M.E. (Full Time)  
Prospectus No. 131736

SANT GADGE BABA AMRAVATI UNIVERSITY

अथ्यासक्रियता

(FACULTY OF ENGINEERING & TECHNOLOGY)

PROSPECTUS

Prescribed for
Post Graduate Two Year Degree Course
Master of Engineering
(Full Time)
Credit Grade System

I & IIInd Year Examinations 2012 - 2013 & Onwards

BRANCHES

1) M.E. (Electronics & Telecommunication)
2) M.E. Civil (Structural Engineering)
3) M.E. Civil (Transportation Engineering & Management)
4) M.E. Mechanical (Thermal Engineering)
6) M.E. (Electrical & Electronics Engineering)
7) M.E. (Computer Science & Information Technology)

2012

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Price Rs. ........../-

Published by
Dineshkumar Joshi
Registrar,
Sant Gadge Baba
Amravati University
Amravati - 444 602

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विद्यापीठाच्या पूर्वांतरूपाती विवाद कोणासाठी पुनरावृत्त किंवा प्रकाशित करता वेळार
नाही.

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SANT GADGE BABA AMRAVATI UNIVERSITY

SPECIAL NOTE FOR INFORMATION OF THE STUDENTS

(1) Notwithstanding anything to the contrary, it is notified for general information and guidance of all concerned that a person, who has passed the qualifying examination and is eligible for admission only to the corresponding next higher examination as an ex-student or an external candidate, shall be examined in accordance with the syllabus of such next higher examination in force at the time of such examination in such subjects papers or combination of papers in which students from University Departments or Colleges are to be examined by the University.

(2) Be it known to all the students desirous to take examination/s for which this prospectus has been prescribed should, if found necessary for any other information regarding examinations etc., refer the University Ordinance Booklet the various conditions/provisions pertaining to examination as prescribed in the following Ordinances.

Ordinance No. 1 : Enrolment of Students
Ordinance No. 2 : Admission of Students
Ordinance No. 4 : National cadet corps
Ordinance No. 6 : Examinations in General (relevent extracts)
Ordinance No. 18/2001: An Ordinance to provide grace marks for passing in a Head of passing and Improvement of Division (Higher Class) and getting Distinction in the subject and condonation of deficiency of marks in a subject in all the faculties prescribed by the Statute No.18, Ordinance 2001.

Ordinance No. 9 : Conduct of Examinations (relevent extracts)
Ordinance No. 10 : Providing for Exemptions and Compartments
Ordinance No. 19 : Admission of Candidates to Degrees

Ordinance No. 109 : Recording of a change of name of a University student in the records of the University.
Ordinance No. 6 of 2008 : For improvement of Division/Grade.
Ordinance No.19/2001 : An Ordinance for Central Assessment Programme, Scheme of Evaluation and Moderation of answerbooks and preparation of results of the examinations, conducted by the University, Ordinance 2001.

Dineshkumar Joshi
Registrar
Sant Gadge Baba Amravati University

PATTERN OF QUESTION PAPER ON THE UNIT SYSTEM
The pattern of question paper as per unit system will be borally based on the following pattern.

(1) Syllabus has been divided into units equal to the number of question to be answered in the paper. On each unit there will be a question either a long answer type or a short answer type.
(2) Number of question will be in accordance with the unit prescribed in the syllabi for each paper i.e. there will be one question on each unit.
(3) For every question long answer type or short answer type there will be an alternative choice from the same unit. However, there will be no internal choice in a question.
(4) Division of marks between long answer and short answer type question will be in the ratio of 40 and 60.
(5) Each short answer type question shall Contain 4 to 8 short sub question with no internal choice.
No. 32/2012  Date: 18/09/2012

Subject:- Corrigendum to Direction No. 31 of 2010, 57 of 2010 & 30 of 2012 regarding Examinations leading to the Degree of अभिव्यक्तिभूती पारंपरिक (Master of Engineering) (Full Time) तंत्रज्ञान पारंपरिक (Master of Technology) (Semester Pattern... Credit Grade System)

Whereas, the Direction No.31/2010 in respect of the examinations leading to the degree of अभिव्यक्तिभूती पारंपरिक (Master of Engineering) (Full Time)/ तंत्रज्ञान पारंपरिक (Master of Technology) (Semester Pattern... Credit Grade System) is in existence,

AND

Whereas, the schemes of teaching & examinations for various branches of Two Year Post Graduate Degree Course in Master of Engineering (Full Time) in the faculty of Engineering & Technology have been provided vide appendices A, B,C,D,E,F,G,H and I appended with Direction No. 31 of 2010,

AND

Whereas, the provisions for the admissions and other detailed provisions to the Degree of Master of Engineering (Full Time) are prescribed by the Direction No. 31 of 2010,

AND

Whereas, the Direction No. 30/2012 which was issued as Corrigendum to Direction No. 31 of 2010 for revised Schemes of teaching and Examinations of M.E Civil (Structural Engg.) (Full Time) is in existence,

AND

Whereas, the proposals were received from the Principal, I.B.S.S. College of Engg., Ghatkheda, Amravati, Principal, P.R. Pote (Patil) College of Engg., Amravati, Principal, S.S.G.M. College of Engg., Shegaon, Principal, P.R.M. College of Engg. & Mngt., Badnera and H.O.D., P.G Deptt. of Computer Science, Sant Gadge Baba Amravati University, Amravati regarding starting of new course i.e. M.E. Civil (Transportation Engg.) (Full-Time), M.E. Mechanical (Thermal Engg.) (Full-Time), M.E. Mechanical Engg. (Advanced Manufacturing & Mechanical Systems Designs) (Full Time), M.E. (Electrical & Electronics Engg.) (Full Time), M.E. (Computer Science & Information Technology) (Full Time) respectively from the current Academic Session 2012-2013,

AND

Whereas, the Board of Studies in Computer Science & Engineering in its meeting held on 29.08.2012 resolved to recommend the scheme of teaching & examination, Eligibility Criteria and draft syllabus of Master of Engineering in Computer Science & Information Technology course for its implementation from the current session 2012-2013 and onwards,

AND

Whereas, Hon’ble Vice Chancellor has accepted the Scheme of teaching & examination, Eligibility Criteria with correction and draft syllabus of Master of Engineering in Computer Science & Information Technology course under section 14(7) of the Maharashtra Universities Act, 1994 on behalf of the Faculty of Engineering & Technology and Academic Council,

AND

Whereas, the Management Council in its meeting held on 16.5.2012, vide item No. 175 has considered and approved the recommendations of Academic Council to start M.E. in Computer Science & I.T. in the P.G. T. Deptt. of Computer Science of Sant Gadge Baba Amravati University,

AND

Whereas, the Academic Council in its meeting held on 28-8-2012 vide Item No.96 has considered and approved the Schemes of Examinations and Syllabi alongwith Eligibility Criteria for admission to M.E. Civil (Transportation Engg.) (Full-Time), M.E. Mechanical (Thermal Engg.) (Full-Time), M.E. Mechanical Engg. (Advanced Manufacturing & Mechanical Systems Designs) (Full Time), and M.E. (Electrical & Electronics Engg.) (Full Time) alongwith the corrections received from the Chairman, Board of Studies in Civil Engineering (including Construction Technology) in the revised scheme of teaching & examinations of first & second Semester of M.E.Civil (Structural) Engineering which was already approved by the Academic Council in its meeting held on 05.05.2012,

AND

Whereas, the Schemes of Examinations and Syllabi alongwith Eligibility Criteria for admission to the courses as mentioned in above paragraph are to be implemented from the current academic session 2012-2013 in phase wise manner,
Whereas, admissions to the First Year of Master of Engineering (Full Time) course are to be made in the Academic Session 2012-2013, AND

Whereas, the matter for admission of the students at the examination is required to be regulated by an Ordinance,

AND

Whereas, the Schemes of Examinations for the said courses in the faculty of Engineering & Technology are required to be regulated by the Regulation,

AND

Whereas, the process of making an Ordinance and the Regulation is likely to take some time,

AND

Whereas, the Syllabi along with the Schemes of Examinations of the above mentioned courses for Semester I & II of M.E. (Full Time) Courses are to be made available for the students admitted during the session 2012-2013,

Now, therefore, I, Dr. Mohan K. Khedkar, Vice-Chancellor of Sant Gadge Baba Amravati University, Amravati in exercise of powers conferred upon me under sub-section (8) of Section 14 of the Maharashtra Universities Act, 1994, do hereby direct as under :-

1. This Direction shall be called “Corrigendum to Direction No. 31 of 2010, 57 of 2010 & 31 of 2012 regarding Examinations leading to the Degree of अनुसारण परीक्षांक (Master of Engineering) (Full Time) तथा अनुसारण परीक्षांक (Master of Technology) (Semester Pattern... Credit Grade System) Direction, 2012.”

2. This Direction shall come into force with effect from the session:
   i) 2012-2013 for Semester - I & II and,
   ii) 2013-2014 for Semester - III & IV

3. The Eligibility Criteria for admission to the degree of Master of Engineering (Full Time)/Master of Technology (Full Time) course shall have passed the Degree examination in Bachelor of Engineering/Bachelor of Technology in the branches mentioned under Column No.2 of the following table against the respective courses :-

<table>
<thead>
<tr>
<th>TABLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>M.E./M.Tech.</td>
</tr>
</tbody>
</table>

* The process of admission shall be as per G.R. issued from time to time by the Higher & Technical Education Department, Government of Maharashtra, Mumbai.
4. The Schemes of Examinations for M.E. Civil (Transportation Engg.) (Full-Time), M.E. Mechanical (Thermal Engg.) (Full-Time), M.E. Mechanical Engg. (Advanced Manufacturing & Mechanical Systems Designs) (Full Time), M.E. (Electrical & Electronics Engg.) (Full Time), M.E. (Computer Science & Information Technology) (Full Time) shall be as per the appendices-A, B, C, D and E respectively, appended with this Direction.

5. Following corrections shall be carried out in Direction No. 30 of 2012:
   a) In Appendix, Under the Schemes of Examination of First Semester of Master of Engineering Civil (Structural Engg.) (Full-Time):
      (i) Under the column of “Minimum Pass Marks” the words “College assessment” shall be substituted by the word “Subject” and the figure “10” against subject Sr.No. 1 to 5 of the same column shall be substituted by the figures “50”,
      (ii) Under the column “Name of the subject”, against Sr. No. 6 and 7, the word “Studio” be substituted by the word “Lab” respectively.
   b) In Appendix, Under the Schemes of Examination of Second Semester of Master of Engineering Civil (Structural Engg.) (Full-Time):
      (i) Under the column of “Minimum Pass Marks” the words “College assessment” shall be substituted by the word “Subject” and the figures “10” against subject Sr.No. 1 to 5 of the same column shall be substituted by the figures “50”,
      (ii) Under the column “Name of the subject”, against Sr. No. 6 and 7, the word “Studio” be substituted by the word “Lab” respectively.

6. Other related provisions of the Direction No. 31 of 2010 shall be applicable for the above mentioned courses.

Date: /09/2012

(Mohan K. Khedkar)
Vice-Chancellor
<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Subject Code</th>
<th>Subject</th>
<th>Theory</th>
<th>Examination Scheme</th>
<th>PRACTICAL</th>
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<td>MAX. MARKS COLLEGE ASSESSMENT</td>
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<td>1SFTR2</td>
<td>Transport Planning and Management</td>
<td>3</td>
<td>80 20 100 40 50</td>
<td></td>
</tr>
<tr>
<td>03</td>
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<td>Design and Construction of Pavement</td>
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<td>80 20 100 40 50</td>
<td></td>
</tr>
<tr>
<td>04</td>
<td>1SFTR4</td>
<td>Docks Harbour and Airport Engineering</td>
<td>3</td>
<td>80 20 100 40 50</td>
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<td>80 20 100 40 50</td>
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<td>06</td>
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<td>25 50 25</td>
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<tr>
<td>07</td>
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<td>25</td>
<td>25 50 25</td>
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Elective – I 1) Applied soil mechanics  2) DESIGN OF BRIDGES
Elective – II 1) Geometric Design of Transportation Facilities  2) Theory and Application of GIS
### Third Semester

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Subject Code</th>
<th>Subject</th>
<th>Lecture</th>
<th>Tutorial</th>
<th>Practical</th>
<th>Total</th>
<th>CREDITS</th>
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</thead>
<tbody>
<tr>
<td>01</td>
<td>3 FSTR 1</td>
<td>SEMINAR AND DISSERTATION</td>
<td>_</td>
<td>_</td>
<td>6</td>
<td>6</td>
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<td>_</td>
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<td>6</td>
<td><strong>15</strong></td>
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</table>

**INTERNAL MARKS**  
**TOTAL**  
**MIN. PASSING MARKS**  

### Fourth Semester

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<thead>
<tr>
<th>Sr. No.</th>
<th>Subject Code</th>
<th>Subject</th>
<th>Lecture</th>
<th>Tutorial</th>
<th>Practical</th>
<th>Total</th>
<th>CREDITS</th>
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<td>4 FSTR 1</td>
<td>SEMINAR AND DISSERTATION</td>
<td>_</td>
<td>_</td>
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<td>30</td>
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<td>_</td>
<td>_</td>
<td>12</td>
<td>12</td>
<td><strong>30</strong></td>
</tr>
</tbody>
</table>

**EXTERNAL MARKS**  
**INTERNAL MARKS**  
**TOTAL**  
**MIN. PASSING MARKS**  

**GRAND TOTAL 1600**

**Semester III**

Seminar: Seminar to be delivered on work completed during third semester. 50 internal marks out of 100 will be assessed by a Committee consisting of Head of Department, dissertation guide and subject expert appointed by Principal of the College / Head of University Department. Remaining 50 internal marks will be given by guide based on performance.

Dissertation: Title of the dissertation work to be submitted to the University on or before 15th Sept. (for regular examination) and 15th of February (for supplementary exam.).

**Semester IV**

Seminar: to be delivered on the complete work of dissertation. 50 internal marks out of 100 will be assessed by a Committee consisting of Head of Department, dissertation guide and subject expert appointed by Principal of the College / Head of University Department. Remaining 50 internal marks will be given by guide based on performance.

**Note**: Thesis of dissertation work must be submitted to the University on or before 30th April (for regular exam.) and 30th November (for supplementary exam.). Thesis of Dissertation work be submitted with late fee to the University upto 31 May (for regular exam.) and 31st December (for supplementary exam.). The late fee shall be charged as in case of Examination form.

**Notes**:
1. Student should fill the examination form in the beginning of III semester jointly for III & IV semester.
2. Single marksheet for III & IV semester together will be given to the student.
## Two Year Post Graduate Degree Course in Master of Engineering (Full Time)
### Mechanical Engineering (Thermal Engineering)

#### Credit Grade System

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Teaching Scheme</th>
<th>Examination Scheme</th>
<th>Practical</th>
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<td>Subject</td>
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<td>02</td>
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<td>Advanced Thermodynamics</td>
<td>4 0 0 4 4</td>
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<tr>
<td>03</td>
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<td>Fluid Dynamics</td>
<td>4 0 0 4 4</td>
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<tr>
<td>04</td>
<td>1MTE4</td>
<td>Advanced Heat Transfer</td>
<td>4 0 0 4 4</td>
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<td>05</td>
<td>1MTE5</td>
<td>Elective – I</td>
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<td>1MTE6</td>
<td>Fluid dynamics Labs</td>
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</tr>
<tr>
<td>07</td>
<td>1MTE7</td>
<td>Advanced Heat Transfer Lab</td>
<td>0 0 2 2 1</td>
</tr>
<tr>
<td>TOTAL</td>
<td>20 6 0 12 22</td>
<td>500</td>
<td>100</td>
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**Elective – I**
- 2) Energy Conservation & Power Plant Economics
- 3) Modern Energy Sources
- 4) Environmental Pollution Control

<table>
<thead>
<tr>
<th>Second Semester</th>
<th>Teaching Scheme</th>
<th>Examination Scheme</th>
<th>Practical</th>
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<td>Subject</td>
<td>HOURS / WEEK</td>
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<tr>
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<td>2MTE1</td>
<td>Advanced Internal Combustion Engines.</td>
<td>4 0 0 4 4</td>
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<tr>
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<td>Advance Refrigeration Engineings</td>
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<td>Research Methodology</td>
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<td>Elective – III</td>
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<td>2MTE7</td>
<td>Advanced Refrigeration Engineering Lab</td>
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<tr>
<td>TOTAL</td>
<td>20 1 2 12 22</td>
<td>500</td>
<td>100</td>
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</tbody>
</table>

**Elective – III**
- 1) Heat Exchanger Design
- 2) Advanced Air Conditioning Systems
- 3) Finite Element Methods
- 4) Gas Turbine and Jet Propulsion

**Appendix - B**

Elective – II
- 1) Waste Management & Energy Generation Systems
- 2) Energy Conservation & Power Plant Economics
- 3) Modern Energy Sources
- 4) Environmental Pollution Control

Elective – III
- 1) Heat Exchanger Design
- 2) Advanced Air Conditioning Systems
- 3) Finite Element Methods
- 4) Gas Turbine and Jet Propulsion

Computational Fluid Dynamics.
### Third Semester

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Subject Code</th>
<th>Subject</th>
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<th>Tutorial</th>
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### Fourth Semester

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<td>_</td>
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<td>12</td>
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<td>_</td>
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<td>12</td>
<td>12</td>
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</tr>
</tbody>
</table>

Semester III
Seminar: Seminar to be delivered on work completed during third semester. 50 internal marks out of 100 will be assessed by a Committee consisting of Head of Department, dissertation guide and subject expert appointed by Principal of the College / Head of University Department. Remaining 50 internal marks will be given by guide based on performance.
Dissertation: Title of the dissertation work to be submitted to the University on or before 15th Sept. (for regular examination) and 15th of February (for supplementary exam.).

Semester IV
Seminar: to be delivered on the complete work of dissertation. 50 internal marks out of 100 will be assessed by a Committee consisting of Head of Department, dissertation guide and subject expert appointed by Principal of the College / Head of University Department. Remaining 50 internal marks will be given by guide based on performance.
Note: Thesis of dissertation work must be submitted to the University on or before 30th April (for regular exam.) and 30th November (for supplementary exam.). Thesis of Dissertation work be submitted with late fee to the University upto 31 May (for regular exam.) and 31st December (for supplementary exam.). The late fee shall be charged as in case of Examination form.
Notes: 1. Student should fill the examination form in the begining of III semester jointly for III & IV semester.
2. Single marksheet for III & IV semester together will be given to the student.
## Appendix C

### TWO YEAR POST GRADUATE DEGREE COURSE IN MASTER OF ENGINEERING (FULL TIME)

**MECHANICAL ENGINEERING (Advanced Manufacturing & Mechanical System Design)**

**CREDIT GRADE SYSTEM**

#### First Semester

<table>
<thead>
<tr>
<th>Sr. No.</th>
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<th>HOURS / WEEK</th>
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<td>Advanced Manufacturing Processes</td>
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<td>02</td>
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<td>Advanced Machine Design</td>
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<td>Computer Aided Design and Engineering</td>
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**TEACHING SCHEME**

**EXAMINATION SCHEME**

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**Elective – I**
1) Reliability, Maintenance Management & Safety, 2) New Product design, 3) Lean Manufacturing
4) Design for Manufacturing and Assembly, 5) Ergonomics of Manufacturing

#### Second Semester

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**Theory**

**Practical**

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**TOTAL** 600

**Elective – II**
4) Computer Assisted Production Management, 5) Concurrent Engineering & Product Lifecycle Management

**TOTAL** 600
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**GRAND TOTAL: 1600**

**Semester III**
Seminar: Seminar to be delivered on work completed during third semester. 50 internal marks out of 100 will be assessed by a Committee consisting of Head of Department, dissertation guide and subject expert appointed by Principal of the College / Head of University Department. Remaining 50 internal marks will be given by guide based on performance. Dissertation: Title of the dissertation work to be submitted to the University on or before 15th Sept. (for regular examination) and 15th of February (for supplementary exam.).

**Semester IV**
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**Note:** Thesis of dissertation work must be submitted to the University on or before 30th April (for regular exam.) and 30th November (for supplementary exam.). Thesis of Dissertation work be submitted with late fee to the University upto 31 May (for regular exam.) and 31st December (for supplementary exam.). The late fee shall be charged as in case of Examination form.

**Notes:**
1. Student should fill the examination form in the beginning of III semester jointly for III & IV semester.
2. Single marksheet for III & IV semester together will be given to the student.
## TEACHING SCHEME

### Hours / Week

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### Elective I
1. Power Electronic Controlled Drives
2. Digital Communication

### Elective II
1. Flexible AC Transmission Systems
2. Digital Image Processing

TOTAL: 600
Semester III
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## Two Year Post Graduate Degree Course in Master of Engineering (Full Time)

**Computer Science & Information Technology**

### Credit Grade System

#### Appendix - E

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**First Semester**

**Elective-I:** 1) Expert System Design & Intelligent System 2) Algorithmics 3) Information Technology & Management

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**Second Semester**

**Elective-II:** 1) Advanced Computing Techniques 2) Mobile Computing 3) Digital Media Development

**Total**

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**TOTAL** | **300**

**GRAND TOTAL: 1700**

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**Semester III**

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SYLLABUS PRESCRIBED FOR
TWO YEAR P.G. DEGREE COURSE IN M.E. (F.T.)
ELECTRONICS & TELECOMMUNICATION (C.G.S.)

SEMESTER I
1ENTC1 ADVANCED OPTICAL COMMUNICATION

SECTION - A

Unit I : Optical Fibre basics and Transmission Characteristics:-
Prorogation of light in planer and circular optical waveguides, Numerical Aperture, Modes in optical fibres, Attenuation in single and multimode fibres, Inter-modal and chromatic dispersion of single mode and multi-mode fibres, Waveguide dispersion, Bandwidth of single mode and multimode fibres, Polarization mode dispersion, Dispersion Compensation fibres, Techniques for reducing fiber losses.

Unit II : Optical Sources, Detectors and Optical fibre measurements

Optical Sources: Absorption & emission of radiation, Einstein Relations, Population inversion, Optical feedback and LASER oscillations, Threshold Conditions, Principles of LASER diode, characteristic and efficiency, Semiconductor injection LASER, Injection LASER characteristics.

Optical Detectors: Optical Detection principles, PIN photodiode, Avalanche photodiodes, Metal semiconductor photo detectors, Noise in P-N photo diode.

Measurements: Fibre attenuation measurement, Fibre dispersion measurement, Fibre reflective index profile measurement, Fibre cut-off wavelength measurement, Fibre NA and diameter measurement, Reflectance and optical return losses, field measurement.

SECTION - B

Unit III : Optical fibre links and components of fibre optic network:-
Link power budget, rise time budget, transmission distance for single mode links, Power penalties in design, Semiconductor optical amplifiers, Erbium Doped Fibre amplifier (EDFA), Stimulated Raman’s Scattering, Raman Amplifiers, Optical parametric amplifiers.

Passive Components, switches and functional modules:-
Directional couplers, fixed and tuneable optical filters, isolators, circulators and attenuators, Concept of optical switching, optical switches, wavelength converters, Optical add/drop multiplexers, optical cross connectors.

Unit IV : WDM Devices and it’s Application
Hybrid & planer wave guide devices, Active WDM devices, Wavelength non selective devices, System application. Long Haul Broad Bandwidth Transmission System : Designing systems for long haul broad bandwidth consideration-Outage, Bit error rate, Cross connect, Low & high speed inter-phases, Multiplex / De-multiplex consideration, Regenerator spacing, Degeneration & Allowances

REFERENCE BOOKS:
1) Fiber Optic Communication Technology by Djafar Mynbaev, Lowell Scheiner, Pearson Education 2011.
2) Optical Fiber communication Principles and Practice by John M Senior, 3rd Ed, Pearson Education.
4) Optical Network by Raju Ramswami (2nd Edition)

1ENTC2 RANDOM PROCESSES

SECTION - A

Unit - I : Scalar Random Variables: -
Concept of random variable, Discrete random variable, Continuous random variable, Expectations & Moments, Characteristics functions, Functions of random variables, Moment generation function, Central Limit theorem (CLT ), Generation of random numbers.

Unit - II: Multi-dimensional Random Variables: -
Joint distribution function, Joint density function, Marginal distribution function, Conditional distribution, Covariance & Covariance matrix, Expectations & Moments, Mean and Variance of weighted sum of Random Variables, Joint Gaussian Random Variables

SECTION - B

Unit - III: Random Processes and Statistical Models for Random Signals:-
Concept of random process, Characterization and Classification, Correlation function, Properties of Auto Correlation function, Relationship between two Random Processes, Properties of
UNIT-IV: Power Spectral Density (PSD): -

REFERENCE BOOKS:
1) Probabilistic Random Signals and Statistics by X Rong Li, CRC Press
2) Random Signals and Systems by Bernard Picnicbono, PHI.
3) A First Course in Probability by Shelabo Ross, Pearson Education

1ENTC3 DIGITAL COMMUNICATION TECHNIQUES
SECTION -A

Unit -I : Characterization of Communication Signal and Optimum Receiver for AWGN Channel:-
Signal Space representation, Memory less Modulation methods, Linear Modulation with memory, Non- linear Modulation methods with memory, CPFSK & CPM, Power Spectra of Linear Modulated signal, Power Spectra of CPFSK & CPM Signals, Correlation Demodulator, Match Filter Demodulator, Optimum Detector, Probability of Error for Binary & M-array signals

Unit - II : Source and Channel Coding:-
Average mutual information & Entropy, Coding of discrete memory-less sources, Discrete Stationary Sources, Lempel-Ziv algorithm; Coding of analog sources, Rate distortion function, Scalar Quantization & Vector Quantization, Temporal and Spectral Waveform Coding, BCH codes, Reed Soloman codes, Reed Muller Codes, Convolution Codes, Transfer function of convolution codes, Viterbi decoding algorithm, stack algorithm(No problems expected), trellis coded modulation.

SECTION: B

Unit -III : Signal Design for Band Limited Channel & Equalization:-
Design of band limited signal for zero ISI, Nyquist Criterion, Design of band limited signal for controlled ISI, partial response signaling, Data detection for controlled ISI

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Linear Equalization: Peak Distortion Criterion, Mean Square Error (MSE) criterion, Decision Feedback Equalization, Coefficient Optimization, Adaptive Linear Equalizer, Zero Forcing Algorithm, LMS Algorithm.

Unit -IV : Spread Spectrum Techniques:-
Generation of PN sequence, direct sequence spread spectrum system, processing gain, jamming margin, application of direct sequence spread spectrum signal, frequency hopped spread spectrum signal, time hopping spread spectrum signal, synchronization of spread spectrum signal – acquisition & tracking.

REFERENCE BOOKS:
2) Digital Communication Techniques by Simon Haykin, John Wiley & Sons
3) Digital Communication Fundamentals and applications by Bernard Sklar, 2nd Ed, Pearson Education Asia
4) Advanced Digital Communication System and Signal Processing techniques by Dr. Kemilo Feher Prentice Hall International

1ENTC 4 DIGITAL SIGNAL PROCESSING AND APPLICATIONS
SECTION –A

Unit -I: Design of Digital FIR filters:-
Filter specifications, Magnitude & Phase response of digital filter. Linear Phase filters: Type I, Type II, Type III, & Type IV. FIR filter design using Impulse Response Truncation: Low pass, High pass filter & Band pass filter, FIR design using Hamming, Hanning, Blackman & Kaiser window, Differentiators, Hilbert transforms, Equi-ripple FIR filter design.

Unit -II: Design of Digital IIR filter:-
Analog filter basics: Butterworth, Chebyshev, Inverse Chebyshev filters, Elliptic filters, IIR filter design using impulse invariance, Bilinear Transform, Matched Transformation, Differentiation method (Backward difference method), Frequency transformations in Analog and Digital domain, frequency normalization, Finite word length problem, Quantization Effects on poles & zeros and frequency response
SECTION - B

Unit III: Multi-rate Digital Signal Processing:
Decimation & Interpolation, Linear filtering with decimation and interpolation, Poly-phase filters, Filter banks, sub-band processing, Decimated filter banks, Uniform DFT filter banks, Quadrature mirror filters

Unit IV: DSP Processors and its Application:
Architecture of TMS 320C67XX, Assembly language instructions, pipeline operations, Speech signal processing, Radar signal processing

REFERENCE BOOKS:
1) A Course in Digital Signal Processing by Boaz Porat John Wiley & Sons
2) Digital Signal Processing by J. P. Proakis, PHI
6) Digital Signal Processing, Thomas J. Cavicchi, John Wiley

ELECTIVE-I
1ENTC5 (A) REAL TIME EMBEDDED SYSTEM

SECTION – A

Unit I : Embedded System Hardware:
Embedded systems overview, Hardware components like microcontroller, GPP, ASSP, AISP, SOC, Details of 32 bit ARM SOC architecture, Organization, Analog, Digital & High speed I/O for embedded systems, Interfacing SRAM, DRAM and flash memories with microcontroller, memory management, allocation of memory to program segments and blocks, memory maps.

Unit II : Embedded System Software:
Techniques of writing efficient C code for microcontroller, C data types for ARM, Signed & unsigned data types, limitation of char & data types, storage class – static & extern, volatile keyword, operation on bits, functions, ARM Thumb procedural call standard, pointers & arrays, conditional statements – if-else, switch, structure, conditional loops – for & while, preprocessing, compiling, cross compiling, compiler driver, startup code and board support packages, program segments calling assembly routines in C, interrupt handling in C, interrupt latency.

SECTION - B

Unit III: Uniprocessor Real Time Scheduling:
Real time systems, tasks and its states, task assignment & scheduling, scheduling algorithms – rate monotonic and earliest deadline first, inter-task communication, semaphore, priority inheritance protocol, priority ceiling protocol, real time operating system features, features of micro COS – II, RTOS.

Unit IV: Embedded System Architecture & Design:
Embedded system implementation aspects & estimation modeling, embedded system architecture, validation and debugging of embedded systems, hardware – software co-design in an embedded system, ARM Philips NXP LPC 2148 programming of on – chip components like ADC and interfacing external peripherals like keyboard, LCD, Stepper Motor.

REFERENCE BOOKS:
01) Embedded Systems by Rajkamal, 2nd Ed, Tata McGraw Hill
02) Embedded Real-time Systems Programming by Iyer & Gupta, Tata McGraw Hill
03) ARM System on Chip Architecture by Furber, 2nd Ed, Pearson India
04) Intro. To Embedded Systems by K.V. Shibu, McGraw Hill
05) Philips NXP LPC 2148 user manual
06) Scheduling in Real Time systems by Cottet, Delacroix & Mammeri, John Wiley & Sons
07) Embedded system design A Unified Hardware/software approach by Frank Valid & Tony Givangis, Publishing 1999
08) Embedded systems: World Class Designs- Jack Ganssle, Newness Publication, Australia.
UNIT-I:  Introduction and Mathematical background: 

Huffman coding: Minimum variance, optimal, length, Extended Huffman codes, Non-binary Huffman codes, Adaptive Huffman coding, Application of Huffman codes.

Arithmetic coding: Coding a sequence, generating binary codes, Adaptive arithmetic coding, Application of arithmetic coding

Unit - II: Dictionary based compression, Context based compression and Lossless image compression: 
- Static and adaptive dictionary coding techniques, Application related to file compression and Image Compression, V.42 bis Standard.
  Context based Compression: Prediction with Partial Match (PPM), Burrows Wheeler Transform, Associative coder, Lossless Image Compression: JPEG, Run-length coding, facsimile coding standards, progressive Image transmission

SECTION- B

Unit -III: Quantization Transform Coding and Sub-band Coding: 
- Scalar Quantization, Quantization problem, Uniform quantization, Adaptive quantization, Non-uniform Quantization, Entropy Coded Quantization.
  Vector Quantization (VQ): Advantages over Scalar Quantization, The Linde-Buzo-Gray algorithm, Tree Structured, Vector Quantization, Structured VQ.
  Transform Coding: K L Transform, DCT, DST, Discrete Walsh-Hadamard transform, Applications of Transform coding to Image and audio compression
  Sub band Coding: Filters, Basic Sub-band coding, algorithm, design of Filter Banks, Application to speech coding audio coding and Image compression

Unit - IV: Audio, Image and Video Compression: 
- Spectral masking, Temporal masking, Psychoacoustic model, MPEG Audio coding, MPEG Advanced Audio coding, Dolby digital.


REFERENCE BOOKS:
1) Introduction to Data Compression by Khalid Sayood, 2nd Ed, Academic Press.

UNIT-C (C) ARTIFICIAL INTELLIGENCE

SECTION-A

Unit I: Fuzzy Set theory: 
- Introduction to Fuzzy sets, Fuzzy relation, Membership functions, Fuzzification, De-fuzzification, Fuzzy logic, Fuzzy rule based system, Fuzzy inference system

Unit II: Fuzzy Decision Making: 
- Fuzzy modeling, Adaptive Neuro-Fuzzy Inference system, Cognitive Neuro-Fuzzy modeling, Neuro-fuzzy control, Application of Neuro Fuzzy control

SECTION-B

Unit III: Artificial Neuron model: 
- Single and multilayer perceptron neural network (MLP)
  Learning process: Training by back-propagation, Swarm particle optimization, Genetic algorithm, simulated annealing, basic concept of bidirectional associative memory (BAM), Self organization feature map, Optical neural network.

Unit IV: Neural Networks and Applications: 
- Recurrent Networks, Hamming Network, Support Vector Machine, Counter Propagation Networks, Cluster Discovery Network (ART), Applications of Neural Network in Character Recognition, Forecasting, Robot Kinematics and Biomedical signals

REFERENCE BOOKS:
1) Fuzzy sets and Fuzzy Logic -Theory and Applications by George J. Klir, Bo Yuan, PHI
2) Neural Networks by Simon Haykin, Pearson Education
4) Artificial Neural Networks by Zurada
5) Neuro Fuzzy and Soft Computing by Jang-Sun, Mezutani, Pearson Education
6) Introduction to Neural Networks using MATLAB 6.0 by S.N.Sivanandan, S. Sumathi, S.N. Deepa, McGraw Hill
7) Intelligent Systems & Controls by Laxmidhar Behera, Indrani Kar, Oxford University Press

1ENTC5 (D) CRYPTOGRAPHY AND NETWORK SECURITY

SECTION-A

Unit I: Overview: Services, Mechanisms and Attacks:-
The OSI Security Architecture, A model for network security.
Block Ciphers and Data Encryption Standards: Simplified DES, Block cipher principles, Data encryption, The Strength of DES, Differential linear cryptanalysis, Block cipher design principles, Block cipher modes of operations, Contemporary symmetric ciphers- Triple DES, Blowfish, RC5, Characteristics of Advanced symmetric block ciphers
Confidentiality using symmetric encryption: Placement of Encryption function, Traffic Confidentiality, Key distribution

Unit II: Public Key Cryptography and RSA:-
Principles of Public key crypto-systems, The RSA Algorithm, Key management, other public key crypto-systems, Key management, Diffie-Hellaman key exchange
Message Authentication and flash function: Authentication requirements, Authentication function, Message Authentication codes, Hash function, Security of Hash function & MACs

SECTION-B


REFERENCE BOOKS:
3) Contemporary Cryptography by Rolf Oppliger, Artech Home Publication, 2005

LABORATORIES

1ENTC6 Lab-I: The laboratory work shall consist of at least 8 experiments. The experiments shall be equally distributed and based on 1ENTC1 and 1ENTC3.
1ENTC7 Lab-II: The laboratory work shall consist of at least 8 experiments. The experiments shall be equally distributed and based on 1ENTC2 and 1ENTC4.

SEMESTER-II

2ENTC1 ADAPTIVE SIGNAL PROCESSING

SECTION-A


Performance analysis: stability Constraints, Conversion Speed, excess MSE

SECTION - B

UNIT III: Kalman Filters and Square Root Adaptive Filters:
Introduction to Recursive Least-Squares Adaptive filters, Recursive minimum MSE for Scalar random variables, Kalman filtering problem, Innovation process and estimation of state, Kalman filtering, Square root Kalman filters, QR-RLS algorithm

UNIT IV: Applications of Adaptive filtering:
Adaptive Equalization, Adaptive noise cancellation, Adaptive Linear prediction, Adaptive Echo Cancellation, Adaptive Lattice Filters

REFERENCE BOOKS:

2ENTC2 WIRELESS COMMUNICATION

SECTION-A

Unit -I: Fundamentals of Wireless Communication: Evolution of wireless networks and challenges
Long term fading models: two ray model, diffraction model, scattering model, Shadow fading
Short term fading: Impulse response of time varying channels, Narrow band fading model, wide band fading models, discrete time model. Capacity of wireless channel, Capacity of AWGN channel, Capacity of flat fading channel, Capacity of frequency selective fading channel, Basic diversity combining techniques.


REFERENCE BOOKS:
7) Mobile Cellular Telecommunication, William C Y Lee , Mc Graw Hill

2ENTC3 ADVANCED COMPUTER NETWORKS AND PROGRAMMING

SECTION-A

Unit -I: Basics of Communication Networks: Communication networks and services, Approach to network design, Key factors in Communication network, Evolution, Concept of Layering, OSI Reference model, TCP/IP
architecture, Barkley API, TCP/IP utilities, Concept of Space-Division Switching and Time-Division Switching, Time Space Time (TST) Switching

Unit - II: Queuing models: -
Delay analysis, Arrival rate, Traffic load, Erlang 'B' and Erlang 'C' concepts, Arrival process, Service time classification of queuing systems, M/M/1 queue and Basic multiplexer model, M/M/1 steady state probabilities, Effect of scale on performance, Average packet delay, M/M/C/C Systems, M/ G/1 model, Service time, Variability and Delay in M/M/1 systems.

SECTION-B

Unit III: TCP/IP and Routing: -
Architecture IPV6 IP addressing ICMP, IGMP, ARP, RARP, DHCP, Transmission Control (TCP), TCP Segment, TCP flow control, TCP Congestion control, UDP, Mobile IP, Unicast Routing protocols, Multicast Routing Protocols

Unit IV: ATM Network and Advanced Network Architectures:-

REFERENCE BOOKS:
1) Communication Networks by Leon Garcia, Wadeja, Tata McGraw Hill
5) Internetworking with TCP/IP- Vol I, II, & III by D.E. Comer, PHI

2 ENTC 4 RF AND MICROWAVE CIRCUIT DESIGN

Unit I: Two Port RF Networks-Circuit Refrigeration
Low frequency parameters-impedance, admittance, hybrid and ABCD. High frequency parameters-Formulation of S parameters, properties of S parameters-Reciprocal and lossless networks, transmission matrix, Signal Flow Graph:

Unit II: RF Transistor Amplifier Design And Matching Networks
Amplifier power relation, stability considerations, gain considerations noise figure, impedance matching networks, frequency response, T and D matching networks, microstripline matching networks (unilateral/bilateral)

Unit III: Microstrip Lines, Design, Analysis
Introduction, types of MICs and their technology, Propagating models, Analysis of MIC by conformal transformation, Numerical analysis, Hybrid mode analysis. losses in Microstrip, Introduction to coupled Microstrip, Even and odd mode analysis, Directional couplers, branch line couplers, Design and Fabrication of Lumped elements for MICs,

Unit IV: Microstrip Circuit Design And MMIC Technology
Introduction, Impedance transformers, Filters, High power circuits, Low power circuits, MICs in satellite and Radar. Fabrication process of MMIC, Hybrid MICs, Configuration, Dielectric substances, thick and thin film technology, Testing methods, Encapsulation and mounting of Devices.

TEXT BOOKS:

2 ENTC 5 Elective-II
(A) MOBILE COMPUTING

Unit – I: Wireless network technology: Introduction to 3G and 4G mobile systems. Global System for Mobile Communication (GSM) , Wireless media access control protocols; Wireless LAN, TDMA, PRMA, CDMA, WCDMA.


Unit – III: Services in wireless networks: Quality of service, Delays, error and packet loss, Error control schemes, Mobile distributed application support: Operating system support, Mobile
Unit – IV: Security issues in mobile and wireless: Traditional Security Issues, Mobile and Wireless Security Issues, Additional Issues (Liability, Fear, uncertainty and doubt, Fraud, Big bucks at stake), Additional Types of Attacks (man in the middle attacks, traffic analysis, Replay attacks, Buffer overflow attacks)

Approaches to security: Limit the signal, Encryption, Integrity codes, Ip security, Other Security related Mechanism (Authentication protocols, AAA, Special Hardware)

REFERENCE BOOKS:
2. Mobile computing by Asok Talukdar, Roopa Yawagal, TMH
3. Fundamentals of Mobile and Pervasive Computing by Frank Adelstein, Sandeep K.S. Gupta—TMT

2ENTC5 ELECTIVE-II

(B) COMMUNICATION SYSTEM DESIGN


Unit – IV: Analog to Digital Converters: Demodulators, A to D Converters used in receivers, Low cost Sigma delta modulators and it’s implementation, Design Technology for Wireless Systems: Design entry / simulation, Validation and analysis tools

REFERENCE BOOKS:
1. VLSI for Wireless Communication- Bosco Leuing, (PE).
2. The design of CMOS Radio frequency integrated circuits – T Lee (Cambridge University press)
3. Analysis and design of analog integrated circuits – P Gray and R Meyer ( John Wiley & Sons)
4. Microelectronics Transistor Amplifier, Analysis and design G Gonzalez (Prentice Hall)

2ENTC5 ELECTIVE-II

(C) OPTICAL NETWORKS

Unit I: SDH/SONET/WDM & DWDM
SONET/SDH architecture and protocols, Multiplexing structures, Functional components, virtual tributaries and containers, SONET/ SDH network elements, SONET/ SDH migration, Single wavelength limitations, WDM concepts and components, Introduction of DWDM, WDM network designs.

Unit II: Optical Networks ATM, IP
Basic of ATM, ATM virtual channels and path, ATM signalling Principal LANE, MOPA ATM in optical world. IP suit, Router and Switches. MPL’s switching in IP, MPLS as an optical control channel, getting IP packets onto DWDM. Optical routers

Unit III: Photonic Packet switching and network survivability
Optical TDM, Synchronization, Header processing, Buffering, Burst switching Testbeds, Basic concept, Protection in SONET / SDM, Protection in client lager, Service class base on protection, Optical layer protection scheme, Network between layers.

Unit IV: Control Management
N/W management functions of SDH/SONET Frames, optical layers services and interfacing, layers within optical layers, Multivendor Interoperability performance and fault Management, Optical safety.
REFERENCE BOOKS:
1. Optical Network by Raju Ramswami (2nd Edition) Morban Kaufmann
   Elsevier
2. Optical Networks– Third generation transport system -Uyless Black
   (Prentice Hall)
3. Opto Electronic computing system – Jordan
4. Optical networking and WDM- W. Goralski

2ENTC5 (D) SPEECH & AUDIO PROCESSING
SECTION - A


Unit II : Speech Enhancement: Microform Codes, Source coders, and Hybrid coders. Microphone Array processing, Noise Suppression, and Echo Canceller.

SECTION - B


Unit IV: Speech synthesis & Applications: Articulatory, formant, and LPC synthesis, voice response and text-to-speech systems. Applications: data compression, vocoders, speech enhancement, speech recognition speaker recognition, aids for the speech and hearing impairments.

Reference Books :
2. L R Rabiner and R W Schafer, Digital Processing of Speech Signals, Prentice Hall

2ENTC6 Lab- I (Based on 2ENTC2 & 2ENTC3)
2ENTC7 LAB-I (Based on 2ENTC1 & 2ENTC4)

THIRD SEMESTER
3ENTC1 SEMINAR & DISSERTATION
( As per Given Scheme )

FOURTH SEMESTER
4ENTC1 SEMINAR & DISSERTATION
( As per Given Scheme )

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SYLLABUS PRESCRIBED FOR
TWO YEAR P.G. DEGREE COURSE IN M.E. (F.T.)
CIVIL ENGINEERING (TRANSPORTATION ENGINEERING & MANAGEMENT ) (C.G.S.)

SEMESTER-I

1SFTR1 TRAFFIC ENGINEERING AND FIELD STUDIES
Introduction: Components of road traffic - the vehicle, driver and road. Objectives and scope of traffic engineering.
Traffic Engineering: Road user characteristics; human and vehicle characteristics, factors affecting road traffic; methods of measurement. Concepts of passenger car units for mixed traffic flow.
Traffic Engineering Studies and Analysis: Sampling in traffic studies; adequacy of sample size; application of sampling methods for traffic studies, objectives, methods of traffic study, equipment, data collection, analysis and interpretation (including case studies) of (i) Spot speed (ii) Speed and delay (iii) Volume (iv) Origin - destination (v) Parking . Traffic manoeuvres and Stream Characteristics; application in intersection design.
Probability and statistics for traffic engineering .
Traffic Regulations and Control: General regulations; Regulations on Vehicles, drivers and flow; Other regulations and control. Traffic management; noise and air pollution due to road traffic and method of control.
Traffic Control Devices: Traffic signs, markings, islands and signals. Different methods of signal design; redesign of existing signal including case studies. Signal system and co-ordination. Evaluation and design of road lighting.
ITS: Introduction to Intelligent Transport System- Application of ITS to Traffic Management System- Public Transportation Management System

Traffic Forecast: General travel forecasting principles, different methods of traffic forecast - Mechanical and analytical methods, Demand relationships, methods for future projection.

Design Hourly Volume for Varying Demand Conditions: Concept of Design vehicle units and determination of PUC under mixed traffic conditions, Price-volume relationships, demand functions. Determination of design hourly volume; critical hour concept.

Highway Capacity: Factors affecting capacity, level of service; Capacity studies Capacity of different highway facilities including unsignalised and signalised intersections.

REFERENCE BOOKS:
3. IRC and IS Publications.
12. Fundamentals of Transportation and traffic Operations. Pergamon, Elsevier science Inc

1SFTR2 TRANSPORT PLANNING AND MANAGEMENT

Urban Transportation Planning - Goals and objectives - Hierarchical levels of transportation planning - Forecast - Implementation - Constraints. UTP survey – Inventory of land use Trip generation - Trip classification - productions and attractions - Multiple regression models - Category analysis - Trip production models - Trip distribution models – Linear programming approach.


Preparation of alternative plans - Evaluation techniques - Plan implementation - Monitoring- Financing of Project – Case studies.

Motor Vehicles Act - statutory provision for road transport and connected organizations.

Route scheduling, Freight transport, Vehicle scheduling, Optimum fleet size, Headway control strategies, Crew scheduling.

Depots and Terminals - Principles and types of layout, Depot location, Twin depot concept, Crew facilities. Design of parking facilities – Bus terminal, bus stops and bus bays.

REFERENCE BOOKS:
3. Institute of Traffic Engineers - An Introduction to Highway Transportation Engineering’.

1SFTR3 DESIGN AND CONSTRUCTION OF PAVEMENT

Components of pavement structure, importance of Sub-Grade soil properties on pavement performance. Functions of Sub-Grade, sub-base, base course and wearing course.

Stresses in flexible pavements: Stresses in homogeneous masses and layered system, deflections, shear failures, equivalent wheel and axle loads.

Elements in design of flexible pavement: Loading characteristics-Static, impact and repeated loads, affects of dual wheels and tandem axles, area of contact and tyre pressure, modulus, CBR value of different layers, equivalent single wheel load, equivalent stress equivalent deflection criterion, equivalent wheel load factors, climatic and environmental factors.


Elements in design of Rigid pavements: Wheel load, stresses, Westergaard’s analysis. Basic properties of concrete elasticity, shrinkage & creep, durability of concrete, rigid pavement design, concrete mix design.

Temperature stresses: Thermal properties of aggregates and concrete. Effect of temperature variations on concrete pavements, Westergaard’s and Tomlinson’s analysis of warping stresses. Combination of stresses due to different causes.

Pavement overlays: Flexible overlays and Rigid overlays.

Pavement Construction:

Equipment in Highway Construction: Various types of equipment for excavation, grading and compaction - their working principle, advantages and limitations. Special equipment for bituminous and cement concrete pavement and stabilized soil road construction

Subgrade: Earthwork grading and construction of embankments and cuts for roads. Preparation of subgrade, quality control tests

Flexible Pavements: Specifications of materials, construction method and field control checks for various types of flexible pavement layers

Cement Concrete Pavements: Specifications and method of cement concrete pavement construction; Quality control tests; Construction of various types of joints.

REFERENCE BOOKS:
1. Kadiyali L.R., “Principles & Practice of Highway Engineering” Khanna Publisher
2. Chakroborty P Das “Principles & Practice of Highway Engineering” (Khanna Publisher 2000)
5. Relevant IRC, ASTM, AASHTO and other Codes, Manuals and Specifications.


1SFTR4 DOCKS HARBOUR AND AIRPORT ENGINEERING

Water Transportation: Scope, Merits, Developments of Water Transportation in India, Inland waterways, River, Canal, Inland water transportation, Development of ports & Harbours, Harbour classification, Site selection, Harbour dimensioning.

Natural Phenomena: Tides, Water waves, Wave decay & port, wave diffraction, breaking, reflection, Littoral drift, sediment transport.

Harbour Infrastructures: Types of breakwaters, jetty, dock fenders, piers, wharves, dolphin, mooring accessories, Repair facilities, wet docks, lift docks, dry docks, gates for graving docks, floating docks, slipways, locks and gates.

Port facility: transit shed, warehouses, cargo handling, container handling, Inland port facility, Navigational aids, types, requirements of signals, lighthouses, beacon light, buoys. Dredging & coastal protection: Types of dredgers, choices, usage of dredged material, sea wall protection-sea wall revetment, bulkhead.

Planning of ports: Planning of ports for regional and intercontinental transportation development, forecasting cargo & passenger demand, regional connectivity, cargo handling capacity of port, economic evaluation of port project, impacts of port activities.

Air Transportation: Characteristics of Air Transportation structure and organization, challenges and the issues, Airport Master Plan, Characteristics of the aircraft, Airport Requirements, site selection, layout plan and financial plan, Forecasting air travel demand, Air freight demand.

Air traffic control, lighting and signing, Airport capacity and configuration, parking configurations and apron facilities, visual aids.

Geometric Design: of runway, taxiway, aprons, Design of Passenger Terminal, analysis of flow through terminals, Design of air cargo facilities, Airfield pavement and drainage design.

Field Visit:
1. Visit to the Airport terminal building, structures of terminal area and management office.
2. Visit to the major Port: Port area and Harbour area infrastructures.

REFERENCES:
ELECTIVE-I

1SFTR5 (1) APPLIED SOIL MECHANICS

Introduction: Soil Mechanics applications to Highway Engg. Soil formations, Types, Regional Soil deposits of India, Index properties, their determination, importance, various soil classification systems, HRB classification, problems on these.

Soil Compaction: Introduction, Lab Tests, Factors affecting, Structure & Engg behavior of compacted cohesive soil, Field compaction specifications Field compaction control, Different types of Equipments used for compaction, their choice.

Stability of slopes: Introduction, Types, Different methods of analysis of slopes for O<0 & C=0 soil, Location of most critical circle, Earth dam slopes stability, Taylor’s stability number. Effect of Earthquake Force, problems on above.


Permeability of soil: Darcy’s Law, Validity, Soil-water system, Types, Determination of permeability, problems.

Site Investigation: Introduction, Planning exploration programmes, Methods, Samplers, SPT, Subsoil investigation Report, Geophysical methods.

Reinforced Earth structures: Introduction, Components, Advantages, Types of stability – external, Internal,Geo textiles – types, Functions, their uses in road embankments and railway works, other uses.

Highway Drainage: Introduction, Importance, Surface drainage, Sub-surface drainage, methods, Design of subsurface drainage system, Road construction in water logged areas, Land slides – definition, classifies, factors producing.

REFERENCE BOOKS:
6. IRC – Relevant Codes.

ELECTIVE-I

1SFTR5 (2) DESIGN OF BRIDGES

Introduction: Principles of Planning of Elevated Rail Transit System, grade separation structures, pedestrian crossing and sub- ways.

Loads on Bridges: Dead loads, live loads, dynamic effects of vehicles, longitudinal forces, centrifugal forces, wind loads, earth quake forces, stream flow pressure, load combinations, design examples

Design of Bridge Slabs: Longitudinally reinforced deck slabs, transversely reinforced bridge slabs

Design of Reinforced Concrete Bridges: Design procedures for T-beam, box girder bridges design examples

Design of Prestressed Concrete Bridges: Design code, design examples

Segmental Box bridges - precast sections, criteria, design examples

Sub-Structure Design: Foundation investigation, bearings, bridge pier design, and abutment design. Examples.

REFERENCE BOOKS:

1SFTR6 TRAFFIC ENGINEERING AND FIELD STUDIES - LABORATORY

To achieve the objective the following practical will be conducted:
1. Traffic volume studies.
2. Spot -speed studies.
3. Speed and delay study.
5. Parking studies
6. Origin -Destination studies, Desire line diagrams.
7. LOS study using VRT.
8. Problems related to traffic engineering.
1SFTR7 DESIGN & CONSTRUCTION OF PAVEMENT - LABORATORY

1. Plate Bearing Test.
2. Field CBR Test.
4. Road Unevenness Measurement by Bump-Integrator.
5. Valuation of Pavement Roughness by Roughometer / Profilometer.
7. Design of Rigid Pavements for Highway and Runway.
8. Design of Overlays
9. Marshal Stability Test
10. Cement Concrete Mix Design

Field Visit:
1. Hot – mix plant visit,
2. Road construction site visit: Earth work construction procedure and bituminous mix laying, spreading and rolling procedure.

REFERENCE BOOKS:

SEMESTER-II
2SFTR1 ADVANCED RAIL ROAD ENGINEERING

Introduction: Important development of Indian Railways, organization of Indian Railway, Track, Loco, Traction revolution for traffic growth on Indian Railways.

Track & Track Stresses: Permanent way, Track standards & structure, Track Modulus, Forces on the Track, loads, Hammer blow effect Bending Stresses in rail, stresses in Sleeper, Ballast, coning & Tilting of rails, Type of rails, Defect in rails, Rail failure, welding, methods, ultrasonic testing of thermit welding joints, Fastening of rails, fish plates, spikes, bearing plates, pandrol clips, new type of elastic fastening with S.T.sleeper, Rubber pads.

Formation, Sleeper & Ballast: Functions of formation, profile of Banks & cuttings, Track drainage, failure of bank & remedial measures, soil stabilization & Geotextiles methods, sleeper types, sleeper density, functions & requirement and Ballast types.

Point & Crossing & Turnouts: Turnout, type of switches, tongue rail, details of crossing, reconditioning of points & crossings calculation of elements of turnout coles method and IRS method. Symmetrical split, Diamond crossing, modern trend in design, problems.

Geometric Design of Track: Radius, degree of curve, super elevation, gradients, speed calculation, safe speed, equilibrium speed, permissible speed, cant, cant deficiency, negative cant, Transition curve & its design, Types, shift, laying of T.C., vertical curve & its design, problems.

Tractive power & Train resistance: various power requirements for steam, electric loco, diesel loco, Hauling power, resistances developed for Train & problems.

Signal & interlocking: Types of Signal, details of electrical signaling system, track circuits, Absolute block system, Automatic block system, interlocking & methods, Modern signaling techniques, Route relay interlocking, CTC systems.

Metropolitan Railways: Travel pattern, problems, Different forms of urban Transport, Trolley buses, surface railways, underground railways, elevated railways, mono rail, tube railways.

REFERENCE BOOKS:
5. Manual on Signaling & Interlocking by Indian Railway board.

2SFTR2 ROAD SAFETY AND MANAGEMENT SYSTEM

Road accidents, Causes, scientific investigations and data collection. Analysis of individual accidents to arrive at real causes; statistical methods of analysis of accident data, application of computer analysis of accident data.

Safety in Road Design – Accident prevention through better planning and design of roads – planning road networks by land use planning, route planning, traffic planning for different land uses etc., designing for safety through link design, design of road geometrics etc., junction design for safety.

Operating the road network for safety, highway operation and counter-measures, road safety audit, principles- procedures and practice, code of good practice and checklists.

Road safety issues and various measures for road safety. Engineering, education and enforcement measures for improving road safety. Short term and long term measures. Road safety education and training. Traffic calming techniques and innovative ideas in road safety.

Economic evaluation of improvement measures by “before and after studies” Counter measures at hazardous locations – accident investigation,
problem diagnosis, development of counter measures, checklists for counter measures. Traffic management techniques. Local area management. Transportation system management. Low cost measures, area traffic control. Various types of medium and long term traffic management measures and their uses. Evaluation of the effectiveness and benefits of different traffic management measures, management and safety practices during road works. Case studies.

REFERENCE BOOKS:
7. Papacoastas ‘Introduction to Transportation Engineering’ – Prentice

2SFTR3 ENVIRONMENTAL IMPACT ASSESSMENT

Introduction: Concepts of environmental impact analysis, key features of National environmental policy act and its implementation, screening in the EIA process, utility and scope of EIA process, Environmental protection acts EIA at national level.

Conceptual approach for environmental impact studies, planning and management of impact studies, matrix and network methodologies for impact identification, description of the affected environmental – environmental indices.

Prediction and Assessment of Impact on Air Environment: Basic information on air quality, sources of air pollutants, effects of air pollutants, key legislations and regulations, conceptual approach for addressing air environment impacts, impact prediction approaches, assessment of significance of impacts, identification and incorporation of mitigation measures.

Prediction & Assessment of Impact on Noise & Social Environment: Basic information on noise, key legislation and guidelines, conceptual approach for addressing noise environment impacts, impact prediction methods, assessment of significance of impacts, identification and incorporation of mitigation measures, Conceptual approach for addressing socio-economic impacts, traffic and transportation system impacts, visual impacts, scoring methodologies for visual impact analysis

Decision Methods for Evaluation of Alternative: Development of decision matrix. Public participation in environmental decision making, Regulatory requirements, environmental impact assessment process, objectives of public participation, techniques for conflict management and dispute resolution, verbal communication in EIA studies

REFERENCE BOOKS:
6. Relevant IRC & CPCB codes.

ELECTIVE-II

2SFTR4 (1) GEOMETRIC DESIGN OF TRANSPORTATION FACILITIES

Introduction: Classification of rural highways and urban roads. Objectives and requirements of highway geometric design. Design Control and Criteria

Design Elements: Sight distances - types, analysis, factors affecting, measurements, Horizontal alignment - design considerations, stability at curves, superelevation, widening, transition curves; curvature at intersections, vertical alignment - grades, ramps, design of summit and valley curves, combination of vertical and horizontal alignment including design of hair pin bends, design of expressways, IRC standards and guidelines for design. problems.

Cross Section Elements: Right of way and width considerations, roadway, shoulders, kerbs traffic barriers, medians, frontage roads;
Facilities for pedestrians, bicycles, buses and trucks, Pavement surface characteristics - types, cross slope, skid resistance, unevenness.

**Design Considerations:** Design considerations for rural and urban arterials, freeways, and other rural and urban roads - design speeds, volumes, levels of service and other design considerations.

**Design Of Intersections:** Characteristics and design considerations of at-grade intersections; Different types of islands, channelization; median openings; Rotary intersections; Grade separations and interchanges - types, warrants, adaptability and design details; Interchanges - different types, ramps. Computer applications for intersection and interchange design.

**Note:** Computer Lab. using highway geometric design software for design of intersections, interchanges and parking lots to be carried out.

**REFERENCE BOOKS:**
5. Relevant IRC publications

**ELECTIVE-II**

**2SFTR4 (2) THEORY AND APPLICATION OF GEOGRAPHIC INFORMATION SYSTEMS (GIS)**

**Geographic information concepts and spatial models** – Introduction, spatial information, temporal information, conceptual models of spatial information, representation of geographic information.

**GIS Functionality** – Introduction, data acquisition, preliminary data processing, data storage and retrieval, spatial search and analysis, graphics and interaction.

**Computer Fundamentals of GIS** and Data storage Fundamentals of computers vector/ raster storage character files and binary files, file organization, linked lists, chains, trees. Coordinate systems and map projection: Rectangular, polar and spherical coordinates, types of map projections, choosing a map projection.

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**GIS Data models and structures** – Cartographic map model, Georelationship model, vector/ raster methods, non - spatial data base structure viz., hierarchal network, relational structures. Digitizing Editing and Structuring map data – Entering the spatial (Digitizing), the non- spatial, associated attributes, linking spatial and non- spatial data, use of digitizers and scanners of different types.

**Data quality and sources of error** – Sources of errors in GIS data, obvious sources, natural variations and the processing errors and accuracy. Principles of Spatial data access and search, regular and object oriented decomposition, introduction to spatial data analysis and overlay analysis, raster analysis, network analysis in GIS.

**GIS and remote sensing data** integration techniques in spatial decision support system land suitability and multioriteria evaluation, rule based systems, network analysis, special interaction modeling, Virtual GIS.

**Data base positioning systems**, desirable characteristics of data base management systems, components of a data base management system, understanding the data conceptual modeling. Global positioning system, hyper spectral remote sensing, DIP techniques, hardware and software requirements for GIS, overview of GIS software.

**REFERENCE BOOKS:**
3. Lillesand, ”remote sensing and image interpretation “(John Wiley and Sons),2000.

**ELECTIVE-III**

**2SFTR5 (1) TRANSPORTATION ECONOMICS AND EVALUATION**


**Cost and Benefits:** Capital Cost, Inflation cost, Interest during construction, maintenance cost, Road user cost, Vehicle Operating cost, Accident Cost, Congestion Cost, and Pricing. Non user cost and consequences. Saving and Benefits, Road user benefits, and Consumer surplus. Social Costs and benefits from transportation projects.
Methods of Economic Analysis: Methods- BCR-NPV-IRR –Their Basic Characteristics, Illustrative applications on above Methods of Economic Analysis, Comparison of the Methods of Analysis when Applied to a Group of Mutually Exclusive Alternatives.


Supply and Demand: Concept-Definition-Factors affecting Demand and Supply- Shift in Demand and Supply- Transportation demand Model- Equilibrium-Sensitivity of Travel Demand- Elasticities-Consumer Surplus- Marginal Cost- Average Cost- Pricing.

REFERENCE BOOKS:
4. Kenneth J. Button, Transport Economics, Elgar
7. Road User Cost Study, Central Road Research Institute
8. Dickey J.W., Project Appraisal for Developing Countries, John Wiley

ELECTIVE-III

2SFTR5 (2) TRANSPORTATION SYSTEMS

Technological characteristics of different systems Principles and functions of important systems elements in Highway, Railways, Waterways, Airways, & Rope ways etc.

Historical development of transport in India - 20 year Road Plans, National Transport Policy Recommendations, IRC, CRR1, Vision 2021, NHDP, PMGSY. Characteristics of different modes of transport and their integration and interactions - impact on environment.

Planning of railway - Passenger and goods terminals - layout - passenger facilities – traffic control.

Airport Planning, requirements and components. Design of runway and taxiway - Apron - parking configuration - terminal requirements - Airport marking and lighting - Air traffic control.

Planning of Harbours and ports - cargo handling - Containerization - Navigation aids – Inland waterways - Pipeline transportation.


REFERENCE BOOKS:

2SFTR6 ROAD SAFETY AND MANAGEMENT SYSTEM - LABORATORY

The field studies on following topics:
1. Transportation management
2. Parking management
3. Road accident studies
4. Public transport route evaluation
5. Traffic signal - capacity evaluation
6. Rotary design

2SFTR7 ENVIRONMENTAL IMPACT ASSESSMENT - LABORATORY

1. Noise emitted by road traffic motor vehicles.
Partial Differential Equations: Linear partial differential equations with constant coefficients and its solution, complimentary function and particular integral.

Applications of Partial Differential Equations: Method of separation of variables, solution of wave equation, one dimensional and two dimensional heat flow equation in steady state (Laplace Equation) and its solution.

SECTION – B

Statistics: -Method of least squares, curve fitting by graphical method. Co-relation regression, probability, axioms of probability, Baye’s theorem, conditional probability, probability distribution; Binomial, Poisson’s and Normal Distribution

Interpolation: -Newton’s interpolation formulae, Newton’s and Gauss’s forward and backward interpolation formulae, Interpolation with unequal intervals, Lagrange’s formula for unequal intervals. Newton’s divided difference formula. Inverse interpolation

Numerical Methods: Numerical integration, Newton-Cote’s formula, Trapezoidal rule, Simpson’s one third and three eighth rule, Waddle’s rule. Numerical solution of ordinary differential equations; Taylor’s series, Runge-Kutta’s fourth order method, Euler’s method, Milne’s predictor-corrector method

TEXT BOOKS:
2. Higher Engineering Mathematics by B. S. Grewal,

REFERENCE BOOKS:

IMTE2 ADVANCED THERMODYNAMICS

SECTION – A


SECTION -B

Multi Phase Systems: General considerations, Dalton & Amagat Model, Mixture of gases and vapors. Changes in Molal Properties upon Mixing, Gibbs Entropy Equation and Gibbs -Duhem Equation


Thermodynamic Optimization: Energy analysis of Vapor and Gas Power Cycles, Guideline for improving Thermodynamic Effectiveness; Energy analysis of Simple Power Plant (Steam Plant)

TEXT BOOKS:

REFERENCE BOOKS:

1MTE3 FLUID DYNAMICS

SECTION - A

Fluid flow concepts: Euler’s equations of motion, Navier stoke equation, equation of continuity, Rotational irrotational flows, potential and stream functions, and flow nets circulations. Vorticity.

Basic Function: Uniform stream, sink, vortex, doublet, superposition of functions, flow over half bodies, Rankine bodies, circular cylinder, Magnus effect.

Conformal Mapping: Simple transformation and inverse transformations.

SECTION - B

Boundary layer theory: Boundary layer theory for laminar and Turbulent flow, Blasius solution for flat plate, approximate methods, boundary layer separation and control, Effect of roughness.

Turbulent flow: Semi empirical theories of turbulence, eddy viscosity, Prandtl’s mixing length theory, Karman’s Similarity hypothesis, Taylor’s Vorticity transfer theory.

Compressible Flow: Review of one dimensional compressible flow, approximation to two and three dimensional such as sonic, supersonic flows, small perturbation theory, Shock Waves, Prandtl Mayor’s Equation.

TEXT BOOKS:
1. Foundations of Fluid Mechanics, Yuan, S.W., Prentice Hall,

REFERENCE BOOKS:

1MTE4 ADVANCED HEAT TRANSFER

SECTION – A

Steady state conduction: Basic fundamentals, One dimensional steady state conduction: critical radius of insulation, Cylinder with heat sources, Fins of non-uniform cross section. Multi dimensional steady state conduction: Two dimensional heat conduction analytical, graphical analysis, Conduction shape factor, Numerical analysis, formulation in terms of resistances of elements, Accuracy considerations


Convection heat transfer: Energy equation of the boundary layer, thermal boundary layer, turbulent boundary layer heat transfer and thickness, Empirical relations for flow across cylinders and tube banks, Liquid metal heat transfer.

Natural convection systems, heat transfer on a vertical plate, free convection from horizontal cylinders and inclined surfaces, combined free and forced convection, criteria for free or forced convection.

SECTION - B

Radiation: Introduction to basic fundamentals, Radiation shape factor, Heat exchange between non-black bodies using network approach, gas radiation, radiation network for an absorbing and transmitting medium, Effect of radiation on temperature measurement, Radiation heat transfer coefficient.

Condensation, Boiling and Heat pipe: heat transfer coefficient during condensation on tube bank Simplified relations for boiling heat transfer with water, transpiration cooling, and ablation; classification, construction and applications of heat pipe.

Note: Heat transfer data book will be permitted in Exam hall

TEXT BOOKS:

REFERENCE BOOKS:
3. Heat Transfer data book Convective heat & mass transfer by Kays and Crawford, Tata
SOLID WASTE:
Definitions - Sources, Types, Compositions, Properties of Solid Waste - Municipal Solid Waste - Physical, Chemical and Biological Property - Collection - Transfer Stations – Waste Minimization and Recycling of Municipal Waste

WASTE TREATMENT:
Size Reduction - Aerobic Composting - Incineration - Furnace Type & Design, Medical / Pharmaceutical Waste Incineration - Environmental Impacts - Measures of Mitigate Environmental Effects due to Incineration

WASTE DISPOSAL:
Land Fill Method of Solid Waste Disposal - Land Fill Classification, Types, Methods & Siting Consideration - Layout & Preliminary Design of Land Fills - Composition, Characteristics, generation, Movement and Control of Landfill Leachate & Gases - Environmental Monitoring System for Land Fill Gases

Hazardous Waste Management

ENERGY GENERATION FROM WASTE

TEXT BOOKS:

REFERENCE BOOKS:

Websites:
2. http://www.volund.dk

ENERGY CONSERVATION AND POWER PLANT ECONOMICS

Energy Conservation:
- Review of Present Status of Conventional and Renewable Energy Sources, Common areas of inefficiency in energy use, principles of energy conservation, energy conservation planning, energy conservation in industries, household, commercial, transport and agricultural fields, energy conservation technologies, energy conservation legislation.

Energy Audit:
- Energy flow diagram, comparison with standards, energy management team, energy audit of illumination systems and electrical systems, energy audit of various compressed air systems, buildings, steam generation and distribution systems.

Demand Side Management:
- Scope of Demand Side Management, load management as a Demand Side Management strategy, tariff options of Demand Side Management, Demand Side Management and environment, different types as a captive power plants, energy banking and wheeling, role of private sector in energy management.

Power Plant Economics:
- Economic analysis of power plants and targets, Load curves, load duration curve, different terms and definitions; Effect of fluctuating load on operation and design of the plant, methods of meeting fluctuating load, cost of electrical energy; operating costs, generation costs, depreciation cost. Cost benefit analysis, Selection of type of generation; Performance and operating characteristics of power plants; Selection of the generating equipments, Combined operation of power plants; load division between stations, effect of load factor on energy cost, different types of tariffs.

Environmental Aspects of Energy Generation:
- Well-to-Wheel Emission analysis of Energy Sources, Social and economical issues of the power plants, Greenhouse effect, Acid precipitation- acid rain and acid snow, dry
deposition and acid fog. Thermal pollution, air pollution, Radiation from nuclear power plant effluents, clean coal technologies, hydro power plants , environmental clearances.

**TEXT BOOKS :**


**REFERENCE BOOKS :**

3. Patterns of Energy Use in Developing Countries, Ashok V Desai, Wiley Eastern limited, Tokyo, 1991

**ELECTIVE - I**

**3. MODERN ENERGY SOURCES**

**SECTION - A**

**Solar Energy:** Flat plate and concentrating collectors- design, analysis and performance, applications. Thermal Power, Photovoltaic power; Economic Analysis

**Tidal and Ocean Energy:** Applications, Design aspects, Power generation methods, various cycles and analysis.

**SECTION - B**

**Wind Energy:** Atmospheric circulation, classification, factors influencing wind, wind shear, turbulence, wind speed monitoring, Betz limit, WECS: classification, characteristics, application, design aspects

**Geothermal Energy And Magneto Hydrodynamics:** Study of various components, Performance and methods of energy conversion.

**Nuclear Energy:** Fusion and fission, study of various components, Design aspects, performance and methods of power generation.

**TEXT BOOKS :**

SECOND SEMESTER

2MTE1 ADVANCED INTERNAL COMBUSTION ENGINES

SECTION - A

SPARK IGNITION ENGINES

COMPRESSION IGNITION ENGINES

SECTION - B

POLLUTANT FORMATION AND CONTROL
Pollutant – Sources – Formation of carbon monoxide, Unburnt hydrocarbon, NOx, Smoke and Particulate matter – Methods of controlling Emissions – Catalytic converters and Particulate Traps – Methods of measurements and Introduction to emission norms and Driving cycles.

ALTERNATIVE FUELS
Alcohol, Hydrogen, Natural Gas and Liquefied Petroleum Gas- Properties, Suitability, Merits and Demerits as fuels, Engine Modifications.

RECENT TRENDS

REFERENCE BOOKS :

TEXT BOOK :

REFERENCE BOOKS :

2MTE2 ADVANCED REFRIGERATION ENGINEERING

SECTION – A


SECTION -B


TEXT BOOKS :
1. Refrigeration and air conditioning, Ahmadul Ameen, Prentice Hall of India, New Delhi, 2006

REFERENCE BOOKS :
3. The ASHRAE Handbooks with CDs, 2005-2008.
2MTE3 RESEARCH METHODOLOGY

SECTION – A

Research Concept: Concept, meaning, objectives, motivation; Types of research, approaches (descriptive research, conceptual, theoretical, applied and experimental research)

Formulation of Research Task: Literature Review: importance & methods, sources, field study, laboratory experiments, critical analysis of already generated facts, hypothetical proposal for future development and testing, selection of research task, prioritization of research, introduction to hypothesis testing.


Experimental Modeling: Definition of experimental design, examples, single factor experiments, guidelines for designing experiments.

SECTION - B

Process optimization and designed experiments: methods for study of response surface, First order design. Determining optimum combination of factors, determination of steepest ascent, Taguchi approach to parameter design.

Analysis of Results (Parametric and Non parametric, Descriptive and Inferential Data): types of data, Methods and techniques of data collection, sampling and sample design, Non parametric test, error analysis, analysis of variance, significance of variance, analysis of co-variance, multiple regression, Introduction to Analytical hierarchical process, Factor analysis, Cluster analysis, Fuzzy logic, testing linearity/ non linearity of model, testing adequacy of model.

Report Writing: types of report, layout of research report, interpretation of results, layout and format, style of writing, typing, references, pagination, tables, figures, conclusions, appendices.

Landscape of Creativity: Convergent Vs. divergent thinking, creativity, creativity Vs intelligence, creativity abilities, determination of Creativity, increasing creativity, creative achievement, techniques of creativity, collective creativity.

TEXT BOOKS :

REFERENCE BOOKS :

ELECTIVE – II
2MTE4 (1) HEAT EXCHANGER DESIGN

SECTION-A

Constructional Details And Heat Transfer

Flow Distribution And Stress Analysis
Effect of Turbulence - Friction Factor - Pressure Loss - Channel Divergence Stresses in Tubes - Heater sheets and Pressure Vessels - Thermal Stresses - Shear Stresses - Types of Failures.

SECTION-B

Design Aspects

Condensers And Evaporators Design
Design of Surface and Evaporative Condensors - Design of Shell and Tube - Plate Type Evaporators

Cooling Towers

TEXT BOOKS :

REFERENCE BOOKS:
3. ANSI Standards for pipe and nozzle selection, 1996.
4. ASME Section VIII Division for pressure Vessel and Boiler Design Code, 1995.

ELECTIVE – II

2MTE4 (2) ADVANCED AIR CONDITIONING SYSTEMS

SECTION - A
Properties of Air Water Mixture, Psychrometric Air Conditioning Processes, Dehumidification Processes, Com-fort Air Conditioning, Parameters Affects Comfort Conditions, Cooling Load Calculations, Design Of Air Delivery System To Hospital, Auditorium, Hotels Etc., Noise And Vibration Control In Air Conditioning Hall.

SECTION - B

Electrical Circuits And Components In Air Conditioner Like Olp, Capacitor, Performance Study Of Motors Used For Fan, Blower, Compressor,

TEXT BOOKS:
1. Refrigeration and air conditioning, Ahmadul Ameen, Prentice Hall of India, New Delhi, 2006

REFERENCE BOOKS:
1. The ASHRAE Handbooks with CDs, 2005-2008

ELECTIVE -II

2MTE4 (3) FINITE ELEMENT METHODS

SECTION - A
Introduction
Overview of numerical methods - Discretised representation of physical systems - thermal resistance, flow resistance networks, thermal capacitance - Governing equations and Boundary conditions for thermal and flow systems.

One Dimentional Heat Conduction
Principles of variations calculus - applications of vibrational approach to one dimensional heat conduction -element matrix contribution and assembly.

Heat Functions And Analysis
Weighted residual methods - Galerkin’s approach - Shape functions and interpolations - Application of Galerkin’s weighted residual approach to one dimensional heat conduction - Three nodded triangular elements, 2 D steady state, state conduction using triangular elements - Radiation and natural convective boundary conditions - incorporation of variations in thermal properties.

SECTION - B
Convective Heat Transfer
Higher order elements and numerical integration solution of heat conduction and creeping flow using higher order element - Solution of convective heat transfer.

Heat Exchanger Applications
Incompressible laminar flow simulation - Stream function/Vorticity methods,Velocity Pressure formulation, mixed order interpolation for incompressible flow, modifications for turbulent flow. Application to heat exchanger.

Software Codes
Description of programs for heat conduction, fluid flow,Assignment problems using these codes.

TEXT BOOKS:

**ELECTIVE -II**

2MTE4  (4) GAS TURBINES & JET PROPULSION

**SECTION - A**

**General Concepts related to Turbo machinery**: Classification; Euler's Equation for Turbo machinery; Velocity triangle; Cascade analysis & nomenclature. Shaft Power & Aircraft Propulsion Cycles.

**Centrifugal Compressors**: Work done and pressure rise; Slip; Compressibility effects; Compressor characteris-tics. Axial Flow Compressors: Stage pressure rise; Blockage in compressor annulus; Degree of reaction; 3- D flow; Stage performance; h-s diagram & efficiency; off design performance; Performance characteristics; Design process. Combustion System.

**Axial Flow Turbines**: Stage performance; Degree of reaction; h-s diagram & efficiency; Vortex theory; Overall turbine performance; Performance characteristics; Blade cooling; Design process. Prediction of performance of simple gas turbines; Off Design performance; Gas turbine blade materials; matching procedure.

**Combined cycles**: Differences between Single and combined Cycles, characteristics of combined cycles, Performance calculations for Combined Cycle.

**SECTION - B**

**Thermodynamics Of Aircraft Jet Engines**


**Aero-Thermodynamics Of Jet Propulsion Subsystems**

Subsonic inlets - Supersonic inlets - Gas turbine combustors - After burners and Ramjet Combustors - Supersonic Combustion - Exhaust Nozzles.

**ELECTIVE -III**

2MTE5  (1) FUEL & COMBUSTION

**SECTION - A**

**Introduction**


**Solid, Liquid & Gaseous Fuels**


**Theory Of Combustion Process**

SECTION - B

**Stoichiometry**
Stoichiometry and Thermodynamics, Combustion Stoichiometry General, Rapid Methods of Combustion
Stoichiometry, Combustion Thermodynamics, Problem, Combustion Problems with Chemical Reactions Burners Stoichiometry Relations, Theoretical Air Required for Complete Combustion, Calculation of Minimum Amount of Air Required for a Fuel of known Composition, Calculation of Dry Flue Gases if Fuel Composition is Known, Calculation of the Composition of Fuel & Excess Air Supplied, from Exhaust Gas Analysis, Dew Point of Products, Flue Gas Analysis (O2, CO2, CO, NOx, SOx).

**Burner Design**
Ignition, Concept of Ignition, Auto Ignition, Ignition Temperature, Flame Propagation, Various Methods of Flame Stabilization, Incorporation in Burner Design, Basic Features and Types of Solid, Liquid and Gaseous Fuel Burner, Design Consideration of Different Types of Coal - Oil and Gas Burners, Recuperative & Regenerative Burners

**TEXT BOOKS :**

**REFERENCE BOOKS :**

**ELECTIVE-III**
2MTE5 (2) SOLAR ENERGY

**SECTION - A**

**Radiative Properties and Characteristics of Materials**
Reflection from ideal specular, ideal diffuse and real surfaces, Selective Surfaces: Ideal coating characteristics; Types and applications; Anti-reflective coating; Preparation and characterization. Reflecting Surfaces and transparent materials.

**Solar Thermal Energy Storage**

**PHOTOVOLTAIC SOLAR CELL**

**Solar Energy for Industrial Process Heat**
Industrial process heat: Temperature requirements, consumption pattern; Applications of solar flat plate water heater & air heater for industrial process heat; Designing thermal storage; Transport of energy.

**SECTION - B**

**Solar Heating & Cooling System**
Solar water heating systems, Liquid based systems for buildings, Solar air heating systems, Methods of modeling and design of Solar heating system, Cooling requirements of buildings, Vapour absorption refrigeration cycle; Water, ammonia & lithium bromide-water absorption refrigeration systems; Solar desiccant cooling.

**Performances of solar collectors**
ASHRAE code; Modeling of solar thermal system components and simulation; Design and sizing of solar heating systems: f – chart method and utilizability methods of solar thermal system evaluation; Development of computer package for solar heating and cooling applications;

**Flat-plate Collectors**
Energy balance for Flat Plate Collectors; Thermal analysis; Heat capacity effect; Testing methods; Types of Flat Plate Collectors: Liquid Flat Plate Collectors, Air flat-plate Collectors- Thermal analysis; Evacuated tubular collectors.

**Concentrating Collector Designs**
Classification, design and performance parameters; Tracking systems; Compound parabolic concentrators; Parabolic trough concentrators; Concentrators with point focus; Heliostats; Comparison of various designs: Central receiver systems, parabolic trough systems; Solar power plant; Solar furnaces
ELECTIVE - III

2MTE5 (3) MECHATRONICS

SECTION - A

Introduction: Scope, sensors, transducers, selection, contact & non contact optical types, performance, examples.

Actuators: Principal, types-hydraulic, pneumatic, electrical, contact speed, multispeed, step and continuous variable, actuators with stepping motors.

Computer process controls: Computer process interface, interface hardware, direct digital control, supervisory computer control.

Design of mechatronics elements: Measuring system, control software and user interface, gauging, tool monitoring system, spindle drives, feed drives, servo principles, configuration CNC systems, interfacing, monitoring, diagnostics.

Automatic loading and unloading devices, magazines, bunkers, orientors, feeders, separators, etc.

SECTION - B

Pneumatic systems: Different control components of pneumatic systems and there conversion valves, auxiliary devices, synchronizing, clamping, declamping, application to robotics.

Hydraulic systems: Different control components of hydraulic systems, valves and auxiliary devices, design and analysis of hydraulic circuits sequencing, synchronizing, pneumo-hydraulic, CNC lubrication, machine tool applications.

TEXT BOOKS:
1. Industrial Automation by Turgam, Mir Publication.
2. Pneumatics and Hydraulics by Stewar

REFERENCE BOOKS:
1. Mechatronics by HMT

ELECTIVE - III

2MTE5 (4) COMPUTATIONAL FLUID DYNAMICS

SECTION - A


Discretization: Introduction to finite differences, difference equations, explicit and implicit approaches: definition and contrasts, errors and analysis of stability.

Classification of Partial Differential Equations: Explicit and Implicit methods, solution of select model equations; Laplace heat and wave equation, laminar boundary layer solution

SECTION - B

CFD Techniques: The lax - wendroff technique, Mac Cormack’s technique, Relaxation technique and its use with low speed inviscid flows, aspects of numerical dissipation and dispersion; artificial viscosity, Alternating Direction Implicit (ADI) technique, pressure correction technique with application to incompressible viscous flow.

Initial And Boundary Value Problems: Free falling of a spherical body, two dimensional motions of a body through a fluid radial flow.

TEXT BOOKS:
Advance machining theory: mechanics of chip formation, shear angle relations, and theoretical determination of cutting force in orthogonal cutting, analysis of turning, drilling, and milling operations. Mechanics of grinding, dynamometry, thermal aspects of machining, tool life and tool wear, economics of machining.

NC/CNC: basic concept, NC control, special features of CNC machine: turret head, tool magazine, servomotors, ball lead screw, automatic tool changer (ATC), and classification of CNC machines, cutting tool and tool holders, point to point, straight cut and continues path, control codes, machine control units, closed system, NC, machine components, CNC, DNC, Manual part programming, formats, coding, programming languages. APT, ADAPR, EXAPT etc. sensors and adaptive control, Manual part programming for drilling, milling and lathe, examples in APT, applications and economics of CNC.

Metal casting: Metal casting processes, pattern and mould, moulding materials, elements of gating system design, riser design, solidification structure, solidification shrinkage structure, defects and properties of finished casting, heat treatment.

**SECTION - B**

Welding process, heat flow in welding, metallurgy of fusion weld, welding stresses and distortions, preheat and post weld heat treatment weld ability tests, weld defects, weld inspection and quality control. Electron beam welding, ultrasonic welding, laser beam welding.

Metal forming: Nature of plastic deformation, fundamentals of plasticity, mechanics of metal forming processes like rolling, forging, drawing, extrusion etc. various forming operations, defects in metal forming, local instability and tearing, bending of sheets, hydro forming. Electro magnetic forming, explosive forming, electro hydraulic forming, stretch forming, contour roll forming.

**Books Recommended:**

**TEXT BOOKS:**
1. Juneja, Fundamentals of metal cutting

**REFERENCE BOOKS:**
1. Arshinov, Metal cutting theory & cutting tool design
2. Mikhal Groover, CAD/CAM
3. N. K. Mehta, Machine tool design
5. 978760) “Materials and Processes in Manufacturing” (8th Edition),

**IMMD2 ADVANCED MACHINE DESIGN SECTION-A**

**Introduction:** Role of failure prevention analysis in mechanical design, Modes of mechanical failure, Review of failure theories for ductile and brittle materials including Mohr’s theory and modified Mohr’s theory, Numerical examples.

**Fatigue of Materials:** Introductory concepts, High cycle and low cycle fatigue, Fatigue design models, Fatigue design methods, Fatigue design criteria, Fatigue testing, Test methods and standard test specimens, Fatigue fracture surfaces and macroscopic features, Fatigue mechanisms and microscopic features.

**Stress-Life (S-N) Approach:** S-N curves, Statistical nature of fatigue test data, General S-N behavior, Mean stress effects, Different factors influencing S-N behaviour, S-N curve representation and approximations, Constant life diagrams, Fatigue life estimation using S-N approach.

**Strain-Life(-N) approach:** Monotonic stress-strain behavior ,Strain controlled test methods ,Cyclic stress-strain behavior, Strain based approach to life estimation, Determination of strain life fatigue properties, Mean stress effects, Effect of surface finish, Life estimation by N approach.
**LEFM Approach:** LEFM concepts, Crack tip plastic zone, Fracture toughness, Fatigue crack growth, Mean stress effects, Crack growth life estimation.

**Statistical Aspects of Fatigue:** Definitions and quantification of data scatter, Probability distributions, Tolerance limits, Regression analysis of fatigue data, Reliability analysis, Problems using the Weibull distribution.

**Fatigue from Variable Amplitude Loading:** Spectrum loads and cumulative damage, Damage quantification and concepts of damage fraction and accumulation, Cumulative damage theories, Load interaction and sequence effects, Cycle counting methods, Life estimation using stress life approach.

**Surface Failure:** Introduction, Surface geometry, Mating surface, Friction, Adhesive wear, Abrasive wear, Corrosion wear, Surface fatigue spherical contact, Cylindrical contact, General contact, Dynamic contact stresses, Surface fatigue strength.

**Books Recommended:**

**TEXT BOOKS:**

**REFERENCE BOOKS:**

**1MMD3 COMPUTER AIDED DESIGN AND ENGINEERING**

**SECTION - A**

**CAD – Introduction, typical Product Cycle, Implementation of a typical CAD process, Application of CAD and their Advantages**

**3D modeling and viewing:** Introduction, Modeling Approaches, Types of Geometric Models, Coordinate System, sketching and Sketch Planes

**Parameter & Dimensions:** Basic Features, Datum Features, Geometric Constraints, Modeling Operations and Strategies

**Modeling Aids and Tools:** Introduction, Geometric Modifiers, Layers, Colors, Grids, Groups, Dragging and Rubbering, Clipping, Entity Selection methods, Geometric Arrays, Transformations, Editing.


**CAD/CAM Data exchange and data storage:** Introduction, graphics and computing standards, data exchange standards like IGES, STEP

**Assembly Modeling:** Introduction, Assembly Modeling, Assembly Tree, Assembly Planning, Mating Conditions, Bottom – Up and Top – Down Assembly Approaches with examples, Tolerance Analysis and Mass Property calculations

**SECTION - B**


**Review of Two and Three Dimensional FEM:** Interpolation and shape functions - element matrices-linear triangular elements (CST)-quadratic triangular elements – bilinear rectangular elements solid elements-higher order elements – stress calculations.

**Applications to Field Problems:** Solution to problems in linear elasticity- plane problems in elasticity- plates and shells- solution of problems in heat-transfer and fluid mechanics- numerical examples-discussion on error estimates

**Books Recommended:**

**TEXT BOOKS:**

REFERENCES BOOKS:
3. Ibrahim Zeid, CAD/CAM – Theory and Practice, MGH International

IMMDF4 DESIGN OF MATERIAL HANDLING EQUIPMENTS

SECTION-A

Introduction: Transmission and its requirements. Matching of load and prime mover. Types of material equipment’s – Characteristics applications selection of the system.


SECTION-B

Design Of Conveyors: Types of conveyors – design of belt, pneumatic, hydraulic, screw and vibratory conveyors – selection of the conveyors.

Selection Of Drives: Types of drives – rails traveling mechanism – slewing with rotary pillar, fixed pillar and turn tablets – traveling gear. Selection of


Books Recommended:

TEXT BOOKS:

REFERENCE BOOKS:

IMMD5 ELECTIVE-I

(1) RELIABILITY, MAINTENANCE MANAGEMENT & SAFETY

SECTION-A

Reliability Engineering: System reliability - series, parallel and mixed configuration, Block diagram, r-out-of-n structure,Solving problems using mathematical models. Reliability improvement and allocation- Difficulty in achieving reliability,Method of improving reliability during design, different techniques available to improve reliability, Optimization, Reliability – Cost trade off, Prediction and analysis, Problems.

Maintainability, Availability & Failure Analysis: Maintainability & Availability – Introduction, formulae, Techniques available to improve
maintainability & availability, trade off among reliability, maintainability & availability, simple problems, Defect generation – Types of failures, defects reporting and recording, Defect analysis, Failure analysis, Equipment down time analysis, Breakdown analysis, TA, FMEA, FMECA.

**Maintenance Planning and Replacement:** Maintenance planning – Overhaul and repair; Meaning and difference, Optimal overhaul/Repair/Replace maintenance policy for equipment subject to breakdown, Replacement decisions – Optimal interval between preventive replacements of equipment subject to breakdown, group replacement.

**SECTION-B**

**Maintenance Systems:** Fixed time maintenance, Condition based maintenance, Operate to failure, Opportunity maintenance, design out maintenance, Total productive maintenance, Inspection decision – Optimal inspection frequency, non-destructive inspection, PERT & CPM in maintenance, Concept of terrotechnology.

**Condition Monitoring:** Techniques-visual monitoring, temperature monitoring, vibration monitoring, lubricant monitoring, Crack monitoring, Thickness monitoring, Noise and sound monitoring, Condition monitoring of hydraulic system, Machine diagnostics - Objectives, Monitoring strategies, Examples of monitoring and diagnosis, Control structure for machine diagnosis.

**Safety Aspects:** Importance of safety, Factors affecting safety, Safety aspects of site and plant, Hazards of commercial chemical reaction and operation, Instruments for safe operation, Safety education and training, Personnel safety, Disaster planning and measuring safety effectiveness, Future trends in industrial safety.

**Books Recommended:**

**TEXT BOOKS:**

**REFERENCE BOOKS:**
1. Failure Diagnosis and Performance Monitoring L.F. Pau Marcel Dekker


**5. Engineering Maintainability: How to Design for Reliability and Easy Maintenance B.S. Dhillon Prentice Hall of India**

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**IMM5 ELECTIVE-I**

**SECTION -A**

**Introduction:** Types of design, importance of design, design considerations, product life cycle, technology life cycle, benchmarking and mass customisation, stages, objectives, success factors, concurrent approach in NPD

**Product Development Process & Methodologies:** Integrated Product development process - Identifying Customer Needs: Gather raw data from customers, interpret raw data in terms of customer needs, organize the needs into a hierarchy, establish the relative importance of the needs and reflect on the results and the process, Conceive – Specification, Concept design: the activities of concept generation, Concept Selection: Overview of methodology, concept screening, and concept scoring, Design - Detailed design, Validation and analysis (simulation), Tool design, Realize - Plan manufacturing: Factors influencing material and process selection, approaches, tools and software used in selection, Manufacture, Build/Assemble, Test (quality check), Service - Sell and Deliver, Use, Maintain and Support, Dispose

**Product Development Approaches:** Bottom-up design, Top-down design, Front-loading design workflow, Design in context, Modular design. Concurrent engineering, partnership with supplier, collaborative and Internet based design, work structuring and team deployment, Product and process systemization, problem, identification and solving methodologies, improving product development solutions

**SECTION - B**

**Prototyping:** Prototyping basics, principles of prototyping, technologies, planning for prototypes, practical examples

**Design Analysis Tools:** Product Reliability, Mortality Curve. Design for Manufacturing: machining, casting, forging and metal forming, optimum design, Design for Assembly and Disassembly, Design for Six Sigma, Design for reliability, Design for product life cycle Design for maintainability and serviceability, Design for environment, Design for aesthetic, Design for packaging, Design for handling, Design for safety, etc., Estimation of Manufacturing costs, Reducing the component costs and assembly costs, Minimize system complexity.
Probabilistic Design Concepts: FMEA, QFD, Taguchi Method for design of experiments, Estimation of Manufacturing costs, Reducing the component costs and assembly costs, Minimize system complexity.

Books Recommended:

TEXT BOOKS:

REFERENCE BOOKS:

1MMD5 ELECTIVE-I
(3) LEAN MANUFACTURING
SECTION – A

Introduction: Introduction, background, and lean thinking. Importances of philosophy, strategy, culture, alignment, focus and systems view.


SECTION – B

Cellular systems: Cellular systems, Quick change and set-up reduction methods.


Sustaining improvement: Sustaining improvement and change, auditing, follow-up actions

Books Recommended:

TEXT BOOKS:
1. N. Gopalkrishnan, Simplified Lean Manufacture, PHI Learning Private Limited. New Delhi


REFERENCES BOOKS:
3. Walter W Mc Intyre, Lean and Mean Process Improvement:

1MMD5 ELECTIVE-I
(4) DESIGN FOR MANUFACTURING AND ASSEMBLY
SECTION – A

Introduction: Design philosophy steps in Design process , General Design rules for manufacturability , basic principles of design Ling for economical production , creativity in design. Materials: Selection of Materials for design Developments in Material technology , criteria for material selection , Material selection interrelationship with process selection process selection charts.

Machining process: Overview of various machining processes , general design rules for machining - Dimensional tolerance and surface roughness , Design for machining , Ease ,Redesigning of components for machining ease with suitable examples. General design recommendations for machined parts.

Metal casting: Appraisal of various casting processes, selection of casting process, - general design considerations for casting , casting tolerances , use of solidification simulation in casting design , product design rules for sand casting.

SECTION – B

Metal joining: Appraisal of various welding processes, Factors in design of elements, general design guidelines , pre and post treatment of welds , effects of thermal stresses in weld joints , design of brazed joints. Forging, Design factors for Forging , Closed die forging design , parting lines of die5 drop forging die design , general design recommendations. Extrusion & Sheet Metal Work: Design guidelines for extruded sections - design principles for Punching, Blanking, Bending, Deep Drawing, Keeler Goodman Forming Line Diagram, and Component Design for Blanking.
Assemble advantages: Development of the assemble process, choice of assemble method assemble advantages social effects of automation.

**Automatic assembly transfer systems:** Continuous transfer, intermittent transfer, indexing mechanisms, and operator - paced free – transfer machine.

**Design of manual assembly:** Design for assembly fits in the design process, general design guidelines for manual assembly, development of the systematic DFA methodology, assembly efficiency, classification system for manual handling, classification system for manual insertion and fastening, effect of part symmetry on handling time, effect of part thickness and size on handling time, effect of weight on handling time, parts requiring two hands for manipulation, effects of combinations of factors, effect of symmetry effect of chamfer design on insertion operations, estimation of insertion time.

**Books Recommended:**

**TEXT BOOKS:**

**REFERENCE BOOKS:**

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**IMMD5 ELECTIVE-I**  
**SECTION -A**

**Introduction:** Introduction and Human performance - Interdisciplinary nature of ergonomics, modern ergonomics. Information input and processing, factors affecting human performance, physical work load and energy expenditure, heat stress, manual lifting.

**Work Space Design:** Work Space Design, Anthropometry. Workspace designs for standing and seated workers, arrangement of components within a physical space, interpersonal aspect of workplace design.

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**IMMD6 ADVANCED MANUFACTURING PROCESSES-LAB**

At least five practicals (study/trials) based on above syllabus, as given below shall be performed and a report there of submitted by the students

**List of Practicals:-**
1. Demonstration of job setting on CNC turning center and vertical machining center.
2. Preparation of program for plain turning of shaft.
3. Preparation of program for taper turning.
4. Preparation of program for grooving.
5. Preparation of program for threading.
6. Preparation of program for pocket milling.
7. Preparation of program for drilling.
8. Preparation of program for 2D profile cutting.
9. Preparation of program for boring and tapping.

**Practical Examination:**
Practical examination shall consist of viva voce/performance based on the above syllabus and practical work.

**IMMD7 COMPUTER AIDED DESIGN AND ENGINEERING-LAB**

At least five practicals (study/trials) based on above syllabus, as given below shall be performed and a report there of submitted by the students
List of Practicals:-
1. Study of at least one CAD software in each of the following category,
   a. High-End CAD like UG/NX, CATIA, Pro/E
   b. Middle-range CAD like Solid Edge, AIP, Solid Edge
   c. Low-end CAD like AutoCAD, Turbo CAD, AutoCAD LT
2. Assembly modeling (for any 2 assemblies or sub-assemblies) using top down and bottom-up approaches inclusive of sketching, parts modeling (using solid and surface modeling/styling toolboxes), drafting (parts and assemblies)
3. Part families and design table creation using spreadsheet interface
4. CAD File/data exchange amongst the various CAD software and software for CMM, CAE, CNC, CAM
5. Customization/Program development for parts modeling and drafting using API and other development tools
6. FEA: Using any FEA software packages solve 2 problems each on structural mechanics and heat transfer, Introduction to nonlinear analysis

Practical Examination:
Practical examination shall consist of viva voce/performance based on the above syllabus and practical work.

SEMESTER-II
2MMD1 ADVANCED MATERIALS TECHNOLOGY
SECTION - A


Mechanical Properties: Strengthening mechanism of materials, elements of dislocation theories, Strain hardening, Grain size control, Single crystal growth, Reinforcing fibres for polymers, Composite structure, determination of mechanical properties of materials, Dynamic tests, Fracture and toughness tests, Low temperature and high temperature tests, Creepm characteristics, Hot hardness tests.

SECTION - B


Non metallic materials: Polymeric materials - Formation of polymer structure - Production techniques of fibres, foams, adhesives and coatings - Structure, properties and applications of engineering polymers - Advanced structural ceramics, WC, TiC, TaC, Al2O3, SiC, Si3N4, CBN and diamond – properties and applications.

Books Recommended:
TEXT BOOKS:
2. Engineering Materials: Polymers, Ceramics and Composites A.K Bhargava Prentice Hall of India

REFERENCE BOOKS:
3. Advances in Materials and Their Applications P. Rama Rao Wiley Eastern
5. P.C.Shrma, Production technology
2MMD2 RAPID PROTOTYPING AND TOOLING

SECTION-A

Introduction: Need for time compression in product development, Product development conceptual design, Development, Detail design, Prototype, Tooling, Applications of RP.


SECTION-B


Books Recommended:

TEXT BOOKS:

REFERENCE BOOKS:

2MMD3 MECHATRONICS IN SYSTEM DESIGN

SECTION - A


Pneumatic Systems: Physical concepts of pneumatics, electro pneumatic components, operation and application, valves, auxiliary devices, actuation, synchronizing, clamping, declamping etc. Design of pneumatic logic circuit.

SECTION - B


Programmable Logic Controller: Comparison between microprocessor and microcontroller organization of microcontroller system Review of logic gates, basic structure, features, input/output processing, programming, functional block diagram (FBD), ladder diagram, logic functions, latching, sequencing, jumps, internal relays, counters, shift registers, master and jump control, data handling, data movement, data comparison, arithmetic operations, code conversion, analog input and output, applications of PLC

Books Recommended:

TEXT BOOKS:
1. C.W. De Silva, “Mechatronics: An Integrated Approach, Publisher: CRC.

REFERENCE BOOKS:
3. A. Malov, Y. Ivanov, “Principles of Automation” Automation by, MIR Publication
5. D.V. Hall, “Microprocessor and It’s Applications”, Tata McGraw Hill
6. Anthony Esposito, “Fluid Power with Applications Prentice Hall of India

2MMD4 EXPERIMENTAL STRESS ANALYSIS
SECTION-A

Introduction to Photoelasticity: Photo elasticity, Light and Optics as Related to Photoelasticity Behavior of Light, Plane and circularly polarized light, Bright and dark field setups, Polariscopes-Plane Polarizers, Wave Plates, Arrangement of Optical Elements in a Polariscope, Constructional Details of Diffused Light and Lens, Photo elastic materials


Analysis Techniques: Isochromatic Fringe Patterns, Isoclinic Fringe Patterns, Compensation Techniques, separation Techniques, Sealing Model to Prototype Stresses.

Three Dimensional Photoelasticity: Introduction, locking in model deformation, materials for three-dimensional photo elasticity, machining cementing and slicing three-dimensional models, slicing the model and interpretation of the resulting fringe patterns, effective stresses, the shear difference method in three dimensions, applications of the Frozen-stress method, the scattered light method.

SECTION-B

Strain Measurement Methods: Basic Characteristics of a Strain Gauge, Various types of strain gauges, Types of Shell Gauge, Moire Method of Strain Analysis, Grid Method of Strain Analysis.


Moire Methods: Introduction, mechanism of formation of Moire fringes, the geometrical approach to Moire-Fringe analysis, the displacement field approach to Moire-Fringe analysis, out of plane displacement measurements, out of plane slope measurements, sharpening and multiplication of Moire-Frings, experimental procedure and techniques.

Brittle Coating Method: Introduction, Coating Stresses, Failure Theories, Brittle Coating Crack Patterns Produced by Direct Loading, Brittle Coating Crack Patterns Produced by refrigeration Techniques, Brittle Coating Crack, Pattern Produced by Releasing the Load, Double Crack Pattern, Crack Detection, Ceramic based brittle coatings, Resin based brittle coatings, Test procedures for brittle coatings analysis, Calibration procedures, analysis of brittle coating data. Load-Time Relation and Its influence on the threshold Strain Effects of a Biaxial stress Field.

Birefringent Coatings
Introduction, Coating stresses and strains, coating sensitivity, coating materials, application of coatings, effects of coating thickness, Fringe-order determinations in coatings, stress separation methods.

Books Recommended:
TEXT BOOKS:
1. J.W. Dally and W.F. Riley, Experimental Stress Analysis, 2nd Ed. MGH.
2. K. Ramesh, Published by IIT Madras, India, Experimental Stress Analysis, 2009.

REFERENCE BOOKS:
2. Sadhu Singh, Khanna Publishers, Experimental Stress Analysis, 1982
4. Dureli, An Introduction to Experimental Stress and Strain Analysis.
5. Srinath, An Introduction to Experimental Stress Analysis - MGH.
6. Experimental Stress Analysis - Dally and Riley, McGraw Hill.
8. Strain Gauge Primer - Perry and Lissner.
10. Motion Measurement and Stress Analysis - Dave and Adams,

2MMD5 ELECTIVE - II

(1) OPTIMIZATION METHODS IN ENGINEERING DESIGN

SECTION - A

Introduction: Historical Developments, Engineering applications of Optimization


Constrained Optimization Techniques: Introduction, Direct methods - Cutting plane method and Method of Feasible directions, Indirect methods - Convex programming problems, Exterior penalty function method, Examples and problems


SECTION – B


Novel methods for Optimization: Introduction to simulated annealing, selection of simulated annealing parameters, simulated annealing algorithm; Genetic Algorithm (GA), Design of GA, Key concepts of GA, Neural Networks, A frame work for Neural Network models, Construction of Neural Network algorithm, Examples of simulated algorithm, genetic annealing and Neural Network method.

Books Recommended:

TEXT BOOKS:
1. Engineering Optimization, S. S. Rao New Age International
2. Optimization for Engineering Design, Kalyanmoy Deb Prentice Hall of India

REFERENCE BOOKS:

2MMD5 ELECTIVE - II

(2) ADVANCED MACHINE TOOL DESIGN

SECTION - A


Regulation of Speed and Feed Rates: Aim of speed feed regulation, stepped regulation of speed, design of speed box, Special cases of gear box design, Set stopped regulation of speed and feed rates.


SECTION - B


Design of Spindles and Spindle Supports: Materials for spindles, Design of spindles, Antifriction bearings, Sliding bearings.

Dynamics of Machines Tools: General procedure of assessing dynamic stability of EES, Cutting processing, Closed loop system, Dynamic characteristics of cutting process, Stability analysis.
Books Recommended:

TEXT BOOKS:

REFERENCE BOOKS:
1. CMTI Bangalore “Machine Tool design Handbook”

2MMD5 ELECTIVE - II
(3) TOTAL QUALITY MANAGEMENT

SECTION – A

Introduction: Quality – Basic concepts, dimensions, economics of quality, quality Gurus.

TQM: Definition, evolution, journey from inspection to TQM, comparison at different stages, dimensions of TQM, TQM viewpoints, reasons for adopting TQM.

Introspection to TQM environment: Sphere of TQM, components of TQM, TQM – Managing Total Quality, Factors affecting TQM environment, Classification and interaction among factors, Researchers’ viewpoint, TQM as a system, steps in TQM implementation, Roadblocks in TQM implementation, Reasons for TQM failure.

Role of soft options in TQM: Hard vs. Soft factors, Role and expectation of employer, employee, customer and supplier from organization and vice versa. Human factors in TQM, Role of top management commitment, work culture, motivation, coordination, attitude, innovation.

Section – B

Quality initiatives in organizations: Role of tools and techniques in TQM, Classification of tools and techniques – Problem identification, Data analysis, Graphical, Creativity, Companywide. Brief description of Quality awards: – MBNQA, Deming award, European quality award, Australian quality award.

TQM Effectiveness: Impact of TQM, Need and difficulty in measuring TQM effect, Parameters governing effect of TQM.

Books Recommended:

TEXT BOOKS:
2. Waller Jenny, Allen Derek and Burna Andrew “The TQM toolkit – a guide to practical techniques for TQM”

REFERENCE BOOKS:
1. Logothetis N. “Managing for total quality from Deming to Taguchi and SPC” by (PHI)
2. Feigenbaum A.V. ”Total Quality Control” (MGH)

2MMD5 ELECTIVE-II
(4) COMPUTER ASSISTED PRODUCTION MANAGEMENT

SECTION – A

Computer aided process planning: Approaches to CAPP, basic part representation methods, shape producing capabilities, Process economics

Computer assisted QC: co-ordinate measuring machines construction and types, automated dimensional gauging and in process gauging

Capacity planning: Roll of capacity planning in manufacturing, planning and control systems, hierarchy of capacity planning decisions links to other system modules, capacity planning and control techniques.

SECTION – B

Just in time: JIT in manufacturing planning and control, leveling the production, pull system introduction, product and process design, JIT applications

Computer aided inventory control: Computer aided purchasing procedure, simulation of inventory problems Computer aided materials management: Material requirement planning, computer integrated materials management.

Books Recommended:

TEXT BOOKS:
1. Groover M.P.- Automation, Production Systems and CIM.
2. CAD/CAM theory and concepts, by Kuldeep Sareen and Chandandeep Grewal, S. Chand & company Ltd.

REFERENCE BOOKS:

2MMD5 ELECTIVE -II
(5) CONCURRENT ENGINEERING & PRODUCT LIFE CYCLE MANAGEMENT

SECTION -A

Introduction: Extensive definition of Concurrent Engineering (CE), CE design methodologies, Review of CE techniques like DFM (Design for manufacture), DFA (Design for assembly), QFD (Quality function deployment), RP (Rapid prototyping), TD (Total design), for integrating these technologies, Organizing for CE, CE tool box, Collaborative product development.

Use of Information Technology: IT support, Solid modeling, Product data management, Collaborative product commerce, Artificial Intelligence, expert systems, Software hardware component design.

Design Stage: Lifecycle design of products, Opportunities for manufacturing enterprises, Modality of concurrent engineering design, Automated analysis Idealization control, CE in optimal structural design, Real time constraints.

SECTION -B

Need for PLM: Importance of PLM, Implementing PLM, Responsibility for PLM, Benefits to different managers, Components of PLM, Emergence of PLM, Lifecycle problems to resolve, Opportunities to seize.

Components of PLM: Components of PLM, Product lifecycle activities, Product organizational structure, Human resources in product lifecycle, Methods, techniques, Practices, Methodologies, Processes, System components in lifecycle, slicing and dicing the systems, Interfaces, Information, Standards.

Books Recommended:
TEXT BOOKS:

REFERENCE BOOKS:

2MMD6 MECHATRONICS IN SYSTEM DESIGN - LAB

At least four practicals (study/trials) based on above syllabus, as given below shall be performed and a report there of submitted by the students

List of Practicals:
1. Sensors applications in Mechanical System
2. Design and testing of sequencing circuits.
3. Design and testing of Different types of Speed control Circuits.
4. Design and testing of Continuous reciprocation of Double acting Cylinder.
5. Study of different components of a CNC Machine-tool
6. Application of Microcontroller in a Mechatronic system

Practical Examination:
Practical examination shall consist of viva voce/performance based on the above syllabus and practical work.

2MMD7 EXPERIMENTAL STRESS ANALYSIS - LAB

At least five practicals (study/trials) based on above syllabus, as given below shall be performed and a report there of submitted by the students

List of Practicals:
1. Determination of Fringe constant of photoelastic material using.
2. Circular disc subjected to diametric compression.
3. Pure bending specimen (four point bending)
5. Determine slopes of plates by experimental technique.
6. Determination of Principal stresses 1 and 2 in magnitude and direction
7. Study of effect of pressure on principal stresses.
8. Determination of stress concentration using photo elasticity for simple component like plate with a hole under tension. 2D crane hook.
9. Determination of stress frozen and a slice of cross section are taken to analyze stress & no separate loading frame required.
10. Experiments using strain gauges.
11. Measurement of strain, temperature effects
12. Fixing of gauges on surfaces.
14. Setting of polariscope and calibration of disc, beam and tension model.

Practical Examination:
Practical examination shall consist of viva voce/performance based on the above syllabus and practical work.

SEMESTER - III

3MMDS SEMINAR & DISSERTETION
(As per given Scheme)

Project

SEMESTER - IV

4MMDP PROJECT SEMINAR & DISSERTETION
(As per given Scheme)

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TEXT BOOK:
M. Gopal, Digital Control and State Variable Techniques, TMH.

REFERENCE BOOKS:
1. Katsuhiko Ogata Digital Control Engineering, PHI.
2. Kuo B. C. Digital Control Systems, Wiley & Sons

1EEEME2 ADVANCED POWER ELECTRONICS

Unit I: Semiconductor Devices: Review of Semiconductor devices like Power BJT, SCR, MOSFET, IGBT, GTO, MCT; Static and dynamic characteristics of these devices; Single quadrant, Two quadrant and bidirectional switches.

Unit II: Switching Voltage Regulators: Linear voltage regulators; Switching voltage regulators; Review of basic dc-dc voltage regulator configurations -Buck, Boost, Buck-Boost converters and their analysis for continuous and discontinuous mode; Fly back converter, Forward converter, Push-pull converter, Cuk converter, Sepic Converter; Design criteria for SMPS; Multi-output switch mode regulator.

Unit III: Design of Magnetic Components: Design of power transformer; high frequency transformers for fly back, forward, half-bridge–full Bridge and push pull converters; Design of inductors for various converter topologies; Design of current transformers; Different types of core materials.

Unit IV: DC-AC converters/Inverters: Classification; Review of line commutated inverters; Bridge inverters with 120°,180°, and 150° modes of operation; Harmonic reduction techniques; Sine-triangular PWM; Space Vector Pulse Width Modulation; Current Source Inverters.

Unit V: Gate and Base drive circuits: Preliminary design considerations; DC coupled drive circuits with uni polar and bipolar outputs; Importance of isolation in driver circuits; electrically isolated drive circuits; Some commonly available driver chips (based on boot-strap capacitor); Cascade connected drive circuits; Thyristor drive circuits; Protection in driver circuits; Blanking circuits for bridge inverters.

Unit VI: Three phase AC voltage controllers and Cyclo-converters: Review of On-off and phase control; Three phase half-wave and full wave controllers and their analysis with resistive loads; three phase bi-directional delta connected controllers; 3-phase cyclo-converter circuits; circulating current operation; non-circulating current operation; mean output voltage and harmonics in supply current waveform

TEXT BOOK:
1. Ned Mohan, Undeland and Robbins, Power Electronics: Converters, Applications and Design (Wiley)

REFERENCE BOOKS:
1. Rashid M.H., Power Electronics, Pearson Education
2. G.K. Dubey, Doradla, Joshi, Sinha, Thyristorised Power Controllers Wiley

1EEEME3 ADVANCED DIGITAL SIGNAL PROCESSING


Unit-II: Implementation of DSP algorithms, Block diagram and signal flow graph representations, Basic IIR and FIR filter structures, Cascaded, parallel and lattice realizations, computational complexity. Finite word length effects and quantization errors.

Unit-III: Digital filter design. FIR and IIR filters, linear phase filters, design techniques for IIR filters using analog filter transformation methods, design techniques for FIR filters using windowing method. Analysis of finite word length effects.

Unit-IV: Estimation of Auto-correlation and Power Spectra of random signals. Nonparametric methods – averaging periodograms,
Welch method, Blackman and Tukey method, Parametric methods, AR, MA and ARMA models, Yule Walker method, Levinson-Durbin algorithm.


TEXT BOOK:

REFERENCE BOOKS:
2. Oppenheim & Schafer, Discrete Time Signal Processing. PHI.
4. Ifeachor & Jervis, Digital Signal Processing, Pearson Education

IEEEME4 VLSI DESIGN


TEXT BOOK:

REFERENCE BOOKS:

IEEEME5 MODELING & ANALYSIS OF ELECTRICAL MACHINES

Unit-I: Introduction to the theory of basic two pole machine applicable to DC Machines, Three-phase induction machines and synchronous machine. Kron’s primitive machine, Need of modeling, Introduction to modeling of electrical machines, Voltage and Torque equations.

Unit-II: Concept of transformation: change of variable & machine variable and transform variable for arbitrary reference frames. Application to DC machine for steady state and transient analysis, Equation of cross field commutator machine.

Unit-III: Polyphase Induction Machines: Voltage and torque equations, Equivalent circuit, Steady state analysis, Dynamic performance during sudden change in load torque and three phase fault at the machine terminals.


Unit-VI: Linearized machine equations: Linearization of machine equation, small displacement stability: Eigen values of typical induction machine and synchronous machine, transfer function formulation.

TEXT BOOK:

REFERENCE BOOKS:

1EEEME6 SEMINAR

The Seminar shall be based on the recent trends in the field of electrical and electronics engineering preferably related to the subjects 1EEEME1 to 1EEEME5. It should be surveyed from the technical literature published in international/national journals. A report should be prepared following the guidelines of IEEE paper format, submitted and followed by the presentation.

1EEEME7 VLSI DESIGN - LAB

Minimum Eight experiments based on the syllabus of 1EEEME4 VLSI Design using appropriate hardware and software.

2EEEME1 DIGITAL INSTRUMENTATION

Unit - I: Introduction: The basis of measurement, International unit system, Measurement &Electrical standards, Measurement errors, Factors influencing measurement errors, Enabling technologies: Processor based components and system components, Semicustom and custom ICs, Display devices.

Unit-II: Data converters: Sampled data systems, A-to-D converter errors, Basic SHA operation, ADC architectures, D to A converters, DAC architectures, Data acquisition system interfaces.


Unit-IV: Electronic counters: Basic counter circuitry, Modes of operation, Accuracy of counters, High frequency measurements and down conversion techniques, Modulation domain analysers. Signal generators. Arbitrary waveform generators (AWG).

Unit-V: Spectrum analysis: Dynamic signal analysis, Types of spectrum analyser, Superheterodyne spectrum analyser, Logic analysers: Basic operation, Types of analysis, Probing, Clocking, Triggering. Advanced features and measurement techniques.


TEXT BOOK:

REFERENCE BOOKS:
2. John Lenk,D.”Handbook of Microcomputer based instrumentation and control”,PHI1984
**2EEME2  EMBEDDED SYSTEMS DESIGN**

**Unit-I**: Embedded systems introduction: Processor technologies, implementation technologies, and design technologies. General-purpose processors and the 8051: Architecture, instruction set and programming environment.

**Unit-II**: Single-purpose processors: Standard peripheral processors (timers/counters, UARTs, A/D, D/A, PWM, etc.) and designing custom processors, combinational logic design, sequential logic design, custom processor design.

**Unit-III**: System Integration: Memories (ROM, RAM, compositions), Interfacing (serial/parallel, interrupt-driven, parallel), Arbiters. Common interfacing protocols: PCI, ISA, I2C, CAN.

**Unit-IV**: Computational models and describing behavior: sequential program, state machines, dataflow. Finite state machines. Concurrent process model. Implementation technologies: Custom VLSI, standard cell and gate array, programmable logic devices (including FPGAs).

**Unit-V**: Real time Operating System Concept: Architecture of kernel, task scheduler, Process and Threads. ISR, Inter Process Communication through Semaphores, mailbox, message queues, pipes. Events, timers and memory management, RTOS services in contrast with traditional OS.

**Unit-VI**: Embedded Linux; Introduction to the Linux kernel, Configuring and booting the kernel, the root file system, Root file directories, Linux file systems, Types of file system: Disk, RAM, Flash. Network configuration, Device control from user space. Accessing hardware directly, Inter Process Communication-Linux process model and IPCs.

**TEXT BOOKS:**
Frank Vahid, Tony Givargis “Embedded System Design “, PHI.

**REFERENCE BOOKS:**
1. Rajkamal, “ Embedded Sytems “, TMH

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**2EEME3  NEURO FUZZY CONTROL**


**Unit-II**: Fuzzy Control: A fuzzy controller for an inverted pendulum, Main approaches to fuzzy control, Stability of fuzzy control systems. Fuzzy controller design.

**Unit-III**: Neural Networks for Control: Introduction to neural network, Implementing neural networks, Learning capability, The delta rule, The back propagation algorithm, Practical issues in training.

**Unit-IV**: Neural Control: Neural networks in control, Inverse dynamics, Neural networks in direct neural control, A neural network for temperature control, Simulating PI control with a neural network, Neural networks in indirect neural control, System identification, Instantaneous linearization.


**Unit-VI**: Applications of neural control to current control and speed control of induction motors, Fuzzy logic control of a synchronous generator set. Applications of neuro fuzzy control: Cooling scheme for laser materials, Color quality processing, Identification of trash in cotton and Integrated pest management systems.

**TEXT BOOKS:**
2 EEEME4 ELECTIVE-I
(1) POWER ELECTRONIC CONTROLLED DRIVES

Unit I: Phase-Controlled DC Motor Drives: Principles of DC Motor Speed Control, Armature and Field Controls, Four Quadrant operation, Phase controlled converters, Control modeling of the Three-Phase converter, Converter configuration for a Four-Quadrant DC Motor Drive, Three-Phase Converter-Controlled DC Motor Drive, Design of Controllers.

Unit II: Chopper-Controlled DC Motor Drive: Principle of operation of the Chopper, Four quadrant Chopper circuit, Model of the Chopper, Steady-State analysis of Chopper-Controlled DC Motor Drive, Pulsating Torques, Closed-Loop operation, Speed-Controlled DC Motor Drive.

Unit III: Phase-Controlled Induction Motor Drives: Stator-Voltage Control, Steady-state analysis, Approximate analysis, Torque-Speed Characteristics with Phase Control, Slip-Energy Recovery Scheme, Steady-state analysis, Starting, Rating, Closed-Loop Control.

Unit IV: Frequency-Controlled Induction Motor Drives: Voltage-Source Inverter, Voltage-Source Inverter-Driven Induction Motor, Speed control, Constant Volts/Hz Control, Constant Slip-Speed Control, and Constant-Air Gap-Flux Control.

Unit V: Vector-Controlled Induction Motor Drives: Principle of Vector control, Direct Vector control, Derivation of Indirect Vector-Control Scheme, Indirect Vector-Control Scheme, and Implementation of Indirect Vector-Control Scheme.

Unit VI: PM Brushless DC Motor (PMBDCM): Modeling of PM Brushless DC Motor, PMBDCM Drive Scheme, Phase Advancing, Half-Wave PMBDCM Drives, Sensorless Control of PMBDCM Drive, Design of Current and Speed Controllers.

TEXT BOOK:

REFERENCE BOOKS:

2 EEEME4 ELECTIVE-I
(2) DIGITAL COMMUNICATIONS

Unit I: Digital Modulation Schemes- Representation of Digitally Modulated Signals, Memory-less Modulation Methods, Signaling Schemes with Memory, Power Spectrum of Digitally Modulated Signals.


Unit IV: Linear Block Codes- Basic Definitions, General Properties of Linear Block Codes, Some Specific Linear Block Codes, Optimum Soft Decision Decoding of Linear Block Codes, Hard Decision Decoding of Linear Block Codes, Comparison of Performance between Hard Decision and Soft Decision Decoding.

Unit V: Trellis Codes- The Structure of Convolutional Codes, Decoding of Convolutional Codes, Distance Properties of Binary Convolutional Codes, Punctured Convolutional Codes, Other Decoding Algorithms for Convolutional Codes, Practical Considerations in the Application of Convolutional Codes.


TEXT BOOK:

REFERENCE BOOKS:
1) FLEXIBLE AC TRANSMISSION SYSTEMS

UNIT –I: Introduction to Facts Controllers: Reactive power control: Reactive power, uncompensated transmission line, reactive power compensation – Principles of conventional reactive power compensators: Synchronous condensers, saturated reactor, phase angle regulator, and other controllers.

UNIT –II: Thyristor Controlled Shunt Compensator: SVC Objective of shunt compensation – Principle and operating characteristics of Thyristor Controlled Reactor – Thyristor Switched Capacitor – TSC-TCR static Var Compensators –


REFERENCE BOOKS:


2) DIGITAL IMAGE PROCESSING


UNIT –V: Image Compression: Need for Image Compression, Redundancy and Classification of redundancy in images, Classification of Image Compression Schemes, Fundamentals of Information Theory, Run-length Coding, Shannon-Fano coding, Huffman Coding, Arithmetic Coding, Dictionary-Based Compression,
Predictive Coding, Transform Based Compression, Image Compression Standard, Scalar Quantization, Vector Quantization.


TEXTBOOK:

REFERENCE BOOKS:

2EEEME6 SEMINAR
The Seminar shall be based on the recent trends in the field of electrical and electronics engineering preferably related to the subjects 2EEEME1 to 2EEEME5. It should be surveyed from the technical literature published in international /national journals. A report should be prepared following the guidelines of IEEE paper format, submitted and followed by the presentation.

2EEEME7 EMBEDDED SYSTEMS DESIGN LAB
Minimum Eight experiments based on the syllabus of 2EEEME2 Embedded Systems Design using appropriate hardware and software.

SEMESTER-III
3EEEME1 SEMINAR & DISSERTETION
(As per given Scheme)

SEMESTER-IV
4EEEME1 SEMINAR & DISSERTETION
(As per given Scheme)

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**Unit I:** Introduction: Distributed Computing Models, Issues in Designing Distributed systems, Client Server Model, Case studies, review of n/w communication, protocols for distributed system.

**Unit II:** Interprocess communication: Message passing, case study, group communication, case study Remote Communication: Introduction, RPC – Implementation, Communication, Issues, RMIs, Java RMs.

**Unit III:** Synchronization: Introduction, Clock synchronization, logical clocks, Mutual Exclusion, Election Algorithm, Deadlocks in distributed systems.

**Unit IV:** Distributed System Management: Introduction, Task assignment, Load Balancing, Load sharing, Process Management, Process Migration, Threads, Fault tolerance.

**Unit V:** Distributed Shared Memory: Introduction, Basic Concepts, Design Issues in DSM, Issues in Implementation.

**Unit VI:** Distributed file management: Introduction, Distributed file system design.

**TEXT BOOKS:**

**REFERENCE BOOKS:**
1) Jose Garrido, Schlesiger, Hongson: “Principle of Mdern Operating Systems”,
   Pub: Jones & Bartlet Learning ((VIVA Books)
2) Tang: “Security Scrategies in Linux Platforms and applications”,
   Pub: Jones & Bartlet Learning ((VIVA)
   Pub: Jones & Bartlet Learning ((VIVA)

**Unit I:** Review of DBMS: Introduction to Database Processing, ER models, Database Models, Symentic Object Models, Relational Model, Normalization, Database Designs Using ER models, Managing multiusers databases, ODBC, OLE, DB, ADO, Webserver Data Environment, ODBC, JDBC, JSP with reference databases, Relational Data Manipulation with SQL, MySQL & Oracle.

**Unit II:** Distributed Databases Management Systems: Introduction to DDBMS, Parallel DBMS, DDBMS Architecture, Data storage, Distributed Catalogue Management, Distributed Query Processing, Distributed transactions, Distributed concurrency control, Distributed Databases Recovery, Mobile Databases, Case Study.

**Unit III:** Emerging Trends in Distributed Computing: Introduction to Grid Computing, SOA, Cloud Computing Dataware Housing: Need, Benefits, Subject oriented Data, Data granularity, Information flow mechanism.

**Unit IV:** Meta Data: Rele, Classification, Management, DWH architecture, DWH and data marts, DWH Scheme, Keys in DWH schema, OLAP in DWH, OLAP Design considerations, OLAP models, Security Issues.

**Unit V:** Data Mining: Introduction, Fundamentals, Classifications, Major Issues, Mining frequent patterns, association & correlation, cluster analysis, evolution analysis

**Unit VI:** Market Basket Analysis, Apriori Algorithm, Association Regeneration, constraint based association rules Classification and Prediction, Bay’s Theorem, Rule Based classification.

**BOOKS RECOMMENDED:**
1) C.J. Date: “Database Processing”, Addison Wesley
2) Mahajan: “Distributed Computing”
3) M.H. Danham: “Data mining Introductory & Advance topics”, PE
4) Han, Kamber: “Data Mining”, Morgan Kaufmah
5) Dataware Housing: OUP
6) Dataware Housing: John Wiley
UNIT I: Wireless Communication present scenario, fundamentals, Introduction to source coding and channel coding

UNIT II: Radio propagation over wireless channels, Brief overview of channel models.


UNIT IV: Spread spectrum technology, multiple access wireless communication, GSM.

UNIT V: GPRS, imode, UmTS, Wireless data networks, RFID.

UNIT VI: Connecting the last mile, wireless Information Security, convergence-3G, Future Trends, 4G.

TEXT BOOKS:
1) Upen Dalal : Wireless Communication, Offord.
2) Vern A D : Wireless Data Technologies, Wiley

REFERENCE BOOKS:
1. Vern A.D.”Wireless Data Technologies” : Wiley

1RNME5 ELECTIVE I (1) EXPERT SYSTEM DESIGN & INTELLIGENT SYSTEMS

UNIT I: Introduction to ES : Overview of AI, Intelligent systems, knowledge representation, principles & techniques evaluating & comparing ES, TMS, Nonmonotonic justification, maintaining multiple contacts.

UNIT II: Rule based systems : Canonical systems, production systems, production systems, associate nets & frame systems, OOAD for ES. University Issues, knowledge acquisition, ES shells, knowledge acquisition methods, tools for building ES.

UNIT III: Fuzzy Systems : introduction, foundation of fuzzy systems, fuzzy relations, arithmetic operations of fuzzy numbers, linguistic descriptions and their analytical forms, defuzzification methods, fuzzy logic in control and decisionmaking applications, hardware realization of the analog fuzzy controller.


UNIT V: Genetic Algorithms and Evolutionary Programming : introduction, genetic algorithms, procedures of genetic algorithms, the working of genetic algorithms, the logic behind genetic algorithms, evolutionary programming, the working of evolutionary programming, genetic-algorithm-based machine learning classifier system.

UNIT VI: Swarm Intelligent Systems : introduction, background of Ant intelligent systems, importance of the ant colony paradigm, ant colony systems, development of the ant colony systems, application of ant colony intelligence, the working of ant colony systems, particle Swarm intelligent systems, engineering applications of PSIS and future research.

TEXT BOOKS:
1) Peter Jackson “Introduction to Expert System” PE 3rd Ed., 2003

REFERENCE BOOKS:

1RNME5 ELECTIVE I (2) ALGORITHMICS

notations. Notation with several parameters. Operations on asymptomatic notations.


REFERENCE BOOKS:

IRNME 5 ELECTIVE I (3) INFORMATION TECHNOLOGY MANAGEMENT

Unit-I: IT and Strategy : Information revolution, Business and strategy. IT Strategy, Strategy and Success, Design Parameters, Strategic positioning, Evolution of strategy sequences and getting the right, development of a strategy ,types of strategy ,context and strategy.

Unit-II: Managing IT :IT management and its roles, It governance, It governance and strategy, Technology management process, Technology selection, Strategic aspects of technology. IT and business alignment, Risk Management ,Exploiting IT Capabilities, Deploying IT in strategic manner ,Strategic planning for information technology and frameworks , Measuring IT, Performance Measures : Balanced Score Card.


Unit-IV: IT strategies for Knowledge Management Knowledge Management, Knowledge Management and IT strategies, role of Knowledge Management in IT strategies for IT companies, knowledge industry and knowledge strategy knowledge workers, IT strategic services ,product and consulting . IT strategies for non –IT companies : Role of IT in non –IT companies , IT Investment decision, measurement of IT,IT strategies for Non-IT companies, IT supply chain management and constraint management, IT enabled supply chain management.

Unit-V: IT Strategies in specific scenario, Enterprise resource planning implementation, mapping IT strategies initiatives to ERP ,supply chain contribution and business strategy, IT strategies for business process outsourcing, IT strategy implementation : IT strategy implementation, Development and need of it strategic plan ,IT strategy implementation to gain competitive advantage, IT strategy and leadership, IT strategy and differentiation , Execution and IT strategy .

Unit-VI: Global dimension of It Strategy : IT strategies in global environment, Global product cycle, Making It global scenario, globalization and competitive strategy, global project management, Mergers and acquisitions ,IT compatibility in M&A.
TEXT BOOK:

REFERENCE BOOKS:
2. Gottschalk , P “ Strategic Knowledge Managements Technology “IGPUSA
3. Hill , C and G Jones “ Strategic management “ Houghton Miflen USA

2RNME1 REAL TIME EMBEDDED SYSTEMS

Unit I: Introduction to ES : Application, categories, architecture overview, specialties, Recent Trends.
Architecture : Hardware Architecture, Software Architecture


Unit IV: RTOS & ES : Kernel architecture, Tash scheduler, ISRs, Semaphones, Mutex, Mailboxes, Message Censes, Event Registers, Pipes, Signals, Timers, Memory Management, Priority Inversion, Embedded OS, RTOS, Handheld OS, OS S/W, Embedded winXP, Pering RTOS on ES Board.

Unit V: Sample ES : Representative OS, Es programming in Linux, Shell programming, system programming, project overview for navigation system, protocol convertor, Database applications, Mobile Java applications.


TEXT BOOK:

REFERENCE BOOKS:

2RNME2 PERFORMANCE ANALYSIS FOR IMAGING SYSTEMS

Unit I Basic Principles of Imaging, Imerging System, Performance, Imaging System Issues

Unit II Acquisition of Images, Image quality, Signal Processing, Performance evolution

Unit III Signal & Image processing, Image resampling performance issues

Unit IV Super resolution, Image debluzzing, performance analysis

Unit V Image contrast Enhancement, Non uniformity correction, performance issues

Unit VI Time Scale, Image Function, Performance measurement

TEXT BOOK:

REFERENCE BOOKS:
2. Abut : “DSP for in-vehicle and mobile systems” Pub: CBS

2RNME3 INFORMATION TECHNOLOGY & SECURITY

Unit I Introduction, Security, Public key cryptography, Hash function, quantum, cryptography, cryptography protocols.

Unit II PKD, wireless network access, mobile security, Secure software Engineering, ICT Security.

Unit III ICT & forensic, Risk Assessment, IS management, Hacking & cracking, Reconnaissance

Unit IV Scanning tools, sniffers, TCP/IP vulnerability, Password cracking, spoofing
Unit V  Session Hacking, Hacking N/W devices, Trojan Horses, Dos Attacks, Buffer Overflows.

Unit VI  Programming experts, mail vulnerability, Web Application Vulnerability, Windows Vulnerability, Linux Vulnerability, Incident Handling.

TEXT BOOKS:
1) Multidisciplinary Introduction to Information Security Stig FM – CRC Press  

REFERENCE BOOKS:

2RNME4  SOFTWARE ENGINEERING, TESTING & RELIABILITY


Unit II:  Software Testing : Introduction to Testing Methodology, Terminology, Methodology, Verification, Validation.


Unit IV:  Test Management & Quality Management :  

Unit V:  Reliability Engineering : Introduction, Reliability maths, Life data analysis and Problem plotting,. Monte Carlo in simulation.


BOOKS RECOMMENDED:
4) Pratric DT “ Practical Reliability Engineering” Wiley

REFERENCE BOOK:  
1. Richardson & Thies :”Secure Software Design, Pub : Jones & Bartlet (VIVA Pub.)

2RNME5  ELECTIVE II  
(1) ADVANCED COMPILING TECHNIQUES

Unit I:  Symbol-Table Structure: Storage Classes, Visibility, and Lifetimes, Symbol Attributes and Symbol-Table Entries, Local Symbol-Table Management, Global Symbol-Table Structure, Storage Binding and Symbolic Registers, Approaches to Generating Loads and Stores.


TEXT BOOK:

REFERENCE BOOKS:
2. D. M. Dhamdhere, “Compiler Construction” (2/e), Macmillan.

2RNME5 ELECTIVE II
(2) MOBILE COMPUTING

Unit I: Characteristics, Fundamentals and Infrastructure of cellular system, Satellite system, Network protocol, Ad hoc and sensor network, Wireless MAN’s, LAN’s and PAN’s. Mobile Ratio Propagation: Types of Radio waves, Propagation mechanism, Freespace propagation, Land propagation, Path loss, Slow fading, Fast fading, Doppler effect, Delay spread, Coherence Bandwidth ,Inter symbol and Co-channel Interferences.

Unit II: Cellular Concept: Cell area, Signal strength and cell parameter, Capacity of a cell, Frequency reuse, Cluster, Co-channel Interference, Cell Splitting, Cell sectoring. Channel allocation: Static allocation verses Dynamic allocation, fixed channel allocation (FCA), Dynamic channel allocation, Hybrid channel allocation (HCA), Allocation in specialized system structure, System Modeling.


Unit V: Wireless MANs, LANs and PANs: Wireless metropolitan area networks (WMANs), Wireless Local Area networks (WLANs), and Wireless Personal Area networks (WPANs), Recent Advances, Introduction, and Ultra – wideband technology.

TEXT BOOK:

REFERENCE BOOKS:

2RNME5 ELECTIVE - II
(3) DIGITAL MEDIA DEVELOPMENT


Unit II: Data and file format standards RTF, TIFF, RIFF, MIDI, JPEG, AVI, MPEG Standards, video and image display systems, image scanners, Digital voice and audio, Digital camera, video images and animation, Full motion video.


Unit IV: Multimedia Authoring and User Interface, Design Considerations, Hypermedia Applications, Information Access,
Object display, Hypermedia Messaging, Integrated document management

**Unit V:** Distributed Multimedia Systems, Components, Client-server Operation, Object Server, Network Performance Issues, Distributed Multimedia databases, Managing distributed Objects

**Unit VI:** System Design: Design issues, requirements, feasibility, Performance Analysis, Design for performance, Multimedia Systems Design, Extensibility and example.

**BOOKS RECOMMENDED:**

**REFERENCE BOOKS:**
1. Game Engineering Design & Implementation - Alan Thorn, Pub: Jones & Bartlet (VIVA Pub.)

**2RNME 6 CSIT LAB - III:** This lab shall be based on 2RNME1 - Real Time Embedded System
AND **2RNME 2** - Performance Analysis for Imaging Systems

**2 RNME 7 CSIT LAB - IV:** This lab shall be based on 2RNME 3- Informn.Tech.& Security
AND **2RNME 4** - Software Engineering, Testing & Reliability
AND/OR **2 RNME5 (E-2)** Mobile Computing (if offered)