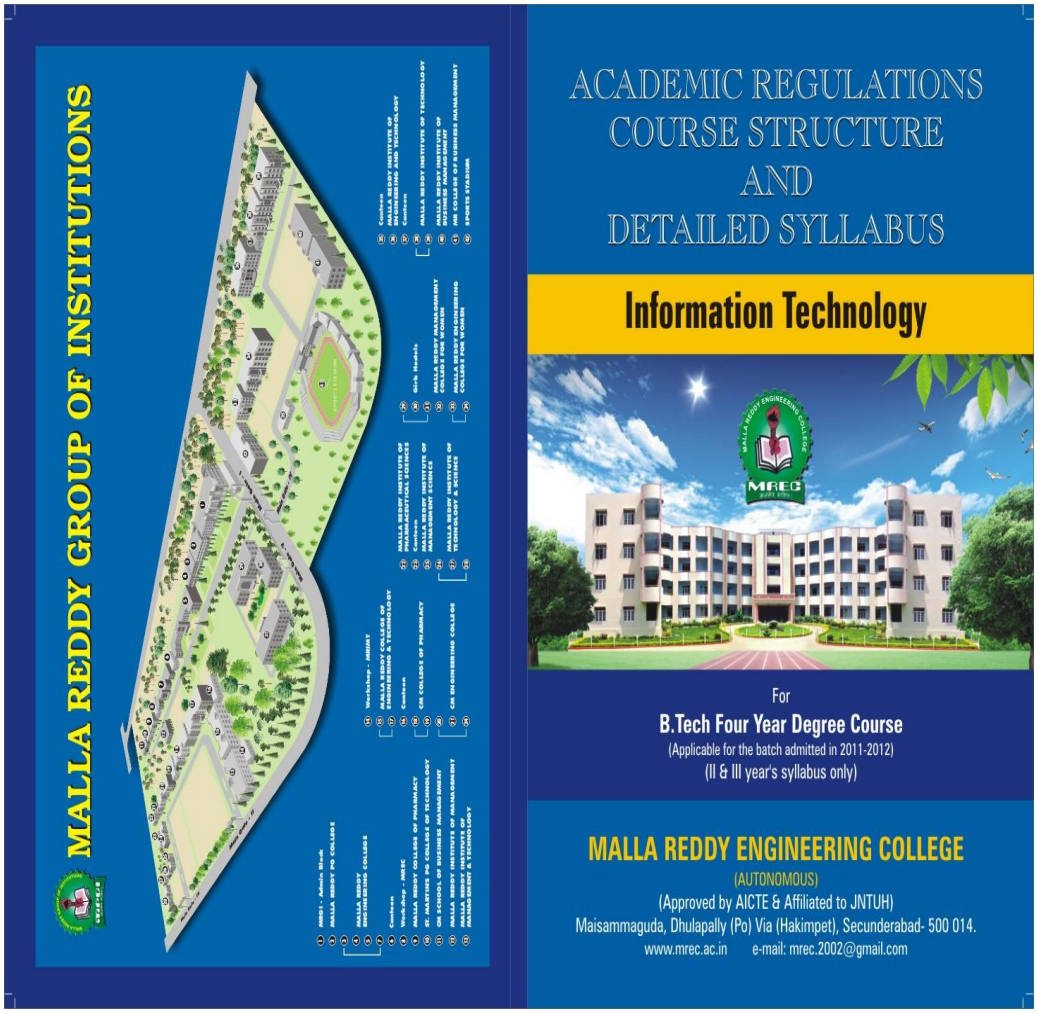


# ACADEMIC REGULATIONS
# COURSE STRUCTURE
# AND
# DETAILED SYLLABUS

**U6**

**ELECTRICAL AND ELECTRONICS ENGINEERING**

## For
## B.Tech Four Year Degree Course
**(Applicable for the batch admitted in 2011-2012)**
**(MR11 Regulations)**

(II & III year's syllabus only)


## MALLA REDDY ENGINEERING COLLEGE
**(AUTONOMOUS)**
**(Approved by AICTE & Affiliated to JNTUH)**
**Maisammaguda, Dhulapally (Po) Via (Hakimpet), Secunderabad- 500 014.**
**www.mrec.ac.in**
**e-mail: mrec.2002@gmail.com**

# MALLA REDDY ENGINEERING COLLEGE
# (AUTONOMOUS)

**Maisammaguda,Dhulapally,Post Via (Hakimpet), Secunderabad- 500 014.**

## Academic Regulations for B. Tech (Regular)
## (MR11 Regulations)

***(Effective for the students admitted into I year from the Academic Year 2011-2012 onwards)***

**1. Award of B.Tech. Degree**

A student will be declared eligible for the award of the B. Tech. Degree if he fulfills the following academic requirements:

i. Pursued a course of study for not less than four academic years and not more than eight academic years.

ii. Register for 200 credits and secure 200 credits

**2.** Students, who fail to fulfill all the academic requirements for the award of the degree within eight academic years from the year of their admission, shall forfeit their seat in B.Tech course.

**3. Courses of study**

Malla Reddy Engineering College offers the following courses of study leading to B.Tech. Degree of the Jawaharlal Nehru Technological University Hyderabad (JNTUH), Hyderabad.

1. Civil Engineering (CE)
2. Computer Science & Engineering (CSE)
3. Electrical & Electronics Engineering (EEE)
4. Electronics & Communications Engineering (ECE)
5. Information Technology (IT)
6. Mechanical Engineering (ME)

**4. Credits**

| | I Year | | Semester | |
|---|---|---|---|---|
| | Periods / Week | Credits | Periods / Week | Credits |
| Theory | 03 | 06 | 03 | 03 |
| | 02 | 04 | -- | -- |
| Practical | 03 | 04 | 03 | 02 |
| Drawing | 02T/03D | 04 | 03<br>06 | 02<br>04 |
| Mini Project | -- | -- | -- | 02 |
| Comprehens-ive Viva Voce | -- | -- | -- | 02 |
| Seminar | -- | -- | 6 | 02 |
| Project | -- | -- | 15 | 10 |

**5.** Distribution and Weightage of Marks

i. The performance of a student is evaluated in each semester or I year , subject-wise, with a maximum of 100 marks for theory and 75 marks for practical examinations. The subject –wise syllabus is spread over 1-8 units. Out of 100 marks in Theory, 25 marks are for internal exam and out of 75 marks in practicals, 25 marks are for internal assessment. In semester system, two midterm examinations are conducted for 25 marks each. Each midterm examination comprises of an internal test for 20 marks and an assignment for 5 marks. Better of the two midterm examinations shall be taken as the final marks secured by each candidate.

ii. However for first year, there shall be 3 midterm examinations as in the above pattern and the average marks of the best two examinations secured in each subject shall be considered as final marks for sessionals.

iii. For practical subjects there shall be a continuous evaluation during the semester for 25 internal marks and 50 end examination marks. Out of the 25 marks for internal, day-to-day work in the laboratory shall be evaluated for 15 marks and internal examination for practical shall be evaluated for 10 marks conducted by the concerned laboratory teacher. The end examination shall be conducted by an external examiner and internal examiner being the laboratory teacher. The external examiner shall be appointed by the Principal/Controller of examinations.

iv. For the subject having design and / or drawing, (such as Engineering Graphics, Engineering Drawing, Machine Drawing) and estimation, the distribution shall be 25 marks for internal evaluation (15 marks for day-to-day work and 10 marks for internal tests) and 75 marks for end examination. There shall be two internal tests in a Semester and the better of the two shall be considered for the award of marks for internal tests. However in the I year class, there shall be three tests and the average of best two will be taken into consideration.

v. There shall be an industry-oriented mini-Project, in collaboration with an industry of their specialization, to be taken up during the vacation after III year II Semester examination. However, the mini project and its report shall be evaluated along with the project work in IV year II Semester. The industry oriented mini project shall be submitted in report form and should be presented before the committee, which shall be evaluated for 50 marks. The committee consists of an external examiner, head of the department, the supervisor of mini project and a senior faculty member of the department. There shall be no internal marks for industry oriented mini project.

vi. There shall be a seminar presentation in IV year II Semester. For the seminar, the student shall collect the information on a specialized topic and prepare a technical report, showing his understanding over the topic, and submit to the department, which shall be evaluated by the Departmental committee consisting of Head of the department, seminar supervisor and a senior faculty member. The seminar report shall be evaluated for 50 marks. There shall be no external examination for seminar.

vii. There shall be a Comprehensive Viva-Voce in IV year II semester. The Comprehensive Viva-Voce will be conducted by a Committee consisting of (i) Head of the Department (ii) two Senior Faculty members of the Department. The Comprehensive Viva-Voce is aimed to assess the students' understanding in various subjects he / she studied during the B.Tech course of study. The Comprehensive Viva-Voce is evaluated for 100 marks by the Committee. There are no internal marks for the Comprehensive viva-voce.

viii. Out of a total of 200 marks for the project work, 50 marks shall be for Internal Evaluation and 150 marks for the End Semester Examination. The End Semester Examination (viva-voce) shall be conducted by the same committee appointed for industry oriented mini project. In addition the project supervisor shall also be included in the committee. The topics for industry oriented mini project, seminar and project work shall be different from each other. The evaluation of project work shall be conducted at the end of the IV year. The Internal Evaluation shall be on the basis of two seminars given by each student on the topic of his project.

ix. Laboratory marks and the sessional marks awarded by the concerned teacher are not final. They are subject to scrutiny and scaling by the Principal/Controller of examinations wherever necessary. In such cases, the sessional and laboratory marks awarded by the concerned teacher will be referred to a Committee consisting of HOD, Senior professor in that particular department headed by Principal. The Committee will arrive at a scaling factor and the marks will be scaled as per the scaling factor. The recommendations of the Committee are final and binding. The laboratory records and internal test papers shall be preserved in the respective departments/exam branch for a minimum period of 6 years from the commencement of the batch, as per the University norms and shall be produced to the Committees of the University as and when the same is asked for.

**6.** Attendance Requirements:

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

ii. Shortage of Attendance below 65% in aggregate shall in NO case be condoned.

iii. Condonation of shortage of attendance in aggregate up to 10% (65% and above and below 75%) in each semester or I year may be granted by the College Academic Committee.

iv. A student will not be promoted to the next semester unless he satisfies the attendance requirement of the present semester / I year, as applicable. They may seek re-admission for that semester / I year when offered next.

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

vi. A stipulated fee shall be payable towards condonation of shortage of attendance.

**7.** Minimum Academic Requirements:

The following academic requirements have to be satisfied in addition to the attendance requirements mentioned in item no.6

i. A student shall be deemed to have satisfied the minimum academic requirements and earned the credits allotted to each theory or practical design or drawing subject or project if he secures not less than 35% of marks in the end examination and a minimum of 40% of marks in the sum total of the internal evaluation and end examination taken together.

ii. A student shall be promoted from II to III year only if he fulfills the academic requirement of 37credits from one regular and one supplementary examinations of I year, and one regular examination of II year I semester irrespective of whether the candidate takes the examination or not. Or as stipulated by affiliating University from time to time.

iii. A student shall be promoted from third year to fourth year only if he fulfills the academic requirements of total 62 credits from the following examinations, whether the candidate takes the examinations or not. Or as stipulated by affiliating University from time to time.

a. Two regular and two supplementary examinations of I year.

b. Two regular and one supplementary examinations of II year I semester.

c. One regular and one supplementary examinations of II year II semester.

d. One regular examination of III year I semester.

iv. A student shall register and put up minimum attendance in all 200 credits and earn the 200 credits. Marks obtained in all 200 credits shall be considered for the calculation of percentage of marks.

v. Students who fail to earn 200 credits as indicated in the course structure within eight academic years from the year of their admission shall forfeit their seat in B.Tech course and their admission shall stand cancelled.

**8.** Course pattern:

i. The entire course of study is of four academic years. The first year shall be on yearly pattern and the second, third and fourth years on semester pattern.

ii. A student eligible to appear for the end examination in a subject, but absent at it or has failed in the end examination may appear for that subject at the supplementary examination.

iii. When a student is detained due to lack of credits / shortage of attendance he may be re-admitted when the semester / year is offered after fulfilment of academic regulations, whereas the academic regulations hold good with the regulations he was first admitted.

**9.** Award of Class:

After a student has satisfied the requirements prescribed for the completion of the program and is eligible for the award of B. Tech. Degree he shall be placed in one of the following four classes:

| Class Awarded | % of marks to be secured | |
|---|---|---|
| First Class with Distinction | 70% and above | From the aggregate marks secured for the best 200 Credits. |
| First Class | Below 70% but not less than 60% | |
| Second Class | Below 60% but not less than 50% | |
| Pass Class | Below 50% but not less than 40% | |

*(The marks in internal evaluation and end examination shall be shown separately in the marks memorandum)*

**10.** Minimum Instruction Days:

The minimum instruction days for each semester / I year shall be 90/180 clear instruction days.

**11.** There shall be no branch transfers after the completion of admission process.

**12.** Transfer from other colleges will be permitted, as per rules stipulated by the affiliating University and State government.

**13.** Detained candidates, either due to lack of credits or attendance, will be admitted to the class work, after successful completion of academic requirements and after obtaining permission from affiliating University.

**14.** General:

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

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

iii. In the case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Vice-Chancellor is final.

iv. The University may change or amend the academic regulations or syllabi at any time and the changes or amendments made shall be applicable to all the students with effect from the date notified by the University.

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# Academic Regulations for B. Tech.

**(Lateral Entry Scheme)**

***(Effective for the students getting admitted into II year from the Academic Year 2012-2013 and onwards)***

**1.** The Students have to acquire 150 credits from II to IV year of B.Tech. Program (Regular) for the award of the degree.

Register for **150** credits and secure **150** credits.

**2.** Students, who fail to fulfil the requirement for the award of the degree in 6 consecutive academic years from the year of admission, shall forfeit their seat.

**3.** The same attendance regulations are to be adopted as that of B. Tech. (Regular).

**4. Promotion Rule:**

**A student shall be promoted from third year to fourth year only if he fulfils the academic requirements of** 37 **credits from the examinations.**

a. Two regular and one supplementary examinations of II year I semester.
b. One regular and one supplementary examinations of II year II semester.
c. One regular examination of III year I semester.

**5. Award of Class:**

After a student has satisfied the requirements prescribed for the completion of the program and is eligible for the award of B. Tech. Degree he shall be placed in one of the following four classes:

| | | |
|---|---|---|
| First Class with Distinction | 70% and above | From the aggregate marks secured for 150 Credits. (i.e. II year to IV year) |
| First Class | Below 70% but not less than 60% | |
| Second Class | Below 60% but not less than 50% | |
| Pass Class | Below 50% but not less than 40% | |

*(The marks in internal evaluation and end examination shall be shown separately in the marks memorandum)*

**6.** All other regulations as applicable for B. Tech. Four-year degree course (Regular) will hold good for B. Tech. (Lateral Entry Scheme)

## MALPRACTICES RULES

### DISCIPLINARY ACTION FOR / IMPROPER CONDUCT IN EXAMINATIONS

| | Nature of Malpractices/ Improper conduct | Punishment |
|---|---|---|
| | *If the candidate:* | |
| 1. (a) | Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the subject of the examination) | Expulsion from the examination hall and cancellation of the performance in that subject only. |
| (b) | Gives assistance or guidance or receives it from any other candidate orally or by any other body language methods or communicates through cell phones with any candidate or persons in or outside the exam hall in respect of any matter. | Expulsion from the examination hall and cancellation of the performance in that subject only of all the candidates involved. In case of an outsider, he will be handed over to the police and a case is registered against him. |
| 2. | Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the candidate is appearing. | Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the subjects of that Semester/year. The Hall Ticket of the candidate is to be cancelled. |

| | | |
|---|---|---|
| 3. | Impersonates any other candidate in connection with the examination. | The candidate who has impersonated shall be expelled from examination hall. The candidate is also debarred and forfeits the seat. The performance of the original candidate, who has been impersonated, shall be cancelled in all the subjects of the examination (including practical's and project work) already appeared and shall not be allowed to appear for examinations of the remaining subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all End examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. If the imposter is an outsider, he will be handed over to the police and a case is registered against him. |
| 4. | Smuggles in the Answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination. | Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all End examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. |
| 5. | Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks. | Cancellation of the performance in that subject. |
| 6. | Refuses to obey the orders of the Principal/Controller of examinations any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the officer-in charge or any person on duty in or outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the officer-in-charge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the College campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination. | In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that subject and all other subjects the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. The candidates also are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is registered against them. |
| 7. | Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall. | Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including |

| | | |
|---|---|---|
| | | practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all End examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. |
| 8. | Possess any lethal weapon or firearm in the examination hall. | Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat. |
| 9. | If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8. | Student of the colleges expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat.<br>Person(s) who do not belong to the College will be handed over to police and, a police case will be registered against them. |
| 10. | Comes in a drunken condition to the examination hall. | Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. |
| 11. | Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny. | Cancellation of the performance in that subject and all other subjects the candidate has appeared including practical examinations and project work of that semester/year examinations. |
| 12. | If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to the Principal/Controller of examination for further action to award suitable punishment. | |

**Malpractices identified by squad or special invigilators**

1. Punishments to the candidates as per the above guidelines.
2. Punishment for institutions : (if the squad reports that the college is also involved in encouraging malpractices)
   (i) A show cause notice shall be issued to the college.
   (ii) Impose a suitable fine on the college.
   (iii) Shifting the examination centre from the college to another college for a specific period of not less than one year.

# MALLA REDDY ENGINEERING COLLEGE
# (AUTONOMOUS)

### B. TECH. ELECTRICAL AND ELECTRONICS ENGINEERING

### I YEAR COURSE STRUCTURE

| Code | Subject | L | T/P/D | C |
|---|---|---|---|---|
| EN1Y1101 | English | 2 | 1 | 4 |
| MA1Y1102 | Mathematics-I | 3 | 1 | 6 |
| MA1Y1103 | Mathematical Methods | 3 | 1 | 6 |
| PH1Y1104 | Engineering Physics | 2 | 1 | 4 |
| CH1Y1105 | Engineering Chemistry | 2 | 1 | 4 |
| CS1Y1106 | Computer Programming & Data Structures | 3 | -- | 6 |
| ME1Y1107 | Engineering Drawing | 2 | 3 | 4 |
| CS1Y1108 | Computer Programming Lab | -- | 3 | 4 |
| PCH1Y1109 | Engineering Physics & Engineering Chemistry Lab | -- | 3 | 4 |
| EN1Y1110 | English Language Communication Skills Lab | -- | 3 | 4 |
| MCS1Y1111 | Engineering Workshop/IT Workshop | -- | 3 | 4 |
| | **Total** | **17** | **20** | **50** |

**II year** **I Semester**

**Course Structure**

| CODE | SUBJECT | L | T/P/D | C |
|---|---|---|---|---|
| MR12U0M4 | Mathematics-III | 3 | 1 | 3 |
| MR11U353 | Fluid Mechanics and Hydraulic Machinery | 3 | 1 | 3 |
| MR11U401 | Electronic Devices and Circuits | 4 | - | 4 |
| MR11U201 | Electrical Circuits | 4 | 1 | 4 |
| MR11U202 | Electromagnetic Fields | 3 | 1 | 3 |
| MR11U203 | Electrical Machines-I | 4 | 1 | 4 |
| MR11U354 | Fluid Mechanics and Hydraulic Machinery Lab | - | 3 | 2 |
| MR11U404 | Electronic Devices & circuits Lab | - | 3 | 2 |
| | **TOTAL** | **21** | **11** | **25** |

**II year** **II Semester**

**Course Structure**

| CODE | SUBJECT | L | T/P/D | C |
|---|---|---|---|---|
| MR11UB01 | Managerial Economics and Financial Analysis | 4 | - | 4 |
| MR11U204 | Power Systems-I | 4 | 1 | 4 |
| MR11U409 | Electronic Circuits | 3 | 1 | 3 |
| MR11U154 | Environmental Studies | 3 | 1 | 3 |
| MR11U205 | Network Theory | 3 | 1 | 3 |
| MR11U206 | Electrical Machines-II | 4 | 1 | 4 |
| MR11U207 | Electrical Machines Lab – I | - | 3 | 2 |
| MR11U208 | Electrical Circuits and Simulation Lab | - | 3 | 2 |
| | **TOTAL** | **21** | **11** | **25** |

**III year** **I Semester**

**Course Structure**

| CODE | SUBJECT | L | T/P/D | C |
|---|---|---|---|---|
| MR11U412 | IC Applications | 3 | 1 | 3 |
| MR11U209 | Electrical Measurements | 3 | 1 | 3 |
| MR11U210 | Power Systems-II | 4 | - | 4 |
| MR11U211 | Control Systems | 3 | 1 | 3 |
| MR11U212 | Power Electronics | 4 | 1 | 4 |
| MR11U213 | Electrical Machines-III | 4 | 1 | 4 |
| MR11U214 | Electrical Machines Lab – II | - | 3 | 2 |
| MR11U215 | Control Systems and Simulation Lab | - | 3 | 2 |
| | **TOTAL** | **21** | **11** | **25** |

**III year** **II Semester**

**Course Structure**

| CODE | SUBJECT | L | T/P/D | C |
|---|---|---|---|---|
| MR11UB02 | Management Science | 3 | 1 | 3 |
| MR11U216 | Power Semiconductor Drives | 4 | 1 | 4 |
| MR11U217 | Computer Methods In Power Systems | 4 | - | 4 |
| MR11U419 | Microprocessors and Microcontrollers | 4 | 1 | 4 |
| MR11U218<br>MR11UB04<br>MR11U459<br>MR11U514 | **OPEN ELECTIVE**<br>Renewable energy sources<br>Intellectual property rights<br>Nano technology<br>Operating Systems | 3 | 1 | 3 |
| MR11U406 | Switching Theory and Logic Design | 3 | 1 | 3 |
| MR11U219 | Electrical Measurements Lab | - | 3 | 2 |
| MR11U220 | Power Electronics and Simulation Lab | - | 3 | 2 |
| | **TOTAL** | **21** | **11** | **25** |

**IV year** **I Semester**

**Course Structure**

| CODE | SUBJECT | L | T/P/D | C |
|---|---|---|---|---|
| MR11U221 | Switch Gear and Protection | 3 | 1 | 3 |
| MR11U222 | Utilization of Electrical Energy | 3 | 1 | 3 |
| MR11U223 | Instrumentation | 3 | 1 | 3 |
| MR11U224 | Power System Operation and Control | 4 | - | 4 |
| MR11U225<br>MR11U423<br>MR11U239<br>MR11U451 | **Elective-I**<br>High Voltage Engineering<br>VLSI Design<br>Digital Control Systems<br>Embedded Systems | 4 | 1 | 4 |
| MR12U0M8<br>MR11U226<br>MR11U418<br>MR11U505 | **Elective-II**<br>Optimization Techniques<br>Electrical Distribution Systems<br>Principles of Digital Signal Processing<br>Database Management Systems | 4 | 1 | 4 |
| MR11U421 | Microprocessors and Microcontrollers lab | - | 3 | 2 |
| MR11U0E1 | Advanced English Communications Skills Lab | - | 3 | 2 |
| | **TOTAL** | **21** | **11** | **25** |

**IV year** **II Semester**

**Course Structure**

| CODE | SUBJECT | L | T/P/D | C |
|---|---|---|---|---|
| MR11U227 | HVDC Transmission | 3 | - | 3 |
| MR11U228<br>MR11U229<br>MR11U230<br><br>MR11U231 | **Elective -III**<br>Neural Networks and Fuzzy Logic<br>Linear Systems Analysis<br>Reliability Engineering Applications to Power Systems<br>Electrical Power Quality | 3 | 1 | 3 |
| MR11U232<br>MR11U233<br>MR11U547<br>MR11U234 | **Elective-IV**<br>Advanced Control Systems<br>EHV AC Transmission<br>Computer System Organization<br>Flexible AC Transmission Systems | 3 | 1 | 3 |
| MR11U235 | Industry Oriented Mini Project | - | - | 2 |
| MR11U236 | Seminar | - | 6 | 2 |
| MR11U237 | Project Work | - | 15 | 10 |
| MR11U238 | Comprehensive Viva | - | - | 2 |
| | **TOTAL** | **9** | **23** | **25** |

**2012-13** **CODE: MR12U0M4**

**MALLA REDDY ENGINEERING COLLEGE**
**(Autonomous)**

**II Year B.Tech EEE I-Sem**

| L | T/P/D | C |
|---|---|---|
| 3 | -/1/- | 3 |

**MATHEMATICS – III**

**UNIT-I: Special Functions I:**

Review of Taylors series for a real many valued functions, Series Solutions of Differential equations, Gamma and Beta Functions-their Properties-Evaluation of improper Integrals. Bessel Functions- Properties-Recurrence relations-Orthogonality.

**UNIT-II: Special Functions II:**

Legendre Polynomials-Properties-Rodriguez's Formula-Recurrence Relations-Orthogonality. Chebchey's Polynomials-Properties-recurrence relations-Orthigonality.

**UNIT-III: Functions of complex variable:**

Continuity-differentiability-Analyticity-Properties-Cauchy-Riemann conditions, Maxima-minima Principle, Harmonic and conjugate Harmonic Functions-Milne-Thomson Method.Elemantry Functions, General Power $z^6$ Principal value Logarithmic Function.

**UNIT-IV: Complex Integration:**

Line Integral-Evaluation along a path and by indefinite Integration-Cauchy's Integral Theorem-Cauchy's Intergal formula-Generalized Intergal Formula.

**UNIT-V: Complex Power Series:**

Radius of convergence-Expansion in Taylor's Series, maclarians series and Laurent series.SingularPoint-Isolated Singular Point-Pole Of Order m-Essential Singularity (Distinction between the Real Analytical and complex analyticity)

**UNIT-VI** : **Contour Integration:**

Residue-Evaluation of residue by formula and by Laurent Series-residue theorem. Evaluation of the type

(a)Improper real integrals $\int_{-\infty}^{\infty} f(x)\,dx$ (b) $\int_{c}^{c+2\pi} f(cosn\theta, sinn\theta)\,d\theta$

(c) $\int_{-\infty}^{\infty} e^{imx} f(x)\,dx$ (d) Integrals by indentation.

**UNIT -VII**

**Conformal Mapping:**

Transformation by $e^z$,lnz,$z^2$ ,$z^n$ (n positive integer), Sinz, cosz, $z+\frac{a}{z}$. Translation, rotation, inversion and bilinear transformation-fixed point-cross ratio-properties –invariance of circles and cross ratio-determination of bilinear transformation mapping 3 given points.

**UNIT-VIII**

**Elementary graph Theory:** Graphs, Rpresentation by matrices, adjacent matrix-incident-Sample, Mutiple, Regular, Complete, Bipertite & Planar Graphs-Hamiltonian and Circuits-Tress Spanning tree –minimum spanning tree.

**TEXT BOOKS**:


1. Engineering Mathematics-III by Krishna Gandhi & others S.Chand & Co..,
2. Engineering Mathematics-III by C.Shankaraiah, V.G.S.Book Links


**REFERENCES:**


1. Higher Engineering of Mathematics by B.S.Grewal Khanna Publications.
2. Advanced Engineering of Mathematics by Jain & S.R.K.Iyenger, Narosa publications.
3. Complex Variables by R.K.Churchill.
4. Advanced Engineering of Mathematics by Allen Jaffrey Academic press.
5. Functions of one complex variable – John B. Convay, Narosa Publications.

**2012-13** **CODE: MR11U353**

**MALLA REDDY ENGINEERING COLLEGE**
**(Autonomous)**

**II Year B.Tech EEE I-Sem**

| L | T/P/D | C |
|---|---|---|
| 3 | -/1/- | 3 |

## FLUID MECHANICS AND HYDRAULIC MACHINERY

**UNIT I**

**Fluid statics:** Dimensions and units: physical properties of fluids- specific gravity, viscosity surface tension- vapor pressure and their influence on fluid motion- atmospheric gauge and vacuum pressure –measurement of pressure- Piezometer, U-tube and differential manometers.

**UNIT II**

**Fluid kinematics:** Stream line, path line and streak lines and stream tube, classification of flows-steady & unsteady, uniform, non uniform, laminar, turbulent, rotational, and irrotational flows-equation of continuity for one dimensional flow.

**Fluid dynamics:** Surface and body forces –Euler's and Bernoulli's equations for flow along a stream line, momentum equation and its application on force on pipe bend.

**UNIT III**

**Closed conduit flow:** Reynold's experiment- Darcy Weisbach equation- Minor losses in pipes- pipes in series and pipes in parallel- total energy line-hydraulic gradient line. Measurement of flow- pitot tube, venturimeter, and orifice meter, Flow nozzle.

**UNIT IV**

**Basics of turbo machinery:** Hydrodynamic force of jets on stationary and moving flat, inclined, and curved vanes, jet striking centrally and at tip, velocity diagrams, work done and efficiency, flow over radial vanes.

**UNIT V**

**Hydro Electric Power Stations:** Elements of Hydro Electric Power Station- Types-Concept of Pumped storage Plants-Storage requirements, Mass Curve (explanation only) estimation of power developed from a given catchment area, heads and efficiencies.

**UNIT VI**

**Hydraulic Turbines** : Classification of turbines, impulse and reaction turbines, Pelton wheel, Francis turbine and Kaplan turbine-working proportions, work done, efficiencies , hydraulic design –draft tube theory- functions and efficiency.

**UNIT VII**

**Performance of hydraulic turbines:** Geometric similarity, Unit and specific quantities, characteristic curves, governing of turbines, selection of type of turbine, cavitation, surge tank, water hammer.

**UNIT VIII**

**Centrifugal pumps:** Classification, working, work done – manomertic head- losses and efficiencies, specific speed- pumps in series and parallel-performance characteristic curves, NPSH.

**Reciprocating pumps:** Working principle, Discharge, slip and slip percentage.

**TEXT BOOKS:**

1. Hydraulics, fluid mechanics and Hydraulic machinery MODI and SETH.
2. Fluid Mechanics and Hydraulic Machines by Rajput.

**REFERENCES:**

1. Fluid Mechanics and Fluid Power Engineering by D.S. Kumar, Kotaria & Sons.
2. Fluid Mechanics and Machinery by D. Rama Durgaiah, New Age International.
3. Hydraulic Machines by Banga & Sharma, Khanna Publishers.
4. Instrumentation for Engineering Measurements by James W. Dally, William E. Riley ,John Wiley & Sons Inc. 2004 (Chapter 12 – Fluid Flow Measurements).

**2012-13** **CODE: MR11U401**

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## ELECTRONIC DEVICES AND CIRCUITS

**UNIT-I: P-N Junction Diode:**

Qualitative Theor y of p-n Junction. P-n Junction as a Diode, Diode Equation. Volt-Ampere Characteristics, Temperature dependence of V I Characteristics. Ideal versus Practical Resistance levels (static and dynamic), Transition and diffusion capacitances. Diode Equivalent circuits, Load Line Analysis, Breakdown Mechanisms in semiconductor diodes, Zener diode characteristics.

**UNIT- II: Rectifiers and Filters**

The p-n junction as a rectifier, half wave rectifiers, full wave rectifiers, bridge rectifiers harmonic components in a rectifier circuit. Inductor filters, capacitor filtlers, L –section filters, d- section filters, composition of filters, voltage regulation using zener diode.

**UNIT- III: Bipolar Junction Transistor**:

The junction transistor, transistor current components. Transistor as an amplifier. Transistor construction. BJJ operation, BJT symbol, common base, common emitter and common collector configuration, limits of operation , BJT specification.

**UNIT- IV: Transistor Biasing and Stabilization**

Operating point, the DC and AC load lines. Need for biasing . fixed bias . collector feedback bias. Emitter feedback bias, collector-emittor feedback bias. Voltage divider bias. Bias stability. Stabilization factors. Stabilization against variations in V BE and . Bias compensation using diodes and transistors . thermal runaway, thermal stability.

**UNIT-V: Small Signal Low Frequency BJT Models**

BJT hybrid model, determination of h-parameters from transistor characteristics. Analysis of a transistor amplifier circuit using h-parameters. Comparision of CB, CE, and CC amplifiers, configurations.

**UNIT- VI: Field Effect Transistor**

The Junction field effect transistor (construction, principle of operation, symbol) pinch of voltage, voltage-ampere characteristics, the JFET small signal model, MOSFET construction, principle of operation, symbol), MOSFET characteristics in enhancement and depletion modes.

**UNIT- VII: FET AMPLIFIERS**

FET Common Source Amlifiere, Common Drain Amplifier, Generalized FET Amplifier, Biasing FET, FET as Voltage Variable Resistor, Comparison of BJT, and FET., Uni junction Transistor.

**UNIT-VIII**

Special Purpose Electronic Devices: Principle of Operation and Characteristics of Tunnel Diode (with the help of Energy Band Diagram 0 and Varactor Diode. Principle of Operation of Schottky Barrier Diode, SCR and Semiconductor Photo Diode.

**TEXT BOOKS :**

1. Millman s Electronic Devices and Circuits J.Millman, C.C.Halkias, and Satyabratha Jit Tata McGraw Hill, 2nd Ed., 1998 . TMH
2. Electronic Devices and Circuits R.L. Boylestad and Louis Nashelsky, pearson/Prentice Hall,9th Edition,2006.
3. Introduction to electronic devices and circuits-r obert t painter PE.

**REFERENCES :**

1. Integrated electronics J.Millman and Christos c halkias 1991, 2008, TMH.
2. Electronic Devices and Circuits Dr. K. Lal Kishore, B.S. Publications, 2nd Edition, 2005.
3. Electronic Devices and Circuits Anil k maini , varsha agarwal , 2009 WIPL
4. Electronic Devices and Circuits s salivahana n suresh kumar, a vallavaraj 2008 TMH.

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## ELECTRICAL CIRCUITS

**Objective :**

This course introduces the basic concepts of circuit analysis which is the foundation for all subjects of the Electrical Engineering discipline. The emphasis of this course is laid on the basic analysis of circuits which includes Single phase circuits, magnetic circuits, theorems, transient analysis and network topology.

**UNIT - I Introduction to Electrical Circuits**

Circuit Concept - R-L-C parameters - Voltage and Current sources - Independent and dependent sources-Source transformation - Voltage -Current relationship for passive elements (the diff input signals, square , ramp, saw tooth, triangular )- problems

**UNIT – II**

Kirchhoff's laws - network reduction techniques - series, parallel, series parallel, star-to-delta or delta-to-star transformation. Nodal analysis, mesh analysis, super node and super mesh for D-C excitation. problems

**UNIT - III Single Phase A.C Circuits**

R.M.S and Average values and form factor and peak factor for different periodic wave forms, Steady state analysis of R, L and C (in series, parallel and series parallel combinations) with sinusoidal excitation - Concept of Reactance, Impedance, Susceptance and Admittance - Phase and Phase difference - concept of power factor, Real and Reactive powers, concept of power triangle - J-notation, Complex and Polar forms of representation, Complex power, problems

**UNIT - IV Locus diagrams & Resonance**

Locus diagrams - series R-L, R-C, R-L-C and parallel combination with variation of various parameters -Resonance - series, parallel circuits, concept of band width and Q factor, problems

**UNIT - V Magnetic Circuits**

Magnetic Circuits - Faraday's laws of electromagnetic induction - concept of self and mutual inductance – dot convention - coefficient of coupling - composite magnetic circuit - Analysis of series and parallel magnetic circuits, problems

**UNIT - VI Network topology:**

Definitions - Graph - Tree, Basic cutest and Basic Tieset matrices for planar networks - Loop and Nodal methods of analysis of Networks with independent voltage and current sources - Duality & Dual networks, problems

**UNIT - VII Network theorems (with D.C)**

Tellegen's, Superposition, Reciprocity, Thevenin's, Norton's, Maximum Power Transfer, Millman's and Compensation theorems for DC excitations, problems

**UNIT - VIII Network theorems (with A.C)**

Tellegen's, Superposition, Reciprocity, Thevenin's, Norton's, Maximum Power Transfer, Millman's and Compensation theorems for AC excitations, problems

**TEXT BOOKS:**


1. Engineering circuit analysis by William Hayt and jack E. kemmerly McGraw Hill 6th edition.
2. Circuits & networks by A.Sudhakar and Shyammohan A palli, TMH
3. Electric circuits by A.Chakravarthy, Dhanipat Rai & sons -6th edition


**REFERENCE BOOKS:**


1. Network analysis by M E Van Valkenberg- 3rd edition-1974.
2. Linear circuit analysis (time domain phasor and laplace transform approaches) second ed. By Raymond A. decarlo oxford press 2004
3. Network theory n c jagan & c lakshiminarayana 2006, BSP.
4. Electric circuit theory by k rajeshwaran, Pearson Education 2004
5. Basic circuit analysis by d.r. Cunningham & j.a. stuller, jaico

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## ELECTROMAGNETIC FIELDS

**UNIT – I Electrostatics:**

Electrostatic Fields – Coulomb's Law – Electric Field Intensity (EFI) – EFI due to a line and a surface charge – Work done in moving a point charge in an electrostatic field – Electric Potential – Properties of potential function – Potential gradient – Guass's law – Application of Guass's Law – Maxwell's first law, div ( D )=ρv

**UNIT – II Conductors and Dipole:**

Laplace's and Poison's equations – Solution of Laplace's equation in one variable. Electric dipole – Dipole moment – potential and EFI due to an electric dipole – Torque on an Electric dipole in an electric field – Behaviour of conductors in an electric field – Conductors and Insulators, problems on electric dipole and field intensity.

***UNIT – III Dielectric & Capacitance :***

Electric field inside a dielectric material – polarization – Dielectric – Conductor and Dielectric – Dielectric boundary conditions, Capacitance – Capacitance of parallel plate and spherical and co-axial capacitors with composite dielectrics – Energy stored and energy density in a static electric field – Current density – conduction and Convection current densities – Ohm's law in point form – Equation of continuity, simple problems on capacitance and energy.

***UNIT – IV Magneto Statics :***

Static magnetic fields – Biot-Savart's law – Oesterd's experiment - Magnetic field intensity (MFI) – MFI due to a straight current carrying filament – MFI due to circular, square and solenoid current – Carrying wire – Relation between magnetic flux, magnetic flux density and MFI – Maxwell's second Equation, div(B)=0.

**UNIT – V Ampere's circuital law and its applications**

Ampere's circuital law and its applications viz. MFI due to an infinite sheet of current and a long current carrying filament – Point form of Ampere's circuital law – Maxwell's third equation, Curl (H)=Jc, Field due to a circular loop, rectangular and square loops and polygon.

**UNIT – VI Force in Magnetic fields:**

Magnetic force - Moving charges in a Magnetic field – Lorentz force equation – force on a current element in a magnetic field – Force on a straight and a long current carrying conductor in a magnetic field – Force between two straight long and parallel current carrying conductors – Magnetic dipole and dipole moment – a differential current loop as a magnetic dipole – Torque on a current loop placed in a magnetic field.

**UNIT – VII Magnetic Potential:**

Scalar Magnetic potential and its limitations – vector magnetic potential and its properties – vector magnetic potential due to simple configurations – vector Poisson's equations. Self and Mutual inductance – Neumans's formulae – determination of self-inductance of a solenoid and toroid and mutual inductance between a straight long wire and a square loop wire in the same plane – energy stored and density in a magnetic field. Introduction to permanent magnets, their characteristics and applications, simple problems on inductance and magnetic energy.

***UNIT – VIII Time Varying Fields :***

Time varying fields – Faraday's laws of electromagnetic induction – Its integral and point forms – Maxwell's fourth equation, Curl (E)=-∂B/∂t – Statically and Dynamically induced EMFs – Simple Problems -Modification of Maxwell's equations for time varying fields – Displacement current – Poynting Theorem and Poynting vector.

***TEXT BOOKS***

1."Engineering Electromagnetics" by William H. Hayt & John. A. Buck Mc. Graw-Hill Companies, 7th Editon.2006.

2. "Electro magnetic Fields" by Sadiku, Oxford Publications-3rd edition-2004

**REFERENCE BOOKS:**

1."Introduction to Electro Dynamics" by D J Griffiths, Prentice-Hall of India Pvt.Ltd, 2nd editon

2.Electromagnetics" by J P Tewari.

3."Electromagnetics" by J. D Kraus Mc Graw-Hill Inc. 4th edition 1992.

4."Electromagnetic fields", by S. Kamakshaiah, Right Publishers, 2007.

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## ELECTRICAL MACHINES – I

**Objective :**

Electrical machines course is one of the important courses of the Electrical discipline. In this course the different types of DC generators and motors which are widely used in industry are covered and their performance aspects will be studied.

***UNIT – I Electromechanical Energy Conversion***

Electromechanical Energy conversion – coupling field reaction- forces and torque in magnetic field systems – energy balance equation – energy and force in a singly excited magnetic field system, determination of magnetic force - co-energy – multi excited magnetic field systems.

***UNIT – II D.C. Generators – Construction & Operation***

D.C. Generators – Principle of operation – Action of commutator – constructional features & essential parts– armature windings – lap and wave windings – simplex and multiplex windings, dummy coils – use of laminated armature – E. M.F Equation – Problems

***UNIT – III Armature reaction in D.C. Generator***

Armature reaction – Cross magnetizing and de-magnetizing AT/pole – compensating winding – commutation – reactance voltage – methods of improving commutation and interpoles.

***UNIT – IV Types of D.C Generators***

Methods of Excitation – separately excited and self excited generators – build-up of E.M.F - critical field resistance and critical speed - causes for failure to self excite and remedial measures and problems.

***UNIT – V Load Characteristics of Generators***

Load characteristics of shunt, series and compound generators – parallel operation of d.c series generators – use of equalizer bar and cross connection of field windings – load sharing, problems.

***UNIT – VI D.C. Motors***

D.C Motors – Principle of operation – Back E.M.F. - Torque equation – characteristics and application of shunt, series and compound motors – Armature reaction and commutation.

***UNIT – VII Speed control of D.C. Motors***

Speed control of d.c. Motors: Armature voltage and field flux control methods. Ward-Leonard system.Principle of 3 point and 4 point starters – protective devices.

***UNIT – VIII Testing of D.C. Machines***

Testing of d.c. machines: Losses – Constant & Variable losses – calculation of efficiency – condition for maximum efficiency.

Methods of Testing – direct, indirect and regenerative testing – brake test – Swinburne's test – Hopkinson's test – Field's test – Retardation test – separation of stray losses in a d.c. motor test, problems.

**TEXT BOOKS:**


1. Electric Machinary – A. E. Fritzgerald, C. Kingsley and S. Umans, Mc Graw-Hill Companies,5th edition.
2. Electrical Machines – P.S. Bimbra., Khanna Publishers-6th edition-2003.


**REFERENCE BOOKS:**


1. Performance and Design of D.C Machines – by Clayton & Hancock, BPB Publishers-1st edition-1990.
2. Electrical Machines -S.K. Battacharya,
3. Electric Machines by I.J. Nagrath & D.P. Kothari, Tata Mc Graw – Hill Publishers, 3rd edition, 2004.
4. Electromechanics – I (D.C. Machines) S. Kamakshaiah Hi-Tech Publishers- Revised edition-2005.

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## FLUID MECHANICS AND HYDRAULIC MACHINES LAB

1. Impact of jets on Vanes
2. Performance Test on Pelton Wheel.
3. Performance Test on Francis Turbine
4. Performance Test on Kaplan Turbine
5. Performance Test on Single Stage Centrifugal Pump
6. Performance Test on Multi Stage Centrifugal Pump
7. Performance Test on Reciprocating Pump
8. Calibration of Venturimeter
9. Calibration of Orifice meter.
10. Determination of friction factor for a given pipe line.
11. Determination of loss of head due to sudden contraction in a pipeline.
12. Turbine flow meter.

**Note:** Any 10 of the above 12 experiments are to be conducted.

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## ELECTRONIC DEVICES AND CIRCUITS LAB

**PART A : (Only for viva voce Examination)**

ELECTRONIC WORKSHOP PRACTICE ( in 3 lab sessions) :

1. Identification, Specifications, Testing of R, L, C Components (Colour Codes), Potentiometers, Switches (SPDT, DPDT, and DIP), Coils, Gang Condensers, Relays, Bread Boards.
2. Identification, Specifications and Testing of Active Devices, Diodes, BJTs, Low power JFETs, MOSFETs,Power Transistors, LEDs, LCDs, SCR, UJT
3. Study and operation of
   - Multimeters (Analog and Digital)
   - Function Generator
   - Regulated Power Supplies
   - CRO

**PART B : (For Laboratory examination – Minimum of 10 experiments)**

1. PN Junction diode characteristics A. Forward bias B. Reverse bias.
2. Zener diode characteristics
3. Transistor CB characteristics (Input and Output)
4. Transistor CE characteristics (Input and Output)
5. Half wave Rectifier with & without filters
6. Full wave Rectifier with & without filters
7. FET characteristics
8. Measurement of h parameters of transistor in CB, CE, CC configurations
9. Frequency Response of CE Amplifier
10. Frequency Response of CC Amplifier
11. Frequency response of Common Source FET amplifier
12. SCR Characteristics
13. UJT Characteristics

**PART C:**

**Equipment required for conducting experiments:**

1. Regulated Power supplies (RPS) - 0-30v
2. CROs - 0-20M Hz.
3. Function Generators - 0-1 M Hz.
4. Multimeters
5. Decade Resitance Boxes/Rheostats
6. Decade Capacitance Boxes
7. Micro Ammeters (Analog or Digital) - 0-20 QA, 0-50QA, 0-100QA, 0-200QA
8. Voltmeters (Analog or Digital) - 0-50V, 0-100V, 0-250V
9. Electronic Components - Resistors, Capacitors, BJTs, LCDs, SCRs, UJTs, FETs, LEDs,MOSFETs,diodes(ge&sitype),transistors(npn & pnp type)



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## MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

**Unit I Introduction to Managerial Economics:**

Definition, Nature and Scope of Managerial Economics–Demand Analysis: Demand Determinants, Law of Demand and its exceptions.

**Unit II Elasticity of Demand**:

Definition, Types, Measurement and Significance of Elasticity of Demand. Demand Forecasting, Factors governing demand forecasting, methods of demand forecasting (survey methods, statistical methods, expert opinion method, test marketing, controlled experiments, judgmental approach to demand forecasting)

**Unit III Theory of Production and Cost Analysis**:

Production Function – Isoquants and Isocosts, MRTS, Least Cost Combination of Inputs, Cobb-Douglas Production function, Laws of Returns, Internal and External Economies of Scale.

**Cost Analysis:** Cost concepts, Opportunity cost, Fixed vs. Variable costs, Explicit costs Vs. Implicit costs, Out of pocket costs vs. Imputed costs. Break-even Analysis (BEA)-Determination of Break-Even Point (simple problems)- Managerial Significance and limitations of BEA.

**Unit IV Introduction to Markets & Pricing Policies:**

**Market structures:** Types of competition, Features of Perfect competition, Monopoly and Monopolistic Competition. Price-Output Determination in case of Perfect Competition and Monopoly.

**Objectives and Policies of Pricing- Methods of Pricing:** Cost Plus Pricing, Marginal Cost Pricing, Sealed Bid Pricing, Going Rate Pricing, Limit Pricing, Market Skimming Pricing, Penetration Pricing, Two-Part Pricing, Block Pricing, Bundling Pricing, Peak Load Pricing, Cross Subsidization.

**Unit V Business & New Economic Environment**:

Characteristic features of Business, Features and evaluation of Sole Proprietorship, Partnership, Joint Stock Company, Public Enterprises and their types, Changing Business Environment in Post-liberalization scenario.

**Unit VI Capital and Capital Budgeting**:

Capital and its significance, Types of Capital, Estimation of Fixed and Working capital requirements, Methods and sources of raising finance.

Nature and scope of capital budgeting, features of capital budgeting proposals, Methods of Capital Budgeting: Payback Method, Accounting Rate of Return (ARR) and Net Present Value Method (simple problems)

**Unit VII Introduction to Financial Accounting:**

Double-Entry Book Keeping, Journal, Ledger, Trial Balance- Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments).

**Unit VIII Financial Analysis through ratios:**

Computation, Analysis and Interpretation of Liquidity Ratios (Current Ratio and quick ratio), Activity Ratios (Inventory turnover ratio and Debtor Turnover ratio), Capital structure Ratios (Debt- Equity ratio, Interest Coverage ratio), and Profitability ratios (Gross Profit Ratio, Net Profit ratio, Operating Ratio, P/E Ratio and EPS).

**TEXT BOOKS:**

1. Aryasri: Managerial Economics and Financial Analysis, 2/e, TMH, 2005.
2. Varshney & Maheswari: Managerial Economics, Sultan Chand, 2003.

**REFERENCES:**

1. Ambrish Gupta, Financial Accounting for Management, Pearson Education, New Delhi.
2. H. Craig Peterson & W. Cris Lewis, Managerial Economics, PHI, 4th Ed.
3. Suma Damodaran, Managerial Economics, Oxford University Press.
4. Lipsey & Chrystel, Economics, Oxford University Press.
5. S. A. Siddiqui & A. S. Siddiqui, Managerial Economics & Financial Analysis, New age International Space Publications.
6. Domnick Salvatore: Managerial Economics In a Global Economy, 4th Edition, Thomson.
7. Narayanaswamy: Financial Accounting—A Managerial Perspective, PHI.
8. Raghunatha Reddy & Narasimhachary: Managerial Economics& Financial Analysis, Scitech.
9. S.N.Maheswari & S.K. Maheswari, Financial Accounting, Vikas.
10. Truet and Truet: Managerial Economics:Analysis, Problems and Cases, Wiley.
11. Dwivedi:Managerial Economics, 6th Ed., Vikas.

**Prerequisites:** Nil

**Objective:** To explain the basic principles of managerial economics, accounting and current business environment underlying business decision making.

**Codes/Tables:** Present Value Tables need to be permitted into the examinations Hall.

**Question Paper Pattern:** 5 Questions to be answered out of 8 questions.
Each question should not have more than 3 bits.

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## POWER SYSTEMS-I

**Objective :**

Electrical Power plays significant role in day to day life of entire mankind. This course concerns the generation and distribution of power along with the economic aspects.

**UNIT-1 Thermal Power Stations**

Line diagram of Thermal Power Station (TPS) showing paths of coal, steam, water, air, ash and flue gasses.- Brief description of TPS components: Economizers, Boilers, Super heaters, Turbines, Condensers, Chimney and Cooling towers.

**UNIT-2 Gas and Nuclear Power Stations**

Nuclear Power Stations: Nuclear Fission and Chain reaction.- Nuclear fuels.- Principle of operation of Nuclear reactor.-Reactor Components: Moderators, Control rods, Reflectors and Coolants.- Radiation hazards: Shielding and Safety precautions.- Types of Nuclear reactors and brief description of PWR, BWR and FBR.

Gas Power Stations: Principle of Operation and Components ( Block Diagram Approach Only)

**UNIT-3 General Aspects of Distribution Systems and D.C. Distribution Systems**

Classification of Distribution Systems - Comparison of DC vs AC and Under-Ground vs Over - Head Distribution Systems- Requirements and Design features of Distribution Systems-Voltage Drop Calculations (Numerical Problems) in D.C Distributors for the following cases: Radial D.C Distributor fed one end and at the both the ends (equal/unequal Voltages) and Ring Main Distributor.

**Unit-4 A.C. Distribution Systems.**

Voltage Drop Calculations (Numerical Problems) in A.C. Distributors for the following cases: Power Factors referred to receiving end voltage and with respect to respective load voltages.

**Unit-5 Substations.**

Classification of substations: **Air insulated substations** - Indoor & Outdoor substations: Substations layout showing the location of all the substation equipment. Bus bar arrangements in the Sub-Stations: Simple arrangements like single bus bar, sectionalized single bus bar, main and transfer bus bar system with relevant diagrams.

**Gas insulated substations (GIS)** – Advantages of Gas insulated substations, different types of gas insulated substations, single line diagram of gas insulated substations, bus bar, construction

aspects of GIS, Installation and maintenance of GIS, Comparison of Air insulated substations and Gas insulated substations.

**UNIT-6 Power factor and Voltage Control**

Causes of low p.f -Methods of Improving p.f -Phase advancing and generation of reactive KVAR using static Capacitors-Most economical p.f. for constant KW load and constant KVA type loads, Numerical Problems. Dependency of Voltage on Reactive Power flow.- Methods of Voltage Control: Shunt Capacitors, Series Capacitors, Synchronous Capacitors, Tap changing and Booster Transformers

**UNIT-7 Economic Aspects of Power Generation**

Load curve, load duration and integrated load duration curves-load, demand, diversity, capacity, utilization and plant use factors- Numerical Problems.

**Unit-8 Tariff Methods**

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

**TEXT BOOKS**


1. A Text Book on Power System Engineering by M.L.Soni, P.V.Gupta, U.S.Bhatnagar and A.Chakraborti, Dhanpat Rai & Co. Pvt. Ltd., 1999.
2. Principles of Power Systems by V.K Mehta and Rohit Mehta S.CHAND& COMPANY LTD., New Delhi 2004.


**REFERENCE BOOKS**


1. Elements of Power Station design and practice by M.V. Deshpande, Wheeler Publishing -3rd edition-1986.
2. Electrical Power Systems by C.L.Wadhawa New age International (P) Limited, Publishers 1997.
3. Electrical Power Generation, Transmission and Distribution by S.N.Singh., PHI, 2003.
4. Gas turbine performance, by PP Wals, P.Fletcher, Blackwell Publisher, 2004.




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**II Year B.Tech EEE II-Sem** **L T/P/D C**
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## ELECTRONIC CIRCUITS

**UNIT I : SINGLE STAGE AMPLIFIERS DESIGN AND ANALYSIS :** Review of CE, CB,CC&CS amplifiers- Classification of Amplifiers, Distortion in amplifiers-Approximate analysis,CE, CB,CC amplifiers comparison.

**UNIT II : BJT & FET FREQUENCY RESPONSE**

Logarithms-Decibels-General frequency consideration-Low frequency analysis-Low frequency response of BJT amplifiers-low frequency response of FET amplifier-Miller effect capacitance-High frequency response of BJT amplifier-square wave testing

**UNIT III: FEEDBACK AMPLIFIERS:** Concept of feedback, Classification of feedback amplifiers, General characteristics of negative feedback amplifiers, Effect of Feedback on amplifier characteristics, Voltage series, voltage shunt, current series, and current shunt feedback configuration –simple problems

**UNIT IV: OSCILLATORS:** Condition for oscillations. RC& LC oscillators, Crystal oscillators Frequency and amplitude stability of oscillators.Generalized analysis of LC oscillators, Quartz, Hartley and Colpitts oscillators, RC phase shift & Wien bridge oscillator,

**UNIT V : LARGE SIGNAL AMPLIFIERS :** Class A Power Amplifier, Maximum Value of Efficiency of Class A Amplifier, Transformer Coupled Amplifier, Transformer Coupled Audio Amplifier, Push Pull Amplifier, Complimentary Symmetry Circuits (Transformer Less Class B Power Amplifier), Phase Inverters, Class D Operation, Class S Operation, Heat Sinks.

**LINEAR WAVE SHAPING :** High pass, low pass RC Circuits, their response for sinusoidal, step, pulse, square and ramp inputs

**UNIT VI: CLIPPERS ANDCLAMPERS:**

Diode clippers, Transistor clippers, clipping at two independent levels, Transfer characteristics of clippers, Emitter coupled clipper, Comparators, applications of voltage comparators, clamping operation, clamping circuits using diode with different inputs, Clamping circuit theorem, practical clamping circuits, effect of diode characteristics on clamping voltage, Transfer characteristics of clampers.

**UNIT VII: SWITCHING CHARACTERISTICS OF DEVICES:** Diode and Transistor as switches, Break down voltage consideration of transistor, saturation parameters of Transistor and their variation with temperature, Design of transistor switch, transistor-switching times.

**UNIT VIII: MULTIVIBRATORS:** Analysis & design of Bistable, Monostable, Astable Multivibrators and Schmitt trigger using transistors.

**TEXT BOOKS :**

1. Electronic Devices and Circuit Theory, Robert L. Boylestad, Louis Nasheisky, 9th Edition 2007, Pearson Education

2. Electronic Devices and Circuits by S.Salivahanan, N.Suresh Kumar and A.Vallavaraj, 2nd edition 2008, Tata McGraw Hill Companies

3. Solid State Pulse Circuits by David a.Bell, 4th Edition, Prentice Hall of India-1992

**REFERENCES:**

1. Introductory Electronic Devices and circuits (Conventional flow version)- Robert T. Paynter, 7th Edition, 2009,PEI

2. Electronic Devices and Circuits, Anil K. Maini, Varsha Agarwal, 1st Edition, WILEY.

3. Pulse, Digital & Switching Waveforms by Jacob Mlliman, Harbert Taub and Mothiki S Prakash Rao, 2nd edition 2008, Tata McGraw Hill Companies.



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## ENVIRONMENTAL STUDIES

**UNIT-I : ECOSYSTEMS:** Definition, Scope and Importance of ecosystem, Concept of ecosystem, Classifications of ecosystem, Structure and Structural Components of an ecosystem, Functions of ecosystem, Food chains, food webs and ecological pyramids. Flow of energy, Biogeochemical cycles, Homeostasis / Cybernetics, Food chain concentration, Biomagnification, ecosystems value, services and carrying capacity.

**UNIT-II: NATURAL RESOURCES:** Classification of Resources: Living and Non-Living resources, Renewable and non-renewable resources. Water resources use and over utilization of surface and ground water, floods and droughts, Dams: benefits and problems. Mineral resources: use and exploitation, environmental effects of extracting and using mineral resources- case studies. Energy resources: growing energy needs, renewable and non renewable energy sources, use of alternative energy sources – case studies. Land resources: land as a resource, land degradation, man induced landslides and land use / land cover mapping.

**UNIT-III: BIODIVERSITY AND BIOTIC RESOURCES:** Introduction, Definition, genetic, species and ecosystem diversity. Value of biodiversity: consumptive use, social, ethical, aesthetic and intrinsic values. Hot spots of biodiversity. Threats to biodiversity: habit loss, poaching of wildlife, man-wildlife conflicts, conversation of biodiversity: In-Situ and Ex-situ conversation. Food and fodder resources, Timber and non-timber forest products.

**UNIT-1V: ENVIRONMENTAL POLLUTION AND CONTROL:** Classification of pollution and pollutants, causes, effects and control technologies. Air Pollution: Primary and secondary pollutants, Automobile and Industrial pollution, Ambient air quality standards. Water pollution: point and non-point sources of pollution, Major pollutant of water and their sources, drinking water quality standards, Waste water treatment methods: effluent treatment plants (ETP), Sewage treatment plants (STP), common and combined effluent treatment plants (CEPT). Soil pollution: Soil as sink for pollutants, Impact of modern agriculture on soil, degradation of soil. Marine Pollution: Misuse of International water for dumping of hazardous waste, coastal pollution due to sewage and marine disposal of industrial effluents. Noise Pollution: Sources, Industrial Noise- Occupational Health hazards, standards, Methods of control of Noise. Thermal Pollution: Thermal Comforts, Heat Island effect, Radiation effects, Nuclear Pollution: Nuclear power plants, nuclear radiation, disasters and impacts, genetical disorders. Solid waste: types, Collection processing and disposal of industrial and municipal solid wastes composition and characteristics of e-waste and its management.

**UNIT-V: GLOBAL ENVIRONMENTAL PROBLEMS AND GLOBAL EFFORTS:** Green house effect, Green Houses Gases (GHG), Global Warming, Sea level rise, climatic change and their impacts on human environment. Ozone depletion and Ozone depleting substances (ODS). Deforestation and desertification. International convections / Protocols: Earth summit, Kyoto protocol and Montreal Protocol.

**UNIT-VI: ENVIRONMENTAL IMPACT ASSESSMENT (EIA) AND ENVIRONMENTAL MANAGEMENT PLAN:** Definition of Impact: classification of impacts, Positive and Negative, Reversible and irreversible, light, moderate and severe, methods of baseline data acquisition. Impacts on different components: such as human health resources, air, water, flora, fauna and society. Prediction of impacts and impact assessment methodologies. Environmental Impact Statement (EIS). Environmental Management plan (EMP): Technological Solutions, preventive methods, Control technologies, treatment technologies: green-belt-development, rain water harvesting, Remote sensing and GIS methods.

**UNIT-VII: ENVIRONMENTAL POLICY, LEGISLATION,RULES AND REGULATIONS:** National Environmental Policy, Environmental Protection act, Legal aspects Air (Prevention and Control of Pollution) Act- 1981, Water( Prevention and control of pollution ) Act-1974, Water pollution Cess Act- 1977, Forest Conservation Act, Municipal solid waste management and handling rules, biomedical waste management and handling rules, hazardous waste management and handling rules.

**UNIT-VIII- TOWARDS SUSTAINABLE FUTURE:** Concept of Sustainable Development, Threats to Sustainability, Population and its explosion, Crazy Consumerism,

Over-exploitation of resources, Strategies for Achieving Sustainable development, Environmental Education, Conservation of Resources, Urban Sprawl, Sustainable Cities and Sustainable Communities, Human health, Role of IT in Environment, Environmental Ethics, Environmental Economics, Concept of Green Building, Clean Development Mechanism(CDM).

**TECT BOOKS:**


1. Environmental studies, From crisis to cure by R.Rajagopalan,2005
2. Text book of Environmental Science and Technology by M.Anji Reddy 2007
3. Environmental studies by Erach Bharuchu 2005, University Grants Commission, University press.


**REFERENCE BOOKS:**


1. Environmental Science towards a sustainable future by Richard T. Wright 2008 PHL Learning private Ltd. New Delhi.
2. Environmental Engineering and science by Gilbert M>Masters and Wendell P.Ela.2008 PHI Learning Pvt Ltd.






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## NETWORK THEORY

**UNIT-I Three phase circuits**

Three phase circuits: Phase sequence- Star and delta connection-Relation between line and phase voltages and currents in balanced systems-Analysis of balanced& unbalanced three phase circuits- Measurement of Active and Reactive power in balanced three phase systems.

**UNIT-II D.C Transient Analysis**

Transient response of R-L, R-C, R-L-C series series& parallel circuits for D.C excitation-Initial conditions-solution method using differential equation and laplace transforms

**UNIT-III A.C Transient Analysis**

Transient response of R-L, R-C, R-L-C series& parallel circuits for sinusoidal excitations-Initial conditions-Solution method using differential equations and Laplace transforms

**UNIT IV Network Functions:** the concept of complex frequency, physical interpretation of complex frequency, transform impedance and transform circuit, series and parallel combination of element, terminal pairs or ports, network functions for one port and two port, poles and zeroes of network functions, significance of poles and zeros, properties of driving point functions, properties of transfer functions, necessary condition for driving point function , necessary condition for transfer functions, time domine response from pole zero plot.

**UNIT-V Two Port Networks - I**

Two port network parameters – Z, Y, ABCD and hybrid parameters and their relations.

**UNIT-VI Two Port Networks -II**

Cascaded networks Concept of transformed network - 2port network parameters using transformed variables.

**UNIT VII Filters**

Low Pass, High Pass, Band Pass, Band Elimination, Prototype filters design

**UNIT-VIII Fourier analysis of A.C Circuits**

Fourier theorem- consideration of symmetry, exponential form of Fourier series – line spectra and phase angle spectra- Fourier Integrals and Fourier Transforms – properties of Fourier Transforms

**TEXT BOOKS :**


1. Network Analysis – ME Van Valkenburg, Prentice Hall of India, 3rd Edition, 2000.
2. Networks, Lines and Fields - JD Ryder, PHI, 2nd Edition, 1999.

3.Engineering Circuit Analysis by William Hayt and Jack E.Kemmerley,Mc Graw Hill Company,6 th edition

**REFERENCES :**

1. Network Analysis – N.C.Jagan and C.Lakshminarayana, B.S. Publications, 2006.

2. Electric Circuits – J.Edminister and M.Nahvi – Schaum's Outlines, TMH, 1999.

3. Electrical circuits by A.Chakarborthy, Dhanpath Rai & Co-6th edition-2010.

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## ELECTRICAL MACHINES – II

**Objective :**

As an extension of Electrical machines I course this subject facilitates to study of the performance of Transformers and Induction motors which are the major part of industrial drives and agricultural pump sets.

**UNIT-I Single Phase Transformers – Construction & Operation**

Single phase transformers-types - constructional details-principle of operation of transformer and EMF equation-minimization of hysteresis and eddy current losses- operation on no load and on load - phasor diagrams

**UNIT-II Single Phase Transformers - Performance**

Equivalent circuit - losses and efficiency-regulation. All day efficiency - effect of variations of frequency & supply voltage on iron losses.

**UNIT-III Testing of Single Phase Transformer and Autotransformer**

OC and SC tests - Sumpner's test - predetermination of efficiency and regulation-separation of losses test-parallel operation with equal and unequal voltage ratios - auto transformers-equivalent circuit - comparison with two winding transformers.

**UNIT-IVPolyphase Transformers**

Polyphase transformers - Polyphase connections - Y/Y, Y/Δ, Δ/Y, Δ/Δ and open Δ, Third harmonics in phase voltages-three winding transformers-tertiary windings-determination of Zp, Zs and Zt transients in switching - off load and on load tap changing; Scott connection.

**UNIT-V Polyphase Induction Motors**

Polyphase induction motors-construction details of cage and wound rotor machines-production of a rotating magnetic field - principle of operation - rotor emf and rotor frequency - rotor reactance, rotor current and pf at standstill and during operation.

**UNIT-VICharacteristics of Induction Motors**

Rotor power input, rotor copper loss and mechanical power developed and their inter relation-torque equation-deduction from torque equation - expressions for maximum torque and starting torque - torque slip characteristic - double cage and deep bar rotors - equivalent circuit - phasor diagram - crawling and cogging

**UNIT-VII Circle Diagram of Induction Motors**

Circle diagram-no load and blocked rotor tests-predetermination of performance-methods of starting and starting current and torque calculations

**UNIT-VIII Speed Control Methods**

Speed control-change of frequency; change of poles and methods of consequent poles; cascade connection. injection of an emf into rotor circuit (qualitative treatment only)-induction generator-principle of operation.

**TEXT BOOKS:**

1. Electric machinery - A.E. Fitzgerald, C.Kingsley and S.Umans, Mc Graw Hill Companies, 5th edition,2003.

2. Electrical machines-PS Bhimbra, Khanna Publishers-6th edition-2003.

**REFERENCE BOOKS:**

1. Performance and Design of AC Machines by MG.Say, BPB Publishers-2000.

2. Theory of Alternating Current Machinery- by Langsdorf, Tata McGraw-Hill Companies, 2nd edition 1990.

3. Electric Machines –by I.J.Nagrath & D.P.Kothari,Tata Mc Graw Hill, 7th Edition.2005

4. Electromechanics-II (transformers and induction motors) S. Kamakashaiah Hitech publishers

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**ELECTRICAL MACHINES LAB – I**

**The following EIGHT experiments are to be compulsorily conducted:**

1. Magnetization characteristics of DC shunt generator. Determination of critical field resistance and critical speed.
2. Load test on DC shunt generator. Determination of characteristics.
3. Load test on DC series generator. Determination of characteristics.
4. Load test on DC compound generator. Determination of characteristics.
5. Hopkinson's test on DC shunt machines. Predetermination of efficiency.
6. Fields test on DC series machines. Determination of efficiency.
7. Swinburne's test and speed control of DC shunt motor. Predetermination of efficiencies.
8. Brake test on DC compound motor. Determination of performance curves.

**In addition to the above eight experiments, at least any two of the experiments from the following list are to be conducted:**

9. Brake test on DC shunt motor. Determination of performance curves.
10. Retardation test on DC shunt motor. Determination of losses at rated speed.
11. Separation of losses in DC shunt motor.

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## ELECTRICAL CIRCUITS AND SIMULATION LAB

**PART-A: ELECTRICAL CIRCUITS (**Any Eight experiments are to be conducted**)**

1) Thevenin's, Norton's and Maximum Power Transfer Theorems
2) Superposition theorem and RMS value of complex wave
3) Verification of Compensation Theorem
4) Reciprocity , Millmann's Theorems
5) Locus Diagrams of RL and RC Series Circuits
6) Series and Parallel Resonance
7) Determination of Self, Mutual Inductances and Coefficient of coupling
8) Z and Y Parameters
9) Transmission and hybrid parameters
10) Measurement of Active Power for Star and Delta connected balanced loads
11) Measurement of Reactive Power for Star and Delta connected balanced loads
12) Measurement of 3-phase Power by two Wattmeter Method for unbalanced loads

**PART-B: PSPICE SIMULATION (**Any Two experiments are to be conducted**)**

1) Simulation of DC Circuits
2) DC Transient response
3) Mesh Analysis
4) Nodal Analysis

**NOTE:**

- PSPICE Software Package is necessary.

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## IC APLLICATIONS

### Part-1 : LINEAR INTEGRATED CIRCUITS

**UNIT I: INTEGRATED CIRCUITS**

***Moore's Law, Classification, basic information of Op-amp, ideal and practical Op-amp, internal circuits, Op-amp characteristics, DC and AC characteristics, 741 op-amp and its features, modes of operation of Op-amp, applications of Op-amp.***

**UNIT II: OP-AMP APPLICATIONS**

Instrumentation amplifier, ac amplifier, V to I and I to V converters, sample & hold circuits, multipliers and dividers, Differentiators and Integrators, Comparators, Schmitt trigger, Multivibrators, introduction to voltage regulators, features of 723.

***UNIT III: ACTIVE FILTERS & OSCILLATORS***

*Introduction, 1st order LPF, HPF filters. Band pass, Band reject and all pass filters (Butter worth and cheybshev fitter). Oscillator types and principle of operation – RC, Wien and quadrature type, waveform generators – triangular, saw tooth, square wave and VCO.*

***UNIT IV: TIMERS & PHASE LOCKED LOOPS***

*Introduction to 555 timer, functional diagram, monostable, bistable and astable operations and applications, Schmitt Trigger. PLL - introduction, block schematic, principles and description of individual blocks of 565.*

### Part-2: DATA CONVERTER INTEGARTOR CIRCUIT IC's

**UNIT V: D-A AND A- D CONVERTERS**

Introduction, basic DAC techniques, weighted resistor DAC, R-2R ladder DAC, inverted R-2R DAC, and IC 1408 DAC, Different types of ADCs - parallel comparator type ADC, counter type ADC, successive approximation ADC and dual slope ADC. DAC and ADC specifications.

**Part-3: DIGITAL INTEGRATED CIRCUITS**

**UNIT VI: INTRODUCTION**

Classification of Integrated circuits, comparison of various logic families, standard RTL,DTL,TTL NAND Gate- Analysis& characteristics, TTL open collector O/Ps, Tristate TTL, MOS & CMOS open drain and tristate outputs, CMOS transmission gate, IC interfacing- TTL driving CMOS & CMOS driving TTL .

**UNIT VII: COMBINATIONAL CIRCUITS**

Design using TTL-74XX & CMOS 40XX series, code converters, decoders, Demultiplexers, decoders & drives for LED & LCD display. Encoder, priority Encoder, multiplexers & their applications, priority generators/checker circuits.Digital arithmetic circuits-parallel binary adder/subtractor circuits using 2's, Complement system. Digital comparator circuits.

**UNIT VIII: SEQUENTIAL CIRCUITS**

Flip-flops & their interrelationships. Design of synchronous counters. Decade counter, shift registers & applications, familiarities with commonly available 74XX & CMOS 40XX series of IC counters.

**TEXT BOOKS**


1. Linear Integrated Circuits –D. Roy Chowdhury, New Age International (p) Ltd, 2nd Ed., 2003.
2. Op-Amps & Linear ICs – Ramakanth A. Gayakwad, PHI, 1987.
3. Digital Fundamentals – Floyd and Jain, Pearson Education,8th Edition, 2005.


**REFERENCES:**


1. Operational Amplifiers and Linear Integrated Circuits – R.F. Coughlin and Fredrick F. Driscoll, PHI, 1977.
2. Op Amps & linear integrated circuits – concepts and applications James M.Fiore cengage lerning 2009.
3. Operating Amplifiers and Linear Integrated Circuits:4/e William D Stanley PEI 2009.
4. Operational Amplifiers and Linear Integrated Circuits: Theory and Applications – Denton J. Daibey, TMH.
5. Operational Amplifiers and Linear Integrated Circuits K.Lal Kishore pearson 2008.
6. Modern Digital Electronics RP Jain 4/e TMH 2010.
7. Design with Operational Amplifiers and Analog Integrated Circuits - Sergio Franco, McGraw Hill, 3rd Ed., 2002.






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## ELECTRICAL MEASUREMENTS

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***UNIT-I Measuring Instruments***

Classification – deflecting, control and damping torques – Ammeters and Voltmeters – PMMC, moving iron type instruments – expression for the deflecting torque and control torque – Errors and compensations, extension of range using shunts and series resistance. Electrostatic Voltmeters-electrometer type and attracted disc type – Extension of range of E.S. Voltmeters.

***UNIT –II Instrument transformers***

a) CT and PT – Ratio and phase angle errors – design considerations and testing of CT & PT

b) Types of P.F. Meters – dynamometer and moving iron type – 1-ph and 3-ph meters – Frequency meters – resonance type and Weston type – synchroscopes.

***UNIT –III Measurement of Power***

Single phase dynamometer wattmeter, LPF and UPF, Double element and three element dynamometer wattmeter, expression for deflecting and control torques – Extension of range of wattmeter using instrument transformers – Measurement of active and reactive powers in balanced and unbalanced systems.

***UNIT –IV Measurement of Energy***

Single phase induction type energy meter – driving and braking torques – errors and compensations – testing by phantom loading using R.S.S. meter. Three phase energy meter – trivector meter, maximum demand meters.

***UNIT – V Potentiometers***

Principle and operation of D.C. Crompton's potentiometer – standardization – Measurement of unknown resistance, current, voltage.A.C. Potentiometers: polar and coordinate types standardization – applications.

***UNIT – VI Resistance Measurements***

Method of measuring low, medium and high resistance – sensitivity of Wheatstone's bridge – Carey Foster's bridge, Kelvin's double bridge for measuring low resistance, measurement of high resistance – loss of charge method.

***UNIT –VII A.C. Bridges***

Measurement of inductance, Quality Factor - Maxwell's bridge, Hay's bridge, Anderson's bridge, Owen's bridge. Measurement of capacitance and loss angle - Desauty bridge. Wien's bridge – Schering Bridge.

***UNIT – V III Magnetic Measurements:***

Ballistic galvanometer – equation of motion – flux meter – constructional details, comparison with ballistic galvanometer.

***TEXT BOOK:***

1. Electrical Measurements and measuring Instruments – by E.W. Golding and F.C. Widdis, fifth Edition, Wheeler Publishing.
2. Electrical & Electronic Measurement & Instruments by A.K.Sawhney Dhanpat Rai & Co. Publications.

**REFERENCE BOOKS:**

1. Electrical Measurements – by Buckingham and Price, Prentice – Hall
2. Electrical Measurements by Harris.
3. Electrical Measurements: Fundamentals, Concepts, Applications – by Reissland, M.U, New Age International (P) Limited, Publishers.





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**POWER SYSTEMS-II**

**UNIT-I Transmission Line Parameters**

Types of conductors - calculation of resistance for solid conductors - Calculation of inductance for single phase and three phase, single and double circuit lines, concept of GMR & GMD, symmetrical and asymmetrical conductor configuration with and without transposition, Numerical Problems.

Calculation of capacitance for 2 wire and 3 wire systems, effect of ground on capacitance, capacitance calculations for symmetrical and asymmetrical single and three phase, single and double circuit lines, Numerical Problems.

**UNIT-II Performance of Short and Medium Length Transmission Lines**

Short, medium and long line and their model representations - Nominal-T, Nominal-Pie and A, B, C, D Constants for symmetrical & Asymmetrical Networks, Numerical Problems. Mathematical Solutions to estimate regulation and efficiency of all types of lines - Numerical Problems.

**UNIT-III Performance of Long Transmission Lines**

Long Transmission Line-Rigorous Solution, evaluation of A,B,C,D Constants, Interpretation of the Long Line Equations, Incident, Reflected and Refracted Waves -Surge Impedance and SIL of Long Lines, Wave Length and Velocity of Propagation of Waves - Representation of Long Lines - Equivalent-T and Equivalent Pie network models (numerical problems).

***UNIT – IV Power System Transients***

Types of System Transients - Travelling or Propagation of Surges - Attenuation, Distortion, Reflection and Refraction Coefficients - Termination of lines with different types of conditions - Open Circuited Line, Short Circuited Line, T-Junction, Lumped Reactive Junctions (Numerical Problems). Bewley's Lattice Diagrams (for all the cases mentioned with numerical examples).

**UNIT-V Various Factors Governing the Performance of Transmission lines**

Skin and Proximity effects - Description and effect on Resistance of Solid Conductors -Ferranti effect - Charging Current - Effect on Regulation of the Transmission Line, Shunt Compensation. Corona - Description of the phenomenon, factors affecting corona, critical voltages and power loss, Radio Interference.

**UNIT-VI Overhead Transmission Line Insulators**

Types of Insulators, String efficiency and Methods for improvement, Numerical Problems - voltage distribution, calculation of string efficiency, Capacitance grading and Static Shielding.

**UNIT-VII Sag and Tension Calculations**

Sag and Tension Calculations with equal and unequal heights of towers, Effect of Wind and Ice on weight of Conductor, Numerical Problems - Stringing chart and sag template and its applications.

**UNIT-VIII Underground Cables**

Types of Cables, Construction, Types of Insulating materials, Calculations of Insulation resistance and stress in insulation, Numerical Problems. Capacitance of Single and 3-Core belted cables, Numerical Problems. Grading of Cables - Capacitance grading, Numerical Problems, Description of Inter-sheath grading.

**TEXT BOOKS:**

1. A Text Book on Power System Engineering by M.L.Soni, P.V.Gupta, U.S.Bhatnagar, A.Chakrabarthy, Dhanpat Rai & Co Pvt. Ltd-6th edition-2003.

2. Electrical power systems - by C.L.Wadhwa, New Age International (P) Limited, Publishers,1998.

**REFERENCE BOOKS:**

1. Power system Analysis-by John J Grainger William D Stevenson TMC Companies, 4th edition,1982.
2. Power System Analysis and Design by B.R.Gupta, Wheeler Publishing-3rd edition,1998.
3. Power System Analysis by Hadi Saadat – TMH Edition-2004.
4. Modern Power System Analysis by I.J.Nagaraj and D.P.Kothari, Tata McGraw Hill, 2nd Edition-2001.



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## CONTROL SYSTEMS

***UNIT – I INTRODUCTION***

Concepts of Control Systems- Transfer function, Basics of matrices, Differential Equations, Integral Equations, Open Loop and closed loop control systems and their differences- With examples of control systems, Feed-Back Characteristics, Effects of feedback. Mathematical modelling of Translational and Rotational mechanical systems.

**UNIT II TRANSFER FUNCTION REPRESENTATION**

Transfer Function of DC Servo motor - AC Servo motor- Synchros, Block diagram representation of systems considering electrical systems as examples -Block diagram algebra – Representation by Signal flow graph - Reduction using Mason's gain formula.

**UNIT-III TIME RESPONSE ANALYSIS**

Standard test signals - Time response of first order systems – Characteristic Equation of Feedback control systems, Transient response of second order systems - Time domain specifications – Steady state response - Steady state errors and error constants – Effects of proportional, derivative, Integral, proportional derivative , proportional Integral, proportional integral derivative systems.

**UNIT – IV STABILITY ANALYSIS IN S-DOMAIN**

The concept of stability – Routh's & Hurwitz stability criterion – qualitative stability and conditional stability – limitations of Routh's stability

**Root Locus Technique:**The root locus concept - construction of root loci-effects of adding poles and zeros to G(s)H(s) on the root loci.

***UNIT – V FREQUENCY RESPONSE ANALYSIS***

Introduction, Frequency domain specifications-Bode diagrams-Determination of Frequency domain specifications and transfer function from the Bode Diagram-Phase margin and Gain margin-Stability Analysis from Bode Plots.

***UNIT – VI STABILITY ANALYSIS IN FREQUENCY DOMAIN***

Polar Plots-Nyquist Plots-Stability Analysis. Constant M and N circles.

***UNIT – VII CLASSICAL CONTROL DESIGN TECHNIQUES***

Compensation techniques – Lag, Lead, Lead-Lag Controllers design in frequency Domain, PID Controllers (Conventional and Discrete).

***UNIT – VIII STATE SPACE ANALYSIS OF CONTINUOUS SYSTEMS***

Concepts of state, state variables and state model, derivation of state models from block diagrams, Diagonalization- Solving the Time invariant state Equations- State Transition Matrix and it's Properties – Concepts of Controllability and Observability (for state and output).

**TEXT BOOKS:**


1. Automatic Control Systems 8th edition– by B. C. Kuo 2003– John wiley and son's.,
2. Automatic control systems 7th edition – by B.C.Kuo 2009-PHI/John Wiley 8ed.
3. Control Systems Engineering – by I. J. Nagrath and M. Gopal, New Age International (P) Limited, Publishers, 2nd edition.
4. Control systems principles and Design – by I.M.Gopal , TMH 3rd edition , 2008.


**REFERENCE BOOKS:**


1. Modern Control Engineering – by Katsuhiko Ogata – Prentice Hall of India Pvt. Ltd., 3rd edition, 1998.
2. Control systems by Anand Kumar, PHI 2008.
3. Control Systems by N.K.Sinha, New Age International (P) Limited Publishers, 3rd Edition, 1998.
4. Control Systems Engg. by NISE 5th Edition – John wiley-2000.
5. "Modelling & Control Of Dynamic Systems" by Narciso F. Macia George J. Thaler, Thomson Publishers.




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## POWER ELECTRONICS

**UNIT – I POWER SEMI CONDUCTOR DEVICES**

Thyristors – Silicon Controlled Rectifiers (SCR's) – BJT – Power MOSFET – Power IGBT and their characteristics and other thyristors – Basic theory of operation of SCR – Static characteristics – Turn on and turn off methods- Dynamic characteristics of SCR - Turn on and Turn off times -Salient points (data sheets , manufacturers).

**UNIT – II DEVICES AND COMMUTATION CIRCUITS**

Two transistor analogy – SCR - UJT firing circuit –— Series and parallel connections of SCR's – Snubber circuit details – Specifications and Ratings of SCR's, BJT, IGBT - Numerical problems – Line Commutation and Forced Commutation circuits.

**UNIT – III SINGLE PHASE HALF CONTROLLED CONVERTERS**

Phase control technique – Single phase Line commutated converters – Mid point and Bridge connections – Half controlled converters with Resistive, RL loads and RLE load– Derivation of average and rms values of load voltage and current -Active and Reactive power inputs to the converters without and with Free wheeling Diode –Numerical problems

**UNIT – IV SINGLE PHASE FULLY CONTROLLED CONVERTERS**

Fully controlled converters, Mid point and Bridge connections with Resistive, RL loads and RLE load– Derivation of average and rms values of load voltage and current – Line commutated inverters -Active and Reactive power inputs to the converters without and with Freewheeling Diode, Effect of source inductance – Derivation of load voltage and current – Numerical problems.

**UNIT – V THREE PHASE LINE COMMUTATED CONVERTERS**

Three phase converters – Three pulse and six pulse converters – Mid point and bridge connections -average and rms load voltage With R and RL loads – Effect of Source inductance– Dual converters (both single phase and three phase) - Waveforms –Numerical Problems.

**UNIT – VI AC VOLTAGE CONTROLLERS & CYCLO CONVERTERS**

AC voltage controllers – Single phase two SCR's in anti parallel – With R and RL loads – modes of operation of Triac – Triac with R and RL loads – Derivation of RMS load voltage, current and power factor wave forms – Firing circuits -Numerical problems -Cyclo converters – Single phase mid point cyclo converters with Resistive and inductive load (Principle of operation only) – Bridge configuration of single phase cyclo converter (Principle of operation only) – Waveforms

**UNIT – VII CHOPPERS**

Choppers – Time ratio control and Current limit control strategies – Step down choppers Derivation of load voltage and currents with R, RL and RLE loads- Step up Chopper – load voltage expression-Morgan's chopper – Jones chopper and Oscillation chopper (Principle of operation only) Waveforms — AC Chopper – Problems.

**UNIT – VIII INVERTERS**

Single phase inverters – Classification-Basic series inverter and basic parallel inverters, – single-phase half and full-bridge inverters with R and R-L Loads – Waveforms.

**TEXT BOOKS :**


1. Power Electronics – by M. D. Singh & K. B. Kanchandhani, Tata Mc Graw – Hill Publishing company, 1998.
2. Power Electronics : Circuits, Devices and Applications – by M. H. Rashid, Prentice Hall of India, 2nd edition, 1998


**REFERENCE BOOKS :**


1. Power Electronics – by Vedam Subramanyam, New Age International (P) Limited, Publishers -1997.
2. Power Electronics - by V.R.Murthy , 1st edition -2005, OXFORD University Press
3. Power Electronics-by P.C.Sen,Tata Mc Graw-Hill Publishing-1987.
4. Thyristorised Power Controllers – by G. K. Dubey, S. R. Doradra, A. Joshi and R. M. K. Sinha, New Age International (P) Limited Publishers, 1996.




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## ELECTRICAL MACHINES - III

***UNIT – I Construction and Principle of operation***

Constructional Features of round rotor and salient pole machines – Armature windings – Integral slot and fractional slot windings; Distributed and concentrated windings – distribution, pitch and winding factors – E.M.F Equation.

**UNIT-II Synchronous Generator Characteristics**

Harmonics in generated e.m.f. – suppression of harmonics – armature reaction - leakage reactance – synchronous reactance and impedance – experimental determination - phasor diagram – load characteristics.

***UNIT – III Regulation of Synchronous Generator***

Regulation by synchronous impedance method, M.M.F. method, Z.P.F. method and A.S.A. methods – salient pole alternators – two reaction analysis – experimental determination of $X_d$ and $X_q$ (Slip test) Phasor diagrams – Regulation of salient pole alternators.

**UNIT – IV Parallel Operation of Synchronous Generator**

Synchronizing alternators with infinite bus bars – synchronizing power torque – parallel operation and load sharing - Effect of change of excitation and mechanical power input. Analysis of short circuit current wave form – determination of sub-transient, transient and steady state reactances.

**UNIT – V Synchronous Motors – Principle of Operation**

Theory of operation – phasor diagram – Variation of current and power factor with excitation – synchronous condenser – Mathematical analysis for power developed.

**UNIT-VI Power Diagrams**

Introduction and Applications of power diagrams, Excitation and power diagrams – hunting and its suppression – Methods of starting – synchronous induction motor.

**UNIT – VII Single Phase Motors**

Single phase Motors: Single phase induction motor – Constructional features-Double revolving field theory – Elementary idea of cross-field theory – split-phase motors – shaded pole motor, capacitor start & run motors.

**UNIT – VIII Special Motors**

Principle & performance of A.C. Series motor-Universal motor – Principle of permanent magnet and reluctance motors.

**TEXT BOOKS**


1. Electric Machines – by I.J.Nagrath & D.P.Kothari, Tata Mc Graw-Hill Publishers, 7th Edition 2005.
2. Electrical Machines – by P.S. Bimbra, Khanna Publishers.


**REFERENCE BOOKS:**


1. The Performance and Design of A.C.Machines – by M.G.Say, ELBS and Ptiman & Sons-3rd edition-1983.
2. Electric Machinery – by A.E. Fitzgerald, C.Kingsley and S.Umans, Mc Graw-Hill Companies, 5th edition, 1990.
3. Theory of Alternating Current Machinery by Langsdorf, Tata Mc Graw-Hill, 2nd edition-1999.
4. Electromachanics-III (Synchronous and single phase machines), S.Kamakashiah, Right Publishers-3rd edition-2008.


**2012-13** **CODE: MR11U214**

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**III Year B.Tech EEE I-Sem**

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## ELECTRICAL MACHINES LAB – II

**The following experiments are to be compulsorily conducted:**

1. O.C. & S.C. Tests on Single phase Transformer
2. Sumpner's test on a pair of single phase transformers
3. Scott connection of transformers
4. No-load & Blocked rotor tests on three phase Induction motor
5. Regulation of a three –phase alternator by synchronous impedance & m.m.f. methods
6. V and Inverted V curves of a three-phase synchronous motor.
7. Equivalent Circuit of a single phase induction motor
8. Determination of Xd and Xq of a salient pole synchronous machine

**In addition to the above eight experiments, at least any two of the following experiments are to be conducted from the following list:**

1. Parallel operation of Single phase Transformers
2. Separation of core losses of a single phase transformer
3. Brake test on three phase Induction Motor
4. Regulation of three-phase alternator by Z.P.F. and A.S.A methods
5. Efficiency of a three-phase alternator
6. Heat run test on a bank of 3 Nos. of single phase Delta connected transformers
7. Measurement of sequence impedance of a three-phase alternator.
8. Performance characteristics of a Schrage motor

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## CONTROL SYSTEMS AND SIMULATION LAB

**Any Eight of the following experiments are to be conducted:**

1. Time response of Second order system
2. Characteristics of Synchros
3. Programmable logic controller – Study and verification of truth tables of logic gates, simple Boolean expressions and application of speed control of motor.
4. Effect of feedback on DC servo motor
5. Transfer function of DC motor
6. Effect of P, PD, PI, PID Controller on a second order systems
7. Lag and lead compensation – Magnitude and phase plot
8. Transfer function of DC generator
9. Temperature controller using PID(open loop & closed loop)
10. Characteristics of magnetic amplifiers(series, parallel & separately-excited)
11. Characteristics of AC servo motor

**Any two simulation experiments are to be conducted:-**

1. PSPICE simulation of Op-Amp based Integrator and Differentiator circuits.
2. Linear system analysis (Time domain analysis, Error analysis) using MATLAB.
3. Stability analysis (Bode, Root Locus, Nyquist) of Linear Time Invariant system using MATLAB
4. State space model for classical transfer function using MATLAB – Verification.

**REFERENCE BOOKS:**


1. Simulation of Electrical and electronics Circuits using PSPICE – by M.H.Rashid, M/s PHI Publications.
2. PSPICE A/D user's manual – Microsim, USA.
3. PSPICE reference guide – Microsim, USA.
4. MATLAB and its Tool Books user's manual and – Mathworks, USA.


2012-13 CODE: MR11UB02

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III Year B.Tech EEE II-Sem

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## MANAGEMENT SCIENCE

**Unit I: Introduction to Management:** Concepts of Management and organization- Nature and Importance of Management, Functions of Management, Taylor's Scientific Management Theory, Fayol's Principles of Management, Maslow's Theory of Human Needs, Douglas McGregor's Theory X and Theory Y, Herzberg's Two-Factor Theory of Motivation, Systems Approach to Management, Leadership Styles, Social responsibilities of Management.

**Unit II: Designing Organisational Structures:** Basic concepts related to Organisation - Departmentation and Decentralisation, Types of mechanistic and organic structures of organisation (Line organization, Line and staff organization, functional organization, Committee organization, matrix organization, Virtual Organisation, Cellular Organisation, team structure, boundaryless organization, inverted pyramid structure, lean and flat organization structure) and their merits, demerits and suitability.

**Unit III: Operations Management:** Principles and Types of Plant Layout-Methods of production (Job, batch and Mass Production), Work Study -Basic procedure involved in Method Study and Work Measurement-Statistical Quality Control: $\overline{X}$ chart, R chart, *c* chart, *p* chart, (simple Problems), Acceptance Sampling, Deming's contribution to quality.

**Unit IV: A) Materials Management:** Objectives, Need for Inventory control, EOQ, ABC Analysis, Purchase Procedure, Stores Management and Stores Records - Supply Chain Management

**B) Marketing:** Functions of Marketing, Marketing Mix, Marketing Strategies based on Product Life Cycle., Channels of distribution.

**Unit V: Human Resources Management (HRM):** Concepts of HRM, HRD and Personnel Management and Industrial Relations (PMIR), HRM vs. PMIR, Basic functions of HR Manager: Manpower planning, Recruitment, Selection, Training and Development, Placement, Wage and Salary Administration, Promotion, Transfer, Separation, Performance Appraisal, Grievance Handling and Welfare Administration, Job Evaluation and Merit Rating.

**Unit VI: Project Management (PERT/CPM):** Network Analysis, Programme Evaluation and Review Technique (PERT), Critical Path Method (CPM), Identifying critical path, Probability

of Completing the project within given time, Project Cost Analysis, Project Crashing. (simple problems)

**Unit VII: Strategic Management:** Mission, Goals, Objectives, Policy, Strategy, Programmes, Elements of Corporate Planning Process, Environmental Scanning, SWOT Analysis, Steps in Strategy Formulation and Implementation, Generic Strategy alternatives.

**Unit VIII: Contemporary Management Practices:** Basic concepts of Just-In-Time (JIT) System, Total Quality Management (TQM), Six sigma and Capability Maturity Model (CMM) Levels, Value Chain Analysis,Enterprise Resource Planning (ERP), Performance Management, Business Process outsourcing (BPO), Business Process Re-engineering and Bench Marking, Balanced Score Card.

**Text Book:**

1. Aryasri: Management Science, TMH, New Delhi.

**Reference Books:**

1. Kotler Philip & Keller Kevin Lane: Marketing Mangement 12/e, PHI, 2007
2. Koontz & Weihrich: *Essentials of Management*, 6/e, TMH, 2007
3. Thomas N.Duening & John M.Ivancevich *Management—Principles and Guidelines*, Biztantra,2007.
4. Kanishka Bedi, *Production and Operations Management*, Oxford University Press, 2007.
5. Memoria & S.V.Ganker, *Personnel Management*, Himalaya, 25/e, 2007
6. Schermerhorn: *Management*, Wiley, 2007.
7. Parnell: Strategic Management, Biztantra,2007.
8. L.S.Srinath: PERT/CPM,Affiliated East-West Press, 2007.



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## POWER SEMICONDUCTOR DRIVES

**UNIT I: ELECTRIC DRIVES**

Type of electric drives, choice of motor, starting and running characteristics, speed control, temperature rise, particular applications of electric drives, types of industrial loads, continuous, intermittent and variable loads, load equalization.

***UNIT –II: Control of DC motors by Single phase Converters***

Introduction to Thyristor controlled Drives, Single Phase semi and Fully controlled converters connected to d.c separately excited and d.c series motors – continuous current operation – output voltage and current waveforms – Speed and Torque expressions – Speed – Torque Characteristics- Problems on Converter fed d.c motors.

***UNIT-III: Control of DC motors by three phase Converters***

Three phase semi and fully controlled converters connected to d.c separately excited and d.c series motors – output voltage and current waveforms – Speed and Torque expressions – Speed – Torque characteristics – Problems.

**UNIT – IV: Four Quadrant operations of DC Drives**

Introduction to Four quadrant operation – Motoring operations, Electric Braking – Plugging, Dynamic and Regenerative Braking operations. Four quadrant operation of D.C motors by dual converters.

**UNIT-V: Control of DC motors by Choppers**

Single quadrant, Two –quadrant and four quadrant chopper fed dc separately excited and series excited motors – Continuous current operation – Output voltage and current wave forms – Speed torque expressions – speed torque characteristics – Problems on Chopper fed d.c Motors

**UNIT-VI: Control of Induction Motor through Stator voltage and Stator Frequency**

Variable voltage characteristics-Control of Induction Motor by Ac Voltage Controllers – Waveforms – speed torque characteristics.

Variable frequency characteristics- control of induction motor by Voltage source inverter and current source inverter - cyclo converters- PWM control – Comparison of VSI and CSI operations – Speed torque characteristics – numerical problems on induction motor drives

**UNIT –VII: Control of Induction motor of Rotor side**

Static rotor resistance control – Slip power recovery – Static Scherbius drive – Static Kramer Drive – their performance and speed torque characteristics – advantages applications – problems

**UNIT – VIII: Control of Synchronous Motors**

Separate control & self control of synchronous motors – Operation of self controlled synchronous motors by VSI.

**TEXT BOOKS:**


1. Fundamentals of Electric Drives – by G K Dubey Narosa Publications-5th edition-reprint,2005.
2. Power Electronic Circuits, Devices and applications by M.H.Rashid, PHI-2nd edition-reprint,2004.


**REFERENCE BOOKS:**


1. Power Electronics – MD Singh and K B Khanchandani, Tata – McGraw-Hill Publishing company,1998-12th edition-reprint 2004.
2. Modern Power Electronics and AC Drives by B.K.Bose, PHI-2002.
3. Thyristor Control of Electric drives – Vedam Subramanyam Tata McGraw Hill Publilcations-1988,1989, reprint 2001.
4. A First course on Electrical Drives – S K Pillai New Age International(P) Ltd. 2nd Editon-9th edition, reprint 2009.




**2012-13** **CODE: MR11U217**

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**III Year B.Tech EEE II-Sem** **L T/P/D C**
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## COMPUTER METHODS IN POWER SYSTEMS

**UNIT -I Power System Network Matrices-1**

*Graph Theory: Definitions, Bus Incidence Matrix, $Y_{bus}$ formation by Direct and Singular Transformation Methods, Numerical Problems.*

**UNIT -II Power System Network Matrices-2**

Formation of $Z_{Bus}$: Partial network, Algorithm for the Modification of $Z_{Bus}$ Matrix for addition element for the following cases: Addition of element from a new bus to reference, Addition of element from a new bus to an old bus, Addition of element between an old bus to reference and Addition of element between two old busses (Derivations and Numerical Problems).- Modification of $Z_{Bus}$ for the changes in network ( Problems )

**UNIT –III Power flow Studies-1**

Necessity of Power Flow Studies – Data for Power Flow Studies – Derivation of Static load flow equations – Load flow solutions using Gauss Seidel Method: Acceleration Factor, Load flow solution with and without P-V buses, Algorithm and Flowchart. Numerical Load flow Solution for Simple Power Systems (Max. 3-Buses): Determination of Bus Voltages, Injected Active and Reactive Powers (Sample One Iteration only) and finding Line Flows/Losses for the given Bus Voltages.

**UNIT – IV Power flow Studies-2**

Newton Raphson Method in Rectangular and Polar Co-Ordinates Form: Load Flow Solution with or without PV Busses- Derivation of Jacobian Elements, Algorithm and Flowchart.
Decoupled and Fast Decoupled Methods.- Comparison of Different Methods – DC load Flow

**UNIT – V Short Circuit Analysis-1**

Per-Unit System of Representation. Per-Unit equivalent reactance network of a three phase Power System, Numerical Problems.

Symmetrical fault Analysis: Short Circuit Current and MVA Calculations, Fault levels, Application of Series Reactors, Numerical Problems.

**UNIT –VI Short Circuit Analysis-2**

Symmetrical Component Theory: Symmetrical Component Transformation, Positive, Negative and Zero sequence components: Voltages, Currents and Impedances.

Sequence Networks: Positive, Negative and Zero sequence Networks, Numerical Problems.

Unsymmetrical Fault Analysis: LG, LL, LLG faults with and without fault impedance, Numerical Problems.

**UNIT –VII Power System Steady State Stability Analysis**

Elementary concepts of Steady State, Dynamic and Transient Stabilities. Description of: Steady State Stability Power Limit, Transfer Reactance, Synchronizing Power Coefficient, Power Angle Curve and Determination of Steady State Stability and Methods to improve steady state stability.

**UNIT –VIII Power System Transient State Stability Analysis**

Derivation of Swing Equation. Determination of Transient Stability by Equal Area Criterion, Application of Equal Area Criterion, Critical Clearing Angle Calculation.- Solution of Swing Equation: Point-by-Point Method. Methods to improve Stability - Application of Auto Reclosing and Fast Operating Circuit Breakers.

**TEXT BOOKS:**

1. Computer Techniques in Power System Analysis by M.A.Pai, TMH Publications.
2. Modern Power system Analysis – by I.J.Nagrath & D.P.Kothari: Tata McGraw-Hill Publishing company, 2nd edition, 4th edition-reprint 2005.
3. Electrical Power Systems –by C.L. Wadhva

**REFERENCE BOOKS:**

1. Power System Analysis by Grainger and Stevenson, Tata McGraw Hill-2nd edition, reprint 2004.
2. Power System Analysis – by A.R.Bergen, Prentice Hall, Inc-3rd edition- reprint 2004.
3. Power System Analysis by Hadi Saadat – TMH Edition-5th edition-reprint 2004.
4. Power System Analysis by B.R.Gupta, Wheeler Publications-reprint 2004.
5. Computer methods in power systems by William stagg.



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**III Year B.Tech EEE II-Sem** **L T/P/D C**
**4 -/1/- 4**

## MICROPROCESSORS AND MICROCONTROLLERS

**Objective :**

The objective of the Microprocessor and Microcontrollers is to do the students familiarize the architecture of 8086 processor, assembling language programming and interfacing with various modules. The student can also understand of 8051 Microcontroller concepts, architecture, programming and application of Microcontrollers. Student able to do any type of industrial and real time applications by knowing the concepts of Microprocessor and Microcontrollers.

**UNIT-I 8086 ARCHITECTURE:**

Functional Diagram, Register Organization, Addressing modes, Instructions, Functional schematic, Minimum and Maximum mode operations of 8086, 8086 Control signal interfacing, Timing Diagrams.

**UNIT-II ASSEMBLY LANGUAGE PROGRAMMMING OF 8086**

Assembly Directives, Macro's, Simple Programs using Assembler, Implimentation of FOR Loop, WHILE, REPEAT and IF-THEN-ELSE Features.

**UNIT-III I/O INTERFACE**

8255 PPI, Various modes of operations and interface of I/O devices to 8086, A/D, D/A Converter Interfacing.

**UNIT-IV INTERFACING WITH ADVANCED DEVICES.**

8086 System bus structure, Memory and I/O Interfacing with 8086, Interfacing through various IC Peripheral Chips, 8257 (DMA Controller), 8259 (Interrupt Priority Control).

**UNIT-V COMMUNICATION INTERFACE**

Serial Communication Standards, USART Interfacing RS-232, IEEE-488, 20mA Current Loop, Prototyping and Trouble shooting, Software Debugging tools, MDS.

**UNIT-VIINTRODUCTION TO MICRO CONTROLLERS**

Overview of 8051 Micro Controller, Architecture, I/O ports and Memory Organization, Addressing modes and Instruction set of 8051, Simple Programs using Stack Pointer, Assembly language programming.

**UNIT-VII 8051 INTERRUPTS COMMUNICATION**

Interrupts, Timer/Counter and Serial Communication, Programming Timer Interrupts, Programming External H/W interrupts, Programming the serial communication interrupts, Interrupt Priority in the 8051, Programming 8051 Timers, Counters and Programming.

**UNIT- VIII INTERFACING AND INDUSTRIAL APPLICATIONS**

Applications of Micro Controllers, Interfacing 8051 to LED's, Push button, Relay's and Latch Connections, Keyboard Interfacing, Interfacing Seven Segment Display, ADC and DAC Interfacing.

**TEXT BOOKS:**


1. Kenneth J Ayala, " The 8051 Micro Controller Architecture, Programming and Applications", Thomson Publishers, 2nd Edition.
2. D.V.Hall, "Micro Processor and Interfacing ", Tata McGraw-Hill.


**REFERENCE BOOKS:**


1. Ajay V. Deshmukh, "Microcontrollers – theory applications", Tata McGraw-Hill Companies – 2005.
2. Ray and BulChandi, " Advanced Micro Processors", Tata McGraw-Hill.
3. Kenneth J Ayala, " The 8086 Micro Processors Architecture, Programming and Applications", Thomson Publishers, 2005.
4. Microcomputer Systems: The 8086/8088 Family: Architecture, Programming and Design, 2nd ed., Liu & Gibson


**2012-13** **CODE: MR11U218**

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**III Year B.Tech EEE II-Sem**

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**RENEWABLE ENERGY SOURCES**
**(Open Elective)**

**UNIT I: PRINCIPLES OF SOLAR RADIATION:**

Role and potential of new and renewable source, the solar energy option, Environmental impact of solar power, physics of the sun, the solar constant, extraterrestrial and terrestrial solar radiation, solar radiation on titled surface, instruments for measuring solar radiation and sun shine, solar radiation data.

**UNIT II: SOLAR ENERGY COLLECTION:**

Flat plate and concentrating collectors, classification of concentrating collectors, orientation and thermal analysis, advanced collectors.

**UNIT III: SOLAR ENERGY STORAGE AND APPLICATIONS:**

Different methods, Sensible, latent heat and stratified storage, solar ponds. Solar Applications- solar heating/cooling technique, solar distillation and drying, photovoltaic energy conversion.

**UNIT IV: WIND ENERGY:**

Sources and potentials, horizontal and vertical axis windmills, performance characteristics, Betz criteria

**UNIT V: BIO-MASS:**

Principles of Bio-Conversion, Anaerobic/aerobic digestion, types of Bio-gas digesters, gas yield, combustion characteristics of bio-gas, utilization for cooking.

**UNIT VI: GEOTHERMAL ENERGY:**

Resources, types of wells, methods of harnessing the energy, potential in India.

**UNIT VII: OCEAN ENERGY:**

OTEC, Principles utilization, setting of OTEC plants, thermodynamic cycles. Tidal and wave energy: Potential and conversion techniques, mini-hydel power plants, and their economics.

**UNIT VIII: DIRECT ENERGY CONVERSION:**

Need for DEC, Carnot cycle, limitations, principles of DEC.

**TEXT BOOKS:**

1. Renewable Energy Resources â€“ Twidell & Wier, CRC Press( Taylor & Francis)

2. Renewable energy sources and emerging technologies by D.P.Kothari,K.C.Singhal, P.H.I.

**REFERANCE BOOKS:**

1. Renewable energy resources/ Tiwari and Ghosal/ Narosa.

2. Renewable Energy Technologies /Ramesh & Kumar /Narosa

3. Non-Conventional Energy Systems / K Mittal /Wheeler

4. Non-Conventional Energy Sources /G.D. Rai, Khanna Publishers-5th edition 2012.





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**III Year B.Tech EEE II-Sem** **L T/P/D C**
**3 -/1/- 3**

**INTELLECTUAL PROPERTY RIGHTS**
**(Open Elective)**

**UNIT-I**

Introduction to Intellectual property: Introduction, types of intellectual property, international organizations, agencies and treaties, importance of intellectual property rights.

**UNIT-II**

Trade Marks: Purpose and function of trademarks, acquisition of trade mark rights, protectable matter, selecting and evaluating trade mark, trade mark registration processes.

**UNIT-III**

Law of copy rights: Fundamental of copy right law, originality of material, rights of reproduction, rights to perform the work publicly, copy right ownership issues, copy right registration, notice of copy right, international copy right law.

**UNIT-IV**

Law of patents: Foundation of patent law, patent searching process, ownership rights and transfer.

**UNIT-V**

Trade Secrets: Trade secrete law, determination of trade secret status, liability for misappropriations of trade secrets, protection for submission, trade secrete litigation.

**UNIT-VI**

Unfair competition: Misappropriation right of publicity, false advertising.

**UNIT-VII**

New development of intellectual property: new development in trade mark law: copy right law, patent law, and intellectual property audits.

**UNIT-VIII**

International overview on intellectual property, international-trade mark law, copy right law, international patent law, and international development in trade secrets law.

**REFERENCE & TEXT BOOKS:**

1. Intellectual property right, Deborah, E.Bouchoux, cengage learing.
2. Intellectual property right – nleashmy the knowledge economy, prabuddha ganguli, tate Mc Graw Hill Publishing company Ltd.

**2012-13** **CODE: MR11U459**

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**III Year B.Tech EEE II-Sem**

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**NANO TECHNOLOGY**
**(Open Elective)**

**UNIT-I: Introduction to nanotechnology:**

Importance of nanoscale, Nanostructure types, electronic, magnetic, optical properties of Nanomaterials, top-down and bottom-up approach to nanostructures.

**UNIT-II: Quantum Mechanical phenomenon in nanostructures:**

Quantum confinement of electrons in semiconductor nano structures, one dimensional confinement (Quantum wires),two dimensional confinements (Quantum wells), three dimensional confinements (Quantum dots).

**UNIT-III: Carbon Nano Structures:**

Carbon nanotubes (CNTs), Fullerenes, C60, C80 and C240 Nanostructures, properties (mechanical, optical and electrical) and applications.

**UNIT-IV: Fabrication of Nanomaterials:**

Physical Methods: Inert gas condensation, Arc discharge, RF plasma, Plasma arc technique, Ion sputtering, Laser ablation, Laser prolysis, Molecular beam epitaxy, chemical vapour deposition method.

**UNIT-V: Nano scale characterization techniques:**

Scanning probe techniques (AFM, MFM,STM,SEM,TEM), XRD.

**UNIT-VI: Nanodevices and Nanomedicine:**

Lab on chip for bioanalysis, core/Shell Nanoparticles in drug delivery system I(site specific and targeted drug delivery), cancer treatment, and bone tissue treatment.

**UNIT-VII: Nano and molecular electronics:**

Resonant-Tunneling structures, single electron tunneling, single Electron transistors, coulomb blockade, giant magneto resistance, tunneling magneto resistance.

**UNIT-VIII: Nanolithography and Nanomanipulation:**

e-beam lithography and SEM based nanolithography and nanomanipulation, Ion beam lithograpy, oxidation and metallization. Mask and its application, Deep UV lithography, X-ray based lithography.

**TEXT BOOKS:**


1. Charles,p.pode, Introduction to nanotechnology, Springer publications.
2. Spring Handbook of Nanotechnology – Bharat Bhusan.
3. Phani kumar, principles of nanotechnology, scitech publications.


**REFERENCES BOOKS:**


1. David Ferry "Transport in Nano structures" Cambridge University press 2000.
2. Nan biotechnology; ed.C.M.Niemeyer,C.A.Mirkin.
3. Nanofabrication towards biomedical application: Techniques, tools, Application and impact – Ed.Challa S., S.R.Kumar, J.H.Carola.
4. Encyclopedia od Nanotechnology-Hari singh Nalwa.
5. Carbon Nanotubes: Properties and Applications – Michael J.O'Connell.
6. S.Dutta "Electron Transport in Mesoscopic systems" Cambridge University press.
7. H.Grabert and M.Devoret "Single charge Tunneling " Plenum press 1992.

**2012-13** **CODE: MR11U514**

**MALLA REDDY ENGINEERING COLLEGE**
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**III Year B.Tech EEE II-Sem**

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**OPERATING SYSTEMS**
**(Open Elective)**

**UNIT I:**

Computer System and Operating System Overview: Overview of computer operating systems operating systems functions protection and security distributed systems special purpose systems operating systems structures and systems calls operating systems generation

**UNIT-II:**

Process Management – Process concepts threads, scheduling-criteria algorithms, their evaluation,Thread scheduling, case studies UNIX, Linux, Windows

**UNIT III:**

Concurrency : Process synchronization, the critical- section problem, Peterson's Solution, ynchronization Hardware, semaphores, classic problems of synchronization, monitors, Synchronization examples, atomic transactions. Case studies UNIX, Linux, Windows

**UNIT IV:**

Memory Management : Swapping, contiguous memory allocation, paging, structure of the page table ,segmentation, virtual memory, demand paging, page-Replacement, algorithms, case studies UNIX, Linux,Windows

**UNIT V:**

Principles of deadlock – system model, deadlock characterization, deadlock prevention, detection and avoidance, recovery form deadlock, I/O systems, Hardware, application interface, kernel I/O subsystem, Transforming I/O requests Hardware operation, STREAMS, performance.

**UNIT VI:**

File system Interface- the concept of a file, Access Methods, Directory structure, File system mounting, and file sharing, protection. File System implementation- File system structure, file system implementation, directory implementation, directory implementation, allocation methods, free-space management, efficiency and performance, case studies. UNIX, Linux, Windows

**UNIT VII :**

Mass-storage structure overview of Mass-storage structure, Disk structure, disk attachment disk scheduling, swap-space management, RAID structure, stable-storage implementation, Tertiary storage structure.

**UNIT VIII:**

Protection : Protection, Goals of Protection, Principles of Protection, Domain of protection Access Matrix, Implementation of Access Matrix, Access control, Revocation of Access Rights, Capability- Based systems, Language – Based Protection, Security- The Security problem, program threats, system and network threats cryptography as a security tool, user authentication, implementing security defenses, firewalling to protect systems and networks, computer – security classifications, case studies UNIX, Linux, Windows

**TEXT BOOKS :**

1. Operating System Concepts- Abraham Silberchatz, Peter B. Galvin, Greg Gagne 7th Edition, John Wiley -8th edition-reprint-2010.
2. Operating systems- A Concept based Approach-D.M.Dhamdhere, 2nd Edition, TMH-1st reprint -2006.

**REFERENCES :**

1. Operating Systems' – Internal and Design Principles Stallings, Fifth Edition–2005, Pearson education/PHI
2. Operating System A Design Approach-Crowley, TMH.
3. Modern Operating Systems, Andrew S Tanenbaum 2nd edition Pearson/PHI.

**2012-13** **CODE: MR11U406**

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**III Year B.Tech EEE II-Sem** **L T/P/D C**
**3 -/1/- 3**

**SWITCHING THEORY AND LOGIC DESIGN**

**UNIT I**

**NUMBER SYSTEMS & CODES:** Philosophy of number systems – complement representation of negative numbers-binary arithmetic-binary codes-error detecting & error correcting codes –hamming codes.

**UNIT II**

**BOOLEAN ALGEBRA AND SWITCHING FUNCTIONS:** Fundamental postulates of Boolean Algebra - Basic theorems and properties - switching functions–Canonical and Standard forms-Algebraic simplification digital logic gates, properties of XOR gates –universal gates-Multilevel NAND/NOR realizations.

**UNIT III**

**MINIMIZATION OF SWITCHING FUNCTIONS:** Map method, Prime implicants, don't care combinations, Minimal SOP and POS forms, Tabular Method, Prime –Implicant chart, simplification rules.

**UNIT IV**

**COMBINATIONAL LOGIC DESIGN**

Design using conventional logic gates, Encoder, Decoder, Multiplexer, De-Multiplexer, Modular design using IC chips, MUX Realization of switching functions Parity bit generator, Code-converters, Hazards and hazard free realizations.

**UNIT V**

**PROGRAMMABLE LOGIC DEVICES, THRESHOLD LOGIC:** Basic PLD's-ROM, PROM, PLA, PLD Realization of Switching functions using PLD's. Capabilities and limitations of Threshold gate, Synthesis of Threshold functions, Multigate Synthesis.

**UNIT VI**

**SEQUENTIAL CIRCUITS - I :** Classification of sequential circuits (Synchronous, Asynchronous, Pulse mode, Level mode with examples) Basic flip-flops-Triggering and excitation tables. Steps in synchronous sequential circuit design. Design of modulo-N Ring & Shift counters, Serial binary adder, sequence detector.

**UNIT VII**

**SEQUENTIAL CIRCUITS - II :** Finite state machine-capabilities and limitations, Mealy and Moore models-minimization of completely specified and incompletely specified sequential machines, Partition techniques and Merger chart methods-concept of minimal cover table.

**UNIT VIII**

**ALGOROTHIMIC STATE MACHINES :** Salient features of the ASM chart-Simple examples-System design using data path and control subsystems-control implementations-examples of Weighing machine and Binary multiplier.

**TEXTBOOKS :**


1. Switching & Finite Automata theory – Zvi Kohavi, TMH,2nd Edition 48th reprint.
2. Digital Design – Morris Mano, PHI, 3rd Edition, 2006.


**REFERENCES :**


1. An Engineering Approach To Digital Design – Fletcher, PHI.
2. Digital Logic – Application and Design – John M. Yarbrough, Thomson.
3. Fundamentals of Logic Design – Charles H. Roth, Thomson Publications, 5th Edition, 2004.
4. Digital Logic Applications and Design – John M. Yarbrough, Thomson Publications, 2006.

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## ELECTRICAL MEASUREMENTS LAB

**The following experiments are to be conducted as compulsory experiments:**

1. Calibration and Testing of single phase energy Meter
2. Calibration of dynamometer power factor meter
3. Crompton D.C. Potentiometer – Calibration of PMMC ammeter and PMMC voltmeter
4. Kelvin's double Bridge – Measurement of resistance – Determination of Tolerance.
5. Dielectric oil testing using H.T testing Kit
6. Schering bridge & Anderson bridge.
7. Measurement of 3 phase reactive power with single-phase wattmeter.
8. Measurement of parameters of a choke coil using 3 voltmeter and 3 ammeter methods.

**In addition to the above eight experiments, at least any two of the experiments from the following list are to be conducted:**

9. Calibration LPF wattmeter – by Phantom testing
10. Measurement of 3 phase power with single watt meter and 2 No's of C.T.
11. C.T. testing using mutual Inductor – Measurement of % ratio error and phase angle of given C.T. by Null method.
12. P.T. testing by comparison – V.G. as Null detector – Measurement of % ratio error and phase angle of the given P.T.
13. LVDT and capacitance pickup – characteristics and Calibration
14. Resistance strain gauge – strain measurements and Calibration
15. Transformer turns ratio measurement using a.c. bridge.
16. Measurement of 1% ratio error and phase angle of given C.T. by comparison.



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## POWER ELECTRONICS AND SIMULATION LAB

**LIST OF EXPERIMENTS:**

1. Study of Characteristics of SCR, MOSFET & IGBT
2. Gate firing circuits for SCR
3. Single Phase AC Voltage Controller with R and RL Loads
4. Single Phase fully controlled bridge converter with R and RL loads
5. Forced Commutation circuits ( Class A, Class B, Class C, Class D & Class E)
6. DC Jones chopper with R and RL Loads
7. Single Phase Parallel, inverter with R and RL loads
8. Single Phase Cycloconverter with R and RL loads
9. Single Phase Half controlled converter with R load
10. Three Phase half controlled bridge converter with R-load
11. Single Phase series inverter with R and RL loads
12. Single Phase Bridge converter with R and RL loads
13. Single Phase dual converter with RL loads

**ANY TWO OF SIMULATION EXPERIMENTS WITH PSPICE/PSIM**

1. PSPICE simulation of single-phase full converter using RLE loads and single-phase AC voltage controller using RLE
2. loads
3. PSPICE simulation of resonant pulse commutation circuit and Buck chopper.
4. PSPICE simulation of single phase Inverter with PWM control.

**Reference Books:**

1. Simulation of Electric and Electronic circuits using PSPICE –by M.H. Rashid, M/s PHI Publications.
2. PSPICE A/D user's manual-Microsim, USA.
3. PSPICE reference guide-Microsim, USA.
4. MATLAB and its Tool Books user's manual and- Mathworks, USA.
5. Spice for power electronics and electric power by Rashid, CRC Press