domain theory of ferromagnetism - hysteresis - energy product of a magnetic material - Ferrite and their applications - magnetic recording materials - tapes and disks - metallic glasses - active and passive dielectrics and their frequency and temperature dependence - internal field and deduction of ClausiusMosotti equation - dielectric loss - different types of dielectric breakdown - classification of insulating materials and their applications.

4. **OPTICAL MATERIALS:**

Optical properties of metals, insulators and semiconductors - excitons, traps, colour centres and their importance - phosphorescence and fluorescence - different phosphors used in CRO screens - liquid crystal as display material - twisted nematic display - construction and working of LED - LED materials - thermography and its applications - photo conductivity and photo conducting materials.

5. **MODERN ENGINEERING MATERIALS:**

Metallic glasses as transformer core material - nanophase material - shape memory alloys - advance ceramic materials - polymers - biomaterials - non-linear materials and their applications.

\[ L = 45 \quad \text{Total} = 45 \]

**TEXT BOOK:**


**REFERENCE:**

diffusion currents - continuity equation - Hall effect - PN junction - current equation-junction capacitance - breakdown characteristics - Varactor, tunnel, fast recovery, Schottky and zener diodes.

3. **BIPOLAR JUNCTION TRANSISTOR:**
Ebers-Moll equation - input output characteristics - switching characteristics - 'h' parameters - Low frequency and high frequency equivalent circuits - RF transistors - Power transistors.

4. **FET, UJT and SCR:**
Theory and characteristics of JFET and MOSFET - low frequency and high frequency equivalent circuits - Theory and characteristics of UJT, SCR and TRAC.

5. **CCD AND OPTOELECTRONIC DEVICES:**
Charge transfers and charge coupled devices-theory and applications. Semiconductor Opto electronic devices - LED, LASER diode, LCD, Photo diode Solar Cell.

L = 45  Total = 45

**TEXT BOOK:**

**REFERENCE:**


**CE25 FLUID MECHANICS**

1. **FLUID PROPERTIES:**
Fundamental units - mass density - specific weight - viscosity - surface tension -capillary - compressibility.

2. **FLUID KINEMATICS AND DYNAMICS:**
Streamline - streak line - pathline - continuity equation - stream and potential functions - Bernoulli's equation - Darcy's equation - Moody's diagram.

3. **FLOW THROUGH PIPES:**
Pipes in series and parallel - major and minor losses - hydraulic grade line - venturi meter - orifice meter - manometer.

4. **HYDRAULIC MACHINERY:**
Classification of turbines - efficiency and performance of turbines - specific speed -rotodynamic and positive displacement pumps - pumps in series and parallel.

L = 30  Total = 30
REFERENCE:

ME 251 THERMODYNAMICS

1. SYSTEMS AND LAWS OF THERMODYNAMICS:
   Closed and open systems-equilibrium - first law - second law - reversibility - entropy - processes - heats and work transfers - entropy change - Carnot cycle.

2. POWER CYCLES AND INTERNAL COMBUSTION ENGINES:
   Carnot cycle - Otto cycle - diesel cycle - dual cycle - Brayton cycle - air standard efficiency - two stroke and four-stroke engines - SI and CI Engines - gas turbine operation.

3. STEAM BIOLERS AND TURBINES:
   Steam properties - use of steam tables and charts - steam power cycle-boilers and accessories - boiler testing - layout of thermal power station - steam turbines - impulse and reaction turbines - compounding of turbines - simple velocity diagrams.

4. AIR COMPRESSORS, REFRIGERATION AND AIR CONDITIONING:
   Reciprocating and rotary compressors - staging compressor work - vapour compression - refrigeration cycle - applications - air-conditioning system layout - selection.

5. HEAT TRANSFER:
   Conduction - plane wall, cylinder, sphere, composite walls - critical insulation thickness - simple fins - convection - free convection and forced convection flow over flat plates and flow through pipes - empirical relations - radiation - black body, grey body radiation exchanges - cooling of machines.

L = 45  Total = 45

TEXT BOOK:
2. Kothandaraman and Domkundwar, 'Applied Thermodynamics',

REFERENCE:

EE 231 ELECTROMAGNETIC THEORY

1. GENERAL PRINCIPLES:
   The field concept - sources of electromagnetic fields.

2. ELECTROSTATICS:
   Charges - Coulomb's Law - electric field intensity - electric flux - Gauss's law - potential - boundary value problems - Laplace and Poisson's equations - electrostatic energy - dielectrics - capacitance.

3. MAGNETOSTATICS:
4. ELECTROMAGNETIC FIELDS: 8

5. ELECTROMAGNETIC WAVES: 9
Generation - propagation of waves in dielectrics - conductors and transmission lines - Poynting vector - skin effect.

6. FIELD MODELLING AND COMPUTATION: 9

7. TUTORIAL PROBLEMS: 15
Field plotting of electrostatic, magnetostatic and electromagnetic configurations using standard software.

L = 45  T = 15  Total = 60

TEXT BOOK:

REFERENCE:


EE 232 ELECTRICAL MACHINES - I 3104

1. INTRODUCTION: 6
Electrical machine types - magnetic circuits - inductance - induced EMF and force - core losses - AC operation of magnetic circuits.

2. TRANSFORMERS: 10

3. ELECTROMECHANICAL ENERGY CONVERSION: 6
Energy in magnetic systems - field energy and mechanical force - singly and multiply excited systems.

4. BASIC CONCEPTS IN ROTATING MACHINES: 8
MMF of distributed windings - magnetic fields in rotating machines - rotating MMF waves in AC machines - generated voltages - torque.

5. DC MACHINES: 15
Construction - EMF and torque - circuit model - armature reaction - commutation - methods of excitation - characteristics of generators - characteristics of motors - starting and speed control - testing and efficiency - parallel operation.

L = 45  T = 15  Total = 60
TEXT BOOK:

REFERENCE:

EE 241 ELECTRIC MACHINES LABORATORY - I 0 0 3 2

1. Open Circuit and load characteristics of a separately excited DC Generator.
2. Open Circuit and load characteristics of DC Shunt generator
3. Load characteristics of DC compound generator
4. Load test on DC shunt motor
5. Load test on DC series motor
6. Speed control of DC Shunt motor
7. Swinburne's Test
8. Study of DC motor starters
9. Load test on single phase transformer
10. Open circuit and short circuit test on single phase transformer
11. Separation of no load losses in a single phase transformer
12. Sumpner's Test
13. Three Phase connection
14. Scott connection

P = 45  Total = 45

SEMESTER - IV

EC 254 ELECTRONICS CIRCUITS 3 0 0 3

1. AMPLIFIERS: 10
   - Biasing circuits for transistors - FET and their analysis - CE, CC and CB amplifiers - FET amplifiers-frequency response - cascade and Darlington connections - analysis of class A and B power amplifiers - complementary symmetry amplifiers - class C power amplifier.

2. DIFFERENTIAL AND TUNED AMPLIFIERS: 8
   - Differential amplifiers - common mode and difference mode analysis-Drift compensation - FET input stages - chopper stabilizer amplifier - introduction to tuned amplifiers.

3. FEEDBACK AMPLIFIERS AND OSCILLATORS: 9
   - Advantages of negative feedback-voltage/current, series/shunt feedback-positive feedback-condition for oscillations; phase shift - Wien bridge, Hartley, Colpits and crystal oscillators.

4. PULSE CIRCUITS: 9
   - RC wave shaping circuits-Diode clamps and clippers-Multivibrators-Schmitt triggers - UJT and transistor sawtooth oscillators.

5. RECTIFIERS AND POWER SUPPLIERS: 9
   - Single and polyphase rectifiers and analysis of filter circuits - Design of zener and Transistor series voltage regulators - switched mode power supplies.

L = 45  Total = 45

TEXT BOOK:
REFERENCE:

EC 256 COMMUNICATION ENGINEERING 3 0 0 3

1. RADIO COMMUNICATION SYSTEMS: 15
   Frequency spectrum - Principle of AM and FM - AM and FM
   transmitters and receivers - Introduction to microwave
   communication systems - principle of satellite communi-
   cation.

2. PULSE COMMUNICATION SYSTEMS: 5
   PAM, PPM, PDM, PCM - delta modulation - differential PCM
   - merit and demerits - comparison of pulse modulation
   schemes.

3. DATA TRANSMISSION: 10
   Base band signal receiver - error probability - optimum and
   matched filter techniques coherent reception - digital modu-
   lation Systems - FS, PSK- comparison of data transmission
   systems.

4. TRANSMISSION MEDIUM: 10
   Characteristics of cables - optical fibers - effects of EM radia-
   tion - bandwidth and noise restrictions - statistical measure-
   ments of random noise - concept of multiplexing - FDM and
   TDM.

5. TELEVISION: 5
   Scanning methods - B/W and colour systems - camera and
   picture tubes - synchronisation - transmitters and receivers.

L = 45 Total = 45

36

TEXT BOOK:
2. Taub and Schilling Principles of Communication Systems,

EE 234 ELECTRICAL MACHINES - II 3 1 0 4

1. SYNCHRONOUS MACHINES: 15
   Construction - types - circuit model - synchronous reactance-
   voltage regulation - EMF, MMF, POTIER and ASA methods
   - armature reaction - synchronising - parallel operation
   - operating characteristics - capability curves - salient pole
   synchronous machines - hunting - short circuit transients.

2. THREE PHASE INDUCTION MACHINES: 15
   Construction - types - principle of operation - equivalent
   circuit - torque and power output - testing - circle diagram-
   cogging and crawling - starting and speed control - double
   cage rotor - induction generator - synchronous induction
   motor.

3. FRACTIONAL HORSEPOWER MOTORS: 15
   Single phase induction motor - double revolving field theory-
   equivalent circuit - performance analysis -load characteristics
   - starting methods - shaded-pole induction motor - variable
   reluctance motor - stepping motor - hysteresis motor - AC

37
series motor - repulsion motor - linear motor - permanent magnet DC and AC motors.

\[ L = 45 \quad T = 15 \quad \text{Total} = 60 \]

TEXT BOOK:

REFERENCE:

EE 235 CONTROL SYSTEMS

1. BASIC CONCEPTS AND SYSTEM REPRESENTATION: 12
Terminology and basic structure-feedback control theory-multivariable systems-dynamic models-state variable models-impulse response models and transfer function models-application to mechanical, thermal, hydraulic, pneumatic and electromechanical systems. Block diagram representation and signal flow graphs-control system components

2. TIME RESPONSE ANALYSIS AND DESIGN: 9
I and II order systems-performance specifications-feedback analysis-P, PI, PID controllers design-effect of pole, zero addition-desired closed loop pole location-root locus plot and applications-steady state and dynamic error coefficients-robust control.

3. FREQUENCY RESPONSE ANALYSIS AND DESIGN: 9
Performance specifications-correlation to time domain specifications-bode plots and polar plots-gain and phase margin-constant M and N circles and Nichols chart-all pass and non-minimum phase systems.

4. STABILITY: 9

5. COMPENSATION DESIGN: 6
Design concepts-realization of basic compensation-cascade compensation in time domain and frequency domain (Simple MATLAB applications to analysis and compensators design problems.)

\[ L = 45 \quad T = 15 \quad \text{Total} = 60 \]

TEXT:

REFERENCES
5. R.C. Dorf and R.H. Bishop, 'Modern Control Systems', Addison-Wesley, 1995 (MATLAB Reference)
EE 236 NETWORK ANALYSIS AND SYNTHESIS 3104

1. **s-DOMAIN ANALYSIS:**
   s-domain network - driving point and transfer impedances and their properties - transform network analysis - poles and zeros of network functions - time response from pole-zero plots.

2. **FREQUENCY DOMAIN ANALYSIS:**
   Immittance loci of RLC networks - Frequency response of RLC networks - frequency response from pole-zero - Bode plots.

3. **NETWORK TOPOLOGY:**
   Network graph, tree and cut-sets - tie set and cut-set schedules - v-shift and l-shift - Primitive impedance and admittance matrices - Application to network solutions.

4. **TWO-PORT NETWORKS:**
   Characterisation of two-port networks in terms of z, y, h and T-parameters - Network Equivalents - Relations between network parameters - Analysis of T, ladder, bridged-T and lattice networks - Transfer function of terminated two-port networks.

5. **ELEMENTS OF NETWORK SYNTHESIS:**

6. **DESIGN OF FILTERS:**
   Filters and attenuators - Design of constant-k, m-derived and composite filters - qualitative treatment of active filters - Butterworth and Chebyshev filters.

\[ L = 45 \quad T = 15 \quad \text{Total} = 60 \]

TEXT BOOK:

REFERENCE:

EE 237 OBJECT ORIENTED PROGRAMMING AND APPLICATION TO ELECTRICAL ENGINEERING 2023

1. **OBJECTED ORIENTED PROGRAMMING PARADIGM:**
   Introduction - reusability - security - object oriented programing fundamental - abstraction - encapsulation - derivation - object oriented languages and packages.

2. **CLASSES AND OBJECTS:**
   Introduction to C++ - procedural oriented approach to C++ - data types - control structures - problem solving - standard input output streams - C++ enhancements -function prototypes - default reference variables - constants - classes - construction - destructs - constraint objects - member objects - member functions.

3. **ADVANCED FEATURES:**
   Dynamic memory allocation pointers - new and delete operators - classes with pointers - copy constructor - static members - friend classes - friend functions - operator overloading.
4. POLYMORPHISM AND INHERITANCE: 7
Function over loading - connection classes - derived classes -
class conversion - protected members - virtual function -
dynamic binding - abstract classes - multiple inheritance -
templates - error handling.

5. CASE STUDIES: 7
Over view of typical object oriented systems - case studies -
application to electrical engineering.

L = 30  L = 30  Total = 60

TEXT BOOK:
2. K.R.Dittrich et al, 'On Object Oriented Database System',

REFERENCE:

EC 258 ELECTRONICS LABORATORY  0 0 3 2
1. Common Emitter and common collector amplifier
2. FET amplifier
3. Class B amplifier
4. Differential amplifier
5. Feed back amplifier
6. Phase shift and Wein bridge Oscillator
7. Hartley and Colpitt oscillator

8. Astable multivibrator
9. Monostable and Bistable multivibrator
10. Series voltage regulator

P = 45  Total = 45

EE 242 ELECTRICAL MACHINES LABORATORY - II  0 0 3 2
1. Regulation of 3 Phase alternator by EMF and MMF methods.
2. Regulation of 3 Phase alternator by ZPF and ASA Method.
3. Slip Test
4. Load characteristics of 3 Phase alternator by busbar loading.
5. V and Inverted V curves of synchronous motor.
6. Load test on 3 phase induction motor
7. No Load and blocked rotor test on three-phase induction
motor.
8. Synchronous induction motor
9. Study of induction motor starters
11. Equivalent circuit and pre-determination of performance
characteristics of single-phase induction motor.

P = 45  Total = 45

SEMESTER - V

EE 331 MEASUREMENTS AND INSTRUMENTATION  3 0 0 3
1. INTRODUCTION:
6
Functional elements of an instrument - static and dynamic
characteristics - errors in measurement - statistical evalu-
tion of measurement data - standard and calibration.
2. **TRANSDUCERS:**

Classification of transducers - selection of transducers - resistive, capacitive and inductive transducers - piezo electric transducers - optical and digital transducers. pH electrodes - transducers for measurement of displacement, temperature, level, flows, pressure, velocity and acceleration.

3. **SIGNAL CONDITIONING CIRCUITS:**

Bridge circuits - differential and Instrumentation amplifiers - filter circuits - V/f and f/V converters - PI and I/P converters - S/H Circuit, A/D and D/A converters - multiplexing and demultiplexing - data acquisition systems - grounding techniques.

4. **STORAGE AND DISPLAY DEVICES:**

Magnetic disc and tape recorders - digital plotters and printers - CRT displays - digital CRO - LED, LCD and Dot matrix displays.

5. **ELECTRICAL AND ELECTRONICS INSTRUMENTS:**

Principle and types analog and digital ammeters and volt-meters - single and three phase Wattmeters and Energy meter - magnetic measurements - instrument transformers - instruments for measurement of torque, speed frequency, phase, viscosity and moisture.

L = 45 \hspace{1cm} \text{Total} = 45

**TEXT BOOK:**


**REFERENCE:**


**EE 332 POWER ELECTRONICS**

1. **POWER SEMICONDUCTOR DEVICES:**

Principle of operation - characteristics and modelling of power diodes, SCR, TRIAC, GTO, power BJT, power MOSFET and IGBT.

2. **PHASE CONTROLLED CONVERTERS:**

2 pulse, 3 pulse and 6-pulse converters - inverter operation - input power factor - effect of source inductance and firing circuits.

3. **DC TO DC CHOPPERS:**

Voltage, current and load-commutated choppers - step up chopper and firing circuits.

4. **INVERTERS:**

Series inverter - voltage source inverters - current source inverters - PWM inverters.

5. **AC VOLTAGE CONTROLLERS:**

Single phase AC voltage controller - multi stage sequence control - step up and step down cycloconverters - three phase to single phase and three phase to three phase cycloconverters.

L = 45 \hspace{1cm} \text{Total} = 45
TEXT BOOK:

REFERENCE:

EE 333 DIGITAL SYSTEMS 3104

1. NUMBER SYSTEM AND CODES: 9
Efficiency of a number system - Radix conversion - Arithmetic with base other than ten - Alphanumeric codes - various codes - error detection and correction.

2. BOOLEAN ALGEBRA AND COMBINATIONAL LOGIC DESIGN: 9

3. LOGIC FAMILIES AND DIGITAL ICs: 9
RTL, DTL, TTL, ECL and MOS families and their characteristics - internal circuits of basic gates AND, OR NOT and XOR using Bipolar, MOS and CMOS families - multiplexer and demultiplexer - encoder and decoder - half-adder and full-adder - subtractor and magnitude comparators.

EE 334 INTEGRATED CIRCUITS 3003

4. SEQUENTIAL LOGIC CIRCUITS: 9
Synchronous and asynchronous operation - SR, JK, D and T flip-flops - Analysis of synchronous and asynchronous sequential circuits - Memories.

5. DESIGN OF DIGITAL SYSTEMS: 9
Examples for combinational logic circuit design - sequential logic circuit design - State minimisation - design of counters using flip-flops - system design using multiplexer and demultiplexer - encoder - decoder - memory based design - design using PAL and PLA.

L = 45   T = 15   Total = 60

TEXT BOOK:

REFERENCE:

1. FABRICATION OF INTEGRATED CIRCUITS: 9
diffusion enhancements and retardation - ion implementation - metallisation - packing - realisation of passive and active devices like R, C, diodes, transistors in ICs.

2. **LINEAR INTEGRATED CIRCUITS:**

   Introduction to Linear IC - operational amps - characteristics - application of op amp - arithmetic circuits, amplifier, rectifiers, op amp circuits using diodes - I, II order filters, waveform generators using op amps - square, triangular and sine wave generations. Basic functional internal block diagram, characteristics and applications of following. ICs: 555, 565, 566, LM723 voltage regulator and current regulators.

3. **DIGITAL INTEGRATED CIRCUIT:**

   Designing combinational logic gates in CMOS - very high performance - Design of sequential logic circuits - arithmetic building blocks - design of memory and array structures.

4. **VLSI INTEGRATED CIRCUITS:**

   Fundamental consideration - NMOS, CMOS, Bipolar IC technology - IC fabrication - assembly technique and packaging of VLSI devices - reliability requirements for VLSI - failure mechanisms & rates - future trends.

5. **SPECIAL APPLICATION ICs:**

   Functional block, characteristics and applications of ADC/DAC ICs - Optical ICs - DSP IC - video and audio ICs - IC transducers - Function generator and filter ICs.

TEXT BOOK:


REFERENCES:


EE 335 TRANSMISSION AND DISTRIBUTION 3 0 0 3

1. **INTRODUCTION:**

   Structure of electric power system - transmission and distribution systems - recent trends in power transmission - EHV AC and HVDC transmission.

2. **TRANSMISSION LINE PARAMETERS:**

   Resistance, inductance and capacitance of single and three phase transmission lines - stranded and bundled conductors - symmetrical and unsymmetrical spacing - transposition - application of self and mutual GMD - skin and proximity effect - inductive interference with neighbouring circuits.

3. **CHARACTERISTICS AND PERFORMANCE OF TRANSMISSION LINES:**

   Equivalent circuits for short, medium and long lines - attenuation constant, phase constant, surge impedance - transmission efficiency and voltage regulation - real and reactive power flow in lines - power angle diagram - receiving end power circle diagram - limiting factors of transmission line loadability - shunt and series compensation - Ferranti effect and corona loss.
4. **INSULATORS AND CABLES:**

5. **GENERAL ASPECTS:**
Mechanical design of transmission lines - tariff and economic utilisation and conservation of energy.

\[ L = 45 \quad \text{Total} = 45 \]

**TEXT BOOK:**

**REFERENCE:**

**EE 336 DESIGN OF ELECTRICAL APPARATUS**

1. **INTRODUCTION:**
Basic concept of design - standard specifications - classification of materials - electric and magnetic circuits - leakage reactance calculation - thermal rating of electrical apparatus - performance prediction from thermal rating.

2. **DC MACHINES:**
DC Machines - constructional details - output equation - main dimensions - choice of number of poles - armature and field coil design - design of commutator and brushes - performance calculation.

3. **TRANSFORMERS:**
Constructional details - output rating - output equation - design of core windings - single and three-phase transformers - determination of no-load current and equivalent circuit parameters - design of tank and cooling tubes for distribution transformers - performance calculations.

4. **INDUCTION MOTORS:**
Constructional details - output equation - main dimensions - design of stator - design of squirrel cage and slip ring rotor - determination of no-load current and equivalent circuit parameters - performance prediction using circle diagram.

5. **COMPUTER AIDED DESIGN:**
Computer in design, flow-chart, magnetic field calculations using finite difference and finite element methods. Determination of equipotential lines.

\[ L = 45 \quad T = 15 \quad \text{Total} = 60 \]

**TEXT BOOK:**

**EE 341 CONTROL SYSTEMS LABORATORY**

1. Transfer function of separately excited DC Generator.
2. Transfer function of Armature controlled DC Motor.
3. Transfer function of AC Servomotor.
4. Compensating networks
5. Study of Synchros.
6. DC Stepper Motor
7. DC Position Control system.
8. Digital control of first order plant (P, PI and PID).
9. Digital control of second orders liquid level system (state variable feedback).
10. Study of transducers

\[ P = 45 \quad \text{Total} = 45 \]

EE 342 POWER ELECTRONICS LABORATORY \hspace{1cm} 0 0 3 2

1. SCR Characteristics.
2. UJT Relaxation oscillator circuits.
3. SCR trigger circuits.
4. Forced commutation circuits.
5. Voltage and current commutation.
6. SCR phase control circuits.
7. Triac phase control circuits.
8. SCR converters.
9. SCR regulated power supply.
10. Speed control of DC shunt motor.
11. SCR DC circuit breaker.

\[ P = 45 \quad \text{Total} = 45 \]

SEMESTER VI

MG 331 PRINCIPLES OF MANAGEMENT \hspace{1cm} 3 0 0 3

1. THE BASIC OF MANAGEMENT THEORY AND SCIENCE: 3
   Management: Science, theory and practice - management and society - social responsibility and ethics.

2. PLANNING: 8
   The nature and purpose of planning - objectives, strategies, policies and planning premises - decision-making.

3. ORGANIZING: 8
   The nature and purpose of organising - basic departmentation - line/staff authority and decentralisation effective organising and organisational culture.

4. STAFFING: 8
   Human resource management and selection - performance appraisal and career strategy - manager and organizational development.

5. LEADING: 8
   Management and the human factor - motivation - leadership - communication.

6. CONTROLLING: 8
   The system and process of controlling control techniques and information technology-productivity and operations management - over all and preventive control.

7. INTERNATIONAL MANAGEMENT AND THE FUTURE: 2
   Towards a unified, global management theory.

\[ L = 45 \quad \text{Total} = 45 \]
TEXT BOOK:

REFERENCE:

EE 337 DIGITAL SIGNAL PROCESSING

1. INTRODUCTION:

2. DISCRETE TIME SYSTEMS:
Representations-classifications - time domain and frequency domain characterization - transfer functions - Z-transform and applications.

3. FREQUENCY ANALYSIS OF SIGNALS:
Analysis of analog and discrete signals-using Fourier series, Fourier transform, Fourier transform of discrete sequence and discrete Fourier transform-properties of transforms-computation of discrete Fourier transforms-Radix 2. FFT algorithms

4. DIGITAL PROCESSING OF CONTINUOUS SIGNALS:
Sampling of continuous signals-analog filter design-anti

5. DIGITAL FILTERS:
Discretization of analog filters-direct discrete design -IIR and FIR structures-window functions-filter realization - introduction to digital signal architecture.

L = 45 P = 15 Total = 60

TEXT BOOK:

REFERENCE:

EE 338 PROTECTION AND SWITCHGEAR

1. INTRODUCTION:
Need for protection - essential qualities of protective relays.

2. RELAY CHARACTERISTICS:
Over current relays - directional, distance and differential, under frequency, negative sequence relays - static relays - microprocessor-based relays.
3. APPARATUS PROTECTION:  
Generator and Transformer Protection, Protection of busbars, transmission lines, CT's & PT's and their application in protective schemes.

4. THEORY ARC QUENCHING:  
Theory of arcing and arc quenching - RRRV - current chopping and capacitive current breaking - D.C. circuit breaking.

5. CIRCUIT BREAKERS:  
Switchgear - fault clearing and interruption of current - various types of circuit breakers - selection of circuit breakers - intelligent circuit breakers.

6. PROTECTION AGAINST OVER VOLTAGES:  
Different methods of protection against overvoltages - lightning arresters.

TEXT BOOK:

REFERENCE:

EE 339 POWER SYSTEM ANALYSIS

1. INTRODUCTION:  
Need for system analysis in planning and operation of power system - distinction between steady state and transient state - per phase analysis of symmetrical three-phase system. General aspects relating to power flow, short circuit and stability analysis - per unit representation.

2. NETWORK MODELLING:  

3. SHORT CIRCUIT ANALYSIS:  

4. POWER FLOW ANALYSIS:  
Problem definition - bus classification - derivation of power flow equation - solution by Gauss-Seidel and Newton-Raphson methods -- P-V bus adjustments for both methods - computation of slack bus power, transmission loss and line flow.

5. STABILITY ANALYSIS:  

L = 45  Total = 45

L = 45  T = 15  Total = 60
3. INTERFACING BASICS:

On controlling/monitoring continuous varying (analog) non-electrical signal using microprocessor/microcontrollers need for interfacing ICs - DIP switch - thumb wheel switch as input devices - single LED, seven segment LED as output devices - interfacing these using both memory mapped I/O and peripheral mapped I/O - D/A, A/D ICs and their signals - sample and hold IC and its usage.

4. INTERFACING ICs:

1) 8255 - Programmable peripheral Interface along with 8085 - Both Mode 0 and Mode 1, detailed study.

2) 8254 - Programmable Interval Timer along with Intel 8086 - Both Mode 0 and Mode 3 to be studied.

3) Need for the following ICs: (a) 8251 - USART; (b) 8257 - Direct Memory Access Controller; (c) 8259 - Programmable Interrupt Controller; (d) 8279 - Keyboard / Display Interface.

L = 45 Total = 45

TEXT BOOK:


REFERENCE:


EE 341 COMPUTER ARCHITECTURE

1. INTRODUCTION: 5
   Generation of computer systems - basics of computer architecture - stored program organization - instruction formats and types - addressing modes - stack organization

2. ARITHMETIC AND LOGIC UNIT: 10
   Fixed-point arithmetic operations - addition, subtraction, multiplication and division - floating point arithmetic operations - design of ALU - bits slice processors.

3. CONTROL UNIT: 10
   Instruction sequencing and interpretation - hardwired control - micro-programmed control - nano-programming.

4. MEMORY AND I/O UNITS: 10
   Memory hierarchy - organization and design - interleaved memories - memory management and virtual memory - Cache and associated memories. Basic concepts of input/output - program I/O - Interrupts and DMA - I/O processors

5. ADVANCED COMPUTER ARCHITECTURE: 10
   RISC concepts - RISC Vs CISC architecture - recent developments - an example RISC architecture - parallel processors - pipe line processors - multi-processors - vector and array processors - data flow computers.

L = 45 Total = 45

TEXT BOOK:

REFERENCE:

EE 343 MEASUREMENT AND INSTRUMENTATION LABORATORY

1. Study of temperature measuring transducers (RTD, Thermocouples, and IC 590).
2. Study of displacement and pressure transducers (LVDT, I/P and P/I).
3. Active filters.
4. Instrumentation amplifiers.
5. Linearisation using microprocessors.
6. A/D and D/A converters.
7. Digital Oscilloscopes.
8. Data acquisition system.
9. Torque and angle measurement.

P = 45 Total = 45

EE 344 IC AND MICROPROCESSOR LABORATORY

1. IC EXPERIMENTS:
   2. Code converters.
   3. Shift registers; Counters
4. Encoders, Decoders, Multiplexers and Demultiplexers
5. Memory devices
7. Application circuits of NE 555.

2. MICROPROCESSOR EXPERIMENTS:
   1. Programming exercises involving looping loop with counting indexing.
   2. Multiplication and Division of signed and unsigned numbers.
   3. Interfacing LED, DIP and Thumb wheel switches.
   5. Design and implementation of temperature control loop
   6. Study of serial interface and interfacing of VDU

P = 45  Total = 45

SEMESTER VII

MG 431 ENGINEERING ECONOMICS AND FINANCIAL ACCOUNTING  3 0 0 3

1. INTRODUCTION:  5
   Factors influencing managerial decision - managerial economics and other disciplines - objectives of the firm - managerial decisions - theoretical concepts.

2. DEMAND ANALYSIS AND FORECASTING:  10
   Meaning of demand - types of demand - determinants of demand-demand function -demand elasticity - demand forecasting - forecasting methods.

3. PRODUCTION AND COST ANALYSIS:  10
   Production function - least cost combination of inputs - factor productivities and return to scale - statistical production function - managerial uses of production function-cost concepts accounting cost and economic costs - determina-

tion of cost - cost output relationship - estimation of cost output relationship

4. PRICING:  5
   Determinants of price - pricing under different objectives - pricing under different market structures - price discrimination - pricing methods in practice.

5. FINANCIAL ACCOUNTING (Elementary treatment only):  5
   The balance sheet and related concepts - the profit and loss statement and related concepts - financial ratio analysis - cash flow analysis - fund flow analysis.

6. CAPITAL BUDGETING:  10
   Investments - risks and return evaluation of investment decision - average rate of return - playback period - net present value and internal rate of return.

L = 45  Total = 45

TEXT BOOK:

EE 431 POWER SYSTEM CONTROL  3 1 0 4

1. INTRODUCTION:  5
   Need for voltage and frequency regulation in power system - system load characteristics - basic P-v and Q-v control loops

62
- cross coupling between control loops - plant level and system level controls - recent trends of real-time control of power systems.

2. REAL POWER AND FREQUENCY CONTROL: 15

3. REACTIVE POWER - VOLTAGE CONTROL: 8

4. COMPUTER CONTROL OF POWER SYSTEM: 10
Energy control center functions - system hardware configuration SCADA system - functional aspects - security monitoring and control - system states and their transition - various controls for secure operation.

5. ECONOMIC DISPATCH CONTROL: 7
Incremental cost curve - co-ordination equations with loss and without losses, solution by iteration method. (No derivation of loss coefficients). Base point and participation factors. Economic controller added to LFC control.

L = 45
Total = 45

TEXT BOOK:
1. Olle I.Elield, 'Electric Energy and System Theory - An


REFERENCE:

EE 432 SOLID STATE DRIVES 3003

1. DRIVE CHARACTERISTICS: 9
Mechanical characteristics - constant torque and constant HP operations - Four quadrant operation - Rating of motors - selection of drives.

2. DC DRIVES: 9
Single phase and three-phase converter fed drives - continuous and discontinuous conduction modes - chopper fed drives - four quadrant operation - closed loop drive system.

3. STATOR CONTROLLED INDUCTION MOTOR DRIVES: 9
Voltage controlled drive - V/f control - VSI and CSI fed drives - closed loop control - braking - energy saving.

4. ROTOR CONTROLLED INDUCTION MOTOR DRIVES: 9
Rotor resistance control - slip power recovery scheme - sub synchronous and super synchronous operations - power factor improvement - closed loop control.

5. SYNCHRONOUS MOTOR DRIVES: 9
Adjustable frequency and controlled current operation- self
controlled synchronous motor - closed loop control - power
factor control - brushless excitation

L = 45 Total = 45

TEXT BOOK:
1. Dubey, G.K., 'Power Semiconductor Drives', Prentice Hall

REFERENCE:
1. Murphy, J.M.D and Turnbull,F.G., 'Thyristor control of AC

EE 433 HIGH VOLTAGE ENGINEERING 3 0 0 3

1. OVER VOLATGES AND INSULATION
COORDINATION: 6
Natural causes of overvoltages - lightning phenomena - over-
voltages due to switching surges - system faults and other
abnormal conditions - principles of insulation co-ordination.

2. ELECTRICAL BREAKDOWN IN GASES, SOLIDS
AND LIQUIDS: 10
Classical gas laws - ionization and decay processes -
secondary effects - Paschen's law - streamer theory - break-
down in non-uniform fields and corona discharges - practical
considerations in using gases for insulation purposes - vacuum
insulation. Conduction and breakdown in pure and commer-
cial liquids. Intrinsic breakdown in solids - electromechanical
breakdown - thermal breakdown - breakdown in composite
dielectrics.

3. GENERATION OF HIGH VOLTAGES AND HIGH
CURRENTS: 8
Generation of high DC voltage, alternating voltage, impulse
voltages and impulse currents.

4. MEASUREMENT OF HIGH VOLTAGE AND
HIGH CURRENTS: 8
Measurement of high voltages and high currents - digital
techniques in high voltage measurement.

5. ELECTROSTATIC FIELD STRESS CONTROL: 4
Electrical field distribution and breakdown strength of insulat-
ing materials - fields in multidielectric materials - dielectric
refraction - stress control by floating screens.

6. HIGH VOLTAGE TESTING: 9
High voltage testing of electrical power apparatus - power fre-
quency, Impulse voltage and DC, International and Indian Stan-
dards.

L = 45 Total = 45

TEXT BOOK:
1. M.S. Naidu and V.Kamaraju, 'High Voltage Engineering',

REFERENCES:
1. Kuffel, E and Zaengli, W.S, 'High Voltage Engineering Funda-
2. Kuffel, E and Abdullah, M., 'High Voltage Engineering',

EE 439 COMPREHENSION 0 0 3 2

The objective of comprehension is to provide opportunity for the
student to apply the knowledge acquired during the academic
programme to real-life problems that he/she may have to face in
future as an engineer.
Three periods per week shall be allotted in the time table for this activity and this time shall be utilized by the student to receive guidance from the members of faculty on solving real-life problems, practice solving these problems and on group discussions, seminar presentations, library reading as assigned by the faculty member in-charge. The continuous assessment and semester evaluation may be carried out as specified in the guidelines to be issued from time to time.

Total : 45

SEMESTER VIII

EE 444 PROJECT WORK 0 0 12 6

The objective of project work is to enable the students, to work in convenient groups of not more than four members in a group, on a project involving some design and fabrication work or theoretical and experimental studies related to the respective engineering discipline.

Every project work shall have a Guide who is a member or the faculty of the University, twelve periods per week shall be allotted in the time table for this important activity and this time shall be utilized by the students to receive directions from the Guide, on library reading, laboratory work, computer analysis, or field work as assigned by the Guide and also to present in periodical seminars or viva to review the progress made in the project.

Each student shall finally produce a comprehensive report covering background information, literature - survey, problem statement, project work details, estimation of cost and conclusions. The final report shall be in typewritten form as specified in the guidelines.

The continuous assessment and semester evaluation any is carried out as specified in the guidelines to be issued from time to time.

Total = 183

ELECTIVES

EE 031 SPECIAL ELECTRICAL MACHINES 3 0 0 3

1. SYNCHRONOUS RELUCTANCE MOTORS: 9
   Constructional features - types - axial and radial air gap motors - operating principle - reluctance - phasor diagram - characteristics - Vernier motor.

2. STEPPING MOTORS: 9

3. SWITCHED RELUCTANCE MOTORS: 9
   Constructional features - principle of operation - torque prediction - power controllers - Nonlinear analysis - Microprocessor based control - characteristics - computer control.

4. PERMANENT MAGNET BRUSHLESS D.C. MOTORS: 9
   Principle of operation - types - magnetic circuit analysis - EMF and Torque equations - Power Controllers - Motor characteristics and control.

5. PERMANENT MAGNET SYNCHRONOUS MOTORS: 9
   Principle of operation - EMF and torque equations - reactance - phasor diagram - power controllers - converter - volt-ampere requirements - torque speed characteristics - microprocessor based control.

   L = 45  Total = 45

TEXT BOOK:


REFERENCE:

EE 032 COMPUTER AIDED DESIGN OF ELECTRICAL APPARATUS 2 0 2 3

1. INTRODUCTION:
Conventional design methodology - computer aided design aspects - Advantages.

2. ELECTROMAGNETICS AND ELECTROSTATICS:
Basic field equations - calculation of field distribution - flux linkages - voltage induced - inductance - capacitance - force / torque.

3. CAD PACKAGES:
Recent developments - preprocessing - modeling - boundary conditions - material characteristics - problem formulation - solution - postprocessing.

4. FINITE ELEMENT ANALYSIS:
Mathematical formulation - discretisation - shape functions - stiffness matrix - solution techniques - postprocessing.

5. DESIGN EXAMPLES (PRACTICALS):

L = 30  P = 30  Total = 60

TEXT BOOK:

REFERENCES:

EE 033 POWER ELECTRONIC INSTRUMENTATION 3 0 0 3

1. INTRODUCTION:
Importance of measurement and sensing - measurement techniques for thyristorised DC and AC circuits - measurement of voltage, current, power, power factor, speed, etc.

2. ANALOG MEASUREMENT TECHNIQUES:
Analog systems - characteristics of operational amplifiers - fundamental circuits using OPAMPs, PLL, 555 timer and applications - application of these analog circuits in measurement and sensing of voltage, current, frequency, speed, power and power factor - isolation techniques - isolation buffer amplifier.

3. DIGITAL MEASUREMENT TECHNIQUES:
Digital systems - digital circuits - Boolean algebra - combinational and sequential logic circuits - analysis, design using memories, multiplexers, PLAs and PAL Sensing and measurement of voltage, current, frequency, speed, power and power factor using digital circuits. Study of digital storage oscilloscope.

70

71
4. CONTROL OF POWER ELECTRONIC CONVERTERS USING ANALOG AND DIGITAL CIRCUITS: 9
Firing Schemes for DC chopper - single-phase and three-phase electronic converters, inverters employing PWM techniques. ADC and DAC, types and principle of operation - use of ADCs and DACs in sensing schemes in power electronic systems - closed loop current and speed control schemes.

L = 45 Total = 45

TEXT BOOK:

REFERENCES:

EE 034 ADVANCED POWER ELECTRONIC SYSTEMS 3 0 0 3

1. REACTIVE POWER COMPENSATION: 9
TSC and TCR systems - systems - theory of load compensation - power factor improvement using forced commutation methods - saturable core reactors - control strategies.

2. CONTROL USING STATIC TAP CHANGERS: 9
Conventional and static tap changing methods, control schemes and comparison

3. EXCITATION CONTROL: 9
Solid state excitation of synchronous generators - static brushless excitation systems and governor excitation system and control strategies.

4. UPS SYSTEMS: 9
Quasi-resonant converters, resonant inverters, parallel redundant and non-redundant UPS using resonant power converters, switched mode power supply.

5. OTHER APPLICATIONS: 9
HVDC system, FACTS, induction heater control using phase control and resonant inverters.

L = 45 Total = 45

TEXT BOOK:

REFERENCE:

EE 035 EHV AC AND DC TRANSMISSION ENGINEERING 3 0 0 3

1. TRANSMISSION ENGINEERING: 9
Transmission line trends - standard transmission voltages - Power handling capacity and line losses - cost of transmission lines and equipment - Mechanical consideration - Transmission Engineering principles.

2. LINE PARAMETERS: 9
Calculation of Line and ground parameters - Resistance,
3. POWER CONTROL: 9
Power Frequency and Voltage control - Over voltages - Power Circle diagram - Voltage control using shunt and series compensation - static VAR compensation - higher phase order system - FACTS.

4. EHV AC TRANSMISSION: 9
Design of EHV lines based on steady state limits and transient over voltages - Design of extra HV cable transmission - XLPE cables - Gas insulated cable Corona and RIV.

5. HVDC TRANSMISSION: 9
HVDC transmission principles - Comparison of HVAC and HVDC Transmission - Economics - Types of converters - HVDC Links - HVDC Control - Harmonics - Filters - Multi terminal DC system - HVDC cables and HVDC circuit breakers.

TEXT BOOK:

REFERENCE:

EE 036 POWER SYSTEM OPERATION 3003

1. INTRODUCTION: 9
Methods adopted in utilities for providing reliable, good quality and economic electric power supply - system load variation - Practical operating problems. Load dispatching - system load characteristics, load curves, load duration curves. Energy curves load factor, diversity factor, Coincidence factor, demand factor reserve requirements, Installed reserves, spinning reserves, cold reserves, hot reserves, operation restrictions, types of outages.

2. LOAD FORECASTING AND UNIT COMMITMENTS: 9

3. STATE ESTIMATION: 9
Least square estimation - sequential form of solution - static state emission in power system by different algorithm. Tracking state estimation in Power system - External equivalencing. Treatment of bad data.

4. ECONOMIC DISPATCH PROBLEM: 9

5. POWER SYSTEM SECURITY: 9
Operating states of power system. Normal, secure, insecure emergency and restorative states. Evaluation of system
state by contingency analysis. Preventive emergency and restorative control strategies.

L = 45  Total = 45

TEXT BOOK:

REFERENCE:

EE 037 'POWER SYSTEM TRANSIENTS' 3 0 0 3

1. INTRODUCTION AND SURVEY: 5
Various types of power system transients - effects of transients on power systems.

2. LIGHTNING AND SWITCHING SURGES: 12

3. MODELLING OF POWER SYSTEM EQUIPMENT: 9
Surge parameters of power systems equipment, equivalent circuit representation, lumped and distributed circuit transients.

4. COMPUTATION OF TRANSIENT OVERVOLTAGES: 12
Computation of transients - travelling wave method, Bewley's

lattice diagram - analysis in time and frequency domain, EMTP for transient computation.

5. INSULATION COORDINATION: 7
Insulation co-ordination - overvoltage protective devises principles of recent co-ordination and design of EHV lines.

L = 45  Total = 45

TEXT BOOK:

REFERENCE:

EE 038 NEURAL NETWORKS AND ITS APPLICATION TO POWER SYSTEMS 3 0 0 3

1. BACK PROPAGATION: 9
Introduction to ANS technology - principles and promises - perceptron - representation - linear separability - learning - training algorithm - the back-propagation network - the generalized delta rule - practical consideration - BPN applications.

2. STATISTICAL METHODS: 9
Hopfield nets - Cauchy training - simulated annealing - the Boltzmann machine - associative memory - bi-directional associative memory - application.

76
3. COUNTER PROPAGATION NETWORK AND SELF-ORGANIZING MAPS: 9
   CPN building blocks - CPN data processing - An image classification example. SOM data processing - application of SOMs.

4. ADAPTIVE RESONANCE THEORY AND SPATIO TEMPORAL PATTERN CLASSIFICATION: 9
   ART network description - ART 1 - ART 2 - application - the formal avalanche - architectures of spatio-temporal networks - the sequential competitive avalanche field - Applications of STNS.

5. NEOCOGNITRON: 9
   Cognitron - structure and training - the Neo-cognitron architecture - neocognitron data processing - performance - addition of lateral inhibition and feedback to the neocognitron - Optical neural networks.

L = 45  Total = 45

REFERENCE:
3. IEEE tutorial on application of Neural Network to Power systems 1996.

EE 039 FUZZY SET THEORY AND ITS APPLICATION TO POWER SYSTEMS 3 0 0 3

1. INTRODUCTION TO FUZZY SETS: 5
   Crispness - vagueness - Fuzziness - uncertainty - fuzzy set theory.

2. FUZZY MATHEMATICS: 10
   Fuzzy set - Basic definition - Extension Fuzzy Measures - Measures of Fuzziness -The extension principles and applications.

3. FUZZY THEORY: 10
   Fuzzy relations - Fuzzy graphs - Fuzzy analysis - Probability theory - Possibility theory - Fuzzy set theory.

4. FUZZY APPLICATIONS: 10
   Fuzzy logic and approximate reasoning Expert system and Fuzzy control - Pattern recognition.

5. FUZZY APPLICATIONS IN POWER SYSTEMS: 10
   Decision making in Power system control through fuzzy set theory - Use of Fuzzy set models of LP in Power systems scheduling problems.

L = 45  Total = 45

REFERENCE:

EE 040 KNOWLEDGE BASED SYSTEM 3 0 0 3

1. INTRODUCTION: 3
   Definition-architecture - difference between conventional and expert system programs.

2. KNOWLEDGE REPRESENTATION AND FORMAL LOGIC: 10
   Knowledge components -levels of representation -knowledge
representation schemes - formal logic - knowledge engineering and inference - process - Semantic networks-frames - scripts - production systems.

3. KNOWLEDGE ACQUISITION:
Knowledge engineer-knowledge acquisition techniques - concept formalisation - knowledge representation development - knowledge acquisition for core problems-knowledge acquisition without knowledge

4. PROBLEM SOLVING STRATEGIES:
Exhaustive search - Large search spaces - planning - least commitment - principle and constraint propagation - classification and black board models.

5. EXPERT SYSTEM TOOLS:
Languages for Expert system development - Expert system shells-lisp machines - PC-based Expert system tools.

6. EXPERT SYSTEM DEVELOPMENT PROCESS AND APPLICATIONS:
Expert system and software engineering - problem selection - problem selection - prototype construction, formalisation, implementation and evaluation. Diagnostic and control applications in high voltage-power systems - control problems

L = 45 Total = 45

TEXT BOOK:

REFERENCE:

EE041 ELECTRIC ENERGY UTILISATION AND CONSERVATION

1. ELECTRIC HEATING:
Resistance heating - induction heating - dielectric heating - arc furnaces - energy conservation in arc furnace industry and welding - electro-chemical processes.

2. ELECTRIC LIGHTING:
Definition of terms - types of lamp - types of lighting - design of illumination - residential - commercial - industrial - energy saving measures.

3. ELECTRIC VEHICLE:
Railway electrification - definition and analysis of traction effort - speed - time curve - traction motors - battery driven vehicles - energy efficiency drives - advanced speed control measures.

4. ENERGY STORAGE:
Modes of storage for mechanical, electrical, magnetic and chemical engines.

5. ENERGY ECONOMICS AND CONSERVATION:
Cost benefit - risk analysis - depreciation methods - energy auditing - energy costing - energy conservation in utility and industries.

L = 45 Total = 45

TEXT BOOK:

REFERENCE:

EE 042 ADVANCED CONTROL SYSTEMS

1. STATE VARIABLE ANALYSIS AND DESIGN: 10
   State models - solution of state equations - controllability and observability - pole assignment by state feedback - full and reduced order observers.

2. NONLINEAR SYSTEMS: 10

3. OPTIMAL CONTROL: 10

4. DIGITAL CONTROL SYSTEM: 7

5. ALGORITHM AND STRATEGY FOR COMPUTER CONTROL: 8
   Scaling data - linearisation of input data - arithmetical operations and functions - integration - control law algorithm - PID control law - self-tuning strategy.

L = 45 Total = 45

TEXT BOOK:

REFERENCE:
1. R.C.Dorf and R.H.Bishop, 'Modern Control Systems', Addison-Wesley, 1995 (MATLAB Reference)

EE 043 PRINCIPLES OF ROBOTICS

1. TYPES AND BASIC COMPONENTS OF ROBOTS: 12
   Automation and Robotics - Robot Anatomy - Classification of Robots by DOF motion, platform, power, source, intelligence and application area - manipulators, wrists, end effectors, control units - robot sensors, proximity sensors, range sensors, tactile sensors, visual sensors, sensors for mobile robots.

2. ROBOT MOTION ANALYSIS AND CONTROL: 9
   Introduction to manipulator Kinematics - Homogeneous transformation and Robot Kinematics - manipulator path control - robot dynamics - configuration of a Robot controller - obstacle avoidance.

3. ARTIFICIAL INTELLIGENCE: 12
   AI techniques - LISP Programming - AI and Robotics - LISP in the factory - sensing and digitizing function in machine vision - image processing and analysis - training and vision system
4. ROBOT PROGRAMMING AND APPLICATIONS: 12
Methods of Robot programming - lead through programming methods - A robot program as a path in space - motion interpolation - weight, signal and delay commands - Branching capabilities and limitations of lead through methods - Application of robots in material handling, processing operations and assembly and inspection - future applications of robots.

TEXT BOOK:

REFERENCE:

EE044 INTELLIGENT CONTROLLERS 3 0 0 3
1. INTRODUCTION: 3
Definition - architecture - difference between conventional and expert system.
1. **INTRODUCTION:**
Cell structure - electrode - electrolyte interface, electrode potential, resting and action potential - electrodes for their measurement, ECG, EEG, EMG - machine description - methods of measurement - three equipment failures and trouble shooting.

2. **TRANSUCERS FOR BIO-MEDICAL INSTRUMENTATION:**
Basic transducer principles - source of bioelectric potentials - resistive, inductive, capacitive, fiber-optic, photoelectric, piezo-electric and chemical transducers - their description and feature applicable for biomedical instrumentation.

3. **SIGNAL CONDITIONING, RECORDING AND DISPLAY:**
Input isolation, DC amplifier, power amplifier, differential amplifier - feedback, op Amp-electrometer amplifier, carrier Amplifier - instrument power supply. Oscillographic - galvanometric - X-Y, magnetic recorder, storage oscilloscopes-electron microscope-PMMC writing systems.

4. **CARDIAC MEASUREMENTS:**

5. **COMPUTERS IN BIO-MEDICAL INSTRUMENTATION:**
Introduction - computers in medicine - basics of signal conversion and digital filtering - data reduction technique - time and frequency domain technique - ECG Analysis systems VLSI in Digital Signal Processing.

**TEXT:**

**REFERENCE:**

**EE 046 MICRO-CONTROLLER BASED SYSTEM DESIGN 3 0 0 3**

1. **THE ROLE OF MICRO-CONTROLLERS:**
Types and selection-Application example.

2. **MICRO-CONTROLLER RESOURCES:**
Family members, bus widths program and data memory parallel ports, D/A and A/D converters, reset circuitry, watchdog timers, power-down considerations.

3. **REAL-TIME CONTROL:**
Interrupt Structures programmable timers, real-time clock, latency, interrupt, density and interval constraints.

4. **PROGRAMMING FRAMEWORK:**
CPU register, Structure, addressing modes, instruction sets, assembly languages, assemblers.

5. **SOFTWARE BUILDING BLOCKS:**
Queues, tables and strings, program organization, micro-
controller expansion methods, I/O hardware alternatives, development tools, Motorola and Intel microcontroller details

\[ L = 45 \quad \text{Total} = 45 \]

TEXT BOOK:

REFERENCE:
3. Motorola manual on 8 and 16 bit microcontrollers.

EE 047 DATABASE MANAGEMENT SYSTEMS

1. INRODUCTION: 5
Need for Database systems - Data Models - Overall System structure - Entities and Entity sets - Relationships and Relationship sets - Mapping Constraints - Design of an E-R database scheme Structure of relational databases - Relational Algebra and Relational Calculus.

2. RELATIONAL MODEL: 10
Relational Commercial Languages-Integrity constraints pitfalls in Relational Database Design - Normalization using functional dependencies, multi-valued dependencies and join dependencies - Domain - key normal form - Alternative approaches to database design.

3. INDEXING AND HASHING: 10
Overall system structure - Physical storage media - File organization - Sequential files - Indexing - B+-Tree index files - B-Tree index files - Static hash functions - Dynamic hash functions.

4. QUERY PROCESSING: 10
Query Interpretation - Equivalence of expressions - Join strategies - Structure of the Query optimizer - Failure classification - Storage hierarchy - Transaction model - Log based recovery - Buffer Management - Shadow paging - Control.

5. SECURITY AND INTEGRITY: 10
Security and Integrity Violations - Authorization and views - security specification in SQL - encryption - case studies - system R - IMS system architecture - DBTG codasyl model.

\[ L = 45 \quad \text{Total} = 45 \]

TEXT BOOK:

REFERENCE:

EE 048 VISUAL LANGUAGE AND ITS APPLICATION TO E E

1. HISTORICAL DEVELOPMENT OF PROGRAMMING: 5
Procedural programming - structural programming - object oriented programming - Windows programming - event driven programming - conceptual comparison.
2. **WINDOWS PROGRAMMING:**
   Overview of windows programming - Data types - Resources controls - Windows messages - Devices contexts - Document interfaces - Dynamic link libraries - SDK (Software development kit tools) - Context help.

3. **VISUAL BASIC PROGRAMMING**
   Form design - Overview - Programming fundamentals - VBX controls - Graphics applications - Animation - Interface - File system control - Data control - Database application.

4. **VISUAL C++ PROGRAMMING:**
   Frame work classes - VC++ components - Resources handling - Event handling - Message dispatch system model and model-less dialogues - Importing VBX controls - Document view architecture - Sterilization - Multiple document - Splitter windows - Co-ordination between controls - Sub classing.

5. **CASE STUDIES:**
   Application to Electrical Engineering problems.

   \[ L = 45 \quad \text{Total} = 45 \]

**REFERENCE:**
2. Holznak, 'Visual C++ Programming', Heavy metal
3. Microsoft Visual C++ and Visual Basic Manuals
4. Plewold, 'Windows Programming'.

**EE 049 COMPUTER NETWORKS**

1. **PROTOCOLS AND ARCHITECTURE:**

2. **NETWORKS ACCESS PROTOCOLS AND INTERNET WORKING:**

3. **TRANSPORT AND SESSION SERVICE PROTOCOLS:**
   Transport services protocol mechanisms - Networks Services - ISO Transport standards - DOD transport protocols - session characteristics - ISO session service definition - ISO session protocol definition - other session approaches.

4. **PRESENTATION APPLICATION PROTOCOLS:**

5. **NETWORK MANAGEMENT:**

   \[ L = 45 \quad \text{Total} = 45 \]

**TEXT BOOK:**

**REFERENCE:**

90
5. Comer and Stevens, 'Internetworking with TCP/IP', val.

GE 034 CREATIVITY, INNOVATION & NEW PRODUCT DEVELOPMENT 2023

1. CREATIVITY: 7
Questioning mind - novel ideas - The need for creativity and innovation - Creativity and problem solving - Brain storming techniques - process of technological invention - Factors contributing to successful innovation and design.

2. IDEA GENERATION AND SCREENING: 7
Process of generating original ideas and products/services - group brain storming project selection and evaluation - problem-solving techniques.

3. NEW PRODUCT DEVELOPMENT: 6
Selection criteria - Goal definition - Successful methods of invention and design, invention notebook.

4. NEW PRODUCT PLANNING: 4
Prototype design - use of CAD (basics) - Fabrication - Testing - Quality standards - Market survey - Introducing new products.

5. PATENTS AND INTELLECTUAL PROPERTY RIGHTS (IPR): 6

6. LABORATORY: 30
Creative idea generation - Product selection - Prototype design - model fabrication - Testing - Cost evaluation - Patent application.

L = 30  P = 30  Total = 60

REFERENCE:

WEB SITES:
2. Http://www.virginia.edu/tcc315
3. Http://www.wipo.int

LANGUAGE ELECTIVES

HS 034 TECHNICAL TAMIL 2023

1. REVIEW OF BASIC GRAMMER: 6
Sentence structure, tense, case gender, voice and number - common errors in usage and their corrections - errors in conjunction - spelling and traditional usage.

2. READINGS FROM TECHNICAL WRITINGS IN TAMIL: 6
Critical study of selected passages from technical writings in Tamil (selected articles from Kalanjiam may be prescribed from time to time

3. TRANSLATION FROM ENGLISH TO TAMIL: 6
Principles of translation coinage of technical terms and exercises in translation.

4. TAMIL AND COMPUTERS: 8
Issues in DTP - keyboard layout - typewriter, phonetic keyboards - internal coding - ISCII and other formats - advantages and disadvantages - sorting morphological analysis -
difficulties in spell checking - research in computerization of Tamil Practical: word processing in Tamil, spelling corrections and sorting.

5. CREATIVE WRITING IN TECHNICAL TAMIL: 4
Style of Technical language, Exercises in writing technical passages in Tamil articles, description of technical matters.

L = 30  P = 30  Total = 60

TEXT BOOK:

REFERENCE:
1. 'Valar Tamilil Arivial ' Vols. I to III , Indian Society for Scientific Tamil, Tamil University Campus, Tanjavur.
2. 'Kalaniam', Quarterly of Anna University, Chennai (Journal articles).
3. 'Tamil and computers' Seminar Proc., Anna University, 1994
4. Dr. Radha Chellapen, "Kalaichollakam".

HS 035 TECHNICAL GERMAN - I 3 1 0 4

1. INTRODUCTION 5
Special and comparative features of German with English, Hindi and Tamil. German Alphabets, pronunciation.

2. THEMA 10
? Name, Land, Wohnort
? Sudium, Beruf
? Familie, Geschwister, Alter
? Tagesablauf, Termine
? Einladung
? Stellensuche, Berufswahl
? Einkauf

3. GRAMMATIK 10
? Personalpronomen, Verb, Wortstellung, Ort
? Possessivpronomen, Verb - 'Sein'
? Verb - 'Haben', Unbestimmter Artikel, Negation - 'Nicht' - 'Kein'
? Zeit, Bestimmter Artikel, Starke Verben
? Trennbare Verben, Imperativ
? Modal Verben
? Akkusativ

4. UEBUNGEN 10
? Partner uebungen
? Schriftliche Uebungen
? Aussprache Uebungen
? Kontrolluebungen
? Text generation

5. DIALOGUE 5
? Oral
? Written

6. GLOSSARY 5
Technical words

Total 45

TEXT BOOK
1. Lernziel Deutsch (Deutsch als Fremdsprache) - Grundstufe I from Max Hueber Variag

HS 036 TECHNICAL GERMAN - II 3 1 0 4

1. INTRODUCTION 5
German Idioms and Phrases
2. **THEMA**

- Geschenke, Auf der Post
- Auskunft-Fest
- Heirat, Kinder
- Stadium
- Ausbuilding
- Erziehung, Jugend
- Deutschsprachige Laender, Europa
- Arbeitswelt, Urlaub

3. **GRAMMATIK**

- Dativ
- Ort und Richtung
- Reflexive Verben, Verben mit Praepositional object
- Perfect
- Praeteritum
- Adjective
- Komparation, Genitiv, Wortbildung
- Nebensatze

4. **UEBUNGEN**

- Partner uebungen
- Schriftliche Uebungen
- Aussprache Uebungen
- Kontrolluebungen
- Text Generation

5. **DIALOGUE**

- Oral
- Written

6. **GLOSSARY**

Technical words

**TEXT BOOK**

1. *Lernziel Deutsch (Deutsch als Fremdsprache) - Grundstufe I* from Max Hueber Verlag

**HS 037 TECHNICAL JAPANESE - I**

1. Introduction to Japanese Alphabets - Hiragana, Katakana and Kanji - Group 1, 2, 3 & 4 syllables - Writing practice - Pronunciation - Word order - Greetings - Receiving a visitor and exchange of pleasanties - Kanji practice.


3. Classification of particles - Ga, Ka, Wa O, E, Ni etc - Aural comprehension - Reading comprehension - Noun-1 Wa, noun-2 desu - Demonstrative pronouns - kore, sore, are and dore - kono, sono, ano and dono - kochira - sochira - achira and dochira - particle -No, kara, ni and de - question-Itsu - conversational grammer - soo desu ka - Na, i adjectives perfect and imperfect - Question words - Doo and Ikaga - particle - To, ne and yo - Kanji practice.

4. Desu as a substitute for a verb - demonstrative pronouns - sono and sore - Group 1 particles - De, O, Made and Ka - conjection - soshite - Question words - dare, nani, doko, itsu, dore, dochira, doyatte, ikutsu, ikura - Words for degrees - gurai or kurai - Phrase - Saa - Anoo - numerals - counters and numbers - humble form of desu and arimasu - Kanji practice.

5. Verbs ending in -te or de - classification of Te forms and Masu forms - verb modifiers - koo, soo, aa and doo - Set phrase - Onegaishimasu- Sumimasen - Adverbs - Mazu, sore kara and salgo ni - formation of the -Te form of I adjective and desu - Kanji practice.
TEXT BOOKS
3. Yan-san Serial, Video tapes, Japan.

HS 038 TECHNICAL JAPANESE - II
1. Demonstrative pronouns: - Are - Interjection: - Ee - Quoted sentences-omoi kai - Non-polite form of verbs - Group 1 ending in - eru or iru, group 2 verbs ending in - u - Non polite forms of i-adjectives - non polite form if desu, desho, daroo - Suffix - sugiru - expression of reason-tame (ni) - Counters - Hon and -Do - Kanji practice.
5. Comparative sentences - no hoo ga and yori - Negative comparative sentences - Negative request - Adverbs of extent - konna ni, sonna ni and anna ni - Te form of transitive verb and -arui - Passive sentence - neutral passive sentence - technical vocabulary related to Engineering and Technology - Preparation of technical reports.

Total 45

HS 039 TECHNICAL FRENCH - I
1. Alphabets - Pronunciation - Masculine and Feminine Genders only - Numbers - Indefinite and definite articles - Plurals - Verbs to be and to have.

Total 45

TEXT BOOKS
REFERENCE BOOKS


HS 040 TECHNICAL FRENCH - II


2. Comparative, superlative sentences - Recent past - Immediate future - Grammatical analysis.

3. Translation from English to French - Translation from French to English - Texts from Physics and Chemistry.

4. Translation from English to French - Translation from French to English - Texts from Basic Engineering.


Total 45

TEXT BOOKS


REFERENCE BOOKS

1. Centre D'études Francaises. Functional French for Scientists and Technologists, Jawaharlal Nehru University, New Delhi, 1986.


HS 041 ENGLISH I

1. LISTENING

Listening comprehension - listening for specific information - note - taking - use of charts and diagrams.

2. SPEAKING

Defining - describing objects - describing uses/functions - comparing - offering suggestions - analysing problems and providing solutions - expressing opinions (agreement/disagreement) predicting - expressing possibility/certainty - framing questions - providing answers - pronunciation practice (word stress).

3. READING

Skimming - scanning - detailed reading - predicting content - interpreting charts and tables - identifying stylistic features in texts - evaluating texts - understanding discourse coherence - guessing meaning from the context - note-making/transforming information.

4. WRITING

Sentence definition - static description - comparison and contrast - classification of information - recommendations - highlighting problems and providing solutions - formal and informal letter writing - using flow-charts/diagrams - paragraph writing - editing.
5. **FOCUS ON LANGUAGE**

Word formation with prefixes and suffixes - discourse markers and their functions - degrees of comparison - expressions relating to recommendations and comparisons - active and passive voice - antonyms - tense forms - gerunds - condition sentences - modal verbs of probability and improbability - acronyms and abbreviations - compound nouns and adjectives - spelling - punctuation.

L = 45  T = 15  Total  60

**TEXT BOOK**

1. "English for Engineers and Technologists", Volume I. Authors: Humanities and Social Science Department, Anna University, Published by Orient Longman Ltd., 1990.

**REFERENCE BOOKS FOR ENGLISH**


**HS 042  ENGLISH II**  3 1 0 4

1. **LISTENING**

Listening comprehension - listening for specific information - note-taking - using non-verbal devices.

102

2. **SPEAKING**

Describing processes - stating purpose - offering opinions, suggestions and recommendations - summarising - reporting - free discussion of chosen topics - pronunciation practice (word stress, consonant clusters - homonyms).

3. **READING**

Skimming - scanning - note-making - understanding the organisation of texts - discourse cohesion - predicting and evaluating content - evaluating style - inferring meaning - study-reading - interpreting tables, flow-charts.

4. **WRITING**

Extended definition - process description - cause and effect analysis - stating choice and justifying it - safety instructions - check list - letter of application - data sheet/resume.

5. **FOCUS ON LANGUAGE AND FUNCTIONS**  10

Word formation - synonyms - prepositions - adverbs - passive voice - sequence words/discourse markers - connective adverbs - numerical expressions - expansion of abbreviations - rules for writing SI units - language of instructions, check-lists, cause and effect, purpose and means - indefinite adjectives of number and quantity - spelling and punctuation.

L = 45  T = 15  Total  60

**TEXT BOOK**


Authors: Humanities and Social Sciences Department, Anna University, Published by Orient Longman Ltd., 1990.
REFERENCE BOOKS FOR ENGLISH II


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