

**ACADEMIC REGULATIONS  
COURSE STRUCTURE  
AND  
DETAILED SYLLABUS**

**X**

**ELECTRICAL AND  
ELECTRONICS  
ENGINEERING**

**For**

**B.TECH. FOUR YEAR DEGREE COURSE  
(Applicable for the batches admitted from 2010-2011)**



**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA  
KAKINADA - 533 003, ANDHRA PRADESH, INDIA**



### **Academic Regulations 2010 for B. Tech. (Regular)**

(Effective for the students admitted in to I year from the Academic Year 2010-2011 and 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 regulations.

- (a) Pursued a course of study for not less than four academic years and not more than eight academic years. However, the student is permitted to write Supplementary examinations for two more years, giving a facility to the student to complete the Degree within 10 academic years.
- (b) For the award of a degree, candidate has to register for **208** credits and secure **200** credits with compulsory subjects: (compulsory subjects are: all Laboratories and Project work, i.e. the student shall pass all laboratory examinations and project work)

**2.** Students, who fail to complete their Four years Course of study within Eight years or fail to acquire the 200 Credits for the award of the degree within ten academic years from the year of their admission, shall forfeit their seat in B. Tech course and their admission shall stand cancelled.

#### **3. Courses of study**

The following courses of study are offered at present for specialization in the B.Tech. Course.

<b>S. No.</b>	<b>Branch Code</b>	<b>Branch Abbreviation</b>
01	01-CE	Civil Engineering
02	02-EEE	Electrical and Electronics Engineering
03	03-ME	Mechanical Engineering
04	04-ECE	Electronics and Communication Engineering
05	05-CSE	Computer Science Engineering

06	08-CHEM	Chemical Engineering
07	10-EIE	Electronics and Instrumentation Engineering
08	11-BME	Bio – Medical Engineering
09	12-IT	Information Technology
10	19-ECom.E	Electronics and Computer Engineering
11	21-AE	Aeronautical Engineering
12	23-BT	Bio – Technology
13	24-AME	Auto Mobile Engineering
14	25-PCE	Petrochemical Engineering
15	26-MM	Mining
16	27-PT	Petroleum Technology / Petroleum Engineering
17.	31-MtE	Metallurgical Engineering

And any other course as approved by the authorities of the University from time to time.

#### 4. Distribution and Weightage of Marks

- (i) The performance of a student in each semester shall be evaluated subject – wise with a maximum of 100 marks for theory and 75 marks for practical subject. The project work shall be evaluated for 200 marks.
- (ii) For theory subjects the distribution shall be 25 marks for Internal Evaluation and 75 marks for the End - Examinations.
- (iii) Out of 25 internal marks – 15 marks are assigned for subjective exam, 10 marks for objective “On Line” exam.
- (iv.) For theory subjects, during the semester there shall be 2 tests. Each test consists of 20 minutes duration objective “On Line” exam for 10 marks and **120 minutes** duration subjective exam for **40 marks**. The Objective exam marks for 10 and subjective exam marks scaled for 15 to be added to get test marks for 25. The best of the two tests will be taken for internal marks. The first test to be conducted in 1-4 units and second test in 5-8 units of each semester.

Each Objective question paper shall contain 20 objective type questions for 10 marks. This examination is conducted “**on line**”

to train the student for on line examinations such as GRE, GMAT etc.

Each subjective type test question paper shall contain 4 questions and all questions need to be answered. The subjective type question paper should be for 40 marks.

- (v.) For practical subjects there shall be continuous evaluation during the semester for 25 marks for internal exam and 50 marks for semester end examination. Of the 25 marks for internal, 15 marks shall be awarded as follows: day to day work 10 and Record-5, and 10 marks to be awarded by conducting an internal laboratory test. The end examination shall be conducted by the teacher concerned and external examiner.
- (vi.) 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.
- (vii.) 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 committee. The committee consists of an external examiner, Head of the Department and Supervisor of the Project. 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 and evaluated by an internal committee.
- (viii) Laboratory marks and the internal marks awarded by the College are not final. The marks are subject to scrutiny and scaling by the University wherever felt desirable. The internal and laboratory marks awarded by the College will be referred to a Committee. The Committee shall arrive at 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 as per the University norms and shall be produced to the Committees of the University as and when they ask for.

#### **5. Attendance Requirements:**

- (i.) A student shall be eligible to appear for University examinations if he acquires a minimum of 75% of attendance in aggregate of all the subjects.
- (ii.) Condonation of shortage of attendance in aggregate up to 10% (65% and above and below 75%) in each semester for genuine reasons and shall be approved by a committee duly appointed by the college. The condonation approved or otherwise can be reviewed by the University.
- (iii.) A Student will not be promoted to the next semester unless he satisfies the attendance requirement of the present semester. They may seek re-admission for that semester when offered next.
- (iv.) **Shortage of Attendance below 65% in aggregate shall in NO case be condoned.**
- (v.) Students whose shortage of attendance is not condoned in any semester are not eligible to take their end examination of that class and their registration shall stand cancelled.
- (vi.) A fee stipulated by the university shall be payable towards condonation of shortage of attendance.

#### **6. Minimum Academic Requirements:**

The following academic requirements have to be satisfied in addition to the attendance requirements mentioned in item No. 5.

- (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 will be promoted to second year, if he put up the minimum attendance requirement.
- (iii.) A student shall be promoted from II to III year only if he fulfills the academic requirement of total 48 credits from regular and supplementary examinations of I year and II year examinations, irrespective of whether the candidate takes the examination or not.
- (iv.) A student shall be promoted from third year to fourth year only if he fulfills the academic requirements of total 76 credits from regular and supplementary examinations of I Year, II Year and III Year examinations, irrespective of whether the candidate takes the examinations or not.
- (v.) A student shall register and put up minimum attendance in all 208 credits and earn at least 200 credits. Marks obtained in the best of 200 credits shall be considered for the calculation of percentage of marks.
- (vii.) Students, who fail to complete their Four year Course study within Eight years or fail to acquire the 200 Credits for the award of the degree within ten academic years from the year of their admission, shall forfeit their seat in B. Tech course and their admission shall stand cancelled.

**7. Course pattern:**

- (i.) The entire course of study is of four academic years and each year will have TWO Semesters (Total EIGHT Semesters).
- (ii.) A student eligible to appear for the end examination in a subject, but absent for it or has failed in the end examinations may appear for that subject's **supplementary** examinations, when offered.
- (iii.) When a student is detained due to lack of credits / shortage of attendance, he may be re-admitted when the semester is offered after fulfillment of academic regulations. Whereas the academic regulations hold good with the regulations he/she first admitted.

**8. Award of Class:**

After having satisfied the requirements prescribed for the completion of the program, the *student* shall be eligible for the award of B. Tech Degree and shall be placed in one of the following grades:

Class Graded	% of marks to be secured	
E	40% to < 50%	From the aggregate marks secured from the best 200 Credits.
D	50% to < 60%	
C	60% to < 70 %	
B	70 % to < 80 %	
A	80 % to < 90%	
O	90 and above	

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

**9. Minimum Instruction Days:**

The minimum instruction days for each semester shall be 95 clear instruction days.

**10.** There shall be no branch transfer after the completion of admission process.

**11.** There shall be no transfer within the Constituent Colleges.

**12. 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 dates notified by the University.



### **Academic Regulations 2010 for B. Tech. (Lateral Entry Scheme)**

(Effective for the students getting admitted into II year from the Academic Year 2011- 2012 and 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 regulations.

- (a.) Pursued a course of study for not less than three academic years and not more than six academic years. However, the student is permitted to write Supplementary examinations for two more years, giving a facility to the student to complete the Degree within 8 academic years.
- (b.) For the award of a degree, candidate has to register for 170 credits and secure 162 credits with compulsory subjects: (compulsory subjects are: all Laboratories and Project work, i.e., the students i.e. the student shall pass all laboratory examinations and project work.

2. Students, who fail to complete their three year Course of study within six years or fail to acquire the 162 Credits for the award of the degree within 8 academic years from the year of their admission, shall forfeit their seat in B. Tech course and their admission shall stand cancelled.

#### **3. Promotion Rule:**

- (a.) A lateral entry student will be promoted from II year to III year if he puts up the minimum required attendance in II year.
- (b.) A student shall be promoted from third year to fourth only if he fulfills the academic requirements of 56 credits from the II Year and III Year examinations, whether the candidate takes the examinations or not.

#### **4. Award of Class:**

After having satisfied the requirements prescribed for the completion of the program, the *student* shall be eligible for the award of B. Tech

Degree and shall be placed in one of the following grades:

<b>Class Graded</b>	<b>% of marks to be secured</b>	
E	40% to < 50%	From the aggregate marks secured from the best 162 Credits.
D	50% to < 60%	
C	60% to < 70 %	
B	70 % to < 80 %	
A	80 % to < 90%	
O	90 and above	

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

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

**DISCIPLINARY ACTION FOR MALPRACTICES /  
IMPROPER CONDUCT IN EXAMINATIONS**

	<b>Nature of Malpractices/Improper conduct</b>	<b>Punishment</b>
1 (a)	If the candidate 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)	If the candidate 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	If the candidate 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

		<p>remaining examinations of the subjects of that Semester/year.</p> <p>The Hall Ticket of the candidate is to be cancelled and sent to the University.</p>
3	<p>If the candidate impersonates any other candidate in connection with the examination.</p>	<p>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 practicals 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 University 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.</p>

4	If the candidate 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 University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
5	If the candidate 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	If the candidate refuses to obey the orders of the Chief Superintendent/ Assistant -Superintendent / 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	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

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.	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	If the candidate 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 University examinations. The continuation of the course

		by the candidate is subject to the academic regulations in connection with forfeiture of seat.
8	If the candidate possesses 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 a 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 college, 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.

		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	If the candidate 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 University 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 center from the college to another college for a specific period of not less than one year.

**Malpractice identified at Nodal Center/Spot Center** during valuation

The following procedure is to be followed in the case of malpractice cases detected during valuation, scrutiny etc. at Nodal Center/Spot Center.

- (i) A notice regarding the malpractice, is to be served to the candidate
  - (i) Through the Principal of the concerned college,
  - (ii) To his/her college address
  - (iii) To his/her permanent address.
- (ii) A committee consisting of the following is to be constituted **at nodal center** to process such malpractice cases and the recommendations of the malpractice committee are to be sent to the University.
  1. Nodal Officer : Chairman
  2. Principal of the concerned college : Member
  3. Chief examiner of that subject/Subject expert from Nodal Centre : Member
  4. OIE of nodal centre : Convener

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**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, KAKINADA**  
**ELECTRICAL AND ELECTRONICS ENGINEERING**  
**COURSE STRUCTURE**

**I YEAR** **I SEMESTER**

S. No.	Subject	T	P	Credits
1	English – I	3	-	2
2	Mathematics - I	3	-	2
3	Engineering Physics – I	3	-	2
4	Engineering Chemistry I	3	-	2
5	C Programming	3	-	2
6	Mathematical Methods	3	-	2
7	Engineering Physics & Engineering Chemistry Laboratory -I	-	3	2
8	Engineering Workshop (Carpentry, Fitting, House wiring, )	-	3	2
9	C Programming Lab	-	3	2
10	English Communication Skills Lab-1	-	3	2
	<b>Total</b>			<b>20</b>

**I YEAR** **II SEMESTER**

S. No.	Subject	T	P	Credits
1	English – II	3	-	2
2	Mathematics – II	3	-	2
3	Engineering Physics – II	3	-	2
4	Engineering Chemistry— II	3	-	2
5	Engineering Drawing	3	-	2
6	Environmental Studies	3	-	2
7	Engineering Physics & Engineering Chemistry Laboratory -II	-	3	2
8	English - Communication Skills Lab-2	-	3	2
9	IT Workshop	-	3	2
	<b>Total</b>			<b>18</b>

<b>IIYEAR</b>		<b>ISEMESTER</b>		
<b>S. No.</b>	<b>Subject</b>	<b>T</b>	<b>P</b>	<b>Credits</b>
1	Electrical Circuit Analysis-I	4	-	4
2	Fluid Mechanics & Hydraulic Machines	4	-	4
3	Electronic Devices and Circuits	4	-	4
4	Managerial Economics and Financial Analysis	4	-	4
5	Electro Magnetic Fields	4	-	4
6	Electrical Machines-I	4	-	4
7	FM & HM Lab	-	3	2
8	Electronic Devices & Circuits Lab	-	3	2
9	English Communication Practice-I	-	2	1
10	Professional Ethics and Morals-I	2	-	-
	<b>Total</b>			<b>29</b>

<b>IIYEAR</b>		<b>ISEMESTER</b>		
<b>S. No.</b>	<b>Subject</b>	<b>T</b>	<b>P</b>	<b>Credits</b>
1	Electrical Circuit Analysis-II	4	-	4
2	Switching Theory and Logic Design	4	-	4
3	Pulse & Digital Circuits	4	-	4
4	Power Systems-I	4	-	4
5	Electrical Machines-II	4	-	4
6	Control Systems	4	-	4
7	Electrical Machines - I Lab	-	3	2
8	Electrical Circuits Lab	-	3	2
9	English Communication Practice-II	-	2	1
10	Professional Ethics and Morals-II	2	-	-
	<b>Total</b>			<b>29</b>

**IIIYEAR ISEMESTER**

S. No.	Subject	T	P	Credits
1	Complex Variables and Statistical Methods	4	-	4
2	Electrical Measurements	4	-	4
3	Power Systems-II	4	-	4
4	Electrical Machines-III	4	-	4
5	Power Electronics	4	-	4
6	Linear & Digital IC Applications	4	-	4
7	Electrical Machines-II Lab	-	3	2
8	Control Systems Lab	-	3	2
9	IPR & Patents-I	2	-	-
	<b>Total</b>			<b>28</b>

**IIIYEAR ISEMESTER**

S. No.	Subject	T	P	Credits
1	Electrical Machine Design	4	-	4
2	Microprocessors & Microcontrollers	4	-	4
3	Utilization of Electrical Energy	4	-	4
4	Power System Analysis	4	-	4
5	Power Semiconductor Drives	4	-	4
6	Management Science	4	-	4
7	Power Electronics Lab	-	3	2
8	Electrical Measurements Lab	-	3	2
9	IPR & Patents-II	2	-	-
	<b>Total</b>			<b>28</b>

**IVYEAR ISEMESTER**

S. No.	Subject	T	P	Credits
1	Computer Organization	4	-	4
2	High Voltage Engineering	4	-	4
3	Switch Gear & Protection	4	-	4
4	Power System Operation & Control	4	-	4
5	Open Elective	4	-	4
6	Elective – I	4	-	4
7	Microprocessors & Microcontrollers Lab	-	3	2
8	Electrical Simulation Lab	-	3	2
	<b>Total</b>			<b>28</b>

**IVYEAR II SEMESTER**

S. No.	Subject	T	P	Credits
1	Digital Control Systems	4	-	4
2	Elective – II	4	-	4
3	Elective – III	4	-	4
4	Elective – IV	4	-	4
5	Project	-	-	12
	<b>Total</b>			<b>28</b>

**Open Elective:**

1. Energy Audit, Conservation and Management (for all branches)
2. Instrumentation (for all branches)
3. Non Conventional Sources of Energy (except EEE branch students)
4. Optimization Techniques (except EEE branch students)

**Elective – I:**

1. VLSI Design
2. Electrical Distribution Systems
3. Optimization Techniques

**Elective – II:**

1. Advanced Control Systems
2. Extra High Voltage Transmission
3. Special Electrical Machines

**Elective – III:**

1. Non Conventional Sources of Energy
2. Digital Signal Processing
3. FACTS: Flexible Alternating Current Transmission Systems.

**Elective-IV:**

1. OOPS through Java
2. UNIX and Shell Programming
3. AI Techniques

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA**  
**I Year B. Tech Electrical and Electronics Engineering – I Sem.**

**ENGLISH SYLLABUS FOR SEM. 1 & 2 of JNTU-K**

**Introduction**

The major challenge of a language teaching in a technical institution is to prepare the student for employability through imparting language skills to develop communicative competence. The proficiency in English language is closely linked to 'good communication skills' more so in the recent times when employability is at stake for want of communication skills on the part of the students. Since skills and personal attributes are revealed through communication, the responsibility of grooming students in life skills is also emphasized as part of language teaching and learning.

The core key skills needed are:

- Communication
- Team Work
- Problem Solving
- Learning Skills

The personal attributes to be groomed are:

- Adaptability
- Commitment
- Enthusiasm
- Stress Management
- Integrity
- Sense of Humour
- Self-Motivation
- Reliability
- Self-esteem
- Personal Presentation

Since the inception of the Board of Studies for English, effort to design a Course Structure that would cater to the needs of a wide range of learner groups has been made. It was felt by the Board that the Course Structure has to take into consideration the above criteria and therefore the objectives of the Language course ought to be much focused.

**Objectives**

- 1:** To improve the language proficiency of technical under graduates in English with emphasis on LSRW skills.
  - 1.1: To provide learning environment to practice *listening, speaking, reading,* and *writing* skills within and beyond the classroom environment.
  - 1.2: To assist the students to carry on the tasks and activities through guided instructions and materials.
- 2:** To effectively integrate English language learning with employability skills and training.
  - 2.1: To design the main course material and exercises with authentic materials drawn from everyday use to cater to everyday needs.

The material may be culled from newspaper articles, advertisements, promotional material etc.
  - 2.2: To provide hands-on experience through case-studies, mini-projects, group & individual presentations.

Each chapter will be structured with a short passage or collage of passages for reading. All further exercises and activities will draw upon the broad subject of the passage(s), and use **functional and situational approach**

<i>Chapter / Grammar &amp; vocabulary</i>	<i>Reading &amp; comprehension</i>	<i>Listening &amp; speaking</i>	<i>Core skills and personal attributes developed through the exercises</i>	<i>Objectives achieved through the exercises</i>	<i>Plan of evaluation</i>
	<p>Reading comprehension based on the passage(s): multiple-choice questions asking students to derive sense of a word from the context provided by a sentence, short questions asking students to sum up the key points of a passage, encouraging students to address not only explicit statement but also implied meaning.</p>	<p>Dialogues from situations related to what Writing and analysis has been encountered in the reading passages.; the dialogues may now be Instructions on how to lay out a piece of used in a role-play, and in groups, writing, and exercises where students may analyze them for meaning are asked to generate their own write-and implications, and ultimately engage in ups dialogues of their own making.</p>			<p>A three-tier system, allowing the student to work through self-assessment, assessment by peers, and finally, assessment by the teacher.</p>



<p><b>Chapter – 1 .Read &amp; Proceed</b></p> <p>The importance of the language used for communication:</p> <ul style="list-style-type: none"> <li>• Understanding the need for English in the wider world, and the opportunities afforded by a strong command of the language</li> <li>• Assessing one's level within the language, and understanding the ways in which grasp of the language can be bettered</li> <li>• Understanding the basic structure of the sentence. <b>English: subject – verb – object - Functional grammar exercise:</b></li> </ul> <p>Students may discuss in groups or pairs when, why and where English is used. What, for example, if they have to face a job in-</p>	<p>Short extracts from:</p> <ol style="list-style-type: none"> <li>1. An interview with Arundhati Roy</li> <li>2. Jawaharlal Nehru's 'Tryst with Destiny' speech</li> <li>3. Albert Einstein's essay 'The World As I See It'</li> </ol>	<p>Sentences Understanding and using the basic structure of the sentence in English (subject – verb – object); creating sentences; understanding the different kinds of sentences (whether a statement, or a question, or an exclamation, and so on)</p>	<p><b>Small conversations between :</b></p> <ol style="list-style-type: none"> <li>1. A student and a hostel warden</li> <li>2. An interviewer and an interviewee</li> <li>3. Two friends together preparing for an oral examination at college</li> </ol>	<p>Communication teamwork, problem solving, learning skills</p>	<p>Enhanced learner-participation, development of linguistic proficiency</p>	<p>Both Teacher's Manual and Sample Test Questions will be provided]</p>
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<p>terview? Or make an official presentation in a State that does not use Telugu? Or even find their way in an unfamiliar city?</p> <p><b>Possible areas of focus and evaluation:</b></p> <ul style="list-style-type: none"> <li>• Making sentences from given keywords</li> <li>• Correcting the order of words to make sentences, noting how change in word order can affect meaning.</li> </ul>						
<p><b>Chapter 2. Travel</b> Nouns, pronouns, and adjectives:</p> <ul style="list-style-type: none"> <li>• Understanding the kinds and uses of nouns</li> <li>• Understanding the use of pronouns to replace nouns</li> <li>• Understanding the ways in which nouns are qualified through adjectives</li> </ul>	<p>Reading and analysis of short extracts from two or more of the following:</p> <ol style="list-style-type: none"> <li>1. Vikram Seth, From Heaven Lake</li> <li>2. Ruskin Bond, Landor Days</li> <li>3. Rabindranath Tagore, The Europe Traveller's Diary</li> <li>4. Pankaj Mishra, Butter Chicken in</li> </ol>	<p>Paragraphs</p> <p>Understanding the structure of a paragraph; retaining the thread of an argument; introducing the subject of the paragraph in the initial sentence; developing the argument in the next few sentences; drawing to a conclusion by reinforcing</p>	<p><b>Snippets of exchanges between:</b></p> <ol style="list-style-type: none"> <li>1. A tour guide and tourist</li> <li>2. A local inhabitant of a city and a visitor</li> </ol>	<p>Communication, adaptability, sense of humour, reliability,</p>	<p>Functional approach to finding solutions, enhanced learner-participation, development of linguistic proficiency</p>	<p>[Both Teacher's Manual and Sample Test Questions will be provided]</p>

<p>• Understanding the kinds of adjectives, their degrees and their uses  <b>Functional grammar exercise:</b>                  Students may be asked, in pairs, to plan a trip to a place of mutual interest. Each pair would then be encouraged to explain how and why they arrived at this choice. What words are used to identify – and distinguish – the proposed destination? What naming words are used? How qualified? How do the nouns (the naming words) and adjectives (the qualifiers) help to create a character and atmosphere for the place or site to be visited? Is it possible to build anticipation through such evoca</p>	<p>Ludhiana</p>	<p>what has already been stated, but without introducing any new ideas towards the end; being brief and concise, but carrying all the information that needs to be conveyed</p>	<p>3 A photographer and her friend, with the photographer telling about the faces of interest she has been to in her recent travels</p>			
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<p>tion? <b>Potential areas of focus and evaluation:</b></p> <ul style="list-style-type: none"> <li>• Changing nouns to the related adjectives</li> <li>• Changing adjectives to the related nouns</li> <li>• Replacing nouns with pronouns while retaining the meaning of the sentence</li> </ul>						
<p><b>Chapter 3. Gender</b> Verbs and adverbs: • Understanding the placement of a verb within a sentence • Understanding tenses • Understanding the use of adverbs to describe verbs <i>Functional grammar exercise:</i> Students may be asked to consider recent news headlines for remarkable stories involving women. How are either the events or the women remark</p>	<p>Reading and analysis of short extracts from four newspaper/journal pieces: 1. The Telegraph report on the 20-year old Burdwan girl who walked out of her marriage in revolt of her in-laws' demands for dowry 2. A perspective on astronaut Kalpana Chawla's achievement 3. The inspirational story of a young woman who survived</p>	<p>Essays and arguments Understanding that an essay or argument is a descriptive or persuasive piece of writing that needs to be organized as a succession of paragraphs; introducing the chief concerns in the first paragraph, and providing a layout of how the argument is going to be structured; developing the main thrust of the argument in the succeeding paragraphs; making smooth tran</p>	<p><b>Short exchanges between:</b> 1. Two friends, on an issue of contemporary interest 2. A reporter and a talk-show guest 3. A teacher and a student in school</p>	<p>Communication, teamwork, commitment, integrity, self-motivation, self-esteem</p>	<p>Enhanced learner-participation, development of linguistic proficiency, development of critical thinking</p>	<p>[Both Teacher's Manual and Sample Test Questions will be provided]</p>

<p>able? What have these women done, or what do they do? What words of action are used to talk about the accomplishments of the women? How are actions of the past differentiated from actions of the present and actions yet to be performed? How (using what adverbs) are those actions qualified?</p> <p><b>Potential areas of focus and evaluation:</b></p> <ul style="list-style-type: none"> <li>• Changing verbs to the related adverbs</li> <li>• Changing adverbs to the related verbs</li> <li>• Using verbs in their correct tenses, deriving the sense from the rest of the sentence.</li> </ul>	<p>child-marriage 4. Sudha Murthy's write on what it is possible for women to achieve</p>	<p>sitions between ideas and paragraphs (using appropriate connecting words or phrases); winding to a conclusion by drawing the various strings of the argument together</p>			
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<p><b>Chapter 4. Disaster Management</b> Articles and punctuation:</p> <ul style="list-style-type: none"> <li>• Understanding the uses of 'a', 'an', and 'the'</li> <li>• Understanding the uses of words/phrases expressing quantity, like 'some', 'a bit of', 'more', etc.</li> <li>• Understanding and using correct punctuation to convey meaning</li> </ul> <p><b>Functional grammar exercise:</b> Students may be asked to imagine that in the aftermath of a natural disaster, they are part of a relief team effort. When asked to effectively identify the needs of the situation, how do they plan to go about providing necessary aid? Is an ambulance to be ar</p>	<p>Reading and analysis of a short piece on the tsunami</p>	<p>Official letters and emails Effectively using the format of official communication: providing one's own address and contact details, documenting the date and place from which the communication is sent, the salutation used for the addressee, the main body of the letter or email (keeping it comprehensive but to the point), and signing off</p>	<p>Dialogues between: 1.a social worker and an earthquake victim 2.two doctors working in an area afflicted by natural disaster 3.two school students campaigning to raise relief money</p>	<p>Communication, teamwork, problem solving, adaptability, stress management, reliability, integrity</p>	<p>Enhanced learner-participation, development of linguistic proficiency, functional approach to problem solving, enabling group work</p>	<p>[Both Teacher's Manual and Sample Test Questions will be provided]</p>
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<p>ranged for? Or a medical tent set up? Are adequate first-aid supplies available? Do more rations need to be fetched? Could there be a tie-up with an overseas relief organization?</p>	<p>Reading and analysis of three different kinds of writing, and comparisons between them: 1.A Government of India report on the success of nationwide campaigns for polio vaccination 2.A vegetarian's perspective on what makes for healthy living 3.An athlete's say on the benefits of lifelong exercise</p>	<p>Reports Learning the difference between an essay, for example, and a report; learning to identify the key points of an event or incident, and documenting them briefly but in a manner that conveys both the temper and the unfolding of the event; understanding what is meant by a 'target readership', and learning to tailor the piece to the needs of that readership</p>	<p><b>Brief exchanges between:</b> 1.A father and his son/daughter, as he explains the importance of staying fit 2.A friends discussing the ideal diet 3.A campus counsellor and a student</p>	<p>Personal presentation, stress-management, commitment, enthusiasm,, self-motivation</p>	<p>Development of linguistic proficiency, functional approach to problem solving</p>	<p>[Both Teacher's Manual and Sample Test Questions will be provided]</p>
<p><b>Chapter 5 –Health Prepositions, and conjunctions and exclamations:</b> •Understanding the use of prepositions – words that connect verbs with their objects •Understanding that certain verbs use certain prepositions •Understanding the uses of common prepositions: to, for, at, by, of, and so on •Understanding the uses of conjunctions and exclamations</p>						

<p><b>Functional grammar exercise:</b> Students may be asked to propose ways in which healthier living might be attained – eating better <i>and</i> exercising, drinking plenty <i>of</i> water, partaking fresh vegetables <i>from</i> the Market, and so on. Possible exercises may be framed around:</p> <ul style="list-style-type: none"><li>• Filling in blanks within sentences</li><li>• Distinguishing between different meanings possible through the use of different prepositions with the same verbs</li></ul>					
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<p><b>Chapter 6 Sports :</b> Revision of all elements of grammar handled thus far, through evocative descriptions of State or national or international level sports stories, and discussion of them.</p> <p><b>Functional grammar exercise:</b> Students may, in pairs, be asked to present an account of a memorable sports meet or game. The use of nouns pronouns, and adjectives should help to clarify exactly what event is being talked about. Judicious use of adjective will help provide the context: how important the game or match was, where it was held, and so on. In a brief account of the game, verbs and adverbs will</p>	<p><b>Reading and analysis</b> of two of four short pieces in depiction of:</p> <ol style="list-style-type: none"> <li>1. Opportunities for men and women in sports</li> <li>2. A decisive moment in a game</li> <li>3. Expectation and failure</li> <li>4. The attitude of sportsmanship</li> </ol>	<p><b>Presentations</b> Learning to identify the key elements of any issue and putting them down as succinct points; structuring the points so that they may be elaborated on according to necessity; understanding the progression of points so that no important element is missed out, but also, repetitions are avoided</p>	<p><b>Small conversations</b> between:</p> <ol style="list-style-type: none"> <li>1. A fitness instructor and a trainee</li> <li>2. Two friends discussing a possible career in sports</li> <li>3. Two friends discussing their favorite game</li> </ol>	<p><b>Teamwork, integrity, self-motivation, self-esteem, commitment</b></p>	<p><b>Development of linguistic proficiency, functional approach to problem solving</b></p>	<p>[Both Teacher's Manual and Sample Test Questions will be provided]</p>
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be necessary to report exactly what happened. If the account has to be detailed and lively, students will be obliged to use the correct forms and tenses. Of course, throughout, not only will the right inflections and articles be necessary, so too will the precise use of prepositions.						
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**Book:** *Step by Step : Learning Language and Life Skills by* Pearson Longman; Pearson Publishers  
**Lab Manual:** Strengthen your Steps (A Multimodal course in communication skills) by Maruthi Publications

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, KAKINADA

**I Year B. Tech Electrical and Electronics Engineering – I Sem.**

**MATHEMATICS-I (Common to All Branches)**

**UNIT – I**

Differential equations of first order and first degree – exact, linear and Bernoulli. Applications to Newton’s Law of cooling, Law of natural growth and decay, orthogonal trajectories.

**UNIT – II**

Non-homogeneous linear differential equations of second and higher order with constant coefficients with RHS term of the type  $e^{ax}$ ,  $\sin ax$ ,  $\cos ax$ , polynomials in  $x$ ,  $e^{ax} V(x)$ ,  $xV(x)$

**UNIT-III**

Generalized Mean Value theorem (without proof) Functions of several variables – Functional dependence- Jacobian- Maxima and Minima of functions of two variables with constraints and without constraints.

**UNIT-IV**

Curve tracing – Cartesian - Polar and Parametric curves.

**UNIT – V**

Applications of Integration to Lengths, Volumes and Surface areas of revolution in Cartesian and Polar Coordinates.

**UNIT – VI**

Multiple integrals - double and triple integrals – change of variables – Change of order of Integration.

**UNIT – VII**

Vector Differentiation: Gradient- Divergence- Curl and their related properties of sums-products- Laplacian and second order operators.

**UNIT-VIII**

Vector Integration - Line integral – work done – Potential function – area-surface and volume integrals Vector integral theorems: Greens, Stokes and Gauss Divergence Theorems (Without proof) and related problems.

**TEXTBOOKS:**

1. ‘A Text Book of Engineering Mathematics – I’ by U. M. Swamy, P. Vijaya Lakshmi, Dr. M. P.K.Kishore and Dr. K.L. Sai Prasad – Excel Books, New Delhi

**REFERENCES:**

1. Engineering Mathematics, Vol- 1, Dr. D. S.C. Prism Publishers
2. Engineering Mathematics, B. V. Ramana , Tata Mc Graw Hill
3. “Advanced Engineering Mathematics”, Erwin Kreszig, 8 Ed. Wiley Student Edition

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA**  
**I Year B. Tech Electrical and Electronics Engineering – I Sem.**

**ENGINEERING PHYSICS -1**

**UNIT-I**

INTERFERENCE: Superposition of waves - Young's double slit experiment - Coherence - Interference in thin films by reflection - Newton's rings.

**UNIT-II**

DIFFRACTION: Fresnel and Fraunhofer diffractions - Fraunhofer diffraction at a single slit - Double slit - Diffraction grating - Grating spectrum - Resolving power of a grating - Rayleigh's criterion for resolving power.

**UNIT-III**

POLARIZATION: Types of Polarization - Double refraction - Nicol prism - Quarter wave plate and Half wave plate..

**UNIT-IV**

CRYSTAL STRUCTURE: Introduction - Space lattice - Basis - Unit cell - Lattice parameters - Bravais lattices - Crystal systems - Structure and packing fractions of simple cubic, Body centered cubic, Face centered cubic crystals.

**UNIT-V**

X-RAY DIFFRACTION: Directions and planes in crystals - Miller indices - Separation between successive [h k l] planes - Diffraction of X - rays by crystal planes - Bragg's law - Laue method - Powder method.

**UNIT-VI**

LASERS: Introduction - Characteristics of lasers - Spontaneous and Stimulated emission of radiation - Einstein's coefficients - Population inversion - Ruby laser - Helium -Neon laser - Semiconductor laser - Applications of lasers in industry, scientific and medical fields.

**UNIT-VII**

FIBER OPTICS: Introduction - Principle of optical fiber - Acceptance angle and acceptance cone - Numerical aperture - Types of optical fibers and refractive index profiles - Attenuation in optical fibers - Application of optical fibers.

**UNIT-VIII**

**NON-DESTRUCTIVE TESTING USING ULTRASONICS:** Ultrasonic Testing - Basic Principle - Transducer - Couplant and Inspection Standards - Inspection Methods - Pulse Echo Testing Technique - Flaw Detector - Different Types of Scans - Applications.

**TEXT BOOKS :**

1. Perspective of Engineering Physics by Dr.M.Sri Rama Rao (Retd Prof. in Physics, Andhra University, Visakhapatnam), Dr.N.Chaudhary and D.Prasad, Pub: Acme Learning.

**REFERENCE BOOKS:**

1. Engineering Physics by S. Mani Naidu ( Pearson publishers )
2. Engineering Physics by Sanjay D Jain and Girish G Sahasrabudhe (University press)
3. Engineering Physics by Alik and A K Singh (Tata Mc Graw-Hill Publishing company Limited)

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA**

**I Year B. Tech Electrical and Electronics Engineering – I Sem.**

**ENGINEERING CHEMISTRY –I**

**CONCEPTS IN CHEMISTRY –ENGINEERING APPLICATIONS**

**UNIT-I**

**1. JOULE THOMSON EFFECT**

Definitions of Enthalpy, Free Energy, Entropy, Principle and explanation of Joule Thomson Effect, application to Air Conditioning , Refrigeration (WORKING PRINCIPLE AND FLOW DAIGRAMS)

**2. OSMOSIS & REVERSE OSMOSIS**

Principles of Osmosis & Reverse Osmosis, application to Desalination process-Types of Membranes used in desalination process-Limitations

**3. LECHATLIER'S PRINCIPLE —**

Definition of Chemical Equilibrium, Factors influence the Chemical Equilibrium, Statement and explanation of Lechatliers principle- Industrial applications for the production of Sulphuric Acid and Ammonia

**4. SOLUBILITY PRODUCT & COMMON ION EFFECT —**

Definition of Solubility & Ionic products, Industrial applications

**UNIT-II**

**1. CATALYSIS**

Explanation of Catalysis, Criteria of Catalysts, Few Industrial Catalysts

**2. COLLOIDS**

Explanation of Colloids- Properties of Colloids, Industrial applications of Colloids

**3. FERMENTATION**

Explanation of Fermentation with examples-Industrial applications

**4. VISCOSITY:**

Definition of Viscosity -Factors influence the Viscosity- Kinematic Viscosity-Determination of Molecular Weight of any one compound-

Applications to fluids in motion –Type of flow.

### **UNIT-III**

#### **1. FLUORESCENCE&PHOSPHORESCENCE— LUMINESCENT COMPOUNDS**

Explanation of Fluorescence &Phosphorescence JOB s Diagram, Industrial applications of Chemiluminiscent compounds

#### **2. PHOTO & LIGHT RESPONSIVE COMPOUNDS— SENSORS,BIOSENSORS**

Explanation of Sensors & Biosensors-Principle –Few Applications

#### **3. IONSELECTIVEELECTRODES–**

Principle- Chemistry &working of Electrode-applications to determination of Fluoride,Chloride and Nitrate

#### **4. NUCLEAR MAGNETIC RESONANCE(NMR):**

Principle –Few Electronic applications

### **UNIT-IV**

#### **1. SUPERCONDUCTIVITY –**

Definition-Preparation –Properties –Engineering Applications

#### **2. SEMICONDUCTORS-**

Definition –Types of semiconductors (Stoichiometric,Non stichometric , Organic, Controlled Valency Semiconductors, Doping )- applications

#### **3. STORAGEDEVICES-**

Materials used and working of Floppy, CD, Pendrive etc.

#### **4. LIQUID CRYSTALS-**

Definition –Types - applications in LCD and Engineering, Applications.

### **UNIT – V**

**THERMAL ENERGY-** introduction to solid fuels – definition – calorific value (LCV,HCV)bomb calorimeter, pulverized coal – carbonization – analysis of coal (proximate and ultimate analysis) – working of thermal power station.



**UNIT - VI**

Chemical sources of energy – single electrode potential – Nernst Equation – reference electrodes – concentration cells – primary and secondary cells – fuel cells.

**UNIT-VII**

**NUCLEAR ENERGY:** Introduction to nuclear fuels – binding energy – nuclear fission and fusion reactions – nuclear reactions – disposal of nuclear wastes.

**UNIT-VIII**

**SOLAR CELLS-** introduction – harnessing solar energy – solar heaters – photo voltaic cells – solar reflection – green house concepts.

\*Teachers Are Requested To Provide Information About National And International Status Of Conventional And Non Conventional Sources To The Students

**TEXTBOOK :**

A Text Book Of Engineering Chemistry By N.Krishan Murty, Anuradha , Maruthi Publications.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA**  
**I Year B. Tech Electrical and Electronics Engineering – I Sem.**

**C- Programming**

**UNIT I:**

**INTRODUCTION:** Computer systems, Hardware & software concepts.

**PROBLEM SOLVING:** Algorithm / pseudo code, flowchart, program development steps, Computer Languages: machine, symbolic, and high-level languages, Creating and running programs: Writing, editing, compiling, linking, and executing.

**BASICS OF C:** Structure of a C program, identifiers, basic data types and sizes. Constants, variables, arithmetic, relational and logical operators, increment and decrement operators, conditional operator, assignment operators, expressions, type conversions, conditional expressions, precedence and order of evaluation, Sample programs.

**UNIT II:**

**BIT-WISE OPERATORS:** logical, shift, rotation, masks.

**SELECTION – MAKING DECISIONS:** Two-way selection: if- else, null else, nested if, examples, Multi-way selection: switch, else-if, examples.

**UNIT III:**

**STRINGS:** concepts, c strings.

**ITERATIVE:** Loops - while, do-while and for statements, break, continue, initialization and updating, event and counter controlled loops, Looping applications: Summation, powers, smallest and largest.

**UNIT IV:**

**ARRAYS:** Arrays - concepts, declaration, definition, accessing elements, storing elements, Strings and string manipulations, 1-D arrays, 2-D arrays and character arrays, string manipulations, Multidimensional arrays , Array applications: Matrix Operations, checking the symmetricity of a Matrix,

**UNIT V:**

**FUNCTIONS-MODULAR PROGRAMMING:** Functions, basics, parameter passing, storage classes- extern, auto, register, static, scope rules, block structure, user defined functions, standard library functions, recursive

functions, Recursive solutions for Fibonacci series, Towers of Hanoi, header files, C pre-processor, example c programs. Passing 1-D arrays, 2-D arrays to functions.

**UNIT VI:**

**POINTERS:** Pointers- concepts, initialization of pointer variables, pointers and function arguments, passing by address –dangling memory, address arithmetic, Character pointers and functions, pointers to pointers, pointers and multidimensional arrays, dynamic memory management functions, command line arguments.

**UNIT VII:**

**ENUMERATED, STRUCTURE AND UNION TYPES:** Derived types- structures- declaration, definition and initialization of structures, accessing structures, nested structures, arrays of structures, structures and functions, pointers to structures, self referential structures, unions, typedef, bit-fields, program applications.

**UNIT VIII:**

**FILE HANDLING:** Input and output – concept of a file, text files and binary files, Formatted I/o, file I/o operations, example programs.

**TEXT BOOKS:**

The C – Programming Language’ B.W. Kernighan, Dennis M. Ritchie, PHI

**REFERENCE:**

1. C Programming : A Problem - Solving Approach, Forouzan, E. V. Prasad, Giliberg, Cengage, 2010.
2. Programming in C, Stephen G. Kochan, 3/e Pearson, 2007.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA****I Year B. Tech Electrical and Electronics Engineering – I Sem.****MATHEMATICALMETHODS****UNIT – I**

Linear systems of equations: Rank-Echelon form, Normal form – Solution of Linear Systems – Direct Methods- Gauss Elimination - Gauss Jordan and Gauss Seidal Methods.

**UNIT – II**

Eigen values - Eigen vectors – Properties – Cayley-Hamilton Theorem - Inverse and powers of a matrix by using Cayley-Hamilton theorem.

**UNIT-III**

Quadratic forms- Reduction of quadratic form to canonical form – Rank - Positive, negative definite - semi definite - index – signature.

**UNIT – IV**

Solution of Algebraic and Transcendental Equations: Introduction – The Bisection Method – The Method of False Position – The Iteration Method – Newton-Raphson Method.

**UNIT-V**

**Interpolation:** Introduction- Errors in Polynomial Interpolation – Finite differences- Forward Differences- Backward differences –Central differences – Symbolic relations and separation of symbols-Differences of a polynomial-Newton’s formulae for interpolation – Interpolation with unevenly spaced points - Lagrange’s Interpolation formula.

**UNIT – VI**

Numerical Differentiation and Integration – Differentiation using finite differences - Trapezoidal rule – Simpson’s 1/3 Rule –Simpson’s 3/8 Rule.

**UNIT – VII**

Numerical solution of Ordinary Differential equations: Solution by Taylor’s series-Picard’s Method of successive Approximations-Euler’s Method-Runge-Kutta Methods –Predictor-Corrector Methods- Milne’s Method.

**UNIT – VIII**

Curve fitting: Fitting a straight line –Second degree curve-exponential curve-power curve by method of least squares.

**TEXTBOOK :**

1. Ravindranath, V. and Vijayalaxmi, A., A Text Book on Mathematical Methods, Himalaya Publishing House, Bombay.

**REFERENCE BOOKS :**

1. Rukmangadachari, E. Mathematical Methods, Pearson Education, Delhi.
2. Kreszig, Erwin “Advanced Engineering Mathematics”, 8 Ed. Wiley Student Edition.
3. Peter O’ Neil, “Engineering Mathematics”, Cengage Learning. Gordon, “Engineering Mathematics”, Pearson Education

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA****I Year B. Tech Electrical and Electronics Engineering – I Sem.****ENGINEERING PHYSICS & CHEMISTRY LABORATORY-1****PHYSICS-I****A. Mechanics**

1. Determine the Rigidity Modulus of the material of the wire using Torsional Pendulum.
2. Determine the Frequency of vibration in Transverse and Longitudinal Mode using Melde's Apparatus.
3. Verify the Laws Transverse vibrations in stretched strings using Sonometer.
4. Determine the Velocity of Sound by Volume Resonator method.
5. Determine the Acceleration due to Gravity and Radius of Gyration using Compound Pendulum.

**B. Optics:**

6. Determine the Wavelength of a source by Normal Incidence method using Diffraction Grating.
7. Determine the Radius Curvature of a convex lens by forming Newton's Rings.
8. Determine the Refractive Index of the material of Prism (Minimum Deviation method) using Spectrometer.
9. Determine the Thickness of the Spacer used to form Parallel fringes due to Wedge shaped film.
10. Determination of Single slit diffraction using Lasers.

**Manual/Record Books:**

1. Manual cum Record for Engineering Physics Lab-1, by Prof. Sri M. Rama Rao, Acme Learning.
2. Lab manual – 1, of Engineering Physics by Dr. Y. Aparna and Dr. K. Venkateswara Rao (VGS Books links, Vijayawada)

## CHEMISTRY LAB - 1

### LIST OF EXPERIMENTS

1. Introduction to Chemistry Lab (the teachers are expected to teach fundamentals like Primary, Secondary Standard Solutions, Normality, Molarity, Molality etc and laboratory ware used, error, accuracy, precision, Theory of indicators, use of volumetric titrations)

#### 2. Introduction to Volumetric Analysis:

The Teacher has to perform four types of volumetric titrations and will explain about the Working of Indicators. (The Teacher has to call the students at random to perform the titrations)

#### 2. ANALYSIS OF WATER

Estimation of :

- a. **Calcium, Magnesium, Iron (II), Zinc (SEPERATELY)**
- b. TOTAL HARDNESS BY EDTA METHOD
- c. TURBIDITY
- d. CONDUCTIVITY
- e. pH
- f. TOTAL DISSOLVED SALTS
- g. FLORIDES, CHLORIDES AND NITRATES ( USING ION ANALYSER OR BY COLORIMETER)
- h. DISSOLVED OXYGEN
- i. BACTERIAL COUNT

The student has to get his water sample and the teacher has to explain the analysis and the results are to be compared with the INDIAN STANDARDS.

- All the teachers are requested to give top priority to water analysis as it is very useful for the students and society. complete water analysis may take couple of hours more but this has a unique influence on the system.

#### 3. CONSTRUCTION OF GALVANIC CELL

Based on the position of the metals in the electrochemical series a model Electrochemical Cell is constructed and the values are determined and effect of metal ion concentration, Temperature etc. on emf are calculated.

#### Lab Manual :

Engineering chemistry laboratory manual & record By srinivasulu .d parshva publications.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA**  
**I Year B. Tech Electrical and Electronics Engineering – I Sem.**

**ENGINEERING WORKSHOP**

**Note: At least two exercises to be done from each trade.**

**Trade:**

- |                     |   |
|---------------------|---|
| <b>Carpentry</b>    | <ol style="list-style-type: none"><li>1. T-Lap Joint</li><li>2. Cross Lap Joint</li><li>3. Dovetail Joint</li><li>4. Mortise and Tennon Joint</li></ol>   |
| <b>Fitting</b>      | <ol style="list-style-type: none"><li>1. Vee Fit</li><li>2. Square Fit</li><li>3. Half Round Fit</li><li>4. Dovetail Fit</li></ol>  |
| <b>Black Smithy</b> | <ol style="list-style-type: none"><li>1. Round rod to Square</li><li>2. S-Hook</li><li>3. Round Rod to Flat Ring</li><li>4. Round Rod to Square headed bolt</li></ol>                                     |
| <b>House Wiring</b> | <ol style="list-style-type: none"><li>1. Parallel / Series Connection of three bulbs</li><li>2. Stair Case wiring</li><li>3. Florescent Lamp Fitting</li><li>4. Measurement of Earth Resistance</li></ol> |
| <b>Tin Smithy</b>   | <ol style="list-style-type: none"><li>1. Taper Tray</li><li>2. Square Box without lid</li><li>3. Open Scoop</li><li>4. Funnel</li></ol>   |



**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA**  
**I Year B. Tech Electrical and Electronics Engineering – I Sem.**

**C PROGRAMMING LAB**

**Objectives:**

- To learn/strengthen a programming language like C, To learn problem solving techniques

**Recommended Systems/Software Requirements:**

- Intel based desktop PC, ANSI C Compiler with Supporting Editors, IDE's such as Turbo C, Bloodshed C,
- Linux with gcc compiler

**Exercise 1**

Solving problems such as temperature conversion, student grading, income tax calculation, etc., which expose students to use basic C operators

**Exercise 2**

2's complement of a number is obtained by scanning it from right to left and complementing all the bits after the first appearance of a 1. Thus 2's complement of 11100 is 00100. Write a C program to find the 2's complement of a binary number.

**Exercise 3**

- a) Write a C program to find the sum of individual digits of a positive integer.
- b) A Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Write a C program to generate the first n terms of the sequence.
- c) Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.
- d) Write a program which checks a given integer is Fibonacci number or not.

**Exercise 4**

- a) Write a C program to calculate the following Sum:

$$\text{Sum} = 1 - x^2/2! + x^4/4! - x^6/6! + x^8/8! - x^{10}/10!$$

- b) Write a C program to find the roots of a quadratic equation.

**Exercise 5**

- a) The total distance travelled by vehicle in 't' seconds is given by distance =  $ut + 1/2at^2$  where 'u' and 'a' are the initial velocity (m/sec.) and acceleration (m/sec<sup>2</sup>). Write C program to find the distance travelled at regular intervals of time given the values of 'u' and 'a'. The program should provide the flexibility to the user to select his own time intervals and repeat the calculations for different values of 'u' and 'a'.
- b) Write a C program, which takes two integer operands and one operator from the user, performs the operation and then prints the result. (Consider the operators +, -, \*, /, % and use Switch Statement)

**Exercise 6**

- a) Simple programming examples to manipulate strings.
- b) Verifying a string for its palindrome property

**Exercise 7**

Write a C program that uses functions to perform the following operations:

- i. To insert a sub-string in to given main string from a given position.
- ii. To delete n Characters from a given position in a given string.
- iii. To replace a character of string either from beginning or ending or at a specified location

**Exercise 8**

Write a C program that uses functions to perform the following operations using Structure:

- i) Reading a complex number
- ii) Writing a complex number
- iii) Addition of two complex numbers
- iv) Multiplication of two complex numbers

**Exercise 9**

- a) Addition of Two Matrices
- b) Calculating transpose of a matrix in-place manner.
- c) Matrix multiplication by checking compatibility

**Exercise 10**

- a) Write C programs that use both recursive and non-recursive functions for the following
  - i) To find the factorial of a given integer.
  - ii) To find the GCD (greatest common divisor) of two given integers.
  - iii) To solve Towers of Hanoi problem.

**Exercise 11**

- a) Write a C functions to find both the largest and smallest number of an array of integers.
- b) Write a C function that uses functions to perform the following:
  - i) that displays the position/ index in the string S where the string T begins, or -1 if S doesn't contain T.
  - ii) to count the lines, words and characters in a given text.

**Exercise 12**

- a) Write a C function to generate Pascal's triangle.
- b) Write a C function to construct a pyramid of numbers.

**Exercise 13**

Write a C function to read in two numbers, x and n, and then compute the sum of this geometric progression:

$$1+x+x^2+x^3+\dots\dots\dots+x^n$$

Write a C function to read in two numbers, x and n(no. of terms), and then compute sin(x) and cos(x).

**Exercise 14**

- a. Pointer based function to exchange value of two integers using passing by address.

- b. Program which explains the use of dynamic arrays.
- c. Program to enlighten dangling memory problem (Creating a 2-D array dynamically using pointer to pointers approach).

**Exercise 15**

Examples which explores the use of structures, union and other user defined variables

**Exercise 16**

- a) Write a C program which copies one file to another.
- b) Write a C program to reverse the first n characters in a file. (Note: The file name and n are specified on the command line)

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA**  
**I Year B. Tech Electrical and Electronics Engineering – I Sem.**

**ENGLISH - COMMUNICATION SKILLS LAB -1**

**UNIT - I**

Section -A Hello, I'm.....

Section –B Practicing Sounds

**UNIT - II**

Section –A I Would Love to .....but

Section – B practicing Sounds

**UNIT - III**

Section-A With your permission I would to ...

Section-B Practicing Sounds

**UNIT - IV**

Section-A Why don't we.....

Section-B Practicing Sounds

**UNIT - V**

Section-A Could you Please.....

Section-B practicing Sounds

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA**  
**I Year B. Tech Electrical and Electronics Engineering – II Sem.**

**MATHEMATICS-II**

**UNIT – I**

Laplace transforms of standard functions – Shifting Theorems, Transforms of derivatives and integrals – Unit step function – Dirac's delta function.

**UNIT – II**

Inverse Laplace transforms – Convolution theorem - Application of Laplace transforms to ordinary differential equations Partial fractions.

**UNIT – III**

Fourier Series: Determination of Fourier coefficients – Fourier series – even and odd functions – Fourier series in an arbitrary interval – Half-range sine and cosine series.

**UNIT – IV**

Fourier integral theorem (only statement) – Fourier sine and cosine integrals - Fourier transform – sine and cosine transforms – properties – inverse transforms – Finite Fourier transforms.

**UNIT – V**

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions – solutions of first order linear (Lagrange) equation and nonlinear (standard type) equations.

**UNIT – VI**

Method of Separation of Variables - Applications to wave equation, heat equation and Laplace Equation.

**UNIT – VII**

Z-transform – properties – Damping rule – Shifting rule – Initial and final value theorems - Inverse z-transform - Convolution theorem – Solution of difference equation by z-transforms.

**UNIT – VIII**

Gamma and Beta Functions – Properties – Evaluation of improper integrals.

**TEXTBOOK:**

1. Swamy,U.M., Vijayalaxmi, P.,Ravikumar, R. V.G., and Phani Krishna Kishore., Mathematics II, Excel Books, New Delhi.

**BOOKS:**

1. B.V.Ramana, Engineering Mathematics, Tata Mc Graw Hill.
2. Iyengar,T.K.V, Krishna Gandhi, et.al Engineering Mathematics Vol-II, S.Chand Co. New Delhi.
3. Erwin Kreszig, “Advanced Engineering Mathematics”, 8 Ed Wiley Student Edition.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA****I Year B. Tech Electrical and Electronics Engineering – II Sem.****ENGINEERING PHYSICS - II****UNIT-I**

QUANTUM MECHANICS & QUANTUM COMPUTING: Introduction - Schrodinger Time Independent and Time Dependent wave equations - Particle in a box - Operator version - Suitability of Quantum system for Information Processing - Classical Bits and Qu-Bits - Bloch's Sphere - Quantum Gates - Multiple Qu-Bits - Advantages of Quantum Computing over classical Computation.

**UNIT-II**

ELECTRON THEORY OF METALS: Classical free electron theory - Mean free path - Relaxation time and drift velocity - Quantum free electron theory - Fermi - Dirac (analytical) and its dependence on temperature - Fermi energy - Electron scattering and resistance.

**UNIT-III**

BAND THEORY OF SOLIDS: Bloch theorem (qualitative) - Kronig - Penney model - Origin of energy band formation in solids - Classification of materials into conductors, semi- conductors & insulators - Concept of effective mass of an electron.

**UNIT-IV**

MAGNETIC PROPERTIES: Permeability - Magnetization - Origin of magnetic moment - Classification of Magnetic materials - Dia, para and ferro- magnetism - Domain and Weiss field theory - Hysteresis Curve - Soft and Hard magnetic materials.

**UNIT-V**

SUPERCONDUCTIVITY: General properties - Meissner effect - Penetration depth - Type I and type II superconductors - Flux quantization - DC and AC Josephson effect - BCS Theory - Applications of superconductors.

**UNIT-VI**

DIELECTRIC PROPERTIES: Introduction - Dielectric constant - Electronic, ionic and orientational polarizations - Internal fields in solids - Clausius-Mossotti equation - Dielectrics in alternating fields - frequency dependence of the polarizability - Ferro and Piezo electricity.



**UNIT-VII**

SEMICONDUCTORS: Introduction - Intrinsic semiconductor and carrier concentration - Equation for conductivity - Extrinsic semiconductor and carrier concentration - Drift and diffusion - Einstein's equation - Hall effect - Direct & indirect band gap semiconductors.

**UNIT-VIII**

PHYSICS OF NANO MATERIALS: Introduction - Properties and preparation of Nano Materials - Surface occupancy - Reduction of Dimensionality - 4D - Force vector - Quantum wires - Quantum dots and Quantum wells - Density of states and Energy spectrum - Nanotubes - Applications of nanomaterials.

**TEXT BOOK:**

Perspective of Engineering Physics - II by M Sri Ramarao, Nityananda Choudary, Daruka Prasad, ACME Learning.

**REFERENCE BOOKS:**

1. Solid State Physics – by A J Dekker , Mcmilan India Ltd.
2. A Text Book of Engineering Physics , by Bhattacharya & Bhaskara , Oxford University Press
3. Engineering Physics by K Shiva Kumar, Prism Books Pvt. Ltd

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

I Year B. Tech Electrical and Electronics Engineering – II Sem.

**ENGINEERING CHEMISTRY –II**

**UNIT-I**

**POLYMERS:** Introduction - Types of polymers – Classification - Methods of polymerisation – Stereo specific polymers - Ziegler Natta catalysis - Properties of polymers –Conducting Polymers- Engineering applications – Biodegradable polymers - Individual polymers(Preparation ,Properties,Uses of Poly Styrene, PVC, PTFE, Bakelite’s, Cellulose derivatives, Poly Carbonates)

**UNIT-II**

**PLASTICS** – Types –Compounding of plastics- Moulding(Four types)- Fiber reinforced , Glass fibre reinforced plastics –Bullet Proof Plastics– Properties of plastics – Engineering applications

**UNIT-III**

**RUBBERS & ELASTOMERS:** Introduction – Preparation – Vulcanization – Properties - Engineering applications.

Buna-S,Buna-N, - Poly Urethane - Engineering applications of Elastomers

**UNIT-IV**

**NANOMATERIALS**

Introduction to Nano materials-preparation of few Nano materials(Carbon Nano Tubes,Fullerenes etc)-Properties of Nano materials- Engineering applications.

**UNIT-V**

**BUILDING MATERIALS(CEMENT,REFRACTORIES,CRAMICS):  
CEMENT**

Introduction, Manufacturing of Portland Cement(Dry &We Process )- Chemistry of Setting and Hardening of Cement-Effect of Carbon dioxide,Sulphur Dioxide ,Chloride on Cement concrete.

**REFRACTORIES**

Introduction-Classification –Properties-Applications

### CERAMICS

Introduction-Classification – Glazed & Unglazed Ceramics -Properties-Engineering Applications.

### UNIT-VI

#### FUEL TECHNOLOGY

Introduction to Liquid Fuels-Classification of Crude Oil-Fractional Distillation-Cracking (Thermal & Catalytic), Polymerization-Refining & Reforming –Working of Internal Combustion Engine, Heated Chambers-Knocking –AntiKnocking Agents-Octane & Cetane Number.

#### LUBRICANTS

Definition and Explanation of Lubrication-Mechanism of Lubrication –Types of Lubricants-Properties of Lubricants-Engineering applications

### UNIT-VII

CORROSION – Mechanism- Factors influence the rate of corrosion - Types of Corrosion -Protection methods (Anodic & Cathodic protection ), - Metallic Coatings - Paints, Varnishes, Enamels , Special paints.

### UNIT-VIII

#### GREEN CHEMISTRY

Introduction-Concepts- Engineering Applications

#### TEXTBOOK :

1. A Text book of engineering chemistry by Srinivasulu D. Parshva publications.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA**  
**I Year B. Tech Electrical and Electronics Engineering – II Sem.**

**ENGINEERING DRAWING**

**Unit-I**

Polygons-Construction of Regular Polygons using given length of a side; Ellipse- Arcs of Circles and Oblong Methods; Scales-Vernier and Diagonal Scales.

**Unit-II**

Introduction to Orthographic Projections; Projections of Points; Projections of Straight Lines parallel to both planes; Projections of Straight Lines-Parallel to one and inclined to other plane.

**Unit-III**

Projections of Straight Lines inclined to both planes, determination of true lengths, angle of inclinations and traces.

**Unit-IV**

Projections of Planes; Regular Planes Perpendicular / Parallel to one Reference Plane and inclined to other Reference Plane; inclined to both the Reference Planes.

**Unit-V**

Projections of Solids-Prisms and Cylinders with the axis inclined to one Plane.

**Unit-VI**

Projections of Solids- Pyramids and Cones with the axis inclined to one plane.

**Unit-VII**

Conversion of Isometric Views to Orthographic Views.

**Unit-VIII**

Conversion of Orthographic Views to Isometric Projections and Views.

**TEXTBOOK:**

1. Engineering Drawing by N.D. Bhat, Chariot Publications

**REFERENCEBOOKS:**

1. Engineering Drawing by M.B. Shah and B.C. Rana, Pearson Publishers
2. Engineering Drawing by Dhananjay A. Jolhe, Tata McGraw Hill Publishers
3. Engineering Graphics for Degree by K.C. John, PHI Publishers

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA**  
**I Year B. Tech Electrical and Electronics Engineering – II Sem.**

**ENVIRONMENTAL STUDIES**

**UNIT - I**

**Multidisciplinary nature of Environmental Studies:** Definition, Scope and Importance – Need for Public Awareness.

**UNIT - II**

**Natural Resources :** Renewable and non-renewable resources – Natural resources and associated problems – Forest resources – Use and over – exploitation, deforestation, case studies – Timber extraction – Mining, dams and other effects on forest and tribal people – Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems - Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies. - Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. – Energy resources: Growing energy needs, renewable and non-renewable energy sources use of alternate energy sources. Case studies. Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification. Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles.

**UNIT - III**

**Ecosystems :** Concept of an ecosystem. - Structure and function of an ecosystem. - Producers, consumers and decomposers. - Energy flow in the ecosystem - Ecological succession. - Food chains, food webs and ecological pyramids. - Introduction, types, characteristic features, structure and function of the following ecosystem:

- a. Forest ecosystem
- b. Grassland ecosystem
- c. Desert ecosystem
- d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

#### **UNIT - IV**

**Biodiversity and its conservation :** Introduction - Definition: genetic, species and ecosystem diversity. - Bio-geographical classification of India - Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values - . Biodiversity at global, National and local levels. - . India as a mega-diversity nation - Hot-spots of biodiversity - Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts. - Endangered and endemic species of India – Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

#### **UNIT - V**

**Environmental Pollution :** Definition, Cause, effects and control measures of :

- a. Air pollution
- b. Water pollution
- c. Soil pollution
- d. Marine pollution
- e. Noise pollution
- f. Thermal pollution
- g. Nuclear hazards

**Solid waste Management:** Causes, effects and control measures of urban and industrial wastes. - Role of an individual in prevention of pollution. - Pollution case studies. - Disaster management: floods, earthquake, cyclone and landslides.

#### **UNIT - VI**

**Social Issues and the Environment:** From Unsustainable to Sustainable development -Urban problems related to energy -Water conservation, rain water harvesting, watershed management -Resettlement and rehabilitation of people; its problems and concerns. Case Studies -Environmental ethics: Issues and possible solutions. -Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies. - Wasteland reclamation. – Consumerism and waste products. -Environment Protection Act. -Air (Prevention and Control of Pollution) Act. –Water (Prevention and control of Pollution) Act -Wildlife Protection Act -Forest Conservation Act -Issues involved in enforcement of environmental

legislation. -Public awareness.

#### **UNIT - VII**

**Human Population and the Environment:** Population growth, variation among nations. Population explosion – Family Welfare Programme. -Environment and human health. -Human Rights. -Value Education. HIV/AIDS. -Women and Child Welfare. -Role of information Technology in Environment and human health. –Case Studies. Page 37 of 79

#### **UNIT - VIII**

**Field work :** Visit to a local area to document environmental assets River / forest grassland/hill/mountain -Visit to a local polluted site Urban/Rural/ industrial/ Agricultural Study of common plants, insects, birds. -Study of simple ecosystems pond, river, hill slopes, etc.

#### **TEXT BOOKS :**

1. An Introduction to Environmental Studies by B. Sudhakara Reddy, T. Sivaji Rao, U. Tataji & K. Purushottam Reddy, Maruti Publications.

#### **REFERENCE:**

1. Text Book of Environmental Studies by Deeshita Dave & P. Udaya Bhaskar, Cengage Learning.
2. Environmental Studies by K.V.S.G Murali Krishna, VGS Publishers, Vijayawada
3. Text Book of Environmental Sciences and Technology by M. Anji Reddy, BS Publications.



**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA**

**I Year B. Tech Electrical and Electronics Engineering – II Sem.**

**ENGINEERING PHYSICS & CHEMISTRY LABORATORY - II**

**PHYSICS:**

**Electro-Magnetism and Electronics:**

1. Determine the Planck's constant using Photo-Ceil.
2. Study the variation of Magnetic Field along the axis of a solenoid coil using Stewart - Gee's apparatus.
3. Draw the Frequency Response curves of L-C-R Series and Parallel Circuits.
4. Determine the Time Constant for a C-R Circuit.
5. Determine the Band Gap of a Semi conductor using a p-n junction diode.
6. Study of Characteristic curves ( $I/V$ ) of a Zener diode to determine its Breakdown voltage.
7. Determine the Hall Coefficient of a Semiconductor.
8. Draw the characteristic curves and determine the Thermoelectric coefficient of a Thermistor
9. Study the Seebeck and Peltier - Thermoelectric Effects and to determine Coefficients and Thermo Electric Effect using Thermocouple.
10. Draw the Characteristic curves of a p-i-n and Avalanche Photo Diodes.
11. Determination of Numerical Aperture and Bending losses of an Optical Fiber.

**Manual Cum Record Books :**

1. Manual cum Record for Engineering Physics Lab- II, by Prof.Sri M. Rama Rao, Acme Learning...
2. Lab manual - II, of Engineering Physics by Dr. Y.Aparna and Dr.K.Venkateswara Rao (VGS Books links, Vijayawada )

**CHEMISTRY LAB –II****1. PRODUCTION OF BIODIESEL. INTRODUCTION TO BIOFUELS**

The teacher has to perform the transesterification reaction of FATTY ACID and the Biodiesel thus produced can be used for analysis. (Please give priority to production of Biodiesel from waste cooking oil)

**2. Estimation of properties of oil:**

- a. Acid Number
- b. Viscosity
- c. Saponification value
- d. Aniline point
- e. Flash and Fire points
- f. Pour and Cloud point

**3. PREPARATION OF PHENOL–FORMALDEHYDE RESIN****4. SOIL ANALYSIS:**

pH, Determination of Zinc, Iron, Copper.

**5. FOOD ANALYSIS:**

Determination Saturated and Unsaturated Fatty Acids, pH, etc.

All the teachers are requested to focus on bio fuels, soil analysis and food analysis as these are the need of 21 st century and these experiments are so designed to encourage students to carry out lab to land process.

**Lab Manual** : Engineering chemistry laboratory manual & record By Srinivasulu . D. Parshva publications.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA**

**I Year B. Tech Electrical and Electronics Engineering – II Sem.**

**ENGLISH - COMMUNICATION SKILLS LAB -2**

**UNIT-6**

Dialogues

**UNIT-7**

Interviews

**UNIT-8**

Effective Telephonic Interviews

**UNIT-9**

Group Discussions

**UNIT-10**

Presentations

**UNIT-11**

Debates

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA**  
**I Year B. Tech Electrical and Electronics Engineering – II Sem.**

**IT WORKSHOP**

**Objectives:**

The IT Workshop for engineers is a 6 training lab course spread over 45 hours.

The modules include training on PC Hardware, Internet & World Wide Web and Productivity tools including (word processor, spread sheet, presentation sw) Word, spread sheet Excel, Power Point and Publisher.

**PC Hardware** Identification of basic peripherals, assembling a PC, installation of system software like MS Windows, Linux and the device drivers. Troubleshooting Hardware and software \_ some tips and tricks .

**Internet & World Wide Web:** Different ways of hooking the PC on to the internet from home and workplace and effectively usage of the internet, web browsers, email, newsgroups and discussion forums .Awareness of cyber hygiene( protecting the personal computer from getting infected with the viruses), worms and other cyber attacks .

**Productivity tools** Crafting professional word documents; excel spread sheets, power point presentations and personal web sites using the Microsoft suite of office tools and LaTeX.

**(Note: Student should be thoroughly exposed to minimum of 12 Tasks)**

**PC Hardware**

**Task 1:** Identification of the peripherals of a computer.

To prepare a report containing the block diagram of the CPU along with the configuration of each peripheral and its functions.

**Task 2(Optional) :** A practice on disassemble the components of a PC and assembling them to working condition.

**Task 3 :** Installation of MS windows and LINUX on a PC.

**Task 4 :** Exposure to Basic commands and system administration in Linux including: Basic Linux commands in bash, Create hard and symbolic links.

**Task 5 :**

**Hardware Troubleshooting (Demonstration):**

Students have to be given a PC which does not boot due to improper assembly or defective peripherals. Identification of a problem and fixing it for getting to working condition.

**Software Troubleshooting (Demonstration):** Students have to be given a malfunctioning CPU due to system software problems. Identification of a problem and fixing it for getting to working condition.

**Internet & World Wide Web**

**Task 6 : Orientation & Connectivity Boot Camp and surfing the Web using Web Browsers :** Students should get connected to their Local Area Network and access the Internet. In the process they should configure the TCP/IP setting and demonstrate how to access the websites and email. Students customize their web browsers using bookmarks, search toolbars and pop up blockers.

**Task 7: Search Engines & Netiquette :** Students should know what search engines are and how to use the search engines.

A few topics would be given to the students for which they need to search on Google.

**Task 8 : Cyber Hygiene (Demonstration) :** Awareness of various threats on the internet. To install an anti virus software and to configure their personal firewall and windows update on their computers.

**LaTeX and Word**

**Word Orientation :** Importance of LaTeX and MS/ equivalent (FOSS) tool Word as word Processors.

Details of the four tasks and features that would be covered in each, Using LaTeX and word – Accessing, overview of toolbars, saving files, Using help and resources, rulers, format painter in word.

**Task 9 : Using LaTeX and word** to create project certificate. Features to be covered:-Formatting Fonts in word, Drop Cap in word, Applying Text effects, Using Character Spacing, Borders and Colors, Inserting Header and Footer, Using Date and Time option in both LaTeX and Word.

**Task 10: Creating project : Abstract** Features to be covered:-Formatting Styles, Inserting table, Bullets and Numbering, Changing Text Direction, Cell

alignment, Footnote, Hyperlink, Symbols, Spell Check , Track Changes, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Textboxes and Paragraphs.

### **Excel**

**Excel Orientation :** The mentor needs to tell the importance of MS/ equivalent (FOSS) tool Excel as a Spreadsheet tool, give the details of the four tasks and features that would be covered in each. Using Excel –

Accessing, overview of toolbars, saving excel files, Using help and resources

**Task 11 : Creating a Scheduler** - Features to be covered:- Gridlines, Format Cells, Summation, auto fill, Formatting Text

### **LOOKUP/VLOOKUP**

**Task 12 : Performance Analysis** - Features to be covered:- Split cells, freeze panes, group and outline, Sorting, Boolean and logical operators, Conditional formatting

### **LaTeX and MS/equivalent (FOSS) tool Power Point**

**Task 13 :** Students will be working on basic power point utilities and tools which help them create basic power point presentation. Topic covered during this week includes :- PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows, Hyperlinks, Inserting –Images, Clip Art, Tables and Charts in both LaTeX and Powerpoint.

**Task 14 :** Concentrating on the in and out of Microsoft power point and presentations in LaTeX. Helps them learn best practices in designing and preparing power point presentation. Topic covered during this week includes: - Master Layouts (slide, template, and notes), Types of views (basic, presentation, slide slotter, notes etc), Inserting – Background, textures, Design Templates, Hidden slides.

### **REFERENCES:**

- 1 Scott Mueller's Upgrading and Repairing PCs, 18/e, Scott. Mueller, QUE, Pearson,2008
- 2 The Complete Computer upgrade and repair book,3/e,Cheryl A Schmidt, Dreamtech

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA**  
**II Year B.Tech. Electrical and Electronics Engineering. I-Sem.**

**ELECTRICAL CIRCUIT ANALYSIS-I**

**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 concepts –Resistor(R)-Inductor (L)-Capacitor(C)-Voltage and Current Sources (Ideal and Non-Ideal)- Independent and Dependent Sources-Source transformation-Voltage - Current relationship for passive bilateral elements (for different input signals-square, ramp, saw tooth, triangular)-Ohm's law

**UNIT-II:**

Kirchoff'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 excitations.

**UNIT-III:**

**Single Phase A.C Circuits**

R.M.S,Average values and form factor for different periodic wave forms – sinusoidal alternating quantities – Phase and Phase difference – Complex and polar forms of representations, J-notation, 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-Power Factor and significance-Real and Reactive power, Complex Power.

**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.

**UNIT-V:****Magnetic Circuits**

Magnetic circuits-Basic definition of MMF, flux and reluctance-Analogy between electrical and 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

**UNIT-VI:****Network topology**

Definitions – Graph – Tree, Basic cutset and Basic Tieset matrices for planar networks – Loop and Nodal methods of analysis of Networks with dependent & independent voltage and current sources – Duality & Dual networks.

**UNIT-VII Network theorems –I (Without Proof)**

Thevenin's, Norton's, Maximum Power Transfer and Millman's theorems for D.C and sinusoidal excitations.

**UNIT-VIII:****Network theorems – II (Without Proof)**

Tellegen's, Superposition, Reciprocity and compensation theorems for D.C and sinusoidal excitations.

**TEXT BOOKS:**

1. Engineering Circuit Analysis by William Hayt and Jack E. Kemmerley, McGraw Hill Company, 6th edition

**REFERENCE BOOKS:**

1. Network Analysis by K. Satya Prasad and S. Sivanagaraju, Cengage Learning
2. Electrical Circuits by A. Sudhakar and Shyam Mohan S Palli, Tata McGraw-Hill.
3. Network Analysis by N.C. Jagan, C. Lakshmi Narayana BS publications 2<sup>nd</sup> edition.
4. Network Analysis: Van Valkenburg; Prentice-Hall of India Private Ltd.



**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA**  
**II Year B.Tech. Electrical and Electronics Engineering. I-Sem.**

**FLUID MECHANICS AND HYDRAULIC MACHINES**

**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: pilot tube, venturimeter, and orifice meter, Flow nozzle, Turbine flow meter (Ref.4)

**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 don and efficiency, flow over radial vanes.

**UNIT V**

**Hydroelectric 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 – manometric head-losses and efficiencies- specific speed- pumps in series and parallel-performance characteristic curves, NPSH.

Reciprocating pumps: Working, Discharge, slip, indicator diagrams

**TEXTBOOKS:**

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

**REFERENCE BOOKS:**

1. Fluid Mechanics and Fluid Power Engineering by D.S. Kumar, Kotaria & Sons.
2. Fluid Mechanics and Machinery by D. Rama Durgaiyah, 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)

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA**  
**II Year B.Tech. Electrical and Electronics Engineering. I-Sem.**

**ELECTRONIC DEVICES AND CIRCUITS**

**UNIT-I:**

**Electron Ballistics and Applications:** Force on Charged Particles in Electric field, Constant Electric Field, Potential, Relationship between Field Intensity and Potential, Two Dimensional Motion, Electrostatic Deflection in Cathode ray Tube, CRO, Force in Magnetic Field, Motion in Magnetic Field, Magnetic Deflection in CRT, Magnetic Focusing, Parallel Electric and Magnetic fields and Perpendicular Electric and Magnetic Fields.

**UNIT-II:**

**Review of Semi Conductor Physics :** Insulators, Semi conductors, and Metals classification using Energy Band Diagrams, Mobility and Conductivity, Electrons and holes in Intrinsic Semi conductors, Extrinsic Semi Conductor, (P and N Type semiconductor) Hall effect, Generation and Recombination of Charges, Diffusion, Continuity Equation, Injected Minority Carriers, Law of Junction, Fermi Dirac Function, Fermi level in Intrinsic and Extrinsic Semiconductor

**UNIT-III:**

**Junction Diode Characteristics:** Open circuited P N Junction, Forward and Reverse Bias, Current components in PN Diode, Diode Equation, Volt-Amper Characteristic, Temperature Dependence on V – I characteristic, Step Graded Junction, Diffusion Capacitance and Diode Resistance (Static and Dynamic), Energy Band Diagram of PN Diode,

**Special Diodes:** Avalanche and Zener Break Down, Zener Characteristics, Tunnel Diode, Characteristics with the help of Energy Band Diagrams, Varactor Diode, LED, PIN Diode, Photo Diode

**UNIT-IV:**

**Rectifiers and Filters:** Half wave rectifier, ripple factor, full wave rectifier (with and without transformer), Harmonic components in a rectifier circuit, Inductor filter, Capacitor filter, L- section filter, P- section filter, Multiple L- section and Multiple P section filter, and comparison of various filter circuits in terms of

ripple factors, Simple circuit of a regulator using zener diode, Series and Shunt voltage regulators

**UNIT-V:**

**Transistors:** Junction transistor, Transistor current components, Transistor as an amplifier, Characteristics of Transistor in Common Base and Common Emitter Configurations, Analytical expressions for Transistor Characteristics, Punch Through/ Reach Through, Photo Transistor, Typical transistor junction voltage values.

**UNIT-VI:**

**Field Effect Transistors:** JFET characteristics (Qualitative and Quantitative discussion), Small signal model of JFET, MOSFET characteristics (Enhancement and depletion mode), Symbols of MOSFET, Introduction to SCR and UJT and their characteristics,

**UNIT-VII:**

**Transistor Biasing and Thermal Stabilization :** Transistor Biasing and Thermal Stabilization: Operating point, Basic Stability, Collector to Base Bias, Self Bias Amplifiers, Stabilization against variations in  $V_{BE}$ , and  $\beta$  for the self bias circuit, Stabilization factors, (S, S', S''), Bias Compensation, Thermistor and Sensor compensation, Compensation against variation in  $V_{BE}$ ,  $I_{co}$ , Thermal runaway, Thermal stability

**UNIT-VIII:**

**Small signal low frequency Transistor models:** Two port devices and the Hybrid model, Transistor Hybrid model, Determination of h-parameters from characteristics, Measurement of h-parameters, Conversion formulas for the parameters of three transistor configurations, Analysis of a Transistor Amplifier circuit using h- parameters, Comparison of Transistor Amplifier configurations

**TEXTBOOK:**

1. Electronic Devices and Circuits – J. Millman, C.C. Halkias, Tata Mc-Graw Hill

**REFERENCE BOOKS:**

1. Electronic Devices and Circuits – K Satya Prasad, VGS Book Links
2. Integrated Electronics – Jacob Millman, Chritos C. Halkies., Tata McGraw Hill, 2009
3. Electronic Devices and Circuits – Salivahanan, Kumar, Vallavaraj, TATA McGraw Hill, Second Edition
4. Electronic Devices and Circuits – R.L. Boylestad and Louis Nashelsky, Pearson/Prentice Hall, 9th Edition, 2006
5. Electronic Devices and Circuits -BV Rao, KBR Murty, K Raja Rajeswari, PCR Pantulu, Pearson, 2<sup>nd</sup> edition

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA**  
**II Year B.Tech. Electrical and Electronics Engineering. I-Sem.**  
**MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS**  
**Common to all Branches (w.e.f.2010 batch)**

**Unit I**

**Introduction to Managerial Economics:**

**Introduction to Managerial Economics & Demand Analysis:** Definition of Managerial Economics, Characteristics and Scope – Managerial Economics and its relation with other subjects- Basic economic tools in Managerial Economics

**Demand Analysis:** Meaning- Demand distinctions- Demand determinants- Law of Demand and its exceptions.

**Unit-II**

**Elasticity of Demand & Demand Forecasting:** Definition -Types of Elasticity of demand - Measurement of price elasticity of demand: Total outlay method, Point method and Arc method- Significance of Elasticity of Demand.

**Demand Forecasting:** Meaning - Factors governing demand forecasting - Methods of demand forecasting (survey of buyers' Intentions, Delphi method, Collective opinion, Analysis of Time series and Trend projections, Economic Indicators, Controlled experiments and Judgmental approach) - Forecasting demand for new products- Criteria of a good forecasting method.

**Unit-III**

**Theory of Production and Cost Analysis:** Production Function- Isoquants and Isocosts, MRTS, Law of variable proportions- Law of returns to scale- Least Cost Combination of Inputs, Cobb-Douglas Production function - 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.- Determination of Break-Even Point (simple problems) - Managerial Significance and limitations of BEP.

#### **UNIT-IV**

##### **Introduction to Markets, Managerial Theories of the Firm & Pricing**

**Policies:** Market structures: Types of competition, Features of Perfect Competition, Monopoly and Monopolistic Competition. Price-Output Determination under Perfect Competition, Monopoly, Monopolistic Competition and Oligopoly Managerial theories of the firm - Marris and Williamson's models.

**Pricing Policies:** Methods of Pricing-Marginal Cost Pricing, Limit Pricing, Market Skimming Pricing, Penetration Pricing, Bundling Pricing, and Peak Load Pricing. Internet Pricing Models: Flat rate pricing, Usage sensitive pricing, Transaction based pricing, Priority pricing, charging on the basis of social cost, Precedence model, Smart market mechanism model.

#### **Unit V**

##### **Types of Industrial Organization & Introduction to business cycles:**

Characteristic features of Industrial organization, Features and evaluation of Sole Proprietorship, Partnership, Joint Stock Company, State/Public Enterprises and their types.

**Introduction to business cycles:** Meaning-Phases of business cycles-Features of business cycles.

#### **Unit VI**

**Introduction to Financial Accounting:** Introduction to Double-entry system, Journal, Ledger, Trial Balance- Final Accounts (with simple adjustments)- Limitations of Financial Statements.

#### **Unit VII**

**Interpretation and analysis of Financial Statement:** Ratio Analysis – Liquidity ratios, Profitability ratios and solvency ratios – Preparation of changes in working capital statement and fund flow statement.

#### **Unit VIII**

**Capital and Capital Budgeting:** Meaning of capital budgeting, Need for capital budgeting – Capital budgeting decisions (Examples of capital

budgeting) - Methods of Capital Budgeting: Payback Method, Accounting Rate of Return (ARR), IRR and Net Present Value Method (simple problems)

**Text Books:**

1. **J.V.Prabhakar Rao:** Managerial Economics and Financial Analysis, Maruthi Publications, 2011
2. **N.Appa Rao. & P. Vijaya Kumar:** 'Managerial Economics and Financial Analysis', Cengage Publications, New Delhi, 2011

**References:**

1. A R Aryasri - Managerial Economics and Financial Analysis, TMH 2011
2. Suma damodaran- Managerial Economics, Oxford 2011
3. S.A. Siddiqui & A.S. Siddiqui, Managerial Economics and Financial Analysis, New Age International Publishers, 2011.



**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA**  
**II Year B.Tech. Electrical and Electronics Engineering. I-Sem.**

**ELECTROMAGNETIC FIELDS**

**Objective:**

The objective of this course is to introduce the concepts of electric field and magnetic fields and their applications useful for Electrical Machine Analysis and Power Systems.

**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,  $\text{div}(\mathbf{D}) = \rho_v$

**UNIT-II: Conductors and Dipole:**

Laplace’s and Poisson’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 – Behavior of conductors in an electric field – Conductors and Insulators.

**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.

**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,  $\text{div}(\mathbf{B}) = 0$ .

**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,  $\text{Curl}(\mathbf{H})=\mathbf{J}_c$ , Field due to a circular loop, rectangular and square loops.

**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: Self and Mutual inductance :**

Self and Mutual inductance - 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.

**UNIT–VIII: Time Varying Fields:**

Time varying fields – Faraday’s laws of electromagnetic induction – Its integral and point forms – Maxwell’s fourth equation,  $\text{Curl}(\mathbf{E})=-\partial\mathbf{B}/\partial t$  – Statically and Dynamically induced EMFs – Simple problems -Modification of Maxwell’s equations for time varying fields – Displacement current – Poynting Theorem and Poynting vector.

**TEXTBOOKS:**

1. “Engineering Electromagnetics” by William H. Hayt & John. A. Buck Mc. Graw-Hill Companies, 7<sup>th</sup> Editon.2006.

**REFERENCE BOOKS:**

1. “Principles of Electro Magnetics” by Sadiku, Oxford Publications,4<sup>th</sup> edition
2. “Introduction to Electro Dynamics” by D J Griffiths, Prentice-Hall of India Pvt.Ltd, 2<sup>nd</sup> edition

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA**  
**II Year B.Tech. Electrical and Electronics Engineering. I-Sem.**

**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 – forces and torque in magnetic field systems – energy balance- 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 – Constructional Features-E.M.F Equation- Action of commutator – armature windings – lap and wave windings – simplex and multiplex windings –Methods of Excitation-Types of DC generator: separately excited and self excited generators

**UNIT-III:**

**Armature Reaction in D.C. Generator**

Armature reaction – Cross magnetizing and de-magnetizing AT/pole – commutation Process – reactance voltage – methods of improving commutation – Compensating windings – Interpoles.

**UNIT-IV:**

**Characteristics of D.C Generators**

O.C.C– build-up of E.M.F - critical field resistance and critical speed - causes for failure to self excite and remedial measures—Internal & External characteristics of shunt, series and Compound generator-Applications, Losses and Efficiency.

**UNIT-V:****Parallel Operation**

Need for parallel operation - Parallel operation of DC Shunt and Compound generators – use of equalizer bar and cross connection of field windings – load sharing.

**UNIT-VI:****D.C. Motors**

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

**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—Application of DC Motors.

**UNIT-VIII:****Testing of D.C. Machines**

Testing of d.c. machines: methods of testing-:Brake test, Indirect testing: Swinburne's method— Regenerative or Hopkinson's method— Field's test for series machines—Retardation test— separation of losses

**TEXTBOOKS:**

1. Electrical Machines – P.S. Bimbra., Khanna Publishers

**REFERENCEBOOKS:**

1. Electrical Machines by R.K.Rajput, Lakshmi publications,5th edition
2. Electrical Machines by D P.Kothari, I .J .Nagarth,Mc GrawHill Publications, 4<sup>th</sup> edition
3. Electrical Machines by J.B.Guptha. S.K.Kataria & Sons

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA**  
**II Year B.Tech. Electrical and Electronics Engineering. I-Sem.**

**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.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA****II Year B.Tech. Electrical and Electronics Engineering. I-Sem.****ELECTRONIC DEVICES AND CIRCUITS LAB****PART A: (Only for viva voce Examination)****ELECTRONIC WORKSHOP PRACTICE (in 6 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, Lowpower JFETs, MOSFETs, Power Transistors, LEDs, LCDs, Optoelectronic Devices, SCR, UJT, DIACs, TRIACs, Linear and Digital ICs.
3. Soldering practice – Simple Circuits using active and passive components.
4. Single layer and Multi layer PCBs (Identification and Utility).
5. Study and operation of
  - Multimeters (Analog and Digital)
  - Function Generator
  - Regulated Power Supplies
1. Study and Operation of CRO.

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

1. Frequency measurement using Lissajous Figures
2. PN Junction diode characteristics A. Forward bias B. Reverse bias. (Cut-in voltage & Resistance calculations)
3. Zener diode characteristics and Zener as a regulator
4. Transistor CB characteristics (Input and Output) & h Parameter calculations
5. Transistor CE characteristics (Input and Output) & h Parameter calculations
6. Rectifier without filters (Full wave & Half wave)

7. Rectifier with filters (Full wave & Half wave)
8. FET characteristics
9. SCR Characteristics
10. UJT Characteristics
11. CE Amplifier
12. CC Amplifier (Emitter Follower).

**PART C:**

**Equipment required for Laboratories:**

1. Regulated Power supplies (RPS) - 0-30v
2. CROs - 0-20MHz.
3. Function Generators - 0-1 MHz.
4. Multimeters
5. Decade Resistance Boxes/Rheostats
6. Decade Capacitance Boxes
7. Micro Ammeters (Analog or Digital) - 0-20  $\mu$ A, 0-50 $\mu$ A, 0-100 $\mu$ A, 0-200 $\mu$ A
8. Voltmeters (Analog or Digital) - 0-50V, 0-100V, 0-250V
9. Electronic Components - Resistors, Capacitors, BJTs, LCDs, SCRs, UJTs, FETs, LEDs,

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA**  
**II Year B.Tech. Electrical and Electronics Engineering. I-Sem.**  
**(Common to All Branches)**

**ENGLISH COMMUNICATION PRACTICE - I**  
**LIFE, LANGUAGE AND CULTURE EXPLORATIONS-I**

**Purpose of the Course:** English for Semesters 3 is designed to provide the learners an opportunity to enhance their language skills through a reading of literary texts which will also help them relate themselves to different cultures vis-à-vis their own. Independent reading is also expected to increase spontaneity in expression among the learners.

**Objectives:** The Course aims at exposing the learners to nuances in culture, inculcating the habit of independent reading which provides the learners an opportunity to develop critical thinking and analytical skills that can be applied to any subject.

**Content of the course:** The literary pieces are carefully chosen from across cultures as samples of contemporary life and issues of global interest. This is meant to encourage students to relate language to personality development. In all, five stories have been selected for English Communication Practice.

**Topics:** Culture and traditions, philosophy, familial relationships, ethics, interpersonal relationships, ability to face disaster and poverty, tolerance.

**Time frame/Hours of instruction:** 2hrs per week (for pre-reading and post reading tasks of the lessons). Total number of hours per semester - 32.

**Time Allocation:** Reading of the text should be done at home. The class hours are meant for discussion, analysis and related activities. Project should be completed in consultation with the teacher.

**Evaluation:** The learner will be assessed on a continuous basis by way of projects and work-sheets given at the end of each story.

Stories selected for English Communication Practice

*Life, Language and Culture:*

**1. The Cop and the Anthem by O. Henry**



**2. The Festival of the Sacred Tooth Relic in Sri Lanka**

(based on the Travelogues of FA Hien Compiled by Ashok Jain Assisted by Dhurjjati Sarma) **3. The Hawk and the Tree** by Mohammad Azam Rahnaward Zaryab

**4. To Be or Not To Be** by Zaheda Hina

**5. Bade Bhai Saab**(My Elder Brother) by Munshi Premchand

**Recommended Book:** Life, Language and Culture Explorations-I, Cengage Learning India Pvt. Ltd., New Delhi.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA**  
**II Year B. Tech. Electrical and Electronics Engineering – I Sem.**

**‘PROFESSIONAL ETHICS AND MORALS-I**

**Unit 1**

What is profession? - Engineering and Professionalism - Two models of Professionalism - Three Types of Ethics or Morality – The Negative face of Engineering Ethics - The Positive Face of Engineering Ethics - Responsibility in Engineering - Engineering Standards - The Standard Care – Blame-Responsibility and causation

**Unit 2**

Engineering Ethics – Variety of moral issues – types of inquiry moral dilemmas – moral autonomy – The problems of Many Hands – Kohlburg’s theory – Gilligan’s theory Impediments to Responsible Action

**Unit 3**

Engineering as social experimentation – Framing the problem – Determining the facts codes of ethics – clarifying Concepts – Application issues – Common Ground – General principles – Utilitarian thinking respect for persons

**Unit 4**

Engineer’s Responsibility for Safety – Social and Value dimensions of Technology - Technology Pessimism – The Perils of Technological Optimism – The Promise of Technology – Computer Technology Privacy and Social Policy – Risk Benefit Analysis – Collegiality and loyalty–

**Books:**

1. Mike Martin and Roland Schinzinger, “Ethics in Engineering” McGraw Hill
2. Charles E Harris, Micheal J Rabins, “Engineering Ethics, Cengage Learning”.
3. Edmund G Seebauer and Robert L Barry, “Fundamentals of Ethics for Scientists and Engineers, Oxford University Press.
4. PSR Murthy, “Indian Culture Values and Professional Ethics”, BS Publications

5. Caroline Whitback< Ethics in Engineering Practice and Research, Cambridgs University Press,.
6. Mike Martin and Roland Schinzinger, "Ethics in Engineering" McGraw Hill.
7. Charles D Fleddermann, "Engineering Ethics", Prentice Hall.
8. George Reynolds, "Ethics in Information Technology", Cengage Learning.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA**  
**II Year B.Tech. Electrical and Electronics Engineering. II-Sem.**

**ELECTRICAL CIRCUIT ANALYSIS-II**

**Objective**

This course aims at study of Three Phase systems, Transient analysis, Network synthesis and Fourier analysis for the future study and analysis of Power Systems.

**UNIT-I:**

**Balanced 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 three phase circuits- Measurement of Active and Reactive power in balanced Three phase systems.

**UNIT-II:**

**Unbalanced Three phase circuits**

Analysis of Three Phase unbalanced circuits-Loop Method- Application of Millman's Theorem- Star Delta Transformation Technique – Two Wattmeter Method of measurement of three phase power.

**UNIT-III:**

**D.C Transient Analysis**

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

**UNIT-IV:**

**A.C Transient Analysis**

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

**UNIT-V:**

**Two Port Networks**

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

relations, Cascaded networks, poles and zeros of network functions.

**UNIT-VI:**

**Network synthesis**

Positive real function, Basic Synthesis procedure, LC Impedance functions, RC Impedance functions, RL impedance function or RC admittance functions, Foster and Cauer methods.

**UNIT-VII:**

**Fourier analysis of A.C Circuits**

Fourier theorem- Trigonometric form and exponential form of Fourier series – conditions of symmetry- line spectra and phase angle spectra- Analysis of Electrical Circuits to Non sinusoidal periodic waveforms.

**UNIT-VIII:**

**Fourier Transforms**

Fourier Integrals and Fourier Transforms – properties of Fourier Transforms and Application to Electrical Circuits.

**TEXT BOOKS:**

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

**REFERENCE BOOKS:**

1. Network Theory by A. Sudhakar and Shyammoohan S Palli, Tata McGraw-Hill Publications, first edition
2. Network Analysis by N.C.Jagan, C.Lakshmi Narayana, BS Publications, 2<sup>nd</sup> edition.
3. Network Synthesis: Van Valkenburg; Prentice-Hall of India Private Ltd.
4. Introduction to circuit analysis and design by Tildon Glisson, Jr. Springer Publications.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA**  
**II Year B.Tech. Electrical and Electronics Engineering. II-Sem.**

**SWITCHING THEORY AND LOGIC DESIGN**

**UNIT I:**

**Review of Number systems:**

Representation of numbers of different radix, conversion of numbers from one radix to another radix,  $r-1$ 's complement and  $r$ 's complement of unsigned numbers subtraction, problem solving. Signed binary numbers, different forms, problem solving for subtraction. 4-bit codes: BCD, EXCESS 3, alphanumeric codes, 9's complement, 2421, etc.. (Text Books: 2,, Reference Books: 1,2,4)

**UNIT II:**

**Logic operation, error detection and correction codes:** Basic logic operations NOT, OR, AND, Boolean theorems, Complement and dual of logical expressions, NAND and NOR Gates, EX-OR, EX-NOR Gates, standard SOP and POS, Minimisation of logic functions using theorems, Generation of self dual functions. Gray code, error detection and error correction codes, parity checking even parity, odd parity, Hamming code, multi leveled AND-NOR Realisations. Two level NAND-NAND and NOR-NOR realizations. Degenerative forms and multi level realizations. (Text Books: 1,2, Reference Books: 12,4)

**UNIT III:**

**Minimisation of switching functions:** Minimisation of switching functions using K-Map up to 6-variables, Tabular minimization, minimal SOP and POS Realisation. Problem solving using K-map such as code converters binary multiplier etc., (Text Books: 1,2 , Reference Books: 2,4)

**UNIT IV:**

**Combinational logic circuits-I:** Design of Half adder, full adder, half subtractor, full subtractor, applications of full adders, 4-bit binary adder, 4-bit binary subtractor, adder-subtractor circuit, BCD adder circuit Excess3 adder circuit, look-a-head adder circuit. (Text Books: 2, , Reference Books: 1,2,3)

**UNIT V:**

**Combinational logic circuits-II:** Design of decoder, Demultiplexer, higher order demultiplexing, encoder, multiplexer, higher order multiplexer, realization of Boolean functions using decoders and multiplexers, priority encoder,

different code converter using full adders. (Text Books: 1,2, Reference Books: 1,2,3)

**UNIT VI:**

**Combinational logic circuits-III:** PROM,PLA,PAL, realization of switching functions using PROM,PLA and PAL; comparison of PROM,PLA, and PAL, Programming tables of PROM,PLA and PAL. (Text Books: 1,2, Reference Books: 1,2,4)

**UNIT VII:**

**Sequential circuits I:** Classification of sequential circuits (synchronous and asynchronous): basic flip-flops, truth tables and excitation tables (nand RS latch, nor RS latch, RS flip-flop. JK flip-flop, T flip-flop, D flip-flop with reset and clear terminals).Conversion of flip-flop to flip-flop. Design of ripple counters, design of synchronous counters, Johnson counters, ring counters. Design of registers, Buffer register, control buffer register, shift register, bi-directional shift register, universal shift register. (Text Books: 1,2, Reference Books: 1,2,3)

**UNIT VIII:**

**Sequential circuits II:** Finite state machine, capabilities and limitations, analysis of clocked sequential circuits, design procedures, reduction of state tables and state assignment. Realization of circuits using various flip-flops. Meelay to Moore conversion and vice-versa. (Text Books: 1 Reference Books: 1,2,4)

**TEXTBOOKS:**

1. Switching theory and logic design by Hill and Peterson Mc-Graw Hill MH edition
2. Modern Digital Electronics by RP Jain, TMH.

**REFERENCE BOOKS:**

1. Switching Theory and Logic Design by A. Ananda Kumar
2. Digital design by Mano 2<sup>nd</sup> edition PHI.
3. Micro electronics by Millman MH edition.
4. Fundamentals of Logic Design by Charles H.Roth Jr, Jaico Publishers.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

**II Year B.Tech. Electrical and Electronics Engineering. II-Sem.**

**PULSE AND DIGITAL CIRCUITS**

**Unit I:**

**Linear wave shaping:** High pass, low pass RC circuits, their response for sinusoidal, step, pulse, square and ramp inputs. RC network as differentiator and integrator, double differentiation, attenuators, RL and RLC circuits and their response for step input, Ringing circuit.

**UNIT II:**

**Non – Linear Wave Shaping :** 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 III:**

**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.

**Digital Logic gate circuits: Realization of Logic Gates using DTL, TTL, ECL and CMOS logic circuits , Comparison of logic families**

**Unit IV:**

**Multivibrators:** Analysis & Design of Bistable Multivibrators : Fixed bias & self biased transistor binary, Commutating capacitors, Triggering in binary, Schmitt trigger circuit, Applications

**UNIT V:**

**Multivibrators (Contd.):** Analysis & design of Monostable Multivibrator: Collector-coupled and Emitter-coupled Monostable multivibrators, Triggering in monostable multi;

Analysis & design of Astable multivibrator (Collector coupled and Emitter-coupled) using transistors.



**UNIT VI:**

**Time Base Generators**

General features of a time base signal, methods of generating time base waveform, Miller and Bootstrap time base generators – basic principles, Transistor miller time base generator, Transistor Bootstrap time base generator, Current time base generators.

**Unit VII:**

**Synchronization and Frequency Division :** Principles of Synchronization, Frequency division in sweep circuit, Astable relaxation circuits, Monostable relaxation circuits, Phase delay & phase jitters; Synchronization of a sweep circuit with symmetrical signals, Sine wave frequency division with a sweep circuit.

**Unit VIII:**

**Blocking oscillators & Sampling Gates:**

**Blocking oscillators:** Monostable blocking oscillators (Base timing & Emitter timing): Astable blocking oscillators (Diode-Controlled & RC controlled), Applications

**Sampling gates;** Basic operating principles of sampling gates, Unidirectional and Bi-directional sampling gates, Reduction of pedestal in gate circuits, Four-diode sampling gates; Applications of sampling gates.

**TEXT BOOKS:**

1. J. Millman and H. Taub, "Pulse, Digital and Switching Waveforms", McGraw-Hill, 1991.
2. A. Anand Kumar, "Pulse and Digital Circuits", PHI, 2005. Second Edition

**REFERENCE BOOKS:**

1. Venkat Rao. K. Ramasudha K, Manmadha Rao G, "Pulse and Digital Circuits," Pearson Education, 2010
2. David J. Comer, "Digital Logic State Machine Design", Oxford University Press, 2008, Third Edition
3. MS Prakash Rao – "Pulse and Digital Circuits" Tata McGraw Hill

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA**  
**II Year B.Tech. Electrical and Electronics Engineering. II-Sem.**

**POWERSYSTEMS-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-I:**

**Thermal Power Stations**

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

**UNIT-II:**

**Nuclear Power Stations**

Working principle, Nuclear fuels. Nuclear reactor Components: Moderators, Control rods, Reflectors and Coolants. Types of Nuclear reactors and brief description of PWR, BWR and FBR. Radiation: Radiation hazards and Shielding.

**UNIT-III:**

**Gas, Wind and Solar power generation**

Gas Power station: Principle of operation and component (block diagram approach only).

Solar Power generation: Line diagram of solar energy storage, solar energy collector, point focusing collector, solar power generation.

**Unit-IV:**

**Distribution Systems**

Classification of distribution systems, design features of distribution systems, radial distribution, ring main distribution, voltage drop calculations: DC distributors for following cases: radial DC distributor fed at one end and at

both ends (equal / unequal voltages), ring main distributor, stepped distributor and AC distribution. Comparison of DC and AC distribution.

**Unit-V:**

**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, double bus bar with one and two circuit breakers 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-VI:**

**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 Intersheath -Grading

**UNIT-VII:**

**Economic Aspects of Power Generation**

Load curve, load duration and integrated load duration curves, discussion on economic aspects: connected load, maximum demand, demand factor, load factor, diversity factor, capacity factor, utilization factor, capacity, utilization and plant use factors- Numerical Problems.

**Unit-VIII:**

**Tariff Methods**

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

**TEXT BOOKS:**

1. A Text Book on Power System Engineering by M.L.Soni, P.V.Gupta, U.S.Bhatnagar and A.Chakrabarti, Dhanpat Rai & Co. Pvt. Ltd., 1999.

**REFERENCE BOOKS:**

1. Generation, Distribution and Utilization of Electric Energy by C.L.Wadhawa New age International (P) Limited, Publishers 2002

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA**  
**II Year B.Tech. Electrical and Electronics Engineering. II-Sem.**

**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:**

**Introduction to Single Phase Transformers**

Construction & Operation – Principle of operation of Single phase transformers-Construction details — types - emf equation - operation on no load and on load - phasor diagrams

**UNIT-II:**

**Performance of Single Phase Transformers**

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

**UNIT-III:**

**Testing of Transformer**

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

**UNIT-IV:**

**Poly-Phase Transformers**

Polyphase connections - Y/Y, Y/ $\Delta$ ,  $\Delta$ /Y,  $\Delta$ / $\Delta$  and open  $\Delta$  — Third harmonics in phase voltages-three winding transformers: tertiary windings-determination of  $Z_p$ ,  $Z_s$  and  $Z_t$  — transients in switching - off load and on load tap changers — Scott connection.

**UNIT-V:**

**3-phase 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 current and pf at standstill and during running conditions  
-Rotor power input, rotor copper loss and mechanical power developed  
and their inter relationship

**UNIT-VI:**

**Characteristics of Induction Motors**

Torque equation- expressions for maximum torque and starting torque -  
torque slip characteristic - equivalent circuit - phasor diagram - double cage  
and deep bar rotors - crawling and cogging

**UNIT-VII:**

**Testing's and starting methods**

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

**UNIT-VIII:**

**Speed Control Methods**

Stator voltage control – frequency control – Pole changing — cascade  
connection. Injection of an emf into rotor circuit (qualitative treatment only)-  
induction generator-principle of operation.

**TEXTBOOKS:**

1. Electrical Machines – P.S. Bimbra., Khanna Publishers

**REFERENCEBOOKS:**

1. Electrical Machines by R.K.Rajput, Lakshmi publications, Fifth edition
2. Electrical Machines by D P.Kothari, I .J .Nagarth, Mc GrawHill Publications, 4<sup>th</sup> edition
3. Electrical Machines by J.B.Guptha. S.K.Kataria & Sons

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA**  
**II Year B.Tech. Electrical and Electronics Engineering. II-Sem.**

**CONTROL SYSTEMS**

**Objective:**

In this course it is aimed to introduce to the students the principles and applications of control systems in everyday life. The basic concepts of block diagram reduction, time domain analysis solutions to time invariant systems and also deals with the different aspects of stability analysis of systems in frequency domain and time domain.

**UNIT – I:**

**INTRODUCTION**

Concepts of Control Systems- Open Loop and closed loop control systems and their differences- Different examples of control systems- Classification of control systems, Feed-Back Characteristics, Effects of feedback.

Mathematical models – Differential equations, Impulse Response and transfer functions - Translational and Rotational mechanical systems

**UNIT-II:**

**TRANSFER FUNCTION REPRESENTATION**

Transfer Function of DC Servo motor - AC Servo motor- Synchro transmitter and Receiver, 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, proportional integral systems.

**UNIT – IV:**

**STABILITY ANALYSIS IN S-DOMAIN**

The concept of stability – Routh's 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.

**UNIT-VII:**

**CLASSICAL CONTROL DESIGN TECHNIQUES**

Compensation techniques – Lag, Lead, Lead-Lag Controllers design in frequency Domain, PID Controllers.

**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 its Properties – Concepts of Controllability and Observability

**TEXT BOOKS:**

1. Control Systems Engineering – by I. J. Nagrath and M. Gopal, New Age International Limited Publishers, 2<sup>nd</sup> edition.

**REFERENCE BOOKS:**

1. Control Systems by A. Anand Kumar, PHI Publications, 4<sup>th</sup> edition
2. Control Systems Engineering by S. Palani, Tata Mc Graw Hill Publications
3. Modern Control Engineering, Fifth edition, Kotsuhiko Ogata, Prentice Hall of India



**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA**  
**II Year B.Tech. Electrical and Electronics Engineering. II-Sem.**

**ELECTRICAL MACHINES LAB – I**

Any 10 of the following experiments are to be 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. Brake test on DC shunt motor. Determination of performance curves.
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 Predetermination of efficiencies as Generator and Motor.
8. Speed control of DC shunt motor by Field and armature Control.
9. Brake test on DC compound motor. Determination of performance curves.
10. Load test on DC series generator. Determination of characteristics.
11. Retardation test on DC shunt motor. Determination of losses at rated speed.
12. Separation of losses in DC shunt motor.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA**  
**II Year B.Tech. Electrical and Electronics Engineering. II-Sem.**

**ELECTRICAL CIRCUITSLAB**

Any 10 of the following experiments are to be conducted :

- 1) Verification of Thevenin's and Norton's Theorems
- 2) Verification of Superposition theorem and Maximum Power Transfer Theorem
- 3) Verification of Compensation Theorem
- 4) Verification of 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

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

**II Year B.Tech. Electrical and Electronics Engineering. II-Sem.**

**ENGLISH COMMUNICATION PRACTICE-II**

**Name of the Course:** *Explorations II*

*Life, Language and Culture*

**Purpose of the Course:** English for Semester 4 is designed to provide the learners an opportunity to enhance their language skills through a reading of literary texts which will also help them relate themselves to different cultures vis-à-vis their own. Independent reading is also expected to increase spontaneity in expression among the learners.

**Objectives:** The Course aims at exposing the learners to nuances in culture, inculcating the habit of independent reading which provides the learners an opportunity to develop critical thinking and analytical skills that can be applied to any subject.

**Content of the course:** The literary pieces are carefully chosen from across cultures as samples of contemporary life and issues of global interest. This is meant to encourage students to relate language to personality development. In all, five literary pieces for Explorations II have been selected and another showcasing a holistic approach to life that can help one develop into better individuals and professionals.

**Topics:** Culture and traditions, philosophy, familial relationships, ethics, inter-personal relationships, ability to face disaster and poverty, tolerance.

**Time frame/Hours of instruction:** 2 hrs per week (for pre-reading and post reading tasks of the lessons). Total number of hours per semester - 32.

**Time Allocation for each unit:** Reading of the text should be done at home. The class hours are meant for discussion, analysis and related activities. Project should be completed in consultation with the teacher.

The title of the book

Explorations- II Life, Language and Culture

The stories included are

1. Morning Bells by Jayashree Mohanraj

2. The Power of the Plate of Rice by Ifeoma Okoye
3. Famadihana and the Other Rituals by Jayashree Mohanraj
4. Dial “000” by Barry Rosenberg
5. Tsunami Religion by Anjali Prashar

1. Prescribed Textbook

**Life, Language and Culture : Explorations -2**, Cengage Learning India Pvt. Ltd., New Delhi.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA**  
**II Year B. Tech. Electronics and Communication Engineering – II Sem.**

**PROFESSIONAL ETHICS AND MORALS-II**

**Unit - I**

Human Values - Morals, Values, and Ethics – Integrity - Work Ethic – Service Learning – Civic Virtue – Respect for Others – Living Peacefully – caring – Sharing – Honesty – Courage – Valuing Time – Co-operation – Commitment – Empathy – Self-Confidence – Spirituality – Character

**Unit - II**

Engineering Ethics – consensus – controversy – Models of Professional Roles – theories about right action – Self – interest – customs and religion – uses of ethical theories

**Unit - III**

Engineer’s Responsibility for Rights - respect for authority – conflicts of interest- Occupational crime – professional rights and employee rights – Communicating Risk and Public Policy- collective bargaining

**Unit - IV**

Global Issues- Multinational Corporations – Environmental Ethics – Engineers as Managers , Advisors, and experts witnesses – moral leadership sample code of ethics like ASME, ASCE, IEEE, IETE, Institute of Engineers – Problem of Bribery, Extortion and Grease payments – Problem of Nepotism, Excessive Gifts – Paternalism – Different business practices – Negotiating Taxes.

**BOOKS:**

1. Mike Martin and Roland Schinzinger, “Ethics in Engineering” McGraw Hill
2. Charles E Harris, Micheal J Rabins, “Engineering Ethics, Cengage Learning”.
3. Edmund G Seebauer and Robert L Barry, “Fundamentals of Ethics for Scientists and Engineers, Oxford University Press.
4. PSR Murthy, “Indian Culture Values and Professional Ethics”, BS Publications

5. Caroline Whitback< Ethics in Engineering Practice and Research, Cambridgs University Press,.
6. Mike Martin and Roland Schinzinger, "Ethics in Engineering" McGraw Hill.
7. Charles D Fleddermann, "Engineering Ethics", Prentice Hall.
8. George Reynolds, "Ethics in Information Technology", Cengage Learning.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA**  
**III Year B. Tech. Electrical and Electronics Engineering – I Sem.**

**COMPLEX VARIABLES AND STATISTICAL METHODS**

**UNIT-I:**

**Analytic Functions**

Functions of a complex variable – Continuity – Differentiability – Analyticity – Properties – Cauchy-Riemann equations in Cartesian and polar coordinates. Harmonic and conjugate harmonic functions – Milne – Thompson method.

**UNIT-II:**

**Integration and Series Expansions**

Complex integration: Line integral – evaluation along a path and by indefinite integration – Cauchy’s integral theorem – Cauchy’s integral formula – Generalized integral formula. Complex power series: Radius of convergence – Expansion in Taylor’s series-Maclaurin’s series and Laurent series.

**UNIT-III:**

**Integration using Residues**

Singular point – Isolated singular point – pole of order m – essential singularity. Residue – Evaluation of residue by formula and by Laurent series - Residue theorem. Evaluation of integrals of the type

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

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

**UNIT-IV:**

**Conformal Mapping**

Conformal mapping: Transformation by  $e^z$ ,  $\ln z$ ,  $z^2$ ,  $z^n$  (n positive integer),  $\sin z$ ,  $\cos z$ ,  $z + a/z$ . 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-V:****Statistical Distributions**

Conditional Probability – Bayes Theorem, Binomial, Poisson, normal distribution – related properties. Moment generating function.

**UNIT-VI:****Sampling Distributions**

Population and samples. Sampling distribution of mean (with known and unknown variance), proportion, variances. - Sampling distribution of sums and differences. Point and interval estimators for means, variances, proportions.

**UNIT-VII:****Tests of Hypothesis using Normal Distribution**

Statistical Hypothesis – Errors of Type I and Type II errors and calculation. One tail, two-tail tests. Testing hypothesis concerning means, proportions and their differences using Z-test.

**UNIT-VIII:****Tests of Hypothesis using Non-normal Distributions**

Tests of hypothesis using Student's t-test, F-test and  $\chi^2$  test.. Test of independence of attributes - ANOVA for one-way and two-way classified data.

**TEXTBOOKS:**

1. Engineering Mathematics Volume-III T. K. V. Iyengar, B. Krishna Gandhi and Others, S. Chand & Company.
2. Probability and Statistics for Engineers, Miller and John E. Freund, Prentice Hall of India.
3. Higher Engineering Mathematics, B.S.Grewel

**REFERENCE BOOKS:**

1. Advanced Engineering Mathematics, Irvin Kreyszig, Wiley India Pvt. Ltd.
2. Probability and statistics by – ATHANASIOS-PAPOULIS-Pearson Edn.



**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA**  
**III Year B. Tech. Electrical and Electronics Engineering – I Sem.**

**ELECTRICAL MEASUREMENTS**

**Objective:**

This course introduces principle of operation of basic analog and digital measuring instruments for measurement of current, voltage, power, energy etc. Measurement of resistance, inductance and capacitance by using bridge circuits will be discussed in detail. It is expected that student will be thorough with various measuring techniques that are required for an electrical engineer.

**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.

**UNIT –II:**

**Instrument transformers and Special Meters**

Extension of range using shunts and series resistance -CT and PT: Ratio and phase angle errors – design considerations. Type of P.F. Meters – single phase and three phase dynamometer and moving iron type

**UNIT –III:**

**Measurement of Power and Energy**

Single phase and three phase dynamometer wattmeter, LPF and UPF, 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. 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 – IV:****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 – V:****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– loss of charge method for measurement of high resistance.

**UNIT – VI:****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 – VII:****Magnetic Measurements:**

Ballistic galvanometer – equation of motion – flux meter – constructional details. Determination of B-H Loop methods of reversals six point method – A.C. testing – Iron loss of bar samples– core loss measurements by bridges and potentiometers.

**UNIT – VIII:****Digital Meters**

Digital Voltmeter-Successive approximation, ramp and integrating type-Digital frequency meter-Digital multimeter-Digital Tachometer

**TEXTBOOK:**

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.
3. Modern Electronic Instrumentation and Measurement Techniques – A.D. Helfrick and W.D. Cooper, PHI, 5th Edition, 2002.

**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.
4. Electrical and Electronic Measurements –by G.K.Banerjee, PHI Learning Private Ltd, New Delhi-2012

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA**  
**III Year B. Tech. Electrical and Electronics Engineering – I Sem.**

**POWER SYSTEMS-II**

**Objective:**

This course is an extension of power systems-I course. It deals with basic theory of transmission lines modeling and their performance analysis. Transient in power system, improvement of power factor and voltage control are discussed in detail. It is important for the student to understand the mechanical design aspects of transmission lines, cables, insulators. These aspects are also covered in detail in this course.

**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**

Classification of Transmission Lines - Short, medium, 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).

**UNIT-V:**

**Various Factors Governing the Performance of Transmission line**

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:**

**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-VII:**

**Overhead 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-VIII:**

**Power Factor Improvement & Voltage Control**

Power factor improvement, Voltage Control, introduction to line compensation.

**TEXTBOOKS:**

1. Electrical Power Systems by P.S.R. Murthy, B.S.P. Publications.
2. Modern Power System Analysis by I.J. Nagarith and D.P. Kothari, Tata McGraw Hills, 2<sup>nd</sup> Edition.

**REFERENCE BOOKS:**

1. Power system Analysis-by John J Grainger William D Stevenson, TMC Companies, 4<sup>th</sup> edition
2. Power System Analysis and Design by B.R.Gupta, Wheeler Publishing.
3. Electrical power system - by C.L. Wadhwa, New Age International (P) Limited, Publishers, 1998.
4. A Text Book on Power System Engineering by M.L. Soni, P.V. Gupta, U.S. Bhatnagar, A. Chakrabarthy, Dhanpat Rai & Co Pvt. Ltd.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA**  
**III Year B. Tech. Electrical and Electronics Engineering – I Sem.**

**ELECTRICAL MACHINES- III**

**Objective:**

This course is an extension of electrical machines-II. At present, majority of the power plants use synchronous machine as 'ac' generator. It is important to understand the construction, principle of operation, characteristics and operational issues of such machine (synchronous generator). This course covers all these aspects in detail. The issues related to starting and operation of synchronous motors are also covered in this course. It is equally important to study the principle of operation of special machines (viz., single phase induction motor, permanent magnet motor, reluctance motors etc) which are used in several home appliances and electronic gadgets.

**UNIT – I:**

**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.

**UNIT-II:**

**Construction and Principle of operation of Synchronous Machines**

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 – III:**

**Synchronous Machine 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 – IV:****Voltage Regulation of Synchronous Alternator**

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 – V:****Parallel Operation of Synchronous Alternator**

Synchronizing alternators with infinite bus bars – synchronizing power – 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-VI:****Synchronous Motors – Introduction**

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

**UNIT – VII:****Synchronous Motor Operation and Starting**

Excitation and power circles – hunting and its suppression – Methods of starting – synchronous induction motor.

**UNIT – VIII:****Introduction to Special Machines**

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

**TEXTBOOKS:**

1. Electrical Machines - by P.S. Bhimbra, Khanna Publishers.
2. The Performance and Design of A.C. Machines - by M.G. Say, ELBS and Ptiman & Sons.



**REFERENCE BOOKS:**

1. Electric Machines - by I.J. Nagrath & D.P. Kothari, Tata Mc Graw-Hill Publishers, 7<sup>th</sup> Edition 2005.
2. Electric Machinery – by A.E. Fitzgerald, C.Kingsley and S.Umans, Mc Graw-Hill Companies, 5<sup>th</sup> edition, 1990.
3. Theory of Alternating Current Machinery by Langsdorf, Tata Mc Graw-Hill, 2<sup>nd</sup> edition.
4. Electromechanics-III (Synchronous and single phase machines), S.Kamakashiah, Right Publishers.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA**  
**III Year B. Tech. Electrical and Electronics Engineering – I Sem.**

**POWER ELECTRONICS**

**Objective:**

The usage of power electronics in day to day life has increased in recent years. It is important for student to understand the fundamental principles behind all these power electronics converters. This course covers characteristics of semi conductor devices, ac/dc, dc/dc, ac/ac and dc/ac converters. The importance of using pulse width modulated techniques to obtain high quality power supply (dc/ac converter) is also discussed in detail in this course.

**UNIT-I:**

**Power Semi Conductor Devices**

Thyristors – Silicon Controlled Rectifiers (SCR's) – BJT – Power MOSFET – Power IGBT and their characteristics – 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

**UNIT-II:**

**Firing and Commutation Circuits of SCR**

Two transistor analogy – SCR – UJT firing circuit — Series and parallel connections of SCR's – Snubber circuit details – Specifications and Ratings of SCR's – 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 load voltage and current.

**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 load voltage and current –

Line commutated inverters without and with Free wheeling Diode, Effect of source inductance – Derivation of load voltage and current.

**UNIT-V:**

**Three Phase Line Commutated Converters**

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

**UNIT – VI:**

**AC Voltage Controllers & Cyclo Converters**

Single phase AC voltage controllers –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).

**UNIT – VII:**

**DC-DC Convertors**

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, High Frequency DC-DC Converter – Buck, Boost, Buck-Boost (Principle of operation only).

**UNIT – VIII:**

**Inverters**

Single Phase and three phase –Basic series inverter, Uni polar, Bi-polar Inverters, PWM Techniques, Sine, Triangular PWM Inverter.

**TEXTBOOKS:**

1. Power Electronics: Circuits, Devices and Applications – by M. H. Rashid, Prentice Hall of India, 2nd edition, 1998
2. Power Electronics: converters, applications & design by Nedmohan, Tore M. Undeland, Riobbins by Wiley India Pvt. Ltd.

**REFERENCEBOOKS:**

1. Power Electronics – by Vedam Subramanyam, New Age International (P) Limited, Publishers
2. Power Electronics - by V.R.Murthy , 1st edition -2005, OXFORD University Press
3. Power Electronics - by M.D. Singh and K.B. Khanchandani, TMH Pvt. Ltd.
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.
5. Power Electronics – by P.S.Bhimbra, Khanna Publishers.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA**  
**III Year B. Tech. Electrical and Electronics Engineering – I Sem.**

**LINEAR & DIGITAL IC APPLICATIONS**

**UNIT I:**

**INTEGRATED CIRCUITS:** Integrated circuits-Types, Classification, Package Types and temperature ranges, Power supplies, Differential Amplifier- DC and AC analysis of Dual input balanced output Configuration, Properties of other differential amplifier configuration (Dual Input Unbalanced Output, Single Ended Input – Balanced/ Unbalanced Output), DC Coupling and Cascade Differential Amplifier Stages, Level translator.

**UNIT II:**

**OPERATIONAL AMPLIFIER:** Characteristics of OP-Amps, Op-amp Block Diagram, ideal and practical Op-amp specifications, DC and AC characteristics, 741 op-amp & its features, FET input. Op-Amps, Op-Amp parameters & Measurement, Input & Out put Off set voltages & currents, slew rates, CMRR, PSRR, drift, Frequency Compensation technique.

**UNIT III:**

**APPLICATIONS OF OP-AMPS:** Inverting and Non-inverting amplifier, Integrator and differentiator, Difference amplifier, Instrumentation amplifier, AC amplifier, V to I, I to V converters, Buffers. Comparators, Multivibrators, Triangular and Square wave generators, Log and Anti log amplifiers, Precision rectifiers.

**UNIT IV:**

**TIMERS & PHASE LOCKED LOOPS:** Introduction to 555 timer, functional diagram, Monostable and Astable operations and applications, Schmitt Trigger. PLL - introduction, block schematic, principles and description of individual blocks, 565 PLL, Applications of PLL – frequency multiplication, frequency translation, AM, FM & FSK demodulators.

**UNIT V:**

**ACTIVE FILTERS:** Introduction, 1st order, 2nd order LPF, HPF filters. Band pass, Band reject and all pass filters.

**D to A & A to D CONVERTERS :** Introduction, basic DAC techniques, weighted resistor DAC, R-2R ladder DAC, inverted R-2R DAC, Different types of ADCs - parallel comparator type ADC, counter type ADC, successive

approximation ADC and dual slope ADC.

**UNIT VI:**

**COMBINATIONAL LOGIC DESIGN:** Introduction, Design and Analysis procedures, Decoders, encoders, multiplexers and demultiplexers, Code Converters, comparators, adders & sub tractors, Ripple Adder, Binary Parallel Adder, Binary Adder-Subtractor, Combinational multipliers, ALU Design considerations of the above combinational logic circuits with relevant Digital ICs.

**UNIT VII:**

**SEQUENTIAL LOGIC DESIGN:** Introduction, Latches, and flip-flops, Flip-Flop Conversions, Counters, Design of Counters using Digital ICs, Counter applications, Synchronous design methodology, Shift Registers, Modes of Operation of Shift Registers, Ring Counter, Johnson Counter, Design considerations of the above sequential logic circuits with relevant Digital ICs.

**UNIT VIII:**

**PROGRAMMABLE LOGIC DEVICES (PLDs):** Programmable Read Only Memory, Programmable Logic Array, and Programmable Array Logic Devices, Design considerations of PLDs with relevant Digital ICs.

**MEMORIES:** ROM: Internal structure, Commercial ROM types, timing and applications,. Static RAM: Internal structure, SRAM timing, standard SRAMS, synchronous SRAMS, Dynamic RAM: Internal structure, timing, synchronous DRAMs.

**TEXTBOOKS:**

1. Linear Integrated Circuits – D. Roy Chowdhury, New Age International (p) Ltd, 2nd Edition, 2003.
2. Op-Amps & Linear ICs - Ramakanth A. Gayakwad, PHI, 1987.
3. Digital IC Applications By Atul P. Godse and Deepali A. Godse, Technical Publications, Pune, 2005.

**REFERENCE BOOKS:**

1. Design with Operational Amplifiers & Analog Integrated Circuits - Sergio Franco, McGraw Hill, 1988.
2. Digital Logic and Computer Design By Mano, Pearson Education.
3. Micro Electronics – Millman, McGraw Hill, 1988.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA**  
**III Year B. Tech. Electrical and Electronics Engineering – I Sem.**  
**ELECTRICAL MACHINES LAB – II**

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

1. O.C. & S.C. Tests on Single phase Transformer
2. Sumpner's test on 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  $X_d$  and  $X_q$  of a salient pole synchronous machine

**In addition to the above eight experiments, atleast any two of the following experiments are required 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.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA**  
**III Year B. Tech. Electrical and Electronics Engineering – I Sem.**

**CONTROL SYSTEMS LAB**

**Any 10 of the following experiments are to be conducted:**

1. Time response of Second order system
2. Characteristics of Synchronos
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. Effect of P, PD, PI, PID Controller on a second order systems
6. Lag and lead compensation – Magnitude and phase plot
7. Transfer function of DC generator
8. Transfer function of DC motor
9. Temperature controller using PID
10. Characteristics of magnetic amplifiers
11. Characteristics of AC servo motor
12. Characteristics of DC servo motor



**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA**

**III Year B. Tech. Electrical and Electronics Engineering – I Sem.**

**INTELLECTUAL PROPERTY RIGHTS AND PATENTS – I**

**UNIT I**

Introduction to Intellectual Property Law – The Evolutionary Past - The IPR Tool Kit- Para -Legal Tasks in Intellectual Property Law – Ethical obligations in Para Legal Tasks in Intellectual Property Law - Introduction to Cyber Law – Innovations and Inventions Trade related Intellectual Property Right

**UNIT II**

Introduction to Trade mark – Trade mark Registration Process – Post registration Procedures – Trade mark maintenance - Transfer of Rights - Inter partes Proceeding – Infringement - Dilution Ownership of Trade mark – Likelihood of confusion - Trademarks claims – Trademarks Litigations – International Trade mark Law

**UNIT III**

Introduction to Copyrights – Principles of Copyright Principles -The subjects Matter of Copy right – The Rights Afforded by Copyright Law – Copy right Ownership, Transfer and duration – Right to prepare Derivative works – Rights of Distribution – Rights of Perform the work Publicity Copyright Formalities and Registrations - Limitations - Copyright disputes and International Copyright Law – Semiconductor Chip Protection Act

**UNIT IV**

Introduction to Trade Secret – Maintaining Trade Secret – Physical Security – Employee Limitation - Employee confidentiality agreement - Trade Secret Law - Unfair Competition – Trade Secret Letigation – Breach of Contract – Applying State Law

**BOOKS:**

1. Deborah E.Bouchoux: “Intellectual Property”. Cengage learning , New Delhi
2. Kompal Bansal & Parishit Bansal "Fundamentals of IPR for Engineers", BS Publications (Press)
3. Cyber Law. Texts & Cases, South-Western’s Special Topics Collections

4. Prabhuddha Ganguli: ' Intellectual Property Rights" Tata Mc-Graw – Hill, New Delhi
5. Richard Stim: "Intellectual Property", Cengage Learning, New Delhi.
6. R. Radha Krishnan, S. Balasubramanian: "Intellectual Property Rights", Excel Books. New Delhi.
7. M.Ashok Kumar and Mohd.Iqbal Ali: "Intellectual Property Right" Serials Pub.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA**  
**III Year B. Tech. Electrical and Electronics Engineering – II Sem.**

**ELECTRICAL MACHINE DESIGN**

**Objective:**

Principle of operation of various electrical machines is covered in detail in the previous courses of electrical machines. The objective of this course is to make student understand and appreciate the design aspects of various electrical machines (transformer, dc machine, induction motor and synchronous machine) used in the power system.

**UNIT-I:**

**Introduction to Electrical Machine Design**

Design concepts, factors, Material Selection, Manufacturing techniques. Review of basic Principles, Heating & Cooling Techniques.

**UNIT-II:**

**Armature Windings (DC & AC)**

Single layer winding, two layer winding, lap and wave windings, concept of pole pitch, emf generation -full pitch coil, fractional pitch coil and concentrated winding.

**UNIT-III:**

**DC Machines**

Constructional details – Output equation - Choice of specific electric and magnetic loadings – Separation of D and L for rotating machines. Estimation of number of conductors / turns- Coils – armature Slots – Conductor dimension – Slot dimension. Choice of number of poles – Length of air gap – Design of field system, Interpoles, Commutator and Brushes.

**UNIT-IV:**

**Transformers –I**

Construction – Comparison of Core and Shell type, Single and Three phase transformer comparison. Core and Yoke Design – cross section, construction, cooling of transformers, Number of tubes.

**UNIT-V:****Transformers – II**

Transformer windings, Coil design, Output equation, determination of number of turns and length of mean turn of winding, Resistance, Leakage reactance, no load current calculation, losses and efficiency.

**UNIT-VI:****Induction Motors – I**

Principles of operation, choice of specific electric and magnetic loadings, Stator Design (Frames), output equation, choice of conductor rating, stator winding, stator slots.

**UNIT-VII:****Induction Motors – II**

Squirrel cage rotor design - air gap length, rotor slots and rotor bars. Design of wound rotor - rotor slots, windings, short circuit (blocked rotor currents).

**UNIT-VIII:****Synchronous Machines**

Constructional features – short circuit ratio– Output equation – Specific loadings – Main dimensions – Stator design – Design of Salient Pole field coil.

**TEXTBOOKS:**

1. “Electrical Machine Design”, Sawhney, Dhanpath Rai.

**REFERENCEBOOKS:**

1. “Performance and Design of DC Machines”, Clayton & Hancock, ELBS.
2. “Performance and Design of AC Machines”, M.G.Say, Pitman, ELBS.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA**  
**III Year B. Tech. Electrical and Electronics Engineering – II Sem.**

**MICROPROCESSORS AND MICROCONTROLLERS**

**Objective:**

Microprocessor and microcontroller have become important building blocks in digital electronics design. It is important for student to understand the architecture of a microprocessor and its interfacing with various modules. 8086 microprocessor architecture, programming, and interfacing is dealt in detail in this course. Interfacing, assembly language programming and interfacing of 8051 microcontroller and its application in industry are also covered in this course.

**UNIT-I:**

**Introduction to Microprocessor Architecture**

Introduction and evolution of Microprocessors, Architecture of 8086, Register Organization of 8086, Memory organization of 8086, General bus operation of 8086.

**UNIT-II:**

**Minimum and Maximum Mode Operations**

Instruction set, Addressing modes, Minimum and Maximum mode operations of 8086, 8086 Control signal interfacing, read and write cycle timing diagrams.

**UNIT-III:**

**Algorithms for Assembly Language Programming**

Assembly Directives, Macro's, Algorithms for Implementation of FOR Loop, WHILE, REPEAT and IF-THEN-ELSE Features.

**UNIT-IV:**

**I/O Interface**

8255 PPI- Architecture of 8255, Modes of operation, Interfacing I/O devices to 8086 using 8255, Interfacing A to D converters, Interfacing D to A converters, Stepper motor interfacing.

**UNIT-V:****Interfacing with Advanced Devices**

Static memory interfacing with 8086, DMA controller (8257)-Architecture, interfacing 8257 DMA controller; Programmable Interrupt Controller (8259)-Command words and operating modes of 8259, Interfacing of 8259; Keyboard/display controller (8279)-Architecture, modes of operation, command words of 8279, Interfacing of 8279.

**UNIT-VI:****Introduction to 8051 Micro Controller**

Overview of 8051 Micro Controller, Architecture, Register set, I/O ports and Memory Organization, Interrupts, Timers and Counters, Serial Communication.

**UNIT-VII:****Assembly Language Programming of 8051**

Addressing modes and Instruction set of 8051, Assembly language programming of 8051, Development systems and tools.

**UNIT-VIII:****Interfacing and Industrial Applications of 8051**

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.

**TEXTBOOKS:**

1. Microprocessors and Interfacing, Douglas V Hall, Mc-Graw Hill, 2<sup>nd</sup> Edition.
2. Kenneth J Ayala, "The 8051 Micro Controller Architecture, Programming and Applications", Thomson Publishers, 2nd Edition.
3. Ray and Burchandi, "Advanced Micro Processors and Interfacing", Tata McGraw-Hill.

**REFERENCE BOOKS:**

1. R.S. Kaler, “A Text book of Microprocessors and Micro Controllers”, I.K. International Publishing House Pvt. Ltd.
2. Ajay V. Deshmukh, “Microcontrollers – Theory and Applications”, Tata McGraw-Hill Companies –2005.
3. Ajit Pal, “Microcontrollers – Principles and Applications”, PHI Learning Pvt Ltd, 2011.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA**  
**III Year B. Tech. Electrical and Electronics Engineering – II Sem.**

**UTILIZATION OF ELECTRICAL ENERGY**

**Objective:**

This course primarily deals with utilization of electrical energy generated from various sources. It is important to understand the technical reasons behind selection of motors for electric drives based on the characteristics of loads. Electric heating, welding and illumination are some important loads in the industry in addition to motor/drives. Another major share of loads is taken by Electric Traction. Utilization of electrical energy in all the above loads is discussed in detail in this course. Demand side management concepts are also introduced as a part of this course.

**UNIT – I:**

**Selection of Motors.**

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

**UNIT – II:**

**Electric Heating**

Advantages and methods of electric heating, resistance heating induction heating and dielectric heating.

**UNIT – III:**

**Electric Welding**

Electric welding, resistance and arc welding, electric welding equipment, comparison between A.C. and D.C. Welding.

**UNIT – IV:**

**Illumination fundamentals**

Introduction, terms used in illumination, laws of illumination, polar curves, integrating sphere, lux meter, sources of light.



**UNIT – V:**

**Various Illumination Methods**

Discharge lamps, MV and SV lamps – comparison between tungsten filament lamps and fluorescent tubes, Basic principles of light control, Types and design of lighting and flood lighting, LED lighting.

**UNIT – VI:**

**Electric Traction - I**

System of electric traction and track electrification. Review of existing electric traction systems in India. Special features of traction motor, Mechanics of train movement. Speed-time curves for different services – trapezoidal and quadrilateral speed time curves.

**UNIT – VII:**

**Electric Traction - II**

Calculations of tractive effort, power, specific energy consumption for given run, effect of varying acceleration and braking retardation, adhesive weight and braking retardation adhesive weight and coefficient of adhesion.

**UNIT – VIII:**

**Demand side management**

Energy star rating of equipment, Demand side management (energy efficiency techniques, demand response).

**TEXTBOOK:**

1. Utilization of Electric Energy – by E. Openshaw Taylor, Orient Longman.
2. Art & Science of Utilization of electrical Energy – by Partab, Dhanpat Rai & Sons.
3. Energy management by W.R. Murphy & G.Mckay Butterworth, Elsevier publications, 2011.

**REFERENCEBOOKS:**

1. Utilization of Electrical Power including Electric drives and Electric traction – by N.V.Suryanarayana, New Age International (P) Limited, Publishers, 1996.
2. Generation, Distribution and Utilization of electrical Energy – by C.L. Wadhwa, New Age International(P)Limited,Publishers,1997.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA**  
**III Year B. Tech. Electrical and Electronics Engineering – II Sem.**

**POWER SYSTEM ANALYSIS**

**Objective:**

The course is designed to give students the required knowledge for the design and analysis of electrical power grids. Calculation of power flow in a power system network using various techniques, formation of  $Z_{bus}$  and its importance are covered in this course. It also deals with short circuit analysis and analysis of power system for steady state and transient stability.

**UNIT-I:**

**Per Unit Representation**

Per Unit Quantities, single line diagram, Impedance diagram of a power system.

**UNIT-II:**

**Power Flow Studies – I**

Graph Theory definition, formulation of Y-Bus, necessity of power flow studies – Derivation of static power flow equations – Gauss-Seidel Method (limited to 3-buses), Algorithm.

**UNIT-III:**

**Power Flow Studies – II**

Newton Raphson Method in Rectangular and polar coordinates form – Derivation of Jacobian matrix, power flow solution using NR method (3bus), Decoupled and fast Decoupled method (3 bus), Algorithms.

**UNIT-IV:**

**Z-Bus formulation.**

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) -Sparsity Matrix.

**UNIT – V:**

**Symmetrical Fault Analysis**

3-Phase short circuit currents and reactances of synchronous machine, short circuit MVA calculations, symmetrical fault calculations using Z-bus.

**UNIT – VI:**

**Symmetrical Components.**

Synthesis of unsymmetrical phasors from their symmetrical components, operators, symmetrical components of unsymmetrical phasors, phase – shift of symmetrical components in Y- $\Delta$ , power in terms of symmetrical components, sequence networks – positive, negative and zero sequence networks.

**UNIT – VII:**

**Unsymmetrical Fault Analysis**

Various types of unsymmetrical faults LG, LL, LLG on unloaded alternator, unsymmetrical faults on power system.

**UNIT – VIII:**

**Power System 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.

Derivation of Swing Equation. Determination of Transient Stability by Equal Area Criterion, Application of Equal Area Criterion, methods to improve steady state and transient stability.

**TEXT BOOKS:**

1. Electrical Power System by P.S.R. Murthy, B.S. Publications.
2. Modern Power System Analysis - by I.J.Nagrath & D.P.Kothari: Tata McGraw-Hill Publishing Company, 2nd edition.
3. Power System Analysis and Design by J. Duncan Glover, M.S. Sarma, T.J. Overbye - Cengage Learning Publications.

**REFERENCE BOOKS:**

1. Power System Analysis by Grainger and Stevenson, Tata McGraw Hill.
2. Power System Analysis – by A.R.Bergen, Prentice Hall, Inc.
2. Power System Analysis by Hadi Saadat – TMH Edition.
3. Power System Analysis by B.R.Gupta, Wheeler Publications.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA****III Year B. Tech. Electrical and Electronics Engineering – II Sem.****POWER SEMICONDUCTOR DRIVES****Objective:**

This course is an extension of power electronics applications to electric drives. This course covers in detail the basic and advanced speed control techniques using power electronic converters that are used in industry. It is equally important to understand the four quadrant operation of electric drives and slip power recovery schemes in induction motors. These concepts are also discussed in detail in this course.

**UNIT-I:****Review of Speed Control techniques.**

DC motor (field flux, armature voltage control), induction motor (stator voltage, stator frequency, rotor resistance, rotor e.m.f. injection), Synchronous motor.

**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 operation 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 – Closed loop operation of DC motor (Block Diagram Only)

**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 – Closed Loop operation (Block Diagram Only)

**UNIT-VI:**

**Induction motor control-Stator side**

Variable voltage characteristics-Control of Induction Motor by AC Voltage Controllers – Waveforms –speed torque characteristics. Variable frequency characteristics-Variable frequency control of induction motor by Voltage source inverter -PWM Control - Closed loop operation of induction motor drives (Block Diagram Only)

**UNIT-VII:**

**Control of Induction motor - Rotor side**

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

**UNIT-VIII:**

**Control of Synchronous Motors**

Separate control & self control of synchronous motors – Operation of self controlled synchronous motors by VSI, Closed Loop control operation of synchronous motor drives (Block Diagram Only), variable frequency control, pulse width modulation.

**TEXTBOOKS:**

1. Fundamentals of Electric Drives – by G K Dubey Narosa Publications
2. Power Electronic Circuits, Devices and applications by M.H.Rashid, PHI.

**REFERENCE BOOKS:**

1. Power Electronics – MD Singh and K B Khanchandani, Tata – McGraw-Hill Publishing company, 1998
2. Modern Power Electronics and AC Drives by B.K.Bose, PHI.
3. Thyristor Control of Electric drives – Vedam Subramanyam Tata McGraw Hill Publications.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA**  
**III Year B. Tech. Electrical and Electronics Engineering – II Sem.**

**MANAGEMENTSCIENCE**

**UNIT I**

**Introduction to Management:** Concept –nature and importance of Management – Functions of Management – Evaluation of Management thought- Theories of Motivation – Decision making process-Designing organization structure- Principles of organization - Types of organization structure

**UNIT II**

**Operations Management:** Principles and Types of Management – Work study- Statistical Quality Control- Control charts (P-chart, R-chart, and C-chart) Simple problems- Material Management: Need for Inventory control- EOQ, ABC analysis (simple problems) and Types of ABC analysis (HML, SDE, VED, and FSN analysis)

**UNIT III**

**Functional Management:** Concept of HRM, HRD and PMIR- Functions of HR Manager- Wage payment plans(Simple Problems) – Job Evaluation and Merit Rating - Marketing Management- Functions of Marketing – Marketing strategies based on product Life Cycle, Channels of distributions.

**UNIT IV**

**Project Management:** (PERT/CPM): Development of Network – Difference between PERT and CPM Identifying Critical Path- Probability- Project Crashing (Simple Problems)

**UNIT V**

**Strategic Management:** Vision, Mission, Goals, Strategy – Elements of Corporate Planning Process – Environmental Scanning – SWOT analysis- Steps in Strategy Formulation and Implementation, Generic Strategy alternatives

**UNIT VI**

**Management Ethics:** Importance of Ethics in Business and Management – Ethics in Marketing - HRM-Financial Management – Business Ethics and Law (Case example)

**UNIT VII**

**Business Communication:** Report writing – Cross Cultural Communication, Problems and Challenges- Presentation Skills – Interviews- Video conferences

**UNIT VIII**

**Contemporary Management Practice:** Basic concepts of MIS, MRP, Just-in-Time(JIT) system, Total Quality Management(TQM), Six sigma and Capability Maturity Model(CMM) Levies, Supply Chain Management , Enterprise Resource Planning (ERP), Performance Management, Business Process outsourcing (BPO), Business process Re-engineering and Bench Marking, Balanced Score Card.

**TEXTBOOKS:**

1. Dr. P. Vijaya Kumar & Dr. N. Appa Rao, '*Management Science*' Cengage, Delhi, 2012.
2. Dr. A. R. Aryasri, '*Management Science*' TMH 2011.

**REFERENCES:**

1. Koontz & Weihrich: '*Essentials of management*' TMH 2011
2. Seth & Rastogi: *Global Management Systems*, Cengage learning , Delhi, 2011
3. Robbins: *Organizational Behaviour*, Pearson publications, 2011
4. Kanishka Bedi: *Production & Operations Management*, Oxford Publications, 2011
5. Philip Kotler & Armstrong: *Principles of Marketing*, Pearson publications
6. Biswajit Patnaik: *Human Resource Management*, PHI, 2011
7. Hitt and Vijaya Kumar: *Starategic Management*, Cengage learning

**Pre-requisites:** Managerial Economics

**Objective:** To familiarize with the process of management and to provide basic insights into select contemporary management practices.

**Codes/ Tables:** Normal Distribution Function Tables need to be permitted into the examination Halls

**Question paper pattern:** 5 questions to be answered out of 8 questions.

Each question should not have more than 3 bits.

Unit VIII will have only short questions, not essay questions



**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA**  
**III Year B. Tech. Electrical and Electronics Engineering – II Sem.**

**POWERELECTRONICSLAB**

**Any 10 of the Following Experiments are to be conducted**

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

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

**III Year B. Tech. Electrical and Electronics Engineering – II Sem.**

**ELECTRICAL MEASUREMENTS LAB**

**Any 10 of the following experiments are to be conducted**

1. Calibration and Testing of single phase energy Meter
2. Calibration of dynamometer wattmeter using phantom loading.
3. Crompton D.C. Potentiometer – Calibration of PMMC ammeter and PMMC voltmeter
4. Kelvin's double Bridge – Measurement of resistance – Determination of Tolerance.
5. Capacitance Measurement using Schering bridge.
6. Inductance Measurement using Anderson bridge.
7. Measurement of 3 phase reactive power with single-phase wattmeter for balanced loading.
8. Measurement of complex power with Trivector meter and verification.
9. Optical bench – Determination of polar curve measurement of MHCP of filament lamps
10. Calibration LPF wattmeter – by Phantom testing
11. Measurement of 3 phase power with single watt meter and 2 No's of C.T.
12. C.T. testing using mutual Inductor – Measurement of % ratio error and phase angle of given C.T. by Null method.
13. P.T. testing by comparison – V.G. as Null detector – Measurement of % ratio error and phase angle of the given P.T.
14. Dielectric oil testing using H.T. testing Kit
15. LVDT and capacitance pickup – characteristics and Calibration
16. Resistance strain gauge – strain measurements and Calibration
17. Polar curve using Lux meter, Measurement of intensity of illumination of fluorescent lamp.
18. Transformer turns ratio measurement using a.c. bridge.
19. A.C. Potentiometer – Polar form/Cartesian form – Calibration of AC Voltmeter, Parameters of Choke.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA**

**III Year B. Tech. Electrical and Electronics Engineering – II Sem.**

**INTELLECTUAL PROPERTY RIGHTS AND PATENTS – II**

**UNIT I**

Intellectual Property Law Basics – Types of Intellectual Property – Agencies responsible for Intellectual Property Registration - Cyber crime and E-commerce – International Aspects of Computer and Online Crime

**UNIT II**

Introduction to Patent Law – Rights and Limitations – Rights under Patent Law – Patent requirements - Ownership - Transfer - Patents Application Process – Patent Infringement - Patent Litigation - International Patent Law – Double Patenting – Patent Searching – Patent Law Treaty - New developments in Patent Law - Invention Developers and Promoters

**UNIT III**

Introduction to Transactional Law: Creating Wealth and Managing Risk – The Employment Relationship in the Internet and Tech Sector – Contact for the Internet and Tech Sector - Business Assets in Information Age – Symbol and Trademark – Trolls and Landmines and other Metaphors

**UNIT IV**

Regulatory, Compliance and Liability Issues – State Privacy Law - Data Security – Privacy issues - Controlling Over use or Misuse of Intellectual Property Rights

**BOOKS:**

1. Deborah E. Bouchoux: "Intellectual Property". Cengage learning, New Delhi
2. Kompal Bansal & Parishit Bansal "Fundamentals of IPR for Engineers", BS Publications (Press)
3. Cyber Law. Texts & Cases, South-Western's Special Topics Collections
4. Prabhuddha Ganguli: "Intellectual Property Rights" Tata Mc-Graw – Hill, New Delhi
5. Richard Stim: "Intellectual Property", Cengage Learning, New Delhi.
6. R. Radha Krishnan, S. Balasubramanian: "Intellectual Property Rights", Excel Books. New Delhi.
7. M. Ashok Kumar and Mohd. Iqbal Ali: "Intellectual Property Right" Serials Pub.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA****IV Year B. Tech. Electrical and Electronics Engineering – I Sem.****COMPUTER ORGANIZATION****Objective:**

Is to acquaint budding engineers with the basic principles of organization, operation and performance of modern-day computer systems. It covers all aspects of computer technology, from the underlying integrated circuit technology used to construct computer components, to the use of parallel organization concepts in combining those components.

**UNIT-I:****Basic Structure of Computers**

Computer Types, Functional unit, Basic Operational concepts, Bus structures, Software, Performance, Data Representation. Fixed point representation. Floating – Point Representation, Floating – Point arithmetic Operations.

**UNIT-II:****Register Transfer Language and Micro operations**

Register Transfer language, Register Transfer Bus and memory transfers, Arithmetic Micro operations, Logic micro operations, shift micro operations, Arithmetic logic shift unit, Instruction codes. Computer Registers-Computer instructions – Instruction cycle.

**UNIT-III:****Instructions and Addressing Modes**

Memory–Reference Instructions, Input–Output instructions, Data transfer and manipulation, Program control instructions. Stack organization, Instruction formats, Addressing modes. Reduced Instruction set computer.

**UNIT-IV:****Micro Programmed Control**

Control memory, Address sequencing, micro program example, design of control unit, Hard wired control, Micro programmed control.

**UNIT-V:**

**The Memory System**

Memory hierarchy, Basic concepts semiconductor RAM memories. Read-only memories, Cache memories, performance considerations, Virtual memories, secondary storage.

**UNIT-VI: Input-Output Organization**

Peripheral Devices, Input-Output Interface, Asynchronous data transfer, Modes of Transfer, Priority Interrupt, Direct memory Access.

**UNIT-VII:**

**Pipeline and Vector Processing**

Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline, Vector Processing, Array Processors.

**UNIT-VIII:**

**Multi Processors**

Characteristics of Multiprocessors, Interconnection Structures-Time shared common bus, Multiport memory, Crossbar switch, Multistage switching network, Hypercube interconnection, Interprocessor Arbitration. Shared Memory Multiprocessors.

**TEXTBOOKS:**

1. Computer Systems Architecture – M.Moris Mano, IIIrd Edition, PHI/Pearson.
2. Computer Organization and Architecture by V.Rajaraman and T.Radhakrishnan, PHI Publications.

**REFERENCEBOOKS:**

1. Computer Organization and Architecture – William Stallings Sixth Edition, PHI/Pearson.
2. Structured Computer Organization – Andrew S. Tanenbaum, 4th Edition PHI/Pearson.
3. Fundamentals of Computer Organization and Design, - Sivarama Dandamudi Springer Int.Edition.
4. Computer Organization – Car Hamacher, Zvonks Vranesic, SafeaZaky, Vth Edition, McGraw Hill

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA**  
**IV Year B. Tech. Electrical and Electronics Engineering – I Sem.**

**HIGH VOLTAGE ENGINEERING**

**Objective:**

This subject deals with the detailed analysis of Breakdown occur in gaseous, liquids and solid dielectrics. Information about generation and measurement of High voltage and current. In addition the High voltage testing methods are also discussed.

**UNIT-I:**

**Introduction to High Voltage Technology**

Electric Field Stresses, Gas Estimation and Control of Electric Stress, Numerical methods for electric field computation, Surge voltages, their distribution and control.

**UNIT-II:**

**Break down phenomenon in gaseous and liquid dielectrics**

Gases as insulating media, collision process, Ionization process, Townsend's criteria of breakdown in gases, Paschen's law. Liquid as Insulator, pure and commercial liquids, breakdown in pure and commercial liquids.

**UNIT-III:**

**Break down phenomenon in solid dielectrics and applications of insulating materials**

Intrinsic breakdown, electromechanical breakdown, thermal breakdown, breakdown of solid dielectrics in practice, Breakdown in composite dielectrics, solid dielectrics used in practice. Applications of insulating materials in transformers, rotating machines, circuit breakers, cable power capacitors and bushings.

**UNIT-IV:**

**Generation of high voltages and High currents**

Generation of High Direct Current Voltages, Generation of High alternating voltages, Generation of Impulse Voltages, Generation of Impulse currents, Tripping and control of impulse generators.

**UNIT-V:**

**Measurement of high voltages and High currents**

Measurement of High Direct Current voltages, Measurement of High Voltages alternating and impulse, Measurement of High Currents-direct, alternating and Impulse,

**UNIT-VI:**

**Non-distractive testing of material and electrical apparatus**

Measurement of D.C Resistivity, Measurement of Dielectric Constant and loss factor, Partial discharge measurements.

**UNIT-VII:**

**High voltage testing of electrical apparatus**

Testing of Insulators and bushings, Testing of Isolators and circuit breakers, Testing of cables, Testing of Transformers, Testing of Surge Arresters, Radio Interference measurements.

**UNIT VIII:**

**Industrial Applications to High Voltage Engineering**

Electro Static applications – Electro static precipitator, Electro static separator, Electro static coating, Electro Static copying, pulsed power.

**TEXTBOOKS:**

1. High Voltage Engineering by M.S.Naidu and V. Kamaraju – TMH Publications, 3rd Edition
2. High Voltage Engineering: Fundamentals by E.Kuffel, W.S.Zaengl, J.Kuffel by Elsevier, 2<sup>nd</sup> Edition.
3. High Voltage Engineering and Technology by Ryan, IET Publishers.

**REFERENCEBOOKS:**

1. High Voltage Engineering by C.L.Wadhwa, New Age Internationals (P) Limited, 1997.
2. High Voltage Insulation Engineering by Ravindra Arora, Wolfgang Mosch, New Age International (P)Limited,1995.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA**  
**IV Year B. Tech. Electrical and Electronics Engineering – I Sem.**

**SWITCHGEAR AND PROTECTION**

**Objective:**

This course introduces all varieties of Circuit Breakers and Relays for protection of Generators, Transformers and feeder bus bars from over voltages and other hazards. It emphasizes on Neutral grounding for overall protection.

**UNIT-I:**

**Circuit Breakers-1**

Circuit Breakers: Elementary principles of arc interruption, Recovery, Restriking Voltage and Recovery voltages. - Restriking Phenomenon, Average and Max. RRRV - Current Chopping and Resistance Switching - CB ratings and Specifications : – Auto reclosures.

**UNIT-II:**

**Circuit Breakers-2**

Description and Operation of Air Blast Circuit Breakers, Vacuum and SF<sub>6</sub> circuit breakers.

**UNIT-III:**

**Electromagnetic Protection**

Principle of Operation and Construction of Attracted armature, Balanced Beam, induction Disc and Induction Cup relays.

Relays Classification: Instantaneous, DMT and IDMT types.

Application of relays: Over current/ Under voltage relays, Direction relays, Differential Relays and Percentage Differential Relays.

Universal torque equation, Distance relays: Impedance, Reactance and Mho and Off-Set Mho relays, Characteristics of Distance Relays and Comparison.

**UNIT-IV:**

**Generator Protection**

Protection of generators against Stator faults, Rotor faults, and Abnormal Conditions. Restricted Earth fault and Inter-turn fault Protection. Numerical Problems on % Winding Unprotected.

**UNIT-V:**



**Transformer Protection**

Protection of transformers: Percentage Differential Protection, Numerical Problem on Design of CT's Ratio, Buchholtz relay Protection.

**UNIT-VI:**

**Feeder and Bus-Bar Protection**

Protection of Lines: Over Current, Carrier Current and Three-zone distance relay protection using Impedance relays. Translay Relay.

Protection of Bus bars – Differential protection.

**UNIT-VII:**

**Static and Digital Relays**

Static Relays: Static relay components, static over current relay, static distance relay microprocessor based digital Relays:

**UNIT-VIII:**

**Protection against over voltage and grounding**

Generation of Over Voltages in Power Systems.-Protection against Lightning Over Voltages - Valve type and Zinc-Oxide Lighting Arresters - Insulation Coordination -BIL, Impulse Ratio, Standard Impulse Test Wave, Volt-Time Characteristics. Grounded and Ungrounded Neutral Systems.- Effects of Ungrounded Neutral on system performance. Methods of Neutral Grounding: Solid, Resistance, Reactance - Arcing Grounds and Grounding Practices.

**TEXTBOOKS:**

1. Switchgear and Protection – by Sunil S Rao, Khanna Publishers
2. Power System Protection and Switchgear by Badari Ram, D.N Viswakarma, TMH Publications

**REFERENCEBOOKS:**

1. Fundamentals of Power System Protection by Paithankar and S.R.Bhide.,PHI, 2003.
2. Art & Science of Protective Relaying – by C R Mason, Wiley Eastern Ltd.
3. Electrical Power Systems – by C.L.Wadhwa, New Age international (P) Limited, Publishers, 3rd editon
4. A Text book on Power System Engineering by B.L.Soni, Gupta, Bhatnagar, Chakrabarthy, DhanpatRai&o.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA****IV Year B. Tech. Electrical and Electronics Engineering – I Sem.****POWERSYSTEM OPERATION AND CONTROL****Objective:**

This subject deals with Economic operation of Power Systems, Hydrothermal scheduling and modeling of turbines, generators and automatic controllers. It emphasizes on single area and two area load frequency control and reactive power control.

**UNIT-I:****Economic Operation of Power Systems-1**

Optimal operation of Generators in Thermal Power Stations, - heat rate Curve – Cost Curve – Incremental fuel and Production costs, input-output characteristics, Optimum generation allocation with line losses neglected.

**UNIT-II:****Economic Operation of Power Systems-2**

Optimum generation allocation including the effect of transmission line losses – Loss Coefficients, General transmission line loss formula.

**UNIT-III:****Hydrothermal Scheduling**

Optimal scheduling of Hydrothermal System: Hydroelectric power plant models, scheduling problems- Short term Hydrothermal scheduling problem.

**UNIT-IV:****Unit Commitment**

Optimal unit commitment problem – Need for unit commitment – constraints in unit commitment – cost function formulation – solution methods – dynamic programming.

**UNIT-V:****Single Area Load Frequency Control**

Modeling of steam turbine, generator, mathematical modeling of speed governing system – Transfer function, modeling of Hydro turbine. Necessity of keeping frequency constant. Definitions of Control area – Single area

control – Block diagram representation of an isolated power system – Steady state analysis – Dynamic response – Uncontrolled case.

**UNIT-VI:**

**Two-Area Load Frequency Control**

Load frequency control of two area system – uncontrolled case and controlled case, tie-line bias control

**UNIT-VII:**

**Load Frequency Controllers**

Proportional plus Integral control of single area and its block diagram representation, steady state response – Load Frequency Control and Economic dispatch control.

**UNIT-VIII:**

**Reactive Power Control**

Overview of Reactive Power control – Reactive Power compensation in transmission systems –advantages and disadvantages of different types of compensating equipment for transmission systems; load compensation – Specifications of load compensator, Uncompensated and compensated transmission lines: shunt and Series Compensation, introduction to flexible alternating current transmission system (FACTS).

**TEXTBOOKS:**

1. Power System stability & control, Prabha Kundur
2. Modern Power System Analysis – by I.J.Nagrath & D.P.Kothari Tata Mc Graw – Hill Publishing Company Ltd, 2nd edition.

**REFERENCEBOOKS:**

1. Power System Analysis and Design by J.Duncan Glover and M.S.Sarma., THOMPSON, 3rd Edition.
2. Electric Energy systems Theory – by O.I.Elgerd, Tata Mc Graw-hill Publishing Company Ltd., Second edition.
3. Power System Analysis by Grainger and Stevenson, Tata McGraw Hill.
4. Power System Analysis by Hadi Saadat – TMH Edition.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA**  
**IV Year B. Tech. Electrical and Electronics Engineering – I Sem.**

**VLSIDESIGN**  
**(Elective -I)**

**UNIT I**

**INTRODUCTION :** Introduction to IC Technology, The IC Era, MOS and related VLSI Technology, Basic MOS Transistors, Enhancement and Depletion modes of transistor action, IC production process, MOS and CMOS Fabrication processes, BiCMOS Technology, Comparison between CMOS and Bipolar technologies.

**UNIT II**

**BASIC ELECTRICAL PROPERTIES of MOS and BiCMOS Circuits:**  $I_{ds}$  versus  $V_{ds}$  Relationships, Aspects of MOS transistor Threshold Voltage, MOS transistor Trans-conductance and Output Conductance, MOS transistor Figure of Merit, The Pass transistor, The nMOS Inverter, Determination of Pull-up to Pull-down Ratio for nMOS inverter driven by another nMOS inverter and for an nMOS inverter driven through one or more pass transistors, Alternative forms of pull-up, The CMOS Inverter, MOS transistor circuit model, Bi-CMOS Inverter, Latch-up in CMOS circuits and BiCMOS Latch-up Susceptibility.

**UNIT III**

**MOS and BiCMOS CIRCUIT DESIGN PROCESSES:** MOS Layers, Stick Diagrams, Design Rules and Layout, General observations on the Design rules,  $2\mu\text{m}$  Double Metal, Double Poly, CMOS/BiCMOS rules,  $1.2\mu\text{m}$  Double Metal, Double Poly CMOS rules, Layout Diagrams of NAND and NOR gates and CMOS inverter, Symbolic Diagrams-Translation to Mask Form.

**UNIT IV**

**BASIC CIRCUIT CONCEPTS:** Sheet Resistance, Sheet Resistance concept applied to MOS transistors and Inverters, Area Capacitance of Layers,

Standard unit of capacitance, Some area Capacitance Calculations, The Delay Unit, Inverter Delays, Driving large capacitive loads, Propagation Delays, Wiring Capacitances, Fan-in and fan-out characteristics, Choice of layers, Transistor switches, Realization of gates using nMOS, pMOS and CMOS technologies.

#### **UNIT V**

**SCALING OF MOS CIRCUITS:** Scaling models and scaling factors, Scaling factors for device parameters, Limitations of scaling, Limits due to subthreshold currents, Limits on logic levels and supply voltage due to noise, Limits due to current density, Some architectural Issues, Introduction to Switch Logic and Gate Logic

#### **UNIT VI**

**SEMICONDUCTOR INTEGRATED CIRCUIT DESIGN:** Introduction to Programmable Logic Devices (PLDs), Programmable Logic Arrays (PLA), Programmable Array Logic (PAL), Implementation approaches in VLSI Design-Full Custom Design, Semicustom Design, Gate Arrays, Standard Cells, Complex Programmable Logic Devices (CPLDs), Field Programmable Gate Arrays(FPGAs), Design Issues.

#### **UNIT VII**

**DIGITAL DESIGN USING HDL:** Digital system design process, VLSI Circuit Design Process, Hardware Simulation, Hardware Synthesis, History of VHDL, VHDL requirements, Levels of Abstraction, Elements of VHDL, Packages, Libraries and Bindings, Objects and Classes, Variable assignments, Sequential statements, Usage of subprograms, Comparison of VHDL and Verilog HDL.

#### **UNIT VIII**

**VHDL MODELLING :** Simulation, Logic Synthesis, Inside a logic Synthesizer, Constraints, Technology Libraries, VHDL and Logic Synthesis, Functional Gate-Level verification, Place and Route, Post Layout Timing Simulation, Static Timing, Major Netlist formats for design representation, VHDL Synthesis-Programming Approach.

**TEXTBOOKS:**

1. Essentials of VLSI Circuits and Systems - Kamran Eshraghian, Douglas and A. Pucknell and Sholeh Eshraghian, Prentice-Hall of India Private Limited, 2005 Edition.
2. VLSI Design-A.Shanthi and A.Kavita, New Age International Private Limited, 2006 First Edition.
3. VLSI Design-K.Lal Kishore and V.S.V.Prabhakar,I.K.International Publishing House Private Limited, 2009 First Edition.

**REFERENCES:**

1. VLSI Design By Debaprasad Das,Oxford University Press,2010.
2. VLSI Design By A.Albert Raj & T.Latha,PHI Learning Private Limited,2010.
3. Principles of VLSI and CMOS Integrated Circuits By Richa Jain & Amrita Rai, S.Chand & Company Limited,First Edition,2012.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA**  
**IV Year B. Tech. Electrical and Electronics Engineering – I Sem.**

**ELECTRICAL DISTRIBUTION SYSTEMS**

**(ELECTIVE-I)**

**UNIT – I:**

**General Concepts**

Introduction to distribution systems, Load modeling and characteristics. Coincidence factor, contribution factor loss factor - Relationship between the load factor and loss factor. Classification of loads (Residential, commercial, Agricultural and Industrial) and their characteristics.

**UNIT – II:**

**Distribution Feeders**

Design Considerations of Distribution Feeders: Radial and loop types of primary feeders, voltage levels, feeder loading; basic design practice of the secondary distribution system.

**UNIT – III:**

**Substations**

Location of Substations: Rating of distribution substation, service area within primary feeders. Benefits derived through optimal location of substations.

**UNIT – IV:**

**System Analysis**

Voltage drop and power-loss calculations: Derivation for voltage drop and power loss in lines, manual methods of solution for radial networks, three phase balanced primary lines.

**UNIT – V:**

**Protection**

Objectives of distribution system protection, types of common faults and procedure for fault calculations. Protective Devices: Principle of operation of Fuses, Circuit Reclosures, line sectionalizers, and circuit breakers

**UNIT – VI:**

**Coordination**

Coordination of Protective Devices: General coordination procedure, residual current circuit breaker RCCB (Wikipedia).

**UNIT – VII:**

**Compensation for Power Factor Improvement**

Capacitive compensation for power-factor control. Different types of power capacitors, shunt and series capacitors, effect of shunt capacitors (Fixed and switched), Power factor correction, capacitor allocation - Economic justification - Procedure to determine the best capacitor location.

**UNIT – VIII:**

**Voltage Control**

Voltage Control: Equipment for voltage control, effect of series capacitors, effect of AVB/AVR, line drop compensation.

**TEXT BOOK:**

1. “Electric Power Distribution system, Engineering” – by Turan Gonen, Mc Graw-hill Book Company.

**REFERENCE BOOKS:**

1. Electric Power Distribution – by A.S. Pabla, Tata Mc Graw-hill Publishing company, 4th edition, 1997.
2. Electrical Power Distribution Systems by V.Kamaraju, Right Publishers.



**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA**  
**IV Year B. Tech. Electrical and Electronics Engineering – I Sem.**

**OPTIMIZATION TECHNIQUES**

**(ELECTIVE-I)**

**UNIT – I:**

**Introduction to Classical Optimization Techniques:**

Statement of an Optimization problem – design vector – design constraints – constraint surface – objective function – objective function surfaces – classification of Optimization problems.

**UNIT – II:**

**Classical Optimization Techniques**

Single variable Optimization – multi variable Optimization without constraints – necessary and sufficient conditions for minimum/maximum – multivariable Optimization with equality constraints. Solution by method of Lagrange multipliers – multivariable Optimization with inequality constraints – Kuhn – Tucker conditions.

**UNIT – III:**

**Linear Programming**

Standard form of a linear programming problem – geometry of linear programming problems – definitions and theorems – solution of a system of linear simultaneous equations – pivotal reduction of a general system of equations – motivation to the simplex method – simplex algorithm.

**UNIT – IV:**

**Transportation Problem**

Finding initial basic feasible solution by north – west corner rule, least cost method and Vogel's approximation method – testing for optimality of balanced transportation problems.

**UNIT – V:**

**Unconstrained Nonlinear Programming:**

One – dimensional minimization methods: Classification, Fibonacci method and Quadratic interpolation method

**UNIT – VI:****Unconstrained Optimization Techniques**

Univariate method, Powell’s method and steepest descent method.

**UNIT – VII:****Constrained Nonlinear Programming:**

Characteristics of a constrained problem, Classification, Basic approach of Penalty Function method; Basic approaches of Interior and Exterior penalty function methods. Introduction to convex Programming Problem.

**UNIT – VIII:****Dynamic Programming:**

Dynamic programming multistage decision processes – types – concept of sub optimization and the principle of optimality – computational procedure in dynamic programming – examples illustrating the calculus method of solution - examples illustrating the tabular method of solution.

**TEXTBOOKS:**

1. “Engineering optimization: Theory and practice” -by S. S.Rao, New Age International (P) Limited, 3<sup>rd</sup> edition, 1998.
2. “Introductory Operations Research” by H.S. Kasene & K.D. Kumar, Springer(India), Pvt .Ltd.

**REFERENCEBOOKS:**

1. “Optimization Methods in Operations Research and systems Analysis” – by K.V. Mital and C. Mohan, New Age International (P) Limited, Publishers, 3rd edition, 1996.
2. Operations Research – by Dr. S.D.Sharma.
3. “Operations Research: An Introduction” – by H.A. Taha, PHI Pvt. Ltd., 6th edition
4. Linear Programming – by G Hadley.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA**  
**IV Year B. Tech. Electrical and Electronics Engineering – I Sem.**

**MICROPROCESSORS AND MICROCONTROLLERS LAB**

**Any 8 of the following are to be conducted**

**I. Microprocessor 8086:**

Introduction to MASM/TASM.

1. Arithmetic operation – Multi byte addition and subtraction, Multiplication and Division – Signed and unsigned Arithmetic operation, ASCII – arithmetic operation.
2. Logic operations – Shift and rotate – Converting packed BCD to unpacked BCD, BCD to ASCII conversion.
3. By using string operation and Instruction prefix: Move Block, Reverse string, Sorting, Inserting, Deleting, Length of the string, String comparison.
4. Modular Program: Procedure, Near and Far implementation, Recursion.
5. Dos/BIOS programming: Reading keyboard (Buffered with and without echo) – Display characters, Strings.
6. Interfacing 8255-PPI
7. Programs using special instructions like swap, bit/byte, set/reset etc.
8. Programs based on short, page, absolute addressing.
9. Interfacing 8259 – Interrupt Controller.
10. Interfacing 8279 – Keyboard Display.

Any 2 of the following experiments are to be conducted :

**Microcontroller 8051**

11. Reading and Writing on a parallel port.
12. Timer in different modes.
13. Serial communication implementation.
14. Understanding three memory areas of 00 – FF (Programs using above areas) Using external interrupts.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA**  
**IV Year B. Tech. Electrical and Electronics Engineering – I Sem.**

**ELECTRICALSIMULATIONLAB**

**Following experiments are required to be conducted:**

1. Simulation of transient response of RLC circuits
  - a. Response to pulse input
  - b. Response to step input
  - c. Response to sinusoidal input
2. Analysis of three phase circuit representing the generator transmission line and load. Plot three phase currents & neutral current using PSPICE.
3. Simulation of single-phase full converter using RL & E loads and single phase AC voltage controller using RL & E loads
4. Plotting of Bode plots, root locus and Nyquist plots for the transfer functions of systems up to 5<sup>th</sup> order
5. Power flow solution of Power System
6. Modelling of transformer and simulation of lossy transmission line.
7. Simulation of Op-Amp based Integrator & Differentiator circuits.
8. Transfer function analysis of a given circuit.

**Any 2 of the following experiments are to be conducted :**

1. Simulation of Resonant pulse commutation circuit and Buck chopper.
2. Simulation of single phase inverter with PWM control.
3. Dynamic stability analysis of Power Systems
4. Switching Transients.

**REFERENCEBOOKS:**

1. Pspice for circuits and electronics 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 user's manual – Mathworks, USA
5. MATLAB - control system tool box – Mathworks, USA
6. SIMULINK user's manual – Mathworks, USA
7. EMTP User's Manual

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA**  
**IV Year B. Tech. Electrical and Electronics Engineering – I Sem.**  
**ENERGY AUDIT, CONSERVATION & MANAGEMENT**  
**(Open Elective)**

**Unit-I:**

**Basic Principles of Energy Audit**

Energy audit- definitions, concept, types of audit, energy index, cost index, pie charts, Sankey diagrams, load profiles, Energy conservation schemes, and energy saving potential.

**Unit-II:**

**Energy Management**

Principles of energy management, organizing energy management program, initiating, planning, controlling, promoting, monitoring, reporting, Energy manager, Qualities and functions, language, Questionnaire - check list for top management.

**Unit-III:**

**Lighting**

Modification of existing systems-Replacement of existing systems-priorities: Definition of terms and units, luminous efficiency - Polar curve - Calculation of illumination level - Illumination of inclined surface to beam - Luminance or brightness - Types of lamps - Types of lighting - Electric lighting fittings (luminaries) - Flood lighting - White light LED and conducting Polymers - Energy conservation measures.

**Unit-IV:**

**Power Factor**

Power factor – methods of improvement, location of capacitors, Pf with non linear loads, effect of harmonics on p.f., motor controllers

**Unit-V:**

**Energy Instruments**

Energy Instruments- watt-hour meter, data loggers, thermocouples, pyrometers, lux meters, tong testers, Power analyzer.

**Unit-VI:****Space Heating and Ventilation**

Ventilation, Air-Conditioning (HVAC) and Water Heating: Introduction-Heating of buildings-Transfer of Heat-Space heating methods-Ventilation and air-conditioning-Insulation-Cooling load-Electric water heating systems-Energy conservation methods.

**Unit-VII:****Economic Aspects and Analysis**

Economics Analysis-Depreciation Methods, time value of money, rate of return, present worth method, replacement analysis, life cycle costing analysis - Energy efficient motors (basic concepts).

**Unit-VIII:****Computation of Economic Aspects**

Calculation of simple payback method, net present worth method- Power factor correction, lighting - Applications of life cycle costing analysis, return on investment.

**TEXTBOOKS:**

1. Energy management by W.R. Murphy & G. McKay Butter worth, Elsevier publications. 2012
2. Energy efficient electric motors by John .C. Andreas, Marcel Dekker Inc Ltd-2<sup>nd</sup> edition, 1995-
3. Electric Energy Utilization and Conservation by S C Tripathy, Tata McGraw hill publishing company Ltd. New Delhi.

**REFERENCEBOOKS:**

1. Energy management by Paul o' Callaghan, Mc-graw Hill Book company- 1<sup>st</sup> edition, 1998
2. Energy management hand book by W.C.Turner, John wiley and sons
3. Energy management and good lighting practice : fuel efficiency-booklet12-EEO

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA**  
**IV Year B. Tech. Electrical and Electronics Engineering – I Sem.**

**INSTRUMENTATION**

**(Open Elective)**

**Objective:**

Instrumentation is essential in monitoring and analysis of any Physical system and its control. This course deals with different types of transducers, digital voltmeters, oscilloscopes and measurement of non electrical quantities.

**UNIT-I:**

**Characteristics of Signals**

Measuring Systems, Performance Characteristics, - Static characteristics, Dynamic Characteristics; Errors in Measurement – Gross Errors, Systematic Errors, Statistical Analysis of Random Errors.

**UNIT-II:**

**Signals and their representation**

Signal and their representation: Standard Test, periodic, aperiodic, modulated signal, sampled data, pulse modulation and pulse code modulation

**UNIT-III:**

**Transducers**

Definition of transducers, Classification of transducers, Advantages of Electrical transducers, Characteristics and choice of transducers; Principle operation of resistor, inductor, LVDT and capacitor transducers; LVDT Applications, Strain gauge and its principle of operation, gauge factor, Thermistors, Thermocouples, Synchronizers, Piezo electric transducers, photo diodes.

**UNIT-IV:**

**Digital Voltmeters**

Digital voltmeters- Successive approximation, ramp, dual-Slope integration continuous balance type-Micro processor based ramp type DVM digital frequency meter-digital phase angle meter-

**UNIT-V:****Oscilloscope**

Cathode ray oscilloscope-time base generator-horizontal and vertical amplifiers- Measurement of phase and frequency-lissajous patterns-Sampling oscilloscope-analog and digital type data logger, transient recorder.

**UNIT-VI:****Signal Analyzers**

Wave Analyzers- Frequency selective analyzers, Heterodyne, Application of Wave analyzers- Harmonic Analyzers, Total Harmonic distortion, spectrum analyzers, Basic spectrum analyzers, spectral displays, vector impedance meter, Q meter. Peak reading and RMS voltmeters

**UNIT-VII:****Measurement of Non-Electrical Quantities-I**

Measurement of strain, Gauge Sensitivity, Displacement, Velocity, Angular Velocity, Acceleration, Force, Torque.

**UNIT-VIII:****Measurement of Non-Electrical Quantities-II**

Measurement of Temperature, Pressure, Vacuum, Flow, Liquid level.

**TEXTBOOKS:**

1. Transducers and Instrumentation by D.V.S Murthy, Prentice Hall of India
2. A course in Electrical and Electronic Measurements and Instrumentation, A.K. Sawhney, Dhanpatrai & Co.

**REFERENCE BOOKS:**

1. Measurements Systems, Applications and Design – by D O Doebelin
2. Principles of Measurement and Instrumentation – by A.S Morris, Pearson /Prentice Hall of India
3. Electronic Instrumentation-by H.S.Kalsi Tata MCGraw-Hill Edition, 1995.
4. Modern Electronic Instrumentation and Measurement techniques – by A.D Helfrick and W.D.Cooper, Pearson/Prentice Hall of India.



**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA**  
**IV Year B. Tech. Electrical and Electronics Engineering – I Sem.**

**NON-CONVENTIONAL SOURCES OF ENERGY**

**(Open Elective)**

**Objective:**

It introduces solar energy its radiation, collection, storage and application. It also introduces the Wind energy, Biomass energy, Geothermal energy and ocean energy as alternative energy sources.

**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 tilted 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, I.C.Engine operation and economic aspects.

**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 Direct Energy Conversion, Carnot cycle, limitations, principles of Direct Energy Conversion. Power generation systems, electron gas dynamic conversion, economic aspects. Fuel cells, principles, faraday's law's, thermodynamic aspects, selection of fuels and operating conditions.

**TEXTBOOKS:**

1. Non-Conventional Energy Sources /G.D. Rai
2. Renewable Energy Technologies /Ramesh & Kumar /Narosa

**REFERENCE BOOKS:**

1. Renewable energy resources/ Tiwari and Ghosal/ Narosa.
2. Non-Conventional Energy / Ashok V Desai /Wiley Eastern.
3. Non-Conventional Energy Systems / K Mittal /Wheeler
4. Solar Energy /Sukhame.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA**  
**IV Year B. Tech. Electrical and Electronics Engineering – I Sem.**

**OPTIMIZATION TECHNIQUES**

**(Open Elective)**

**UNIT – I:**

**Introduction and Classical Optimization Techniques:**

Statement of an Optimization problem – design vector – design constraints – constraint surface – objective function – objective function surfaces – classification of Optimization problems.

**UNIT – II:**

**Classical Optimization Techniques**

Single variable Optimization – multi variable Optimization without constraints – necessary and sufficient conditions for minimum/maximum – multivariable Optimization with equality constraints. Solution by method of Lagrange multipliers – multivariable Optimization with inequality constraints – Kuhn – Tucker conditions.

**UNIT – III:**

**Linear Programming**

Standard form of a linear programming problem – geometry of linear programming problems – definitions and theorems – solution of a system of linear simultaneous equations – pivotal reduction of a general system of equations – motivation to the simplex method – simplex algorithm.

**UNIT – IV:**

**Transportation Problem**

Finding initial basic feasible solution by north – west corner rule, least cost method and Vogel's approximation method – testing for optimality of balanced transportation problems.

**UNIT – V:**

**Unconstrained Nonlinear Programming:**

One – dimensional minimization methods: Classification, Fibonacci method and Quadratic interpolation method

**UNIT – VI:****Unconstrained Optimization Techniques**

Univariate method, Powell’s method and steepest descent method.

**UNIT – VII:****Constrained Nonlinear Programming:**

Characteristics of a constrained problem, Classification, Basic approach of Penalty Function method; Basic approaches of Interior and Exterior penalty function methods. Introduction to convex Programming Problem.

**UNIT – VIII:****Dynamic Programming:**

Dynamic programming multistage decision processes – types – concept of sub optimization and the principle of optimality – computational procedure in dynamic programming – examples illustrating the calculus method of solution - examples illustrating the tabular method of solution.

**TEXTBOOKS:**

1. “Engineering optimization: Theory and practice”-by S. S.Rao, New Age International (P) Limited, 3rd edition, 1998.
2. “Introductory Operations Research” by H.S. Kasene & K.D. Kumar, Springer(India), Pvt .Ltd.

**REFERENCEBOOKS:**

1. “Optimization Methods in Operations Research and systems Analysis” – by K.V. Mital and C. Mohan, New Age International (P) Limited, Publishers, 3rd edition, 1996.
2. Operations Research – by Dr. S.D.Sharma.
3. “Operations Research: An Introduction” – by H.A. Taha, PHI Pvt. Ltd., 6th edition
4. Linear Programming–by G.Hadley.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA**  
**IV Year B. Tech. Electrical and Electronics Engineering – II Sem.**

**DIGITAL CONTROL SYSTEMS**

**UNIT – I:**

**Introduction to signals**

Introduction of continuous and discrete time signals, shifting and scaling operator, periodic and nonperiodic signals, linear time invariant and causal systems

**UNIT-II:**

**Introduction to z-transforms**

Z-Transform and theorems, finding inverse and method for solving difference equations; Pulse transforms function, block diagram analysis of sampled – data systems, mapping between s-plane and z-plane.

**UNIT-III:**

**Sampling and reconstruction**

Introduction, sampling theorem, Examples of Data control systems – Digital to Analog conversion and Analog to Digital conversion, sample and hold operations.

**UNIT – IV:**

**State space analysis**

State Space Representation of discrete time systems, Pulse Transfer Function Matrix solving discrete time state space equations, State transition matrix and it's Properties, Methods for Computation of State Transition Matrix, Discretization of continuous time state – space equations

**UNIT – V:**

**Controllability and observability**

Concepts of Controllability and Observability, Tests for controllability and Observability. Duality between Controllability and Observability, Controllability and Observability conditions for Pulse Transfer Function

**UNIT – VI:**

**Stability analysis**

Mapping between the S-Plane and the Z-Plane – Primary strips and Complementary Strips – Constant frequency loci, Constant damping ratio loci, Stability Analysis of closed loop systems in the Z-Plane. Jury stability test – Stability Analysis by use of the Bilinear Transformation and Routh Stability criterion.

**UNIT – VII:**

**Design of discrete time control system by conventional methods**

Transient and steady – State response Analysis – Design based on the frequency response method – Bilinear Transformation and Design procedure in the w-plane, Lead, Lag and Lead-Lag compensators and digital PID controllers.

**UNIT – VIII:**

**State feedback controllers and observers**

Design of state feedback controller through pole placement – Necessary and sufficient conditions, Ackerman's formula.

**TEXT BOOK:**

1. Discrete-Time Control systems - K. Ogata, Pearson Education/PHI, 2nd Edition

**REFERENCE BOOKS:**

1. Digital Control Systems, Kuo, Oxford University Press, 2nd Edition, 2003.
2. Digital Control and State Variable Methods by M.Gopal, TMH

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA**  
**IV Year B. Tech. Electrical and Electronics Engineering – II Sem.**

**ADVANCED CONTROL SYSTEMS**

**(ELECTIVE – II)**

**Objective:**

This subject deals with state space, describing function, phase plane and stability analysis including controllability and observability. It also deals with modern control and optimal control systems.

**UNIT – I:**

**State space analysis**

State Space Representation, Solution of State Equation, State Transition Matrix, Canonical Forms – Controllable Canonical Form, Observable Canonical Form, Jordan Canonical Form.

**UNIT – II:**

**Controllability and observability**

Tests for controllability and observability for continuous time systems – Time varying case, minimum energy control, time invariant case, Principle of Duality, Controllability and observability form Jordan canonical form and other canonical forms.

**UNIT – III:**

**Multi input multi output (MIMO) system**

Models of MIMO system, matrix representation, transfer function representation, poles and zeros, decoupling, introduction to multi variable Nyquist plot and singular values analysis

**UNIT – IV:**

**Describing function analysis**

Introduction to nonlinear systems, Types of nonlinearities, describing functions, Introduction to phase-plane analysis.

**UNIT-V:**

**Stability analysis**

Stability in the sense of Lyapunov, Lyapunov's stability and Lyapunov's instability theorems. Direct method of Lyapunov for the Linear and Nonlinear continuous time autonomous systems.

**UNIT – VI:**

**Modal control**

Effect of state feedback on controllability and observability, Design of State Feedback Control through Pole placement.

**UNIT-VII:**

**Calculus of variations**

Minimization of functionals of single function, Constrained minimization. Minimum principle. Control variable inequality constraints. Control and state variable inequality constraints. Euler Lagrangine Equation.

**UNIT –VIII:**

**Optimal control**

Linear quadratic optimal regulator (LQR) problem formulation, optimal regulator design by parameter adjustment (Lyapunov method), optimal regulator design by continuous time algebraic riccatti equation (CARE), optimal controller design using LQG framework.

**TEXTBOOKS:**

1. Modern Control Engineering – by K. Ogata, Prentice Hall of India, 3rd edition, 1998
2. Automatic Control Systems by B.C. Kuo, Prentice Hall Publication.

**REFERENCE BOOKS:**

1. Modern Control System Theory – by M. Gopal, New Age International Publishers, 2nd edition, 1996
2. Control Systems Engineering by I.J. Nagarath and M.Gopal, New Age International (P) Ltd.
3. Digital Control and State Variable Methods – by M. Gopal, Tata Mc Graw-Hill Companies, 1997.
4. Systems and Control by Stainslaw H. Zak , Oxford Press, 2003.
5. Optimal control theory: an Introduction by Donald E.Kirk by Dover publications.



**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA**  
**IV Year B. Tech. Electrical and Electronics Engineering – II Sem.**

**EXTRAHIGH VOLTAGE TRANSMISSION**

**(Elective-II)**

**Unit – I:**

**Preliminaries:**

Necessity of EHV AC transmission – advantages and problems – power handling capacity and line losses mechanical considerations – resistance of conductors – properties of bundled conductors – bundle spacing and bundle radius- Examples.

**Unit – II:**

**Voltage gradients of conductors:**

Electrostatics – field of sphere gap – field of line charges and properties – charge – potential relations for multi-conductors – surface voltage gradient on conductors – distribution of voltage gradient on subconductors of bundle – Examples.

**Unit – III:**

**Corona effects – I:**

Power loss and audible noise (AN) – corona loss formulae – charge voltage diagram – generation, characteristics - limits and measurements of AN – relation between 1-phase and 3-phase AN levels – Examples.

**Unit – IV:**

**Corona effects – II:**

Radio interference (RI) - corona pulses generation, properties, limits – frequency spectrum – modes of propagation – excitation function – measurement of RI, RIV and excitation functions – Examples.

**UNIT – V:**

**Basic Concepts of DC Transmission**

Economics & Terminal equipment of HVDC transmission systems: Types of HVDC Links – Apparatus required for VDC Systems – Comparison of AC & DC Transmission, Application of DC Transmission System – Planning & Modern trends in D.C. Transmission.

**UNIT – VI:****Analysis of HVDC Converters and System Control**

Choice of Converter configuration – analysis of Graetz – characteristics of 6 Pulse & 12 Pulse converters – Cases of two 3 phase converters in star – star mode – their performance. Principal of DC Link Control – Converters Control Characteristics – Firing angle control – Current and extinction angle control – Effect of source inductance on the system; Starting and stopping of DC link; Power Control.

**UNIT-VII:****Reactive Power Control in HVDC**

Reactive Power Requirements in steady state-Conventional control strategies-Alternate control strategies sources of reactive power-AC Filters – shunt capacitors-synchronous condensers.

**UNIT – VIII:****Harmonics and Filters**

Generation of Harmonics – Characteristics harmonics, calculation of AC Harmonics, Non- Characteristics harmonics, adverse effects of harmonics – Calculation of voltage & Current harmonics – Effect of Pulse number on harmonics. Types of AC filters, Design of Single tuned filters – Design of High pass filters.

**TEXTBOOKS:**

1. EHVAC Transmission Engineering by R. D. Begamudre, New Age International (p) Ltd.
2. HVDC Transmission – J. Arrillaga.
3. Direct Current Transmission – by E. W. Kimbark, John Wiley & Sons.

**REFERENCEBOOKS:**

1. HVDC Power Transmission Systems: Technology and system Interactions – by K.R. Padiyar, New Age International (P) Limited, and Publishers.
2. EHVAC and HVDC Transmission Engineering and Practice – S. Rao.
3. Power Transmission by Direct Current – by E. Uhlmann, B.S. Publications
4. HVAC and DC Transmission by S. Rao.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA**  
**IV Year B. Tech. Electrical and Electronics Engineering – II Sem.**

**SPECIAL ELECTRICAL MACHINES**

**(Elective – II)**

**Unit I:**

**Switched Reluctance Motor**

Principle of operation, design of stator and rotor pole arc, Power Converter for switched reluctance motor.

**Unit II:**

**Stepper Motors**

Construction, principle of operation, theory of torque production, hybrid stepping motor, variable reluctance stepping motor.

**Unit III:**

**Brushless DC Motor**

Construction, principle of operation, theory of brushless DC Motor as variable speed synchronous motor.

**Unit IV:**

**Linear Induction Motor**

Construction, principle of operation, application of linear induction drive for electric traction.

**Unit V:**

**Permanent Magnet Motors**

Hysteresis loop, Permanent Magnet DC Motors, equivalent circuit, electrically commutated DC Motor.

**Unit VI:**

**Control of special Machines – I**

Stepper motors (open loop control, closed loop control). Characteristics of stepper motor in open-loop drive. Comparison of open loop and closed loop systems.

**Unit VII:**

**Control of special Machines – II**

Control of switched reluctance motor for fraction type load. Control of brushless dc motor, rotor position sensing and switching logic for brushless dc motor.

**Unit VIII:**

**Electric Motors for traction drives**

AC motors, DC motors, single sided linear induction motor for traction drives, Comparison of AC and DC traction.

**TEXTBOOKS:**

1. Special electrical Machines, K.Venkata Ratnam, University press, 2009, New Delhi.
2. Brushless Permanent magnet & reluctance motor drives, clarendon press, T.J.E. Miller, 1989, Oxford.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA**  
**IV Year B. Tech. Electrical and Electronics Engineering – II Sem.**

**NON-CONVENTIONAL SOURCES OF ENERGY**

**(ELECTIVE-III)**

**Objective:**

It introduces solar energy its radiation, collection, storage and application. It also introduces the Wind energy, Biomass energy, Geothermal energy and ocean energy as alternative energy sources.

**UNIT – I:**

**Principles of Solar Radiation:**

Physics of the sun, the solar constant, extraterrestrial and terrestrial solar radiation, solar radiation on tilted surface, instruments for measuring solar radiation and sun shine, solar radiation data.

**UNIT-II:**

**Solar Energy Utilization.**

Flat plate and concentrating collectors, classification of concentrating collectors, orientation and thermal analysis, advanced collectors, solar applications- solar heating/cooling technique, photovoltaic energy conversion.

**UNIT-III:**

**Wind Energy:**

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

**UNIT-IV:**

**Maximum Power Extraction.**

Maximum power point tracking for wind and photovoltaic power systems, battery energy storage system.

**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, I.C.Engine operation and economic aspects.

**UNIT-VI:**

**Geothermal Energy:**

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

**UNIT-VII:**

**Ocean Energy:**

Ocean thermal energy conversion, Principles utilization, setting of Ocean thermal energy conversion 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 Direct energy conversion, Carnot cycle, limitations, principles of Direct energy conversion. Fuel cells, principles, faraday's law's, thermodynamic aspects, selection of fuels and operating conditions.

**TEXTBOOKS:**

1. Non-Conventional Energy Sources /G.D. Rai
2. Renewable Energy Technologies /Ramesh & Kumar /Narosa

**REFERENCE BOOKS:**

1. Renewable energy resources/ Tiwari and Ghosal/ Narosa.
2. Non-Conventional Energy / Ashok V Desai /Wiley Eastern.
3. Non-Conventional Energy Systems / K Mittal /Wheeler
4. Solar Energy /Sukhatme / TMH

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA**  
**IV Year B. Tech. Electrical and Electronics Engineering – II Sem.**

**DIGITAL SIGNAL PROCESSING**

**(Elective – III)**

**UNIT-I:**

**Introduction:**

Introduction to Digital Signal Processing: Discrete time signals & sequences, linear shift invariant systems, stability, and causality. Linear constant coefficient difference equations. Frequency domain representation of discrete time signals and systems.

**UNIT-II:**

**Discrete Fourier Series:**

Properties of discrete Fourier series, DFS representation of periodic sequences, Discrete Fourier transforms: Properties of DFT, linear convolution of sequences using DFT, Computation of DFT. Relation between Z-transform and DFS

**UNIT-III:**

**Fast Fourier Transforms:**

Fast Fourier transforms (FFT) - Radix-2 decimation in time and decimation in frequency FFT Algorithms, Inverse FFT, and FFT for composite N

**UNIT-IV:**

**Realization of Digital Filters:**

Review of Z-transforms, Applications of Z – transforms, solution of difference equations of digital filters, Block diagram representation of linear constant-coefficient difference equations, Basic structures of IIR systems, Transposed forms, Basic structures of FIR systems, System function,

**UNIT-V:**

**IIR Digital Filters:**

Analog filter approximations – Butter worth and Chebyshev, Design of IIR Digital filters from analog filters, Design Examples: Analog-Digital transformations

**UNIT-VI:**

**FIR Digital Filters:**

Characteristics of FIR Digital Filters, frequency response. Design of FIR Digital Filters using Window Techniques, Frequency Sampling technique,

Comparison of IIR & FIR filters.

**UNIT-VII:**

**Multirate Digital Signal Processing:**

Decimation, interpolation, sampling rate conversion, Implementation of sampling rate conversion.

**UNIT-VIII:**

**Introduction to DSP Processors:**

Introduction to programmable DSPs: Multiplier and Multiplier Accumulator (MAC), Modified Bus Structures and Memory Access schemes in DSPs Multiple access memory, multiport memory, VLSI Architecture, Pipelining, Special addressing modes, On-Chip Peripherals. Architecture of TMS 320C5X- Introduction, Bus Structure, Central Arithmetic Logic Unit, Auxiliary Registrar, Index Registrar, Auxiliary Register Compare Register, Block Move Address Register, Parallel Logic Unit, Memory mapped registers, program controller, some flags in the status registers, On- chip registers, On-chip peripherals

**TEXTBOOKS:**

1. Digital Signal Processing, Principles, Algorithms, and Applications: John G. Proakis, Dimitris G. Manolakis, Pearson Education / PHI, 2007.
2. Digital Signal Processing – Alan V. Oppenheim, Ronald W. Schaffer, PHI Ed., 2006
3. Digital Signal Processing - a computer based approach, TMH, 2001, New Delhi.

**REFERENCE BOOKS:**

1. Digital Signal Processing: Andreas Antoniou, TATA McGraw Hill , 2006
2. Digital Signal Processing: MH Hayes, Schaum's Outlines, TATA McGraw Hill, 2007.
3. DSP Primer - C. Britton Rorabaugh, Tata McGraw Hill, 2005.
4. Fundamentals of Digital Signal Processing using Matlab – Robert J. Schilling, Sandra L. Harris, Thomson, 2007.
5. Digital Signal Processors – Architecture, Programming and Applications,, B. Venkataramani, M. Bhaskar, TATA McGraw Hill, 2002.



**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA**  
**IV Year B. Tech. Electrical and Electronics Engineering – II Sem.**

**FLEXIBLE ALTERNATING CURRENT TRANSMISSION SYSTEMS**  
**(FACTS)**

**(Elective – III)**

**Unit-I:**

**Introduction:**

Transmission interconnections, power flow in an AC System, loading capability limits, Power flow and Dynamic stability considerations, importance of controllable parameters.

**Unit-II:**

**Basics of FACTS:**

Opportunities for FACTS, basic types of FACTS controllers, benefits from FACTS controllers, Requirements and Characteristics of High Power devices – Voltage and Current rating, losses and speed of switching, parameter trade-off of devices.

**Unit-III:**

**VSC Based Converters:**

Basic concept of Voltage source converter, Single phase full wave bridge converter, Single phase-leg (pole) operation, Square-wave voltage harmonics for a single phase Bridge, 3 Phase full wave bridge converter, basic concept of current source converters, comparison of current source converters with voltage source converters.

**Unit-IV:**

**Shunt Converters:**

Objectives of shunt compensation, mid-point voltage regulation for line segmentation, End of line voltage support to prevent voltage instability, improvement of transient stability, Power oscillation damping.

**Unit-V:**

**Var Controllers:**

Methods of controllable var generation: variable impedance type static var generators – TCR and TSR, TSC, FC-TCR, TSC-TCR, switching converter type var generators, hybrid var generators.

**Unit-VI:**

**Shunt Controllers:**

SVC and STATCOM: The regulation and slope transfer function and dynamic performance, transient stability enhancement and power oscillation damping, operating point control and summary of compensation control.

**Unit VII:**

**Series Controllers:**

Static series compensators: Concept of series capacitive compensation, improvement of transient stability, power oscillation damping, functional requirements. GTO thyristor controlled series capacitor (GSC), thyristor switched series capacitor (TSSC), and thyristor controlled series capacitor (TCSC), control schemes for GSC, TSSC and TCSC.

**Unit-VIII:**

**Combined Controllers:**

UPFC: Basic Operating Principles, IPFC: Basic Operating Principles and Characteristics

**TEXTBOOKS:**

1. “Understanding FACTS” N.G.Hingorani and L.Guygi, IEEE Press. Indian Edition is available:—Standard Publications, 2001.
2. “Flexible a c transmission system (FACTS)” Edited by YONG HUE SONG and ALLAN T JOHNS, Institution of Electrical Engineers, London.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA**  
**IV Year B. Tech. Electrical and Electronics Engineering – II Sem.**

**OOPS THROUGH JAVA**

**(Elective IV)**

**UNIT - I:**

**Basic of Object Oriented Programming (OOP) :**

Need for OO paradigm, A way of viewing world - Agents, responsibility, messages, methods, classes and instances, class hierarchies (Inheritance), method binding, overriding and exceptions, summary of oop concepts, coping with complexity, abstraction mechanisms.

**UNIT - II:**

**Java Basics :**

Data types, variables, scope and life time of variables, arrays, operators, expressions, control statements, type conversion and casting, simple java program, classes and objects - concepts of classes, objects, constructors, methods, access control, this keyword, garbage collection, overloading methods and constructors, parameter passing, recursion, string handling.

**UNIT - III:**

**Inheritance :**

Hierarchical abstractions, Base class object, subtype, substitutability, forms of inheritance - specialization, specification, construction, extension, limitation, combination, benefits of inheritance, costs of inheritance. Member access rules, super uses, using final with inheritance, polymorphism, abstract classes.

**UNIT - IV:**

**Packages and Interfaces :**

Defining, Creating and Accessing a Package, Understanding CLASSPATH, importing packages, differences between classes and interfaces, defining an interface, implementing interface, applying interfaces, variables in interface and extending interfaces.

**UNIT - V:**

**Exception handling and Multithreading :**

Concepts of exception handling, benefits exception handling, Termination or presumptive models, exception hierarchy, usage of try, catch, throw, throws and finally, built in exceptions, creating own exception sub classes. Differences between multi threading and multitasking, thread life cycle, creating threads, synchronizing threads, daemon threads, thread groups.

**UNIT - VI:****Applets :**

Concepts of Applets, differences between applets and applications, life cycle of an applet, types of applets, creating applets, passing parameters to applets. Applet to applet communication, secure applet.

**UNIT - VII:****Event Handling :**

Events, Event sources, Event classes, Event Listeners, Delegation event model, handling mouse and keyboard events, Adapter classes, inner classes. The AWT class hierarchy, user interface components - labels, button, canvas, scrollbars, text components, check box, check box groups, choices, lists panels - scrollpane, dialogs, menubar, graphics, layout manager - layout manager types - boarder, grid, flow, card and grid bag.

**UNIT - VIII:****Swings :**

Intruction, limitations of AWT, MVC architecture, components, containers, exploring swing - J Applet, J Frame and J Component, Icons and Labels, text fields, buttons - The JButton class, check boxes, Radio buttons, Combo boxes, Tabbed Panes, Scroll Panes, Trees and Tables.

**TEXT BOOKS :**

1. Java : The complete reference, 7/e, Herbert schildt, TMH.
2. Java : How to Program, 8/e, Dietal, Dietal, PHI

**REFERENCE BOOKS :**

1. Learn Object Oriented Programming using Java, Venkateswarlu, E V Prasad, S. Chand.
2. Programming in Java2, Dr K Soma Sundaram, JAICO Publishing house.
3. Object Oriented Programming through Java, P. Radha Krishna, University Press.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

IV Year B. Tech. Electrical and Electronics Engineering – II Sem.

**UNIX AND SHELL PROGRAMMING**

**(Elective IV)**

**UNIT - I:**

Introduction to Unix :- Architecture of Unix, Features of Unix, Unix Commands - PATH, man, echo, printf, script, passwd, uname, who date, stty, pwd, cd, mkdir, rmdir, ls, cp, mv, rm, cat, more, wc, lp, od, tar, gzip.

**UNIT - II:**

Unix Utilities : Introduction to unix file system, vi editor, file handling utilities, security by file permissions, process utilities, disk utilities, networking commands, unlink, du, df, mount, umount, find, unmount, ulimit, ps, w, finger, arp, ftp, telnet, rlogin. Text processing utilities and backup utilities, detailed commands to be covered are tail, head, sort, nl, uniq, grep, egrep, fgrep, cut, paste, join, tee, pg, comm, cmp, diff, tr, awk, cpio.

**UNIT - III:**

**Introduction to Shells :**

Unix Session, Standard Streams, Redirection, Pipes, Tee Command, Command Execution, Command - Line Editing, Quotes, Command Substitution, Job Control, Aliases, Variables, Predefined Variables, Options, Shell/Environment Customization.

**Filters :**

Filters and Pipes, Concatenating files, Display Beginning and End of files, Cut and Paste, Sorting, Translating Characters, Files with Duplicate Lines, Count characters, Words or Lines, Comparing Files.

**UNIT - IV:**

**Grep :**

Operation, grep Family, Searching for File Content.

**Sed :**

Scripts, Operation, Addresses, Commands, Applications, grep and sed.

**UNIT - V:**

**awk :**

Execution, Fields and Records, Scripts, Operations, Patterns, Actions, Associative Arrays, String Functions, String Functions, Mathematical Functions, User - Defined Functions, Using System commands in awk, Applications, awk and grep, sed and awk.

**UNIT - VI:**

**Interactive Korn Shell :**

Korn Shell Features, Two Special Files, Variables, Output, Input, Exit Status of a Command, eval Command, Environmental Variables, Options, Startup Scripts, Command History, Command Execution Process.

**Korn Shell Programming :**

Basic Script concepts, Expressions, Decisions : Making Selections, Repetition, Special Parameters and Variables, Changing Positional Parameters, Argument Validation, Debugging Scripts, Script Examples.

**UNIT - VII :**

**Interactive C Shell :**

C Shell features, Two Special Files, Variables, Output, Input, Exit Status of a Command, eval Command, Environmental Variables, On-Off Variables, Startup and Shutdown Scripts, Command History, Command Execution Scripts.

**C Shell Programming :**

Basic Script concepts, Expressions, Decisions : Making Selections, Repetition, Special Parameters and Variables, changing Positional Parameters, Argument Validation, Debugging Scripts, Script Examples.

**UNIT - VIII :**

**File Management :**

File Structure, System Calls for File Management - create, open, close, read, write, lseek, link, symlink, unlink, stat, fstat, lstat, chmod, chown, Directory API - opendir, readdir, closedir, mkdir, rmdir, umask.

**TEXT BOOKS :**

1. Unix and shell Programming Behrouz A. Forouzan, Richard F. Gilberg, Thomson.
2. Your Unix the ultimate guide, Sumitabha Das, TMH, 2nd Edition, 2007-2008 Page 34 or 95.

**REFERENCES :**

1. Unix for programmers and users, 3rd edition, Graham Class, King Ables, Pearson Education.
2. Unix programming environment, Kernighan and Pike, PHI / Pearson Education.
3. The Complete Reference Unix, Rosen, Host, Klee, Farber, Rosinski, Second Edition, TMH.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA**  
**IV Year B. Tech. Electrical and Electronics Engineering – II Sem.**

**ARTIFICIAL INTELLEAGENT TECHNIQUES**  
**(Elective IV)**

**UNIT-I:**

**Introduction to AI Techniques**

Introduction, Humans and Computers, -knowledge representation-learning process-learning tasks, Methods of AI techniques

**Unit-II:**

**Neural Networks**

Organization of the Brain, Biological Neuron, Biological and Artificial Neuron Models. Introduction-neural network models-architectures, Perceptron Models: Discrete, Continuous and Multi-Category, Training Algorithms: Discrete and Continuous Perceptron Networks, Perceptron Convergence theorem, Limitations of the Perceptron Model, Applications.

**Unit-III:**

**ANN paradigm**

Back propagation-RBF algorithms-Hope field networks.

**Unit-IV:Genetic Algorithms**

Introduction-encoding-fitness function-reproduction operators

**Unit-V:**

**Genetic Modeling**

Genetic operators-cross over and mutation-generational cycle-convergence of genetic algorithm

**Unit – VI:**

**Classical and Fuzzy Sets**

Introduction to classical sets - properties, Operations and relations; Fuzzy sets, Membership, Uncertainty, Operations, properties, fuzzy relations, cardinalities, membership functions.

**Unit-VII:**

**Fuzzy Logic System Components**

Fuzzification, Membership value assignment, development of rule base and decision making system, Defuzzification to crisp sets, Defuzzification methods.

**Unit-VIII:****Application of AI techniques**

load forecasting-load flow studies-economic load dispatch-load frequency control-reactive power control-speed control of dc and ac motors

**TEXT BOOK:**

1. Neural Networks, Fuzzy logic, Genetic algorithms: synthesis and applications by S.Rajasekaran and G.A. Vijayalakshmi Pai – PHI Publication.
2. Introduction to Artificial Neural Systems - Jacek M. Zuarda, Jaico Publishing House, 1997.

**REFERENCE BOOK:**

1. Neural Networks, Algorithms, Applications and programming Techniques by James A. Freeman, David M. Skapura.
2. Introduction to Neural Networks using MATLAB 6.0 by S N Sivanandam, S Sumathi, S N Deepa, TMGH.



