UNIVERSITY OF KERALA

B. TECH DEGREE COURSE
2008 SCHEME

ELECTRICAL AND ELECTRONICS ENGINEERING

I to VIII SEMESTER SCHEME AND SYLLABUS

BOARD OF STUDIES IN ENGINEERING AND
FACULTY OF ENGINEERING AND TECHNOLOGY
UNIVERSITY OF KERALA
B.Tech Degree Course – 2008 Scheme
REGULATIONS

1. Conditions for Admission

Candidates for admission to the B.Tech degree course shall be required to have passed the Higher Secondary Examination, Kerala or 12th Standard V.H.S.E., C.B.S.E., I.S.C. or any examination accepted by the university as equivalent thereto obtaining not less than 50% in Mathematics and 50% in Mathematics, Physics and Chemistry/ Bio-technology/ Computer Science/ Biology put together, or a diploma in Engineering awarded by the Board of Technical Education, Kerala or an examination recognized as equivalent thereto after undergoing an institutional course of at least three years securing a minimum of 50% marks in the final diploma examination subject to the usual concessions allowed for backward classes and other communities as specified from time to time.

2. Duration of the course

i) The course for the B.Tech Degree shall extend over a period of four academic years comprising of eight semesters. The first and second semester shall be combined and each semester from third semester onwards shall cover the groups of subjects as given in the curriculum and scheme of examination

ii) Each semester shall ordinarily comprise of not less than 400 working periods each of 60 minutes duration

iii) A candidate who could not complete the programme and pass all examinations within Ten (10) years since his first admission to the B.Tech programme will not be allowed to continue and he has to quit the Programme. However he can be readmitted to the first year of the programme if he/she satisfies the eligibility norms applicable to the regular candidates prevailing at the time of readmission.

3. Eligibility for the Degree

Candidates for admission to the degree of bachelor of technology shall be required to have undergone the prescribed course of study in an institution maintained by or affiliated to the University of Kerala for a period of not less than four academic years and to have passed all the examinations specified in the scheme of study

4. Subjects of Study

The subjects of study shall be in accordance with the scheme and syllabi prescribed

5. Evaluation

Candidates in each semester will be evaluated both by continuous assessment and end semester University examination. The individual maximum marks allotted for continuous assessment and University examination for each subject is as prescribed by the scheme of study.
5.1 Continuous Assessment (C.A)

The marks awarded for the continuous assessment will be on the basis of the day-to-day work, periodic tests (minimum two in a semester) and assignments (minimum of three – one each from each module). The faculty member concerned will do the continuous assessment for each semester. The C.A. marks for the individual subjects shall be computed by giving weightage to the following parameters.

<table>
<thead>
<tr>
<th>Subject</th>
<th>Attendance</th>
<th>Tests</th>
<th>Assignments/Class Work</th>
</tr>
</thead>
<tbody>
<tr>
<td>Theory Subjects</td>
<td>20%</td>
<td>50%</td>
<td>30%</td>
</tr>
<tr>
<td>Drawing</td>
<td>20%</td>
<td>40%</td>
<td>40%</td>
</tr>
<tr>
<td>Practical</td>
<td>20%</td>
<td>40%</td>
<td>40%</td>
</tr>
<tr>
<td>Project Work</td>
<td></td>
<td></td>
<td>Work Assessed by Guide – 50% Assessed by a three member committee out of which one member is the guide – 50%</td>
</tr>
</tbody>
</table>

The C.A. marks for the attendance (20%) for each theory, practical and drawing shall be awarded in full only if the candidate has secured 90% attendance or above in the subject. Proportionate reduction shall be made in the case of subjects in which he/she gets below 90% of the attendance for a subject. The CA marks obtained by the student for all subjects in a semester is to be published at least 5 days before the commencement of the University examinations. Anomalies if any may be scrutinized by the department committee and the final CA marks are forwarded to the university within the stipulated time.

5.2. End Semester University Examinations

i) There will be University examinations at the end of the first academic year and at the end of every semester from third semester onwards in subjects as prescribed under the respective scheme of examinations. Semester classes shall be completed at least 10 working days before the commencement of the University examination.

ii) The examination will be held twice in a year – April/May session (for even semester) and October/November session (for odd semester). The combined 1st and 2nd semester is reckoned as equivalent to an even semester for the purpose of conduct of examination and the University examination will be held during April/May. However VII and VIII Semester examination will be conducted in both the sessions. This schedule will not be changed.

iii) A student will be permitted to appear for the university examination only if he/she satisfies the following requirements

   a. He/she must secure not less than 75% attendance in the total number of working periods during the first year and in each semester thereafter and shall be physically present for a minimum of 60% of the total working periods. In addition, he/she also shall be physically present in at least 50% of total working periods for each subject

   b. He must earn a progress certificate from the head of the institution of having satisfactorily completed the course of study in the semester as prescribed by these regulations
c. It shall be open to the Vice-Chancellor to grant condonation of shortage of attendance on the recommendation of the head of the institution in accordance with the following norms.
d. The attendance shall not be less than 60% of the total working periods.
e. He/she shall be physically present for a minimum of 50% of the total working periods.
f. The shortage shall not be condoned more than twice during the entire course.
g. The condonation shall be granted subject to the rules and procedures prescribed by the university from time to time.
h. The condonation for combined 1st and 2nd semesters will be reckoned as a single condonation for attendance purposes.

iv) A student who is not permitted to appear for the University examinations for a particular semester due to the shortage of attendance and not permitted by the authorities for condonation of shortage of attendance shall repeat the semester when it is offered again. This provision is allowed only once for a semester.

v) The university will conduct examinations for all subjects (Theory, Drawing & Practical).

vi) The scheme of valuation will be decided by the chief examiner for theory / drawing subjects.

vii) For practical examinations, the examiners together will decide the marks to be awarded. The student shall produce the certified record of the work done in the laboratory during the examination. The evaluation of the candidate should be as per the guidelines given in the syllabus for the practical subject.

6. Letter Grades

For each subject in a semester, based on the total marks obtained by the student in the University examination and Continuous assessment put together a letter grade (S, A+, A, B+, B, C+, C, D, E and F) will be awarded. All letter grades except ‘F’ will be awarded if the marks for the University examination is 40% or above and the total mark (C.A marks + University Exam mark) is 50% or above. No absolute mark will be indicated in the grade card. Letter grade corresponding to total marks (C.A marks + University Exam mark) and the corresponding grade point in a ten-point scale is described below.

<table>
<thead>
<tr>
<th>% of Total marks (C.A marks + University Exam mark)</th>
<th>Letter Grade</th>
<th>Grade Point (G.P)</th>
<th>Remarks</th>
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</thead>
<tbody>
<tr>
<td>90 % and above</td>
<td>S</td>
<td>10</td>
<td>Excellent</td>
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<tr>
<td>85 % and above but less than 90%</td>
<td>A+</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>80 % and above but less than 85%</td>
<td>A</td>
<td>8.5</td>
<td></td>
</tr>
<tr>
<td>75 % and above but less than 80%</td>
<td>B+</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>70 % and above but less than 75%</td>
<td>B</td>
<td>7.5</td>
<td></td>
</tr>
<tr>
<td>65 % and above but less than 70%</td>
<td>C+</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>60 % and above but less than 65%</td>
<td>C</td>
<td>6.5</td>
<td></td>
</tr>
<tr>
<td>55 % and above but less than 60%</td>
<td>D</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>50 % and above but less than 55%</td>
<td>E</td>
<td>5.5</td>
<td></td>
</tr>
<tr>
<td>Below 50% (C.A + U.E) or below 40 % for U.E only</td>
<td>F</td>
<td>0</td>
<td>Failed</td>
</tr>
</tbody>
</table>
7. Grade Point Average (GPA) and Cumulative Grade Point Average (CGPA)

Grade point average is the semester wise average points obtained by each student in a 10-point scale. GPA for a particular semester is calculated as per the calculation shown below.

\[ GPA = \frac{\sum \text{Credit} \times \text{GP obtained for the subject}}{\sum \text{credit for subject}} \]

Cumulative Grade point Average (CGPA) is the average grade points obtained by the students till the end of any particular semester. CGPA is calculated in a 10-point scale as shown below.

\[ CGPA = \frac{\sum \text{Credits for semester} \times \text{GPA obtained for the semester}}{\sum \text{credits for the semester}} \]

GPA and CGPA shall be rounded to two decimal points. The Grade card issued to the students shall contain subject number and subject name, credits for the subject, letter grades obtained, GPA for the semester and CGPA up to that particular semester. In addition to the grade cards for each semester all successful candidate shall also be issued a consolidated statement grades. On specific request from a candidate and after remitting the prescribed fees the University shall issue detailed mark to the individual candidate.

8. Minimum for a pass

a) A candidate shall be declared to have passed a semester examination in full in the first appearance if he/she secures not less than 5.5 GPA with a minimum of ‘E’ grade for the all individual subject in that semester.

b) A candidate shall be declared to have passed in an individual subject of a semester examination if he/she secures grade ‘E’ or above.

c) A candidate who does not secure a full pass in a semester examination as per clause (a) above will have to pass in all the subjects of the semester examination as per clause (b) above before he is declared to have passed in that semester examination in full.

9. Improvement of Grades

i) A candidate shall be allowed to re-appear for a maximum of two subjects of a semester examination in order to improve the marks and hence the grades already obtained subject to the following conditions

a) The candidate shall be permitted to improve the examination only along with next available chance.

b) The candidate shall not be allowed to appear for an improvement examination for the subjects of the VII & VIII semesters

c) The grades obtained by the candidate for each subject in the improvement chance he has appeared for or the already existing grades – whichever is better will be reckoned as the grades secured.

d) First & Second semester will be counted as a single chance and they can improve a maximum of three subjects
ii) A candidate shall be allowed to repeat the course work in one or more semesters in order to better the C.A. marks already obtained, subject to the following conditions
   a) He/she shall repeat the course work in a particular semester only once and that too at the earliest opportunity offered to him/her.
   b) He/she shall not combine this course work with his/her regular course work
   c) He/she shall not be allowed to repeat the course work of any semester if he has already passed that semester examination in full
   d) The C.A marks obtained by the repetition of the course work will be considered for all purposes

iii) A candidate shall be allowed to withdraw from the whole examination of a semester in accordance with the rules for cancellation of examination of the University of Kerala.

10. Classification of Successful candidates

i) A candidate who qualifies for the degree passing all the subjects of the eight semesters within five academic years (ten consecutive semesters after the commencement of his/her course of study) and secures not less than 8 CGPA up to and including eighth semester (overall CGPA) shall be declared to have passed the B.Tech degree examination in FIRST CLASS WITH DISTINCTION

ii) A candidate who qualifies for the degree passing all the subjects of the eight semesters within five academic years (ten consecutive semesters after the commencement of his/her course of study) and secures less than 8 CGPA but not less than 6.5 CGPA up to and including eighth semester shall be declared to have passed the B.Tech degree examination in FIRST CLASS.

iii) All other successful candidates shall be declared to have passed the B.Tech Degree examination in SECOND CLASS

iv) Successful candidates who complete the examination in four academic years (Eight consecutive semesters after the commencement of the course of study) shall be ranked branch-wise on the basis of the CGPA in all eight semesters put together. In the case of a tie in the CGPA the total marks of the students who have got same CGPA shall be considered for finalizing the rank. Students who pass the examination in supplementary examination are also covered under this clause

11. Educational Tour

a) The students may undertake one educational tour preferably after fourth semester of the course and submit a tour report
b) The tour may be conducted during the vacation / holidays taking not more than 5 working days, combined with the vacation / holidays if required. Total number of Tour days shall not exceed 15 days.
c) The tour period shall be considered as part of the working periods of a semester

12. Revision of Regulations

The university may from time to time revise, amend or change the regulations, curriculum, scheme of examinations and syllabi. These changes unless specified otherwise, will have effect from the beginning of the academic year / semester following the notification of the University
### I to VIII SEMESTERS 2008 SCHEME

**Combined I and II Semesters, 2008 scheme**  
(Common for all branches)

<table>
<thead>
<tr>
<th>Course No</th>
<th>Name of subject</th>
<th>Weekly load, hours</th>
<th>Max sessional marks</th>
<th>Exam Dur Hrs</th>
<th>Exam max marks</th>
<th>Credits</th>
</tr>
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<tbody>
<tr>
<td>08.101</td>
<td>Engineering Mathematics</td>
<td>L 2 T 1 D/P 0</td>
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<td>100</td>
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<td>08.104</td>
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<td>3</td>
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<td>08.105</td>
<td>Engineering Mechanics</td>
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<td>08.106</td>
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<td>08.108</td>
<td>Basic Electrical and Electronics Engineering</td>
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<td>100</td>
<td>6</td>
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<tr>
<td>08.109</td>
<td>Basic Communication and Information Engineering</td>
<td>L 2 T 1 D/P 0</td>
<td>50</td>
<td>3</td>
<td>100</td>
<td>6</td>
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<td>08.110</td>
<td>Engineering Workshops</td>
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<td><strong>Total</strong></td>
<td></td>
<td>L 17 T 8 D/P 4</td>
<td>500</td>
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The subject 08.109 will be handled by the Department of Electronics and Communication Engineering.

### Semester III

<table>
<thead>
<tr>
<th>Course No</th>
<th>Name of subject</th>
<th>Weekly load, hours</th>
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<th>Exam Dur Hrs</th>
<th>Exam max marks</th>
<th>Credits</th>
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<tbody>
<tr>
<td>08.301</td>
<td>Engineering Mathematics II</td>
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<td>50</td>
<td>3</td>
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<tr>
<td>08.302</td>
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<td>L 3 T - D/P -</td>
<td>50</td>
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<tr>
<td>08.303</td>
<td>Hydraulic Machines and Heat Engines</td>
<td>L 2 T 2 D/P -</td>
<td>50</td>
<td>3</td>
<td>100</td>
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<tr>
<td>08.304</td>
<td>Network Analysis and Synthesis</td>
<td>L 2 T 2 D/P -</td>
<td>50</td>
<td>3</td>
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<tr>
<td>08.305</td>
<td>Solid State Devices and Circuits</td>
<td>L 2 T 2 D/P -</td>
<td>50</td>
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<tr>
<td>08.306</td>
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<td>08.307</td>
<td>Hydraulic Machines and Heat Engines Lab</td>
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<td>08.308</td>
<td>Electrical and Electronic Workshops</td>
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Semester IV

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<tr>
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<th>Weekly load, hours</th>
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<th>Exam Dur Hrs</th>
<th>Exam max marks</th>
<th>Credits</th>
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<tbody>
<tr>
<td>08.401</td>
<td>Engineering Mathematics III</td>
<td>L 3 T 1 D/P -</td>
<td>50</td>
<td>3</td>
<td>100</td>
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<tr>
<td>08.402</td>
<td>Digital Electronics and Logic Design</td>
<td>L 3 T 1 D/P -</td>
<td>50</td>
<td>3</td>
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<td>4</td>
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<tr>
<td>08.403</td>
<td>Engineering Electromagnetics</td>
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<td>50</td>
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<td>Engineering Material Science</td>
<td>L 2 T 1 D/P -</td>
<td>50</td>
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<td>100</td>
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<tr>
<td>08.406</td>
<td>Power System Engineering I</td>
<td>L 2 T 2 D/P -</td>
<td>50</td>
<td>3</td>
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<tr>
<td>08.407</td>
<td>Electronic Circuits Lab</td>
<td>L 0 T 0 D/P 4</td>
<td>50</td>
<td>3</td>
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<tr>
<td>08.408</td>
<td>Electrical Machines Lab I</td>
<td>L 0 T 0 D/P 4</td>
<td>50</td>
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Semester V

<table>
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<tr>
<th>Course No</th>
<th>Name of subject</th>
<th>Weekly load, hours</th>
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<th>Exam Dur Hrs</th>
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<tbody>
<tr>
<td>08.501</td>
<td>Engineering Mathematics IV</td>
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<td>08.503</td>
<td>Electrical Measurements II</td>
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<td>08.505</td>
<td>Electrical Machines II</td>
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<td>50</td>
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<tr>
<td>08.506</td>
<td>Elective I</td>
<td>L 2 T 1 D/P -</td>
<td>50</td>
<td>3</td>
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<tr>
<td>08.507</td>
<td>Digital Circuits Lab</td>
<td>L 0 T 0 D/P 4</td>
<td>50</td>
<td>3</td>
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<tr>
<td>08.508</td>
<td>Measurements &amp; Instrumentation Lab</td>
<td>L 0 T 0 D/P 4</td>
<td>50</td>
<td>3</td>
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Semester VI

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<tr>
<th>Course No</th>
<th>Name of subject</th>
<th>Weekly load, hours</th>
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<tbody>
<tr>
<td>08.601</td>
<td>Electrical Machines III</td>
<td>L 2 T 1 D/P -</td>
<td>50</td>
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<td>08.602</td>
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<tr>
<td>08.603</td>
<td>Numerical Techniques &amp; Computer Programming</td>
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<td>08.604</td>
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<tr>
<td>08.606</td>
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<td>100</td>
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<tr>
<td>08.607</td>
<td>Power Electronics Lab</td>
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<td>50</td>
<td>3</td>
<td>100</td>
<td>4</td>
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<tr>
<td>08.608</td>
<td>Microprocessor Lab</td>
<td>L 0 T 0 D/P 25</td>
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<td>08.609</td>
<td>Software Lab</td>
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### Semester VII

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<th>Course No</th>
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<td>08.701</td>
<td>Control Systems</td>
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<td>Power System Engineering III</td>
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### Semester VIII

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<td>08.801</td>
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List of Electives offered by the Electrical & Electronics Engineering Department

08. 506 Elective I

(a) Computer Organisation
(b) Superconductivity and Applications
(c) Operations Research
(d) New and Renewable Energy Sources

08. 606 Elective II

(a) Energy Conservation and Management
(b) Biomedical Instrumentation
(c) Software Engineering
(d) Technical English and Communicative Skills

08. 704 Elective III

(a) Electronic Communication
(b) Environmental Engineering
(c) Modern Operating Systems
(d) Management Information System
(e) Nano Technology
(f) Computer Aided Power System Analysis
(g) Microprocessor Based System Design
(h) Embedded System
(i) Illumination technology

08. 805 Elective IV

(a) Robotics and Industrial Automation
(b) Advanced Microprocessor Architecture and Programming
(c) Soft Computing Techniques
(d) Pattern Recognition
(e) HVDC & FACTS
(f) Control & Guidance Engineering
(g) Design of Digital Control Systems

08. 806 Elective V

(a) Computer and Data Networks
(b) Advanced Electronic Communication
(c) High Voltage Engineering
(d) Object Oriented Programming
(e) Digital Image Processing
(f) Wavelets and Applications
(g) Optimal Control Theory
(h) Non-linear Control Theory
(i) Special Electrical Machines
B. TECH DEGREE COURSE  
2008 SCHEME  

ELECTRICAL AND ELECTRONICS ENGINEERING  

Combined I and II Semesters, 2008 scheme  
(Common for all branches)  

<table>
<thead>
<tr>
<th>Course No</th>
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<td>Engineering Mathematics</td>
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MODULE- 1

Applications of differentiation:-- Definition of Hyperbolic functions and their derivatives- Successive differentiation- Leibnitz’ Theorem(without proof)- Curvature- Radius of curvature- centre of curvature- Evolute ( Cartesian ,polar and parametric forms)
Partial differentiation and applications: - Partial derivatives- Euler’s theorem on homogeneous functions- Total derivatives- Jacobians- Errors and approximations- Taylor’s series (one and two variables) - Maxima and minima of functions of two variables - Lagrange’s method- Leibnitz rule on differentiation under integral sign.
Vector differentiation and applications :- Scalar and vector functions- differentiation of vector functions- Velocity and acceleration- Scalar and vector fields- Operator \( \nabla \) - Gradient- Physical interpretation of gradient- Directional derivative- Divergence- Curl- Identities involving \( \nabla \) (no proof) - Irrotational and solenoidal fields – Scalar potential.

MODULE-II

Laplace transforms: - Transforms of elementary functions - shifting property- Inverse transforms- Transforms of derivatives and integrals- Transform functions multiplied by \( t \) and divided by \( t \) - Convolution theorem(without proof)-Transforms of unit step function, unit impulse function and periodic functions-second shifting theorem- Solution of ordinary differential equations with constant coefficients using Laplace transforms.

MODULE-III


REFERENCES
2. Peter O’ Neil ; Advanced Engineering Mathematics, Thomson
5. Michel D Greenberg; Advanced Engineering Mathematics, Pearson International
MODULE-I


Electromagnetic Theory: Del operator – grad, div, curl and their physical significance. Concept of displacement current. Deduction of Maxwell’s equations. Prediction of electromagnetic waves. Transverse nature of electromagnetic waves. $\mathbf{E}$ and $\mathbf{H}$ are at right angles. Poynting’s theorem (qualitative only)


MODULE- II


MODULE – III


REFERENCE:
1. Sears & Zemansky ; University Physics. XI Edn.; Pearson
2. Frank & Leno; Introduction to Optics. III Edn., , Pearson
3. J.C. Upadhyaya; Mechanics, Ram Prasad & Sons
4. David J Griffiths; Introduction to Electrodynamics, III Edn., Pearson
LIST OF DEMONSTRATION EXPERIMENTS

5. Laser – Diffraction at a narrow slit.
6. Laser – Diffraction at a straight wire or circular aperture.
11. Computer stimulation – study of \( \mathbf{E} \) & \( \mathbf{H} \). (Gauss’ law & Ampere’s law)

Pattern of Question Paper
University examination is for a maximum of 100 marks, in 3 hour duration. The syllabus is spread in 3 modules. The question paper will consist of two parts (A and B).

Part A contains short answer questions for 40 marks. This part contains 10 questions without any choice, each of 4 marks (uniformly taken from all modules).

Part B contains long answer questions for 60 marks. From each module, this part contains 3 questions out of which 2 are to be answered, each of 10 marks. Long answer questions from all the 3 modules will form 60 marks.
## MODULE-1


**Corrosion and its control** - Theories of corrosion (chemical corrosion and electrochemical corrosion)- Galvanic series- Types of corrosion (Concentration cell corrosion, Stress corrosion, Galvanic corrosion) - Factors affecting corrosion (nature of metal and nature of environment) and different methods of corrosion control (corrosion inhibitors, cathodic protection). (5hrs)

**Protective coatings** - Metallic coatings- Chemical conversion coatings- paint (4hrs)


## MODULE-2

**Water treatment** - Types of hardness- Degree of hardness- Related problems- Estimation of hardness- by EDTA method- Sludge and scales in boilers- Priming and foaming- Boiler corrosion-Water softening methods, Lime-soda process, Ion exchange methods-Internal treatments (colloidal, carbonate, phosphate and calgon conditioning)- Domestic water treatment- Methods of disinfection of water-Desalination process (Reverse osmosis, electro dialysis- Distillation). (12hrs)

**Environmental damages and prevention** - Air pollution- CFCs and ozone depletion- Alternative refrigerants- Green house effect-Water pollution- BOD and COD- Waste water treatment- Aerobic - Anaerobic and USAB processes. (3hrs)

**Thermal methods of analysis** - Basic principles involved in Thermo gravimetry, Differential thermal analysis and applications. (2hrs)

**Spectroscopy** - Molecular energy levels-Types of molecular spectra- Electronic spectra (Classification of electronic transitions- Beer Lamberts law, Vibrational spectra (mechanism of interaction and application), Rotational spectra (Determination of bond length and application). NMR spectra (Basic principle, chemical shift, spin-spin splitting) (6hrs)

**Chromatography** - General principles- High performance liquid chromatography- Gas chromatography. (2hrs)

## MODULE-3

**Polymers** - Classifications- Mechanism of polymerisation (Addition, free radical, cationic, anionic and coordination polymerisation)- Thermoplastics and thermosetting plastics-Compounding of plastics-Moulding techniques of plastics (Compression, Injection, Transfer and Extrusion moulding)-Preparation, properties and uses of PVC, PVA, PMMA, Nylon, PET, Bakelite, Urea formaldehyde resin- Silicon polymers- Biodegradable plastics. Elastomers- structure of natural rubber- vulcanisation- synthetic rubbers (Buna-S, Butyl rubber and Neoprene) (12hrs)

**Organo electronic compounds** -Super conducting and conducting organic materials like Polyaniline, polyacetylene and polypyrrol and its applications. (2hrs)

**Fuels** - Calorific value- HCV and LCV-Experimental determination of calorific value-Theoretical calculation of calorific value-Dulong's formula- Bio fuels -Bio hydrogen and Bio-diesel (5hrs)

**Lubricants** - Introduction-Mechanism of lubrication- solid and liquid lubricant- Properties of lubricants- Viscosity index- flash and fire point- cloud and pour point- aniline value. (4hrs)

**Cement** - Manufacture of Portland cement- Theory of setting and hardening of cement (2hrs)

## LAB-EXPERIMENTS (DEMONSTRATION ONLY)

1. Estimation of total hardness in water using EDTA.
2. Estimation of chloride ions in domestic water.
3. Estimation of dissolved oxygen.
4. Estimation of COD in sewage water.
5. Estimation of available chlorine in bleaching powder.
8. Determination of flash and fire point of a lubricating oil by Pensky Marten’s apparatus.
12. Determinations of PH using glass electrode and quinhydrone electrode.

REFERENCES

1. H.A. Willard, L.L. Merrit and J.A. Dean; Instrumental methods of analysis
2. A.K. De; Environmental Chemistry
3. K.J. Klauhunde; Nanoscale materials in chemistry
4. B.R. Goweriker; Polymer science
5. B.W. Gonser; Modern materials
6. V. Raghavan; Material Science and engineering. A first course
7. L.H. Van Vlack; Elements of Material science and Engineering
8. J.W. Goodby; Chemistry of liquid crystals
9. S. Glasstone; A text book of physical chemistry
10. P.C. Jain; Engineering Chemistry
11. Juhaaina Ahad; Engineering Chemistry
12. Shashi Chawla; A text book of Engineering Chemistry
14. J.C. Kurikose and J. Rajaram; Chemistry of Engineering and Technology volume I & II
15. R.N. Goyal and Harmendra Goel; Engineering Chemistry, Ane Students Edition, Thiruvananthapuram
INTRODUCTION: Introduction to technical drawing and its language. Lines, lettering, dimensioning, scaling of figures, symbols and drawing instruments. (1 sheet practice)

MODULE I

PLAIN CURVES: Conic sections by eccentricity method. Construction of ellipse: (i) Arc of circles method (ii) Rectangle method (iii) Concentric circles method. Construction of parabola (i) Rectangle method (ii) Tangent method. Construction of hyperbola (i) Arc of circles method (ii) given ordinate, abscissa and the transverse axis (iii) given the asymptotes and a point on the curve. Construction of Tangent and Normal at any point on these curves

MISCELLANEOUS CURVES: Construction of Cycloid, Epicycloid and Hypocycloid, Involute of a circle. Archimedian spiral, Logarithmic spiral and Helix. Construction of Tangent and Normal at any point on these curves

PROJECTION OF POINTS AND LINES: Types of projections, Principles of Orthographic projection. Projections of points and lines. Determination of true length, inclination with planes of projection and traces of lines.

MODULE II

PROJECTION OF SOLIDS: Projection of simple solids such as prisms, pyramids, cone, cylinder, tetrahedron, octahedron, sphere and their auxiliary projections.

SECTIONS OF SOLIDS: Types of cutting planes, section of simple solids cut by parallel, perpendicular and inclined cutting planes. Their projections and true shape of cut sections.

DEVELOPMENT OF SURFACES: Development of surfaces of (i) simple solids like prisms, pyramids, cylinder and cone (ii) Cut regular solids.

MODULE III

ISOMETRIC PROJECTION: Isometric scale, Isometric view and projections of simple solids like prisms, pyramids, cylinder, cone sphere, frustum of solids and also their combinations.

INTERSECTION OF SURFACES: Intersection of surfaces of two solids as given below.
(i) Cylinder and cylinder
(ii) Prism and prism.
(iii) Cone and Cylinder
(Only cases where the axes are perpendicular to each other and intersecting with or without offset.)


CAD: Introduction to CAD systems, Benefits of CAD, Various Soft wares for CAD, Demonstration of any one CAD software.

General Note:
(i) First angle projection to be followed
(ii) Question paper shall contain 3 questions from each module, except from CAD. Students are required to answer any two questions from each module.
(iii) Distribution of marks
Module -I  2 x 16 = 32
Module -II  2 x 17 = 34
Module III  2 x 17 = 34

REFERENCES

08.104 ENGINEERING GRAPHICS

L-T-P: 1-0-2
Credit: 6
1. Luzadder and Duff; *Fundamentals of Engineering Drawing*
2. N. D. Bhatt; *Engineering Drawing*
3. K. Venugopal; *Engineering Drawing and Graphics*
4. P.S. Gill; *Engineering Graphics*
5. P.I. Varghese; *Engineering Graphics*
6. K.R. Gopalakrishnan; *Engineering Drawing*
7. Thamaraselvi; *Engineering Drawing*
8. K.C. John; *Engineering Graphics*
9. K.N. Anil Kumar; *Engineering Graphics*
MODULE I (20 HRS)

Idealizations of Mechanics- Elements of vector algebra
Statics of rigid bodies-Classification of force systems- principle of transmissibility of a force- composition and resolution- Resultant and Equilibrant of coplanar concurrent force systems- various analytical methods- - Lami’s theorem, method of resolution- Conditions of equilibrium-
Moment of a force, couple, properties of couple- Varignon’s theorem- Resultant and equilibrant of coplanar non-concurrent force systems- Conditions of equilibrium. Equilibrium of rigid bodies-free body diagrams.(simple problems)
Types of supports - types of beams - types of loading- Support reactions of simply supported and overhanging beams under different types of loading.
Forces in space, equations of equilibrium, Vector approach.

MODULE II (20 HRS)

Properties of surfaces- centroid of composite areas- Theorems of Pappus-Gouldinus- Moment of inertia of areas, Parallel and perpendicular axes theorems- Radius of Gyration- moment of inertia of composite areas.
Dynamics: Kinematics-Combined motion of translation and rotation-instantaneous centre, motion of link, motion of connecting rod and piston, wheel rolling without slipping.
Relative velocity - basic concepts-analysis of different types of problems
Kinetics- Newton’s laws of translatory motion- D’Alembert’s principle- Motion of lift- Motion of connected bodies.

MODULE III (20 HRS)

Collision of elastic bodies-Law of conservation of momentum-Direct and oblique impact between elastic bodies and impact with fixed plane.
Curvilinear motion- D’Alembert’s principle in curvilinear motion- Mass moment of inertia of rings, solid discs and solid spheres (no derivations required)Angular momentum-Angular impulse.
Kinetics of rigid bodies under combined translatory and rotational motion – work – energy principle for rigid bodies.
Centrifugal and centripetal forces – motion of vehicles on curved paths in horizontal and vertical planes – super elevation – stability of vehicles moving in curved paths (qualitative ideas only).

REFERENCES:

Note
Question For University Examination:- Part A – 8 compulsory questions covering entire syllabus, 5 marks each.
(5 x 8 = 40) Part B – Three questions of 10 marks from each module, out of which two should be answered (10 x 2 x 3 = 60).
MODULE I

Surveying: Object and Principles of Surveying.
Linear Measurements: Direct measurements - Tape & chain only - Ranging out survey lines-Taking measurements of sloping ground - Errors - Tape correction (problems).
Levelling: Levelling instruments - Level (Dumpy Level, Tilting Level) - Levelling Staff. Measurements in levelling - Temporary adjustments of a level, holding the staff, reading the staff - Principles of leveling - recording measurements in the field book - reduction of level - height of collimation method only (simple examples).
Contour maps (Brief description only). Computation of areas - Mid ordinate rule, average ordinate rule, Trapezoidal rule, Simpson’s rule (examples) - Introduction to Distomat, Total Station & GPS (Brief description only)

MODULE II

Building construction: Selection of site for buildings - types of buildings - Components of buildings.
Foundation: Different types - Spread footing, Isolated footing, Combined footing, Mat foundation, Pile foundation (description only).
Safe Bearing Capacity of Soil: Importance of determination of the Safe Bearing Capacity of Soil (brief description only).
Super structure: Masonry - stone masonry, brick masonry - Types - desirable qualities of stone and brick.
Partition: Materials used for making partition - plywood, particle boards & glass.
Doors, windows & ventilators: Types - materials used for the construction of doors and windows - wood, steel & Aluminium.
Plastering: Mortar - properties - Preparation of Cement mortar
Painting: Preparation of surfaces for painting - plastered, wood and steel surfaces - Types of paint - enamel, emulsion & distemper.
Flooring: Types - mosaic tiles, ceramic tiles, marble, granite and synthetic materials.
Roofing: Selection of type of roof - flat roof, sloping roof - Concrete roof, tiled roof. Selection of roof covering materials. GI Sheet, AC Sheet, PVC Sheet

MODULE III

Concrete: Ingredients- cement, aggregate, and water. Qualities of ingredients (brief description only).
Tests on Cement - consistency, initial and final setting times. Compressive strength -IS Specifications.
Aggregates - desirable qualities of fine and coarse aggregates
Steel-common types used in construction- Mild Steel, HYS Steel and their properties.
Reinforced Cement Concrete (RCC)-advantages of RCC over Plain Cement Concrete.
Elementary ideas on pre-cast and pre-stressed concrete constructions.
Building services - vertical transportation - stairs - types, escalators and elevators, ramps (brief description only). Plumbing services- brief description of water supply and sewage disposal arrangements for residential buildings.

REFERENCE:
8. Jha and Sinha, “Construction and Technology”
Note: The question paper will consist of two parts, Part I and part II.
Part I is Compulsory covering the entire syllabus, for 40 marks. It contains 8 questions of 5 marks each.
Part II is to cover 3 modules. There will be two questions (20 marks each) from each module out of which one from each module is to be answered. (20 \times 3 = 60)
MODULE I

Thermodynamics: Basic concepts and definitions of Zeroth law, First law, Second law of thermodynamics-concept of reversibility and entropy. p-v and T-s diagrams
Air cycles: Carnot, Otto and Diesel cycles-Air standard efficiency (simple problems)
IC Engines: Working and comparison of two stroke and four stroke petrol and diesel engines - general description of various systems using block diagrams – air system, fuel system, ignition system and governing system. A brief description of CRDI, MPFI, GDI and Hybrid Vehicles
Steam boilers: Classification – Cochran boiler, Babcock and Wilcox boiler, Benson boiler - fluidized bed combustion,

MODULE II

Principles and fields of application of - compressors - reciprocating and centrifugal, blower, pumps-reciprocating, centrifugal and jet pumps, steam and hydraulic turbines- impulse and reaction, gas turbine cycles-open and closed
Elementary ideas of hydro electric, thermal and nuclear power plants
Refrigeration & Air Conditioning: Refrigerants, CFC free refrigerants. Vapor compression refrigeration system, Comfort and Industrial air conditioning-typical window air conditioning unit (general description only).

MODULE III

Mechanical Power transmission systems: Belt, rope and gear drives-types, comparison and fields of application-velocity ratio-slip (simple problems) friction disc, single plate clutch, gear trains (no derivations).
Manufacturing processes: Elementary ideas of casting, forging, rolling, welding, soldering and brazing
Machining processes- turning, taper turning, thread cutting, shaping, drilling, grinding, milling (simple sketches and short notes).
Non conventional machining - Electro discharge machining (EDM) and Electro chemical machining (ECM)
Principle, application and advantages of C N C machine

REFERENCES
2. Gill, Smith and Zairys, “Fundamentals of IC Engines”
3. Amstead, Ostwald and Begeman, “Manufacturing processes”
5. Roy and Choudhary, “Elements of Mechanical Engineering”
6. Hajra Choudhary, “Workshop Technology”
7. R K Bensal, “Fluid mechanics and machines”

Note: Lectures are to be supplemented by demonstration in laboratories.

Note: The question paper will consist of two parts. Part I is to be compulsory for 40 marks. This may contain 10 questions of 4 marks each. Part II is to cover 3 modules. There can be 3 questions from each module (10 marks each) out of which 2 are to be answered.
MODULE – I

MODULE – II

MODULE – III
Diodes - PN junction diodes., V-I characteristics, dynamic & static resistance, principle of working and V-I characteristics of Zener diode, principle of Photo diode, Solar cell, & LED. Rectifiers & power supplies - block diagram description of a dc power supply, circuit diagram & working of half-wave & full wave rectifier, final equations of Vrms, Vdc, ripple factor and peak inverse voltage in each case, principle of working of series inductor and shunt capacitor filters. Working of simple zener voltage regulator. Power devices – V – I characteristics and applications of SCR and Triac Working principle of UPS and SMPS. Transducers – Resistance strain guage, thermistor, LVDT.

REFERENCES
5. TP Imthias Ahmed, B. Premlet, “Introduction to Electrical Engineering”, Phasor Books, Kollam

**Note:** The question paper will consist of two parts. Part – A is to be compulsory for 40 marks (10 questions of 4 marks each). Part-B is to cover 3 modules for 60 marks. (50% choice- One out of two or two out of four from each module).
MODULE 1 (Qualitative Treatment)

(a) Bipolar junction transistors: NPN & PNP transistors, structure, typical doping, working of NPN transistor, concepts of common base, common emitter & common collector configurations, current gain of each, input & output characteristics of common emitter configuration, comparison of three configurations with reference to voltage & current gain, input & output resistances and applications. (6 hrs)

(b) Field effect Transistors: basic principles of JFET, MESFET and MOSFET, comparison with BJT. (3 hrs)

(c) Amplifiers & Oscillators: circuit diagram & working of common emitter amplifier, function of each component in the circuit, need of proper biasing, frequency response, voltage gain and 3dB bandwidth, concepts of class A, B, AB and Class C power amplifiers, circuit diagram & working of push pull amplifiers, concepts of feedback, working principles of oscillators, circuit diagram & working of RC phase shift oscillator (7 hrs)

(d) Integrated circuits: advantages of ICs, analog and digital ICs, functional block diagram of operational amplifier, ideal operational amplifier, use as inverting amplifier, non inverting amplifier, summing amplifier, integrator and comparator. (4 hrs)

(e) Digital ICs: logic gates, realization of logic functions, principle of combinational and sequential logic circuits, flip flop (JK), logic families: TTL and CMOS Logic (No internal diagram) (4 hrs)

(f) IC fabrication: purification of silicon, crystal growth, wafer preparation. unit process: oxidation, diffusion, ion implantation, epitaxy, deposition, photolithography. (4 hrs)

MODULE 2 (Qualitative Treatment)

(a) Measurements: principle and block diagram of analog and digital multimeter, working principle of CRT, block diagram of CRO, measurements using CRO, principle of digital storage oscilloscope, principle and block diagram of function generator. (5 hrs)


(c) Color television: TV Standards, interlaced scanning, block diagram of PAL TV transmitter & receiver, basic principles of cable TV, CCTV system, basic principles of HDTV, basic principles of LCD & Plasma displays. (5 hrs)

(d) Radar and navigation: principle of radar and radar equation, block schematics of pulsed radar, factors affecting range, applications of radar in measurements and navigation. (4 hrs)

(e) Satellite communication: microwave frequency bands, concept of geo-stationary satellite, frequency bands used, satellite transponder, block diagram of earth station transmitter & receiver, advantages of satellite communication, principle of Global Positioning System (GPS). (3 hrs)

(f) Optical communication: block diagram of the optical communication system, principle of light transmission through fiber, concepts of Single Mode and Multi Mode optical fiber, working principle of source (semiconductor Laser) & detector (PIN, APD), advantages of optical communication. (5 hrs)

MODULE 3 (Qualitative Treatment)

(a) Computer Architecture: functional units: basic concept of ALU- data path and control, memory hierarchy, caches, main memory, virtual memory, operating systems, microprocessors - functional block diagram of 8085 (9 hrs)

(b) Data communication: overview, analog and digital data transmission, transmission media, digitization of wave forms, PCM, digital modulation techniques- ASK, PSK, FSK, basic concepts of error detection, parity checking. (6 hrs)

(c) Mobile communication: basic principles of cellular communications, concepts of cells, frequency reuse, principle and block diagram of GSM, principle of CDMA, WLL & GPRS technologies. (4 hrs)

(d) Internet Technology: concepts of networking: client - server computing, IP addresses, domain names, network interface unit - modem, switching technologies- circuit switching and packet switching, LAN, MAN, WAN & World wide web, network topologies, communication protocols- TCP/IP. Introduction to
web languages-HTML, XML, internetworking concepts, network devices- basic principles of router, bridge, switch, network security- Firewall. (7 hrs)

REFERENCES
1. Santiram Kal, Basic Electronics – Devices, Circuits and IT fundamentals, PHI
4. M.Moris Mano, Computer Architecture, PHI
5. Neil H E Weste,Kamran Eshraghian, Principles of CMOS VLSI design – A system perspective, Pearson Education [Module 1(f)]
6. David A. Bell, Electronic Instrumentation and Measurements, PHI [Module 2(a)]
7. N N Bhargava,D C Kulshreshtha,S C Gupta, Basic Electronics & Linear Circuits, TMH
9. R.R. Gulati, Monochrome and Colour Television, New Age International [Module 2 (c)]

This subject shall be handled by faculty of Dept.of Electronics and Communication in the Colleges.

Question Paper
The question paper shall consist of two parts. Part I is to cover the entire syllabus, and carries 40 marks. This shall contain 10 compulsory questions of 4 marks each. Part II is to cover 3 modules, and carries 60 marks. There shall be 3 questions from each module (10 marks each) out of which 2 are to be answered.


D. Plumbing: Study of tools. Details of plumbing work in domestic and industrial applications. Study of pipe joints, cutting, threading and laying of pipes with different fittings using PVC pipes. Use of special tools in plumbing work.

E. Foundry: Study of tools. Preparation of sand, moulding practice and demonstration of casting.


G. Smithy: Study of tools. Demonstration on forging of square prism, hexagonal bolt, T bolt and Eye bolt.


**NOTE:** For the university examination the student shall be examined in sections A, B, C, D and E only.
**B. TECH DEGREE COURSE**

**2008 SCHEME**

**ELECTRICAL AND ELECTRONICS ENGINEERING**

**SCHEME AND SYLLABUS FOR Semester III**

<table>
<thead>
<tr>
<th>Course No</th>
<th>Name of subject</th>
<th>Weekly load, hours</th>
<th>Max sessional marks</th>
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<td>Hydraulic Machines and Heat Engines</td>
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<td>08.305</td>
<td>Solid State Devices and Circuits</td>
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Module I

Module II
Fourier series: Fourier series of periodic functions of period $2\pi$ and $2l$. Dirichlet’s condition for convergence. Odd and even functions. Half range expansions. Fourier Transforms: Fourier integral theorem (no proof)- Fourier transforms- Fourier sine and cosine transforms, inverse Fourier transforms, properties

Module III

References

Examination Duration: 3 hours
Note: The question paper shall consists of two parts. Part A (40 marks) Ten compulsory questions of 4 marks each. Part B (60 marks) Student must answer one out of two from each module. Each question carries 20 marks.
PART I  ECONOMICS (2 periods per week)
MODULE – I
Definition of Economics – Basic Concepts Goods – Choice of techniques – Production possibility curve
Primary – Secondary, Tertiary Sector – Significance of Money.
Meaning of Demand and Supply – Types of demand – Determinants of Demand – Demand forecasting
Production function – Law of Variable proportion – Returns to scale - Least cost combination of inputs –
Cost concepts – Cost output relationship

Module II
Inflation – causes of inflation – measures to control inflation – Demand – Pull inflation – cost push inflation
– effects of Inflation – effects of inflations comparison between inflation and deflation
Applicability of Keynesian Theory to UDC’S.
Stock Market and present scenario – Industrial sector past and present – Industry Analysis –
Electronics – Chemical – Automobile – FMCG Industry.

Environment and Development – Basic Issues – Sustainable Development and Environmental Accounting –
Population – Resources and the Environment – Poverty and the Environment – Growth versus the

PART II  ACCOUNTANCY (1 Period per week)
Module III
Book- Keeping and Accountancy -Elements of Double Entry -Book- Keeping-rules for journalizing -Ledger
accounts –Cash book-Banking transactions – Trial Balance- Method of Balancing accounts- the journal proper
(simple problems).
Final accounts: Preparation of trading and profit and loss Account- Balance sheet (with simple problems) -
Introduction to Accounting packages (Description only)

References :
1.  K.K Dewett, Modern Economic theory
3.  Mohinder Kumar Sharma _ Business Environment in India
4.  D.M. Mithani-Money, Banking, International Trade and Public Finance, Himalaya publishing House,
    New Delhi.
5.  Rudder Dutt and K.P.M Sundaran – Indian Economy
8.  Double Entry book Keeping – Batliboi
9.  A Systematic approach to Accounting: Dr K.G. Chandrasekharan Nair

Examination Duration: 3 hours

University question
Note: Part I and Part II  to be answers in separate answer books.
Part – I Economics
Part A – 30 Marks (short answers) covering entire syllabus (3x10=30)
Part B – 40 marks (50% choice one out of two or two out of four from each module)
Part – II Accountancy
Three questions covering entire syllabus out of which two questions has to be answered (2x15=30)
Module I  Fluid Mechanics
Basic concepts and definitions – Properties of fluids – Newton’s law of viscosity – Fluid pressure, Pascal’s law – manometers – pressure gauges – Atmospheric pressure, Gauge pressure, absolute pressure
Continuity equation – Euler’s equation and Bernoulli’s equation – Flow measuring devices – Venturimeter - Orifice meter – Pitot tube- Notches and weirs (description only for notches and weirs) – Flow through orifices - hydraulic coefficients of orifice
Flow through pipes : Losses in pipes, Reynolds Number – Laminar and turbulent flow – Hagen Poiseuille formula- Friction factor- Darcy’s and Chezy’s formula - Transmission of power through pipes

Module II  Hydraulic Machines
Pumps- Classification- Rotodynamic and positive displacement pumps
Rotodynamic pumps – Centrifugal pump - working – static and manometric head – work done – efficiencies – Cavitation – Characteristics curves –Specific speed -Multi stage pumps
Positive Displacement pumps: Reciprocating pump - single acting and double acting – indicator diagram - effect of acceleration and friction on indicator diagram –calculation of max. speed of reciprocating pumps - Air vessels

Module III  Heat Engines

References
1. Fluid mechanics and machines _ Modi and Seth
2. Fluid mechanics and machines – Jagadish lal
5. Heat Engines – Ballaney
6. Thermal Engineering – R K Rajput
8. Gas Turbines – Cohen, Rogers and Saravanamittoo
9. GasTurbines - V. Ganesan

Examination Duration: 3 hours
Note: Question paper will be in two parts. Part A ( Total 40 marks) consists of 10 short answer type questions of 4 marks each. Part B ( Total 60 marks) will have 2 questions of 20 marks each from each module and the candidate has to answer one question from each module.
Module - I

Module - II

Module - III
Network functions – Poles and zeros - one port network and two port network - necessary conditions for driving point function and transfer functions, Introduction to network synthesis - positive real functions - properties - synthesis of one port LC, RC & RL networks by Foster and Cauer methods. Introduction to filters - low pass, high pass, band pass and band elimination filters - design of constant k and m derived filters.

REFERENCES

Examination Duration: 3 hours

Note: The question paper will consist of two parts. Part – A is to be compulsory for 40 marks (10 questions of 4 marks each). Part-B is to cover 3 modules for 60 marks. (50% choice, One out of two or two out of four from each module).
Module I
Transistor modeling - h parameter equivalent circuit - graphical determination of h parameters. BJT Small signal analysis of CE amplifier at low frequencies - current gain, input impedance, voltage gain, output impedance and power gain using exact equivalent circuit.
Field effect transistor - construction and characteristics of JFETs - JFET parameters - ratings and specifications.
JFET bias circuits - voltage divider bias. JFET small signal analysis of common source and common drain amplifiers.
MOSFET construction and characteristics - depletion and enhancement type - specifications - CMOS devices - advantages.

Module II
Multistage amplifiers - RC coupled, transformer coupled and direct coupled transistor amplifiers - Cascade amplifier - General frequency considerations of single stage amplifier - Low frequency considerations - High frequency considerations - hybrid pi model (qualitative study) - Overview of frequency response of cascaded FET amplifiers, Large signal amplifiers - Classifications of amplifiers - Maximum power and efficiency of class A (series fed and transformer coupled) amplifier Class B and Class C amplifiers - Push pull and complementary symmetry power amplifiers - Distortion in amplifiers - causes and effect (analysis not required).

Module - III
Operational Amplifiers - differential amplifier - emitter coupled differential amplifier - analysis - transfer characteristics - typical IC operational amplifiers – 741 & 301 - gain, CMRR, offset, slew rate - drift compensation - frequency compensation.
Opamp circuits - inverting and non-inverting amplifiers - summer, integrator differentiator and comparator circuits - comparator IC 311 - voltage level detectors - zero crossing detectors - waveform generation using Op-Amps.

References:

Examination Duration: 3 hours

Note: The question paper will consist of two parts. Part – A is to be compulsory for 40 marks (10 questions of 4 marks each). Part-B is to cover 3 modules for 60 marks. (50% choice, One out of two or two out of four from each module).
Module I

Module II

Module III

References

Examination Duration: 3 hours

Note: The question paper will consist of two parts. Part – A is to be compulsory for 40 marks (10 questions of 4 marks each). Part-B is to cover 3 modules for 60 marks. (50% choice, One out of two or two out of four from each module).
Hydraulic Machines Lab.

Study of gauges, meters and valves.
Study of pumps and turbines.

Experiments
1. Determination of Coefficient of discharge and Calibration of Notches, Orifice meter and Venturi meter
2. Determination of Chezys constant and Darcy’s coefficient on pipe friction apparatus
3. Performance tests on centrifugal and reciprocating pumps
4. Performance tests on Impulse and Reaction turbines

Heat Engines Lab.
Study of IC engines, Blowers and Compressors.

Experiments
1. Load test on SI Engines (Hydraulic/Brake drum dynamometer)
2. Load test on CI Engines (Hydraulic/Brake drum dynamometer)
3. Load test on SI/CI engine with electrical loading
4. Performance test on Blowers
5. Performance test on compressors

Examination Duration: 3 hours

Note:
1. Common Lab record will be used for both Hydraulic Machines Lab and Heat Engines Lab
2. University practical examination will be conducted in Hydraulic Machines Lab and Heat Engines lab by two set of examiners and students will be allotted to the labs by taking lot.
1. Study of wiring cables and electrical accessories – Electrical and Electronics symbols.
2. Simple wiring circuits- A light is controlled by a single pole single throw (S.P.S.T) switch, addition of a plug point in the light circuit and addition of a calling bell in the wiring circuit.
3. Circuit with Fluorescent tube light
4. Circuits to control a lamp from two independent positions
5. Hospital wiring
6. Godown wiring
7. Wiring of D.B with ELCB and MCB.
8. Testing of circuits - testing of ON/OFF conditions using a tester, test lamp, and location of phase and neutral.
9. Study of analog and digital multimeters and other electronic meters
10. Study of CRO for the measurements of voltage, phase angle, frequency etc.
11. Identification. and testing of Electronic components and devices. (Resister, Capacitor, Diode, Zener Diode, Transistor etc.)
12. assembling of circuits using breadboard
13. Soldering practice – Soldering of circuits (Half wave and Full wave Rectifiers with and without RC filter circuits - Zener Voltage regulator)

Examination Duration: 3 hours

For University examination, the following guidelines should be followed regarding award of marks
(a) Wiring diagram / Circuit diagram - 30%
(b) Wiring / Soldering - 30%
(c) Result - 20%
(d) Viva voce - 20%
### B. TECH DEGREE COURSE
#### 2008 SCHEME

#### ELECTRICAL AND ELECTRONICS ENGINEERING

**SCHEME AND SYLLABUS FOR Semester IV**

#### Semester IV

<table>
<thead>
<tr>
<th>Course No</th>
<th>Name of subject</th>
<th>Weekly load, hours</th>
<th>Max sessional marks</th>
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</table>
Module I

**Complex Differentiation:** Limits, continuity and differentiation of complex functions. Analytic functions-Cauchy Reimann equations in Cartesian form (proof of necessary part only) properties of analytic functions-harmonic functions. Milne Thomson method

**Conformal mapping:** The Transformations \( w = \frac{1}{z} \), \( w = z^2 \), \( w = z + \frac{1}{z} \), \( w = \sin z \), \( w = \cos z \), Bilinear transformation

Module II

**Complex Integration:** Line integral- Cauchy’s integral theorem-Cauchy’s integral formula. Power series-radius of convergence-Taylors and Launrepts series-zeros and singularities –Residues and residue theorem. Evaluation of real definite integrals-

\[
2\pi \int f(\sin \theta, \cos \theta) \, d\theta, \quad \int_{-\infty}^{\infty} f(x) \, dx \quad \text{with no poles of} \quad f(z)
\]

on the real axis (proof of theorems not required)

Module III


**References:**
7. S.S.Sastry, Introductory methods of numerical analysis.

Examination Duration: 3 hours

**Note:** The question paper shall consists of two parts. **Part A** (40 marks) Ten compulsory questions of 4 marks each. **Part B** (60 marks) Student must answer one out of two from each module. Each question carries 20 marks.
Module I
Number systems and codes: Review of number systems - decimal and binary numbers – octal and hexadecimal numbers – Binary arithmetic - 1’s and 2’s complements. Binary codes - BCD, excess-3 code and gray code - alphanumeric codes ASCII code - EBCDIC.

Logic functions and gates: Review of basic gates and truth tables - Elements of Boolean algebra - De Morgan’s theorem - Universality of NAND and NOR gates. Realization of combinational circuits using sum of products (SOP) and product of sums (POS) expression - Minimization of Boolean functions by Boolean algebra, Karnaugh map (up to four variables), Quine McCluskey method (up to 5 variables).

Module II
Combinational logic circuits: Half adder and full adder - parallel binary adder – BCD adder - ripple carry and look ahead carry adders, binary subtracter - parity checker/generator, 4 bit magnitude comparator - multiplexers and de-multiplexers - decoders and encoders - BCD to decimal and BCD to seven segment decoders. Realization of logic functions using multiplexers and decoders.

Logic families: Description of TTL, CMOS and ECL families - advantages and disadvantages of major logic families - Current sourcing and current sinking operations of ICs – fan-in and fan-out – noise margin. Familiarization of commercially available logic gates in 7400/5400 and 4000 series of IC’s.

Module III
Sequential logic circuits: Flip flops - SR, clocked SR, D, JK, master slave and T flip flops - level and edge triggering - conversion of one type of flip flop into another, Shift registers - SISO, SIPO, PIPO and PISO shift registers - left shift register - Universal shift register - applications of shift registers - Counters - ripple counter, synchronous counter, modulo N counter – ring counter – Johnson counter, up-down counter- - state diagrams – design of counters for random sequence.

Timer circuits: 555 Timer - astable multivibrator and monostable multivibrator circuits, Programmable Logic Devices: Description of PLA, PAL and FPGA . Memories – ROM- organisation, PROMs, RAMs – Basic structure, Static and dynamic RAMs. Basics of Hardware Description Language - VHDL.

References:

Examination Duration: 3 hours

Note: The question paper will consist of two parts. Part – A is to be compulsory for 40 marks (10 questions of 4 marks each). Part-B is to cover 3 modules for 60 marks. (50% choice, One out of two or two out of four from each module).
Module - I
Vector analysis – vector algebra - cartesian co-ordinate system - cylindrical co-ordinate system - spherical co-ordinate systems - dot and cross product - vector field.
Coulomb's law & electric field intensity - field due to a continuous volume charge distribution - line charge - sheet of charge - flux density - Gauss law – applications – Divergence – Maxwell's first equation - divergence theorem.
Concepts of electric potential, potential difference and energy - line integral -potential field of a point charge - system of charges - conservative property -potential gradient - electric field due to a dipole - energy density.
Conductors and dielectrics - current and current density - continuity of current -conductor properties and boundary conditions - method of images - boundary conditions for perfect dielectric materials. Capacitance - capacitance of co-axial cable - two wire line.

Module - II
Poisson's and Laplace's equations - examples - uniqueness theorem.

Module - III
Reflection of Uniform plane waves – standing wave ratio – transmission lines – transmission line equations – transmission line parameters.

References
6. B. Premlet,” Electromagnetic Theory with Applications”, Phasor books
7.

Examination Duration: 3 hours

Note: The question paper will consist of two parts. Part – A is to be compulsory for 40 marks (10 questions of 4 marks each). Part-B is to cover 3 modules for 60 marks. (50% choice, One out of two or two out of four from each module).
Module I

Module II
DC potentiometers - Vernier potentiometer - calibration of ammeter, voltmeter and wattmeter - AC potentiometer polar and coordinate type. Wattmeters - electrodynamic type wattmeter - constructional features - errors and compensations - measurement of 3-phase power (active and reactive). Induction type watt-hour meter - construction - working principle - testing and adjustment - rotating substandard - maximum demand indicator (Merz Price Type only) - trivector meter - TOD meter.

Module III

References:

Examination Duration: 3 hours
Note: The question paper will consist of two parts. Part – A is to be compulsory for 40 marks (10 questions of 4 marks each). Part-B is to cover 3 modules for 60 marks. (50% choice, One out of two or two out of four from each module).
Module I

Gaseous dielectrics: Ionisation and decay process-ionisation by electron collision, Townsend's first ionization coefficient, photo-ionisation, ionisation by metastables, electron detachment, decay by recombination, decay by attachment-decay by diffusion.

Cathode process: Photo electric emission, electron emission by positive ions and excited atom impact, field emission, Townsend's second ionization coefficient.

Electric breakdown in gases: Townsend's criterion for breakdown, the sparking potential, Paschen's law - effect of space charge, the Streamer mechanism, breakdown voltage characteristics in uniform field, penning effect, surge breakdown voltage, time lag, statistical and formative time lags.

Electro-negative gases: Production, properties and application of SF$_6$ gas, high voltage breakdown and arc phenomenon in SF$_6$ and its mixtures with nitrogen. Breakdown in high vacuum, application of vacuum insulation.

Corona discharge: Negative point-plane corona, Trichel pulses, positive point corona.

Module II

Liquid dielectrics: Conduction and breakdown in pure liquids and commercial liquids, suspended particle theory, cavitation and bubble theory, thermal breakdown, stressed oil volume theory, treatment and testing of transformer oil, properties of transformer oil and synthetic oil used in transformers.

Solid dielectrics: Classification based on temperature, breakdown in solid dielectrics, intrinsic breakdown, electro-mechanical breakdown - breakdown by treeing and tracking. Thermal breakdown, electro-chemical breakdown, cavity breakdown, internal partial discharges - a b c equivalent circuit, degradation of capacitor insulation by partial discharges. Properties of polyethylene and cross-linking polyethylene and polypropylene films. Properties and applications of paper, rubber, plastic, wood, mica, ceramic and glass as dielectric materials.

Elementary idea of life of insulation: Exponential and inverse power law models, constant stress test, accelerated life test methods.

Module III

Magnetic materials: Dia, para, ferro, antiferro and ferri magnetism, magnetic anisotropy, magnetostriction. B-H curve, reversible and irreversible regions, hysteresis loop for soft and hard magnetic materials, annealing, properties of grain oriented silicon steel. Properties and application of iron, alloys of iron, and harden alloys.

Materials for resistors: Properties of copper, aluminium and its alloys, silver, gold, Nickel, Molybdneum and Tungsten.

Non-linear resistors: Thyrite and ZnO.

Semi-conductor materials: Classification - properties and applications of silicon, germanium, diamond, graphite, selenium, silicon carbide, gallium arsenide, indium, antimonide, gallium phosphide, cadmium compounds as semi conducting materials, merits of semiconductor materials for use in electrical engineering.

Fuses: Different types of fuses and materials used.

Superconductivity: Superconducting elements and compounds, Soft & hard superconductors, applications of superconductivity.

References:

4. SF$_6$ and vacuum insulation for high voltage applications: M.S. Naidu and V.N. Maller, Khanna Publishers.

Note: The question paper will consist of two parts. Part – A is to be compulsory for 40 marks (10 questions of 4 marks each). Part-B is to cover 3 modules for 60 marks. (50% choice, One out of two or two out of four from each module).
Module - I
Per unit quantities- single phase and three phase- selection of base quantities - advantages of per unit system – changing the base of per unit quantities.
Resistance, inductance and capacitance of three phase transmission lines - symmetrical and unsymmetrical spacing - double circuit lines - bundled conductors - effect of earth on transmission line capacitance - performance of transmission lines.
Representation of lines - short and medium lines - equivalent Pi and T networks. Long lines - equivalent circuit of a long line.
Representation of power system components - single line diagram - impedance and reactance diagrams.

Module – II
Mechanical features of transmission lines – sag - sag template.
Insulators - Different types - Voltage distribution, grading and string efficiency of suspension insulators.
Conductors - types of conductors - copper, aluminium and ACSR conductors - Volume of conductor required for various systems of transmission- Choice of transmission voltage, conductor size - Kelvin's law.
Introduction to HVDC transmission -Advantages and Disadvantages only.
Cables -types of cables - insulation resistance - voltage stress - grading of cables - capacitance of single core and 3 - core cables - current rating.
Corona - disruptive critical voltage - visual critical voltage -power loss due to corona -Factors affecting corona - interference on communication lines.

Module- III
Economic aspects — Cost of generation — significance of diversity factor, load factor - plant factor.
Power factor considerations - Methods of power factor improvement.
Tariffs - different types of LT and HT consumers - tariff schemes - uniform tariff and differential tariff.
Power distribution systems – Radial and Ring Main Systems - DC and AC distribution: Types of distributors - Concentrated and Uniform loading - Methods of solving distribution problems.

References :

Note : The question paper will consist of two parts. Part – A is to be compulsory for 40 marks (10 questions of 4 marks each). Part-B is to cover 3 modules for 60 marks. (50% choice, One out of two or two out of four from each module).
1. Characteristics of a diode and zener diode.
2. R-C differentiating, integrating, clipping and clamping circuits (using diodes or transistors) - Transfer characteristics.
3. Zener regulator and stabilized power supply using series regulator.
5. Characteristics of JFET (Draw the equivalent circuit).
7. Design and testing of a common source JFET amplifier - frequency response characteristics.
8. Design and testing of R-C phase shift and Wein bridge oscillators.
12. UJT oscillator.
13. Study of OPAMP 741 and finding its parameters.
14. Inverting and non-inverting amplifiers using OPAMP.
15. Optional - Simulation of some of the above experiments using PSPICE.

Examination Duration: 3 hours

Note:
For University examination, the following guidelines should be followed regarding award of marks.
(a) Circuit and design - 30%
(b) Performance - 30%
(c) Result - 20%
(d) Viva voce - 20%
1. OCC of dc generator – Critical Resistance and critical speed
2. Load characteristics of dc shunt and compound generators
3. Load test on dc series motor
4. Load test on DC shunt motor
5. Swinburne's and Retardation tests on dc machine.
6. Hopkinson's test
7. Separation of losses in dc machines.
8. Polarity and transformation ratio test on a single phase transformer
10. Sumpner's test on two single phase transformers
11. OC and SC test on three phase transformer
12. Separation of losses in a single phase transformer

Examination Duration: 3 hours

Note:
For University examination, the following guidelines should be followed regarding award of marks
(a) Circuit and design - 30%
(b) Performance - 30%
(c) Result - 20%
(d) Viva voce - 20%
### B. TECH DEGREE COURSE
#### 2008 SCHEME

#### ELECTRICAL AND ELECTRONICS ENGINEERING

#### SCHEME AND SYLLABUS FOR Semester V

<table>
<thead>
<tr>
<th>Course No</th>
<th>Name of subject</th>
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#### 08. 506 Elective I

(a) Computer Organisation  
(b) Superconductivity and Applications  
(c) Operations Research  
(d) New and Renewable Energy Sources
08.501  ENGINEERING MATHEMATICS IV (ERHBF)
L/T/P: 3/1/0  Credits: 04

MODULE I
Discrete and continuous random variables and their probability distributions- Probability distribution (density) functions-Distribution functions- Mean and Variance - Simple problems -Binomial, Poisson, uniform and exponential distributions - Mean and Variance of the above distributions - Normal distribution - Properties of normal distribution-Computing probabilities using Binomial, Poisson, uniform, exponential and normal distributions

MODULE II
Curve fitting- Principle of least squares-Fitting a straight line-Fitting a parabola-Linear correlation and regression-Karl Pearson’s coefficient of correlation-Sampling distributions-Standard error-Estimation- Interval estimation of population mean and proportions (small and large samples)-Testing of Hypothesis- Hypothesis concerning a mean, Equality of means-Hypothesis concerning one proportion, difference of two proportions.

MODULE III
Joint probability density function-Properties-Marginal and conditional distribution- Independence-Random processes -Classification of random processes- Examples-Average values such as mean, autocorrelation, auto covariance, correlation coefficient of random processes- stationarity- strict sense stationary process-wide sense stationary process-Autocorrelation function and its properties-Power spectral density and its properties (no proof)-Related problems-Markov chains. Transition probability matrices-Chapman-Kolmogorov equation (no proof)-Poisson process-Mean and autocorrelation of Poisson process-Related problems

REFERENCES
1. Papoulis and S.U. Pillai, Probability, random variable and stochastic processes, 4/e, TMH
2. Veerarajan, Probability and Random Processes, 2/e, TMH
3. Stark and Woods, Probability and Random processes with application to signal processing, 3/e, Pearson Education

The question paper consists of Part A and Part B. Part A is for 40 marks. Part A consists of 10 compulsory short answer questions each carrying 4 marks covering the entire syllabus. Part B is for 60 marks. There will be two questions from each module. The candidate has to answer one question of 20 marks from each module.
No charts, tables, codes are permitted in the Examination hall if necessary relevant data is given along with the question paper by the question paper setter.
Module - I
Process Control - block diagram, identification of elements, sensor time response - first and second order response. Description of control valves, actuators and current to pressure and pressure to current converters.
Transducers - definition - primary and secondary transducers.

Module - II

Module - III

REFERENCES

Note:
1. The question paper will consist of two parts. Part – A is to be compulsory for 40 marks (10 questions of 4 marks each). Part-B is to cover 3 modules for 60 marks. (50% choice, One out of two or two out of four from each module).
2. Maximum of four questions and a minimum of three questions from each module should be included in Part A.
08.503 ELECTRICAL MEASUREMENTS – II

L/T/P: 2/1/0

Module - I

Module - II

Module - III

Textbook:

References

Note:
3. The question paper will consist of two parts. Part – A is to be compulsory for 40 marks (10 questions of 4 marks each). Part-B is to cover 3 modules for 60 marks. (50% choice, One out of two or two out of four from each module).
4. Maximum of four questions and a minimum of three questions from each module should be included in Part A.
Module – I


Module – II

SCR circuits for phase controlled rectification – single phase half wave and full wave converters – Semi-converter and full converter with R, RL and RLE loads – output voltage expression – effect of free wheeling diode- inverter operation-continuous and discontinuous current mode of operation.

Three pulse and six pulse converters – output voltage expression for m-pulse converter – 3 φ fully controlled bridge converter –3 φ half controlled bridge converter - effect of source inductance.

Module – III

Choppers – step down and step up choppers –voltage and current commutated choppers – output voltage control.


REFERENCES


Note :

1. The question paper will consist of two parts. Part – A is to be compulsory for 40 marks (10 questions of 4 marks each). Part-B is to cover 3 modules for 60 marks. (50% choice, One out of two or two out of four from each module).
2. Maximum of four questions and a minimum of three questions from each module should be included in Part A.
Module - I

Module - II

Module - III

REFERENCES
1. MG Say, “Performance and design of AC machines”, Pitman & ELBS

Note:
1. The question paper will consist of two parts. Part – A is to be compulsory for 40 marks (10 questions of 4 marks each). Part-B is to cover 3 modules for 60 marks. (50% choice, One out of two or two out of four from each module).
2. Maximum of four questions and a minimum of three questions from each module should be included in Part A.
### Module 1
Basic Operational concepts - Von-Neumann architecture, Bus structure - monobus and multibus structures, PCI Bus, Addressing methods, Instruction formats - Instruction sequencing.
Processing unit - fundamental concepts - single bus organisation of CPU - multiple bus organisation of CPU, memory read and memory write operations - Data transfer using registers. Execution of a complete instruction - sequencing of control signals.
Computer Arithmetic - Constructing an arithmetic logic unit - A 32 bit ALU, Basic Operations - Signed and unsigned addition - carry look ahead adder, subtraction, Multiplication algorithm - Booths algorithm, Division algorithm.

### Module - II
Control unit - hardwired control and micro-programmed control - grouping of control signals - microinstruction with next field address - Pre-fetching of microinstructions - Emulation.

### Module - III
Main memory unit - Memory organisation - memory cells – static memory-dynamic memories - multiple module memory - Memory interleaving - Cache memory - principles - elements of cache design - mapping function - associate mapping - set associative mapping - fully associative mapping - aging.

### TEXT BOOKS

### Note:
1. The question paper will consist of two parts. Part – A is to be compulsory for 40 marks (10 questions of 4 marks each). Part-B is to cover 3 modules for 60 marks. (50% choice, One out of two or two out of four from each module).
2. Maximum of four questions and a minimum of three questions from each module should be included in Part A.
Module I

Module II

Module III
3-D images Derived magnetic resonance images - Superconducting Magnetic Energy Storages (SMES) - Actively shielded transportable SMES Systems - High temperature superconductors and their potential for utility applications - Design of air-core superconducting power transformer-cable transmission system - High temperature superconducting magnetic motor - Superconducting power generation - Power systems of the future - Superfast magnetically levitated train-Superconducting quantum interference device (SQUID)– Supercomputers -Superconductors in defence application - Advantages of HTSC - ore refining (magnetic separators) - Magnetic shielding - Large Physics machines (colliders, fusion confinement) – semiconductor - superconductor hybrids (A-D converters) -Active Superconducting elements (FETs) – Optoelectronics - Matched filters.

Textbooks

Note:
1. The question paper will consist of two parts. Part – A is to be compulsory for 40 marks (10 questions of 4 marks each). Part-B is to cover 3 modules for 60 marks. (50% choice, One out of two or two out of four from each module).
2. Maximum of four questions and a minimum of three questions from each module should be included in Part A.
Module – I
Definition of OR, Modeling in OR, general methods of solving OR models, Scientific methods in OR.
Mathematical formulation of Linear Programming Problem, Graphical solution, Simplex Algorithm and its applications, use of artificial variables, (quality, economic interpretation), degeneracy and elementary sensitivity analysis.
The transportation problem, mathematical formulation, Solution, degeneracy, unbalanced transportation problem.
Assignment problem, mathematical formulation, the assignment algorithm, unbalanced assignment problems.

Module – II
Replacement model, types of replacement problem, problem of choosing between two machines, determination of best replacement age of machine using present worth and discount rate, group replacement, Sequencing.
Game theory – definition of a game, pay-off, two person zero sum game, graphical solution, application in marketing, advertisement etc.
Decision theory – decision under risk – expected value of profit or loss, expected variance criterion, decision trees, decisions under uncertainty – the Laplace criterion, the mini-max criterion, minimax regret criterion, Hurwicz criterion.
Inventory problems, the economic lot size system, Newspaper boy problem, purchase, inventory model with price breaks.

Module – III
Network analysis, project scheduling by PERT – CPM, Arrow head representation, calculation of critical path, probability and cost consideration in project scheduling. Construction of the time chart-resource leveling, queuing theory, basic elements of the queuing model problems connecting (m/m/I) and (m/m/k) – Problems – various applications in commercial subjects.

REFERENCES

Note:
1. The question paper will consist of two parts. Part – A is to be compulsory for 40 marks (10 questions of 4 marks each). Part-B is to cover 3 modules for 60 marks. (50% choice, One out of two or two out of four from each module).
2. Maximum of four questions and a minimum of three questions from each module should be included in Part A.
Module I
Renewable and non-renewable sources of energy - Brief review of conventional sources of energy - Energy production and world energy consumption - Greenhouse effect and global warning.
Solar energy option - Thermal conversion - Design, fabrication and performance of flat plate collectors - Description of solar thermal devices (stills, water heaters, furnaces, cookers and refrigerators) - Solar thermal power generation systems - thermal storage.

Module - II
Wind energy - Wind turbines - Horizontal axis and vertical axis wind turbines - Power and energy from wind turbines - Wind characteristics.
Energy from oceans: Wave energy - Physical principles - Wave characteristics and wave power - Wave energy technology - Fixed devices - Floating devices.
Ocean thermal energy conversion (OTEC) - Principles - Methods of power generations - Heat exchangers - Basic ideas about other practical considerations.
Tidal power - Basic principles - Power generation - Limitations of tidal generation.

Module - III
Biomass: Extracting energy from bio-fuels - Direct combustion, gasification, pyrolysis, anaerobic digestion, fermentation - Energy from refuse - Refuse derived fuel (RDF) - Energy farming.
Small hydro power: Classification as micro, mini and small hydro projects - Basic concepts and types of turbines - Design and selection considerations.
Recent trends (only brief description expected): Fuel cell, hydrogen energy, alcohol energy, nuclear fusion, power from satellite stations.

REFERENCES:
1. Renewable energy resources - John W. Twidell and Anthony D. Weir, English Language Book Society (ELBS), 1996.
2. Renewable energy - power for sustainable future - Edited by Godfrey Boyle, Oxford University Press in association with the Open University, 1996.

Note:
1. The question paper will consist of two parts. Part – A is to be compulsory for 40 marks (10 questions of 4 marks each). Part-B is to cover 3 modules for 60 marks. (50% choice, One out of two or two out of four from each module).
2. Maximum of four questions and a minimum of three questions from each module should be included in Part A.
1. Characteristics of TTL and CMOS gates
2. Familiarisation of Logic Gates
3. Verification and Realisation of DeMorgan’s theorem and Realisation of SOP and POS functions after K map reduction
4. Half adder and full adder (using XOR, AND and OR gates)
5. 4 bit adder/subtractor and BCD adder using IC 7483/ CMOS equivalent.
7. Study of Flip Flop ICs (7474, 7476).
8. Design and testing of monostable and astable multivibrators using ICs. (74121 for monoshot and 555 for astable)
9. BCD to decimal decoder and BCD to 7 segment decoder and display
10. Realisation of two bit comparator using gates and study of four bit comparator IC (7485)
11. a) Realisation of MUX using gates and study of MUX IC.
    b) Realisation of combinational circuits using MUX
12. a) Realisation of ripple counters using flip flops
    b) Study of counter ICs (7490, 7493)
13. Design of synchronous up down and Modulo N counters.
14. a) Realisation of four bit serial IN serial OUT registers using flip flops.
    b) Study of Shift register IC 7495, ring counter and Johnsons counter
15. Optional - Simulation of some of the above experiments using VHDL/PSPICE.

Examination Duration: 3 hours

Note:
For University examination, the following guidelines should be followed regarding award of marks
(a) Circuit and design - 30%
(b) Performance - 30%
(c) Result - 20%
(d) Viva voce - 20%
1. Resistance measurement using Kelvin’s Double Bridge and Wheatstones’s Bridge
2. Calibration of ammeter using slide-wire potentiometer
3. Calibrations of voltmeter, wattmeter using vernier dial potentiometer
4. Calibration of single phase energy-meter by direct and phantom loading
6. Plotting the magnetizing curves of (i) ring specimen (ii) transformer core.
7. Simulation of Hysteresis Loop on the CRO.
8. Opamp Circuits: Summer, integrator, differentiator, Wien Bridge Oscillator, Instrumentation amplifier
9. Opamp Comparator circuits: level detector, ZCD, Schmitt Trigger
10. Characteristics of LVDT, Load-cell
11. Characteristics of Thermistor
12. Characteristics of Thermocouple, RTD

Note:
For University examination, the following guidelines should be followed regarding award of marks
(a) Circuit and design -30%
(b) Performance -30%
(c) Result -20%
(d) Viva voce -20%
## B. TECH DEGREE COURSE
### 2008 SCHEME

### ELECTRICAL AND ELECTRONICS ENGINEERING

### SCHEME AND SYLLABUS FOR Semester VI

<table>
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<th>Name of subject</th>
<th>Weekly load, hours</th>
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### 08.606 Elective II

- (a) Energy Conservation and Management
- (b) Biomedical Instrumentation
- (c) Software Engineering
- (d) Technical English and Communicative Skills
Module - I

Module - II

Module - III

REFERENCES
1. Say M.G, Performance and design of ac machines, ELBS and PITMAN
4. D.R. Gupta, Vandana Singhal, fundamentals of Electric Machines, New Age International
5. Open Shaw Taylor E - , “Performance and design of AC commutator motors”.
7. R.Krishnan, “Electric Drives”,
8. Irving L. Kossov, “Electrical Machinery and Transformers”,

Note:
5. The question paper will consist of two parts. Part – A is to be compulsory for 40 marks (10 questions of 4 marks each). Part-B is to cover 3 modules for 60 marks. (50% choice, One out of two or two out of four from each module).
6. Maximum of four questions and a minimum of three questions from each module should be included in Part A.
Module – I


Module – II

IO and memory interfacing - Interfacing memory – Address decoding – Programmable I/O ports – Programmable peripheral interface PPI 8255- Modes of operation. Methods of data transfer – synchronous and asynchronous data transfer, Programmed data transfer – interrupt driven data transfer – interrupt structure of 8085. Interfacing of LEDs, ADC and DACs. Case study – microprocessor based temperature control consisting of 8085 CPU, 2K RAM, 2K EPROM, PPI 8255, 8 bit A/D converter and LEDs to indicate normal, high and low temperature.

Module – III


REFERENCES

4. Naresh Grover, Microprocessors
5. Douglas V. Hall : Microprocessors and Interfacing, TMH, New Hill
6. M. Rafiquzzaman : Microprocessor Theory and Application, PHI.

Note :

1. The question paper will consist of two parts. Part – A is to be compulsory for 40 marks (10 questions of 4 marks each). Part-B is to cover 3 modules for 60 marks. (50% choice, One out of two or two out of four from each module).
2. Maximum of four questions and a minimum of three questions from each module should be included in Part A.
Module 1

Module 2

Module 3

References:
2) Brian W Kernighan & Dennis M Ritchie, "The C Programming language" Pretice Hall - India-1986
5) B.S. Grewal, “Numerical Methods and Computer Programming”.

Note:
1. The question paper will consist of two parts. Part – A is to be compulsory for 40 marks (10 questions of 4 marks each). Part-B is to cover 3 modules for 60 marks. (50% choice, One out of two or two out of four from each module).
2. Maximum of four questions and a minimum of three questions from each module should be included in Part A.
Module I
Types of Organisation structures, Types of companies and their formation.
Personal Management - Objectives and functions - Recruitment, Selection, Training, Induction concepts and techniques.
Production cost concept and break even analysis – simple problems
Introduction to financial management- scope of financial management - functions - objectives of financial management. Working capital- factors affecting working capital- working capital cycle
Depreciation - methods of calculating depreciation.

Module II
Facility location: Factors influencing plant location- Plant layout- different types of layout- material flow pattern- layout planning-systematic layout planning-computerized layout planning techniques
Work study-Methods study and Time Measurement, Steps in methods improvement- Use of chart and diagrams.
Performance rating and Methods - Types of Allowances, computation of basic time and Standard time - Examples.
Wages and Incentives- System of Wage Incentive Plans, Job evaluation and Merit rating.

Module III
Industrial relations- Fatigue and methods of eliminating fatigue.
Industrial disputes - collective bargaining- Trade unions
Production Planning and Control- Functions and Objectives-job. batch, mass and continuous production-
Materials Management – Importance, Inventory, Determination of EOQ, selective inventory control techniques.
Project management- Phases- Planning using PERT and CPM (concepts only)

References:
1. M. Mahajan, Industrial engineering and Production management, Dhanpat Rai & Co
2. Martand Telsang, Industrial engineering and Production management, S Chand & CO Ltd.
3. Grant and Levenworth, . Statistical Quality Control, TMH.
5. Introduction to Work Study- ILO
10. Khan and Jain, Financial Management, TMH.
12. Prasenna Chandra, Project Planning Analysis Selection Implementation and review- TMH

Note:
1. The question paper will consist of two parts. Part – A is to be compulsory for 40 marks (10 questions of 4 marks each). Part-B is to cover 3 modules for 60 marks. (50% choice, One out of two or two out of four from each module).
2. Maximum of four questions and a minimum of three questions from each module should be included in Part A.
Module – I
Power system faults - symmetrical faults - short circuit MVA - current limiting reactors, Symmetrical components - sequence impedances and sequence networks of generators, transformers and transmission lines. Unsymmetrical faults - single line to ground, line to line, double line to ground faults -consideration of prefault current.

Module – II
Fuses: Fuse Characteristics, Types of Fuses, Selection of Fuses
Circuit breakers - Arc voltage, Arc interruption - Restricting voltage and Recovery voltage, Resistance Switching, Current chopping, Interruption of capacitive current
Protective relays - Introduction - Zones of Protection - Primary and Back up Protection - Essential qualities of protection - Classification of Protective relays - Basic Relay Terminology and characteristics- Types of Electromagnetic relays - Over current protection - Distance protection - Pilot relaying schemes(basic concepts only) – Principle of Relay coordination

Module - III

TEXTBOOK

REFERENCES
7. P Switchgear Handbooks

Note :
1. The question paper will consist of two parts. Part – A is to be compulsory for 40 marks (10 questions of 4 marks each). Part-B is to cover 3 modules for 60 marks. (50% choice, One out of two or two out of four from each module).
2. Maximum of four questions and a minimum of three questions from each module should be included in Part A.
Module - I
Global energy scenario, Global warming and need for energy conservation - Energy intensity - Energy - GDP coupling - General principles of energy management and energy management planning. Establishing energy database - Energy audit - Identifying, evaluating and implementing feasible energy conservation opportunities - energy audit report. Study of various governmental agencies related to energy conservation and management.

Module II
Management of electrical load and lighting - Energy Efficient lightings- CFL’s, advantages and disadvantages. LED, power LED’s, advantages and disadvantages. Surface mounted devices. Solar powered lightings.

Module III
Use of computers in energy management (description about basic ideas only). Co-generation of electricity.

TEXTBOOKS
2. Energy management principles - Craig B. Smith - Pergamon Press.

REFERENCES:

Note :
1. The question paper will consist of two parts. Part – A is to be compulsory for 40 marks (10 questions of 4 marks each). Part-B is to cover 3 modules for 60 marks. (50% choice, One out of two or two out of four from each module).
2. Maximum of four questions and a minimum of three questions from each module should be included in Part A.
Module-I

Action potentials- Propagation, Bioelectric potentials.

Module-II

Electrocardiography- Principle, lead system, standards, Block diagram of ECG machine-Pre-amplifier, driver and recorder. Block diagram of computer aided ECG.
Electroencephalography- Lead system, Position of Electrodes, Block diagram and features.
Electromyography- block diagram of EMG recorders, Applications
Bed side monitors- Block diagram.

Module-III

Modern imaging systems
Basic x-ray machines, CAT scanner- Principle of operation, scanning components, Ultrasonic imaging-principle, types of Ultrasound imaging. MRI scanning,(Principle only)
Therapeutic equipments Cardiac pace makers, de-fibrillators, hemo-dialysis machines, artificial kidney, short wave and Micro wave diathermy machines.
Patient Safety: Shock hazards – leakage current – safety and test instruments

References
4. Medical Instrumentation, application and design – John G.Webster (Editor) – John Wiley and sons
8. Biomedical Instrumentation Dr.R.Arumugham

Note :
1. The question paper will consist of two parts. Part – A is to be compulsory for 40 marks (10 questions of 4 marks each). Part-B is to cover 3 modules for 60 marks. (50% choice, One out of two or two out of four from each module).
2. Maximum of four questions and a minimum of three questions from each module should be included in Part A.
Module I
**Introduction:** Software Crisis, Software Processes, Software life cycle models: Waterfall, Prototype, Evolutionary and Spiral models, Overview of Quality Standards like ISO 9001, SEI-CMM
**Software Metrics:** Size Metrics like LOC, Token Count, Function Count, Design Metrics, Data Structure Metrics, Information Flow Metrics.
**Software Project Planning:** Cost estimation, static, Single and multivariate models, COCOMO model, Putnam Resource, Allocation Model, Risk management.

Module II
**Software Requirement Analysis and Specifications:** Problem Analysis, Data Flow Diagrams, Data Dictionaries, Entity-Relationship diagrams, Software Requirement and Specifications, Behavioural and non-behavioural requirements, Software Prototyping.
**Software Design:** Cohesion & Coupling, Classification of Cohesiveness & Coupling, Function Oriented Design, Object Oriented Design, User Interface Design.
**Software Reliability:** Failure and Faults, Reliability Models: Basic Model, Logarithmic Poisson Model, Calendar time Component, Reliability Allocation.

Module III
**Software Testing:** Software process, Functional testing: Boundary value analysis, Equivalence class testing, Decision table testing, Cause effect graphing, Structural testing: Path testing, Data flow and mutation testing, unit testing, integration and system testing, Debugging, Testing Tools & Standards.
**Software Maintenance:** Management of Maintenance, Maintenance Process, Maintenance Models, Reverse Engineering, Software Re-engineering, Configuration Management, Documentation.
**Interface Design and CASE:** GUI design - advantages - types of user interfaces. Styles of human-computer interaction - Human-Computer interface design - interface design models. Computer Aided Software Engineering (CASE) tools - Tool integration - object management - Analysis and design tools - programming tools - Integration and testing tools - Maintenance tools.

Note: The semester assignment is a mini project which consists of the preparation of a software project proposal, planning and management.

**Text:**

**Reference:**

**Note:**
1. The question paper will consist of two parts. Part – A is to be compulsory for 40 marks (10 questions of 4 marks each). Part-B is to cover 3 modules for 60 marks. (50% choice, One out of two or two out of four from each module).
2. Maximum of four questions and a minimum of three questions from each module should be included in Part A.
MODULE I

Vocabulary and Functional English: This area attempts at making learners withstand the competition at the transnational technical environment so as to enable them to undertake various professional operations.
1) Vocabulary – a basic word list of one thousand words.
2) Functional grammar, with special focus on Common Errors in English.
3) Idioms and Phrasal verbs.
(A brief review of the above topic is only desired)

Listening, Speaking and Reading: This area exposes the learners to the standard expressions including stress, rhythm and various aspects of isolated elements and connected speech.
The use of diphthongs, elements of spoken expression, Varieties of English, accent neutralization

Listening Skills: Listening for general content, Intensive listening, listening for specific information. Sounds, stress, intonation, question tag, listening to lectures, audio/video Cassettes, asking and answering questions, note-taking, dialogue-writing.

Speaking Skills: Oral practice: Describing objects/situations/people-Roll play-(Individual and group activities)
Just A Minute (JAM)/Group Discussion.

Reading Comprehension: This area exposes the learners to the techniques deciphering and analyzing longer texts pertaining to various disciplines of study.

Types of Reading, Sub skills of Reading, Eye span – fixation, Reading Aloud and Silent Reading, Vertical and Horizontal Reading, Vocalization and sub-vocalization.

Reading Skills: Skimming the text- exposure to a variety of technical articles, essays, graphic representation, and journalistic articles.

MODULE II

Written Communication Skills

This area exposes the learners to the basic tenets of writing; the style and format of different tools of written communication

Description (through paragraph writing), Reflection (through essay writing), Persuasion (through indented letter writing), skills to express ideas in sentences, use of appropriate vocabulary -sentence construction-paragraphs development-note making, informal letters, essentials of telephonic conversation, invitations, minutes of a meeting, editing a passage and essay writing.

Technical communication skills

Technical report writing (informational, analytical and special reports), technical vocabulary, technical communication- features, distinction between general and technical communication, and language as a tool of communication: levels of communication, interpersonal, organizational, mass communication, the flow of communication: upward, downward and lateral, importance of technical communication, barriers to communication.


MODULE III

Students should read the book on their own and selected topics may be discussed in the class.

REFERENCES
1. Andrea J Rutherford, Basic Communication Skills for Technology, Pearson Education.
10. Sarma B.S, Structural Patterns and Usage in English, Poosha Series

University Examination:
Six short questions to be answered out of 8 questions from Module I. Each answer carries 5 marks. (30 marks). Questions to be limited to the topics Writing Skills & Basics of Technical Communication. 2 questions out of 4 has to be answered from Module II. Each answer carries 15 marks. (30 marks). Two essays out of Four has to be answered from module III. Each answer carries 20 marks. (40 marks).
1. Study of Power devices- SCR, TRIAC, Power MOSFET, IGBT, etc.
2. Static VI characteristics of SCR
3. Characteristics of Power MOSFET.
4. Characteristics of IGBT
7. *AC voltage controller using Triac.
10. *Ramp Control trigger circuit
13. Control of step down MOSFET/IGBT Chopper.
15. Study of single phase Transistorized inverter.

*Design of the triggering circuit is part of the experiment

Note: According to the facility available in the laboratory a minimum of 15 experiments should be conducted.

Examination Duration: 3 hours

Note:
For University examination, the following guidelines should be followed regarding award of marks
(a) Circuit and design  -30%
(b) Performance        -30%
(c)Result              -20%
(d) Viva voce          -20%
1. Study of 8085 Microprocessor kit and Instruction set.
2. Data transfer instructions using different addressing modes and block transfer.
3. Arithmetic operations in binary and BCD-addition, subtraction, multiplication and division.
4. Logical instructions- sorting of arrays in ascending and descending order.
5. Binary to BCD conversion and vice versa.
7. Interfacing D/A converter- generation of simple waveforms-triangular wave, ramp etc
8. Interfacing A/D converter
10. Stepper motor control (8085).

Examination Duration: 2 hours

Note:
For University examination, the following guidelines should be followed regarding award of marks
(a) Circuit and design  -30%
(b) Performance        -30%
(c) Result            -20%
(d) Viva voce         -20%
1. Simple programs using input output statements
2. Simple programs using decision statements
3. Programs using Control statements
4. Array manipulation
5. Functions Pass by value Pass by reference
6. Recursive functions
7. String manipulation – compare, copy, reverse operations
8. Matrix operations: addition multiplication, determinant and inverse
9. Reading from a file and writing to a file merging and appending of files.
10. Solution of algebraic and transcendental equations: bisections, Newton- Raphson method- comparison
12. Solution of set of linear equations-Gauss, Gauss-Jordan, Gauss-Siedel- comparison
13. Solution of differential equation – Euler, Runge-Kutta, step size- comparison

Examination Duration: 2 hours

Note:
For University examination, the following guidelines should be followed regarding award of marks
(a) Circuit and design -30%
(b) Performance -30%
(c) Result -20%
(d) Viva voce -20%
B. TECH DEGREE COURSE  
2008 SCHEME  

ELECTRICAL AND ELECTRONICS ENGINEERING  

SCHEME AND SYLLABUS FOR Semester VII  

<table>
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<th>Course No</th>
<th>Name of subject</th>
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08. 704 Elective III  
(a) Electronic Communication  
(b) Environmental Engineering  
(c) Modern Operating Systems  
(d) Management Information System  
(e) Nano Technology  
(f) Computer Aided Power System Analysis  
(g) Microprocessor Based System Design  
(h) Embedded System  
(i) Illumination Technology
Module - I
Control system components: DC and AC servo motor – synchro - magnetic amplifier - gyroscope - stepper motor - Tacho meter.

Module - II
Time domain analysis of control systems: Transient and steady state responses - test signals - time domain specifications - first and second order systems - impulse and step responses - steady state error analysis - static error coefficient of type 0,1,2 systems - Dynamic error coefficients - PID controllers -Tradeoff between steady state and transient behaviour

Module - III
Frequency domain specifications: - Non-minimum phase system -transportation lag- Nyquist stability criterion-
gain margin - phase margin - stability analysis using bode plot.
Compensation design: Realization of basic compensators-Design of compensator using bode plot.

TEXT BOOKS

REFERENCES

Note :
1. The question paper will consist of two parts. Part – A is to be compulsory for 40 marks (10 questions of 4 marks each). Part-B is to cover 3 modules for 60 marks. (50% choice, One out of two or two out of four from each module).
2. Maximum of four questions and a minimum of three questions from each module should be included in Part A.
Module I
Load flow studies – Introduction-types-network model formulation - formation of bus admittance matrix, Gauss-Siedel, Newton-Raphson (Qualitative analysis only) and Fast Decoupled methods-principle of DC load flow.
Economic Operation - Distribution of load between units within a plant - transmission loss as a function of plant generation - distribution of load between plants - Method of computing penalty factors and loss coefficients.
Unit commitment: Introduction — Constraints on unit commitments: Spinning reserve, Thermal unit constraints - Hydro constraints.

Module - II
Automatic Generation and Voltage Control: Load frequency control: single area and two area systems - Automatic voltage control
Reactive power control- synchronous compensators- reactors, capacitors, static VAR compensators, FACTS Introduction, Objectives - Basic types– Basic concepts of Static Var Compensator (SVC), Static Compensator (STATCOM), Thyristor Controlled Series compensator (TCSC), Static Synchronous Series Compensator (SSSC) and Unified Power Flow Controller (UPFC).

Module - III
AC traction -Traction mechanics - main line, suburban service requirements - Speed-time graph - Specific energy consumption.
HVDC Transmission-types of DC links-constant extinction angle control-constant current control- control characteristics-power flow in HVDC systems-ground return-Application of HVDC back to back links-HVDC developments in India.
Over voltages and insulation requirements - Generation of over voltages - Switching surges -Protection against over voltages - Surge diverters-Insulation co-ordination -propagation of surges -Termination in inductance and capacitance - Determination of system voltages produced by travelling waves - Bewly lattice diagram -effects of line loss.

TEXTBOOK

REFERENCES

Note :
1. The question paper will consist of two parts. Part – A is to be compulsory for 40 marks (10 questions of 4 marks each). Part-B is to cover 3 modules for 60 marks. (50% choice, One out of two or two out of four from each module).

2. Maximum of four questions and a minimum of three questions from each module should be included in Part A.

---

**Module I:**


**Module II:**

The Z transforms, Region of convergence Inverse Z transform. Properties analysis of LTI Systems using Z transforms. Transient and steady state response, causality and stability using z transforms, Schur Cohn stability.

Discrete Fourier transform: Frequency domain sampling, Discrete Fourier transform (DFT): DFT pair, properties of DFT, frequency response analysis of signals using the DFT, circular convolution using DFT, linear filtering based on DFT, Fast Fourier Transform (FFT); Introduction, Radix-2 decimation in time FFT algorithm, Radix-2 decimation in frequency algorithm.

**Module III:**


**REFERENCES**


**Note:**

1. The question paper will consist of two parts. Part – A is to be compulsory for 40 marks (10 questions of 4 marks each). Part-B is to cover 3 modules for 60 marks. (50% choice, One out of two or two out of four from each module).

2. Maximum of four questions and a minimum of three questions from each module should be included in Part A.
Module - I: Radio Communication
Theory of amplitude modulation (AM) - generation of (block diagrams only) double sideband full carrier, double sideband suppressed carrier, single sideband suppressed carrier - propagation of electromagnetic waves - block diagrams of low power and high power AM transmission - AM receivers: straight receivers superhetodyne receiver - choice of intermediate frequency - simple AVC circuit.
Theory of frequency modulation (FM) - sidebands - FM broadcasting - block diagrams of direct FM transmitter and Armstrong transmitter - FM receivers (balanced - slope detector and Foster-Seely discriminator only ).
Carrier communication: General principles of multi-channel system and power-line carrier - terminal equipment. Electronic telephone exchange (basic idea only).

Module - II: Radar, Facsimile and Television
Principles of digital communication – pulse modulation - sampling process-PAM –Quantization - pulse code modulation (PCM) (basic principles only)
Television: TV standards - frequency bands - TV Cameras - TV picture tube - interlacing and synchronisation - composite video signal - TV receiver and transmitter block diagrams: black and white, color (PAL system only) - high definition television.

Module - III: Mobile Telephone service
Evaluation of mobile telephone - two-way communication services - cellular telephone: basic concepts, frequency reuse, interference cell splitting, sectoring, cell system layout, cell processing.
Analog cellular telephone: Basic concept, block diagram of analog cellular tranceiver.
Digital cellular telephone (basic concept) - code division multiple accessing (CDMA) - block diagram of global system for mobile (GSM) architecture–overview of personal communication satellite system (PCSS).

TEXT BOOKS:

REFERENCES

Note:
1. The question paper will consist of two parts. Part – A is to be compulsory for 40 marks (10 questions of 4 marks each). Part-B is to cover 3 modules for 60 marks. (50% choice, One out of two or two out of four from each module).
2. Maximum of four questions and a minimum of three questions from each module should be included in Part A.
Module I

Technology and sustainability - Integrated system, Technological evolution, Contemporaneous thinking, Forward thinking The greening of engineering, The relevance of biological ecology to technology. Technological change and evolving risk- Historical patterns in technological evolution. The social dimensions of industrial ecology - industrial ecology and sustainable engineering within society, cultural constructs and temporal scales, social ecology, consumption, government and governance, legal and ethical concerns, economics and industrial ecology.

The concept of sustainability - Sustainable engineering - engineering and the industrial sequence, green chemistry, green engineering, pollution prevention. Industrial product development Approaches to design for recycling, guidelines for eodesign. An introduction to life-cycle assessment, the concept of the life cycle.

Module II


Water and Other Natural Resources- Social ConsiderationsBusiness Considerations, Calculating the Water Footprint, Trading Virtual Water, Other Natural Resources. Water and industrial ecology - water and products, the water footprint, water quality.

Urban industrial ecology, The status of resources - mineral resources scarcity, cumulative supply curves, energy resources, water resources. Industrial ecology and sustainable engineering in developing countries.

Eco-Engineering – Eco-Engineering, Carbon Neutrality, Greenwashing and Green Noise, Measuring and Sharing with OpenEco,

Module III

Citizen Engineer - Responsibilities of the Citizen EngineerKnowledge Base of the Citizen Engineer, nges Cha, in the Nature of EngineeringEngineering on a Whole New Scale, Externally Driven Changes in Engineering, Perspectives on an Engineering Transformation.


Open Source Software: Licenses and Leverage - Nonfree but Free, Free but Nonfree Software Licenses, Free, Sounding Software Licenses, A Closer Look at the GPL, Contributor Agreements, Software Indemnity,

References:
1. T. E. Graedel, Braden Allenby, “Industrial Ecology and Sustainable Engineering”, Perason Education India
2. Srinivasan D, “Environmental Engineering”, Prentice Hall India
3. David Douglas, Greg Papadopoulos, John Boutelle, “Citizen Engineer”, Pearson Education India

Note:

7. The question paper will consist of two parts. Part – A is to be compulsory for 40 marks (10 questions of 4 marks each). Part-B is to cover 3 modules for 60 marks. (50% choice, One out of two or two out of four from each module).
2. Maximum of four questions and a minimum of three questions from each module should be included in Part A.

Module - I

Module - II

Module - III

TEXT BOOK:

REFERENCES
1. IL. Peterson and A Silbershultz, "Operating Systems
3. P.K. Sinha, "Distributed Operating Systems"

Note :
1. The question paper will consist of two parts. Part – A is to be compulsory for 40 marks (10 questions of 4 marks each). Part-B is to cover 3 modules for 60 marks. (50% choice, One out of two or two out of four from each module).
2. Maximum of four questions and a minimum of three questions from each module should be included in Part A.
Module I

Module II

Module III

References

2. Raymond McLeod, George Schell, “Management Information Systems, 10/e”
3. SADAGOPAN S. “MANAGEMENT INFORMATION SYSTEMS” Prentice hall India
4. KELKAR, S. A. “MANAGEMENT INFORMATION SYSTEMS : A Concise Study” Prentice hall India

Note :
1. The question paper will consist of two parts. Part – A is to be compulsory for 40 marks (10 questions of 4 marks each). Part-B is to cover 3 modules for 60 marks. (50% choice, One out of two or two out of four from each module).
2. Maximum of four questions and a minimum of three questions from each module should be included in Part A.
Module I (Introduction)
Necessity to study Nanotechnology, why nanoscale behavior deviates from bulk behavior, applications- present and future, threats and scope.
Design principles and implementation of nano-engineered materials in the development of nanotechnology applications.
Novel structural functionality, sensory functionality, and information processing capabilities of nanomaterials.
Molecular self-assembly phenomena, molecular materials and architectures; Nanoscale materials characterization and metrology.
Physical properties of nano-structured semiconductors critical to nanoscale optoelectronic devices.

References

Module II (Nano material characterization)
Electronic properties of atoms and solids, the isolated atom, bonding between atoms, giant molecular solids.
Spectroscopic Techniques

References

Module III (Micro Electro Mechanical Systems)
Overview of micro electro mechanical devices and technologies.
Introduction to architecture design, process flow, fabrication, packaging and testing. MEMS Fabrication - MEMS device concepts (micro sensors/actuators) - Use of capacitive, inductive, optical, piezoresistive, piezoelectric methods for sensing.
MEMS Applications- Microsystems Packaging.
Introduction to existing and next-generation metrology tools for MEMS and NEMS inspection and qualification.

References

Note :
The question paper will consist of two parts. Part – A is to be compulsory for 40 marks (10 questions of 4 marks each). Part-B is to cover 3 modules for 60 marks. (50% choice, One out of two or two out of four from each module).

2. Maximum of four questions and a minimum of three questions from each module should be included in Part A.

Module - I
Network fault and Contingency Calculations. Fault calculations using ZBUS, Fault Calculations using the YBUS Table of Factors, Contingency analysis in Power systems, Contingency studies using the YBUS table of factors.

Module - II
Power Flow on Transmission line Networks: Slack bus, ZBUS formulation for load flow equation, Gauss and Gauss-Seidel Iteration using YBUS, Newton-Raphson method, Fast Decoupled Load Flow (FDLF)- (Not more than two iteration problems) - Adjustment of network operating conditions - Operational Power flow.

Module - III

Note:
A Mini Project can be given involving computer aided analysis of power systems as a semester assignment.

TEXT BOOK

REFERENCES

Note :
1. The question paper will consist of two parts. Part – A is to be compulsory for 40 marks (10 questions of 4 marks each). Part-B is to cover 3 modules for 60 marks. (50% choice, One out of two or two out of four from each module).
2. Maximum of four questions and a minimum of three questions from each module should be included in Part A.
MODULE I

I/O ports-INTEL 8212-programmable peripheral interface-INTEL 8155 and INTEL8255 interface chips-application of 8255 for display and stepper motor control. INTEL8253 timer chip-architecture and programming. Interrupts- multiple interrupts-device polling- vectored interrupt. Interrupt controller INTEL 8259 architecture and features

MODULE II

DMA controller-8257-architecture and features- DMA execution.
Serial communication- transmission format. Programmable communication interface 8251 architecture, features and applications. Interfacing keyboard and display CRT operation- scanning- charter generator- display format-timing- CRT controller INTEL 8275- architecture- features.

MODULE III

INTEL 8279- programmable keyboard /display. Interface- architecture- features.display and keyboard interfacing with 8279.
16-bit microprocessor-8086- architecture- addressing modes-segmentation-instruction set of 8086. Interfacing of display, matrix keyboard and printer.

REFERENCES
4. Naresh Grover, Microprocessors
5. Douglas V. Hall : Microprocessors and Interfacing, TMH, New Hill
6. M. Rafiquzzaman : Microprocessor Theory and Application, PHI.

Note :
1. The question paper will consist of two parts. Part – A is to be compulsory for 40 marks (10 questions of 4 marks each). Part-B is to cover 3 modules for 60 marks. (50% choice, One out of two or two out of four from each module).
2. Maximum of four questions and a minimum of three questions from each module should be included in Part A.

Note :
1. The question paper will consist of two parts. Part – A is to be compulsory for 40 marks (10 questions of 4 marks each). Part-B is to cover 3 modules for 60 marks. (50% choice, One out of two or two out of four from each module).
2. Maximum of four questions and a minimum of three questions from each module should be included in Part A.

Module I
**Introduction to Embedded Systems** - An Embedded system, features, Current trends and Challenges, Product live Cycle, Processor, Tool Chain, Hardware Design Issues, System memory Layouts, Realtime Systems, Hard and Soft,


Module II
**8051-8 bit Microcontrollers and Interfacing** –

**Hardware**: Microprocessor basics. Terminology and principles. 8051 Microcontroller Architecture: Function and basic description of 8051 components to include Special Function Registers (SFRs). Interfacing and address decoding techniques. Essential hardware for computer control, Interfacing, address decoding, analogue and digital input/output, input/output control A/D and D/A conversion, Interrupts, bus timing, serial and parallel communications. Bus timing, Interrupts Real-time systems.

Module III

**Project on 8051** - Application based on 8051 microcontroller.

**Core references:**

1. MAZIDI, “The 8051 Microcontrollers & Embedded Systems”, Pearson Education Asia

**References**

4. YERALAN, S, AHLUWALIA, A, ”Programming and interfacing the 8051 Microcontroller”, Addison-Wesley,1995

**Note:**

* The question paper will consist of two parts. Part – A is to be compulsory for 40 marks (10 questions of 4 marks each). Part-B is to cover 3 modules for 60 marks. (50% choice, One out of two or two out of four from each module).
2. Maximum of four questions and a minimum of three questions from each module should be included in Part A.

Module I
Illumination- Laws of Illumination - Polar Curves - Photometry - Luminous Efficiency - Measurement of Illumination of Different Light Sources - Illumination of Surfaces - Levels of Illumination- Types of lamps, filament lamps, flurecent lamps, arc lamps, mercury/sodium vapour lamps, CFL (Compact flurecent lamps), Effect of Voltage variation.

Module II
Lighting Design & Calculation
Lighting field of luminaire- Practical coordinate systems, Transformation of coordinate system from point, line area source, Illuminance calculation- Derivation of luminous flux from luminous intensity, flux transfer and inter-reflection luminance calculations, Discomfort glare, Optical design- reflector system, refractor system. Principal of lighting design- Indoor lighting design by lumen method, by point method, Designing problem and solution and designing documentation. Exterior lighting system- Road lighting system and highway lighting system

Module III
Lighting Power Conditioning, Monitoring and Control
Lighting control strategies, techniques & equipment, sensors and timers, switches versus dimming control algorithm, harmonics, EI from lighting equipment – its measurement & suppression techniques.

References:

Note:
1. The question paper will consist of two parts. Part – A is to be compulsory for 40 marks (10 questions of 4 marks each). Part-B is to cover 3 modules for 60 marks. (50% choice, One out of two or two out of four from each module).
2. Maximum of four questions and a minimum of three questions from each module should be included in Part A.
1. DC Machine: (3 sheets)
   Assembly of pole and yoke of a medium size DC Machine
   Assembled views of armature and commutator
   Sectional elevation and end views of DC machines.
2. Transformer: (2 sheets)
   Sectional plan and elevation of core type and shell type single phase transformer.
   Sectional plan and elevation of three phase transformer.
3. Induction Motor, (2 sheets)
   Sectional elevation and end views of squirrel cage induction motor.
   Sectional elevation and end views of slip ring induction motor.
4. Synchronous Machines: (3 sheets)
   Dimensional sketches of hub, spider
   Half sectional elevation and end views of salient pole with spider and without spider (2 sheets).
5. Single line diagram of
   (a) Generating station switch yard (1 sheet)
   (b) 220 kV substation (1 sheet)
6. Sketches of
   (a) Pin insulator, Disc insulator and bushings (1 sheet)
   (b) 220 kV and 400 kV double circuit transmission towers. (1 sheet)

References
2. Electrical Engineering Drawing, SK Bhattacharya

Note: The question paper shall contain two parts, in Part A, there will be three questions of 25 marks each out of which two should be answered. In Part B, there will be two questions of 50 marks each out of which one should be answered.
1. Regulation of alternator by direct loading - Effect of prime mover speed and Generator Excitation.
2. Regulation of alternator by emf and mmf methods - Potier triangle Calculation
3. Regulation of alternator by Potier and ASA methods
4. Slip test - regulation of salient pole alternator using two reaction theory
5. Synchronization of alternator to mains by dark lamp and bright lamp methods and control of reactive power - effect of normal excitation, under excitation & over excitation in an alternator connected to infinite bus - V and inverted V curves as generator and motor
6. Study of induction motor starters
7. Variation of starting torque with rotor resistance in slip-ring induction motors
8. Direct load test on three phase induction motor
9. No load and block rotor test on three phase induction motor - predetermination of performance characteristics from circle diagram and determination of equivalent circuit
10. Pole changing induction motor - predetermination of performance characteristics
11. Induction generator - Circle diagrams and Direct load test
12. Synchronous induction motor - V-curves and predetermination of field current
13. Single phase induction motor -equivalent circuit

**Note:**
For University examination, the following guidelines should be followed regarding award of marks
(a) Circuit and design - 30%
(b) Performance - 30%
(c) Result - 20%
(d) Viva voce - 20%
**Hardware Tests**

1. Power frequency testing of electrical equipment like insulators, fuses, AB switches, lightning arresters etc.
2. Determination of string efficiency of string insulators.
3. Calibration of HV measuring equipment using sphere gap
4. Impulse voltage test on insulators, lightning arresters etc.
6. Determine the characteristic, pick up time etc. of different types of electromagnetic relays
7. Determine the characteristic, pick up time etc. of different types of static relays.
9. Testing of insulation of 3 core and 4 core cable
10. Characteristics of Current Transformers and Potential Transformers
11. Power measurement using current transformer & potential transformer.
12. Power factor improvement with capacitor banks.
13. Testing of energymeters
14. Ferranti Effect and its mitigation
15. Transient stability study

**Software Simulation Tests**

16. Load flow analysis- Gauss Siedal Method
   Newton Raphson Method
   Fast decoupled method
   Of test systems with buses not exceeding 6 numbers.
18. Simulation of FACTS devices (Shunt Compensation).
19. Analysis of Transient stability and Voltage stability of power systems (using Power angle and PV curves respectively).
20. Simulation of AGC for single area and two area systems using SIMULINK.
21. Formulation of Ybus matrix with mutual coupling using MATLAB.

**Note:**

(i) Ten of the twelve Hardware Experiments and all the Six Software Experiments are to be conducted.

(ii) University Question paper will contain one hardware and one software question for the exam. Each student must answer both parts.

**Note:**

For University examination, the following guidelines should be followed regarding award of marks
(a) Circuit and design -30%
(b) Performance -30%
(c)Result -20%
(d) Viva voce -20%
The students shall present a seminar on a topic which is of high relevance to Electrical and Electronics engineering field. A report on seminar shall be submitted at the end of the semester. The seminar report should also be submitted for Project and Viva voce at the end of 8th semester.

The Students shall do a project work, which can be the preliminary work of final project, and submit a report at the end of seventh semester. The credit for the project work will be based on the seminar presentation of the project at the end of the semester.

25% credit for Project, and 75% credit for Seminar.
## ELECTRICAL AND ELECTRONICS ENGINEERING

### SCHEME AND SYLLABUS FOR Semester VIII

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<td>08.806</td>
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**08.805 Elective IV**

(a) Robotics and Industrial Automation  
(b) Advanced Microprocessor Architecture and Programming  
(c) Soft Computing Techniques  
(d) Pattern Recognition  
(e) HVDC & FACTS  
(f) Control & Guidance Engineering  
(g) Design of Digital Control Systems

**08.806 Elective V**

(a) Computer and Data Networks  
(b) Advanced Electronic Communication  
(c) High Voltage Engineering  
(d) Object Oriented Programming  
(e) Digital Image Processing  
(f) Wavelets and Applications  
(g) Optimal Control Theory  
(h) Non-linear Control Theory  
(i) Special Electrical Machines
Module – I


Module – II

Sampled data control system . Sampling process - Z transform method-solving difference equation by the Z transform method- pulse transfer function- system time response by Z transform method - analysis of the sampling process - data reconstruction and hold circuits - zero order hold circuit - Sampling theorem.
Stability of sampled data system - Routh Hurwitz criterion and Jury's test

Module – III


REFERENCES


Note :

1. The question paper will consist of two parts. Part – A is to be compulsory for 40 marks (10 questions of 4 marks each). Part-B is to cover 3 modules for 60 marks. (50% choice, One out of two or two out of four from each module).
2. Maximum of four questions and a minimum of three questions from each module should be included in Part A.
MODULE-1

Principles of electrical machine design - General design considerations - specifications of machines - types of enclosures - types of ventilation - heating - short time rating - overload capacity - temperature rise time curve - hot spot rating.

Review of properties of materials used in electrical machines.

Design of transformers - single phase and three phase transformers - distribution and power transformers - output equation - core design - window area - window space factor - overall dimensions of core. Windings – no. of turns - current density - conductor section - Cooling of transformers - design of cooling tank and tubes.

Module – II

Magnetic circuit calculation - calculation of field ampere turns - air gap mmf - effect of slot and ventilating duct - active iron length - mmf for teeth - real and apparent flux densities - mmf per pole.

Design of DC machines - output equation - specific loading - choice of speed and no of poles - calculation of main dimensions - choice of type of winding - number of slots - number of conductors per slot-current density - conductor section - slot insulation - length of air gap - design of field winding - conductor cross section - height of pole - design of interpole - flux density under interpole - calculation of turns of interpole winding – design of compensating winding – brushes of commutatators.

Module – III

Design of synchronous machines - specific loading - output equation - main dimensions - types of winding - number of turns - number of slots and slot design - field design for water wheel and turbo alternators - cooling of alternators.

Design of three phase induction motors - main dimensions - stator design - squirrel cage and slip ring types - number of stator and rotor slots - rotor bar current - design of rotor bar - end ring current - design of end ring - design of slip ring rotor winding.

Introduction to computer aided design. Analysis and synthesis methods - hybrid techniques - optimization - electrical machine design - general procedure - simple design programs

TEXT BOOK


REFERENCES


Note :

I. The question paper will consist of two parts. Part – A is to be compulsory for 40 marks (10 questions of 4 marks each). Part-B is to cover 3 modules for 60 marks. (50% choice, One out of two or two out of four from each module).

II. Maximum of four questions and a minimum of three questions from each module should be included in Part A.
Module 1

Module II

Module – III

REFERENCES
3. Approved data and reference manuals (to be permitted to use in the exam hall).

Note:
1. The question paper will consist of two parts. Part – A is to be compulsory for 40 marks (10 questions of 4 marks each). Part-B is to cover 3 modules for 60 marks. (50% choice, One out of two or two out of four from each module).
2. Maximum of four questions and a minimum of three questions from each module should be included in Part A.


References
1. DUBEY G.K “power semiconductor controlled drives” PrinticeHall, Englewood cliffs, New Jersy, 1989
2. Bimal.K.Bose “Modern power electronics and Ac drives” pearson education Asia 2003
3. N.K De, P.K.Sen “Eletrical drives” Printice Hall of India 2002
4. JMD Murphy “Thyristor control of Ac drives.
5. Dr. P.S. Bimbra “Power electronics” Khanna publishers.
7. PILLAI S.K “A First Course on Electric Drives” Wieley Eastern Ltd, New Delhi

Note:
1. The question paper will consists of two parts. Part – A is to be compulsory for 40 marks (10 questions of 4 marks each). Part-B is to cover 3 modules for 60 marks. (50% choice, One out of two or two out of four from each module).
2. Maximum of four questions and a minimum of three questions from each module should be included in Part A.
Module – I
Introduction to robotics. Robot fundamentals, classification, specifications, notations, Direct Kinematics: Coordinate frames-rotations-Homogeneous coordinates-The Arm equation-Kinematic analysis of a typical Robot-example of a 3 arm robot, Inverse Kinematics: -Tool configuration-Inverse kinematics of a typical Robot-example of a 3 arm robot -Workspace analysis and trajectory planning-Work envelope of different robots-The pick and place operation -Continuous path motion- Tool configuration Jacobian matrix and manipulator Jacobian-Manipulator Dynamics-Dynamic model of a robot using Lagrange’s Equation

Module – II
Robot vision : Image representation , Perspective and inverse perspective Transformations, camera calibration.
Robot programming and programming languages.: Robot applications-Characteristics-Robot cell design-Types of applications-Industrial applications: material handling applications-Processing , assembly and inspection, Machine loading and unloading-spot welding-arc welding-spray painting. Non Industrial applications- robots in medicine

Module – III
Evolution of instrumentation and control, Role of automation in industries, Benefits of automation, basic elements of an automation system, Levels of automation Introduction to automation tools PLC, DCS, SCADA, Hybrid DCS/PLC.

TEXT BOOKS

REFERENCES

Note :
1. The question paper will consist of two parts. Part – A is to be compulsory for 40 marks (10 questions of 4 marks each). Part-B is to cover 3 modules for 60 marks. (50% choice, One out of two or two out of four from each module).
2. Maximum of four questions and a minimum of three questions from each module should be included in Part A.
Module I:
History of Intel Pentium 4 Processor Architecture, performance and Moores’ Law, Floating-point unit, Detailed description of Pentium Processor Net Burst Micro architecture, Hyper Threading, Basic Execution Environment-Modes of operation, overview, Execution trace Cache, MESI protocol, Real and Protected mode Memory organization, Registers, Operand size address size, procedure calls, Interrupts and exception. Overview of IA 64 architecture.

Module II:
Data type & Address modes-Fundamental data type, numeric, pointer, string data type, floating point, SIMD Techniques, MMX data type, operand addressing, I/O port addressing, instruction set, MMX and SSE instructions, floating point instructions, system instruction, string operations, segment register instruction.

Module III:
Introduction to assembly language programming, simple arithmetic programming, floating point programming, MMX Programming, Interrupt programming, Advanced I/O Programming, Exception handling, Real Mode and Protected Mode programming, communication programming.

Text Books:

References:

Note:
1. The question paper will consist of two parts. Part – A is to be compulsory for 40 marks (10 questions of 4 marks each). Part-B is to cover 3 modules for 60 marks. (50% choice, One out of two or two out of four from each module).
2. Maximum of four questions and a minimum of three questions from each module should be included in Part A.
Module I
Statement of a nonlinear Optimization problem. Unconstrained and constrained optimization problem
Derivative-based Optimization – Descent Methods – The Method of Steepest Descent – Classical Newton’s

Module II
Characteristics of ANN, McCulloch-Pitts Model, Historical Developments, Potential Applications of ANN.
Perceptrons and the LMS Algorithm, Limitations of the Perceptron Model.– Backpropagation Mutilayer
Perceptrons – Radial Basis Function Networks – Unsupervised Learning Neural Networks – Competitive
Learning Networks – Kohonen Self-Organizing Networks

Module III
Introduction to classical sets - properties, Operations and relations; Fuzzy sets, Membership, Uncertainty,
Operations, properties, fuzzy relations, cardinalities, membership functions. Fuzzification, Membership value assignment, development of rule base and decision making system, Defuzzification to crisp sets, Defuzzification methods. Fuzzy logic control.

REFERENCES
   edition, 1998

Note :
1. The question paper will consist of two parts. Part – A is to be compulsory for 40 marks (10 questions of
   4 marks each). Part-B is to cover 3 modules for 60 marks. (50% choice, One out of two or two out of
   four from each module).
2. Maximum of four questions and a minimum of three questions from each module should be included in
   Part A.
Module 1


Module 2

Artificial Neural Networks: Introduction, Multilayer neural networks- Feed forward operation and classification, Back propagation algorithm.
Supervised learning and clustering: Introduction, Hierarchical clustering, partial clustering, Networks without hidden layers.

Module 3

Processing of waveforms and images: Introduction, transformations, geometric image scaling and interpolations, logarithmic gray level scaling, the statistical significance of image features. Image Analysis: Introduction, Scene segmentation and labeling.
Applications of Pattern Recognition-Examples

Text Books
1. E. Gose, R. Johnsonbaugh, and S. Jost, Pattern Recognition and Image Analysis, Prentice Hall of India, NewDelhi, 1999
3
Reference Books
2. C. M. Bishop, Neural Network for Pattern Recognition, Oxford University Press, New York, 1998

Note :
1. The question paper will consist of two parts. Part – A is to be compulsory for 40 marks (10 questions of 4 marks each). Part-B is to cover 3 modules for 60 marks. (50% choice, One out of two or two out of four from each module).
2. Maximum of four questions and a minimum of three questions from each module should be included in Part A.
Module I

Introduction: Need of reactive power flow control in load and transmission line. Fundamental theory of compensation - Power factor correction and voltage regulation in single phase systems, Analysis of uncompensated AC line, Passive reactive power compensation- series capacitor connected at the midpoint of the line, shunt capacitor connected at the midpoint of the line. Comparison between series and shunt capacitor.

Introduction to FACTS: Benefits from FACTS technology, Basic types of FACTS controllers. Compensation by Static Compensator (STATCOM) and Static synchronous series compensator (SSSC).

Module II

Principle of operation, configuration and control characteristics of Static VAR compensator (SVC) - TCR, TSC and FC+TCR. Expression for voltage and power of SVC. Principle of operation and configuration of Thyristor controlled series compensator (TCSC) and Thyristor controlled phase angle regulator (TCPAR).

Static synchronous compensators: Principle of operation, configuration and control characteristics of STATCOM and SSSC, Principle of operation and configuration of Unified Power Flow controller (UPFC).

Module III

DC Power transmission technology- introduction, comparison of AC and DC transmission, application of DC transmission. Types of DC links, converter station equipments, Analysis of HVDC converters- simplified analysis of Graetz circuit. Power flow control in DC link, converter control characteristics, HVDC breakers- basic concepts of DC circuit interruption. Reactive power requirements of converter, Monopolar operation.

REFERENCES


Note:

1. The question paper will consist of two parts. Part – A is to be compulsory for 40 marks (10 questions of 4 marks each). Part-B is to cover 3 modules for 60 marks. (50% choice, One out of two or two out of four from each module).
2. Maximum of four questions and a minimum of three questions from each module should be included in Part A.
Module I

Module II

Module III

Reference Books

Note :
1. The question paper will consist of two parts. Part – A is to be compulsory for 40 marks (10 questions of 4 marks each). Part-B is to cover 3 modules for 60 marks. (50% choice, One out of two or two out of four from each module).
2. Maximum of four questions and a minimum of three questions from each module should be included in Part A.
Module I
Basic digital control system- Examples - mathematical model-ZOH and FOH- choice of sampling rate-principles of discretisation-Mapping between s-domain and z-domain-Pulse transfer function- Different configurations for the design- Modified z-transform- Multi-rate discrete data systems. Time responses of discrete data systems-Steady state performance

Module II

Module III

Reference Books

3.

Note:
1. The question paper will consist of two parts. Part – A is to be compulsory for 40 marks (10 questions of 4 marks each). Part-B is to cover 3 modules for 60 marks. (50% choice, One out of two or two out of four from each module).
2. Maximum of four questions and a minimum of three questions from each module should be included in Part A.
Module – I

The Physical layer
Transmission media - twisted pair - base band coaxial cables - broadband cables - fiber optics-unguided media.

The Data link layer
Design issues - services provided to the network layer - framing - error control - flow control - elementary data link protocols - unrestricted simplex protocol - simplex stop and wait protocol - simplex protocol for noisy channel.

Module – II
The medium access sub-layer
The channel allocation problem - static channel allocation - dynamic channel allocation - multiple access protocols - ALOHA - CSMA protocols - collision free protocols - limited contention protocols - CDMA. Introduction to IEEE 802 standards – 802.3.

The network layer

Module - III
Congestion control algorithms - principles - prevention policies - traffic shaping - leaky bucket and token bucket - flow specification - choke packets - load shedding - jitter control.

The transport layer
The transport service - services provided to the upper layer - quality of service -transport layer primitives. Elements of transport protocols –TCP and UDP. Addressing-Establishing a connection, Releasing a connection. Flow control and buffering-Crash recovery

The Application layer
Basic ideas of network security - public key cryptography, DNS, SNMP, e-mail, WWW IPV6

Text Book:
1. Andrew S. Tanenbaum, "Computer networks", PHI.

REFERENCES:
3. William Stalling, "Data and Computer Communication".

Note :
1. The question paper will consist of two parts. Part – A is to be compulsory for 40 marks (10 questions of 4 marks each). Part-B is to cover 3 modules for 60 marks. (50% choice, One out of two or two out of four from each module).
2. Maximum of four questions and a minimum of three questions from each module should be included in Part A.
Module - I: Microwave Satellite and Digital Communication
Microwave frequency bands - propagation characteristics and line-of-sight communication - repeater - microwave radio link systems - land-line and satellite -comparison - advantages and disadvantages - microwave application - Maser.
Principles of digital communication – pulse modulation- sampling process-PAM –Quantization - pulse code modulation (PCM) - block diagrams of PCM transmitter and receiver - digital microwave techniques - basic principles of PSK - basic principles of ISDN.

Module - II: Optical Communication, Spread spectrum communication
Optical communication - basic principles - types of optical fibres - losses in fibres - optical sources: light emitting diodes, injection laser diodes, optical detectors -comparison of LED and ILD - optical communication systems - direct detection and heterodyne receivers - advantages of coherent optical communication.
Spread spectrum communication - direct sequence or pseudo noise, frequency hopping, time hopping, hybrid and chirp spread spectrum systems - comparison of modulation methods - generation and detection of spread spectrum signals -and applications

Module - III: Computer Communication
Need for computer communication - basic principles of computer communication networks - data communication protocols - (elementary treatment of) open systems interconnection (OSI) protocol - multiple accessing - basics of TDMA, FDMA, CDMA, CSMA/ CD.
Inter-networking techniques (elementary treatment only) - Internet and ATM networks - important services provided by internet - TCP/IP - connecting to the internet - ISDN - types of MODEMs - Intranets.

REFERENCES

Note :
1. The question paper will consist of two parts. Part – A is to be compulsory for 40 marks (10 questions of 4 marks each). Part-B is to cover 3 modules for 60 marks. (50% choice, One out of two or two out of four from each module).
2. Maximum of four questions and a minimum of three questions from each module should be included in Part A.
08.806 Elective -V (c) HIGH VOLTAGE ENGINEERING (E)  
L/T/P : 2/1/0  
Credits : 3

Module - I

Generation of High AC voltages: Cascade transformers, resonant transformers- parallel and series resonant test systems.

Generation of High frequency high voltages- Tesla coil.


Generation of impulse currents- Definition of impulse current waveform - Circuit for producing impulse current waves.

Module - II
Over voltages in power system - Over voltages and their significance. Switching over voltages - origin and characteristics - switching over voltages in EHV and UHV systems. Insulation requirements of EHV line.

Protection of power system apparatus against over voltages. Surge arresters - dynamic volt-ampere characteristics and surge diverter operation characteristic. Connections and rated voltages of surge arresters. Thyrite and ZnO arresters. Protective devices against lightning over voltages - rod - rod gaps – over-head ground wires.

Control of over voltages due to switching - method of reducing switching over voltages.

Principle of insulation co-ordination on HV and EHV power systems: Insulation level of equipment. Volt-time characteristics. Insulation co-ordination of a substation. Insulation co-ordination of EHV system.

Module - III

HV testing of electrical apparatus- Definitions - Terms and conditions. Test on insulators, cables, transformers, surge arresters. HV and EHV bushing design, selection, quality control, maintenance and diagnostic testing. Biological and environmental aspects in EHV and UHV line design. Live line maintenance – Principles - common live line maintenance - Tools for live line maintenance.

TEXT BOOK
3. 

REFERENCES

Note :
1. The question paper will consist of two parts. Part – A is to be compulsory for 40 marks (10 questions of 4 marks each). Part-B is to cover 3 modules for 60 marks. (50% choice, One out of two or two out of four from each module).
2. Maximum of four questions and a minimum of three questions from each module should be included in Part A.
Module I

Module II

Module III

Text Books

References:

Note :
1. The question paper will consist of two parts. Part – A is to be compulsory for 40 marks (10 questions of 4 marks each). Part-B is to cover 3 modules for 60 marks. (50% choice, One out of two or two out of four from each module).
2. Maximum of four questions and a minimum of three questions from each module should be included in Part A.


TEXT BOOKS

REFERENCES

Note:
1. The question paper will consist of two parts. Part – A is to be compulsory for 40 marks (10 questions of 4 marks each). Part-B is to cover 3 modules for 60 marks. (50% choice, One out of two or two out of four from each module).
2. Maximum of four questions and a minimum of three questions from each module should be included in Part A.
Module I

Fundamentals of signal decomposition - brief overview of Fourier transform and short term Fourier transform - Introduction to wavelets - continuous wavelet transform - definition - scaling – shifting - scale and frequency. CWT as a correlation - time frequency resolution. Introduction to the DWT and orthogonal wavelet decomposition. One Stage filtering - Approximation and Details - Filter bank analysis.

Module II


Module III


Text book


Reference books


Note:

1. The question paper will consist of two parts. Part – A is to be compulsory for 40 marks (10 questions of 4 marks each). Part-B is to cover 3 modules for 60 marks. (50% choice, One out of two or two out of four from each module).
2. Maximum of four questions and a minimum of three questions from each module should be included in Part A.
MODULE I

MODULE II

MODULE III

Textbook

Reference Books

Note:
1. The question paper will consist of two parts. Part – A is to be compulsory for 40 marks (10 questions of 4 marks each). Part-B is to cover 3 modules for 60 marks. (50% choice, One out of two or two out of four from each module).
2. Maximum of four questions and a minimum of three questions from each module should be included in Part A.
MODULE I

MODULE II

MODULE III

Reference Books:
10. Ashok D Belegundu, Tirupathi R Chandrupatla, ‘*Optimization concepts and Applications in Engineering*’, Pearson Education, Delhi, 2002

Note :
1. The question paper will consist of two parts. Part – A is to be compulsory for 40 marks (10 questions of 4 marks each). Part-B is to cover 3 modules for 60 marks. (50% choice, One out of two or two out of four from each module).
2. Maximum of four questions and a minimum of three questions from each module should be included in Part A.
Module I

AC Servomotors-Construction-principle of operation-performance characteristics-damped AC servomotors-
Drag cup servomotor-applications-DC servomotors-field and armature controlled DC servomotors- permanent
magnet armature controlled – seriessplit field DC servomotor.
Stepper motors-Basic principle - construction –variable reluctance- permanent magnet – hybrid type- -
comparison – applications

Module II

Reluctance motors- Principle of operation- torque equation -torque slip characteristics applications.
Switched reluctance motors - principle of operation- torque equation-different types-comparison-applications.

Module III

Brushless dc motor- construction - trapezoidal type-sinusoidal type -comparison– applications.
Linear motors – different types -Linear induction motors- different types -Expression for linear force- equivalent
circuit – applications.

Reference:
1.Irving L.Kosow.'Electrical Machinery and Transformers’, Oxford Science Publications.

08.806 Elective V (i) SPECIAL ELECTRICAL MACHINES
L/T/P : 2/1/0
Credits : 3
Out of 100 marks for Sessional work, 20 marks are to be given for industrial visits, to be assessed based on the reports presented. Viva Voce examination may be on Project, Seminar, Industrial visits (Four Visits During V to VIII Semesters) and overall performance.
1. Predetermination and verification of frequency response characteristics of Lag and Lead networks.
2. Transfer Function of AC and DC servomotors
3. Step and frequency response of R-L-C circuit
5. Study of P, PI and PID controllers. Response analysis of a typical system with different controllers, using process control simulator.
6. Study of performance characteristics and response analysis of a typical temperature/ Flow/ Level control system.
7. MATLAB: Use of control system Tool box for the Time domain and frequency domain methods of system analysis and design
8. SIMULINK: Simulation and control of real time systems using SIMULINK
9. Compensator design using Bode plot with MATLAB control system Tool box
10. Programmable Logic controller(PLC): To control a simple process using PLC

Note:
For University examination, the following guidelines should be followed regarding award of marks
(a) Circuit and design -30%
(b) Performance -30%
(c) Result -20%
(d) Viva voce -20%