ACADEMIC REGULATIONS
COURSE STRUCTURE
AND
DETAILED SYLLABUS

XIV

MECHANICAL 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.

S. No.	Branch Code	Branch Abbreviation
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 pres**cri**bed 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:

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

(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

	Nature of Malpractices/Improper conduct	Punishment
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

		remaining examinations of the subjects of that Semester/year. The Hall Ticket of the candidate is to be cancelled and sent to the University.
3	If the candidate impersonates any other candidate in connection with the examination.	The candidate who has impersonated shall be expelled from examination hall. The candidate is also debarred and forfeits the seat. The performance of the original candidate, who has been impersonated, shall be cancelled in all the subjects of the examination (including 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.

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   :   Convenor

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, KAKINADA
MECHANICAL 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	Environmental Studies	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
	Total			**20**

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	Mathematical Methods	3	-	2
7	Engineering Physics & Engineering Chemistry Laboratory -II	-	3	2
8	English - Communication Skills Lab - 2	-	3	2
9	IT Workshop	-	3	2
	Total			**18**

II YEAR   **I SEMESTER**

S. No.	Subject	T	P	Credits
1	Engineering Mechanics	4	-	4
2	Fluid Mechanics & Hydraulic Machinery	4	-	4
3	Thermodynamics	4	-	4
4	Managerial Economics & Financial Analysis	4	-	4
5	Electrical & Electronics Engineering	4	-	4
6	Computer aided Engineering Drawing Practice	6	-	4
7	Electrical & Electronics Engg. Lab	-	3	2
8	Fluid Mechanics & Hydraulic Machinery Lab	-	3	2
9	English Communication Practice-1	-	2	1
10	Professional Ethics &Morals - I	2	-	-
	Total			**29**

II YEAR   **II SEMESTER**

S. No.	Subject	T	P	Credits
1	Kinematics of Machinery	4	-	4
2	Thermal Engineering -I	4	-	4
3	Production Technology	4	-	4
4	Mechanics of Solids	4	-	4
5	Metallurgy & Materials Science	4	-	4
6	Machine Drawing	6	-	4
7	Mechanics of Solids & Metallurgy lab	-	3	2
8	Production Technology Lab	-	3	2
9	English Communication Practice-2	-	2	1
10	Professional Ethics &Morals - II	2	-	-
	Total			**29**

III YEAR   **I SEMESTER**

S. No.	Subject	T	P	Credits
1	Dynamics of Machinery	4	-	4
2	Metal Cutting & Machine Tools	4	-	4
3	Design of Machine Members–I	4	-	4
4	Finite Element Methods	4	-	4
5	Thermal Engineering -II	4	-	4
6	Operations Research	4	-	4
7	Thermal Engineering Lab	-	3	2
8	Machine Tools Lab	-	3	2
9	IPR & Patent - I	2	-	-
	Total			**28**

III YEAR   **II SEMESTER**

S. No.	Subject	T	P	Credits
1	Metrology	4	-	4
2	Instrumentation & Control Systems	4	-	4
3	Design of Machine Members– II	4	-	4
4	Robotics	4	-	4
5	Heat Transfer	4	-	4
6	Industrial Engg. & Management	4	-	4
7	Metrology & Instrumentation Lab	-	3	2
8	Heat Transfer Lab	-	3	2
9	IPR & Patent - II	2	-	-
	Total			**28**

IV YEAR   **I SEMESTER**

S. No.	Subject	T	P	Credits
1	Refrigeration & Air Conditioning	4	-	4
2	CAD/CAM	4	-	4
3	Alternative Sources of Energy	4	-	4
4	Unconventional Machining Processes	4	-	4
5	Open Elective	4	-	4
6	Departmental Elective – I	4	-	4
7	Simulation Lab	-	3	2
8	Advanced Communication skills Lab	-	3	2
	Total			**28**

IV YEAR   **II SEMESTER**

S. No.	Subject	T	P	Credits
1	Interactive Computer Graphics	4	-	4
2	Departmental Elective – II	4	-	4
3	Departmental Elective – III	4	-	4
4	Departmental Elective – IV	4	-	4
5	Project Work			12
	Total			**28**

DEPARTMENTAL ELECTIVE- I	DEPARTMENTAL ELECTIVE- II
1. Automobile Engineering 2. Computational Fluid Dynamics 3. Condition Monitoring 4. Rapid Prototyping	1. Metal Corrosion 2. Nanotechnology 3. Automation in Manufacturing 4. Industrial Hydraulics & Pneumatics
DEPARTMENTAL ELECTIVE- III	**DEPARTMENTAL ELECTIVE-IV**
1. Non Destructive Evaluation 2. DBMS 3. Advanced Materials 4. Power Plant Engineering	1. Production Planning and Control 2. Advanced Optimization Techniques 3. Gas Dynamics & Jet Propulsion 4. Quality and Reliability Engineering
OPEN ELECTIVE 1. MEMS 2. Industrial Robotics(Except for Mechanical Students)	

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA
I Year B. Tech Mechanical 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**

Chapter / Grammar & vocabulary	Reading & comprehension	Listening & speaking	Core skills and personal attributes developed through the exercises	Objectives achieved through the exercises	Plan of evaluation
	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.	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.			A three-tier system, allowing the student to work through self-assessment, assessment by peers, and finally, assessment by the teacher.

Chapter – 1 .Read & Proceed The importance of the language used for communication: •Understanding the need for English in the wider world, and the opportunities afforded by a strong command of the language •Assessing one's level within the language, and understanding the ways in which grasp of the language can be bettered •Understanding the basic structure of the sentence. **English: subject – verb – object - *Functional grammar exercise:*** 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-	Short extracts from: 1.An interview with Arundhati Roy 2.Jawaharlal Nehru's 'Tryst with Destiny' speech 3.Albert Einstein's essay 'The World As I See It'	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)	**Small conversations between :** 1.A student and a hostel warden 2.An interviewer and an interviewee 3.Two friends together preparing for an oral examination at college	Communication teamwork, problem solving, learning skills	Enhanced learner-participation, development of linguistic proficiency	Both Teacher's Manual and Sample Test Questions will be provided]

				Communication, adaptability, sense of humour, reliability,	Functional approach to finding solutions, enhanced learner-participation, development of linguistic proficiency
					[Both Teacher's Manual and Sample Test Questions will be provided]
terview? Or make an official presentation in a State that does not use Telugu? Or even find their way in an unfamiliar city? **Possible areas of focus and evalua-tion:** •Making sentences from given keywords •Correcting the order of words to make sen-tences, noting how change in word order can affect meaning.					
Chapter 2. Travel Nouns, pronouns, and adjectives: •Understanding the kinds and uses of nouns •Understanding the use of pronouns to re-place nouns •Understanding the ways in which nouns are qualified through adjectives	Reading and analysis of short extracts from two or more of the following: 1.Vikram Seth, From Heaven Lake 2.Ruskin Bond, Landor Days 3.Rabindranath Tagore, The Europe Traveller's Diary 4.Pankaj Mishra, Butter Chicken in	Paragraphs Understanding the structure of a para-graph; retaining the thread of an argu-ment; introducing the subject of the para-graph in the initial sentence; developing the argument in the next few sentences; drawing to a conclu-sion by reinforcing	**Snippets of exchanges between:** 1 A tour guide and tourist 2. A local inhabitant of a city and a visitor		

	Ludhiana	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	3 A photographer and her friend, with the photographer telling bout the laces of interest she has been to in her recent travelS
• Understanding the kinds of adjectives, their degrees and their uses ***Functional grammar exercise:*** 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 those words are then 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			

tion? *Potential areas of focus and evaluation:* •Changing nouns to the related adjectives •Changing adjectives to the related nouns •Replacing nouns with pronouns while retaining the meaning of the sentence					
Chapter 3. Gender Verbs and adverbs: •Understanding the placement of a verb within a sentence •Understanding tenses •Understanding the use of adverbs to describe verbs *Functional grammar exercise:* Students may be asked to consider recent news headlines for re-markable stories in-volving women. How are either the events or the women remark	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 astronautKalpana Chawla's achieve-ment 3.The inspirational story of a young woman who survived	Essays and arguments Understanding that an essay or argument is a descriptive or persua-sive piece of writing that needs to be orga-nized as a succession of paragraphs; intro-ducing the chief con-cerns in the first para-graph, and providing a layout of how the argument is going to be structured; develop-ing the main thrust of the argument in the succeeding paragraphs; making smooth tran **Short exchanges between:** 1.Two friends, on an issue of contempo-rary interest 2.A reporter and a talk-show guest 3. A teacher and a student in school	Communication, teamwork, commit-ment, integrity, self-motivation, self-esteem	Enhanced learner-participa-tion, develop-ment of linguistic profi-ciency, develop-ment of critical thinking	[Both Teacher's Manual and Sample Test Questions will be provided]

	sitions between ideas and paragraphs(using appropriate connecting words or phrases); winding to a conclusion by drawing the various strings of the argument together
child-marriage 4.Sudha Murthy's write on what it is possible for women to achieve	
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? *Potential areas of focus and evaluation:* •Changing verbs to the related adverbs •Changing adverbs to the related verbs •Using verbs in their correct tenses, deriving the sense from the rest of the sentence.	

Chapter 4. Disaster Management	Reading and analysis of a short piece on the tsunami	Official letters and emails	Dialogues between:	Communication, teamwork, problem solving, adaptability, stress management, reliability, integrity	Enhanced learner-participation, development of linguistic proficiency, functional approach to problem solving, enabling group work	[Both Teacher's Manual and Sample Test Questions will be provided]
Articles and punctuation: • Understanding the uses of 'a', 'an', and 'the' • Understanding the uses of words/phrases expressing quantity, like 'some', 'a bit of', 'more', etc. • Understanding and using correct punctuation to convey meaning *Functional grammar exercise:* 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		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	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			

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?					
Chapter 5 –Health Prepositions, conjunctions and exclamations: •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	Reading and analysis of three different kinds of writing, and comparisons between them: 1.A Government of India report on the success of documenting 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 life-long exercise	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	**Brief exchanges between:** 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	Personal presentation, stress-management, commitment, enthusiasm., self-motivation	Development of linguistic proficiency, functional approach to problem solving	[Both Teacher's Manual and Sample Test Questions will be provided]

Functional grammar exercise: Students may be asked to propose ways in which healthier living might be attained – eating better *and* exercising, drinking plenty *of* water, partaking fresh vegetables *from* the Market, and so on. Possible exercises may be framed around: •Filling in blanks within sentences •Distinguishing between different meanings possible through the use of different prepositions with the same verbs	

Chapter 6 Sports : 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. *Functional grammar exercise:* 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	Reading and analysis of two of four short pieces in depiction of: 1. Opportunities for men and women in sports 2. A decisive moment in a game 3. Expectation and failure 4. The attitude of sportsmanship	Presentations 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	Small conversations between: 1. A fitness instructor and a trainee 2. Two friends discussing a possible career in sports 3. Two friends discussing their favorite game	Teamwork, integrity, self-motivation, self-esteem, commitment	Development of linguistic proficiency, functional approach to problem solving	[Both Teacher's Manual and Sample Test Questions will be provided]

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.

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 Mechanical 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.

TEXT BOOKS:

1. **'A Text Book of Engineering Mathematics – I',** 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 Mechanical Engineering Engineering – I Sem.

ENGINEERING PHYSICS -1

UNIT-1

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 1] 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 Mechanical 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 DIAGRAMS)

2.   OSMOSIS &REVERSE OSMOSIS

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

3.   LECHATELIERS PRINCIPLE —

Definition of Chemical Equilibrium, Factors influence the Chemical Equilibrium, Statement and explanation of Lechateliers 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. **FLUORESENCE&PHOSPHORESENCE— LUMINISCENT 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. **NUCLEARMAGNETICRESONANCE(NMR)**:

   Principle –Few Electronic applications

UNIT-IV

1. **SUPERCONDUCTIVTY** –

   Definition-Preparation –Properties –Engineering Applications

2. **SEMICONDUCTORS**-

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

3. **STORAGEDEVICES -**

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

4. **LIQUIDCRYSTALS** -

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

UNIT – V

THERMALENERGY- 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 – Nernest 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

TEXT BOOK :

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

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

I Year B. Tech Mechanical 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 Mechanical Engineering – I 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 andecosystem 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-sports 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.

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 cosystemspond, 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 Mechanical 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 Phaysics 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 (111),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 STANDRDS.

- 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, Temprature 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 Mechanical Engineering – I Sem.

ENGINEERING WORKSHOP

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

Trade:

Carpentry	1. T-Lap Joint
	2. Cross Lap Joint
	3. Dovetail Joint
	4. Mortise and Tennon Joint
Fitting	1. V- Fit
	2. Square Fit
	3. Half Round Fit
	4. Dovetail Fit
Black Smithy	1. Round rod to Square
	2. S-Hook
	3. Round Rod to Flat Ring
	4. Round Rod to Square headed bolt
House Wiring	1. Parallel / Series Connection of three bulbs
	2. Stair Case wiring
	3. Florescent Lamp Fitting
	4. Measurement of Earth Resistance
Tin Smithy	1. Taper Tray
	2. Square Box without lid
	3. Open Scoop
	4. Funnel

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

I Year B. Tech Mechanical 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 l

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:

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^2). 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 form 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:

$$1+x+x^2+x^3+\ldots\ldots..+x^n$$

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 Mechanical Engineering – I Sem.

ENGLISH - COMMUNICATION SKILLS LAB -1

UNIT-1

Section -A   Hello, I'm…..

Section –B   Practicing Sounds

UNIT – 2

Section –A   I Would Love to …..but

Section – B   practicing Sounds

UNIT -3

Section-A   With your permission I would to …

Section-B   Practicing Sounds

UNIT-4

Section-A   Why don't we………..

Section-B   Practicing Sounds

UNIT-5

Section-A   Could you Please……..

Section-B   practicing Sounds

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

I Year B. Tech Mechanical 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.

TEXT BOOK:

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 Mechanical 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 - Orgin 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 prepation 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 Mechanical 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 ,Properities,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

NANO MATERIALS

Introduction to Nano materials-preparation of few Nano materials(Carbon Nano Tubes,Fullerenes etc)-Properities 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

TEXT BOOK :

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

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

I Year B. Tech Mechanical 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.

TEXT BOOK:

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

REFERENCE BOOKS:

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 Mechanical Engineering – II Sem.

MATHEMATICAL METHODS

UNIT – I

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

TEXT BOOK :

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 Mechanical Engineering – II Sem.

ENGINEERING PHYSICS & CHEMISTRY LABORATORY- II

PHYSICS:

Electro-Magnetism and Electronics:

1. Determine the Planck's constant using Photo-Cell.

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 (l/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 Phaysics 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 BIO FUELS

The teacher has to perform the transesterfication 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 desigened 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 Mechanical 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 Mechanical 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. Mech. Engg. I-Sem.

ENIGINEERING MECHANICS

UNIT – I

Introduction to Engg. Mechanics – Basic Concepts.

Systems of Forces : Coplanar Concurrent Forces – Components in Space – Resultant – Moment of Force and its Application – Couples and Resultant of Force Systems.

UNIT – II

Equilibrium of Systems of Forces: Free Body Diagrams, Equations of Equilibrium of Coplanar Systems, Spatial Systems for concurrent forces. Lamis Theorm, Graphical method for the equilibrium of coplanar forces, Converse of the law of Triangle of forces, converse of the law of polygon of forces condition of equilibrium.

UNIT – III

Centroid : Centroids of simple figures (from basic principles) – Centroids of Composite Figures

Centre of Gravity: Centre of gravity of simple body (from basis principles), centre of gravity of composite bodies, pappus theorem.

UNIT – IV

Area moments of Inertia : Definition – Polar Moment of Inertia, Transfer Theorem, Moments of Inertia of Composite Figures, Products of Inertia, Transfer Formula for Product of Inertia. **Mass Moment of Inertia:** Moment of Inertia of Masses, Transfer Formula for Mass Moments of Inertia, mass moment of inertia of composite bodies.

UNIT – V

Analysis of perfect frames (Analytical Method) – Types of Frames – Assumptions for forces in members of a perfect frame, Method of joints, Method of sections, Force table, Cantilever Trusses, Structures with one end hinged and the other freely supported on rollers carrying horizontal or inclined loads.

UNIT – VI

Kinematics: Rectilinear and Curvelinear motions – Velocity and Acceleration – Motion of Rigid Body – Types and their Analysis in Planar Motion. **Kinetics:** Analysis as a Particle and Analysis as a Rigid Body in Translation – Central Force Motion – Equations of Plane Motion – Fixed Axis Rotation – Rolling Bodies.

UNIT – VII

Work – Energy Method: Equations for Translation, Work-Energy Applications to Particle Motion, Connected System-Fixed Axis Rotation and Plane Motion. Impulse momentum method.

UNIT – VIII

Friction: Introduction**,** limiting friction and impending motion, coulomb's laws of dry friction, coefficient of friction, cone of friction. Applications of friction- impending motion of connected bodies, relative motion, ladder friction, wedges, screw friction.

TEXT BOOKS:

1.   Engg. Mechanics, Timoshenko & Young.

2.   Engg. Mechanics, R.K. Bansal , Laxmi publications

REFERENCE BOOKS:

1.   Engineering Mechanics, Fedinand . L. Singer, Harper – Collins.

2.   Engineering Mechanics statics and dynamics , A Nelson , Mc Gra Hill publications

3.   Engg. Mechanics Umesh Regl, Tayal.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

II Year B.Tech. Mech. Engg. I-Sem.

FLUID MECHANICS AND HYDRAULIC MACHINERY

UNIT I

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

UNIT II

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

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

UNIT III

Closed conduit flow: Reynold's experiment- Darcy Weisbach equation- Minor losses in pipes- pipes in series and pipes in parallel- total energy line- hydraulic gradient line.

Measurement of flow: 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 done 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

TEXT BOOKS:

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 Durgaiah, New Age International.

3. Hydraulic Machines by Banga & Sharma, Khanna Publishers.

4. Instrumentation for Engineering Measurements by James W. Dally, William E. Riley, John Wiley & Sons Inc. 2004 (Chapter 12 – Fluid Flow Measurements)

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

II Year B.Tech. Mech. Engg. I-Sem.

THERMODYNAMICS

UNIT – I

Introduction: Basic Concepts : System, Control Volume, Surrounding, Boundaries, Universe, Types of Systems, Macroscopic and Microscopic viewpoints, Concept of Continuum, Thermodynamic Equilibrium, State, Property, Process, Cycle – Reversibility – Quasi – static Process, Irreversible Process, Causes of Irreversibility – Energy in State and in Transition, Types, Work and Heat, Point and Path function.

UNIT II

Zeroth Law of Thermodynamics – Concept of Temperature – Principles of Thermometry – Reference Points – Const. Volume gas Thermometer – Scales of Temperature, Ideal Gas Scale – PMM I - Joule's Experiments – First law of Thermodynamics – Corollaries – First law applied to a Process – applied to a flow system – Steady Flow Energy Equation.

UNIT – III

Limitations of the First Law – Thermal Reservoir, Heat Engine, Heat pump, Parameters of performance, Second Law of Thermodynamics, Kelvin-Planck and Clausius Statements and their Equivalence / Corollaries, PMM of Second kind, Carnot's principle, Carnot cycle and its specialties, Thermodynamic scale of Temperature, Clausius Inequality, Entropy, Principle of Entropy Increase – Energy Equation, Availability and Irreversibility – Thermodynamic Potentials, Gibbs and Helmholtz Functions, Maxwell Relations – Elementary Treatment of the Third Law of Thermodynamics.

UNIT - IV

Pure Substances, p-V-T- surfaces, T-S and h-s diagrams, Mollier Charts, Phase Transformations – Triple point at critical state properties during change of phase, Dryness Fraction – Clausius – Clapeyron Equation Property tables. Mollier charts – Various Thermodynamic processes and energy Transfer – Steam Calorimetry.

UNIT - V

Perfect Gas Laws – Equation of State, specific and Universal Gas constants – various Non-flow processes, properties, end states, Heat and Work

Transfer, changes in Internal Energy – Throttling and Free Expansion Processes – Flow processes – Deviations from perfect Gas Model – Vander Waals Equation of State – Compressibility charts – variable specific Heats – Gas Tables.

UNIT – VI

Mixtures of perfect Gases – Mole Fraction, Mass friction Gravimetric and volumetric Analysis – Dalton's Law of partial pressure, Avogadro's Laws of additive volumes – Mole fraction , Volume fraction and partial pressure, Equivalent Gas const. And Molecular Internal Energy, Enthalpy, sp. Heats and Entropy of Mixture of perfect Gases and Vapour, Atmospheric air - Psychrometric Properties – Dry bulb Temperature, Wet Bulb Temperature, Dew point Temperature, Thermodynamic Wet Bulb Temperature, Specific Humidity, Relative Humidity, saturated Air, Vapour pressure, Degree of saturation – Adiabatic Saturation , Carrier's Equation – Psychrometric chart.

UNIT - VII

Power Cycles : Otto, Diesel, Dual Combustion cycles, Sterling Cycle, Atkinson Cycle, Ericcson Cycle, Lenoir Cycle – Description and representation on P–V and T-S diagram, Thermal Efficiency, Mean Effective Pressures on Air standard basis – comparison of Cycles.

UNIT VIII

Refrigeration Cycles: Brayton and Rankine cycles – Performance Evaluation – combined cycles, Bell- Coleman cycle, Vapour compression cycle-performance Evaluation.

TEXT BOOKS:

1.   Engineering Thermodynamics, PK Nag, TMH, III Edition

2.   Fundamentals of Thermodynamics – Sonntag, Borgnakke and van wylen , John Wiley & sons (ASIA) Pte Ltd.

REFERENCE BOOKS:

1.   Engineering Thermodynamics – Jones & Dugan

2.   Thermodynamics – An Engineering Approach – Yunus Cengel & Boles, TMH

3.   Thermodynamics – J.P.Holman , McGrawHill

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

II Year B.Tech. Mech. Engg. 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, Mangerial Economice and Financial Analysis, New Age International Publishers, 2011.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

II Year B.Tech. Mech. Engg. I-Sem.

ELECTRICAL AND ELECTRONICS ENGINEERING
Part-A Electrical Engineering

UNIT - I

ELECTRICAL CIRCUITS: Basic definitions, Types of net work elements, Ohm's Law, Resistive networks, Kirchhoff's Laws, Inductive networks, capacitive networks, Series, Parallel circuits and Star-delta and delta-star transformations.

UNIT - II

DC MACHINES: Principle of operation of DC Generator – emf equation - types – DC motor types –torque equation – applications – three point starter.

UNIT - III

TRANSFORMERS: Principle of operation of single phase transformers – emf equation – losses –efficiency and regulation

UNIT - IV

AC MACHINES: Principle of operation of alternators – regulation by synchronous impedance method –Principle of operation of induction motor – slip – torque characteristics – applications.

TEXT BOOKS:

1. Basic Electrical Engineering by Nagsarkar,Sukhija, Oxford Publications,2nd edition

REFERENCE BOOKS:

1. Basic Electrical Engineering by M.S.Naidu and S.Kamakshiah,TMH Publications

2. Fundamentals of Electrical Engineering by Rajendra Prasad, PHI Publications,2nd edition

Part – B Electronics Engineering

UNIT V

DIODE AND ITS CHARACTERISTICS: PN Junction Diode, Symbol, V-I Characteristics, Diode Applications, Rectifiers – Half wave, Full wave and Bridge Rectifiers (Problems)

UNIT VI

TRANSISTORS: PNP and NPN Junction Transistor, Transistor as an Amplifier, Single Stage CE Amplifier, Frequency Response of CE Amplifier, Concepts of Feedback Amplifier, Necessary conditions for Oscillators, SCR Characteristics and applications

UNIT VII

INDUCTION HEATING: Theory of Induction Heating, Application to Industries

DIELECTRIC HEATING: Theory of Dielectric Heating and its Industrial Applications

ULTRASONICS: Generation, Flow detection and other Applications

UNIT-VIII

TRANSDUCERS AND MEASURING INSTRUMENTS: Principles of Strain Gauge, LVDT, Thermocouples, Thermistors, Piezo-electric transistors, CRO Principles and application, Voltage, Current and Frequency Measurements, Digital Multimeters.

TEXT BOOKS:

1. Electronic Devices and Circuits, R.L. Boylestad and Louis Nashelsky, 9th edition, PEI/PHI 2006.

2. Industrial Electronics by G.K. Mittal, PHI

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

II Year B.Tech. Mech. Engg. I-Sem.

COMPUTER AIDED ENGINEERING DRAWING PRACTICE

PART A:
UNIT – I
PROJECTIONS OF PLANES & SOLIDS: Projections of Regular Solids inclined to both planes – Auxiliary Views. Sections and Sectional views of Right Regular Solids – Prism, Cylinder, Pyramid, Cone – Auxiliary views.
UNIT – II
DEVELOPMENT AND INTERPENETRATION OF SOLIDS: Development of Surfaces of Right

Regular Solids – Prisms, Cylinder, Pyramid Cone and their parts.
Interpenetration of Right Regular Solids – Intersection of Cylinder Vs Cylinder, Cylinder Vs Prism, Cylinder Vs Cone.
UNIT – III
ISOMETRIC PROJECTIONS: Principles of Isometric Projection – Isometric Scale – Isometric Views – Conventions – Isometric Views of Lines, Plane Figures, Simple and Compound Solids – Isometric Projection of objects having non- isometric lines. Isometric Projection of Spherical Parts.
TRANSFORMATION OF PROJECTIONS: Conversion of Isometric Views to Orthographic Views – Conventions.
UNIT – IV
PERSPECTIVE PROJECTIONS: Perspective View: Points, Lines, Plane Figures and Simple Solids, Vanishing Point Methods (General Method only).
PART B:
UNIT – V
Introduction to Computer aided Drafting: Generation of points, lines, curves, polygons, dimensioning.
UNIT – VI
Types of modeling: object selection commands – edit, zoom, cross hatching, pattern filling, utility commands, 2D wire frame modeling, 3D wire frame modeling,**.**

UNIT – VII

View points and view ports: view point coordinates and view(s) displayed, examples to exercise different options like save, restore, delete ,joint , single option.

UNIT-VIII

Computer aided Solid Modeling: Isometric projections, orthographic projections of isometric projections ,Modeling of simple solids, Modeling of Machines & Machine Parts.

TEXT BOOKS:

1.   Engineering Graphics, K.C. john, PHI Publications
2.   Machine Drawing, K.LNarayana ,P. Kannaiah and K.venkata reddy / New age international publishers

REFERENCE BOOKS:

1.   Autocad 2009 , Galgotia publications , New Delhi
2.   Text book of Engineering Drawing with Auto-CAD, K.venkata reddy/ B.S. Publications.
3.   Engineering drawing by N.D Bhatt, Charotar publications.

Mode of examination for Computer Aided Engineering Graphics Practice

The syllabus in respect of the subject "Computer Aided Graphics Practice" for II B Tech I sem (Mech, Civil, Automobile, Aeronautical, Mining Engg) students consists of two major portions

Part A: Unit I to IV - conventional drawing pattern

Part B: Unit V to VIII - computer lab pattern using any drafting packages

Class work - 6 hrs per week & Credits - 4

 Max Marks - 100   Internal Marks: 25 & External Marks: 75

 It is suggested that the examination in respect of the above may conducted on par with lab by the concerned college with the following pattern:

 Mid Exam: I Mid Exam from Part A (first Four Units) - Conventional Drawing Exam

       II Mid Exam Part B (from last Four Units) - In Computer Lab

End Exam: Duration - 4 hrs

Part A - Conventional Drawing test in Drawing Hall from Part A (first FOUR Units) - 2 hrs duration.

Part B - Exam in Computer Lab using any drafting package Part B (last four units) - 2 hrs duration.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

II Year B.Tech. Mech. Engg. I-Sem.

ELECTRICAL & ELECTRONICS ENGG. LAB

PART A: Electrical Engineering Lab:

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

1. Swinburne's test on D.C. Shunt machine. (Predetermination of efficiency of a given D.C. Shunt machine working as motor and generator).

2. OC and SC tests on single phase transformer (Predetermination of efficiency and regulation at given power factors)

3. Brake test on 3-phase Induction motor (Determination of performance characteristics)

4. Regulation of alternator by Synchronous impedance method.

5. Speed control of D.C. Shunt motor by

    a) Armature Voltage control b) Field flux control method

6. Brake test on D.C Shunt Motor

Section B: Electronics Engineering:

1. Transistor CE Characteristics (Input and Output)

2. Full wave Rectifier with and without filters.

3. CE Amplifiers.

4. RC Phase Shift Oscillator

5. Class A Power Amplifier

6. Micro Processor

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

II Year B.Tech. Mech. Engg. I-Sem.

FLUID MECHANICS & HYDRAULIC MACHINERY 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. Mech. Engg. I-Sem.

(Common to All Branches)
ENGLISH COMMUNICATION PRACTICE
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, inter-personal 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. Mech. Engg. I-Sem.

'PROFESSIONAL ETHICS AND MORALS -I

UNIT- I

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- II

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- III

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- IV

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. Mech. Engg. II-Sem.

KINEMATICS OF MACHINERY

UNIT – I

MECHANISMS : Elements or Links – Classification – Rigid Link, flexible and fluid link – Types of kinematic pairs – sliding, turning, rolling, screw and spherical pairs – lower and higher pairs – closed and open pairs – constrained motion – completely, partially or successfully constrained and incompletely constrained .

Khubralrs criteria , Grashoff's law , Degrees of freedom ,Kutzbach criterian for planar mechanisms, Mechanism and machines – classification of machines – kinematic chain – inversion of mechanism – inversion of mechanism – inversions of quadric cycle, chain – single and double slider crank chains.

UNIT - II

STRAIGHT LINE MOTION MECHANISMS: Exact and approximate copiers and generated types – Peaucellier, Hart and Scott Russul – Grasshopper – Watt T. Chebicheff and Robert Mechanisms and straight line motion, Pantograph.

UNIT – III

KINEMATICS: Velocity and acceleration – Motion of link in machine – Determination of Velocity and acceleration diagrams – Graphical method – Application of relative velocity method four bar chain.

Analysis of Mechanisms: Analysis of slider crank chain for displacement, velocity and acceleration of slider – Acceleration diagram for a given mechanism, Kleins construction, Coriolis acceleration, determination of Coriolis component of acceleration.

Plane motion of body : Instantaneous center of rotation, centroids and axodes – relative motion between two bodies – Three centres in line theorem – Graphical determination of instantaneous centre, diagrams forsimple mechanisms and determination of angular velocity of points and links.

UNIT – IV

STEERING Mechanisms: Conditions for correct steering – Davis Steering gear, Ackermans steering gear – velocity ratio.

HOOKE'S JOINT: Single and double Hooke's joint – Universial coupling – application – problems.

UNIT – V

CAMS: Definitions of cam and followers – their uses – Types of followers and cams – Terminology –Types of follower motion - Uniform velocity – Simple harmonic motion and uniform acceleration. Maximum velocity and maximum acceleration during outward and return strokes in the above 3 cases.

Analysis of motion of followers: Roller follower – circular cam with straight, concave and convex flanks.

UNIT – VI

Gears: Higher pairs, friction wheels and toothed gears – types – law of gearing, condition for constant velocity ratio for transmission of motion, Form of teeth: cycloidal and involute profiles. Velocity of sliding – phenomena of interferences – Methods of interference. Condition for minimum number of teeth to avoid interference, expressions for arc of contact and path of contact – Introduction to Helical, Bevel and worm gearing.

UNIT – VII

Belt Rope and Chain Drives : Introduction, Belt and rope drives, selection of belt drive- types of belt drives, V-belts, materials used for belt and rope drives, velocity ratio of belt drives, slip of belt, creep of belt, tensions for flat belt drive, angle of contact, centrifugal tension, maximum tension of belt, Chains- length, angular speed ratio, classification of chains.

UNIT – VIII

GEAR TRAINS: Introduction – Train value – Types – Simple and reverted wheel train – Epicyclic gear Train. Methods of finding train value or velocity ratio – Epicyclic gear trains. Selection of gear box-Differential gear for an automobile.

TEXT BOOKS:

1. Theory of Machines by Thomas Bevan/ CBS
2. Theory of machines – PL. Balaney/khanna publishers.

REFERENCE BOOKS:

1. Theory of Machines Sadhu Singh Pearsons Edn
2. The theory of Machines /Shiegley/ Oxford.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

II Year B.Tech. Mech. Engg. II-Sem

THERMAL ENGINEERING - I

UNIT – I

Actual Cycles and their Analysis: Introduction, Comparison of Air Standard and Actual Cycles, Time Loss Factor, Heat Loss Factor, Exhaust Blowdown- Loss due to Gas exchange process, Volumetric Efficiency. Loss due to Rubbing Friction, Actual and Fuel-Air Cycles of CI Engines.

UNIT-II

I.C. ENGINES : Classification - Working principles, Valve and Port Timing Diagrams, Air – Standard, air-fuel and actual cycles - Engine systems – Fuel, Carburetor, Fuel Injection System, Ignition, Cooling and Lubrication, principle of wankle engine.

UNIT – III

Combustion in S.I. Engines : Normal Combustion and abnormal combustion – Importance of flame speed and effect of engine variables – Type of Abnormal combustion, pre-ignition and knocking (explanation of) – Fuel requirements and fuel rating, anti knock additives – combustion chamber – requirements, types.

UNIT IV

Combustion in C.I. Engines : Four stages of combustion – Delay period and its importance – Effect of engine variables – Diesel Knock– Need for air movement, suction, compression and combustion induced turbulence – open and divided combustion chambers and nozzles used – fuel requirements and fuel rating.

UNIT – V

Testing and Performance: Parameters of performance - measurement of cylinder pressure, fuel

consumption, air intake, exhaust gas composition, Brake power – Determination of frictional losses and indicated power – Performance test – Heat balance sheet and chart.

UNIT – VI

COMPRESSORS – Classification –positive displacement and roto dynamic

machinery – Power producing and power absorbing machines, fan, blower and compressor – positive displacement and dynamic types – reciprocating and rotary types.

Reciprocating: Principle of operation, work required, Isothermal efficiency volumetric efficiency and effect of clearance, stage compression, undercooling, saving of work, minimum work condition for stage compression.

UNIT VII

Rotary (Positive displacement type): Roots Blower, vane sealed compressor, Lysholm compressor – mechanical details and principle of working – efficiency considerations.

Dynamic Compressors: Centrifugal compressors: Mechanical details and principle of operation – velocity and pressure variation. Energy transfer-impeller blade shape-losses, slip factor, power input factor, pressure coefficient and adiabatic coefficient – velocity diagrams – power.

UNIT-VIII

Axial Flow Compressors: Mechanical details and principle of operation – velocity triangles and energy transfer per stage degree of reaction, work done factor - isentropic efficiency- pressure rise calculations – Polytropic efficiency.

TEXT BOOKS:

1.   I.C. Engines / V. GANESAN- TMH

2.   Heat engines, vasandan & Kumar publications Thermal

REFERENCE BOOKS:

1.   IC Engines – Mathur & Sharma – Dhanpath Rai & Sons.

2.   Thermal Engineering / Rudramoorthy - TMH

3.   I.C. Engines / Heywood /McGrawHIll.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

II Year B.Tech. Mech. Engg. II-Sem

PRODUCTION TECHNOLOGY

UNIT – I

CASTING: Steps involved in making a casting – Advantage of casting and its applications. – Patterns and Pattern making – Types of patterns – Materials used for patterns, pattern allowances and their construction, Principles of Gating, Gating ratio and design of Gating systems

UNIT – II

Solidification of casting – Concept – Solidification of pure metal and alloys, short & long freezing range alloys. Risers – Types, function and design, casting design considerations, special casting processes 1) Centrifugal 2)Die, 3) Investment.

Methods of Melting: Crucible melting and cupola operation, steel making processes, special.

UNIT – III

A) Welding: Classification of welding process types of welds and welded joints and their

characteristics, design of welded joints, Gas welding, ARC welding-sub merged , electron beam welding, solid state welding process, Forge welding, resistance welding, Thermit welding and Plasma welding.

B) Cutting of Metals: Oxy – Acetylene Gas cutting, plasma cutting . Cutting of ferrous, non-ferrous metals.

UNIT – IV

Inert Gas welding, TIG & MIG, MAG /CO2 welding, Friction welding, Induction welding, Explosive welding, Laser welding, Soldering & Brazing. Heat affected zones in welding; pre & post heating, weld ability of metals welding defects – causes and remedies – destructive nondestructive testing of welds.

UNIT – V

Hot working, cold working, strain hardening, recovery, recrystallisation and grain growth, Comparison of properties of Cold and Hot worked parts, Rolling fundamentals – theory of rolling, types of Rolling mills and products. Forces

in rolling and power requirements.

UNIT - VI

Stamping, forming and other cold working processes : Blanking and piercing – Bending and forming – Drawing and its types – wire drawing and Tube drawing – coining – Hot and cold spinning – Types of presses and press tools. Forces and power requirement in the above operations.

UNIT- VII

EXTRUSION OF METALS: Basic extrusion process and its characteristics. Hot extrusion and cold extrusion - Forward extrusion and backward extrusion – Impact extrusion Hydrostatic extrusion.

Forging processes: Principles of forging – Tools and dies – Types Forging – Smith forging, Drop Forging– Roll forging – Forging hammers: Rotary forging – forging defects.

UNIT - VIII

Processing of Plastics: Types of Plastics, Properties, applications and their Processing methods & Equipment (blow &injection modeling)

TEXT BOOKS:

1. Manufacturing Engineering and Technology/Kalpakjin S/ Pearson Edu.

2. Manufacturing Technology / P.N. Rao/TMH

REFERENCE BOOKS:

1. Production Technology, R.K. Jain

2. Process and materials of manufacturing –Lindberg, PE

3. Principles of Metal Castings, Roenthal.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

II Year B.Tech. Mech. Engg. II-Sem

MECHANICS OF SOLIDS

UNIT – I

SIMPLE STRESSES & STRAINS : Elasticity and plasticity – Types of stresses & strains–Hooke's law – stress – strain diagram for mild steel – Working stress – Factor of safety – Lateral strain, Poisson's ratio & volumetric strain – Elastic moduli & the relationship between them – Bars of varying section – composite bars – Temperature stresses.Strain energy – Resilience – Gradual, sudden, impact and shock loadings.

UNIT – II

SHEAR FORCE AND BENDING MOMENT : Definition of beam – Types of beams – Concept of shear force and bending moment – S.F and B.M diagrams for cantilever, simply supported and overhanging beams subjected to point loads, u.d.l., uniformly varying loads and combination of these loads – Point of contra flexure – Relation between S.F., B.M and rate of loading at a section of a beam.

UNIT – III

FLEXURAL STRESSES : Theory of simple bending – Assumptions – Derivation of bending equation: $M/I = f/y = E/R$ Neutral axis – Determination bending stresses – section modulus of rectangular and circular sections (Solid and Hollow), I,T,Angle and Channel sections – Design of simple beam sections.

UNIT – IV

SHEAR STRESSES: Derivation of formula – Shear stress distribution across various beams sections like rectangular, circular, triangular, I, T angle sections.

UNIT – V

ANALYSIS OF PIN-JOINTED PLANE FRAMES: Determination of Forces in members of plane, pinjointed, perfect trusses by (i) method of joints and (ii) method of sections. Analysis of various types of cantilever& simply–supported trusses-by method of joints, method of sections & tension coefficient methods.

UNIT – VI

DEFLECTION OF BEAMS : Bending into a circular arc – slope, deflection and radius of curvature – Differential equation for the elastic line of a beam – Double integration and Macaulay's methods – Determination of slope and deflection for cantilever and simply supported beams subjected to point loads, - U.D.L uniformly varying load. Mohr's theorems – Moment area method – application to simple cases including overhanging beams.

UNIT – VII

THIN CYLINDERS: Thin seamless cylindrical shells – Derivation of formula for longitudinal and circumferential stresses – hoop, longitudinal and volumetric strains – changes in dia, and volume of thin cylinders – Riveted boiler shells – Thin spherical shells.

UNIT – VIII

Thick cylinders–lame's equation – cylinders subjected to inside & outside pressures –compound cylinders.

TEXT BOOKS:

1.   Strength of materials by Bhavikatti, Lakshmi publications.

2.   Solid Mechanics, by Popov

REFERENCE BOOKS:

1.   Strength of Materials -By Jindal, Umesh Publications.

2.   Analysis of structures by Vazirani and Ratwani.

3.   Mechanics of Structures Vol-III, by S.B.Junnarkar.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

II Year B.Tech. Mech. Engg. II-Sem

METALLURGY & MATERIAL SCIENCE

UNIT – I

Structure of Metals: Bonds in Solids – Metallic bond - crystallization of metals, grain and grain boundaries, effect of grain boundaries on the properties of metal / alloys – determination of grain size.

UNIT - II

Constitution of Alloys: Necessity of alloying, types of solid solutions, Hume Rotherys rules, Intermediate alloy phases, and electron compounds.

UNIT -III

Equilibrium of Diagrams : Experimental methods of construction of equilibrium diagrams, Isomorphous alloy systems, equilibrium cooling and heating of alloys, Lever rule, coring miscibility gaps, eutectic systems, congruent melting intermediate phases, peritectic reaction. Transformations in the solid state – allotropy, eutectoid, peritectoid reactions, phase rule, relationship between equilibrium diagrams and properties of alloys. Study of important binary phase diagrams of Cu-Ni-, Al-Cu, Bi-Cd, Cu-An, Cus-Sn and $Fe-Fe_3C$.

UNIT -IV

Cast Irons and Steels: Structure and properties of White Cast iron, Malleable Cast iron, grey cast iron, Spheriodal graphite cast iron, Alloy cast irons. Classification of steels, structure and properties of plain carbon steels, Low alloy steels, Hadfield manganese steels, tool and die steels.

UNIT – V

Heat treatment of Alloys: Effect of alloying elements on $Fe-Fe_3C$ system, Annealing, Normalizing, Hardening, TTT diagrams, Kempering, Hardenability, surface - hardening methods, Age hardening treatment, Cryogenic treatment of alloys.

UNIT - VI

Non-ferrous Metals and Alloys: Structure and properties of copper and its

alloys, Aluminium and its alloys, Titanium and its alloys.

UNIT – VII

Ceramic materials: Crystalline ceramics, glasses, cermaets, abrasive materials, nanomaterials –definition, properties and applications of the above.

UNIT - VIII

Composite materials: Classification of composites, various methods of component manufacture of composites, particle – reinforced materials, fiber reinforced materials, metal ceramic mixtures, metal – matrix composites and C – C composites.

TEXT BOOKS:

1.   Introduction to Physical Metallurgy / Sidney H. Avener.

2.   Elements of Material science / V. Rahghavan

REFERENCE BOOKS:

1.   An Introduction to Metallurgy, sir Alan Cottrell, second edition universities press (India) private limited

2.   Engineering Materials and Metallurgy/R.K.Rajput/ S.Chand.

3.   Science of Engineering Materials / Agarwal

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

II Year B.Tech. Mech. Engg. II-Sem

MACHINE DRAWING

Machine Drawing Conventions:

Need for drawing conventions – introduction to IS conventions

a) Conventional representation of materials, common machine elements and parts such as screws, nuts, bolts, keys, gears, webs, ribs.

b) Types of sections – selection of section planes and drawing of sections and auxiliary sectional views. Parts not usually sectioned.

c) Methods of dimensioning, general rules for sizes and placement of dimensions for holes, centers, curved and tapered features.

d) Title boxes, their size, location and details - common abbreviations & their liberal usage

e) Types of Drawings – working drawings for machine parts.

I. Drawing of Machine Elements and simple parts

Selection of Views, additional views for the following machine elements and parts with every drawing proportions.

a) Popular forms of Screw threads, bolts, nuts, stud bolts, tap bolts, set screws.

b) Keys, cottered joints and knuckle joint.

c) Rivetted joints for plates

d) Shaft coupling, spigot and socket pipe joint.

e) Journal, pivot and collar and foot step bearings.

II. Assembly Drawings:

Drawings of assembled views for the part drawings of the following using conventions and easy drawing proportions.

a) Engine parts – stuffing boxes, cross heads, Eccentrics, Petrol Engine connecting rod, piston assembly.

b) Other machine parts - Screws jacks, Machine Vices Plummer block,

Tailstock.

c)   Valves: Steam stop valve, spring loaded safety valve, feed check valve and air cock.

NOTE: First angle projection to be adopted. The student should be able to provide working drawings of actual parts.

TEXT BOOKS:

1.   Machine Drawing – Dhawan, S.Chand Publications

2.   Machine Drawing –K.L.Narayana, P.Kannaiah & K. Venkata Reddy / New Age/ Publishers

REFERENCE BOOKS:

1.   Machine Drawing – P.S.Gill.

2.   Machine Drawing – Luzzader

3.   Machine Drawing – Rajput

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

II Year B.Tech. Mech. Engg. II-Sem

MECHANICS OF SOLIDS & METALLURGY LAB

Any 6 experiments from each section A and B.

(A) METALLURGY LAB:

1. Preparation and study of the Micro Structure of pure metals like Iron, Cu and Al.

2. Preparation and study of the Microstructure of Mild steels, low carbon steels, high – C steels.

3. Study of the Micro Structures of Cast Irons.

4. Study of the Micro Structures of Non-Ferrous alloys.

5. Study of the Micro structures of Heat treated steels.

6. Hardeneability of steels by Jominy End Quench Test.

7. To find out the hardness of various treated and untreated steels.

(B) MECHNICS OF SOLIDS LAB:

1. Direct tension test

2. Bending test on
   a) Simple supported
   b) Cantilever beam

3. Torsion test

4. Hardness test
   a) Brinells hardness test
   b) Rockwell hardness test

5. Test on springs

6. Compression test on cube

7. Impact test

8. Punch shear test

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

II Year B.Tech. Mech. Engg. II-Sem

PRODUCTION TECHNOLOGY LAB

Minimum of 12 Exercises need to be performed

I. METAL CASTING LAB:

1. Pattern Design and making - for one casting drawing.

2. Sand properties testing - Exercise -for strengths, and Permeability – 1

3. Moulding Melting and Casting - 1 Exercise

II WELDING LAB:

1. ARC Welding Lap & Butt Joint - 2 Exercises

2. Spot Welding - 1 Exercise

3. TIG Welding - 1 Exercise

4. Plasma welding and Brazing - 2 Exercises (Water Plasma Device)

III MECHANICAL PRESS WORKING:

1. Blanking & Piercing operation and study of simple, compound and progressive press tool.

2. Hydraulic Press: Deep drawing and extrusion operation.

3. Bending and other operations

IV PROCESSING OF PLASTICS

1. Injection Moulding

2. Blow Moulding

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

II Year B.Tech. Mech. Engg. II-Sem

ENGLISH COMMUNICATION PRACTICE

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. Mech. Engg. 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. Mech. Engg. I-Sem.

DYNAMICS OF MACHINERY

UNIT – I

PRECESSION: Gyroscopes, effect of precession motion on the stability of moving vehicles such as motor car, motor cycle, aero planes and ships, static and dynamic force analysis of planar mechanisms, (Demonstration of models in video show).

UNIT – II

FRICTION: Inclined plane, friction of screw and nuts, pivot and collar, uniform pressure, uniform wear, friction circle and friction axis: lubricated surfaces, boundary friction, film lubrication.

UNIT –III

CLUTCHES: Friction clutches- single disc or plate clutch, multiple disc clutch, cone clutch, centrifugal clutch.

BRAKES AND DYNAMOMETERS: Simple block brakes, internal expanding brake, band brake of vehicle. General description and operation of dynamometers: Prony, Rope brake, Epicyclic, Bevis Gibson and belt transmission,

UNIT – IV

TURNING MOMENT DIAGRAMS: Dynamic force analysis of slider crank mechanism**,** inertia torque, angular velocity and acceleration of connecting rod, crank effort and turning moment diagrams – fluctuation of energy – fly wheels and their design.

UNIT-V

GOVERNERS: Watt, porter and proell governors, spring loaded governors – Hartnell and Hartung with auxiliary springs. Sensitiveness, isochronism and hunting.

UNIT – VI

BALANCING: Balancing of rotating masses single and multiple – single and different planes, use analytical and graphical methods.

UNIT – VII

BALANCING OF RECIPROCATING MASSES: Primary, secondary, and higher balancing of reciprocating masses. Analytical and graphical methods, unbalanced forces and couples – examination of "V" multi cylinder in line and radial engines for primary and secondary balancing, locomotive balancing, hammer blow, swaying couple, variation of tractive effort.

UNIT – VIII

VIBRATIONS: Free Vibration of spring mass system – oscillation of pendulums, centers of oscillation and suspension. transverse loads, vibrations of beams with concentrated and distributed loads. Dunkerly's methods, Raleigh's method, whirling of shafts, critical speeds, torsional vibrations, two and three rotor systems, Simple problems on forced damped vibration, vibration isolation and transmissibility.

TEXT BOOKS:

1. Theory of Machines / S.S Ratan/ Mc. Graw Hill Publ.

2. Mechanism and machine theory by Ashok G. Ambedkar, PHI Publications.

REFERENCE BOOKS:

1. Mechanism and Machine Theory / JS Rao and RV Dukkipati / New Age

2. Theory of Machines / Shiegly / MGH

3. Theory of Machines / Thomas Bevan / CBS Publishers

4. Theory of machines / Khurmi/S.Chand.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

III Year B.Tech. Mech. Engg. I-Sem.

METAL CUTTING & MACHINE TOOLS

UNIT – I

Elementary treatment of metal cutting theory – element of cutting process – geometry of single point tool angles, chip formation and types of chips – built up edge and its effects chip breakers, mechanics of orthogonal cutting –Merchant's force diagram, cutting forces, cutting speeds, feed, depth of cut, tool life, coolants, tool materials, constructional features of speed gear box and feed gear box.

UNIT – II

Engine lathe – principle of working, specification of lathe – types of lathe – work holders tool holders – box tools taper turning, thread turning – for lathes and attachments, turret and capstan lathes – collet chucks – other work holders – tool holding devices – box and tool layout.

Principal features of automatic lathes – classification – single spindle and multi-spindle automatic lathes – tool layout and cam design.

UNIT – III

SHAPING, SLOTTING AND PLANNING MACHINES: Principles of working – principal parts – specifications, operations performed, machining time calculations.

UNIT – IV

DRILLING & BORING MACHINES: Principles of working, specifications, types, operations performed – tool holding devices – twist drill – Boring Machines – fine Boring Machines – jig boring machine, deep hole Drilling Machine.

UNIT – V

MILLING MACHINE: Principles of working – specifications – classification of Milling Machines – principal features of horizontal, vertical and universal Milling Machine, machining operations, types of cutters, geometry of milling cutters – methods of indexing, accessories to milling machines.

UNIT –VI

GRINDING: Theory of grinding – classification of grinding machines,

cylindrical and surface grinding machines, tool and cutter grinding machines, different types of abrasives, bonds, specification and selection of a grinding wheel. Lapping, Honing & Broaching operations, comparison to grinding.

UNIT - VII

JIGS & FIXTURES: Principles of design of jigs and fixtures and uses, classification of jigs & fixtures, principles of location and clamping, types of clamping & work holding devices, typical examples of jigs and fixtures.

UNIT – VIII

CNC MACHINE TOOLS: CNC Machines, working principle, classification, constructional features of CNC machines, CNC controller, types of motion controls in CNC machines, applications of CNC machines.

TEXT BOOKS:

1.   Production Technology by R.K. Jain and S.C. Gupta.

2.   Workshop Technology – B.S.Raghu Vamshi – Vol II

REFERENCE BOOKS:

1.   Metal cutting Principles by M.C. Shaw

2.   Metal cutting and machine tools by Boothroyd

3.   Production Technology by H.M.T. (Hindustan Machine Tools).

4.   Production Engineering, K.C Jain & A.K Chitaley, PHI Publishers

5.   Manufacturing technology II, P.N Rao,

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

III Year B.Tech. Mech. Engg. I-Sem.

DESIGN OF MACHINE MEMBERS - I

UNIT – I

INTRODUCTION: General considerations in the design of Engineering Materials and their properties – selection –Manufacturing consideration in design, tolerances and fits –BIS codes of steels.

STRESSES IN MACHINE MEMBERS: Simple stresses – combined stresses – torsional and bending stresses – impact stresses – stress strain relation – various theories of failure – factor of safety – design for strength and rigidity – preferred numbers. the concept of stiffness in tension, bending, torsion and combined situations – static strength design based on fracture toughness.

UNIT – II

STRENGTH OF MACHINE ELEMENTS: Stress concentration – theoretical stress concentration factor – fatigue stress concentration factor notch sensitivity – design for fluctuating stresses – endurance limit – estimation of endurance strength – goodman's line – soderberg's line – modified goodman's line.

UNIT – III

Riveted and welded joints – design of joints with initial stresses – eccentric loading

UNIT – IV

Bolted joints – design of bolts with pre-stresses – design of joints under eccentric loading – locking devices – both of uniform strength, different seals.

UNIT – V

KEYS, COTTERS AND KNUCKLE JOINTS: Design of keys-stresses in keys-cotter joints-spigot and socket, sleeve and cotter, jib and cotter joints-knuckle joints.

UNIT – VI

SHAFTS: Design of solid and hollow shafts for strength and rigidity –

design of shafts for combined bending and axial loads – shaft sizes – BIS code. Use of internal and external circlips, gaskets and seals (stationary & rotary).

UNIT – VII

SHAFT COUPLING: Rigid couplings – muff, split muff and flange couplings, flexible couplings – flange coupling (modified).

UNIT – VIII

MECHANICAL SPRINGS:

Stresses and deflections of helical springs – extension -compression springs – springs for fatigue loading, energy storage capacity – helical torsion springs – co-axial springs, leaf springs.

TEXT BOOKS:

1. Machine Design, V.Bandari, TMH Publishers

2. Machine design – Pandya & Shah

3. Machine Design PSG Data hand book

REFERENCE BOOKS:

1. Design of Machine Elements / V.M. Faires

2. Machine design / Schaum Series.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

III Year B.Tech. Mech. Engg. I-Sem.

FINITE ELEMENT METHODS

UNIT-I

Introduction to finite element method, stress and equilibrium, strain – displacement relations, stress – strain relations, plane stress and plane strain conditions, variational and weighted residual methods, concept of potential energy, one dimensional problems.

UNIT – II

Discretization of domain, element shapes, discretization procedures, assembly of stiffness matrix, band width, node numbering, mesh generation, interpolation functions, local and global coordinates, convergence requirements, treatment of boundary conditions.

UNIT – III

Analysis of Trusses: Finite element modeling, coordinates and shape functions, assembly of global stiffness matrix and load vector, finite element equations, treatment of boundary conditions, stress, strain and support reaction calculations.

UNIT – IV

Analysis of Beams: Element stiffness matrix for Hermite beam element, derivation of load vector for concentrated and UDL, simple problems on beams.

UNIT – V

Finite element modeling of two dimensional stress analysis with constant strain triangles and treatment of boundary conditions, formulation of axisymmetric problems.

UNIT-VI

Higher order and isoparametric elements: One dimensional quadratic and cubic elements in natural coordinates, two dimensional four noded isoparametric elements and numerical integration.

UNIT – VII

Steady state heat transfer analysis: one dimensional analysis of a fin and

two dimensional analysis of thin plate, analysis of a uniform shaft subjected to torsion.

UNIT-VIII

Dynamic Analysis: Formulation of finite element model, element consistent and lumped mass matrices, evaluation of eigen values and eigen vectors, free vibration analysis.

TEXT BOOKS:

1. Introduction to Finite Elements in Engineering / Chandraputla, Ashok and Belegundu / Prentice – Hall.

2. The Finite Element Methods in Engineering / SS Rao / Pergamon.

REFERENCE BOOKS:

1. An introduction to Finite Element Method / JN Reddy / McGrawHill

2. The Finite Element Method for Engineers – Kenneth H. Huebner, Donald L. Dewhirst, Douglas E. Smith and Ted G. Byrom / John Wiley & sons (ASIA) Pte Ltd.

3. Finite Element Analysis: Theory and Application with Ansys, Saeed Moaveniu, Pearson Education

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

III Year B.Tech. Mech. Engg. I-Sem.

THERMAL ENGINEERING – II
(Use of steam tables and Mollier chart is allowed)

UNIT – I

BASIC CONCEPTS: Rankine cycle - schematic layout, thermodynamic analysis, concept of mean temperature of heat addition, methods to improve cycle performance – regeneration & reheating. combustion: fuels and combustion, concepts of heat of reaction, adiabatic flame temperature, stoichiometry, flue gas analysis.

UNIT-II

BOILERS : Classification – working principles – with sketches including H.P.Boilers – mountings and accessories – working principles, boiler horse power, equivalent evaporation, efficiency and heat balance – draught, classification – height of chimney for given draught and discharge, condition for maximum discharge, efficiency of chimney – artificial draught- induced and forced.

UNIT – III

STEAM NOZZLES: Function of a nozzle – applications - types, flow through nozzles, thermodynamic analysis – assumptions -velocity of fluid at nozzle exit-Ideal and actual expansion in a nozzle, velocity coefficient, condition for maximum discharge, critical pressure ratio, criteria to decide nozzle shape: Super saturated flow, its effects, degree of super saturation and degree of under cooling - Wilson line.

UNIT – IV

STEAM TURBINES: Classification – impulse turbine; mechanical details – velocity diagram – effect of friction – power developed, axial thrust, blade or diagram efficiency – condition for maximum efficiency. De-laval turbine - methods to reduce rotor speed-velocity compounding, pressure

compounding and velocity & pressure compounding, velocity and pressure variation along the flow – combined velocity diagram for a velocity compounded impulse turbine, condition for maximum efficiency

UNIT-V

REACTION TURBINE: Mechanical details – principle of operation, thermodynamic analysis of a stage, degree of reaction –velocity diagram – Parson's reaction turbine – condition for maximum efficiency – calculation of blade height.

UNIT-VI

STEAM CONDENSERS: Requirements of steam condensing plant – classification of condensers – working principle of different types – vacuum efficiency and condenser efficiency – air leakage, sources and its affects, air pump- cooling water requirement.

UNIT -VII

GAS TURBINES: Simple gas turbine plant – ideal cycle, essential components – parameters of performance – actual cycle – regeneration, inter cooling and reheating –closed and semi-closed cycles – merits and demerits, types of combustion chambers.

UNIT – VIII

JET PROPULSION : Principle of operation –classification of jet propulsive engines – working principles with schematic diagrams and representation on t-s diagram - thrust, thrust power and propulsive efficiency – turbo jet engines – needs and demands met by turbo jet – schematic diagram, thermodynamic cycle, performance evaluation, thrust augmentation – methods.

Rockets : Application – working principle – classification – propellant type – thrust, propulsive efficiency – specific impulse – solid and liquid propellant rocket engines.

TEXT BOOKS:

1. Thermodynamics and Heat Engines- R.Yadav- Central book depot.

2. Gas Turbines – V.Ganesan /TMH

3. Heat Engineering – V.P Vasandani and D.S Kumar- Metropolitan Book Company, New Delhi

REFERENCE BOOKS:

1. Gas Turbines and Propulsive Systems – P.Khajuria & S.P.Dubey - / Dhanpatrai

2. Gas Turbines / Cohen, Rogers and Saravana Muttoo / Addison Wesley – Longman

3. Thermal Engineering-R.S Khurmi/JS Gupta/S.Chand.

4. Thermal Engineering-P.L.Bellaney/ Khanna publishers.

5. Thermal Engineering-M.L.Marthur & Mehta/Jain bros.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

III Year B.Tech. Mech. Engg. I-Sem.

OPERATIONS RESEARCH

UNIT – I

Development – definition– characteristics and phases – types of models – operation research models – applications.

ALLOCATION: Linear programming problem formulation – graphical solution – simplex method- artificial variables techniques -two–phase method, big-m method – duality principle.

UNIT – II

TRANSPORTATION PROBLEM: Formulation – optimal solution, unbalanced transportation problem – degeneracy, assignment problem – formulation – optimal solution - variants of assignment problem- traveling salesman problem.

SEQUENCING – Introduction – flow –shop sequencing – n jobs through two machines – n jobs through three machines – job shop sequencing – two jobs through 'm' machines.

UNIT – III

REPLACEMENT: Introduction – replacement of items that deteriorate with time – when money value is not counted and counted – replacement of items that fail completely, group replacement.

UNIT – IV

THEORY OF GAMES: Introduction – mini. max (max. mini) – criterion and optimal strategy – solution of games with saddle points – rectangular games without saddle points – 2 x 2 games – dominance principle – m x 2 & 2 x n games -graphical method.

UNIT – V

WAITING LINES: Introduction – single channel – poison arrivals – exponential service times – with infinite population and finite population models– multichannel – poison arrivals – exponential service times with infinite population single channel poison arrivals.

UNIT – VI

INVENTORY : Introduction – single item – deterministic models – purchase inventory models with one price break and multiple price breaks – shortages are not allowed – stiochastic models – demand may be discrete variable or continuous variable – instantaneous production. Instantaneous demand and continuous demand and no set up cost.

UNIT – VII

DYNAMIC PROGRAMMING: Introduction – Bellman's principle of optimality – applications of dynamic programming- capital budgeting problem – shortest path problem – linear programming problem.

UNIT – VIII

SIMULATION: Definition – types of simulation models – phases of simulation– applications of simulation – inventory and queuing problems – advantages and disadvantages – simulation languages.

TEXT BOOKS:

1.   Operations Research / S.D.Sharma-Kedarnath

2.   Introduction to O.R/Hiller & Libermann (TMH).

REFERENCE BOOKS:

1.   Operations Research /A.M.Natarajan,P.Balasubramani, A. Tamilarasi/ Pearson Education.

2.   Operations Research: Methods & Problems / Maurice Saseini, Arhur Yaspan & Lawrence Friedman

3.   Operations Research / R.Pannerselvam,PHI Publications.

4.   Operations Research / Wagner/ PHI Publications.

5.   Operation Research /J.K.Sharma/MacMilan.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

III Year B.Tech. Mech. Engg. I-Sem.

THERMAL ENGINEERING LAB

1. I.C. Engines valve / port timing diagrams

2. I.C. Engines performance test (4 -stroke diesel engines)

3. I.C. Engines performance test on 2-stroke petrol

4. Evaluation of engine friction by conducting morse test on 4-stroke multi cylinder petrol engine

5. Determination of FHP by retardation and motoring test on IC engine

6. I.C. Engines heat balance.

7. Economical speed test of an IC engine

8. Performance test on variable compression ratio engines.

9. Performance test on reciprocating air compressor unit

10. Study of boilers

11. Dis-assembly / assembly of engines.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

III Year B.Tech. Mech. Engg. I-Sem.

MACHINE TOOLS LAB

1. Introduction of general purpose machines -lathe, drilling machine, milling machine, shaper, planing machine, slotting machine, cylindrical grinder, surface grinder and tool and cutter grinder.

2. Step turning and taper turning on lathe machine

3. Thread cutting and knurling on lathe machine.

4. Drilling and tapping

5. Shaping and planning

6. Slotting

7. Milling

8. Cylindrical surface grinding

9. Grinding of tool angles.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

III Year B.Tech. Mech. Engg. 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 parties 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 - Limitions - Copyright disputes and International Copyright Law – Semiconductor Chip Protection Act

UNIT IV

Introduction to Trade Secret – Maintaining Trade Secret – Physical Secrurity – Employee Limitation - Employee confidentiality agreement - Trade Secret Law - Unfair Competation – 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. Mech. Engg. II-Sem.

METROLOGY

UNIT-I

SYSTEMS OF LIMITS AND FITS: Introduction, nominal size, tolerance, limits, deviations, fits and their types-unilateral and bilateral tolerance system, hole and shaft basis systems- interchangeability, determistic & statistical tolerancing, selective assembly. British standard system, International standard system, application of limits and tolerances for correct functioning.

UNIT-II

LINEAR MEASUREMENT: Length standards, end standards, slip gauges-calibration of the slip gauges, dial indicators, micrometers.

MEASUREMENT OF ANGLES AND TAPERS:

Different methods – bevel protractor, angle slip gauges-clinometer – angle dekkor- spirit levels- sine bar- sine table, rollers and spheres used to determine tapers.

LIMIT GAUGES:

Taylor's principle – design of go and no go gauges; plug, ring, snap, gap, taper, profile and position gauges.

UNIT-III

OPTICAL MEASUREMENT INSTRUMENTS: Tools maker's microscope and uses- collimators, optical projector, optical flats and their uses.

INTERFEROMETRY:

Interference of light, Michaleson's interferometer, NPL flatness interferometer and NPL gauge interferometer.

FLAT SURFACE MEASUREMENT:

Measurement of flat surfaces- instruments used- straight edges- surface plates – auto collimator.

UNIT-IV

SURFACE ROUGHNESS MEASUREMENT: Differences between surface roughness and surface waviness –Numerical assessment of surface finish-

CLA, Rt., R.M.S. Rz, R10 values, Method of measurement of surface finish – Profilograph. Talysurf, ISI symbols for indication of surface finish.

UNIT-V

Comparators: Types - mechanical, optical, electrical and electronic, pneumatic comparators and their uses.

UNIT – VI

GEAR MEASUREMENT: Nomenclature of gear tooth, tooth thickness measurement with gear tooth vernier & flange micro meter, pitch measurement, total composite error and tooth to tooth composite errors, rolling gear tester, involute profile checking.

UNIT – VII

SCREW THREAD MEASUREMENT: Elements of measurement – errors in screw threads- concept of virtual effective diameter, measurement of effective diameter, angle of thread and thread pitch, and profile thread gauges.

UNIT – VIII

MACHINE TOOL ALIGNMENT TESTS: Machine tool alignment test on lathe, drilling and milling machines.

TEXT BOOKS:

1. Engineering Metrology by R.K.Jain / Khanna Publishers

2. Engineering Metrology by Mahajan / Dhanpat Rai Publishers

3. Dimensional Metrology, Connie Dotson, Cengage Learning

REFERENCE BOOKS:

1. Engineering Metrology by I.C.Gupta / Dhanpat Rai Publishers

2. Precision Engineering in Manufacturing by R.L.Murthy / New Age

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

III Year B.Tech. Mech. Engg. II-Sem.

INSTRUMENTATION & CONTROL SYSTEMS

UNIT – I

Definition – Basic principles of measurement – measurement systems, generalized configuration and functional descriptions of measuring instruments – examples, dynamic performance characteristics – sources of error, classification and elimination of error.

UNIT – II

MEASUREMENT OF DISPLACEMENT: Theory and construction of various transducers to measure displacement – piezo electric, inductive, capacitance, resistance, ionization and photo electric transducers, calibration procedures.

MEASUREMENT OF TEMPERATURE: Classification – ranges – various principles of measurement – expansion, electrical resistance – thermistor – thermocouple – pyrometers – temperature indicators.

UNIT – III

MEASUREMENT OF PRESSURE: Units – classification – different principles used, manometers, piston, bourdon pressure gauges, bellows – diaphragm gauges. low pressure measurement – thermal conductivity gauges – ionization pressure gauges, mcleod pressure gauge.

UNIT – IV

MEASUREMENT OF LEVEL: Direct method – indirect methods – capacitative, ultrasonic, magnetic, cryogenic fuel level indicators – bubbler level indicators.

FLOW MEASUREMENT: Rotameter, magnetic, ultrasonic, turbine flow meter, hot-wire anemometer, laser doppler anemometer (LDA).

UNIT – V

MEASUREMENT OF SPEED: Mechanical tachometers – electrical tachometers – stroboscope, noncontact type of tachometer

Measurement of Acceleration and Vibration: Different simple instruments – principles of seismic instruments – vibrometer and accelerometer using this principle.

UNIT – VI

STRESS STRAIN MEASUREMENTS: Various types of stress and strain measurements – electrical strain gauge – gauge factor – method of usage of resistance strain gauge for bending compressive and tensile strains – usage for measuring torque, strain gauge rosettes.

UNIT – VII

MEASUREMENT OF HUMIDITY – Moisture content of gases, sling psychrometer, Absorption psychrometer, Dew point meter.

MEASUREMENT OF FORCE, TORQUE AND POWER- Elastic force meters, load cells, torsion meters, dynamometers.

UNIT – VIII

ELEMENTS OF CONTROL SYSTEMS: Introduction, importance – classification – open and closed systems, servomechanisms–examples with block diagrams–temperature, speed & position control systems.

TEXT BOOKS:

1.   Measurement Systems: Applications & design by D.S Kumar.

2.   Mechanical Measurements / BeckWith, Marangoni,Linehard, PHI / PE

REFERENCE BOOKS:

1.   Measurement systems: Application and design, Doeblin Earnest. O. Adaptation by Manik and Dhanesh/ TMH

2.   Experimental Methods for Engineers / Holman.

3.   Mechanical and Industrial Measurements / R.K. Jain/ Khanna Publishers.

4.   Instrumentation, measurement & analysis by B.C.Nakra & K.K.Choudhary, TMH

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

III Year B.Tech. Mech. Engg. II-Sem.

DESIGN OF MACHINE MEMBERS – II

UNIT – I

BEARINGS: Classification of bearings- applications, types of journal bearings – lubrication – bearing modulus – full and partial bearings – clearance ratio – heat dissipation of bearings, bearing materials – journal bearing design – ball and roller bearings – static loading of ball & roller bearings, bearing life.

UNIT – II

ENGINE PARTS: Connecting Rod: Thrust in connecting rod – stress due to whipping action on connecting rod ends – cranks and crank shafts, strength and proportions of over hung and center cranks – crank pins, crank shafts.

UNIT–III

Pistons, forces acting on piston – construction design and proportions of piston, cylinder, cylinder liners.

UNIT – IV

Design of curved beams: introduction, stresses in curved beams, expression for radius of neutral axis for rectangular, circular, trapezoidal and t-section. Design of crane hooks, c –clamps.

UNIT – V

POWER TRANSMISSIONS SYSTEMS, PULLEYS: Transmission of power by belt and rope drives, transmission efficiencies, belts – flat and v types – ropes - pulleys for belt and rope drives, materials, chain drives

UNIT – VI

SPUR & HELICAL GEAR DRIVES: Spur gears- helical gears – load concentration factor – dynamic load factor, surface compressive strength – bending strength – design analysis of spur gears – estimation of centre distance, module and face width, check for plastic deformation, check for dynamic and wear considerations.

UNIT – VII

DESIGN OF POWER SCREWS: Design of screw, square ACME, buttress screws, design of nut, compound screw, differential screw, ball screw- possible failures.

UNIT – VIII

MACHINE TOOL ELEMENTS: Levers and brackets: design of levers – hand levers-foot lever – cranked lever – lever of a lever loaded safety valve-rocker arm straight – angular- design of a crank pin – brackets- hangers- wall boxes.

TEXT BOOKS:

1. Machine Design, V.Bandari, TMH Publishers

2. Machine Design PSG Data hand book

3. Machine Design, Pandya & Shaw, Charotar publishers

REFERENCE BOOKS:

1. Machine Design / R.N. Norton

2. Data Books : (I) P.S.G. College of Technology (ii) Mahadevan

3. Mech. Engg. Design / JE Shigley

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

III Year B.Tech. Mech. Engg. II-Sem.

ROBOTICS

UNIT-I

INTRODUCTION: Automation and Robotics, CAD/CAM and Robotics – An over view of Robotics – present and future applications – classification by coordinate system and control system.

UNIT – II

COMPONENTS OF THE INDUSTRIAL ROBOTICS: Function line diagram representation of robot arms, common types of arms. Components, Architecture, number of degrees of freedom – Requirements and challenges of end effectors, determination of the end effectors, comparison of Electric, Hydraulic and Pneumatic types of locomotion devices.

UNIT – III

MOTION ANALYSIS: Homogeneous transformations as applicable to rotation and translation – problems.

UNIT – IV

MANIPULATOR KINEMATICS: Specifications of matrices, D-H notation joint coordinates and world coordinates Forward and inverse kinematics – problems.

UNIT – V

Differential transformation and manipulators, Jacobians – problems

Dynamics: Lagrange – Euler and Newton – Euler formulations – Problems.

UNIT VI

General considerations in path description and generation. Trajectory planning and avoidance of obstacles, path planning, Skew motion, joint integrated motion –straight line motion – Robot programming, languages and software packages-description of paths with a robot programming language..

UNIT VII

ROBOT ACTUATORS AND FEED BACK COMPONENTS:

Actuators: Pneumatic, Hydraulic actuators, electric & stepper motors.

Feedback components: position sensors – potentiometers, resolvers, encoders – Velocity sensors.

UNIT VIII

ROBOT APPLICATIONS IN MANUFACTURING: Material Transfer - Material handling, loading and unloading- Processing - spot and continuous arc welding & spray painting - Assembly and Inspection.

TEXT BOOKS:

1. Industrial Robotics / Groover M P /Pearson Edu.

2. Robotics and Control / Mittal R K & Nagrath I J / TMH.

REFERENCE BOOKS:

1. Robotics / Fu K S/ McGraw Hill.

2. Robotic Engineering / Richard D. Klafter, Prentice Hall

3. Robot Analysis and Intelligence / Asada and Slow time / Wiley Inter-Science.

4. Introduction to Robotics / John J Craig / Pearson Edu.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

III Year B.Tech. Mech. Engg. II-Sem.

HEAT TRANSFER
(Heat transfer data book allowed)

UNIT – I

INTRODUCTION: Modes and mechanisms of heat transfer – Basic laws of heat transfer –General discussion about applications of heat transfer.

CONDUCTION HEAT TRANSFER: Fourier rate equation – General heat conduction equation in Cartesian, Cylindrical and Spherical coordinates.

UNIT – II

Steady, unsteady and periodic heat transfer – Initial and boundary conditions.

ONE DIMENSIONAL STEADY STATE CONDUCTION HEAT TRANSFER: Homogeneous slabs, hollow cylinders and spheres – overall heat transfer coefficient – electrical analogy – Critical radius of insulation.

Variable Thermal conductivity – systems with heat sources or Heat generation. Extended surface (fins) heat Transfer – Long Fin, Fin with insulated tip and Short Fin, Application to error measurement of Temperature.

UNIT III

ONE DIMENSIONAL TRANSIENT CONDUCTION HEAT TRANSFER: Systems with negligible internal resistance – Significance of Biot and Fourier Numbers - Chart solutions of transient conduction systems

UNIT – IV

CONVECTIVE HEAT TRANSFER: Classification of convective heat transfer – dimensional analysis as a tool for experimental investigation – Buckingham Pi Theorem for forced and free convection, application for developing semi-empirical non- dimensional correlation for convective heat transfer – Significance of non-dimensional numbers – concepts of continuity, momentum and Energy Equations.

UNIT – V

FORCED CONVECTION

EXTERNAL FLOWS: Concepts about hydrodynamic and thermal boundary layer and use of empirical correlations for convective heat transfer-Flat plates and Cylinders.

INTERNAL FLOWS: Concepts about Hydrodynamic and Thermal Entry Lengths – Division of internal flow based on this –Use of empirical relations for Horizontal Pipe Flow and annulus flow.

FREE CONVECTION: Development of Hydrodynamic and thermal boundary layer along a vertical plate – Use of empirical relations for Vertical plates and pipes.

UNIT VI

HEAT TRANSFER WITH PHASE CHANGE

BOILING: Pool boiling – Regimes- Calculations on Nucleate boiling, Critical Heat flux and Film boiling.

CONDENSATION: Film wise and drop wise condensation –Nusselt's theory of condensation on a vertical plate - Film condensation on vertical and horizontal cylinders using empirical correlations.

UNIT VII

HEAT EXCHANGERS:

Classification of heat exchangers – overall heat transfer Coefficient and fouling factor – Concepts of LMTD and NTU methods – Problems.

UNIT VIII

RADIATION HEAT TRANSFER:

Emission characteristics and laws of black-body radiation – Irradiation – total and monochromatic quantities – laws of Planck, Wien, Kirchoff, Lambert, Stefan and Boltzmann– heat exchange between two black bodies – concepts of shape factor – Emissivity – heat exchange between grey bodies – radiation shields – electrical analogy for radiation networks.

TEXT BOOKS:

1. Heat Transfer - HOLMAN/TMH
2. Heat Transfer – P.K.Nag/ TMH

REFERENCE BOOKS:

1. Heat and Mass Transfer – Arora and Domkundwar, Dhanpatrai & sons
2. Fundamentals of Engg. Heat and Mass Transfer / R.C.SACHDEVA / New Age International
3. Heat and Mass Transfer –Cengel- McGraw Hill.
4. Heat and Mass Transfer – D.S.Kumar / S.K.Kataria & Sons

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

III Year B.Tech. Mech. Engg. II-Sem.

INDUSTRIAL ENGG. & MANAGEMENT

UNIT – I

INTRODUCTION: Definition of industrial engineering (I.E), Development, applications, role of an industrial engineer, differences between production management and industrial engineering, quantitative tools of IE and productivity measurement. Concepts of Management, Importance, functions of management, scientific management, Taylor's principles, theory X and theory Y, Fayol's principles of management.

UNIT – II

PLANT LAYOUT: Factors governing plant location, types of production layouts, advantages and disadvantages of process layout and product layout, applications, quantitative techniques for optimal design of layouts, Plant maintenance, preventive and breakdown maintenance.

UNIT – III

OPERATIONS MANAGEMENT: Importance, types of production, applications, workstudy, method study and time study, work sampling, PMTS, micro-motion study, rating techniques, MTM, work factor system, principles of Ergonomics, flow process charts, string diagrams and Therbligs,

UNIT – IV

STATISTICAL QUALITY CONTROL: Quality control, its importance, SQC, sampling inspection, types, Control charts – X and R – charts X AND S charts and their applications, numerical examples.

UNIT – V

RESOURCE MANAGEMENT: Concept of human resource management, personnel management and industrial relations, functions of personnel management, Job-evaluation, its importance and types, merit rating, quantitative methods, wage incentive plans, types.

UNIT – VI

TOTAL QUALITY MANAGEMENT: zero defect concept, quality circles, implementation, applications, ISO quality systems. Six sigma – definition, basic concepts.

UNIT - VII

VALUE ANALYSIS: Value engineering, implementation procedure, enterprise resource planning and supply chain management.

UNIT - VIII

PROJECT MANAGEMENT: PERT, CPM – differences & applications, Critical path, determination of floats, importance, project crashing, smoothing and numerical examples.

TEXT BOOKS:

1. Industrial Engineering and management by O.P Khanna, Khanna Publishers.

2. Industrial Engineering and Production Management, Martand Telsang, S.Chand & Company Ltd. New Delhi

REFERENCE BOOKS:

1. Operations Management by J.G Monks, McGrawHill Publishers.

2. Industrial Engineering by Banga & Sharma.

3. Principles of Management by Koontz O' Donnel, McGraw Hill Publishers.

4. Statistical Quality Control by Gupta.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

III Year B.Tech. Mech. Engg. II-Sem.

METROLOGY & INSTRUMENTATION LAB

Note: MINIMUM OF 6 EXPERIMENTS FROM EACH SECTION

METROLOGY LAB

1. Measurement of lengths, heights, diameters by Vernier callipers, micrometers etc.

2. Measurement of bores by internal micrometers and dial bore indicators.

3. Use of gear tooth Vernier callipers and checking the chordal thickness of spur gear.

4. Machine tool alignment test on the lathe.

5. Machine tool alignment test on milling machine.

6. Angle and taper measurements by Bevel protractor, Sine bars, etc.

7. Use of spirit level in finding the straightness of a bed and flatness of a surface.

8. Thread measurement by two wire/ three wire method & Tool makers microscope.

9. Surface roughness measurement by Talysurf.

INSTRUMENTATION LAB

1. Calibration of Pressure Gauges

2. Calibration of transducer for temperature measurement.

3. Study and calibration of LVDT transducer for displacement measurement.

4. Calibration of strain gauge for temperature measurement.

5. Calibration of thermocouple for temperature measurement.

6. Calibration of capacitive transducer for angular displacement.

7. Study and calibration of photo and magnetic speed pickups for the measurement of speed.

8. Calibration of resistance temperature detector for temperature measurement.

9. Study and calibration of a Rotameter for flow measurement.

10. Study and use of a Seismic pickup for the measurement of vibration amplitude of an engine bed at various loads.

11. Study and calibration of Mcleod gauge for low pressure.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

III Year B.Tech. Mech. Engg. II-Sem.

HEAT TRANSFER LAB

1. Determination of overall heat transfer co-efficient of a composite slab

2. Determination of heat transfer rate through a lagged pipe.

3. Determination of heat transfer rate through a concentric sphere

4. Determination of thermal conductivity of a metal rod.

5. Determination of efficiency of a pin-fin

6. Determination of heat transfer coefficient in forced convection

7. Determination of heat transfer coefficient in natural convection.

8. Determination of effectiveness of parallel and counter flow heat exchangers.

9. Determination of emissivity of a given surface.

10. Determination of Stefan Boltzman constant.

11. Determination of heat transfer rate in drop and film wise condensation.

12. Determination of critical heat flux.

13. Demonstration of heat pipe.

14. Study of two – phase flow.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

III Year B.Tech. Mech. Engg. II-Sem.

INTELLECTUAL PROPERTY RIGHTS AND PATENTS – II

UNIT I

Intellectual Property Law Basics – Types of Intellectual Property – Agencies responsible for Intellectual Property Regristration - 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 - Date Security – Privacy issues - Controlling Over use or Misuse of 1 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. Mech. Engg. I-Sem.

REFRIGERATION & AIR CONDITIONING
(Refrigeration and Psychrometric tables and charts allowed)

UNIT – I

INTRODUCTION TO REFRIGERATION: Necessity and applications – Unit of refrigeration and C.O.P. – Mechanical Refrigeration – Types of ideal cycles of refrigeration. Air Refrigeration: Bell Colemann cycle-open and dense air systems – refrigeration systems used in air crafts and problems.

UNIT – II

VAPOUR COMPRESSION REFRIGERATION: Working principle and essential components of the plant – simple vapour compression refrigeration cycle – COP – Representation of cycle on T-S and p-h charts – effect of sub cooling and super heating – cycle analysis – Actual cycle-Influence of various parameters on system performance – Use of p-h charts – numerical problems.

UNIT III

SYSTEM COMPONENTS: Compressors – general classification – comparison – Advantages and Disadvantages. Condensers – classification, Working Principles, Evaporators – classification– Working Principles, Expansion devices – Types, Working Principles

REFRIGERANTS – Desirable properties – classification refrigerants used – Nomenclature – Ozone Depletion – Global warming.

UNIT IV

VAPOR ABSORPTION SYSTEM: Calculation of max COP – description and working of NH3 – water system and Li Br –water (Two shell & Four shell) System. Principle of operation of Three Fluid absorption system, salient features.

UNIT V

STEAM JET REFRIGERATION SYSTEM: Working Principle and Basic Components. Principle and operation of (i) Thermoelectric refrigerator (ii) Vortex tube.

UNIT – VI

INTRODUCTION TO AIR CONDITIONING: Psychrometric Properties & Processes – Characterization of sensible and latent heat loads — Need for Ventilation, Consideration of Infiltration – Load concepts of RSHF, GSHF-Problems, Concept of ESHF and ADP temperature.

UNIT VII

Requirements of human comfort and concept of effective temperature-Comfort chart –Comfort Air conditioning – Requirements of Industrial air conditioning, Air conditioning Load Calculations.

UNIT – VIII

AIR CONDITIONING SYSTEMS: Classification of equipment, cooling, heating, humidification and dehumidification, filters, grills and registers fans and blowers. Heat Pump – Heat sources – different heat pump circuits.

TEXT BOOKS:

1. A Course in Refrigeration and Air conditioning / SC Arora & Domkundwar / Dhanpatrai

2. Refrigeration and Air Conditioning / CP Arora / TMH.

REFERENCE BOOKS:

1. Refrigeration and Air Conditioning / Manohar Prasad / New Age.

2. Principles of Refrigeration - Dossat / Pearson Education.

3. Basic Refrigeration and Air-Conditioning – Ananthanarayanan / TMH

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

IV Year B.Tech. Mech. Engg. I-Sem.

CAD/CAM

UNIT – I

Computers in Industrial Manufacturing, Product cycle, CAD / CAM Hardware, Basic structure, CPU, Memory types, input devices, display devices, hard copy devices, storage devices.

UNIT – II

COMPUTER GRAPHICS: Raster scan graphics coordinate system, database structure for graphics modeling, transformation of geometry, 3D transformations, mathematics of projections, clipping, hidden surface removal.

UNIT – III

GEOMETRIC MODELING: Requirements, geometric models, geometric construction models, curve representation methods, surface representation methods, modeling facilities desired.

UNIT – IV

DRAFTING AND MODELING SYSTEMS: Basic geometric commands, layers, display control commands, editing, dimensioning, solid modeling.

UNIT – V

PART PROGRAMMING FOR NC MACHINES: NC, NC modes, NC elements, CNC machine tools, structure of CNC machine tools, features of Machining center, turning center, CNC Part Programming: fundamentals, manual part programming methods, Computer Aided Part Programming.

UNIT – VI

GROUP TECHNOLOGY: Part family, coding and classification, production flow analysis, advantages and limitations, Computer Aided Processes Planning, Retrieval type and Generative type.

UNIT – VII

COMPUTER AIDED QUALITY CONTROL: Terminology in quality control, the computer in QC, contact inspection methods, noncontact inspection methods-optical, noncontact inspection methods-nonoptical, computer aided testing, integration of C AQC with CAD/CAM.

UNIT – VIII

COMPUTER INTEGRATED MANUFACTURING SYSTEMS: Types of Manufacturing systems, Machine tools and related equipment, material handling systems, computer control systems, human labor in the manufacturing systems, CIMS benefits.

TEXT BOOKS:

1. CAD / CAM A Zimmers & P.Groover/PE/PHI

2. Automation, Production systems & Computer integrated Manufacturing/ Groover/P.E

REFERENCE BOOKS:

1. CAD / CAM Theory and Practice / Ibrahim Zeid / TMH

2. Principles of Computer Aided Design and Manufacturing / Farid Amirouche / Pearson

3. Computer Numerical Control Concepts and programming / Warren S Seames / Thomson.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

IV Year B.Tech. Mech. Engg. I-Sem.

ALTERNATIVE SOURCES OF ENERGY

UNIT-I

SOLAR RADIATION: Role and potential of new and renewable sources, the solar energy option, Environmental impact of solar power, structure of the sun, the solar constant, sun-earth relationships, coordinate systems and coordinates of the sun, extraterrestrial and terrestrial solar radiation, solar radiation on titled surface, instruments for measuring solar radiation and sun shine, solar radiation data, numerical problems.

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, solar cookers, central power tower concept and solar chimney.

UNIT-IV

WIND ENERGY: Sources and potentials, horizontal and vertical axis windmills, performance characteristics, Betz criteria, types of winds, wind data measurement.

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, bio fuels, 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 DEC, Carnot cycle, limitations, principles of DEC. Thermo-electric generators, See-beck, Peltier and Joul Thomson effects, Figure of merit, materials, applications, MHD generators, principles, dissociation and ionization, hall effect, magnetic flux, MHD accelerator, MHD Engine, power generation systems, electron gas dynamic conversion, economic aspects. Fuel cells, principles, faraday's law's, thermodynamic aspects, selection of fuels and operating conditions, photo voltaic energy conversion – types of PV cells, I-V characteristics.

TEXT BOOKS:

1. Sukhatme S.P. and J.K.Nayak, *Solar Energy – Principles of Thermal Collection and Storage*, TMH

2. Khan B.H., Non-Conventional Energy Resources, Tata McGraw Hill, New Delhi, 2006

REFERENCE BOOKS:

1. Solar Power Engineering / B.S Magal Frank Kreith & J.F Kreith.

2. Principles of Solar Energy / Frank Krieth & John F Kreider.

3. Non-Conventional Energy / Ashok V Desai /Wiley Eastern.

4. Renewable Energy Technologies /Ramesh & Kumar /Narosa.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

IV Year B.Tech. Mech. Engg. I-Sem.

UN CONVENTIONAL MACHINING PROCESSES

UNIT – I

INTRODUCTION: Need for non-traditional machining methods-Classification of modern machining processes – considerations in process selection, applications.

UNIT II

Ultrasonic machining – Elements of the process, mechanics of material removal, MRR process parameters, economic considerations, applications and limitations.

UNIT – III

Abrasive jet machining, Water jet machining and abrasive water jet machining: Basic principles, equipments, process variables, mechanics of material removal, MRR, application and limitations.

UNIT - IV

ELECTRO – CHEMICAL MACHINING: Fundamentals of electro chemical machining, electrochemical grinding, electro chemical honing and deburring process, metal removal rate in ECM, Tool design, Surface finish and accuracy, economic aspects of ECM – Simple problems for estimation of metal removal rate. Fundamentals of chemical, machining, advantages and applications.

UNIT - V

THERMAL METAL REMOVAL PROCESSES: General principle and applications of Electric Discharge Machining, Electric Discharge Grinding and wire EDM – Power circuits for EDM, Mechanics of metal removal in EDM, Process parameters, selection of tool electrode and dielectric fluids, surface finish and machining accuracy, characteristics of spark eroded surface

UNIT – VI

EBM, LBM, basic principle and theory, process parameters, efficiency & accuracy, applications

UNIT-VII

Application of plasma for machining, metal removal mechanism, process parameters, accuracy and surface finish and other applications of plasma in manufacturing industries.

UNIT – VIII

Magnetic abrasive finishing, Abrasive flow finishing, Electrostream drilling, Shaped tube electrolytic machining.

TEXT BOOK:

1. Advanced machining processes/ VK Jain/ Allied publishers.

REFERENCE BOOKS:

1. Modern Machining Process / Pandey P.C. and Shah H.S./ TMH.

2. New Technology / Bhattacharya A/ The Institution of Engineers, India 1984.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

IV Year B.Tech. Mech. Engg. I-Sem.

AUTOMOBILE ENGINEERING
(DEPARTMENTAL ELECTIVE – I)

UNIT – I

INTRODUCTION: Components of four wheeler automobile – chassis and body – power unit – power transmission – rear wheel drive, front wheel drive, 4 wheel drive – types of automobile engines, engine construction, turbo charging and super charging – engine lubrication, splash and pressure lubrication systems, oil filters, oil pumps – crank case ventilation – engine service, reboring, decarbonisation, Nitriding of crank shaft.

UNIT – II

TRANSMISSION SYSTEM: Clutches, principle, types, cone clutch, single plate clutch, multi plate clutch, magnetic and centrifugal clutches, fluid fly wheel – gear boxes, types, sliding mesh, construct mesh, synchro mesh gear boxes, epicyclic gear box , over drive torque converter. propeller shaft – Hotch – Kiss drive, Torque tube drive, universal joint, differential rear axles – types – wheels and tyres.

UNIT – III

STEERING SYSTEM: Steering geometry – camber, castor, king pin rake, combined angle toein, center point steering. types of steering mechanism – Ackerman steering mechanism, Davis steering mechanism, steering gears – types, steering linkages.

UNIT – IV

SUSPENSION SYSTEM: Objects of suspension systems – rigid axle suspension system, torsion bar, shock absorber, Independent suspension system.

BRAKING SYSTEM: Mechanical brake system, hydraulic brake system, master cylinder, wheel cylinder tandem master cylinder requirement of brake fluid, pneumatic and vacuum brakes.

UNIT – V

ELECTRICAL SYSTEM: Charging circuit, generator, current – voltage regulator – starting system, bendix drive mechanism solenoid switch, lighting systems, horn, wiper, fuel gauge – oil pressure gauge, engine temperature

indicator etc.

UNIT – VI

ENGINE SPECIFICATION AND SAFETY SYSTEMS: Introduction- engine specifications with regard to power, speed, torque, no. of cylinders and arrangement, lubrication and cooling etc.

Safety: Introduction, safety systems - seat belt, air bags, bumper, anti lock brake system (ABS), wind shield, suspension sensors, traction control, mirrors, central locking and electric windows, speed control.

UNIT – VII

ENGINE EMISSION CONTROL: Introduction – types of pollutants, mechanism of formation, concentration measurement, methods of controlling-engine modification, exhaust gas treatment-thermal and catalytic converters-use of alternative fuels for emission control – National and International pollution standards

UNIT – VIII

ENGINE SERVICE: Introduction, service details of engine cylinder head, valves and valve mechanism, piston-connecting rod assembly, cylinder block, crank shaft and main bearings, engine reassembly-precautions.

TEXT BOOKS:

1. Automotive Mechanics – Vol. 1 & Vol. 2 / Kripal Sing, standard publishers

2. Automobile Engineering / William Crouse, TMH Distributors

3. Automobile Engineering- P.S Gill, S.K. Kataria & Sons, New Delhi.

REFERENCE BOOKS:

1. Automotive Engines Theory and Servicing, James D. Halderman and Chase D. Mitchell Jr., Pearson education inc.

2. Automotive Engineering / Newton Steeds & Garrett Automotive Mechanics / Heitner

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

IV Year B.Tech. Mech. Engg. I-Sem.

COMPUTATIONAL FLUID DYNAMICS
(DEPARTMENTAL ELECTIVE – I)

UNIT-I

ELEMENTARY DETAILS IN NUMERICAL TECHNIQUES: Number system and errors, Representation of integers, Fractions, Floating point Arithmetic, loss of significance and error propagation, condition and instability, computational methods for error estimation, Convergence of Sequences.

UNIT – II

APPLIED NUMERICAL METHODS: Solution of a system of simultaneous Linear Algebraic Equations, iterative schemes of Matrix Inversion, Direct Methods for Matrix inversion, Direct Methods for banded matrices.

UNIT – III

REVIEW OF EQUATIONS GOVERNING FLUID FLOW AND HEAT TRANSFER: Introduction, conservation of mass, Newton's second law of motion, expanded forms of Navier-stokes equations, conservation of energy principle, special forms of the Navier-stokes equations.

UNIT - IV

Steady flow, dimensionless form of Momentum and Energy equations, Stokes equation, conservative body force fields, stream function - Vorticity formulation.

UNIT - V

Finite Difference Applications in Heat conduction and Convention – Heat conduction, steady heat conduction in a rectangular geometry, transient heat conduction, finite difference application in convective heat transfer, closure.

UNIT - VI

Finite Differences, discretization, consistency, stability, and Fundamentals of fluid flow modeling: Introduction, elementary finite difference quotients, implementation aspects of finite-difference equations, consistency, explicit and implicit methods.

UNIT - VII

Introduction to first order wave equation, stability of hyperbolic and elliptic equations, fundamentals of fluid flow modeling, conservative property, the upwind scheme.

UNIT - VIII

FINITE VOLUME METHOD: Approximation of surface integrals, volume integrals, interpolation and differentiation practices, upwind interpolation, Linear interpolation and Quadratic interpolation.

TEXT BOOKS:

1. Numerical heat transfer and fluid flow / Suhas V. Patankar- Butter-worth Publishers

2. Computational fluid dynamics - Basics with applications - John. D. Anderson / Mc Graw Hill.

REFERENCE BOOKS:

1. Computational Fluid Flow and Heat Transfer/ Niyogi, Pearson Publications

2. Fundamentals of Computational Fluid Dynamics – Tapan K. Sengupta / Universities Press.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

IV Year B.Tech. Mech. Engg. I-Sem.

CONDITION MONITORING
(DEPARTMENTAL ELECTIVE – I)

UNIT-I

BASICS OF VIBRATION: Basic motion: amplitudes, period, frequency, Basic Parameters: displacement, velocity, acceleration, Units (including dB scales) and conversions, Mass, spring and damper concept, Introduction to SDOF and MDOF systems, Natural frequencies and resonance, Forced response.

UNIT-II

VIBRATION MEASUREMENTS AND ANALYSIS: Transducers and mounting methods, Data acquisition using instrumentation recorders/data loggers, Time domain signal analysis, Orbit analysis, Filters, Frequency domain analysis (Narrow band FFT analysis), Nyquist criteria, Sampling, aliasing, windowing and averaging.

UNIT-III

VIBRATION MEASUREMENT AND ANALYSIS: Use of phase; Bode, polar and water fall plots, Constant percentage band width analysis (1/3 and 1/1 Octave analysis), Envelope detection /Spike energy analysis, Cepstral analysis, Advances in analysis (PC based and portable instruments for vibration analysis).

UNIT-IV

Fault Diagnosis, Interpreting vibration measurements for common machine faults , Imbalance, Misalignment, Mechanical looseness, Bearing and Gearing faults, Faults in Induction motors, Resonances, Some case studies, Static and Dynamic Balancing, International Standards for vibration condition monitoring.

UNIT-V

THERMOGRAPHY: The basics of infrared Thermography, Differences in equipment and specific wave length limitations, Application of IR to: Electrical inspection, Mechanical inspection, Energy conservation, How to take good thermal images, Hands-on demonstrations focusing on proper camera settings and image interpretation, Analysis of Thermal Images and Report Generation, Study of thermo graphy applications

UNIT-VI

OIL AND WEAR DEBRIS ANALYSIS: Basics of oil analysis, Monitoring condition of oil, Lubricant analysis, Physio – Chemical properties, Moisture, TAN TBN, Wear Debris analysis, Particle counting, Spectroscopy, uses & limitations, Ferrography wear particle analysis, Concept of Ferrography, Principle particle classification, Size, Shape, Composition, Concentration, Analysis procedure, Sampling & Analytical Ferrography Equipments, Severity rating.

UNIT-VII

CONDITION MONITORING OF ELECTRIC MACHINES AND MOTOR CURRENT SIGNATURE ANALYSIS: Basics of Electric Motors, Types of Electric Motors and operation, Synchronous Motors, Induction Motors, Constructional features of Squirrel Cage Induction Motors, Common faults in Induction Motors, Motor Current Signature Analysis, Electric Motor Current Waveform and its characteristics, Motor current harmonics, Stator motor current wave pattern and reflection of rotor current harmonics, Rotor bar condition analysis, Estimation of rotor bar condition

UNIT-VIII

ULTRASONIC MONITORING AND ANALYSIS: Ultrasonic Monitoring (Leak, Crack and Thickness) Basics of Ultrasonic Monitoring , Ultrasonic theory, Test taking philosophy, Ultrasonic theory, Mathematics of Ultrasound, Equipment and transducers, Inspection parameters and calibration, Immersion theory, Equipment quality control, Flaw origins and inspection methods, UT Procedure familiarization, and Study recommendations, Application of ultrasound to: Air leaks, Steam trap testing, Bearing lubrication, Electrical inspection, case studies.

TEXT BOOKS:

1.   The Vibration Analysis Handbook, J I Taylor (1994)

2.   Machinery Vibration Condition Monitoring, Lynn, Butterworth(1989)

REFERENCE BOOKS:

1.   Machinery Vibration: Measurement and Analysis. Victor Wowk(1991)

2.   Mechanical fault diagnosis and condition monitoring, RA Collacott(1977)

3.   The Vibration Monitoring Handbook (Coxmoor's Machine & Systems Condition Monitoring) (1998)

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

IV Year B.Tech. Mech. Engg. I-Sem.

RAPID PROTOTYPING
(DEPARTMENTAL ELECTIVE – I)

UNIT – I

INTRODUCTION: Prototyping fundamentals, Historical development, Fundamentals of Rapid Prototyping, Advantages and Limitations of Rapid Prototyping, Commonly used Terms, Classification of RP process, Rapid Prototyping Process Chain: Fundamental Automated Processes, Process Chain.

UNIT – II

LIQUID-BASED RAPID PROTOTYPING SYSTEMS: Stereo lithography Apparatus (SLA): Models and specifications, Process, working principle, photopolymers, photo polymerization, Layering technology, laser and laser scanning, Applications, Advantages and Disadvantages, Case studies. Solid ground curing (SGC): Models and specifications, Process, working principle, Applications, Advantages and Disadvantages, Case studies.

UNIT-III

SOLID-BASED RAPID PROTOTYPING SYSTEMS: Laminated Object Manufacturing (LOM): Models and specifications, Process, working principle, Applications, Advantages and Disadvantages, Case studies. Fused Deposition Modeling (FDM): Models and specifications, Process, working principle, Applications, Advantages and Disadvantages, Case studies.

UNIT – IV

POWDER BASED RAPID PROTOTYPING SYSTEMS: Selective laser sintering (SLS): Models and specifications, Process, working principle, Applications, Advantages and Disadvantages, Case studies. Three dimensional Printing (3DP): Models and specifications, Process, working principle, Applications, Advantages and Disadvantages, Case studies.

UNIT-V

RAPID TOOLING: Introduction to Rapid Tooling (RT), Conventional Tooling Vs RT, Need for RT. Rapid Tooling Classification: Indirect Rapid Tooling Methods: Spray Metal Deposition, RTV Epoxy Tools, Ceramic tools, Investment Casting, Spin Casting, Die casting, Sand Casting, 3D Keltool

process. Direct Rapid Tooling: Direct AIM, LOM Tools, DTM Rapid Tool Process, EOS Direct Tool Process and Direct Metal Tooling using 3DP.

UNIT – VI

RAPID PROTOTYPING DATA FORMATS: STL Format, STL File Problems, Consequence of Building Valid and Invalid Tessellated Models, STL file Repairs: Generic Solution, Other Translators, Newly Proposed Formats.

UNIT-VII

RAPID PROTOTYPING SOFTWARE'S: Features of various RP software's like Magics, Mimics, Solid View, View Expert, 3 D View, Velocity 2, Rhino, STL View 3 Data Expert and 3 D doctor.

UNIT –VIII

RP APPLICATIONS: Application – Material Relationship, Application in Design, Application in Engineering, Analysis and Planning, Aerospace Industry, Automotive Industry, Jewelry Industry, Coin Industry, GIS application, Arts and Architecture. RP Medical and Bioengineering Applications: Planning and simulation of complex surgery, Customized Implants & Prosthesis, Design and Production of Medical Devices, Forensic Science and Anthropology, Visualization of Bimolecular.

TEXT BOOK:

1. Rapid prototyping: Principles and Applications - Chua C.K., Leong K.F. and LIM C.S, World Scientific publications

REFERENCE BOOKS:

1. Rapid Manufacturing – D.T. Pham and S.S. Dimov, Springer

2. Wholers Report 2000 – Terry Wohlers, Wohlers Associates

3. Rapid Prototyping & Manufacturing – Paul F.Jacobs, ASME Press

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

IV Year B.Tech. Mech. Engg. I-Sem.

SIMULATION LAB

1. **DRAFTING:** Development of part drawings for various components in the form of orthographic and isometric. Representation of Dimensioning and tolerances scanning and plotting. Study of script, DXE and IGES files.

2. **PART MODELING:** Generation of various 3D Models through Protrusion, revolve, shell sweep. Creation of various features. Study of parent child relation. Feature based and Boolean based modeling surface and Assembly Modeling. Study of various standard Translators. Design simple components.

3. a). Determination of deflection and stresses in 2D and 3D trusses and beams.

    b). Determination of deflections component and principal and Von-mises stresses in plane stress, plane strain and Axisymmetric components.

    c). Determination of stresses in 3D and shell structures (at least one example in each case)

    d). Estimation of natural frequencies and mode shapes, Harmonic response of 2D beam.

    e). Steady state heat transfer Analysis of plane and Axisymmetric components.

4. a). Development of process sheets for various components based on tooling Machines.

    b). Development of manufacturing and tool management systems.

    c). Study of various post processors used in NC Machines.

    d). Development of NC code for free form and sculptured surfaces using CAM packages.

e). Machining of simple components on NC lathe and Mill by transferring NC Code / from a CAM package. Through RS 232.

f) Quality Control and inspection.

Packages to be provided to cater to drafting, modeling & analysis from the following:

Auto CAD, Micro Station, CATIA, Pro-E, I-DEAS, ANSYS, NISA, CAEFEM, Gibbs CAM, Master CAM etc.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

IV Year B.Tech. Mech. Engg. I-Sem.

ADVANCED ENGLISH COMMUNICATION SKILLS LAB

1. Introduction

The introduction of the English Language Lab is considered essential at 3rd year level. At this stage the students need to prepare themselves for their careers which may require them to listen to, read, speak and write in English both for their professional and interpersonal communication in the globalised context. The proposed course should be an integrated theory and lab course to enable students to use 'good' English and perform the following:

i)   Gather ideas and information, to organise ideas relevantly and coherently.

ii)   Engage in debates.

iii)   Participate in group discussions.

iv)   Face interviews.

v)   Write project/research reports/technical reports.

vi)   Make oral presentations.

vii)   Write formal letters.

viii) Transfer information from non-verbal to verbal texts and vice versa.

ix)   To take part in social and professional communication.

2. Objectives:

This Lab focuses on using computer-aided multimedia instruction for language development to meet the following targets:

i)   To improve the students' fluency in English, through a well-developed vocabulary and enable them to listen to English spoken at normal conversational speed by educated English speakers and respond appropriately in different socio-cultural and professional contexts.

ii)   Further, they would be required to communicate their ideas relevantly and coherently in writing.

3. Syllabus:

The following course content is prescribed for the Advanced Communication Skills Lab:

i) Functional English - starting a conversation – responding appropriately and relevantly – using the right body language – role play in different situations.

ii) Vocabulary building – synonyms and antonyms, word roots, one-word substitutes, prefixes and suffixes, study of word origin, analogy, idioms and phrases.

iii) Group Discussion – dynamics of group discussion, intervention, summarizing, modulation of voice, body language, relevance, fluency and coherence.

iv) Interview Skills – concept and process, pre-interview planning, opening strategies, answering strategies, interview through tele and video-conferencing.

v) Resume' writing – structure and presentation, planning, defining the career objective, projecting ones strengths and skill-sets, summary, formats and styles, letter-writing.

vi) Reading comprehension – reading for facts, guessing meanings from context, scanning, skimming, inferring meaning, critical reading.

vii) Technical Report writing – Types of formats and styles, subject matter – organization, clarity, coherence and style, planning, data-collection, tools, analysis.

4. Minimum Requirement:

The English Language Lab shall have two parts:

i) **The Computer aided Language Lab** for 60 students with 60 systems, one master console, LAN facility and English language software for self- study by learners.

ii) **The Communication Skills Lab** with movable chairs and audio-visual aids with a P.A System, a T. V., a digital stereo –audio & video system and camcorder etc.

System Requirement (Hardware component):

Computer network with Lan with minimum 60 multimedia systems with the following specifications:

iii)   P – IV Processor

    a)   Speed – 2.8 GHZ

    b)   RAM – 512 MB Minimum

    c)   Hard Disk – 80 GB

iv)   Headphones of High quality

5. Suggested Software:

The software consisting of the prescribed topics elaborated above should be procured and used.

Suggested Software:

i)   **Clarity Pronunciation Power** – part II

ii)   **Oxford Advanced Learner's Compass**, 7th Edition

iii)   **DELTA's key to the Next Generation TOEFL Test: Advanced Skill Practice.**

iv)   **Lingua TOEFL CBT Insider**, by Dreamtech

v)   **TOEFL & GRE**(KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS)

●   **The following software from 'train2success.com'**

i)   **preparing for being interviewed,**

ii)   **Positive Thinking,**

iii)   **Interviewing Skills,**

iv)   **Telephone Skills,**

v)   **Time Management**

vi)   **Team Building,**

vii)   **Decision making**

    English in Mind, Herbert Puchta and Jeff Stranks with Meredith Levy, Cambridge

6. Books Recommended:

1.   **Effective Technical Communication**, M. Ashraf Rizvi, Tata Mc. Graw-

Hill Publishing Company Ltd.

2. **A Course in English communication** by Madhavi Apte, Prentice-Hall of India, 2007.

3. **Communication Skills** by Leena Sen, Prentice-Hall of India, 2005.

4. **Academic Writing- A Practical guide for students** by Stephen Bailey, Rontledge Falmer, London & New York, 2004.

5. **English Language Communication: A Reader cum Lab Manual** Dr A Ramakrishna Rao, Dr G Natanam & Prof SA Sankaranarayanan, Anuradha Publications, Chennai

6. **Body Language- Your Success Mantra** by Dr. Shalini Verma, S. Chand, 2006.

7. **DELTA's key to the Next Generation TOEFL Test: Advanced Skill Practice**, New Age International (P) Ltd., Publishers, New Delhi.

8. Books on **TOEFL/GRE/GMAT/CAT** by Barron's/cup

9. **IELTS series with CDs** by Cambridge University Press.

10. **Technical Report Writing Today** by Daniel G. Riordan & Steven E. Pauley, Biztantra Publishers, 2005.

11. **Basic Communication Skills for Technology** by Andra J. Rutherford, 2nd Edition, Pearson Education, 2007.

12. **Communication Skills for Engineers** by Sunita Mishra & C. Muralikrishna, Pearson Education, 2007.

13. **Objective English** by Edgar Thorpe & Showick Thorpe, 2nd edition, Pearson Education, 2007.

14. **Cambridge Preparation for the TOEFL** Test by Jolene Gear & Robert Gear, 4th Edition.

15. **Technical Communication** by Meenakshi Raman & Sangeeta Sharma, Oxford University Press.

DISTRIBUTION AND WEIGHTAGE OF MARKS:

Advanced Communication Skills Lab Practicals:

1. The practical examinations for the English Language Laboratory practice shall be conducted as per the University norms prescribed for the core engineering practical sessions.

2. For the English Language lab sessions, there shall be a continuous evaluation during the year for 25 sessional marks and 50 End Examination marks. Of the 25 marks, 15 marks shall be awarded for day-to-day work and 10 marks to be awarded by conducting Internal Lab Test(s). The End Examination shall be conducted by the teacher concerned with the help of another member of the staff of the same department of the same institution.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

IV Year B.Tech. Mech. Engg. I-Sem.

MICRO ELECTRO MECHANICAL SYSTEMS (MEMS)
(OPEN ELECTIVE)

UNIT – I

INTRODUCTION: Definition of MEMS, MEMS history and development, micro machining, lithography principles & methods, structural and sacrificial materials, thin film deposition, impurity doping, etching, surface micro machining, wafer bonding, LIGA.

UNIT – II

MECHANICAL SENSORS AND ACTUATORS: Principles of sensing and actuation: beam and cantilever, capacitive, piezo electric, strain, pressure, flow, pressure measurement by micro phone, MEMS gyroscopes, shear mode piezo actuator, gripping piezo actuator, Inchworm technology.

UNIT – III

THERMAL SENSORS AND ACTUATORS: Thermal energy basics and heat transfer processes, thermisters, thermo devices, thermo couple, micro machined thermo couple probe, peltier effect heat pumps, thermal flow sensors, micro hot plate gas sensors, MEMS thermo vessels, pyro electricity, shape memory alloys (SMA), U-shaped horizontal and vertical electro thermal actuator, thermally activated MEMS relay, micro spring thermal actuator, data storage cantilever.

UNIT – IV

MICRO-OPTO-ELECTRO MECHANICAL SYSTEMS: Principle of MOEMS technology, properties of light, light modulators, beam splitter, micro lens, micro mirrors, digital micro mirror device (DMD), light detectors, grating light valve (GLV), optical switch, wave guide and tuning, shear stress measurement.

UNIT – V

MAGNETIC SENSORS AND ACTUATORS: Magnetic materials for MEMS and properties, magnetic sensing and detection, magneto resistive sensor, more on hall effect, magneto diodes, magneto transistor, MEMS magnetic sensor, pressure sensor utilizing MOKE, mag MEMS actuators, by directional

micro actuator, feedback circuit integrated magnetic actuator, large force reluctance actuator, magnetic probe based storage device.

UNIT – VI

RADIO FREQUENCY (RF) MEMS: RF – based communication systems, RF MEMS, MEMS inductors, varactors, tuner/filter, resonator, clarification of tuner, filter, resonator, MEMS switches, phase shifter.

UNIT – VII

MICRO FLUIDIC SYSTEMS: Applications, considerations on micro scale fluid, fluid actuation methods, dielectro phoresis (DEP), electro wetting, electro thermal flow, thermo capillary effect, electro osmosis flow, opto electro wetting (OEW), tuning using micro fluidics, typical micro fluidic channel, microfluid dispenser, micro needle, molecular gate, micro pumps.

UNIT - VIII

CHEMICAL AND BIO MEDICAL MICRO SYSTEMS: Sensing mechanism & principle, membrane-transducer materials, chem.-lab-on-a-chip (CLOC) chemoresistors, chemocapacitors, chemotransistors, electronic nose (E-nose), mass sensitive chemosensors, fluroscence detection, calorimetric spectroscopy.

TEXT BOOK:

1. MEMS, Nitaigour Premchand Mahalik, TMH Publishing co.

REFERENCE BOOKS:

1. Foundation of MEMS, Chang Liu, Prentice Hall Ltd.

2. Bio-MEMS (Micro systems), Gerald Urban, Springer.

3. MEMS and Micro Systems: Design and Manufacture, Tai-Ran Hsu, TMH Publishers.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

IV Year B.Tech. Mech. Engg. I-Sem.

INDUSTRIAL ROBOTICS
(OPEN ELECTIVE)

UNIT – I

Automation and Robots-Technology of Robots-Economics and social issues-General characteristics of Robots-Basic components-Robot configuration-Robot selection.

UNIT-II

Robot classification-Arm Geometry-Degree of Freedom-Power Sources-Types of Motion-Path control-Intelligence Level. Robot System Analysis-Robot Operation-Hierarchical Control Structure-Line Tracking-Dynamic Properties of Robots-Modular Robot Components. Robot End Effectors-Types of End Effectors-Mechanical Grippers-Gripper Force Analysis—Other Types of Grippers.

UNIT-III

Sensors-Robot sensors-Sensor Classification-Micro switches-Solid-State Switches-Proximity Sensors-Photoelectric Sensors-Rotary Position Sensors-Usage and Selection of Sensors-Signal Processing. Vision-Visual Sensing-Machine Vision-Machine Vision Applications.

UNIT-IV

Control Systems-Control System Correlation-Control System Requirements-Programmable Logic Controller-PLC Programming Terminals-Proportional-Integral-Derivative-Computer Numerical Control-Microprocessor Unit-Work cell Control.

UNIT-V

Programming-Robot Programming-Programming Methods-Programming Languages-Levels of Robot Programming-Motion Interpolation-Sample Programs.

UNIT-VI

Artificial Intelligence-Intelligent Systems-Elements of Artificial Intelligence-System Architecture-Applications of Advanced Robots-Fuzzy Logic controls-Advanced Concepts and Procedures-Future Developments.

UNIT-VII

Safety-Robot Safety-Safety standards-System Reliability-Human Factor Issues-Safety Sensors and Monitoring-Safeguarding—Training-Safety Guide lines-Definitions.

UNIT-VIII

Industrial Applications-Automation in Manufacturing-Robot Applications-Material-Handling Applications-Processing Operations-Assembly Operations-Inspection Operations-Evaluating The Potential of a Robot Application-Future Applications-Innovations.

TEXT BOOKS:

1. Robot Technology Fundamentals by James G.Keramas, Cengage Learning.

2. Industrial Robotics by Mikell P.Groover, Weiss, Nagel, Odrey/ McGrawHill.

REFERENCE BOOKS:

1. Robotics, K.S Fu/McGrawHill

2. Introduction to Robotics, Mechanics & Control by John J.Craig/Pearson 3rd edition

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

IV Year B.Tech. Mech. Engg. II-Sem.

INTERACTIVE COMPUTER GRAPHICS

UNIT-I

INTRODUCTION: Application areas of Computer graphics, overview of graphic system, video-display devices, raster-scan systems, random scan systems, graphics monitors and work stations, introduction to PHIGS &GKS and input devices, input device handling algorithms

UNIT-II

OUTPUT PRIMITIVES: Points and lines, line drawing algorithms, mid-point circle algorithm,

Filled area primitives: scan-line polygon fill algorithm, boundary-fill and flood-fill algorithm.

UNIT-III

2-D VIEWING : The viewing pipe-line, viewing coordinate reference frame, window to view-port co-ordinate transformations, viewing function, Cohen-Sutherland and Cyrus-beck line clipping algorithms, Sutherland-Hodgeman polygon clipping algorithm, segments.

UNIT-IV

3-D OBJECT REPRESENTATION: spline representation, Hermite curve, Bezier curve and B-spline curve, Polygon surfaces, quadric surfaces, Solid modeling Schalars – wire frame, CSG, B-rep. Bezier and B-spline surfaces

UNIT –V

Illumination: Basic illumination models, Light sources, diffuse reflection-lambert's cosine law and point source illumination, specular reflection, Transparency and shadows.

Shading algorithms: Constant intensity algorithm, Phong's shading algorithm, gourand shading algorithm, Comparison of shading algorithms.

UNIT -VI

Visible surface detection methods: Classification, back-face detection, depth-buffer, scan-line, depth sorting

UNIT-VII

COMPUTER ANIMATION: Design of animation sequence, general computer animation functions, raster animation, computer animation language, key frame system, motion specification.

UNIT-VIII

MULTIMEDIA

Introduction: Multimedia-Systems, Technology, Architecture, Hardware trade-offs, contents, PC, Applications, Data compressions, Authoring System

MULTIMEDIA AUTHORING TOOLS

Introduction, types of authoring tools, page based/In card authoring tools, icon-based authoring tools,

Time-based and presentation tools, Object-oriented authoring tools, authorware professional for windows (APW).

TEXT BOOKS:

1.	"Computer Graphics C version" Donald Hearn and M. Pauline Baker, Pearson/PHI

2.	"Computer Graphics Principles & practice", second edition in C, Foley, VanDam, Feiner and Hughes, Pearson Education

REFERENCE BOOKS:

1.	"Computer graphics a practical approach", Er. Rajiv Chopra, S.chand Publications.

2.	"Computer Graphics Second edition", Zhigand xiang, Roy Plastock, Schaum's outlines, Tata Mc-Graw hill edition.

3.	Procedural elements for Computer Graphics, David F Rogers, Tata Mc Graw hill, 2nd edition.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

IV Year B.Tech. Mech. Engg. II-Sem.

METAL CORROSION
(DEPARTMENTAL ELECTIVE – II)

UNIT-I

Corrosion –Theoretical aspects. Electrolysis. Principles. Faraday's laws and their application. Current efficiency. Energy efficiency. Ion conductivity. Equivalent and motor conductivities. Tonic mobilities and Transport Nos. Electrode potential, Equilibrium potentials – EMF series. Polarization, over voltage/over potential.

UNIT-II

Activation, concentration, Ohmic polarization. Effect of polarization on electrode processes. Corrosion as an irreversible electrode process. Tafels equation. Tafels slopes. Effect of Temperature, composition and concentration of the corrosive media. Kinetics of electrode process (briefly). Passivity

UNIT-III

Electronic processes. Cathodic Technical processes. Brief classification. Anodic technical process. Corrosion – Electrochemical aspects of Corrosion. Corrosion cells/Electro chemical cells, Concentration cells, Temperature cells. Determination of Electrode potential.

UNIT-IV

Thermodynamic aspects-Nerrnest equation, Helmholtz equation. Galvanic series. Displacement equilibrium and its significance in corrosion processes. Potential – pH, Fe-H O diagram. E- I diagrams for prediction of corrosion currents. Polarization$_2$resistance , Linear polarization technique for evaluation of Icorr.

UNIT-V

Corrosion – Practical aspects .Importance. Direct and indirect losses. Types and Forms of Corrosion. Uniform Corrosion, Pitting Corrosion, Galvanic Corrosion, and Integranular Corrosion, Stress Corrosion cracking. Cavitation Erosion, Erosion Corrosion. Corrosion Fatigue. Differential aeration corrosion. Corrosion rate expressions.

UNIT-VI

Testing methods. Effect of velocity, flow-rate, concentration, temperature and inhibitors on corrosion rates. Corrosion rate calculations.

UNIT-VII

Corrosion prevention, 1) Design aspects 2) Alteration of Environment inhibitors 3) Alteration of the material, pure metals alloys, Non-metallic as structural materials – Reinforcement of the material for reducing, Corrosion rates. 4) Surface protection. Electroplating, Principles – Throwing power and its evaluation.

UNIT-VIII

Commercial plating of Cu, Ni, Cr, Cd, Zn, Ag, Au. Electro-deposition of alloys plating structure of Electro deposits and testing of deposits. 5) Anodic oxidation of Aluminum and its alloys. Commercial anodizing process. Faults in the anodic coating and the remedies. Treatment after anodizing. 6) Cathodic and Anodic protection.

TEXT BOOKS:

1. An introduction to Electrometallurgy, Sharan and Narain, Standard Publishers

2. Corrosion Engineering, MG Fountana, Mc-Graw Hill book company

REFERENCE BOOK:

1. Electro Beam Analysis of Materials, Loretto.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

IV Year B.Tech. Mech. Engg. II-Sem.

NANO TECHNOLOGY
(DEPARTMENTAL ELECTIVE – II)

UNIT-I

GENERAL INTRODUCTION: Basics of Quantum Mechanics, Harmonic oscillator, magnetic Phenomena, band structure in solids, Mossbauer and Spectroscopy, optical phenomena bonding in solids, Anisotropy.

UNIT-II

SILICON CARBIDE: Application of Silicon carbide, nano materials preparation, Sintering of SiC, X-ray Diffraction data, electron microscopy sintering of nano particles,

NANO PARTICLES OF ALUMINA AND ZIRCONIA: Nano materials preparation, Characterization, Wear materials and nano composites,

UNIT-III

MECHANICAL PROPERTIES: Strength of nano crystalline SiC, Preparation for strength measurements, Mechanical properties, Magnetic properties,

Unit -IV

ELECTRICAL PROPERTIES: Switching glasses with nanoparticles,Electronic conduction with nano particles

OPTICAL PROPERTIES: Optical properties, special properties and the coloured glasses

UNIT-V

Process of synthesis of nano powders, Electro deposition, Important Nano materials

UNIT-VI:

INVESTIGAING AND MANIPULATING MATERIALS IN THE NANOSCALE: Electron microscopics, scanning probe microscopics, optical microscopics for nano science and technology, X-ray diffraction.

UNIT-VII

NANOBIOLOGY: Interaction between bimolecules and nanoparticle surface,

Different types of inorganic materials used for the synthesis of hybrid nano-bio assemblies, Application of nano in biology, naoprobes for Analytical Applications-A new Methodology in medical diagnostics and Biotechnology, Current status of nano Biotechnology, Future perspectives of Nanobiology, Nanosensors.

UNIT-VIII

NANOMEDICENS: Developing of Nanomedicens Nanosytems in use,Protocols for nanodrug Administration, Nanotechnology in Diagnostics applications, materials for used in Diagnostics and Therapeutic applications, Molecular Nanomechanics, Molecular devices, Nanotribology, studying tribology at nanoscale, Nanotribology applications.

TEXT BOOKS:

1.	Nano Materials- A.K.Bandyopadhyay/ New Age Publishers.

2.	Nano Essentials- T.Pradeep/TMH

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

IV Year B.Tech. Mech. Engg. II-Sem.

AUTOMATION IN MANUFACTURING
(DEPARTMENTAL ELECTIVE – II)

UNIT-I

INTRODUCTION: Types and strategies of automation, pneumatic and hydraulic components, circuits, Automation in machine tools, Mechanical feeding and tool changing and machine tool control.

UNIT – II

AUTOMATED FLOW LINES: Methods of part transport, transfer mechanism, buffer storage, control function, design and fabrication considerations.

UNIT – III

ANALYSIS OF AUTOMATED FLOW LINES: General terminology and analysis of transfer lines without and with buffer storage, partial automation, implementation of automated flow lines.

UNIT – IV

ASSEMBLY SYSTEM AND LINE BALANCING: Assembly process and systems, assembly line, line balancing methods, ways of improving line balance, flexible assembly lines.

UNIT – V

AUTOMATED MATERIAL HANDLING: Types of equipment, functions, analysis and design of material handling systems, conveyor systems, automated guided vehicle systems.

UNIT-VI

AUTOMATED STORAGE SYSTEMS: Automated storage and retrieval systems; work in process storage, interfacing handling and storage with manufacturing.

UNIT – VII

ADAPTIVE CONTROL SYSTEMS: Introduction, adaptive control with optimization, Adaptive control with constraints, Application of A.C. in Machining operations. Use of various parameters such as cutting force,

temperatures, vibration and acoustic emission.

UNIT – VIII

Automated inspection: Fundamentals, types of inspection methods and equipment, CMM, machine vision.

TEXT BOOK:

1. Automation, Production Systems and Computer Integrated Manufacturing: M.P. Groover./ PE/PHI

REFERENCE BOOKS:

1. Computer Control of Manufacturing Systems by Yoram Coren.

2. CAD / CAM/ CIM by Radhakrishnan.

3. Automation by W. Buekinsham.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

IV Year B.Tech. Mech. Engg. II-Sem.

INDUSTRIAL HYDRAULICS & PNEUMATICS
(DEPARTMENTAL ELECTIVE – II)

UNIT – I

Fundamentals of Fluid Power Systems-Introduction-types advantages, disadvantages & applications-fluid characteristics-terminologies used in fluid power-hydraulic symbols-hydraulic systems and components-sources-pumping theory-gear, vane & piston pumps.

UNIT-II

Fluid Power Actuators: Introduction-hydraulic actuators-hydraulic cylinders-types, construction, specifications and special types. Hydraulic motors-Working principle-selection criteria for various types-Hydraulic motors in circuits- Formulae-numerical problems

UNIT-III

Hydraulic elements in the design of circuits- Introduction-control elements-direction control valve-check valve-Pressure control valve-Relief valve-Throttle valve-Temperature & Pressure compensation-locations of flow control valve

UNIT-IV

Accumulators & Intensifiers-Types, size &function of accumulators-application & circuits of accumulators- Intensifiers-circuit & Applications.

UNIT-V

Design & drawing of hydraulic circuits-Introduction-case study & specifications-method of drawing a hydraulic circuit-hydraulic cylinder-quick return of a hydraulic cylinder

UNIT-VI

Pneumatic systems-Introduction-symbols used-concepts & components-comparision-types & specifications of compressors-arrangement of a complete pneumatic system-compressed air behaviour- understanding pneumatic circuits-direction control valves

UNIT-VII

Electro pneumatics- Introduction-Pilot operated solenoid valve-electrical

connections to solenoids-electro pneumatic circuit switches-relays-solenoids-P.E converter-concept of latching

UNIT-VIII

Applications-Servo systems-Introduction-closed loop, hydro-mechanical and electro hydraulic – conventional and proportional valves-characteristics of proportional and servo valves- PLC applications in fluid power – selected pneumatic / electro pneumatic circuit problems – failure and trouble shooting in fluid power systems.

TEXT BOOKS:

1. Introduction to Hydraulics and Pneumatics by S. Ilango and V. Soundararajan, PHI , New Delhi

2. Applied hydraulics and pneumatics-T. Sunder Selwyn & R. Jayendiran, Anuradha Publications.

REFERENCE BOOKS:

1. Oil Hydraulic Systems, S.R .Majumdar, McGrawHill Companies

2. Pneumatic Systems: Principles and Maintenance, Majumdar, McGrawHill

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

IV Year B.Tech. Mech. Engg. II-Sem.

NON - DESTRUCTIVE EVALUATION
(DEPARTMENTAL ELECTIVE – III)

UNIT – I

ULTRA SONIC HARDNESS TESTING: Flaw Detection Using Dye Penetrants. Magnetic Particle Inspection introduction to electrical impedance, Principles of Eddy Current testing, Flaw detection using eddy currents.

UNIT – II

INTRODUCTION TO X-RAY RADIOGRAPHY: The Radiographic process, X-Ray and Gamma-ray sources, Geometric Principles, Factors Governing Exposure, Radio graphic screens, Scattered radiation, Arithmetic of exposure, Radiographic image quality and detail visibility, Industrial X-Ray films

UNIT – III

X-RAY RADIOGRAPHY PROCESSES: Fundamentals of processing techniques, Process control, The processing Room, Special Processing techniques, Paper Radiography, Sensitometric characteristics of x-ray films, Film graininess signal to noise ratio in radiographs, The photographic latent image, Radiation Protection

UNIT – IV

INTRODUCTION TO ULTRASONIC TESTING: Generation of ultrasonic waves, Horizontal and shear waves, Near field and far field acoustic wave description, Ultrasonic probes- straight beam, direct contact type, Angle beam, Transmission/reflection type, and delay line transducers, acoustic coupling and media

UNIT – V

ULTRASONIC TESTS: Transmission and pulse echo methods, A-scan, B-scan, C-scan, F-scan and P- scan modes, Flaw sizing in ultrasonic inspection: AVG, Amplitude, Transmission, TOFD, Satellite pulse, Multi-modal transducer, Zonal method using focused beam. Flow location methods, Signal processing in Ultrasonic NDT; Mimics, spurious echos and noise. Ultrasonic flaw evaluation.

UNIT – VI

HOLOGRAPHY: Principles and practices of Optical holography, acoustical, microwave, x-ray and electron beam holography techniques.

UNIT – VII

APPLICATIONS - I: NDT in flaw analysis of Pressure vessels, piping

UNIT – VIII

APPLICATIONS - II: NDT in Castings, Welded constructions, etc., Case studies.

TEXT BOOKS:

1. Ultrasonic testing by Krautkramer and Krautkramer

2. Ultrasonic inspection 2 Training for NDT: E. A. Gingel, Prometheus Press,

3. ASTM Standards, Vol 3.01, Metals and alloys

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

IV Year B.Tech. Mech. Engg. II-Sem.

DATA BASE MANAGEMENT SYSTEMS
(DEPARTMENTAL ELECTIVE – III)

UNIT – I

Data base System Applications, data base System VS file System – View of Data – Data Abstraction – Instances and Schemas – data Models – the ER Model – Relational Model – Other Models – Database Languages – DDL – DML – database Access for applications Programs – data base Users and Administrator – Transaction Management – data base System Structure – Storage Manager – the Query Processor

UNIT – II

History of Data base Systems.Data base design and ER diagrams – Beyond ER Design Entities, Attributes and Entity sets – Relationships and Relationship sets – Additional features of ER Model – Concept Design with the ER Model – Conceptual Design for Large enterprises.

UNIT – III

Introduction to the Relational Model – Integrity Constraint Over relations – Enforcing Integrity constraints – Querying relational data – Logical data base Design – Introduction to Views – Destroying /altering Tables and Views.

Relational Algebra – Selection and projection set operations – renaming – Joins – Division – Examples of Algebra overviews – Relational calculus – Tuple relational Calculus – Domain relational calculus – Expressive Power of Algebra and calculus.

UNIT – IV

Form of Basic SQL Query – Examples of Basic SQL Queries – Introduction to Nested Queries – Correlated Nested Queries Set – Comparison Operators – Aggregative Operators – NULL values – Comparison using Null values – Logical connectivity's – AND, OR and NOT – Impact on SQL Constructs – Outer Joins – Disallowing NULL values – Complex Integrity Constraints in SQL Triggers and Active Data bases.

UNIT – V

Schema refinement – Problems Caused by redundancy – Decompositions – Problem related to decomposition– reasoning about FDS – FIRST, SECOND, THIRD Normal forms – BCNF – Lossless join Decomposition – Dependency preserving Decomposition – Schema refinement in Data base Design – Multi valued Dependencies – FORTH Normal Form.

UNIT – VI

Transaction Concept- Transaction State- Implementation of Atomicity and Durability – Concurrent – Executions – Serializability- Recoverability – Implementation of Isolation – Testing for serializability- Lock – Based Protocols – Timestamp Based Protocols- Validation- Based Protocols – Multiple Granularity.

UNIT – VII

Recovery and Atomicity – Log – Based Recovery – Recovery with Concurrent Transactions – Buffer Management – Failure with loss of nonvolatile storage- Advance Recovery systems- Remote Backup systems.

UNIT – VIII

Data on External Storage – File Organization and Indexing – Cluster Indexes, Primary and Secondary Indexes – Index data Structures – Hash Based Indexing – Tree base Indexing – Comparison of File Organizations – Indexes and Performance Tuning- Intuitions for tree Indexes – Indexed Sequential Access Methods (ISAM) – B+ Trees: A Dynamic Index Structure.

TEXT BOOKS:

1. Data base Management Systems, Raghurama Krishnan, Johannes Gehrke, TATA McGrawHill 3rd Edition

2. Data base System Concepts, Silberschatz, Korth, McGraw hill, V edition.

REFERENCE BOOKS:

1. Data base Systems design, Implementation, and Management, Peter Rob & Carlos Coronel 7th Edition.

2. Fundamentals of Database Systems, Elmasri Navrate Pearson Education

3. Introduction to Database Systems, C.J.Date Pearson Education

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

IV Year B.Tech. Mech. Engg. II-Sem.

ADVANCED MATERIALS
(DEPARTMENTAL ELECTIVE – III)

UNIT-I

INTRODUCTION TO COMPOSITE MATERIALS: Introduction ,Classification: Polymer Matrix Composites, Metal Matrix Composites, Ceramic Matrix Composites, Carbon–Carbon Composites, Fiber- Reinforced Composites and nature-made composites, and applications .

UNIT-II

REINFORCEMENTS: Fibres- Glass, Silica, Kevlar, carbon, boron, silicon carbide, and born carbide fibres. Particulate composites, Polymer composites, Thermoplastics, Thermosetts, Metal matrix and ceramic composites.

UNIT-III

MANUFACTURING METHODS: Autoclave, tape production, moulding methods, filament winding, man layup, pultrusion, RTM.

UNIT-IV

MACROMECHANICAL ANALYSIS OF A LAMINA: Introduction, Generalized Hooke's Law, Reduction of Hooke's Law in Three Dimensions to Two Dimensions, Relationship of Compliance and Stiffness Matrix to Engineering Elastic Constants of an orthotropic Lamina, Laminate-Laminate code.

UNIT-V

METAL MATRIX AND CERAMIC MATRIX COMPOSITES: Manufacturing of C.M.C & metal matrix composites and their applications, stress strain relations for MMC and CMC.

UNIT-VI

FUNCTIONALLY GRADED MATERIALS: Types of Functionally graded materials-classification-different systems-Preparation-Properties and applications of Functionally graded materials.

UNIT-VII

SHAPE MEMORY ALLOYS: Introduction-Shape memory effect-Classification of shape memory alloys-Composition-Properties and applications of shape memory alloys.

UNIT-VIII

NANO MATERIALS: Introduction-Properties at nano scales-advantages & disadvantages-applications in comparison with bulk materials (Nano – structure, wires, tubes, composites). State of art nano advanced- topic delivered by student.

TEXT BOOKS:

1. Nano material by A.K. Bandyopadyay, New age Publishers

2. Material science and Technology- Cahan

3. Engineering Mechanics of Composite Materials by Isaac and M Daniel, Oxford University Press

REFERENCE BOOKS:

1. R. M. Jones, Mechanics of Composite Materials, Mc Graw Hill Company, New York, 1975.

2. L. R. Calcote, Analysis of Laminated Composite Structures, Van Nostrand Rainfold.

3. B. D. Agarwal and L. J. Broutman, Analysis and performance of fibre Composites, Wiley-Interscience, New York, 1980

4. Mechanics of Composite Materials, Second Edition (Mechanical Engineering), Autar K.Kaw, Publisher: CRC

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

IV Year B.Tech. Mech. Engg. II-Sem.

POWER PLANT ENGINEERING
(DEPARTMENTAL ELECTIVE – III)

UNIT – I

Introduction to the Sources of Energy – Resources and Development of Power in India.

STEAM POWER PLANT: Plant Layout, Working of different Circuits, Fuel handling equipments, types of coals, coal handling, choice of handling equipment, coal storage, Ash handling systems.

UNIT II

STEAM POWER PLANT: Combustion: Properties of coal – overfeed and underfeed fuel beds, traveling grate stokers, spreader stokers, retort stokers, pulverized fuel burning system and its components, combustion needs and draught system, cyclone furnace, design and construction, Dust collectors, cooling towers and heat rejection. Corrosion and feed water treatment.

UNIT – III

INTERNAL COMBUSTION AND GAS TURBINE POWER PLANTS:

DIESEL POWER PLANT: Plant layout with auxiliaries – fuel supply system, air starting equipment, super charging.

GAS TURBINE PLANT: Introduction – classification – construction–layout with auxiliaries, combined cycle power plants and comparison.

UNIT – IV

HYDRO ELECTRIC POWER PLANT: Water power – Hydrological cycle – flow measurement – drainage area characteristics – Hydrographs – storage and pondage – classification of dams and spill ways.

HYDRO PROJECTS AND PLANT: Classification – typical layouts – plant auxiliaries – plant operation pumped storage plants.

UNIT – V

NUCLEAR POWER STATION: Nuclear fuel – breeding and fertile materials – Nuclear reactor – reactor operation.

TYPES OF REACTORS: Pressurized water reactor, boiling water reactor,

sodium-graphite reactor, fast breeder reactor, homogeneous reactor, gas cooled reactor, radiation hazards and shielding – radioactive waste disposal.

UNIT – VI

COMBINED OPERATIONS OF DIFFERENT POWER PLANTS: Introduction, advantages of combined working, load division between power stations, storage type hydro-electric plant in combination with steam plant, run-of-river plant in combination with steam plant, pump storage plant in combination with steam or nuclear power plant, co-ordination of hydro-electric and gas turbine stations, co-ordination of hydro-electric and nuclear power stations, co-ordination of different types of power plants.

UNIT – VII

POWER PLANT INSTRUMENTATION AND CONTROL: Importance of measurement and instrumentation in power plant, measurement of water purity, gas analysis, O_2 and CO_2 measurements, measurement of smoke and dust, measurement of moisture in carbon dioxide circuit, nuclear measurements.

UNIT – VIII

POWER PLANT ECONOMICS AND ENVIRONMENTAL CONSIDERATIONS: Capital cost, investment of fixed charges, operating costs, general arrangement of power distribution, load curves, load duration curve. definitions of connected load, maximum demand, demand factor, average load, load factor, diversity factor – related exercises. effluents from power plants and Impact on environment – pollutants and pollution standards – methods of pollution control.

TEXT BOOKS:

1. A course in Power Plant Engineering – Arora and Domkundwar, Dhanpatrai & Co.

2. Power Plant Engineering – P.C.Sharma / S.K.Kataria Pub

REFERENCE BOOKS:

1. Power Plant Engineering: P.K.Nag/ II Edition /TMH.

2. Power station Engineering – ElWakil / McHill.

3. An Introduction to Power Plant Technology / G.D. Rai.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

IV Year B.Tech. Mech. Engg. II-Sem.

PRODUCTION PLANNING AND CONTROL
(DEPARTMENTAL ELECTIVE – IV)

UNIT – I

Introduction: Definition – Objectives and functions of production planning and control – Elements of production control – Types of production – Organization of production planning and control department – Internal organization of department.

UNIT – II

Forecasting – Importance of forecasting – Types of forecasting, their uses – General principles of forecasting – Forecasting techniques – qualitative methods and quantitive methods.

UNIT – III

Inventory management – Functions of inventories – relevant inventory costs – ABC analysis – VED analysis – EOQ model – Inventory control systems – P–Systems and Q-Systems –

UNIT – IV

Introduction to MRP I, MRP II, ERP, LOB (Line of Balance), JIT and KANBAN system.

UNIT – V

Routing – definition – routing procedure –route sheets – bill of material – factors affecting routing procedure, schedule –definition – difference with loading

UNIT – VI

Scheduling policies – techniques, standard scheduling methods.

UNIT – VII

Line Balancing, aggregate planning, chase planning, expediting, controlling aspects.

UNIT – VIII

Dispatching – Activities of dispatcher – dispatching procedure – follow up – definition – Reason for existence of functions – types of follow up, applications of computer in production planning and control.

TEXT BOOKS:

1. Elements of Production Planning and Control / Samuel Eilon.

2. Manufacturing, Planning and Control, Partik Jonsson Stig-Arne Mattsson, TataMcGrawHill

REFERENCE BOOKS:

1. Inventory Control Theory and Practice / Martin K. Starr and David W. Miller.

2. Production Planning and Control, Mukhopadyay, PHI.

3. Production Control A Quantitative Approach / John E. Biegel.

4. Production Control / Moore.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

IV Year B.Tech. Mech. Engg. II-Sem.

ADVANCED OPTIMIZATION TECHNIQUES
(DEPARTMENTAL ELECTIVE – IV)

UNIT I

INTRODUCTION TO OPTIMIZATION: Engineering applications of optimization- Statement of an optimization problem- Classification of optimization problem- Optimization techniques.

UNIT-II

CLASSICAL OPTIMIZATION TECHNIQUES: Single variable optimization- Multivariable optimization with equality constraints- Multivariable optimization with inequality constraints.

UNIT-III

NONLINEAR PROGRAMMING: One-Dimensional Minimization: Unimodal function- Elimination methods- Unrestricted search- Exhaustive search- Dichotomous search- Fibonacci method- Golden section method- Interpolation methods- Quadratic interpolation method- Cubic interpolation method- direct root method.

UNIT-IV

NONLINEAR PROGRAMMING: Unconstrained Optimization Techniques: Direct search methods- Random search methods- Univariate method- Pattern search method- Rosenbrock's method of rotating coordinates- The simplex method- Descent methods- Gradient of function- Steepest descent method- Conjugate gradient method (Fletcher-Reeves method)- Quasi-Newton methods- Variable metric method (Davidon- Fletcher-Powell method).

UNIT-V

NONLINEAR PROGRAMMING: Constrained Optimization Techniques: Characteristics of a constrained problem- Direct method- The complex method- Cutting plane method- Methods of feasible directions- Indirect methods- Transformation techniques- Basic approach in the penalty function method- Interior penalty function method- Convex programming problem- Exterior penalty function method.

UNIT-VI

GEOMETRIC PROGRAMMING (G.P): Solution of an unconstrained geometric programming, differential calculus method and arithmetic method. Primal dual relationship and sufficiency conditions. Solution of a constrained geometric programming problem (G.P.P). Complimentary geometric programming (C.G.P)

UNIT-VII

DYNAMIC PROGRAMMING (D.P): Multistage decision processes. Concepts of sub optimization, computational procedure in dynamic programming calculus method and tabular methods. Linear programming as a case of D.P., Continuous D.P.

UNIT-VIII

INTEGER PROGRAMMING (I.P): Graphical representation. Gomory's cutting plane method. Bala's algorithm for zero-one programming problem. Integer non linear programming.

TEXT BOOK:

1. Optimization Theory and Applications, by S.S.Rao, Wiley Eastern Limited, New Delhi.

REFERENCE BOOKS:

1. Engineering Optimization By Kalyanmanai Deb, Prentice Hall of India, New Delhi.

2. Optimization Techniques,C.Mohan, Kusum Deep.

3. Operations Research by S.D.Sharma

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

IV Year B.Tech. Mech. Engg. II-Sem.

GAS DYNAMICS AND JET PROPULSION
(DEPARTMENTAL ELECTIVE – IV)

UNIT-I

Introduction to gas dynamics: control volume and system approaches acoustic waves and sonic velocity - Mach number - classification of fluid flow based on mach number - mach cone-compressibility factor - General features of one dimensional flow of a compressible fluid - continuity and momentum equations for a control volume.

UNIT-II

Isentropic flow of an ideal gas: basic equation - stagnation enthalpy, temperature, pressure and density-stagnation, acoustic speed - critical speed of sound- dimensionless velocity-governing equations for isentropic flow of a perfect gas - critical flow area - stream thrust and impulse function.

UNIT-III

Steady one dimensional isentropic flow with area change-effect of area change on flow parameters- chocking- convergent nozzle - performance of a nozzle under decreasing back pressure -De lavel nozzle - optimum area ratio effect of back pressure - nozzle discharge coefficients - nozzle efficiencies.

UNIT- IV

Simple frictional flow: adiabatic flow with friction in a constant area duct-governing equations - fanno line limiting conditions - effect of wall friction on flow properties in an Isothermal flow with friction in a constant area duct-governing equations - limiting conditions.

UNIT-V

Steady one dimensional flow with heat transfer in constant area ducts-governing equations - Rayleigh line entropy change caused by heat transfer - conditions of maximum enthalpy and entropy.

UNIT-VI

Effect of heat transfer on flow parameters: Intersection of Fanno and Rayleigh lines. Shock waves in perfect gas- properties of flow across a normal shock - governing equations - Rankine Hugoniat equations - Prandtl's velocity

relationship - converging diverging nozzle flow with shock thickness - shock strength.

UNIT-VII

Propulsion: Air craft propulsion: - types of jet engines - energy flow through jet engines, thrust, thrust power and propulsive efficiency turbojet components-diffuser, compressor, combustion chamber, turbines, exhaust systems.

UNIT-VIII

Performance of turbo propeller engines, ramjet and pulsejet, scramjet engines. Rocket propulsion - rocket engines, Basic theory of equations - thrust equation - effective jet velocity - specific impulse - rocket engine performance - solid and liquid propellant rockets - comparison of various propulsion systems.

TEXT BOOKS:

1. Compressible fluid flow - A. H. Shapiro

2. Fundamentals of compressible flow with aircraft and rocket propulsion- S. M. Yahya

REFERENCE BOOKS:

1. Elements of gas dynamics - Liepman & Roshko

2. Aircraft & Missile propulsion - Zucrow

3. Gas dynamics - M.J. Zucrow & Joe D.Holfman

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

IV Year B.Tech. Mech. Engg. II-Sem.

QUALITY AND RELIABILITY ENGINEERING
(DEPARTMENTAL ELECTIVE – IV)

UNIT-I

Quality value and engineering – quality systems – quality engineering in product design and production process – system design – parameter design – tolerance design, quality costs – quality improvement.

UNIT-II

Statistical P process control   X, R, p, c charts, other types of control charts, process capability, process capability analysis, process capability index. (SQC tables can be used in the examination)

UNIT-III

 Acceptance sampling by variables and attributes, design of sampling plans, single, double, sequential and continuous sampling plans, design of various sampling plan.

UNIT-IV

Loss function, tolerance design – N type, L type, S type; determination of tolerance for these types. online quality control – variable characteristics, attribute characteristics, parameter design.

UNIT-V

Quality function deployment – house of quality, QFD matrix, total quality management concepts. quality information systems, quality circles, introduction to ISO 9000 standards.

UNIT-VI

Reliability – Evaluation of design by tests - Hazard Models, Linear, Releigh, Weibull. Failure Data Analysis, reliability prediction based on weibull distribution, Reliability improvement.

UNIT-VII

Complex system, reliability, reliability of series, parallel & standby systems

& complex systems & reliability prediction and system effectiveness.

UNIT-VIII

Maintainability, availability, economics of reliability engineering, replacement of items, maintenance costing and budgeting, reliability testing.

TEXT BOOKS:

1. Eugene Grant, Richard Leavenworth "Statistical Process Control",McGraw Hill.

2. G Taguchi, 'Quality Engineering in Production Systems', - McGraw Hill, 1989.

3. W.A. Taylor, 'Optimization & Variation Reduction in Quality', Tata McGraw Hill, 1991, 1st Edition.

REFERENCE BOOKS:

1. Frank.M.Gryna Jr. "Jurans Quality planning & Analysis", McGraw Hill.

2. Philipposs, 'Taguchi Techniques for Quality Engineering', McGraw Hill, 1996, 2nd Edition.

3. LS Srinath, 'Reliability Engineering', Affiliated East West Pvt. Ltd., 1991, 3rd Edition.

4. E.Bala Guruswamy, 'Reliability Engineering', Tata McGraw Hill, 1994.