ACADEMIC REGULATIONS

COURSE STRUCTURE AND

DETAILED SYLLABUS

Automobile Engineering

B.TECH. FOUR YEAR DEGREE COURSE

(Applicable for the batches admitted from 2012-2013)

TAMASOMA JYOTIRGAMAYA

Estd. 1995

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

An Autonomous Institute
Approved by AICTE & Affiliated to JNTUH
Accredited by NBA and NAAC with 'A' Grade

Bachupally, Nizampet (S.O), Hyderabad – 500090, Andhra Pradesh, India
Phone: 040-23042758/59/60; FAX: 040-23042761
E-Mail: postbox@vnrvjiet.ac.in, Website: www.vnrvjiet.ac.in

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY
HYDERABAD
An Autonomous Institute
Approved by AICTE, New Delhi and Govt. of A.P & Affiliated to JNTUH

ACADEMIC REGULATIONS FOR B.TECH. DEGREE COURSE
(Applicable for Students admitted from the academic year 2012-2013)

1. Courses of study

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

Branch Code	Branch
01	Civil Engineering.
02	Electrical and Electronics Engineering
03	Mechanical Engineering
04	Electronics and Communication Engineering
05	Computer Science and Engineering.
10	Electronics and Instrumentation Engineering
12	Information Technology
24	Automobile Engineering

1.1   Eligibility Criteria for Admission

The eligibility criteria for admission into engineering programmes shall be as mentioned below:

The candidate shall be an Indian National / NRI

The candidate should have completed 16 years of age as on 31st December of the academic year for which the admissions are being conducted.

The Candidate should have passed the qualifying examination (10+2) or equivalent as on the date of admission.

Seats in each programme in the Institution are classified into **Category** A and **Category** B as per the G.Os.

1.1.1 Category – A Seats

These seats will be filled through counseling as per the rank at the Common Entrance Test (EAMCET) conducted by the State Government and as per other admission criteria laid down in the G.Os.

1.1.2 Category - B Seats

These seats will be filled by the institute as per the G.Os Issued by State Government from time to time.

1.1.3 Category: Lateral Entry

The candidate shall be admitted into the Third Semester, based on the rank secured by the candidate at Engineering Common Entrance Test (ECET(FDH)) by the Convener, ECET.

2. 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 100 marks for practical subjects.** In addition, an Industry oriented mini-project, Seminar, Comprehensive viva-voce, and Project Work shall be evaluated for **50, 50, 50 and 200 marks** respectively.

   ii. For theory subjects the distribution shall be **30 marks for Mid Semester Evaluation** and **70 marks for the End-Examination**.**For theory** subjects, Two mid examinations will be conducted in each Semester as per the academic calendar. Each mid examination is evaluated for 25 marks. Two assignments are to be given to students covering the syllabus of first Mid and second Mid examinations and are evaluated for 5 marks each. .

   The first assignment shall be submitted before first mid examinations and second Assignment should be submitted before second mid examination.

   At the end of the Semester, Internal Marks (Maximum 30) for the respective subject is assigned as follows:

   (a) 25 marks: 80% from the best performed Mid examination and 20% from the other Mid examination.

   (b) 5 marks: Average of the two assignment marks

   iii. For practical subjects there shall be a continuous evaluation during the Semester for 30 **marks and 70 marks for end examination**. Out of the 30 marks, **day-to-day work in the laboratory shall be evaluated for 10 marks**, and 10 marks for practical examination (two practical examinations will be conducted and the average of the two examinations will be taken into account) and 10 marks for laboratory record.

NOTE: A student who is absent for any assignment/Mid term examination for any reason what so ever shall be deemed to have secured 'zero' marks in the test/examination and no makeup test/examination shall be conducted.

iv For the subjects having design and / or drawing, (such as Engineering Graphics, Engineering Drawing, Machine Drawing, Production Drawing Practice, and Estimation etc.,) the distribution shall be 30 **marks for internal evaluation (15 marks for day-to-day work and 15 marks for Mid examination (**the average of the two examinations will be taken into account**) and 70 marks for end semester examination.** There shall be **two Mid examinations** in a Semester.

V   There shall be an **industry-oriented mini-Project**, in collaboration with an industry of their specialization, to be taken up during the a summer vacation after III year II Semester examination. The **mini project shall be evaluated during the IV year I Semester.** The industry oriented mini project shall be submitted in report form and should be presented before a committee, which shall be evaluated for **50 marks.** The committee consists of Head of the Department, the supervisor of mini project and a senior faculty member of the department. There shall be **no Midterm assessment for industry oriented mini project. However, attending the shadow engineering program is a pre – requisite for evaluating industry – oriented mini project**. Students should submit a report on learning outcomes of the shadow engineering. Every student should attend shadow engineering programming an industry for a week days during second year I or II semester.

vi. There shall be a **Seminar presentation in IV year II Semester**. For the Seminar, the student shall collect the information on a specialized topic other than the project topic and prepare a technical report, showing his understanding of the topic, and submit to the department, which shall be evaluated by a Departmental committee consisting of the Head of the department, Seminar supervisor and a senior faculty member. **The seminar will be awarded 50 marks in which 40 marks will be evaluated for seminar report and 10 marks for MTP Record by the committee.**

vii. There shall be a **Comprehensive Viva-Voce in IV year II Semester**. The Comprehensive Viva-Voce will be conducted by a Committee consisting of the Head of the Department and three Senior Faculty members of the Department. The Comprehensive Viva-Voce is aimed to assess the student's understanding in various subjects studied during the B.Tech. course of study. The Comprehensive Viva-Voce is evaluated **for 50 marks** by the Committee. There will be **no Midterm assessment for the Comprehensive viva-voce.**

viii. The Project work shall be started by the student in the beginning of the IV year I Semester. Out of a total of **200 marks** for the project work, **60 marks shall be for Midterm Evaluation** and **140 marks for the Semester end Examination**. The viva-voce shall be conducted by a committee comprising of an external examiner, Head of the Department and the project supervisor

and one senior faculty. The evaluation of project work shall be conducted at the end of the IV year II Semester. **The Midterm Evaluation shall be on the basis of three Seminars conducted during the IV year II Semester for 30 marks by the committee consisting of Head of the Department, project supervisor and senior faculty member of the Department and for 30 marks by the supervisor of the project.**

3. **Semester end Examination**

   (a) **Theory Courses**

   Each course is evaluated for 70 marks. Examination is of 3 hours duration.

   (c) **Practical Courses**

   Each lab course is evaluated for 70 marks. The examination shall be conducted by the laboratory teacher and another senior teacher concerned with the subject of the same/other department/Industry. One examiner may be appointed by the Chief Superintendent in consultation with HOD as and when required.

   (c) **Supplementary Examinations**

   Supplementary examinations will be conducted along with regular Semester end examinations. (During even Semester regular examinations: supplementary examinations of odd Semester, and during odd Semester regular examinations: supplementary examinations of even Semester will be conducted).

4. **Attendance Requirements**

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

   ii. Condonation of shortage of attendance in aggregate **up to 10% (65% and above and below 75%)** in a Semester may be granted by **Institute Academic Committee.**

   iii. A student will not be permitted to write the end examination and not promoted to the next Semester unless he satisfies the attendance requirement of the present Semester, as applicable. He 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 semester examination of that Semester.

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

5. Minimum Academic Requirements

The following academic requirements have to be satisfied in addition to the attendance requirements mentioned in item No.**4.**

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% (25 out of 70 marks)** of **marks in the end examination and a minimum of 40% of marks in the sum total of the Midterm evaluation and end semester examination taken together.**

ii. A student shall be **promoted from II to III year** only if he fulfils the academic requirement of **37 credits from the following examinations,**
  - ➢ Two regular and one supplementary examinations of I year I Semester
  - ➢ One Regular and One Supplementary exam of I year II Semester
  - ➢ one regular examination of II year I Semester irrespective

iii. A student shall be **promoted from III year to IV year** only if he fulfils the academic requirements of total **62 credits from the following examinations,**
  - ➢ Three regular and Two supplementary examinations of I B Tech I Semester.
  - ➢ Two regular and two Supplementary examinations for I B Tech II Semester
  - ➢ Two regular and one supplementary examinations up to the end of II year I Semester.
  - ➢ One regular and one supplementary examinations of II year II Semester.
  - ➢ One regular examination of III year I Semester.

iv. A student shall register and put up minimum academic requirement in all 200 credits and earn the 200 credits. Marks obtained in all 200 credits shall be considered for the calculation of Cumulative Grade Point Average **(CGPA)**.

v. In addition to the above 200 credits the student must complete the non credit courses also. The non-credit courses awarded with a grade of satisfactory or not satisfactory based on the attendance of the student. Minimum attendance for the non-credit course is 75%.

vi. The student should also register and complete any two value added courses offered by the Institute.

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

6. Course pattern

i. The entire course of study is of four academic years. **All the I, II, III and IV years are of Semester pattern .**

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

iii. When a student is detained due to shortage of attendance in any Semester, he may be re-admitted into that Semester when it is offered next, **with the academic regulations of the batch into which he gets readmitted.**

iv. When a student is detained due to lack of credits in any year, he may be eligible to be promoted or for promotion into the next year after fulfillment of the academic requirements, **with the academic regulations of the batch into which he gets admitted**

Award of B.Tech. Degree and Class

A student will be declared eligible for the award of the B. Tech. Degree if he/she fulfils the following academic regulations:

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

ii) Registered for **200 credits** and secured **200 credits and other Academic Requirements .**

iii) complete the non-credit courses and value added courses as per their course structure.

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

7. **CGPA System:**

Method of awarding absolute grades and grade points:

The **absolute grading method** is followed, based on the total marks obtained in internal and external examinations. Grades and grade points are assigned as per the Table given below

B.Tech Program: The Absolute Grading Method is followed, based on the total marks obtained in internal and external examinations. Grades and Grade points are assigned as given below

Marks Obtained	Grade	Description of Grade	Grade Points(GP) Value Per Credit
>=90	O	Outstanding	10.00
>=80 and <89.99	A+	Excellent	9.00
>=70 and <79.99	A	Very Good	8.00
>=60 and <69.99	B	Good	7.00
>=50 and <59.99	C	Fair	6.00
>=40 and <49.99	D	Pass	5.00
<40	F	Remedial	
Not Appeared the Exam(s)	N	Absent	

The student is eligible for the award of the B.Tech degree with the class as

CGPA	CLASS
>= 7.5	First Class with Distinction
>= 6.5 and <7.5	First class
>= 5.5 and < 6.5	Second Class
>=5.0 and < 5.5	Pass class

mentioned in the Table.

Calculation of Semester Grade Points Average (SGPA):

The performance of each student at the end of the each semester is indicated in terms of SGPA. The SGPA is calculated as below:

$$SGPA = \frac{Total\ Earned\ Weighted\ Grade\ Points\ for\ that\ Semester}{Total\ Credits\ for\ the\ Semester}$$

$$SGPA = \frac{\sum_{i=1}^{P} C_i * G_i}{\sum_{i=1}^{P} C_i}$$

Where   'Ci' = Number of Credits allotted to particular subject 'I'

'Gi' = Grade Point corresponding to the letter grade awarded in that subject 'i"

'i"= 1,2,…..P represent the number of subjects for that particular semester

* **SGPA is calculated and awarded for the candidates who pass all the courses in a semester.**

Calculation of Cumulative Grade Point Average (CGPA) for Entire Programme.
The CGPA is calculated as below:

Assessment of the overall performance of a student is obtained by calculating Cumulative Grade Point Average (CGPA), which is weighted average of the grade points obtained in all subjects during the course of study.

$$CGPA = \frac{\sum_{i=1}^{m} C_i * G_i}{\sum_{i=1}^{m} C_i}$$

Where   Ci= Number of credits allotted to a particular subject 'I"

Gi = Grade Point corresponding to the letter grade awarded in that subject 'i"

I= 1,2,….m represent the number of subjects of the entire program.

Grade lower than D in any subject is not considered for CGPA calculation. The CGPA is awarded only when the student acquires the required number of credits prescribed for the program.

Grade Card

The grade card issued shall contain the following:

 a) The credits for each subject offered in that semester
 b) The letter grade and grade point awarded in each subject
 c) The **SGPA/CGPA**
 d) Total number of credits earned by the student up to the end of that semester.
 e) Award list indicating the marks awarded to the student.

8.   Withholding of Results

If the student has not paid dues to College, or if any case of indiscipline is pending against him, the result of the candidate may be withheld and he will not be allowed to go into the next higher Semester. The award or issue of the Degree may also be withheld in such cases

9.   Transitory Regulations

Students who have discontinued or have been detained for want of attendance or any other academic requirements, may be considered for readmission as and when they become eligible. They have to take up Equivalent subjects, as substitute subject in place of repetition of subjects as decided by the Institute Academic Committee.

10.   Minimum Instruction Days The minimum instruction days for each Semester shall be **90 instruction days.**

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

12.   The decision of the Institute Academic Committee will be final in respect of equivalent subjects for   those students who are transferred from other colleges. The procedure for permitting students to transfer from other colleges will be decided by the principal / Institute Academic Committee keeping the Government Rules in view.

13.   General

 i. Where the words "he", "him", "his", occur in the regulations, they include "she", "her", "hers".
 ii. The academic regulations should be read as a whole for the purpose of any interpretation.

iii. In the case of any discrepancy/ambiguity/doubt arises in the above rules and regulations, the decision of the Principal shall be final.

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

14. Academic Regulations for B.Tech. (Lateral Entry Scheme)

(Applicable for students admitted from the academic year 2013-2014)

(i) A student shall register for all 150 credits and earn all the 150 credits. Marks obtained in all 150 credits shall be considered for the calculation of the class.

(ii) A student who fails to earn 150 credits as indicated in the course structure within **six** academic years from the year of their admission shall forfeit their seat in B.Tech. programme and their admission stands cancelled.

(iii) The same attendance regulations are adopted as that of B.Tech. Four year degree course.

(iv) A student shall be promoted from third year to fourth year only on fulfilling the academic requirements of securing 37 credits from the following examinations.

      a. Two regular and one supplementary examination of II year I Semester

      b. One regular and one supplementary examination of II year II Semester

      c. One regular examination of III year I Semester.

In case of getting detained for want of credits the student may make up the credits through supplementary exams of the above exams before the date of commencement of class work for IV year I Semester.

(v) All other regulations as applicable to B.Tech. four year degree course will hold good for B.Tech. (Lateral Entry Scheme).

15. Malpractice Rules

Disciplinary Action for Malpractices/Improper Conduct in Examinations

	Nature of Malpractices/Improper conduct	Punishment
	If the candidate:	
1.	(a) Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the subject of the examination)	Expulsion from the examination hall and cancellation of the performance in that subject only.
	(b)Gives assistance or guidance or receives it	Expulsion from the

	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.	examination hall and cancellation of the performance in that subject only of all the candidates involved. In case of an outsider, he will be handed over to the police and a case is registered against him.
2.	Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the candidate is appearing.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the subjects of that Semester/year. The Hall Ticket of the candidate is to be cancelled.
3.	Impersonates any other candidate in connection with the examination.	The candidate who has impersonated shall be expelled from examination hall. The candidate is also debarred and forfeits the seat. The performance of the original candidate who has been impersonated, shall be cancelled in all the subjects of the examination (including 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 end semester examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. If the imposter is an outsider, he will be handed over to the police and a case is registered against him.
4.	Smuggles the Answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all end semester examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
5.	Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.	Cancellation of the performance in that subject.
6.	Refuses to obey the orders of the 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	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

	officer-in charge or any person on duty in or outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the officer-in-charge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the College campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. The candidates are also debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is registered against them.
7.	Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
8.	Possess any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject

		and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat.
9.	If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8.	If the student belongs to 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.	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.
12.	If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to the academic council of the Institute for further action to award suitable punishment.	

Malpractices identified by squad or special invigilators

Punishments to the candidates as per the above guidelines.

Malpractice identified at Spot center during valuation

The following procedure is to be followed in the case of malpractice cases detected during valuation, scrutiny etc. at spot center.

1) Malpractice is detected at the spot valuation. The case is to be referred to the malpractice committee. Malpractice committee will meet and discuss/question the candidate and based on the evidences, the committee will recommend suitable action on the candidate.

2) A notice is to be served to the candidate(s) involved through the Principal to his address and to the candidate(s) permanent address regarding the malpractice and seek explanations.

3) The involvement of staff who are in charge of conducting examinations, invigilators valuing examination papers and preparing / keeping records of documents relating to the examinations in such acts (inclusive of providing in correct or misleading information) that infringe upon the course of natural justice to one and all concerned at the examinations shall be viewed seriously and recommended for award of appropriate punishment after thorough enquire.

4) Based on the explanation and recommendation of the committee action may be initiated.

5) Malpractice committee:

i.	Controller of Examinations	Chairman
ii.	Assistant controller of Evaluation	Member
iii.	Chief Examiner of the subject/subject expert	Member
iv.	Concerned Head of the Department	Member

VNR Vignanaf Jyothi Institute of Engineering and Technology

B. TECH (AE)
(R12)

I YEAR I SEMESTER   COURSE STRUCTURE

Subject Code	Subject Name	Lectures	T/P/D	Credits
MTH1101	Mathematics – I	3	1	3
PHY1101	Engineering Physics	3	1	3
CHE1102	Chemistry of Engineering Materials	3	0	3
ITD1101	Computer Programming and Data Structures	3	1	3
MED1101	Engineering Mechanics – I	3	1	3
MED1102	Engineering Graphics – I	2	4	4
EPC1201	Engg. Physics and Chemistry Lab	0	3	2
ENG1201	English language Communication skills Lab - I	0	3	2
ITD1201	Computer Programming and Data Structures Lab	0	3	2
	Total	17	17	25

* T/P/D: Tutorial/Practical/Drawing Practice

VNR Vignanaf Jyothi Institute of Engineering and Technology

B. TECH (AE)
(R12)

I YEAR II SEMESTER   **COURSE STRUCTURE**

Subject Code	Subject Name	Lectures	T/P/D	Credits
MTH1102	Mathematics – II	3	1	3
PHY1102	Physics of Materials	3	1	3
ENG1101	English	3	0	3
CHE1101	Engineering Chemistry	3	0	3
MED1103	Engineering Mechanics – II	3	1	3
MED1104	Engineering Graphics - II (using AutoCAD)	2	4	4
MED1210	IT and Fuels lab	0	3	2
MED1201	Engineering Workshop	0	3	2
ENG1202	English language Communication skills Lab – II	0	3	2
	Total	**17**	**16**	**25**

* T/P/D: Tutorial/Practical/Drawing Practice

VNR Vignanaf Jyothi Institute of Engineering and Technology

B. TECH (AE)
(R12)

II YEAR I SEMESTER COURSE STRUCTURE

Subject Code	Subject Name	Lectures	T/P/D	Credits
MTH1103	Mathematics – III	3	1	3
MED1106	Solid Mechanics	3	1	3
MED1107	Thermodynamics	4	1	4
MED1108	Metallurgy and Material Science	4	0	4
EEE1153	Basic Electrical and Electronics Engineering	3	1	3
CMS1101	Business Economics & Financial Analysis	4	0	4
MED1203	Metallurgy Lab and Mechanics of Solids Lab	0	3	2
EEE1251	Basic Electrical and Electronics Engineering Lab	0	3	2
	Total	**21**	**10**	**25**

* T/P/D: Tutorial/Practical/Drawing Practice

VNR Vignanaf Jyothi Institute of Engineering and Technology

B. TECH (AE)
(R12)

II YEAR II SEMESTER   **COURSE STRUCTURE**

Subject Code	Subject Name	Lectures	T/P/D	Credits
MTH1106	Probability and Statistics	3	1	3
MED1111	Kinematics of Machines	4	0	4
AED1101	Fluid Mechanics & Hydraulic Machines	4	1	4
AED1102	Applied Thermodynamics	3	1	3
AED1103	Automotive Engines & Systems	4	0	4
MED1109	Machine Drawing	0	6	3
AED1201	Automotive Engines Lab	0	3	2
MED1205	Fluid Mechanics and Hydraulic Machines Lab	0	3	2
NCC1101	Human Values and Professional Ethics	2	Non Credit Audit Course	
Total		**20**	**15**	**25**

* T/P/D: Tutorial/Practical/Drawing Practice

VNR Vignanaf Jyothi Institute of Engineering and Technology

B. TECH (AE)
(R12)

III YEAR I SEMESTER   COURSE STRUCTURE

Subject Code	Subject Name	Lectures	T/P/D	Credits
MTH1104	Numerical Analysis and Linear Programming	3	1	3
MED1115	Dynamics of Machinery	4	1	4
MED1116	Engineering Design Basics	4	1	4
MED1122	Heat and Mass Transfer	4	1	4
MED1114	Production Technology	3	0	3
AED1104	Refrigeration & Auto Air Conditioning	3	1	3
MED1204	Production Technology Lab	0	3	2
AED1202	Heat Transfer & RAC Lab	0	3	2
Total		**21**	**11**	**25**

VNR Vignanaf Jyothi Institute of Engineering and Technology

B. TECH (AE)
(R12)

III YEAR II SEMESTER   COURSE STRUCTURE

Subject Code	Subject Name	Lectures	T/P/D	Credits
CED1105	Environmental Studies	3	1	3
AED1105	Automobile Engineering Design	4	1	4
AED1106	Machine Tools & Metrology	4	1	4
AED1107	Vehicle Dynamics	4	1	4
EIE1128	Instrumentation & Control Systems	3	1	3
MED1149	Operations Research	3	1	3
MED1206	Machine Tools and Metrology Lab	0	3	2
ENG1204	Advanced English Communication Skills Laboratory	0	3	2
NCC1102	Soft Skills and Personality Development	2	Non Credit Audit Course	
Total		**21**	**12**	**25**

* T/P/D: Tutorial/Practical/Drawing Practice

B. TECH (AE)

(R12)

IV YEAR I SEMESTER   **COURSE STRUCTURE**

Subject Code	Subject Name	Lectures	T/P/D	Credits
EEE1155	Automotive Electrical and Autotronics	4	0	4
MED1128	CAD/CAM	4	0	4
	Elective – I OPEN			
CED1147	Disaster Management	3	0	3
CSE1121	Cyber Security			
ITD1116	Computer Forensics			
ITD1105	Object Oriented Programming through JAVA			
ITD1126	Green IT			
	Elective – II			
MED1129	Robotics	3	1	3
AED1108	Automotive Chassis and Suspension			
MED1132	Product Life Cycle Management			
MED1130	Composite Materials			
MED1135	Surface Modification Techniques			
AED1109	Gas Dynamics			
	Elective – III			
MED1139	Unconventional Machining Process	3	1	3
AED1110	Vehicle Body Engineering and safety			
MED1121	Finite Element Method			
MED1171	Introduction to Aircraft Industry & Aircraft System			
MED1142	Fluid Power Systems			
MED1144	Renewable Energy Sources			
MED1209	CAD/CAM Lab	0	3	2
AED1203	Automobile Engineering Lab& Instrumentation Lab	0	3	2
AED1301	Industry Oriented Mini Project	0	6	2
AED1303	Comprehensive Viva	0	3	2
	Total	17	17	25

VNR Vignanaf Jyothi Institute of Engineering and Technology

B. TECH (AE)
(R12)

IV YEAR II SEMESTER　　　　　　　　　　　　　COURSE STRUCTURE

Subject Code	Subject Name	Lectures	T/P/D	Credits
MED1138	Industrial Engineering and Management	3	1	3
	Elective – IV			
MED1145	Nano Technology			
AED1111	Alternate Fuels for Automobiles			
MED1146	Maintenance and Safety Engineering	4	0	4
MED1136	Tribology			
MED1153	Principles of Entrepreneurship			
MED1154	Interactive Computer Graphics			
	Elective – V			
MED1147	Design for Manufacturing			
MED1148	Non-Destructive Testing and Evaluation			
AED1113	Automotive Pollution and Control			
MED1141	Computational Fluid Dynamics	4	0	4
MED1140	Plant Layout and Material Handling Systems			
MED1172	Design of Aircraft Structures			
AED1302	Technical Seminar	0	3	2
AED1304	Project Work	0	18	12
	Total	11	22	25

* T/P/D: Tutorial/Practical/Drawing Practice

VNR Vignana Jyothi Institute of Engineering and Technology

I Year B.Tech I Sem	L	T/P/D	C
	3	1	3

(MTH1101) MATHEMATICS – I
(Advanced Calculus)

UNIT I
DIFFERENTIAL CALCULUS:
Mean value theorems - Rolle 's Theorem, Lagrange's theorem, Cauchy's theorem, and generalized mean value theorem (Taylor's Theorem) (statements only), Curvature and Radius of curvature, Curve tracing – Cartesian, polar and parametric curves (standard curves only)

UNIT II
FUNCTIONS OF SEVERAL VARIABLES:
Partial differentiation; Euler's theorem, Functional dependence; Jacobian; Maxima and Minima of functions of two variables with constraints and without constraints.

UNIT III
IMPROPER INTEGRALS AND MULTIPLE INTEGRALS:
Improper Integrals; Beta, Gamma, and Error integrals - Properties and simple applications. Applications of integration to lengths, volumes and surface areas in cartesian and polar coordinates. Multiple integrals - double and triple integrals, change of variables (Cylindrical and Spherical polar coordinates) and change of order of integration.

UNIT IV
VECTOR CALCULUS:
Introduction to vector and scalar functions; gradient, curl, divergence, and their related properties of sums and products; Laplacian and second order operators; Vector integration - line integral, work done, potential function; Area, surface, and volume integrals; Statements of Vector integral theorems and their verification (without proofs) - Green's theorem, Stoke's theorem, and Gauss divergence theorem.

UNIT V
ELEMENTARY ANALYSIS:
Sequences and series - convergence and divergence, ratio test, comparison test, integral test, Cauchy's root test, Raabe's test (statements only for the tests), and absolute and conditional convergence.

TEXT BOOKS:
1. Calculus and Analytic Geometry by Thomas and Finney, 9th edition; Publisher: Person Education.
2. Higher Engineering Mathematics by Dr. B. S. Grewal, 40th edition, Publisher: Khanna Publishers.
3. Schaum's Outline of Vector Analysis by Murray R. Spiegel (2011); 2nd edition; Publisher: Tata McGraw Hill.

REFERENCES:
1. Elementary Analysis: The Theory of Calculus by Kenneth Ross; Publisher: Springer.
2. Advanced Engineering Mathematics by Erwin Kreyszig, 8th edition; Publisher: John Wiley.

VNR Vignana Jyothi Institute of Engineering and Technology

I Year B.Tech I Sem (Common to all branches)	L	T/P/D	C
	3	1	3

(PHY1101) ENGINEERING PHYSICS

UNIT I

INTERFERENCE:

Superposition principle, resultant amplitude, coherence, methods to obtain coherent sources, interference, Young's double slit experiment, interference in thin films by reflection, Newton's rings Experiment.

DIFFRACTION-I:

Distinguish between Fraunhofer and Fresnel diffraction, diffraction at single slit (Qualitative and Quantitative (Phasors approach)).

UNIT –II

DIFFRACTION-II:

Diffraction at double slit, circular aperture, and multiple slits (grating) (Qualitative Approach), Resolution of spectral lines, Rayleigh criterion, and resolving power of grating.

POLARIZATION:

Polarization phenomenon, Brewster's Law and Malus law, examples, types of polarization, double refraction, Nicol prism, Quarter and Half wave plates

UNIT -III

LASERS:

Characteristics of Lasers, Spontaneous and Stimulated Emission of radiation, meta stable state, population inversion, lasing action, Einstein's coefficients and relation between them, Ruby Laser, Helium, Neon Laser, Semiconductor Laser, Applications of lasers.

FIBER OPTICS:

Principle of optical fiber and properties, Acceptance angle and acceptance cone, Numerical aperture, Types of fibers and refractive index profiles, Qualitative analysis of attenuation in optical fibers, Application of optical fibers.

UNIT -IV

ELEMENTS OF STATISTICAL MECHANICS:

Maxwell-Boltzmann, Bose-Einstein and Fermi-Dirac statistics (non-mathematical treatment); Photon gas, Planck's law of black body radiation; Deduction of Wien's law and Rayleigh, Jeans law from Plank's law.

PRINCIPLES OF QUANTUM MECHANICS:

Waves and particles, De Broglie hypothesis, Matter waves, Davisson and Germer experiment, Heisenberg's uncertainty principle, Schrodinger Wave Equation, Wave

function and its Physical Significance, Particle in one dimensional potential box (wave functions, probability densities and energy states).

UNIT -V

FREE ELECTRON FERMI GAS:

Energy levels in one dimension, Effect of temperature on the Fermi-Dirac distribution, Free electron gas in three dimensions, electrical conductivity and Ohm's law, Electrical Resistivity of Metals (Qualitative).

BAND THEORY OF SOLIDS:

Electron in a periodic potential; Bloch Theorem; Kronig-Penney model (non-mathematical treatment); Origin of energy band formation in solids; Classification of materials into conductors, semiconductors and Insulators; and Concept of effective mass of an electron.

TEXT BOOKS:

1. Physics Vol.2, by Halliday, Resnick and Krane; John Wiley and Sons
2. Concepts of Modern physics by Arthur Beiser, McGraw Hill Inc.
3. Introduction to Solid State Physics by Charles Kittel : John Wiley and Sons

REFERENCES:

1. Engineering Physics by R.K.Gaur and S.L.Gupta; Dhanpat Rai and Sons
2. Applied Physics by P.K.Mittal, IK International Publishing House (P) Ltd.
3. Optics by Ghatak and Thyagarajan, Tata Mc Graw
4. Engineering Physics by G Sahashrabuddhe; University Press
5. Elements of Solid State Physics by J.P.Srivatsva, PHI Publishers
6. Engineering Physics by Dr M Chandra Shekar and Dr P. Appala Naidu, VGS Book links.
7. Introduction to Optical Communication by G. Keiser
8. Quantum Mechanics by Gupta Kumar Sharma

VNR Vignana Jyothi Institute of Engineering and Technology

I B.Tech CE, ME and AE I Sem	L	T/P/D	C
	3	0	3

(CHE1102) CHEMISTRY OF ENGINEERING MATERIALS

UNIT I
ENERGY SOURCES:
Fuels - classification (solid, liquid, gaseous), calorific value of fuel (HCV, LCV), determination of calorific value by bomb calorimeter; Solid fuels – coal – analysis – proximate and ultimate analysis and their significance; Liquid fuels – petroleum, refining of petroleum, cracking, knocking, synthetic petrol – Bergius and Fischer-Tropsch's process. Biofuels- characteristics, biodiesel (preparation, properties and applications); Gaseous fuels – natural gas, LPG, CNG (composition and uses), Combustion – problems.

UNIT II
CEMENT:
Types of cement; Chemical constituents and composition of Portland cement; Manufacturing methods of Portland cement (wet and dry processes); Properties of cement - Setting and Hardening of cement (reactions); Testing of cement; Decay of cement; Cement concrete - RCC.

UNIT III
ENGINEERING MATERIALS:
a) Abrasives and Adhesives - Introduction, classification of abrasives, and their applications. Criteria of a good adhesive, classification and their applications.
b) Composites: Need for composites, classification and their applications.

UNIT IV
REFRACTORIES AND CERAMICS:
Refractories: Definition; Classification with examples; Characteristics of a good refractory; Causes for the failure of a refractory material; Properties of refractories - refractoriness, RUL test, porosity.
Ceramics: Introduction; Classification, Glazing and Applications of glazed and non glazed ceramics.

UNIT V
LUBRICANTS:
Criteria of a good lubricant; Classification of lubricants-lubricating oils; Greases or semisolid lubricants; Solid lubricants; Mechanism of lubrication-fluid film lubrication, boundary lubrication, and extreme pressure lubrication; Biodegradable lubricants:

types of biodegradable lubricants, advantages and disadvantages of biodegradable lubricants. Properties of lubricants - viscosity, cloud point, pour point, flash and fire point, mechanical stability, oiliness, and carbon residue.

TEXT BOOKS:
1. Engineering Chemistry by Y.Bharathi Kumari, and Jyotsna Cherukuri; Publisher: VGS Book Links.
2. Engineering Chemistry by P.C.Jain and Monica Jain; Publisher: Dhanpat Rai.
3. Engineering Chemistry by S.S. Dhara and Mukkanti; Publisher: S.Chand and Co.

REFERENCES:
1. Engineering Chemistry by O G Palanna
2. Engineering Chemistry by Balram Pani; Publisher: Galgotia Publications Pvt.Ltd.
3. Engineering Chemistry by Shashi Chawla Publisher: Dhanpat Rai and Co.
4. Engineering Chemistry by R.P.Mani, S.N. Mishra, B.Rama Devi, Cengage Learning Publications.
5. Engineering Chemistry by R.Gopalan, D.Venkappayya, Sulochana Nagarajan; Publisher: Vikas Publishers.

VNR Vignana Jyothi Institute of Engineering and Technology

I Year B. Tech CE, ME and AE I Sem	L	T/P/D	C
	3	1	3

(ITD1101) COMPUTER PROGRAMMING AND DATA STRUCTURES

UNIT – I

Introduction to Computers, Computer Systems, Computing Environments, Computer languages, creating and running programs, Software Development Methods.

UNIT – II

Algorithm / pseudo code, flowchart, program development steps, structure of C program, identifiers, basic data types, Constants, variables, operators, expressions, precedence and order of evaluation.

Input-output statements, if and switch statements, loops- while, do-while and for statements, break, continue, goto and labels, example C programs.

UNIT - III

Functions, basic concepts, parameter passing, storage classes, scope rules, user defined functions, standard library functions, recursive functions, example C programs.

Arrays- Basic concepts, one-dimensional and two-dimensional arrays, Character array, string handling functions, example C programs.

UNIT - IV

Derived types- structures- Basic concepts, nested structures, arrays of structures, program examples.

pointers- Basic concepts, pointers and functions, pointers and strings, pointers and arrays, pointers and structures, self referential structures, example C programs.

UNIT - V

Searching - Linear and binary search methods, sorting - Bubble sort, selection sort, Insertion sort.

Introduction to data structures, Dynamic memory allocation, stacks and queues- implementation using arrays.

TEXT BOOKS:

1. Computer science, A structured programming approach using C, B.A. Forouzan and R.F. Gilberg, Third edition, Thomson.
2. The C Programming Language, B.W. Kernighan, Dennis M.Ritchie, PHI/Pearson Education
3. C Programming and Data structures, E.Balagurusamy, TMH.

REFERENCES:

1. Data Structures Using C - A.S.Tanenbaum, Y. Langsam, and M.J. Augenstein, PHI/Pearson Education.
2. Programming in C - Stephen G. Kochan, III Edition, Pearson Education.
3. Data Structures and Program Design in C, R.Kruse, C.L. Tondo, BP Leung, Shashi M, Second Edition, Pearson Education.

VNR Vignana Jyothi Institute of Engineering and Technology

I Year B. Tech ME / AE I Sem	L	T/P/D	C
	3	1	3

(MED 1101) ENGINEERING MECHANICS - I

UNIT – I
FORCES:

Introduction to Engineering Mechanics – Basic Concepts: Rigid body, Force, specifications of a force, Classification of a force system, Composition of force, Resolution of forces, Rectangular components, parallelogram of forces, Triangle of forces, Polygon law of forces, Equilibrium of Collinear forces, Equilibrium law, Superposition and Transmissibility, Law of action and reaction, Free Body Diagram, Active and reactive forces, Types of supports, Lami's theorem, Resultant, Equilibrant, Method of projections, Equations of equilibrium, Resultant of coplanar concurrent forces, Equilibrium of coplanar concurrent forces.

UNIT – II
MOMENTS:

Moment, Moment of a force, Moment of a force about a point, Moment of a force about an axis, Arm of the force, Varignon's principle, Parallel forces, Resultant of parallel forces, Couple, Moment of a couple about any point lying in the plane, Resolution of a force into a force-couple and vice versa, Resultant of coplanar non-concurrent forces, Equilibrium of coplanar non-concurrent forces.

UNIT - III
FRICTION:

Types of Friction, Limiting Friction, Coulomb Laws of Friction, Coefficient of friction Static friction, Kinetic friction, Angle of friction, Cone of static friction, Equilibrium of bodies on rough horizontal and inclined planes, Equilibrium of connected bodies on rough horizontal and inclined planes, Ladder friction, wedge friction, screw friction.

UNIT – IV
CENTROID, CENTRE OF GRAVITY:

Centroid, Centroids of simple figures (from basic principles) – Centroids of composite figures and built-up sections, Centroids of Symmetric figures, Center of parallel forces, Center of gravity ,Centre of gravity of simple bodies (from basic principles) , Centre of gravity of composite bodies, Centre of gravity of Symmetric bodies, Pappus theorems.

UNIT – V
MOMENT OF INERTIA:

Introduction, Moment of inertia of plane areas, Radius of gyration, Polar moment of inertia, Parallel axis theorem, Perpendicular axis theorem, Moments of inertia of simple figures from basic principles and composite figures. Product of inertia, moment of

inertia about inclined axis, Principle moment of inertia. Mass moment of Inertia: Introduction, Moments of inertia of simple bodies from basic principles and composite bodies.

TEXT BOOKS:
1. Engineering Mechanics by Timoshenko and Young, Tata Mc-Graw Hill Publishers
2. Engineering Mechanics by S.S. Bhavikatti, New age International Publishers
3. Engineering Mechanics by R.K. Bansal, Laxmi Publishers

REFERENCES:
1. Singer's Engineering Mechanics by K. Vijaya Kumar Reddy ,BS Publishers
2. Engineering Mechanics (Statics) by Meriam and Kraige, John Wiley Publishers
3. Engineering Mechanics by Tayal, Umesh Publishers

VNR Vignana Jyothi Institute of Engineering and Technology

I Year B.Tech ME / AE I Sem **L** **T/P/D** **C**

2 **4** **4**

(MED1102) ENGINEERING GRAPHICS – I

UNIT I
Introduction to **AutoCAD**.
INTRODUCTION TO ENGINEERING DRAWING
Principles of engineering graphics and their significance; Drawing instruments and their uses; Conventions in drawing-lettering; BIS Convention; Different types of scales; Scale of chords.
UNIT II
CURVES USED IN ENGINEERING PRACTICE AND THEIR CONSTRUCTION
Ellipse; Parabola; Hyperbola and Rectangular hyperbola; Cycloid; Epicycloids; Hypocycloid – Involutes.
UNIT III
ORTHOGRAPHIC PROJECTION
Points and straight lines inclined to both planes; True lengths and traces.
UNIT IV
PROJECTION OF PLANES
Projection of regular planes inclined to both planes; Auxiliary projections.
UNIT V
PROJECTION OF SOLIDS
Projection of regular solids-inclined to both planes; Auxiliary projections.
TEXT BOOKS:
1. Elementary Engineering Drawing by N.D. Bhat; Publisher: Charotar Publishing House
2. Engineering Drawing by K.L. Narayana and P. Kannaiah; Publisher: Scitech Publications.
3. Engineering Graphics for degree by K.C. John; Publisher: Prentice Hall of India.

R12

VNR Vignana Jyothi Institute of Engineering and Technology

I Year B.Tech ME / AE I Sem

L	T/P/D	C
0	3	2

(EPC 1201) ENGINEERING PHYSICS AND CHEMISTRY LAB

Any **Eight** Experiments from the following:

1. Dispersive Power of the material of a Prism using Spectrometer
2. Diffraction Grating (both with Laser and non laser source)
3. Single Slit with laser light
4. Newton's Rings
5. Finding thickness of a thin wire or sheet by forming a wedge shaped film
6. Energy gap of a semiconductor material
7. To determine the rigidity modulus of material of a wire
8. Melde's experiment
9. Sonometer Experiment
10. AC frequency by sonometer method
11. Numerical Aperture and Acceptance angle of an optical fiber cable
12. Attenuation and Bending losses in optical fiber
13. Stewart Gee's experiment
14. Characteristics of LED/Laser Diode.
15. Photo cell/ Solar Cell

TEXT BOOKS:

1. Essential Practical Lab Manual in Physics: by P.Raghavendra Rao

   LIST OF EXPERIMENTS
1. **Titrimetry:** a) Estimation of hardness of water by EDTA method.
2. **Instrumental methods**
(i) **Conductometry:** a) Conductometric titration of strong acid vs strong base
(ii) **Colorimetry:** a) Estimation of copper by colorimetric method
(iii) **pH metry:** a)Titration of strong acid vs strong base by pH metry
3. **Physical properties:** a) Determination of viscosity of sample oil by Redwood viscometer.
4. **Preparations:**
   a) Preparation of soap
   b) Preparation of Nano particles.

TEXT BOOKS:

1. Laboratory Manual on Engineering Chemistry by S.K.Bhasin and Sudha Rani; Publisher: Dhanpat Rai.
2. Laboratory Manual on Engineering Chemistry by Y.Bharathi Kumari and Jyotsna Cherukuri; Publisher: VGS Book Links.

VNR Vignana Jyothi Institute of Engineering and Technology

I Year B.Tech (Common to CSE, IT, ME, AE) I Sem   **L**   **T/P/D**   **C**

                                          0   **3**   **2**

(ENG1201) ENGLISH LANGUAGE COMMUNICATION SKILLS LABORATORY- I

The English language Communication Skills Lab aims to provide practice in all the four skills of LSRW, with a special emphasis on listening and speaking skills.

UNIT I

MULTIMEDIA LAB

1. Sounds of English
2. Listening Comprehension
3. Vocabulary   Lesson 1

COMMUNICATION SKILLS LAB: Introduction of Self and others

UNIT II

MULTIMEDIA LAB

1. Grammar ---Nouns and Pronouns; The Present Tense
2. Vocabulary   Lesson 2
3. Listening Skills

COMMUNICATION SKILLS LAB: Seeking and Giving Information

UNIT III

MULTIMEDIA LAB

1. Grammar --- Articles; The Past Tense
2. Vocabulary   Lesson 3
3. Telephoning Skills

COMMUNICATION SKILLS LAB: Giving and Taking Instructions

UNIT IV

MULTIMEDIA LAB

1. Grammar ---- Concord; The Future Tense
2. Vocabulary   Lesson 4
3. Listening Comprehension

COMMUNICATION SKILLS LAB: Role Play/ Situational Dialogues

UNIT V

MULTIMEDIA LAB

1. Grammar --- Adjectives, adverbs, conjunctions
2. Vocabulary -- Lesson 5

COMMUNICATION SKILLS LAB : i) jam/ short talk

                                     ii) Information Transfer   a) Data Analysis

                                                      b) Interpretation of Graph

MULTIMEDIA LAB REQUIREMENTS

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 and video system and camcorder etc.

System Requirement (Hardware component):

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

iv) **P – IV Processor**

a) Speed – 2.8 GHZ

b) RAM – 512 MB Minimum

c) Hard Disk – 80 GB

v) Headphones of High quality

5. Suggested Software:

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

Suggested Software:

o **Clarity Pronunciation Power** – part II

o **Oxford Advanced Learner's Compass**, 7th Edition

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

o **Lingua TOEFL CBT Insider**, by Dreamtech

o **TOEFL and GRE** (KAPLAN, AARCO and BARRONS, USA, Cracking GRE by CLIFFS)

VNR Vignana Jyothi Institute of Engineering and Technology

I Year B. Tech CE, ME and AE I Sem	L	T/P/D	C
	0	3	2

(ITD1201)   COMPUTER PROGRAMMING AND DATA STRUCTURES LABORATORY

Week 1
1. Write a program that reads three different integers from the keyboard and prints – sum, average, product, smallest, largest of the numbers.
2. Write a program that reads two integers and prints – difference, quotient and remainder
3. WAP that reads two integers and determines whether the first is a multiple of the other

Week 2
1. Write a C program to find the sum of individual digits of a positive integer.
2. Write a C program for Fibonacci sequence.
3. Write a C program to generate the first n terms of the sequence.
4. Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.

Week 3
1. Write a C program to calculate the following Sum:
   Sum=1-x2/2! +x4/4!-x6/6!+x8/8!-x10/10!
2. Write a C program toe find the roots of a quadratic equation.

Week 4
1. Write C programs that use both recursive and non-recursive functions
   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.

Week 5
1. Write a C program, which takes two integer operands and one operator from the user, performs the operation and then prints the result. (Consider the operators +,-,*, /, % and use Switch Statement)
2. Write a program to print a given number [0-1000] in words. For example, 123 as One Hundred and Twenty Three

Week 6
1. WAP to check whether a given number is an Armstrong, Palindrome, Perfect, Prime, or a Fibonacci Number

2. Write a C program to find both the largest and smallest number in a list of integers

Week 7
1. Write a C program to generate Pascal's triangle.
2. Write a C program to construct a pyramid of numbers.

Week 8
1. Write a C program to calculate
i) Minimum and maximum of an 1-d array
ii) Sorting an array
iii) Searching an array

Week 9
1. Write a C program that uses functions to perform the following:
i) Addition of Two Matrices
ii) Multiplication of Two Matrices
iii) To find the determinant of a 3 by 3 matrix

Week 10
1. Write a C program that uses functions to perform the following operations using
Pointers:
i. To insert a sub-string in to a given main string from a given position
ii. To delete n Characters from a given position in a given string.
iii. To reverse a given string

Week 11
1. Write C Programs to implement Structures and Nested structures with suitable Examples
(Students has to practice with relevant examples taught in the class room)

Week 12
1. Write C Programs using Pointers and Pointer Arithmetic operations
2. Write C Programs using Pointers to structures, Pointers to Arrays and Pointers to strings (Students has to practice with relevant examples taught in the class room)

Week 13
1. Write C Programs to implement the following sorting algorithms
a. Bubble Sort   b. Selection sort   c. Insertion Sort

Week 14
1. Write a C program to implement STACK and QUEUE operations using Arrays

Week 15
1. Write a C program to implement the following searching techniques.
a. Linear Search   b. Binary Search

Week 16 Lab Internal Examination

VNR Vignana Jyothi Institute of Engineering and Technology

I Year B.Tech ME and AE II Sem   **L**   **T/P/D**   **C**

                                                                  3   **1**   **3**

(MTH1102) MATHEMATICS – II
(Linear Algebra and Ordinary Differential Equations)

LINEAR ALGEBRA
UNIT I
SOLUTION OF LINEAR SYSTEMS
Matrices and linear systems of equations - elementary row transformations, Rank, row Echelon form, and normal form; Solution of linear systems - direct methods - LU decomposition, LU decomposition from Gauss elimination, and solution of Tri-diagonal systems by Thomas algorithm; Eigen values, eigen vectors, and their properties - Liner dependence and independence; Cayley-Hamilton theorem (without proof) - inverse and powers of a matrix by Cayley-Hamilton theorem, diagonalization of a matrix, calculation of powers of a matrix; Modal and spectral matrices.

UNIT II
LINEAR TRANSFORMATIONS
Real matrices - symmetric, skew symmetric, and orthogonal linear transformation; Complex matrices - Hermitian, Skew-Hermitian and unitary matrices; Quadratic forms - reduction of quadratic form to canonical form, rank, positive, negative definite, semi definite, index, signature, Sylvester law, and singular value decomposition.

ORDINARY DIFFERENTIAL EQUATIONS
UNIT III
ORDINARY DIFFERENTIAL EQUATIONS AND THEIR APPLICATIONS
Differential equations of first order and first degree - Linear, Bernoulli and exact differential equation; Applications of differential equations of first order and first degree - Newton's law of cooling, Law of natural growth and decay, Orthogonal trajectories, and basic circuits.

UNIT IV
DIFFERENTIAL EQUATIONS OF HIGHER ORDER AND THEIR APPLICATIONS
Differential equations of higher order - homogeneous and non-homogenous type, differential equations of second order and higher order with constant coefficients with right hand side term of the type e^{ax}, sin (ax), cos (ax), polynomials in x, e^{ax} V(x), x V(x), and method of variation of parameters and Euler-Cauchy's 2nd order differential equations, applications to mechanical systems and Simple harmonic motion.

UNIT V

LAPLACE TRANSFORM AND APPLICATION TO ODE

Laplace transform of standard functions; Inverse transform-first shifting theorem; Dirac's delta function; Convolution theorem; Periodic function; Differentiation and integration of transforms; Application of Laplace transforms to ordinary differential equations.

TEXT BOOKS:

1. Differential Equations, with Applications and Historical Notes by George F. Simmons and John S. Robertson (2008) 2nd Edition; Publisher: Tata McGraw Hill.
2. A First Course in Differential Equations by Dennis G. Zill; Publisher: Brooks Cole.
3. Advanced Engineering Mathematics by Dennis G. Zill, Warren S. Wright, and Michael R. Cullen, 4th edition; Publisher: Jones and Bartlett Learning.

REFERENCES:

1. Advanced Engineering Mathematics by Erwin Kreyszig, 8th edition; Publisher: John Wiley.
2. Advanced Engineering Mathematics by Peter V. O'Neil, 9th Edition; Publisher: Cengage Learning.
3. Elementary Differential Equations and Boundary Value Problems by William E. Boyce and Richard C. Diprima; Publisher: Wiley.
4. Linear Algebra and its applications by David C Clay; Publisher: Pearson Education.

VNR Vignana Jyothi Institute of Engineering and Technology

I Year B.Tech ME/AE II Sem	L	T/P/D	C
	3	1	3

(PHY1102) PHYSICS OF MATERIALS

UNIT -I

CRYSTAL STRUCTURES:

Space lattice – Unit cell – Lattice parameter – Crystal systems – Bravais lattices Atomic radius – Co-ordination number - Structures and Packing fractions of Simple Cubic – Body Centered Cubic – Face Centered Cubic crystals – Hexagonal closed packed crystals - Structures of diamond, NaCl.

BONDING IN SOLIDS:

 Force and energy between two approaching atoms, primary and secondary bonds, binding energy and cohesive energy, Madelung constant, cohesive energy and Madelung constant for NaCl crystal

UNIT -II

DIRECTIONS, PLANES AND X-RD:

Miller Indices for Crystal planes and directions – Inter planar spacing of orthogonal crystal systems –Diffraction of X-rays by crystal planes and Bragg's law– Laue method – Powder method.

DEFECTS IN SOLIDS:

 Imperfections in crystals – Point defects (Vacancies, Interstitial and Impurities) Schottky and Frenkel defects – (with mathematical treatment)- Line imperfections – Edge and Screw dislocation – Burger vector – Surface defects and volume defects (Qualitative Treatment).

 UNIT -III

MAGNETIC PROPERTIES OF MATERIALS:

Permeability, Field intensity, magnetic field induction, Magnetization and Magnetic susceptibility – Origin of magnetic moment, Bohr magneton – Classification of magnetic materials (Dia, Para and Ferro)- Domain theory of ferromagnetism, Hysteresis curve – Soft and Hard magnetic materials – Ferrites and their applications.

 UNIT -IV

DIELECTRIC PROPERTIES:

Electric dipole, Dipole moment, Dielectric constant, Electronic, Ionic and Orientation Polarization – Calculation of Polarizibilities – Internal fields – Claussius – Mossotti equation –Piezo and Ferro electricity.

SUPERCONDUCTORS:

Experimental survey and superconductivity phenomenon, – Meissner effect – Critical fields and Persistent currents, Type I and Type II superconductors - London equations-flux quantization, Applications of Superconductors.

UNIT -V

SURFACE PHYSICS:

Work function, Thermionic emission, Contact Potential, Electron Microscope, Scanning Tunneling Microscope.

SCIENCE AND TECHNOLOGY OF NANOMATERIALS:

Origin of nanotechnology – (Basic principles of Nanoscience and Technology) surface to volume ratio, quantum confinement – Fabrication of nano materials Bottom up fabrication: sol-gel and combustion methods – Top down fabrication: CVD& PVD methods– Applications of nanotechnology.

TEXT BOOKS:

1. Introduction to Solid State Physics by Charles Kittel (Publishers: John Wiley and Sons)
2. Applied Physics by P.K.Mittal, IK International Publishing House (P) Ltd

REFERENCES:

1. Solid State Physics by A.J.Dekker; Macmillan Publishers India Ltd.
2. Engineering Physics by Dr M Chandra Shekar and Dr P. Appala Naidu, VGS Book links.
3. Engineering Physics by G Sahashrabuddhe; University Press
4. Elements of Solid State Physics by J.P.Srivatsva, PHI Publishers
5. Engineering Physics by M.R.Srinivasan, New Age Publishers.

VNR Vignana Jyothi Institute of Engineering and Technology

I Year B.Tech II Sem (Common to all Branches)	L	T/P/D	C
	3	0	3

(ENG1101) ENGLISH

Introduction

This is the age of information and communication technologies. Engineers and technical professionals need to convey technical information in English for various purposes.

Besides learning general English as an international language, engineering students need to be equipped with adequate writing ability so that they can communicate technical information clearly on at least a basic level. A good English writing proficiency can be a contributing factor to professional recognition and career prospects. This course teaches those writing strategies that scientists, engineers, and others will need in order to write successfully on the job. It initiates the students into Technical Writing. The purposes of technical writing are to inform and persuade. This program aims to train students in writing clear, concise and effective English.

This syllabus is therefore, a Pragmatic English Writing Program for engineering students with intermediate proficiency. The program covers a syllabus outline and instructional approaches on basic writing skills with particular reference to technical writing.

Objectives:

i) To equip the students with all the LSRW skills for advanced writing and speaking.

ii) To equip the students with basic grammar, infrastructural patterns and grammatical constructions required of in technical writing.

iii) To acquaint the students with the writing process, beginning with paragraph writing. This would prepare them for academic and workplace writing.

iv) Equip the students with Oral Communication Skills.

Methodology

A Task-based, process oriented methodology will be used by the teachers to give a practical orientation to the teaching of language. An inductive approach will be used to demonstrate the use of language in context. This should enable the students to internalize the language structures and vocabulary used in context. Students will be exposed to numerous examples and ample practice will be given in the contextual use of language structures.

Syllabus Outline

UNIT I : REVIEW OF GRAMMAR
- i)   Common Errors
- ii) Subject-Verb Agreement
- iii) Adverbs
- v)   Transitional elements
- v) Use of Articles and Prepositions
- vi) Conjunctions
- vii) pronoun reference

UNIT II : PROSE 1
1. Heaven's Gate by Pico Iyer
2. The Connoisseur by Nergis Dalal

UNIT III :   READING AND WRITING SKILLS
- i)   Reading Comprehension --   Skimmimg and scanning
- ii) Reading Comprehension --   Intensive reading
- iii) Reading Comprehension --   Critical Analysis
- iv) Paragraph Writing
- v)   Letter Writing
- vi) Memo Writing

UNIT IV : PROSE 2
1. The Cuddalore Experience by Anu George
2. The Odds Against Us by Satyajit Ray

UNIT V : ADVANCED WRITING SKILLS
1. Comparison and Contrast Pattern
2. Cause and Effect Pattern
3. Classification
4. Analogy
5. Problem-Solution Pattern

TEXT BOOKS:
1. **Enjoying Every day English** by A. Ramakrishna Rao
2. **Effective Technical Communication**   by   Ashraf Rizvi
3. **Technical Writing Process and Product** by Gerson Sharon J. and Steven Gerson, 3rd edition, New Jersey: Prentice Hall 1999

REFERENCES:
1. M. Raman and S. Sharma, 2004; Technical Communication : Principles and Practices, OUP, (Indian Edition)

2. Blanton, L.L. 1993; Composition Practice, Book 4 ,Second Edition, Heinle and Heine Publishers, pp. 54
3. Georges, T.M. 1996; A course in Analytical Writing for Science and Technology,
   http://www.mspiggy.etl.noaa.gov/write/
4. Neufeld, J.K. 1987; A Handbook for Technical Communication, Prentice-Hall, Inc. pp.20,65-68
5. Yalden, J. 1987; Principles of Course Design for Language Teaching, Cambridge University Press
6. David F. Beer and David McMurrey Guide to Writing as an Engineer, 2nd ed., Wiley, 2004, ISBN: 0471430749.
7. Greaney, G.L. 1997; Less is More: Summary Writing and Sentence Structure in the Advanced ESL Classroom, The Internet TESL Journal, Vol.III, No.9
   http://iteslj.org/Techniques/Greaney-Writing.html

VNR Vignana Jyothi Institute of Engineering and Technology

I B.Tech CSE, IT II Sem	L	T/P/D	C
CE, ME, AE, ECE, EEE, EIE II Sem	3	0	3

(CHE1101) ENGINEERING CHEMISTRY

UNIT I
ELECTROCHEMICAL CELLS AND BATTERIES
 Conductance-factors effecting conductance, conductometric titrations; cells: types of cells, cell representation, electrode potential; Standard electrode potential; Electrochemical series; Nernst equation; Reference electrodes – hydrogen, calomel electrode; Ion selective electrodes (glass electrode and flouride electrode); Numerical problems.
BATTERIES
Primary and secondary cells (lead-acid cell; Ni-Cd cell; lithium cells); Applications of batteries; Fuel cells – methanol – oxygen fuel cells, advantages of fuel cells; Solar cells - principle, and applications.
UNIT II
CORROSION AND ITS CONTROL
Introduction; Causes and effects of corrosion; Different types of corrosion; Theories of corrosion – chemical, electrochemical corrosion (reactions); Factors affecting corrosion – nature of metal (galvanic series; over voltage; purity of metal; nature of oxide film; nature of corrosion product), and nature of environment (effect of temperature; effect of pH; humidity; effect of oxidant).
Corrosion control methods – cathodic protection, sacrificial anode, and impressed current cathode;
Surface coatings – methods of application on metals (hot dipping; galvanizing; tinning; cladding; electroplating), and organic surface coatings (paints - constituents and functions).
UNIT III
a) POLYMERS
Introduction**;** Types of polymerization; Plastics - thermoplastic resins, and thermoset resins; Compounding and fabrication of plastics; Preparation, properties, and engineering applications of polyethylene, PVC, PS, Teflon, bakelite, nylon.
b) RUBBER
Natural rubber- processing, vulcanization; Elastomers (Buna-s; Butyl rubber; Thiokol rubbers); Fiber reinforced plastics (FRP) and their applications.

UNIT IV
WATER

Introduction; Hardness - causes, expression of hardness, units, types of hardness, estimation of temporary and permanent hardness of water, and numerical problems; Boiler troubles – scale and sludge formation, caustic embrittlement, corrosion, priming and foaming; Softening of water (Internal and external treatment - lime soda, zeolite, ion exchange process, and numerical problems); Reverse osmosis and Electro dialysis (desalination processes).

UNIT V
NANOMATERIALS

Introduction; Preparation and applications of nanomaterials with special reference to carbon nanotubes.

INSULATORS

Classification of insulators; characteristics of thermal and electrical insulators and their applications; Superconductors - Nb-Sn alloy, $YBa_2\ Cu_3\ O_{7-x}$; Applications of superconductors.

TEXT BOOKS:
1. Engineering Chemistry by Y.Bharathi Kumari, Jyotsna Cherukuri; Publisher: VGS Book Links.
2. Engineering Chemistry by P.C.Jain and Monica Jain, Publisher: Dhanpat Rai Publishing Company.

REFERENCES:
1. Engineering Chemistry by S.S. Dhara and Mukkanti; Publisher: S.Chand and Co.
2. Engineering Chemistry by O G Palanna
3. Engineering Chemistry by R.Gopalan, D.Venkappayya, Sulochana Nagarajan; Publisher: Vikas Publishers.
4. Engineering Chemistry by R.P.Mani, S.N. Mishra, B.Rama Devi ,Cengage Learning Publications.

VNR Vignana Jyothi Institute of Engineering and Technology

I Year B. Tech ME / AE II Sem	L	T/P/D	C
	3	1	3

(MED 1103) ENGINEERING MECHANICS – II

UNIT – I
TRUSSES:
Introduction –Types of Trusses, Assumptions made in the analysis of Trusses, Method of Joints, Method of Sections, Force table, Cantilever Trusses, Trusses with one end hinged and the other freely supported on rollers carrying horizontal or inclined loads. Frames: Introduction, Types of Frames, Method of members.

UNIT – II
VIRTUAL WORK:
Equilibrium of ideal systems, Virtual displacement, Concept of virtual work, Principle of virtual work, Application of principle of virtual work to beams, ladders, framed structures.

UNIT – III
KINEMATICS:
Kinematics of particles - Path, Tortuous path, Plane path, Rectilinear motion, Displacement, Displacement time diagram, Velocity, Instantaneous velocity, Average velocity, Velocity time diagram, Acceleration, Variable acceleration, Average acceleration, Curvilinear motions, normal and tangential accelerations, Projectiles, Kinematics of rigid bodies rotation about a fixed axis

UNIT - IV
KINETICS:
Kinetics of particles, Newton's Second Law, differential equations of rectilinear and curvilinear motions, motion of a particle acted upon by constant force, Dynamic equilibrium, Inertia force, D'Alembert's Principle applied for rectilinear and curvilinear motion, Kinetics of rigid bodies in rotation under action of a constant moment.

UNIT – V
WORK–ENERGY, IMPULSE–MOMENTUM METHOD:
Work of a force, Principle of Work and Energy, Application of principle of Work-Energy for rectilinear motion, Impulse-Momentum Principle, Application of Impulse-Momentum principle to connected bodies. Moment of momentum, Application of principle of Work-Energy for curvilinear motion

TEXT BOOKS:

1. Engineering Mechanics by Timoshenko and Young, Tata Mc-Graw Hill ublishers
2. Engineering Mechanics by S.S. Bhavikatti, New age International Publishers
3. Engineering Mechanics by R.K. Bansal, Laxmi Publishers

REFERENCES:

1. Singer's Engineering Mechanics by K. Vijaya Kumar Reddy, BS Publishers
2. Engineering Mechanics (Statics) by Meriam and Kraige, John Wiley Publishers
3. Engineering Mechanics by Tayal, Umesh Publishers

VNR Vignana Jyothi Institute of Engineering and Technology

I Year B.Tech ME / AE II Sem	L	T/P/D	C
	2	4	4

(MED1104) ENGINEERING GRAPHICS – II (USING AUTOCAD)

UNIT I

SECTIONS AND SECTIONAL VIEWS

Sections of right regular solids-prisms, pyramids, cylinders and cones – auxiliary views

DEVELOPMENT OF SURFACES

Development of surfaces of right regular solids prisms, pyramids, cylinders and cones.

UNIT II

INTERSECTION OF SOLIDS

Intersection of prism Vs prism, cylinder vs prism, cylinder vs cylinder and cylinder vs cone

UNIT III

ISOMETRIC PROJECTIONS

Principles of isometric projections, Isometric scale, isometric views, conventions, isometric views of lines, planes, simple and compound solids, isometric views of objects having spherical parts.

UNIT IV

TRANSFORMATION OF PROJECTIONS

Conversion of isometric views to orthographic views - conventions for simple objects. Construction of orthographic projections for given isometric projections.

UNIT V

PERSPECTIVE PROJECTIONS

Perspective view of points, lines, plane figures and simple solids, vanishing point method and visual ray method

TEXT BOOKS:

1. Elementary Engineering Drawing by N.D.Bhat; Publisher: Charotar Publishing House
2. Engineering Drawing by K.L. Narayana and P. Kannaiah; Publisher: Scitech Publications.
3. Engineering Graphics for degree by K.C. John; Publisher: Prentice Hall of India.

VNR Vignana Jyothi Institute of Engineering and Technology

I Year B.Tech ME/ AE II Sem	L	T/P/D	C
	0	3	2

(MED1210) IT AND FUELS LAB

IT Lab
1. Computer Hardware: Identification of Peripherals
2. Assembling and disassembling of a PC
3. Simple diagnostic exercises – Related to hardware
4. Installation of Windows Operating System
5. Installation of Linux Operating System
6. Linux Basic Commands
7. Simple diagnostic exercises –Related to Operating System

TEXTBOOKS:
1. IT Essentials PC Hardware and Software Companion Guide Third Edition by Davis Anfinson and Ken Quamme – CISCO Press, Pearson Education.
2. PC Hardware and A+ Handbook – Kate J. Chase PHI (Microsoft)

   Fuels Lab

Any Six Experiments
1. Find the flash and fire points of the given fuel (open cup method)
2. Find the flash and fire points of the given fuel (closed cup method)
3. Find the calorific value of the given fuel using Bomb calorimeter
4. Find the calorific of the gas using Junkers gas calorimeter
5. To do carbon residue test using Conradson apparatus
6. To analyze the exhaust gas using Orsat apparatus
7. To find viscosity using Saybolt Apparatus

VNR Vignana Jyothi Institute of Engineering and Technology

I Year B.Tech ME/AE II Sem	L	T/P/D	C
	0	3	2

(MED1201) ENGINEERING WORKSHOP

TRADES FOR EXCERCISES

At least **two** exercises from each trade:

1. Carpentry
2. Tin-Smithy
3. Fitting
4. Welding
5. Electrical Wiring

TRADES FOR DEMONSTRATION and EXPOSURE:

1. Power tools in construction, wood working, electrical engineering and mechanical engineering.
2. Machine shop.
3. CNC Lathe

TEXT BOOKS:

1. Workshop Manual by P.Kannaiah and K.L.Narayana; Publisher: Scitech.

VNR Vignana Jyothi Institute of Engineering and Technology

I Year B.Tech (Common to CSE, IT, ME, AE) II Sem   **L   T/P/D   C**

                                                                                0   3   2

(ENG 1202)   ENGLISH LANGUAGE COMMUNICATION SKILLS LABORATORY - II
In continuation with the first Year I semester syllabus, this course offers further practice
in Listening, Speaking, and Grammar in preparation for the advanced speaking and
writing skills offered in the III Year .

UNIT- I

MULTIMEDIA LAB:
  1. Grammar – Active and Passive Voice
  2. Vocabulary   Lesson 6
  3. Listening Comprehension

Communication Skills Lab: i) Data Analysis (Writing) ii)   Interpretation of visuals

UNIT- II

MULTIMEDIA LAB:
  1. Grammar - Conditionals and Prepositions
  2. Vocabulary   Lesson 7
  3. Listening Comprehension

Communication Skills Lab: Presentation Skills : Oral Presentation

UNIT-III

MULTIMEDIA LAB:
  1.   Grammar -- Language Analysis
  2.   Vocabulary   Lesson 8

Communication Skills Lab: Presentation Skills : PPTs

UNIT-IV

MULTIMEDIA LAB:
  1. Grammar – Common Errors
  2. Writing: Self Introduction (in the Written Form)
  3. Vocabulary   Lesson 9
  4. Listening Comprehension

Communication Skills Lab: Debate

UNIT-V

MULTIMEDIA LAB:
  1. **Introduction to Technical Writing**
  A. Definition of a Technical Term
  B. Description of a Mechanism
  C. Description of a Technical Process
  2. Vocabulary   Lesson 10

COMMUNICATION SKILLS LAB: Group Discussions

VNR Vignana Jyothi Institute of Engineering and Technology

II Year B.Tech ME/AE I Sem	L	T/P/D	C
	3	1	3

(MTH1103) MATHEMATICS III
(Partial Differential Equations and Integral Transforms)

PARTIAL DIFFERENTIAL EQUATIONS
UNIT I
PARTIAL DIFFERENTIAL EQUATIONS
Introduction and formation of partial differential equations by elimination of arbitrary constants and arbitrary functions; Solutions of first order linear (Lagrange's) equation and non-linear (standard type) equations; Method of separation of variables for second order equations; Particular integrals.

INTEGRAL TRANSFROMS
UNIT II
FOURIER SERIES
Determination of Fourier coefficients; Fourier series - even and odd functions; Fourier series in an arbitrary interval; Half range Fourier series, sine and cosine series.

UNIT III
FOURIER TRANSFORMS
Fourier integral theorem (only statement); Fourier sine, cosine integrals and complex form of Fourier integral; Fourier transforms - Fourier sine and cosine transforms; Inverse transforms; Properties and convolution theorem; finite Fourier transforms; cosine and sine transforms.

UNIT IV
STANDARD PARTIAL DIFFERENTIAL EQUATIONS
Solutions of wave equation, heat equation and Laplace equation and their use in problems of vibrating string; one dimensional unsteady heat flow; two dimensional steady heat flow.

UNIT V
Z-TRANSFORM
Z-transform; Inverse z-transform; Properties, initial, and final value theorems; Convolution theorem; Difference equations; Solutions of difference equations using z-transform.

TEXT BOOKS:
1. Higher Engineering Mathematics – by B.S.Grewal
2. Advanced Engineering Mathematics by Dennis G. Zill and Warren S. Wright; 4th edition; Publisher: Jones and Bartlett Learning.
3. Advanced Engineering Mathematics by S.R.K . Iyengar

REFERENCES:
1. Advanced Engineering Mathematics by Erwin Kreyszig, 8th Edition; Publisher: John Wiley.
2. Advanced Engineering Mathematics by Peter V. O'Neil, 9th Edition; Publisher: Cengage Learning.

VNR Vignana Jyothi Institute of Engineering and Technology

II Year B.Tech ME/AE I Sem	L	T/P/D	C
	3	1	3

(MED1106) SOLID MECHANICS

UNIT I
TENSION, COMPRESSION, AND SHEAR

Introduction; Normal Stress and Strain; Stress-strain diagrams; Elasticity and plasticity; Linear elasticity and Hooke's law; Allowable stress and allowable loads.

AXIALLY LOADED MEMBERS

Introduction; Deflections of axially loaded members; Strain energy; Dynamic loading.

UNIT II

Area moment of inertia of composite sections.

STRESSES IN BEAMS

Introduction; Normal strains in beams; Normal stresses in beams; Cross-sectional shapes of beams-C, angular and semicircle structures; Shear stresses in rectangular beams; Shear stress in webs of beams with flanges; Shear stress in circular beams (solid and hollow sections); Concept of shear center and shear flow

UNIT III
SHEAR FORCE AND BENDING MOMENT DIAGRAMS

Types of beams; Types of loading; Shear force and bending moment; Relationship between load, shear force and bending moment; Shear force and bending moment diagrams.

TORSION

Introduction; Torsion of circular bars; Non uniform torsion; Pure shear; Relationship between modulus of elasticity E and G; Transmission of power by circular shafts.

UNIT IV
ANALYSIS OF STRESS AND STRAIN

Introduction; Plane stress; Principal stresses and maximum shear stresses; Mohr's circle for plane stress; Hooke's law for plane stress; Spherical and cylindrical pressure vessels (biaxial stress; Hoop and longitudinal stresses); Combined loadings (plane stress); Principal stresses in beams.

UNIT V
DEFLECTIONS OF BEAMS

Introduction; Differential equations of the deflection curve; Deflections by integration of the bending moment equation; Deflections by integration of the shear-force and load equations; Macaulay's method; Moment area method; Method of superposition.

TEXT BOOK:

1. Mechanics of Materials (SI units) by J.M.Gere and S.P.Timoshenko; Publisher: CBS Publishers.

REFERENCE:

1. Engineering Mechanics of Solids by Popov; Publisher: Pearson Education.
2. Strength of Materials Schaum's Series.

VNR Vignana Jyothi Institute of Engineering and Technology

II Year B.Tech ME/AE I Sem

L	T/P/D	C
4	1	4

(MED1107) THERMODYNAMICS

UNIT I
CONCEPTS AND DEFINITIONS
Thermodynamic system and control volume; Macroscopic versus microscopic point of view; Properties and state of a substance; Processes and cycles, Energy, Specific volume and density, Equality of temperature; The Zeroth law of thermodynamics; Temperature scales.

WORK AND HEAT
Definition of work; Units for work; Work done at the moving boundary of a simple compressible system; Other systems that involve work; Definition of heat; Heat transfer modes; Comparison of heat and work.

THE FIRST LAW OF THERMODYNAMICS
The first law of thermodynamics for a control mass undergoing a cycle; The first law of thermodynamics for a change in state of a control mass; Internal energy-a thermodynamic property; Problem analysis and solution technique; Enthalpy; The constant-volume and constant-pressure specific heats; The internal energy, enthalpy, and specific heat of ideal gases; The first law as a rate equation.

FIRST LAW ANALYSIS FOR A CONTROL VOLUME
Conversion of mass and the control volume, The first law of thermodynamics for a control volume, The steady-state process; Examples of steady-state processes.

UNIT II
THE SECOND LAW OF THERMODYNAMICS
Heat engines and refrigerators; The second law of thermodynamics; The reversible process; Factors that render processes irreversible; The Carnot cycle; Two propositions regarding the efficiency of a Carnot cycle; The thermodynamic temperature scale; The ideal-gas temperature scale; Ideal versus real machines.

ENTROPY FOR A CONTROL MASS
The inequality of Clausius; Entropy — a property of a system; The entropy of a pure substance; Entropy change in reversible processes; The thermodynamic property relation; Entropy change of an ideal gas; The reversible polytropic process for an ideal gas; Entropy change of a control mass during an irreversible process; Entropy generation; Principle of increase of entropy; Entropy as a rate equation.

UNIT III
IRREVERSIBILITY AND AVAILABILITY
Available energy; Reversible work and irreversibility; Availability and second-law efficiency; Exergy balance equation.

Introduction to Third law of Thermodynamics & Concept of absolute entropy

PROPERTIES OF A PURE SUBSTANCE

The pure substance; Vapor- liquid- solid- phase equilibrium in a pure substance; Independent properties of a pure substance; Steam Tables; Thermodynamic surfaces; The compressibility factor; Equations of state.

UNIT IV

POWER CYCLES

Introduction to power systems; The Rankine cycle; Effect of pressure and temperature on the Rankine cycle; Air-standard power cycles; The Brayton cycle; The air-standard cycle for jet propulsion; Reciprocating engine power cycles; The Otto cycle; The Diesel cycle; The Dual cycle, The Stirling cycle; The Atkinson and Miller cycles

UNIT V

IDEAL GAS MIXTURES

General consideration and mixtures of ideal gases; ideal gas equation Daltons law of partial pressure

THERMODYNAMIC PROPERTY RELATIONS

Mathematical relations for a homogeneous phase; The Maxwell relations; Thermodynamic relations involving enthalpy, internal energy, and entropy; The Clapeyron equation; Joule-Thompson coefficient; Volume expansivity, and isothermal and adiabatic compressibility; Real gas behavior and equations of state; The generalized chart for changes of enthalpy at constant temperature; The generalized chart for changes of entropy at constant temperature; The property relation for mixtures; Tables of thermodynamic properties of gases.

TEXT BOOK:
1. Fundamentals of Thermodynamics by C. Borgnakke and R.E. Sonntag; Publisher Wiley India Pvt. Ltd.
2. Engineering Thermodynamics by P.K. Nag.

REFERENCES:
1. Fundamentals of Thermodynamics by C. Borgnakke, R.E. Sonntag, and G.J. Van Wylen; Publisher John Wiley.
2. Engineering Thermodynamics by Burgadt, Harper & Row Publication
3. Thermodynamics — An engineering approach by Yunus Cengel and Boles; Publisher: TMH.

VNR Vignana Jyothi Institute of Engineering and Technology

II Year B.Tech ME/AE I Sem	L	T/P/D	C
	4	0	4

(MED1108) METALLURGY AND MATERIAL SCIENCE

UNIT I
METAL STRUCTURE AND CRYSTALLIZATION
Introduction - atom binding, ionic bond, covalent bond, metallic bond, and Vander Waals forces; Crystal imperfections

OVERVIEW OF METAL STRUCTURE AND CRYSTALLIZATION. CONSTITUTION OF ALLOYS
Introduction; Classification of alloys or compounds; Pure metal; Intermediate alloy phase or compound - intermetallic compounds or valency compounds, interstitial compounds, and electron compounds; Solid solutions; Substitution solid solution - factors that control the range of solubility in alloy system; Interstitial solid solutions.

UNIT II
PHASE DIAGRAMS
Introduction; Coordinates of phase diagrams; Experimental methods - construction of equilibrium diagrams by thermal analysis, metallographic methods, and X-ray diffraction;

Type-I-Two metals completely soluble in the liquid and solid states; Chemical composition of phases; relative amounts of each phase; Equilibrium cooling of a solid solution alloy; Diffusion; Nonequilibrium cooling; Homogenization; Properties of solid-solution alloys; Variation of Type I; Type II-Two metals completely soluble in the liquid state and completely insoluble in the solid state; Type III-Two metals completely soluble in the liquid state but only partly soluble in the solid state; Properties of eutectic alloy systems; Age hardening – solution treatment, and aging process; Type IV-The congruent-melting intermediate phase; Type V-The peritectic reaction; Type VI-Two liquids partly soluble in the liquid state: the monotectic reaction; Type VII-two metals insoluble in the liquid and solid states; Interrelation of basic types;

Transformations in the solid state - allotropy, order-disorder transformation, the eutectoid reaction, the peritectoid reaction, and complex diagrams;

Study of important binary phase diagrams of Cu-Ni, Al-Si, Sib-Pb, Pt-Ag, Bi-Cod, Cu-Pb, Cu-Son and Fe-Fe3C.

UNIT III
THE HEAT TREATMENT OF STEEL
Introduction; Full Annealing; Spheroidizing; Stress-relief annealing; Process annealing; Normalizing; Hardening; The isothermal transformation diagram; Transformation to Pearlite and Bainite; Cooling curves and I-T Diagram; Transformation on continuous

cooling; Position of the I-T curves; Hardening or austenitizing temperature; Homogeneity of austenite; Mechanism of heat removal during quenching - vapor-blanket cooling state (stage A), vapor transport cooling stage (stage B), Liquid cooling stage (stage C); Quenching medium; Temperature of quenching medium; Surface condition - methods to minimize the formation of scale - copper plating, protective atmosphere, liquid-salt pots, and cast-iron chips; Size and Mass; Hardenability; Use of Hardenability data; Tempering; Austempering; Surface heat treatment or case hardening; Carburizing; Heat treatment after carburizing; Cyaniding and Carbonitriding; Nitriding; Flame hardening; Induction Hardening; Residual Stresses; Hardenable carbon steels; Effect of cryogenic heat treatment – A brief study.

UNIT IV

ALLOY STEELS

Introduction; Purpose of alloying; Effect of alloying elements upon Ferrite; Effect of alloying elements upon carbide; Influence of alloying elements on the iron-iron carbide diagram; Effect of alloying elements in tampering; Classification of steels - nickel steel, chromium steel, nickel-chromium steels, manganese steels, molybdenum steels, tungsten steels, vanadium steels, silicon steels, stainless steels, martensitic stainless steels, ferritic stainless steels, austenitic stainless steels, precipitation-hardening stainless steels, maraging steels, and ausforming.

TOOL STEELS

Classification of tool steels; Selection of tool steels; Comparative properties; Non-deforming properties; Depth of hardening; Toughness; Wear resistance; Red-hardness; Machinability; Resistance to decarburization; Brand names; Water-hardening tool steels (Group W); Shock resisting tool steels (Group S); Cold-work tool steels; Hot-work tool steels (Group H); High speed tool steels; Mold Steels (Group P); Special purpose tool steels; Heat treatment of tool steels; Overview of tool failures; Special cutting materials – satellites, cemented carbides, and ceramic tools.

UNIT V

CAST IRON

Introduction; Types of cast iron; White cast iron; Malleable cast iron; Pearlitic malleable iron; Gray cast iron; Silicon in cast iron; Sulfur in cast iron; Manganese in cast iron; Phosphorus in cast iron; Heat treatment of grey iron, Size and distribution of graphite flakes; Mechanical properties and applications of grey cast iron; Chilled cast iron; Nodular cast iron; Alloy cast irons.

NON-FERROUS METALS AND ALLOYS

Introduction; Copper and its alloys - Copper, temper designation of copper and copper alloys, and copper alloys; Aluminum and its alloys - Aluminum, Alloy designation system, and temper designation; Titanium and Titanium alloys.

TEXT BOOK:

1. Introduction to Physical Metallurgy by Sidney H. Avner; Publisher: McGraw-Hill.

REFERENCES:

1. Essentials of Materials Science and Engineering by Donald R. Askeland and Thomson.
2. Materials Science and Engineering by William and Collister.
3. Elements of Materials Science by V.Raghavan

VNR Vignana Jyothi Institute of Engineering and Technology

II Year B.Tech ME/ AE I Sem	L	T/P/D	C
	3	1	3

(EEE1153) BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

UNIT - I
ELECTRICAL CIRCUITS:
Basic definitions, Types of 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 – Principle of operation of DC Motor - DC motor types –torque equation – Three point starter -Swinburne's test, applications.

TRANSFORMERS:
Principle of operation of single phase transformer–emf equation–losses–OC and SC tests - efficiency and regulation/

UNIT - III
AC MACHINES:
Principle of operation of alternator – regulation by synchronous impedance method – Principle of operation of induction motor – slip – torque characteristics – applications.

INSTRUMENTS:
Principle and construction of permanent magnet moving coil and moving iron instruments.

UNIT - IV
DIODE AND IT'S CHARACTERISTICS:
P-n junction diode, symbol, V-I Characteristics, Diode Applications: Rectifiers – Half wave Full wave and Bridge rectifiers (simple Problems)

UNIT - V
TRANSISTORS:
PNP and NPN Junction transistor, Transistor as an amplifier, SCR characteristics and applications

CATHODE RAY OSCILLOSCOPE:
Principles of CRT (Cathode Ray Tube), Deflection, Sensitivity, Electrostatic and Magnetic deflection, Applications of CRO - Voltage, Current and frequency measurements.

TEXT BOOKS:
1. Electronic Devices and Circuits David A Bell Oxford University Press.
2. Introduction to Electrical Engineering – M.S Naidu and S. Kamakshaiah, TMH Publications.

REFERENCES:
1. Principles of Electrical and Electronics Engineering by V.K.Mehta, S.Chand & Co.
2. Basic Electrical Engineering by Kothari and Nagarath, TMH Publications, 2nd edition.

VNR Vignana Jyothi Institute of Engineering and Technology

II Year B. Tech AE I Sem	L	T/P/D	C
	4	0	4

(CMS1101) BUSINESS ECONOMICS AND FINANCIAL ANALYSIS

UNIT I
BUSINESS AND NEW ECONOMIC ENVIRONMENT
Characteristic features of business; Features and evaluation of sole proprietorship; Partnership; Joint stock company; Public enterprises and their types; Changing business environment in post- liberalization scenario.

UNIT II
INTRODUCTION TO BUSINESS ECONOMICS, AND DEMAND ANALYSIS
Definition; Nature and scope of managerial economics - demand analysis determinants; Law of demand and its exceptions.

ELASTICITY OF DEMAND AND DEMAND FORECASTING
Definition; Types; Measurement and significance of elasticity of demand; Demand forecasting; Factors governing demand forecasting; Methods of demand forecasting - survey methods, statistical methods, expert opinion method, test marketing, controlled experiments, and judgmental approach to demand forecasting.

UNIT III
COST ANALYSIS
Cost concepts - opportunity cost, fixed vs. variable costs, explicit costs vs. implicit costs, and out of pocket costs vs. imputed costs; Break-even analysis (BEA) - determination of break-even point (simple problems), managerial significance, and limitations of BEA.

CAPITAL AND CAPITAL BUDGETING
Capital and its significance; Types of capital; Estimation of fixed and working capital requirements; Methods and sources of raising finance.

Nature and scope of capital budgeting; Features of capital budgeting proposals; Methods of capital budgeting - payback method, accounting rate of return (ARR), and net present value method (simple problems)

UNIT IV
THEORY OF PRODUCTION
Production function - isoquants and isocosts, least cost combination of inputs, and laws of returns; Internal and external economics of scale.

MARKET STRUCTURES
Types of competition; Features of perfect competition, monopoly, and monopolistic competition; Price-output determination in case of perfect competition and monopoly.

PRICING POLICIES AND METHODS

Cost plus pricing; Marginal cost pricing; Sealed bid pricing; Going rate pricing, Limit pricing, Market skimming pricing, Penetration pricing, Two-part pricing, Block pricing, Bundling pricing, Peak load pricing, Cross subsidization.

UNI T V

INTRODUCTION TO FINANCIAL ACCOUNTING

Double-entry book keeping; Journal; Ledger; Trial balance; Final accounts - trading account, profit and loss account, and balance sheet with simple adjustments.

FINANCIAL ANALYSIS THROUGH RATIOS

Computation; Analysis and interpretation of liquidity ratios - current ratio, and quick ratio; Activity ratios - inventory turnover ratio, and debtor turnover ratio; Capital structure ratios – debt-equity ratio, and interest coverage ratio; Profitability ratios - gross profit ratio, net profit ratio, operating ratio, P/E ratio, and EPs.

TEXT BOOKS:

1. Managerial Economics and Financial Analysis by Aryasri, 2009; Publisher: Tata McGraw Hill.
2. Managerial Economics by Varshney and Maheswari, 2009; Publisher: Sultan Chand.

REFERENCES:

1. Financial Accounting for Management: An analytical perspective by Ambrish Gupta, 2010; Publisher: Pearson Education.
2. Managerial Economics by H. Craig Peterson and W. Cris Lewis; Publisher: Prentice Hall of India.

VNR Vignana Jyothi Institute of Engineering and Technology

II Year B.Tech ME/AE I Sem	L	T/P/D	C
	0	3	2

(MED1203) METALLURGY AND MECHANICS OF SOLIDS LAB

Metallurgy lab (Six experiments)

1. Preparation and study of the microstructure of metals like Iron, Cu and Al.
2. Preparation and study of the microstructure of mild steels, low carbon steels, and high carbon steels.
3. Study of the microstructures of cast irons.
4. Study of the microstructures of non-ferrous alloys.
5. Study of the microstructures of heat treated steels.
6. Harden ability of steels by Jiminy end quench test.
7. To find out the hardness of various treated and untreated steels.
8. Study the microstructure of cutting tools

Mechanics of Solids lab (Six experiments)
1. Direct tension test
2. Bending tests:
   a) Simple supported beam
   b) Cantilever beam
3. Torsion test
4. Hardness test
   a) Brunel hardness test
   b) Rockwell hardness test
5. Test on springs
6. Compression test on a cube
7. Impact test
8. Punch shear test

VNR Vignana Jyothi Institute of Engineering and Technology

II Year B.Tech ME/AE I Sem	L	T/P/D	C
	0	3	2

(EEE1251) BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LAB

Section A: Electrical Engineering:

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. Brake test on D.C Shunt Motor
3. OC and SC tests on single phase transformer (Predetermination of efficiency and regulation at given power factors)
4. Brake test on 3-phase Induction motor (Determination of performance characteristics)
5. Regulation of alternator by Synchronous impedance method

Section B: Electronics Engineering:

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

1. P-n Diode Characteristics
2. Transistor CE Characteristics (Input and Output)
3. Full wave Rectifier with and without filters
4. CE Amplifiers
5. SCR Characteristics

VNR Vignana Jyothi Institute of Engineering and Technology

II Year B. Tech ME/AE II Sem	L	T/P/D	C
	3	1	3

(MTH1106) PROBABILITY AND STATISTICS

UNIT I
PROBABILITY AND DISTRIBUTIONS
Sample space and events, Probability- The axioms of probability, some elementary theorems, conditional probability, Baye's theorem, Random variables - discrete and continuous. Distributions - Binomial, Poisson and Normal distributions–related properties.

UNIT II
SAMPLING DISTRIBUTIONS AND TESTING OF HYPOTHESIS
Sampling distributions, Sampling distribution of means (σ known and unknown), Point estimation, interval estimation, Tests of hypothesis - Null hypothesis, Alternate hypothesis, Type I, Type II errors, Critical region, Inferences concerning means and proportions- Large samples- Test of hypothesis for single mean and difference between the means, Test of hypothesis for the proportions- Single and difference between the proportions, Confidence interval for the mean and proportions.

UNIT III
TESTS OF SIGNIFICANCE- SMALL SAMPLES
Tests of significance - t distributions, Confidence interval for the t- distribution, F-distributions and Chi square distributions.

UNIT IV
CORRELATION AND REGRESSION
Coefficient of correlation, regression coefficient, the lines of regression, rank correlation, correlation for bivariate frequency distributions.

UNIT V
RELIABILITY THEORY AND TIME SERIES ANALYSIS
Basic concepts of reliability, Normal failure law, Exponential failure law, The Weibull failure law and reliability of systems, Time series- utility of time series analysis, Components of time series, Preliminary adjustments before analyzing time series, Measurement of trend by the method of least squares.

TEXT BOOKS:

1. Probability and Statistics for Engineers - Miller I.R. and Freund J.E, 5th Edition, Prentice-Hall, 1995.
2. Introductory Probability and Statistical Application – Meyer, 2nd edition, Oxford and Ibh, 1970.
3. Statistical Methods - S.P. Gupta, Sultan Chand and sons, 2011.

REFERENCES:

1. Reliability Engineering - Balagurusamy E, Tata McGraw Hill, 1984.
2. Elements of Applied Stochastic processes - Bhat U.N, Wiley Series in Probability and Mathematical Statistics, 1983.

VNR Vignana Jyothi Institute of Engineering and Technology

II Year B.Tech ME/AE II Sem

	L	T/P/D	C
	4	0	4

(MED1111) KINEMATICS OF MACHINES

UNIT-I

MECHANISMS AND MACHINES:

Elements or links-classification-rigid link, flexible and fluid link-types of kinematic pairs-sliding pairs, turning, rolling, screw and spherical pairs-lower and higher pairs-closed and open pairs-constrained motion-completely, partially or successfully constrained and incompletely constrained.

Mechanisms, Machines -classification of machines- kinematic chain-inversion of mechanism-inversions of quadric cycle chain, single and double slider crank chains, Intermittent motion mechanisms.

UNIT-II

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, Klein's 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 centers in line theorem-Graphical determination of instantaneous centre, diagrams for simple mechanisms and determination of angular velocity of points and links.

UNIT-III

STEERING MECHANISMS AND HOOKE'S JOINT:

Condition for correct steering –Davis steering gear, Ackerman's steering gear-velocity - ratio - Single and double Hooke's Joint- Universal coupling-applications- problems.

STRAIGHT LINE MOTION MECHANISMS:

Exact and approximate-copied and generated types - Peaucellier , Hart and Scott Russell- Grasshopper- Watt-Tchebicheff and Robert mechanism and straight line motion, Pantograph.

UNIT-IV
CAMS:
Definition 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 acceleration during outward and return strokes in the above three cases. Overview of polynomial motions, Analysis of motion of followers: roller follower- circular cam with straight, concave and convex flanks.

UNIT-V
HIGHER PAIRS:
Friction wheels and toothed gears-types-law of gearing, condition for constant velocity ratio for transmission of motion, forms of teeth- Cycloidal and Involute profiles. Velocity of sliding-phenomena of interference-methods of interference, condition for minimum number of teeth to avoid interference, expression for arc of contact and path of contact-introduction to helical, bevel and worm gearing.

GEAR TRAINS:
Introduction-train value-types-simple and reverted wheel trains – epicyclic gear train, methods of finding train value or velocity ratio-selection of gear box differential gear for an automobile.

TEXT BOOKS:
1. Theory of Machines by Thomas Bevan
2. Theory of Machines by P. L. Ballaney
3. Theory of Machines by Ratan

REFERENCES:
1. Theory of machines by R. S. Khurmi & J. K. Gupta
2. Theory of machines by R. K. Bansal
3. Theory of machines by Sadhu Singh
4. Theory of machines by Shigley
5. Mechanism and Machine Theory by J. S. Rao and R. V. Dukkipati

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING & TECHNOLOGY

II Year B.Tech AE II Sem	L	T/P/D	C
	4	1	4

(AED1101) FLUID MECHANICS & HYDRAULIC MACHINES

UNIT I:

Fluid Statics: Properties of fluid – specific gravity, viscosity, surface tension, vapor pressure and their influence on fluid motion, Pressure at a point, measurement of pressure, Forces on immersed surfaces, Center of pressure, Buoyancy, Elements of stability of floating bodies.

Fluid Kinematics: Classification of flows, acceleration equations, Stream line, path line and streak lines and stream tube, continuity equation, Stream function, velocity potential function.

UNIT II:

Fluid Dynamics: Surface and body forces – Euler's and Bernoulli's equation, Venturimeter, Orifice meter, Pitot tube, Reynolds experiment –Darcy Weisbach equation – Minor losses in pipes – pipes in series and pipes in parallel. Momentum equation, force on pipe bend.

UNIT III:

Impact of Jets: Hydrodynamic force of jets on flat, inclined and curved vanes - jet striking centrally and at tip, flow over radial vanes

Elements of hydroelectric power station: Types of power plants, storage requirements, estimation of power from a given catchment area, head and efficiency.

UNIT IV:

Hydraulic Turbines: Classification of turbines, design of Pelton wheel, Francis turbine and Kaplan turbine – working proportion, work done, efficiency, draft tube- theory, functions and efficiency. Geometric similarity, Unit and specific quantities, characteristic curves, governing of turbines, selection of type of turbine, cavitation, surge tank and water hammer.

UNIT V:

Hydraulic Pumps: Classification, centrifugal pumps – types, working, work done, manometric head, losses and efficiency, specific speed – pumps in series and parallel – performance characteristic curves, NPSH, Reciprocating Pump – types, Working, Discharge, slip, indicator diagrams.

TEXT BOOK:
1. Hydraulics and Fluid Mechanics Including Hydraulics Machines: Dr. P.N.Modi, Dr. S.M. Seth

REFERENCE BOOKS:
1. Fluid mechanics V.L.Streeter & E.B.Wylie.
2. Fluid mechanics, fundamentals & applications - Yunus A. Çengel, John M. Cimbala.
3. Fluid mechanics : F.M.White

VNR Vignana Jyothi Institute of Engineering and Technology

II Year   B.Tech AE II SEM   L   T/P/D   C
                                                                                       3   1   3

(AED1102) APPLIED THERMODYNAMICS

UNIT I
Steam Generators: Introduction, Classification of Boilers, Working Principles of Fire Tube and Water Tube Boilers, Low Pressure boilers, High Pressure Boilers, Babcock and Wilcox, Lamont Boiler, Boiler draught and performance of boilers, Equivalent evaporation.
Steam Condensors: Introduction, purpose and types of condensers, Efficiency of condenser, Edward Air Pump.
UNIT – II
Steam Nozzles : Functions of nozzle, applications, types, flow through nozzles, Thermodynamic analysis, assumptions, velocity of nozzle at exit, Ideal and actual expansion in nozzle, velocity co-efficient, condition for maximum discharge, Critical pressure ratio.
Steam Turbines: Classification – Impulse turbine, Mechanical details, Velocity diagram, Effect of friction, Power developed, axial thrust, diagram efficiency, Condition for maximum efficiency. Methods to reduce rotor speed.
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.
UNIT – III
Compressors : Classification – Power producing and power absorbing machines, fan, Blower and compressor, Roots blower, Vane blower, Sealed compressor, Lysholm compressor –working principles.
Reciprocating Compressors: Principle of operation, work required, Isothermal efficiency, volumetric efficiency and effect of clearance, Multi Stage compression, under cooling, saving of work, minimum work condition for stage compression.
UNIT – IV
Centrifugal Compressors: Mechanical details and principle of operation, velocity and pressure variation. Energy transfer, Impeller blade shape-losses, slip factor, power input factor, pressure co-efficient and adiabatic co-efficient, velocity diagrams, power requirement to run the compressor.

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,

Polytrophic efficiency

UNIT – V

Gas Turbines: Classification of Gas Turbine plants, Ideal cycle, essential components, parameters of performance, actual cycle, regeneration, inter cooling and reheating.

Jet Propulsion and Rockets:

Classification of Jet propulsion engines, Principle of operation, Working principles with schematic diagram and representation on T- s diagram. Needs and demands met by Turbo Jet Engines, Rockets, Application, working principle, Classification, Propellant type.

TEXT BOOKS:
1.   Thermal Engineering/ Rathod / TMH
2.   Gas Turbines / V. Ganesan / TMH

REFERENCES:
1.   Thermal Engineering / R.K.Rajput / Laxmi Publications
2.   I. C Engines / Mathur & Sharma / Dhanpath Rai & Sons
2.   Thermodynamics & Heat Engines / R.Yadav/ Central Book Depot.
3.   Thermal Engineering / P L Ballaney / Khanna Publishers
4.   Gas Turbines and Propulsive systems / P Khajuria and S P Dubey / Dhanpat Rai & Sons

VNR Vignana Jyothi Institute of Engineering & Technology

II Year B.Tech AE II Sem	T	T/P/D	C
	4	0	4

(AED1103) AUTOMOTIVE ENGINES & SYSTEMS

UNIT-I:
INTRODUCTION: Classification and components of an engine, Principle and working of four stoke and two stroke SI and CI engine. Comparison of theoretical and actual cycles and their analysis. Multi fuel engine, Sterling cycle engine, Wankel engine, stratified charge engine and lean burn engine, hybrid electric vehicles.
ENGINE CONSTRUCTION: Cylinder head, cylinder block, crank case, sump, cooling passages, cylinder liners, piston types, piston rings, connecting rods, crank shafts, valves, valve seat inserts, valve actuating mechanisms, drive mechanisms.

UNIT-II:
COMBUSTION AND COMBUSTION CHAMBERS: Petrol engines - Ignition limits, stages of combustion, effect of engine variables, knocking and detonation - theory, parameters affecting and control, combustion chamber - different types and design. Diesel engines – Air/Fuel Ratio, stages of combustion, knocking and detonation - theory, parameters affecting and control, combustion chamber - different types.
FUEL FEED SYSTEMS: Carburetor, Air/Fuel mixture proportions, cold start, idle, normal running, and acceleration and transfer circuits. Diesel fuel injection pump, construction and working principles. Governing systems, types of fuel injectors and nozzles, Introduction to electronic fuel injection system.

UNIT-III
IGNITION SYSTEM: Battery Ignition System, Magneto Ignition System, Electronic ignition system using contract breakers and triggers.
ELECTRICAL SYSTEMS: Charging Circuit, Generator, current – Voltage regulator, Starting system, Bendex drive mechanism, Solenoid switch.

UNIT-IV
COOLING AND LUBRICATION SYSTEMS: Engine heat transfer, engine energy balance, necessity of cooling, air-cooling, water cooling, thermosyphon and pump cooling, radiator, pump, thermostat, antifreeze solution, radiator fan. Lubrication Systems – Mist, splash, forced, dry sump and wet sump, oil filters, oil pumps.
SUPERCHARGING AND TURBOCHARGING: Necessity of supercharging, mechanical supercharging and turbo Charging, compressors and turbines for supercharging, degree of supercharging, methods of supercharging, efficiency of supercharged engine.

UNIT-V

ENGINE TESTING AND PERFORMANCE: Indicated power , Brake Power , Engine Torque , Mechanical Efficiency , Air standard Efficiency , Brake thermal efficiency , indicated thermal efficiency , relative efficiency , volumetric efficiency , Heat Balance sheet , Exhaust gas analyzer

ENGINE EMISSION AND CONTROL: Sources of Emissions, unburnt hydrocarbons (HC) nitrogen oxides (NO_X) carbon monoxide (CO) in SI Engines, catalytic converters, un burnt hydrocarbons (HC) nitrogen oxides (NO_X) and particulate in CI Engines, Exhaust gas recirculation.

TEXT BOOKS:
1. Automobile Engineering / Williams Crouse , TM Hill Publishers
2. Ganesan V, "Internal Combustion Engines", Tata McGraw Hill, New Delhi.

REFERENCES:
1. Fundamentals of Automotive Engines/ Richard Stone, SAE Publications
2. Obert E F, "Internal Combustion Engine analysis and Practice ", International Text Book Co. Scranton, Pennsylvania, 1988.
3. John B Heywood, "Internal Combustion Engine Fundamentals", McGraw Hill International Editions, 1988.
4. Mathur L and Sharma R P, "Internal Combustion Engines", Dhanpat Rai Publications (P), Ltd, 8th edition, New Delhi.

VNR Vignana Jyothi Institute of Engineering and Technology

II Year B.Tech ME/AE II Sem	L	T/P/D	C
	0	6	3

(MED1109) 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 and 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, and curved and tapered features.

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

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

f) Production drawings

I. Drawing of machine elements and simple parts

Selection of orthogonal views and additional views for the following machine elements and parts with every drawing proportion.

a) Popular forms of screw threads, bolts, nuts, stud bolts.

b) Keys, cottered joints, and knuckle joint.

c) Riveted joints for plates.

d) Shaft coupling and spigot joint.

e) Journal, pivot, and collar bearings.

II. Part and Assembly drawings

Assembly drawings for the following, using conventions and easy drawing proportions:

a) Engine parts – stuffing boxes, eccentrics, I.C. engine connecting rod and piston assembly.

b) Other parts - screws jacks, machine vices, and tailstock.

III. Production drawings

a) Overview of limits, fits, ISO system of tolerances, geometrical accuracy, surface roughness symbols, welding symbols etc.

b) Production drawings of piston assembly and tailstock.

NOTE

1. To adopt first angle of projection.

2. The student should be able to provide working drawings of actual parts.

TEXT BOOK:
1. Machine Drawing by K. L. Narayana, P. Kannaiah and K. Venkata Reddy; Publisher: New Age/ Publishers.

REFERENCES:
1. Machine Drawing by Siddheswar, Kannaiah and Sastry.
2. Machine Drawing by N. D. Bhat.

VNR Vignana Jyothi Institute of Engineering and Technology

II Year B.Tech AE II sem   **L**   **T/P/D**   **C**

                                            0   **3**   **2**

(AED1201) AUTOMOTIVE ENGINES LAB

List Of Experiments

- Valve Timing Diagram for 4-Stroke Diesel Engine
- Valve Timing Diagram for 4-Stroke Petrol Engine
- Port Timing Diagram for 2- Stroke Petrol Engine
- Performance test on 4- Stroke Single Cylinder Diesel Engine
- Performance Test on 2 – Stroke Petrol Engine
- Heat Balance Test on 4 – Stroke Single Cylinder Diesel Engine
- Optimum cooling temperature test on Single Cylinder Diesel Engine
- Morse Test on Multi Cylinder Petrol Engine
- Performance Test on Computerised Diesel Engine
- Performance Test on Computerised Duel Fuel Engine
- Exhaust Gas Analysis on Computerised Diesel Engine By Flue Gas Analyser
- Permanence test on reciprocating compressor test rig

VNR Vignana Jyothi Institute of Engineering and Technology

II Year B.Tech ME/ AE II Sem	L	T/P/D	C
	0	3	2

(MED1205) FLUID MECHANICS AND HYDRAULIC MACHINES LAB

Any 10 experiments to be conducted from the following**:**

1. Verification of Bernoulli's theorem
2. Calibration of Venturimeter - Orifice meter.
3. Calibration of triangles notches.
4. Determination of friction factor for a given pipe line.
5. Determination of Minor losses for the given equipment
6. Impact of jets on vanes.
7. Performance test on Pelton wheel.
8. Performance test on Francis turbine.
9. Performance test on Kaplan turbine.
10. Performance test on single stage centrifugal pump.
11. Performance test on multi stage centrifugal pump.
12. Performance test on reciprocating pump.

VNR Vignana Jyothi Institute of Engineering and Technology

II Year B.Tech AE II Sem	L	T/P/D	C
	2	0	0

(NCC1101) HUMAN VALUES AND PROFESSIONAL ETHICS

Course Description
Objectives
To develop the ability to distinguish between what is of value and what is superficial in life.
To develop the ability to face difficult situations in life boldly and resolve them confidently.
To enable students to progress from discrimination to commitment.
To Encourage the students to understand values in life.
Syllabus

1. Self-confidence
2. Peer Pressure-Irregular life style
3. The Power of Self- determination
4. Human relationship—trust and respect- resolving conflict
5. Anger-A sign of helplessness
6. Interaction and ragging
7. Right Utilization of physical facilities
8. Unhappiness -Unfulfilled expectations
9. Setting goals- long term and short term goals-handling responsibilities
10. Dealing with people while coordinating work
11. Coping with stress-Identifying one's interests and strengths
12. Time Management-Planning and aligning with one's goals
13. Skills and Values
14. The role of values in Society

Course Book
The resource material that has been prepared by IIIT can be used apart from material that is available in the websites. Later text books can be identified for the facility of the students.
Evaluation
This course would only have a pass/ fail grade. Participation in discussions, submission of assignments and weekly reports and a final report will be used in evaluation.

Outcome

At the end of the course the students would become sensitive towards human values. They would understand commitment and responsibility. They would be able to bring harmony in the society they live.

TEXT BOOKS

1. Mike Martin and Roland Schinzinger, "Ethics in Engineering", McGraw -Hill, New York 1996.
2. Govindarajan M, Natarajan S, Senthil Kumar V. S, "Engineering Ethics", Prentice Hall of India, New Delhi, 2004

REFERENCES

1. Charles D. Fleddermann, "Engineering Ethics", Pearson Education / Prentice Hall, New Jersey, 2004 (Indian Reprint now available).
2. Charles E Harris, Michael S. Protchard and Michael J Rabins, "Engineering Ethics–Concepts and Cases", Wadsworth Thompson Leatning, United States, 2000 (Indian Reprint now available)
3. John R Boatright, "Ethics and the Conduct of Business", Pearson Education, New Delhi, 2003.
4. Edmund G Seebauer and Robert L Barry, "Fundamentals of Ethics for Scientists and Engineers", Oxford University Press, Oxford, 2001.
5. Naagarazan, R.S. 'A Textbook on Professional Ethics and Human Values' 2006.

VNR Vignana Jyothi Institute of Engineering and Technology

III Year B.Tech ME/AE I Sem	L	T/P/D	C
	3	1	3

(MTH1104) NUMERICAL ANALYSIS AND LINEAR PROGRAMMING

NUMERICAL ANALYSIS
UNIT-I
Solutions of non-linear systems
Introduction; Mathematical preliminaries; Solution of algebraic and transcendental equations – the bisection method, the method of false position, the iteration method,Newton - Raphson method, and their order of convergence.
UNIT II
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; Central difference interpolation formulae; Gauss's central difference formulae; Lagrange and Hermite interpolation formulae; Cubic spline interpolation.
UNIT III
Numerical Integration
Trapezoidal rule, Simpson's 1/3 rule, and Simpson's 3/8 rule.
Numerical solutions of ordinary differential equations
Solution of initial value problems by Taylor's series - Picard's method of successive approximations, Euler's method, and Runge - Kutta methods; Predictor Corrector methods - Adams Moulton method, and Milne's method.
UNIT IV
Numerical solutions of partial differential equations (PDE)
Introduction; Classification of second order PDE; Approximation of derivatives by finite difference method; Solution of Laplace equation - Jacobi's method, Gauss-Seidal (Leibmann's) method, Solution of parabolic equations by explicit and crank Nicolson implicit scheme method; Solution of hyperbolic equations.
LINEAR PROGRAMMING
UNIT V
Linear programming
linear programming - Basic concepts; -problem formulation, graphical method, canonical and standard forms of LPP simplex method, Artificial variables techniques- M method, Transportation problems: Balanced transportation problem-North-West corner rule, Least cost method, Vogel's approximation method and MODI method.

TEXT BOOKS
1. Elementary Numerical Analysis – an algorithmic approach by Samuel D. Conte and Carl De Boor (2006); 3rd edition; Publisher: Tata McGraw Hill.
2. Elementary Numerical Analysis by Dr. B.S.Grewal, 4th edition, Publisher: Khanna Publishers
3. Operations Research: Theory and Applications by Kanthi Swaroop, 4th edition, Macmillan Publishers India Ltd.

REFERENCE BOOKS
1. Advanced Engineering Mathematics by Erwin Kreyszig, 8th Edition; Publisher: John Wiley and Sons.
2. Advanced Engineering Mathematics by Peter V. O'Neil, 9th Edition; Publisher: Cengage Lear

VNR Vignana Jyothi Institute of Engineering and Technology

III Year B.Tech ME/AE I Sem   L   T/P/D   C

                                           4   1   4

(MED1115) DYNAMICS OF MACHINERY

UNIT-I
PRECESSION:
Gyroscopes, effect of precessional motion on the stability of moving vehicles such as motor car, motor cycle, aeroplanes and ships.
STATIC AND DYNAMIC FORCE ANALYSIS OF PLANAR MECHANISMS: (NEGLECTING FRICTION)
Introduction-free body diagrams-conditions of equilibrium-two and three force members-Inertia forces and D'Alembert's principle-planar rotation about a fixed centre.
SYNTHESIS OF LINKAGES:
Three position synthesis- four position synthesis- precision positions-structural error-Chebyshev's spacing, Freudenstein's Equation, problems.
UNIT-II
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.
Dynamometers - absorption and transmission types- general description and method of operation.
UNIT-III
TURNING MOMENT DIAGRAMS AND FLYWHEELS:
TURNING MOMENT:
Inertia torque-angular velocity and acceleration of connecting rod, crank effort and torque diagrams- Fluctuation of energy-design of flywheels
GOVERNORS:
Watt, Porter and Proell governors, Spring loaded governors- Hartnell and Hartung with auxiliary springs, Sensitiveness, isochronism and hunting.
UNIT-IV
BALANCING:
Balancing of rotating masses – single and multiple-single and different planes-balancing of reciprocating masses-primary and secondary balancing- analytical and graphical methods.

UNBALANCED FORCES AND COUPLES:
Balancing of V, multi cylinder inline and radial engines for primary, secondary balancing and locomotive balancing.
UNIT-V
VIBRATIONS:
Free vibration of mass attached to a vertical spring - simple problems on forced damped vibration. Vibration isolation and transmissibility-
Whirling of shafts, critical speeds, torsional vibrations, two and three rotor systems.
TEXT BOOKS:
1. Theory of Machines by Thomas Bevan; Publisher: Pearson Education.
2. Theory of Machines by S. S. Ratan; Publisher: Tata McGraw Hill.
REFERENCES:
1. Theory of Machines and Mechanisms by P. L. Ballaney; Publisher: Khanna.
2. Mechanism and Machine Theory by J. S. Rao and R. V. Dukkipati; Publisher: New Age.
3. Kinematics and Dynamics of Machinery by R. L. Norton; Publisher: McGraw Hill.
4. Theory of Machines and Mechanisms by Uicker, Pennock & Shigley; Publisher: Oxford.

VNR Vignana Jyothi Institute of Engineering and Technology

III Year B.Tech ME/AE I Sem	L	T/P/D	C
	4	**1**	**4**

(MED1116) ENGINEERING DESIGN BASICS

UNIT I
ENGINEERING MATERIALS AND DESIGN CONSIDERATIONS
The Design Phase / Methodology, and identification of need, Evaluation and Presentation, Reliability and Product liability. Mechanical Properties of Engineering Materials, overall design considerations, Factor safety, Preferred Numbers. Standard and codes, design data handbook. Load, stress and critical sections in machine parts. Static strength, plastic deformation, temperature properties, Definition of stress, simple stress, combined stress, complex stress. Members subjected to axial, bending, torsion and shear loading, impact stresses.

UNIT II
DESIGN AGAINST FLUCTUATING LOAD
Stress concentration, stress concentration factors, Reduction stress concentration, fluctuating stresses. Fatigue strength, Endurance Limit, fatigue test, S-N diagrams for different structural materials. Low cycle and high cycle fatigue, Notch sensitivity, Design for finite and infinite life. Soderberg and Goodman lines the fatigue strength, modified Goodman theory, soderberg theory, Gerber theory

UNIT III
DESIGN OF FASTENERS
Temporary Fasteners (Bolted and Screwed Fasteners)
Bolted joints, bolted joint under initial loading, eccentrically loaded Bolted Joints under different static load conditions.
Permanent Fasteners (Riveted and Welded Fasteners)
Riveted Joints, eccentrically loaded Riveted Joints, Design of Boiler Riveted joints, and Welding symbols, butt and fillet welds, stress in the welded joints carries tension bending and shear loading, Design of various types of Welding joints and eccentrically loaded welded joints under different static load conditions.

UNIT IV
DESIGN OF FLEXIBLE MECHANICAL ELEMENTS
Belt Drives:
Introduction, classification of belts, belt materials, design of flat (rectangular) belts, ratio of belt tensions, V-Belts, power transmitted through V-Belt, design of V-Belts and timing belts.

Springs:

Classification of springs, spring material, Design of helical, leaf, disc and tensional springs under constant loads and varying loads.

UNIT V

DESIGN OF SHAFTS AND KEYS

Transmission shafts, Design of solid and hollow shafts based on strength, rigidity and Flexible shafts, shaft and axles – key and classification of keys, stresses in the keys, design considerations, effect of key way on the shaft strength.

TEXT BOOKS:

1. Design of Machine Elements by Bhandari; Publisher: Tata McGraw Hill.
2. Mechanical Engineering Design by Shigley J. E and Mischke C. R; Publisher: Tata McGraw Hill.

REFERENCES:

1. Engineering design by George E Dieter; Publisher: McGraw Hill.
2. Machine Design - An Integrated Approach by Robert L.Norton; Publisher: Addison Wesley.
3. Fundamentals of Machine Component Design by Juvinall R. C and Marshek K. M; Publisher: John Wiley and Sons

VNR Vignana Jyothi Institute of Engineering and Technology

III Year B.Tech ME/AE I Sem	L	T/P/D	C
	4	1	4

(MED1122) HEAT AND MASS TRANSFER

UNIT-I
INTRODUCTION:
Modes and mechanisms of heat transfer - Basic laws of heat transfer - Simple general discussion about applications of heat transfer. Conduction Heat Transfer: Fourier heat conduction equation - General heat conduction equation in Cartesian, Cylindrical and Spherical coordinates - simplification and forms of the field equation steady, unsteady and periodic heat transfer - Initial and boundary conditions.

UNIT-II
ONE DIMENSIONAL STEADY STATE CONDUCTION HEAT TRANSFER:
Homogeneous slabs, hollow cylinders and sphere - overall heat transfer coefficient - electrical analogy - Critical radius of insulation - variable Thermal conductivity - systems with heat sources or Heat generation - extended surfaces and fins. One Dimensional Transient Conduction Heat Transfer: Systems with negligible internal resistance - chart solutions of transient conduction systems.

UNIT-III
CONVECTIVE HEAT TRANSFER:
Classification of systems based on causation of flow, condition of flow, configuration of flow and medium of flow - Dimensional analysis as a tool for experimental investigation - Concepts about hydrodynamic and thermal boundary layers - Buckingham Pi-Theorem and method, application for developing Semi - empirical non-dimensional correlation for convection heat transfer - Significance of non -dimensional numbers - use of empirical correlations for convective heat transfer- Forced Convection: Flat plates and horizontal pipes. Free Convection: Vertical plates and pipes.

UNIT-IV
HEAT TRANSFER WITH PHASE CHANGE:
Heat transfer with boiling - pool boiling and film boiling - boiling curve for pool boiling - simple correlations for pool boiling - Condensation plates heat transfer: film wise and drop wise condensation - film condensation on vertical and horizontal cylinders using empirical correlations.

RADIATION HEAT TRANSFER:
Emission characteristics and laws of black-body radiation - incident radiation - 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 net works.

UNIT V

HEAT EXCHANGERS:

Classification of heat exchangers - overall and fouling resistance - problems using LMTD and NTU methods.

INTRODUCTION TO MASS TRANSFER:

Analogy between heat, mass and momentum transfer - classification: Diffusion and convective mass transfer processes - Examples - Fick's Law of diffusion simple problems for steady state molecular diffusion - Convection mass transfer coefficient - non-dimensional numbers of mass transfer analogous to convection heat transfer

TEXTBOOKS:

1. Fundamentals of Engineering Heat and Mass Transfer by R.C. Sachdeva; Publisher: New Age International.
2. Heat and Mass Transfer Data book by C.P. Kothandaraman; Publisher: New Age.

REFERENCES:

1. Heat Transfer by OZSIK
2. Heat Transfer by HOLMAN
3. Heat Transfer by Sukhatme; Publisher: University Press.
4. Heat and Mass Transfer by D. S. Kumar
5. Fundamentals of Heat & Mass Transfer by Incopera & Dewitt

VNR Vignana Jyothi Institute of Engineering and Technology

III Year B.Tech ME/ AE I Sem	L	T/P/D	C
	3	0	3

(MED1114) PRODUCTION TECHNOLOGY

UNIT – I
CASTING:

Steps involved in making a casting; Advantage of casting and its applications; Pattern and core making; Types of patterns – Materials used for patterns; Pattern allowances and their construction; Principles of Gating, Gating ratio and design of gating systems. Solidification of casting; Concept; Solidification of pure metal and alloys; Risers; Types; Function and design; Casting design considerations; Quality testing and inspection of castings; Special casting processes; Centrifugal, Die, Investment casting; Melting furnaces.

UNIT – II
WELDING:

Classification of welding process types of welds and welded joints and their characteristics, design of welded joints, Gas welding, ARC welding, Forge welding, resistance welding, Thermit welding and Plasma welding Inert Gas welding, TIG & MIG, welding, Friction stir welding, Induction welding, Explosive welding, Laser welding, Soldering & Brazing. Heat affected zones in welding; welding defects – causes and remedies – destructive nondestructive testing of welds.

UNIT –III
MECHANICAL WORKING -1:

Hot working; Cold working; Strain hardening; Recovery; Recrystallisation and grain growth; Comparison of properties of cold and hot worked parts

ROLLING:

Rolling fundamentals; Theory of rolling; Types of Rolling mills and products; Forces in rolling and power requirements.

EXTRUSION:

Basic extrusion process and its characteristics; Hot extrusion and Cold extrusion; Forward extrusion and backward extrusion – Impact extrusion; Hydrostatic extrusion; Extrusion defects.

FORGING PROCESSES:

Principles of forging; Tools and dies; Types of Forging; Smith forging; Drop Forging; Roll forging; Forging hammers; Rotary forging; Forging defects.

UNIT – IV

MECHANICAL WORKING -2:

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 – V

PLASTIC MATERIALS AND PROCESS:

Types of plastics; Compression moulding; Injection moulding; Blow moulding; Film and Sheet forming; Thermoforming.

TEXT BOOK:

1. Manufacturing Technology by P.N. Rao

REFERENCES:

1. Production Technology by R.K. Jain
2. Manufacturing Engineering and Technology by Kalpak Jian S
3. Process and Materials of Manufacturing by Lindberg/PE
4. Principles of Metal Castings by Rosenthal.
5. Welding Process by Parmar
6. Production Technology by Sharma P C

VNR Vignana Jyothi Institute of Engineering & Technology

III Year B.Tech AE I Sem	L	T/P/D	C
	3	1	3

(AED1104) REFRIGERATION AND AUTO AIR CONDITIONING

Unit –I:

Vapour compressors refrigeration - working principle, refrigeration cycle in T-s and P-h coordinates, Effect of sub cooling & super heating and cycle analysis.

Air Refrigeration: Applications – Air Craft Refrigeration -Simple, Bootstrap, Regenerative systems.

Vehicle cooling, load estimation, capacity requirements of Air Conditioning System, refrigerants used in Automobiles – properties.

Unit – II:

Vapor absorption system –aqua – ammonia system, Lithium – Bromide system.

Steam Jet refrigeration system: Representation on T-S and H-S diagrams – limitations and applications.

Unconventional Refrigeration system – Thermo-electric – Vortex tube & Pulse tube – working principles.

UNIT - III

Introduction to Air Conditioning – Psychrometric properties and processes, sensible and latent heat loads, characterization and SHF load for ventilation and filtration, concepts of RSHF& SHF ESHF and ADP, concepts of human comfort and effective temperature.

Components of Air conditioners: Air-conditioning Components: Compressor-Evaporator-Condenser- Expansion valve-Receiver Drier- Filters-Mufflers -special features-compressor protection Anti freezing relay.

UNIT – I V

Operation of an Air-conditioning System: Type of Air conditioners. Heaters-Vehicle ventilation-combination heater and air conditioner-manually controlled air conditioner and heater system- automatically controlled air conditioner and heater systems.

Air Heating equipment: Ducts, Registers and Grills, blowers, filters

UNIT - V

Trouble Shooting and Services: Servicing of heating Systems, Causes of air conditioner Failure, leak testing guide, Discharging the system- Evacuating the system-charging the System-trouble shooting air conditioner heater Systems.

Servicing of Air Conditioners- Heating Systems: Air conditioner maintenance and service. Compressor trouble shooting and service, clutch service- shaft seal leakage compressor. Seal removal checking oil level-oil addition, repairs on compressors.

TEXT BOOKS:
1. Refrigeration & Air Conditioning – C.P. Aurora-TMH
2. Refrigeration & Air Conditioning – Aurora & Domkundwar – Dhanpat Rai
3. Automotive Air Conditioning –William .H.Crouse & Donald L.Angtin.-MH

REFERENCE BOOKS :
1) Refrigeration and Air Conditioning : Manohar Prasad
2) Refrigeration and Air Conditioning : Stoecker – Mc Graw Hill
3) Refrigeration and Air Conditioning : Dossat – Mc Graw Hill
4) Refrigeration and Air Conditioning : Domkundwar – Dhanpatrai

VNR Vignana Jyothi Institute of Engineering and Technology

III Year B.Tech ME/AE I Sem	L	T/P/D	C
	0	3	2

(MED1204) PRODUCTION TECHNOLOGY LAB

Minimum 12 exercises to be performed from the following:

1. METAL CASTING:
- Pattern Design and making - for one casting drawing.
- Sand properties testing - Exercise -for strengths, and permeability – 1
- Moulding Melting and Casting - 1 Exercise

2. WELDING:
- Arc Welding Lap and Butt Joint - 2 Exercises
- Spot Welding - 1 Exercise
- TIG Welding - 1 Exercise
- MIG Welding - 1 Exercise
- Plasma welding and Brazing - 2 Exercises

3. MECHANICAL PRESS WORKING:
- Blanking and Piercing operation and study of simple, compound and progressive press tool.
- Hydraulic Press: Deep drawing and extrusion operation.
- Bending and other operations

4. PROCESSING OF PLASTICS:
- Injection Moulding
- Blow Moulding

VNR Vignana Jyothi Institute of Engineering & Technology

III Year B.Tech AE I Sem	L	T/P/D	C
	0	3	2

(AED1202) HEAT TRANSFER & RAC LAB

LIST OF EXPERIMENTS

1. Thermal Conductivity of given Metal Rod
2. Stefan Boltzmann Apparatus.
3. Critical Heat Flux Apparatus
4. Composite Wall Overall Heat Transfer Co-Efficient.
5. Heat Transfer through Lagged Pipe.
6. Heat Transfer in Forced Convection Apparatus.
7. Heat Transfer in Natural Convection
8. Thermal Conductivity of Insulation Powder.
9. Parallel and Counter Flow Heat Exchanger.
10. Emissivity Apparatus.
11. Study of Heat Pipe and its Demonstration.
12. Heat Transfer in pin-fin
13. Heat Transfer in Drop and Film Wise Condensation
14. Performance test on Air conditioning Test Rig
15. Performance test on Refrigeration test rig

VNR Vignana Jyothi Institute of Engineering and Technology

III Year B. Tech ME/AE II Sem	L	T/P/D	C
	3	1	3

(CED1105) ENVIRONMENTAL STUDIES

UNIT-I

Introduction, Definition, scope and importance, Ecosystems: Introduction, types, characteristic features, structure and functions of ecosystems. Bio geo chemical cycle, Classification of Eco system.

UNIT-II

Natural Resources :classification of Resources, Land resources, Land as resource, Common property resources, Land degradation, Soil erosion and desertification, Effects of modern agriculture, fertilizer –pesticide problems, Forest resources, Use and over-exploitation.

Mining and dams – their effects on forest and tribal people, Water resources, Use and over- utilization of surface and groundwater, Floods, droughts, Water logging and salinity, Dams –benefits and costs, Conflicts over Water. Energy resources, Energy resources.

UNIT III

Bio-diversity and its conservation, Value of bio-diversity -consumptive and productive use, social, ethical, aesthetic and option values, Bio-geographical classification of India – India as a mega diversity habitat, Threats to bio-diversity –Hot-spots, habitat loss, poaching of wild life, loss of species, seeds, etc. Conservation of bio-diversity – Insitu and Ex-situ conservation.

UNIT IV

Environmental Pollution –Local and Global Issues,Nature of thermal pollution and nuclear hazards, Global warming, Acid rain,Ozone depletion., Environmental case studies:.

UNIT-V

Environmental Problems in India,Drinking water, sanitation and public health,Effects of the activities on the quality of environment, Water scarcity and groundwater depletion,Controversies on major dams – resettlement and rehabilitation of people: problems and concerns,Rain water harvesting, cloud seeding and watershed management. Economy and Environment,The economy and environment interaction,Economics of development, preservation and conservation, Sustainability: theory and practices,Limits to growth,Equitable use of resources for sustainable life styles, Environmental Impact Assessment.

TEXT BOOKS

1. Environmental studies-A.Y.Anjaneyulu
2. Environmental studies-Deeksha dave
3. Environmental sciences and management-Venugopal

VNR Vignana Jyothi Institute of Engineering and Technology

III Year B.Tech AE II sem	L	T/P/D	C
	4	1	4

(AED1105) AUTOMOBILE ENGINEERING DESIGN

UNIT – I

BEARINGS:

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 and roller bearings, Bearing life, Bearing selection.

UNIT – II

ENGINE PARTS:

Pistons, Forces acting on piston – Construction, design and proportions of piston, Cylinder, Cylinder liners.

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 & Overview of Center cranks; Crank pins, Crank shafts.

DESIGN OF VEHICLE GEAR BOX:

3 Speed Gear box, 4 speed gear box, Steering Gear mechanism Design.

UNIT – III

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.

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 AND 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 – V

DESIGN OF BEVEL GEAR DRIVES:

Bevel gears – Load concentration factor – Dynamic load factor. Surface compressive strength- Bending strength – Design analysis of Bevel gears- Estimation of centre distance, module and face width, check for plastic deformation, Check for dynamic and wear considerations.

DESIGN OF WORM GEAR DRIVES:

Worm gears – Properties of worm gears – Selection of materials – Strength and wear rating of worm gears – Force analysis – Friction in worm gears – thermal considerations.

TEXT BOOKS:

1.　Machine Design by V. Bhandari; Publisher: Tata McGraw Hill.
2.　Machine Design by R. L. Norton

REFERENCES:

1.　Mechanics of Materials (SI Units) by Beer & Johnson; Publisher: McGraw Hill.
2.　Data Books: P.S.G. College of Technology
3.　Mechanical Engineering Design by J. E. Shigley
4.　Machine Design by R. S. Khurmi & J. S. Gupta; Publisher: Sultan Chand.
5.　Machine Design (SI Units) by Schaums Outline Series; Publisher: McGraw Hill.

VNR Vignana Jyothi Institute of Engineering and Technology

III Year B.Tech AE II SEM	L	T/P/D	C
	4	1	4

(AED1106) MACHINE TOOLS AND METROLOGY

Unit-I

Elementary treatment of metal cutting theory -Elements of cutting process – Classification of cutting tools –Principle angles of single point tools –Orthogonal and oblique cutting –Chip thickness ratio –Velocity relationships in orthogonal cutting – Force relationship in orthogonal cutting (Merchant force circle) -cutting speeds, feed, depth of cut, tool life, coolants, machinability –Stress and strain in the chip -Tool materials.

Engine lathe -Principle of working, specification of lathe - types of lathe –Lathe specifications and sizes – Parts of lathe - work holders tool holders –Turning –Lathe attachments. Turret and capstan lathes - Principal features of automatic lathes - classification - Single spindle and multi-spindle automatic lathes.

UNIT-II

Milling machine - Principles of working - specifications and size - classification of milling machines - Principal features of universal milling machine - Milling Cutters

Shaping, slotting and planning machines - Principles of working - Principal parts – specification and size – classifications

Drilling and Boring Machines - Principles of working, specifications and size, types, operations performed

UNIT-III

Grinding machine -Fundamentals -Theory of grinding - classification of grinding machine - cylindrical and surface grinding machine - Tool and cutter grinding machine - special types of grinding machines - Different types of abrasives -bonds specification of a grinding wheel and selection of a grinding wheel.

Over view on Lapping, honing and broaching machines - comparison to grinding.

Systems of limits and fits: Introduction, normal size, tolerance limits, deviations, allowance, fits and their types -unilateral and bilateral tolerance system, hole and shaft basis systems - Interchangeability and selective assembly

UNIT-IV

Indian standard Institution system - British standard system, International Standard system for plain and screwed work.

LIMIT GAUGES: Taylors principle – Design of go and No go gauges, plug, ring, snap, gap, taper, profile and position gauges.

OPTICAL MEASURING INSTRUMENTS: Tool maker's microscope and its uses – collimators, optical projector.

UNIT-V

SURFACE ROUGHNESS MEASUREMENT: Differences between surface roughness and surface waviness-Numerical assessment of surface finish – CLA, Ra, R.M.S Values – Rz Values, Methods of measurement of surface finish - profilograph.

SCREW THREAD MEASUREMENT: Element of measurement – errors in screw threads – measurement of effective diameter, angle of thread andthreadpitch.GEAR MEASUREMENT: Gear measuring instruments, Gear tooth profile measurement. Measurement of diameter, pitch pressure angle and tooth thickness.

TEXT BOOKS

1. Production Technology by R.K. Jain and S.C. Gupta.
2. Engineering Metrology / R.K. Jain / Khanna Publishers
3. Manufacturing engineering and Technology- Kalpakjian, Wesley.

REFERENCEBOOKS:

1. Manufacturing Technology (Volume 2) Metal Cutting and Machine Tools, P N Rao, Tata McGraw Hill
2. Elements of workshop Technology Vol. II, Hajara Chowdhary, Indian Book Distributors, Calcutta
3. Production Technology by H.M.T. (Hindustan Machine Tools)
4. Engineering Metrology / Mahajan
5. Precision Engineering in Manufacturing / RL Murthy / New Age

VNR Vignana Jyothi Institute of Engineering and Technology

III Year   B.Tech AE II SEM   L   T/P/D   C
                                                         4   1   4

(AED1107) VEHICLE DYNAMICS

Unit-I
Tire and Rim Fundamentals: Tires and Sidewall Information, Tire components, Radial and Non-Radial Tires, Tread, Wheel and Rim, Vehicle Classifications
Tire Dynamics: Tire Coordinate Frame and Tire force system, tite Stiffness, tire print forces, effective radius, rolling resistance, Longitudinal, Lateral, Gamber, Tire Forces.
Unit-II
One-Dimensional Vehicle Dynamics: Parked Car on a Level and an Inclined Road, Accelerating car on a Level and an inclined Road, Parked car on a Banked Road, Optimal Drive and Brake Force Distribution, Vehicles With More Than Two Axles.
Driveline Dynamics: Engine Dynamics, Driveline and Efficiency, Gearbox and Clutch Dynamics, Gearbox Design.
Unit-III
VEHICLE DYNAMICS: Applied Dynamics: Force and Moment, Rigid Body Translational and Rotational Dynamics, Mass Moment of Inertia Matrix, Lagrange's Form of Newton's Equations of Motion, Lagrangian Mechanics
Vehicle Planar Dynamics: Vehicle Coordinate Frame, Rigid Vehicle Newton-Euler Dynamics, Force System Acting on a Rigid Vehicle, Two-wheel Rigid Vehicle Dynamics, Steady-State Turning
Unit-IV
Vehicle Roll Dynamics: Vehicle Coordinate and DOF, Equations of Motion, Vehicle Force System, Two wheel Rigid Vehicle Dynamics, Steady state motion, Time Response
Unit-V
Applied Vibrations: Mechanical Vibration Elements, Newton's Method and Vibrations, Frequency Response of Vibrating Systems, Time Response of Vibrating Systems
Vehicle Vibrations: Lagrange Method and Dissipation Function, Natural Frequencies and Mode Shapes, Bicycle Car and Body Pitch Mode, Half Car and Body Roll Mode, Full Car Vibrating Model natural frequencies using sweeping matrix and orthogonality principle, Holzer's method for systems with free, fixed free and fixed ends.

TEXTBOOKS:
1. Vehicle Dynamics Theory and Application by Reza N. Jazar, Springer Int. Edition.
2. Mechanical Vibration -By G.K.Grover, Nernchand& Brothers

REFERENCES:
1. Vehicle Refinment Controlling Noise and Vibration in Road Vehicle By. Matthew Harrison Elsevier, Distributed by Yes Dee Publishing Pvt. Ltd.
2. Theory & Problems of Mechanical Vibration -By William W. Seto, McGrawHil1
3. Problems in Automobile Mechanics-By N. K. Giri, Khanna Pub.
4. Mechanics of Pneumatic Tyre -By S. K. Clark, Prentice Hall
5. Mechanical Vibration Analysis -By P Srinivasan, TMH
6. Mechanical Vibration -By Church. Wife International
7. Vibration Theory & Applications -By William I Thomson, Prentice Hall.

VNR Vignana Jyothi Institute of Engineering and Technology

III Year B.Tech ME/AE II Sem	L	T/P/D	C
	3	1	3

(EIE1128) INSTRUMENTATION AND CONTROL SYSTEMS

UNIT I

Definition – Basic principles of measurement – Measurement systems, static characteristics.

MEASUREMENT OF DISPLACEMENT:

Theory and construction of various transducers to measure displacement-Piezo electric, Inductive, capacitance, resistance, ionization and Photo electric transducers.

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 II

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.

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 III

MEASUREMENT OF TEMPERATURE: Classification – Ranges – Various Principles of measurement– Expansion, Electrical Resistance – Thermistor – Thermocouple – Pyrometers – Temperature Indicators.

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.

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

FLOW MEASUREMENT: Rotameter, magnetic, Ultrasonic, Turbine flow meter, Hot – wire anemometer, Laser Doppler Anemometer (LDA).

UNIT IV
INTRODUCTION TO CONTROL SYSTEMS:

Introduction - basic components of a control system, control-system applications, open-loop control systems (without feed-back systems), and closed-loop control systems (with feedback systems); Example of open loop and closed loop systems. Feedback and its effects - effect of feedback on overall gain, effect of feedback on stability, and effect of feedback on external disturbance or noise; Classification of systems, nonlinear characteristics of systems.

UNIT V
SYSTEM MODELING:

Transfer function (TF) Block diagram (BD) reduction techniques, Signal flow graph(SFG), BD to TF, TF to BD, TF to SFG, SFG to TF conversions, Mathematical Modeling of systems in translational and rotational motions, Analogy between different types of systems like electrical, mechanical, pneumatic & hydraulic, DC motor transfer function, signal flow graph, Working of Potentiometer, tachometer, servo motors, synchros.

TEXT BOOKS:
1. Measurement Systems: Applications & design by D. S. Kumar.
2. Mechanical Measurements by Beckwith, Marangoni & Linehard; Publisher: Prentice Hall International/Pearson Education

REFERENCES:
1. Measurement systems: Application and Design, Doeblin Earnest. O. Adaptation by Manik and Dhanesh; Publisher: Tata   McGraw Hill
2. Instrumentation and Control systems by S. Bhaskar; Publisher: Anuradha Agencies.
3. Experimental Methods for Engineers by Holman.
4. Mechanical and Industrial Measurements by R.K. Jain; Publisher: Khanna
5. Instrumentation & Mechanical Measurements by A.K. Tayal; Publisher: Galgotia
6. Instrumentation, Measurement & Analysis by B. C. Nakra & K. K. Choudhary, Publisher: Tata McGraw Hill
7. Mechanical Measurements by Sahani

VNR Vignana Jyothi Institute of Engineering and Technology

III Year B.Tech AE II Sem	L	T/P/D	C
	3	1	3

(MED 1149) OPERATIONS RESEARCH

UNIT-I
INTRODUCTION:
Origin, Development-Definition-Characteristics and Phases-Types of OR models-applications, limitations.
ALLOCATION:
Linear Programming Problem Formulation- Graphical solution-Simplex method-Artificial variables technique-Two phase method, Big-M Method-Duality Principle.
UNIT-II
TRANSPORTATION PROBLEM:
Formulation-Optimal solution-unbalanced transportation problem-Degeneracy. Assignment problem-Formulation-Optimal solution-Variations of Assignment Problem-Travelling 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.
THEORY OF GAMES:
Introduction-Minimax (maximin) - criterion and optimal strategy-Solution of games with saddle points-Rectangular games without saddle points-principles of dominance-m*2and 2*n games-graphical method.
UNIT-IV
WAITING LINES:
Introduction-Single channel-Poisson arrivals-exponential service times-with infinite population and finite population models-Multichannel-Poisson arrivals-exponential service times with infinite population single channel Poisson arrivals.
INVENTORY:
Introduction-Single item-Deterministic models-Purchase inventory models with one price break and multiple price breaks-shortages not allowed-Stochastic models-demand may be discrete variable or continuous variable-Instantaneous production, Instantaneous demand and continuous demand and no set up cost-single period model.

UNIT-V

DYNAMIC PROGRAMMING:

Introduction-Terminology-Bellman's Principle of optimality- Applications of dynamic programming- shortest path problem-linear programming problem.

SIMULATION:

Definition-Types of simulation models-phases of simulation-applications of simulation-Inventory and Queuing problems-Advantages and Disadvantages-Brief Introduction of Simulation Languages.

TEXT BOOKS:
1. Operations Research by J.K.Sharma; Publisher: Mac Milan.
2. Operations Research by R. Pannerselvam; Publisher: Prentice Hall International.

REFERENCES:
1. Operations Research by A. M. Natarajan, P.Balasubramani, A.Tamilarasi; Publisher: Pearson Education.
2. Operations Research: Methods and Problems by Maurice Saseini, Arthur Yaspan and Lawrence Friedman
3. Introduction to OR by Taha; Publisher: Prentice Hall International.
4. Operations Research by Wagner; Publisher: Prentice Hall International.
5. Operations Research by S.D.Sharma-Kedarnath
6. O.R Wayne L. Winston by Thomson; Publisher: Brooks/Cole
7. Introduction to O.R by Hiller and Liebermann; Publisher: Tata McGraw Hill.

VNR Vignana Jyothi Institute of Engineering and Technology

III Year B.Tech ME/AE II Sem	L	T/P/D	C
	0	3	2

(MED1206) MACHINE TOOLS AND METROLOGY LAB

MACHINE TOOLS: Any <u>Six</u> experiments
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. Exercise on Facing, turning, step turning and taper turning on lathe machine
3. Exercise on Grooving, Thread cutting and knurling on lathe machine.
4. Exercise on Drilling, Boring, Counter boring, Counter sinking and Tapping operations on drilling machine
5. Exercise on Shaping to prepare plain surfaces
6. Exercise on Slotting to prepare contour surfaces
7. Exercise on Milling to perform plain /gear cutting
8. Exercise on Cylindrical Surface Grinding
9. **Exercise on Grinding of Tool angles.**

Demonstration on

Different methods of Taper Turning, Boring, Collar turning, use of four jaw chuck on lathe, Cutting of V - block on shape, Key way cutting on shaper/milling

METROLOGY: Any <u>Six</u> experiments
1. Measurement of lengths, heights, diameters by vernier calipers micrometers etc.
2. Measurement of bores by internal micrometers and dial bore indicators.
3. Use of gear teeth, Vernier calipers and checking the chordal addendum and chordal height of spur gear.
4. Machine tool alignment test on a lathe.
5. Machine tool alignment test on a milling machine.
6. Tool makers microscope and its application
7. Angle and taper measurements by bevel protractor, sine bars, etc.
8. Use of spirit level in finding the flatness of surface plate.
9. Thread measurement by two wire/ three wire method or tool makers' microscope.
10. Surface roughness measurement by TalySurf.
11. Surface wear resistances test using electro spark coating device.

REFERENCES:

1. Workshop Technology by W.A.J. Chapman (Parts I, II, and III); Publisher: Viva Books.
2. The Principles of Metallographic Laboratory Practice by George L. Kehl; Publisher: McGraw Hill.

VNR Vignana Jyothi Institute of Engineering & Technology

III Year B.Tech AE II Sem	L	T/P/D	C
	0	3	2

(ENG1204) ADVANCED ENGLISH COMMUNICATION SKILLS LABORATORY
(Common to all Branches)

Introduction

This course aims to offer students a practical approach to Technical Writing, and provide a relevant, contemporary and authoritative introduction to the dynamic field of technical communication that prepares them for Workplace Communication. Each unit in the syllabus is devised so as to include a writing component as well as an oral component.

The objectives of this course are to

i)   expose students to workplace writing
ii) initiate them into the Process of Technical Communication
iii) enable the students to create clear, accurate, and succinct content
iv) enable students to produce documents reflecting different types of technical communication such as Abstracts, Proposals and Technical Reports through ample practice
v)   enable students to adjust technical content to meet the needs of a specific target audience
vi) groom students in behavioral skills

Methodology

Written Communication Component

A Process- Genre methodology will be used in teaching the technical genres. This method would enable students to understand the use of particular lexico-grammatical patterns required of in the context of technical writing. They would learn to use language to express the particular communicative intent that is required of in the context of writing these genres.

Objectives of Writing Component

i) enable students to write clearly and succintly
ii) equip students with the ability to write technical genres

Oral Communication Component

The objective of including Oral Communication is to impart behavioral skills and prepare students to speak to a large group or team, keeping in mind the audience, context and purpose of communication. This Oral Communication component must enable students to speak in an organized and mature way, without any inhibitions. They will be groomed to relate their speech to their audience.

Objectives of Oral Communication Component
   i)   equip students with Behavioral skills
   ii) prepare them for Oral presentations, and Group Discussions
   iii) equip them with Interview skills

Syllabus Outline

Unit I

Writing Skills 1
   1. Applications and Covering letters
   2. Resume Writing
   3. Verbal Ability
   4. **Oral Communication** :Talking About Yourself

Unit II
   1. Writing an SOP
   2. Summarizing and Synthesizing Information
   3. Oral Communication: Making Presentations

Unit III
   1. Writing Project Proposals
   2. Oral Communication: Group Discussions

Unit   IV
   1. Writing Project Reports
   2. Oral Communication: Interview Skills

Unit V.

Behavioral Skills and Personality Development
   1. Building a positive attitude, building a positive personality, Motivation, goal setting & values &
      vision
   2. Problem Solving and Decision Making; Negotiation Skills through Role Play
   3. Team Building and Leadership Abilities
   4. Social Etiquette

 REQUIRED TEXT AND MATERIALS
   1. Ashraf Rizvi, M (2005). Effective Technical Communication, Tata Mc Graw Hill Publishing Company Limited, New Delhi.
   2. Anderson, Paul V. (2003). Reports. In Paul V. Anderson's Technical Communication: A Reader-Centered Approach (5th ed..) (pp. 457-473). Boston: Heinle.
   3. William S. Pfeiffer, (2010) Technical Communication: A Practical Approach (7th ed.). Prentice Hall

References

1. Burnett, Rebecca. Technical Communication. 5th Ed., Heinle, 2001
2. Bolter, Jay David. (2001). The late age of print. In Robert P. Yagelski's (Ed.) Literacies and
     Technologies: A Reader for Contemporary Writers (135-145). New York: Longman.
3. Brandt, Deborah. (1998). Sponsors of literacy. College Composition and Communication 49.2, 165-185.
4. Gerson Sharon J. and Steven Gerson : Technical Writing Process and Product. 3rd edition, New Jersey: Prentice Hall 1999
5. Johnson-Sheehan, Richard. (2007). Starting Your Career. In Richard Johnson-Sheehan's Technical Communication Today (2nd ed.) (pp. 388-402). New York: Longman.
6. Markel, Mike**.** Technical Communication: Situations and Strategies (8th EDITION (2006-2007)
7. R. C. Sharma and K. Mohan, Business Correspondence and Report Writing, Third Edition, TMH, 2002. (Indian Edition)
8. M. Raman and S. Sharma, Technical Communication : Principles and Practices, OUP, 2004. (Indian Edition)

VNR Vignana Jyothi Institute of Engineering and Technology

III Year B.Tech AE II Sem	L	T/P/D	C
	2	0	0

(NCC1102) Soft Skills and Personality Development

Introduction

In an era of Technological advances and competition in the job market, it is necessary for students to possess soft skills and effective personal skills in addition to technical skills. It is essential that students possess the ability to convey technical ideas in a sound and simple manner. Planning and execution are the two important activities required for them. It is the execution that requires the soft skills as it most of the times deals with people. This course on "Soft Skills and Personality Development" is aimed at enhancing students' career prospects.

This course uncovers the principles of soft skills and personality skills, the ways to integrate them in different phases of career that require personal and interpersonal skills. It focuses on transforming the way of one's thinking and reacting to the environment. It equips the students with self analysis and gain self- control through stress management and conflict management. It also helps students with study skills. It helps students overcome their barriers and achieve excellence in performance and succeed in their chosen field of work.

Objectives

enable students to convert the conceptual understanding of communication into everyday
practice

train students to ground concepts/ideas in their own experience

enable students to exercise control over language use

sensitise students to the nuances of the four basic communication skills – Listening, Speaking,
Reading and Writing

enable students to understand the concept and components of personality, so as to apply the
acquired knowledge and march towards excellence in their academic careers.

train students to become aware of their thinking styles and to enable them to convert thinking
into performance

prepare students to evolve mental models for intra-personal and inter-personal transactions

make students reflect and improve their use of body language – posture, gesture, facial expression, tone

sharpen memory skills and other study skills, which are vital for academic excellence.
bring outthe creativity and latent talents of students through goal setting
train students for positive thinking to keep them in good stead at the time of crisis.

SYLLABUS

Unit I: Introduction to Personality Development
1. Definition and Basics of personality
   - Determinants of Personality- biological, psychological and socio-cultural factors
   - Need for personality Development
2. Analyzing strengths and Weaknesses
3. Corporate theories on Personality development
4. Increasing vocabulary
5. Body Language
6. Preparation of Self Introduction
7. Motivation
   - Self-analysis through SWOT
   - Techniques and strategies for self-motivation

Unit II : Techniques in Personality Development Stage I
1. Communication Skills
2. Listening
3. Communication Barriers
4. Overcoming these Barriers
5. Importance of Self Esteem -- Building Self-esteem& Self Confidence
6. Working on attitudes – aggressive, assertive and submissive
7. Goal Setting
8. Leadership and Team Building Skills
9. Group Discussion

Unit III: Techniques in Personality Development Stage II
1. Interpersonal relationships
   - Analysis of ego states, Transactions, Strokes and Life Positions
2. Stress Management
   - Concept, Nature and Dimensions of Stress
   - Causes, Impact and Managing Stress
   - Relaxation Techniques
3. The Power of positive thinking
   - Nurturing creativity, decision-making and problem solving
   - Goals and techniques for positive thinking
   - Enhancement of concentration through positive thinking
4. Projecting a Positive Social Image
   - Grooming & Social Etiquette
   - Voice Modulation

- Public Speaking

Unit IV: Techniques in Personality Development Stage III
- Conflict Management
- Introduction to Conflict Management
- Levels of Conflict
- Managing Conflict
- Time Management
- Concept
- Importance and Need
- Steps towards better Time Management

Unit V: Memory and Study Skills
- Definition and importance of memory
- Causes of forgetting
- How to forget (thought stopping), how to remember (techniques for improving memory)
- The technique of passing exams-Management of examination fear.

PRACTICAL TRAINING
The course would include the following practical exercises.
- Ice- breaking. Brainstorming and simulation exercises. Thought stopping. Memory and study skills training
- Role play and record work

REFERENCES
1. Mile, D.J (2004). Power of positive thinking. Delhi: Rohan Book Company.
2. Pravesh Kumar (2005). All about self- Motivation. New Delhi: Goodwill Publishing House.
3. Dudley, G.A. (2004). Double your learning power. Delhi: Konark Press. Thomas Publishing Group Ltd.
4. Lorayne, H. (2004). How to develop a super power memory. Delhi: Konark Press. Thomas Publishing Group Ltd.
5. Hurlock, E.B (2006). Personality Development, 28th Reprint. New Delhi: Tata Mc Graw Hill.
6. Windshuttle, Keith and Elizabeth Elliot.1999. Writing, Researching and Communicating: Communication Skills for the Information Age. 3rd Reprint. Tata McGraw-Hill. Australia
7. Dignen, Flinders and Sweeney. English 365. Cambridge University Press
8. Goleman, Daniel. 1998. Working with Emotional Intelligence. Bantam Books. New York

9.   Jones, Leo and Richard Alexander. 2003. New International Business English. Cambridge University Press

10. Lucas, Stephen.2001. Art of Public Speaking. Mc-Graw Hill.

11. Tamblyn, Doni and Sharyn Weiss. 2000. The Big Book OF Humorous Training Games. 2004 Edition. Tata McGraw-Hill. New Delhi

12. Personality Development by Rajiv K. Mishra. Rupa & Co.

13. Powell. In Company. Macmillan

14. Cotton, et al. Market Leader. Longman

15. Pease, Allan. 1998. Body Language: How to Read Others Thoughts by their Gestures. Sudha Publications. New Delhi

16. Gardner, Howard. 1993. Multiple Intelligences: The Theory in Practice: A Reader. Basic Books. New York

17. De Bono, Edward. 2000. Six Thinking Hats. 2nd Edition. Penguin Books.

18. De Bono, Edward. 1993. Serious Creativity. Reprint. Harper Business.

19. Mohan, Krishna and Meera Bannerji, 2001, Developing Communication Skills. Macmillan.

20. V. Syamala, 2002. Effective English Communication for you. Emerald Publishers, Chennai.

VNR Vignana Jyothi Institute of Engineering and Technology

IV Year B.Tech AE I Sem	L	T/P/D	C
	4	0	4

(EEE1155) AUTOMOTIVE ELECTRICAL AND AUTOTRONICS

UNIT I

STORAGE BATTERY: Principles of lead acid cells and their characteristics. construction and working of lead acid battery. types of batteries-Nickel Cadmium Battery, Sodium Sulphur Battery, Nickel Metal battery, Hybrid battery, Aluminum Air, Battery Various tests on batteries, effect of temperature on capacity and voltage, battery capacity, voltage, efficiency, charging techniques of batteries, sulphation and desulphation, maintenance and servicing.

CHARGING SYSTEM : Principle of generation of direct current Principle, construction and working of alternator, Wiring diagram of charging system, Cut out relay, Voltage and current regulators for DC generators, Voltage regulator for alternator, Maintenance, servicing and trouble shooting.

UNIT II

IGNITION SYSTEM: Conventional ignition system and study of its components. Types of ignition systems spark advance and retarding mechanisms. Types of spark plugs, ignition timing, maintenance, servicing and fault diagnosis. Electronic ignition systems, programmed ignition, distributor-less ignition.

STARTER MOTOR: Construction and working of series and shunt automotive starter motor, wiring diagram of a starting system; Types of switches, starting drive mechanisms- bendix drive, folo-thru drive, overrunning clutch drive mechanism with solenoid switch; starter motor troubles and repairs.

Electronic fuel injection system, components of fuel injection systems, multipoint injection. Electronic control of gasoline fuel injection system, electronic control diesel fuel injection.

UNIT III

WIRING FOR AUTO ELECTRICAL SYSTEMS: Automotive cables, cable connectors, wiring harness, fuses, insulated return and earth return systems, Earth return and insulated return systems, positive and negative earth systems, wiring diagram for a luxury car electrical system and lighting system, maintenance and servicing.

DASH BOARD UNITS AND ELECTRICAL ACCESSORIES: Principle of automobile illumination, head lamp construction and wiring, horn, wind screen wiper signaling devices, fog lamps, auxiliary lighting , temperature gauge, oil pressure gauge, fuel gauge, speedometer, odometer.

UNIT IV

NUMBER SYSTEM CODES AND DATA REPRESENTATION : Binary numbers, number base conversion, decimal, octal and hexa-decimal numbers, BCD codes, memory representation of positive and negative integers, conversion of real numbers. floating point notations and representations of floating point numbers, binary arithmetics, addition and subtraction of binary numbers, ones and two's complement method.,

UNIT V

LOGIC GATES, ARITHMETIC CIRCUITS AND INTRODUCTION TO MICROPROCESSORS : Study of basic and universal logic gates, study of X-OR and X-NOR gates. Latches, S-R flip flop, J-K flip flop, counters- 4 bit synchronous counters and 4 bit Asynchronous counters, shift registers – Right shift register and left shift register, half adders and subtractors.

TEXTBOOKS
1. Automotive Electrical Equipments by young, A.P and Griffith, S.L, ELBS and New press
2. Digital Logic and Computer Design by Mano, Prentice Hall of India
3. Automotive Electrical Equipment, By P.L. Kohli, TMH

REFERENCES
1. Automobile Electrical Equipment By Crouse.W.H, McGraw Hill Book Co inc, New York,2005.
2. Basic automotive electrical systems, By C.P.Nakra, Dhanpat Rai.
3. Modem Electrical Equipments, By A. W. Judge, chapman & Hall, Londan 2004.

VNR Vignana Jyothi Institute of Engineering and Technology

IV Year B.Tech ME/AE I Sem	L	T/P/D	C
	4	0	4

(MED1128) CAD/CAM

UNIT I
INTRODUCTION:
Computers in Industrial Manufacturing, Product cycle, CAD and CAM, Overview of CAD / CAM Hardware, Display devices, Hard copy devices.
COMPUTER GRAPHICS:
Raster scan graphics, Coordinate systems, Database structure for graphics modeling, Transformation of geometry, 3D Transformations, Mathematics of projections, Clipping, Hidden surface removal.

UNIT II
GEOMETRIC MODELING:
Geometric models, Geometric construction methods, Curve representation, Surface representation methods, Modeling facilities desired.
DRAFTING AND MODELING SYSTEMS:
Basic geometric commands, Layers, Display control commands, Editing, Dimensioning, Solid modeling.

UNIT III
COMPUTER NUMERICAL CONTROL:
Introduction to NC machines and CNC machines, Structure of CNC machine tools, Features of Machining center and Turning center, Concept of ATC & APC, Feedback control
CNC PART PROGRAMMING:
Fundamentals, Manual part programming methods, Computer Aided Part Programming, Introduction to G & M codes.
GROUP TECHNOLOGY:
Philosophy of Group Technology, Part families, Methods of Parts Classification and Coding, Advantages and Limitations.

UNIT IV
COMPUTER AIDED PROCESSES PLANNING:
Introduction, Retrieval type and Generative type, Benefits
COMPUTER AIDED QUALITY CONTROL:
Introduction, Terminology in quality control, The computer in QC, Contact inspection methods, Noncontact inspection methods-optical and nonoptical, Computer aided testing, Integration of CAQC with CAD/CAM.

UNIT V
COMPUTER INTEGRATED MANUFACTURING SYSTEMS:
Introduction, 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 by A. Zimmers and P. Groover; Publisher: Prentice Hall
   International/Pearson Education
2. CAD/CAM Principles and Applications by P N Rao; Publisher: Tata McGraw
   Hill
3. CAD / CAM Theory and Practice by Ibrahim Zeid; Publisher: Tata McGraw
   Hill

REFERENCES:
1. Automation, Production Systems and Computer integrated Manufacturing by
   Groover; Publisher: Pearson Education
2. CAD / CAM / CIM by Radhakrishnan and Subramanian; Publisher: Pearson
   Education
3. Principles of Computer Aided Design and Manufacturing by Farid Amirouche;
   Publisher: Pearson Education
4. CAD/CAM: Concepts and Applications by Alavala; Publisher: Prentice Hall
   International
5. Computer Numerical Control Concepts and programming by Warren S
   Seames; Publisher: Thomson

VNR Vignana Jyothi Institute of Engineering and Technology

IV Year B.Tech ME/AE I Sem	L	T/P/D	C
Open Elective I	**3**	**0**	**3**

(CED1147) DISASTER MANAGEMENT

UNIT-I

INTRODUCTION TO DISASTER:

Concepts and definitions (Disaster, Hazard, Vulnerability, Resilience, Risks)

UNIT-II

DISASTERS:

Classifications, Causes, Impacts (including social, economic, political, environment, health, psychosocial, etc.)

Differential impacts-in terms of caste, class, gender, age, location, disability Global trends in disasters. Urban disaster, pandemics, complex emergencies, Climate change

UNIT-III

APPROACHES TO DISASTER RISK REDUCTION:

Disaster cycle-its analysis, phase, Culture of safety, prevention, mitigation and preparedness, community based DRR, Structural measures, roles and responsibilities of community. Panchayati Raj Institutions/Urban Local Bodies (PRIs/ULBs), states, center and other stake-holders.

UNIT-IV

INTER-RELATIONSHIP BETWEEN DISASTER AND DEVELOPMENT:

Factors affecting Vulnerabilities, differential impacts, impact of development projects such as dams, embankments, change in land-use etc. Climate change Adaption. Relevance of indigenous knowledge, appropriate technology and local resources.

UNIT-V

DISASTER RISK MANAGEMENT IN INDIA:

Hazard and vulnerability profile of India Components of Disaster relief: Water, food, sanitation, shelter, health, waste management

Institutional arrangements (Mitigation, Response and Preparedness, DM Act Policy, Other related polices, plan, programmes and legislation)

PROJECT WORK :(FIELD WORK, CASE STUDIES)

The project/fieldwork is meant for students to understand vulnerabilities and to work on reducing disaster risks and to build a culture of safety. Projects must be conceived creatively based on the geographic location and hazard.

Suggested Reading list:

1. Alexander David, Introduction in 'Confronting Catastrophe', oxford University press, 2000
2. Andharia J. Vulnerability in disaster Discourse, JTCDM, Tata Institute of Social Sciences working paper no.8, 2008
3. Blaikie, P, Cannon T, Davis I, Wisner B 1997. At Risk Natural Hazards, Peoples' Vulnerability and Disaster, Rutledge.
4. Coppola P Damon, 2007. Introduction to International Disaster Management.
5. Carter, Nick 1991.Disaster Management: A Disaster Manager's Handbook. Asian Development Bank, Manila Philippines.
6. Cuny,F.1983. Development and Disasters, Oxford University Press
7. Govt.of India; Disaster Management Act 2005,Government of India, New Delhi.

VNR Vignana Jyothi Institute of Engineering and Technology

IV Year B.Tech ME/AE I Sem	L	T/P/D	C
Open Elective I	3	0	3

(CSE1121) CYBER SECURITY

UNIT I.

INTRODUCTION: Introduction and Overview of Cyber Crime, Nature and Scope of Cyber Crime, Types of Cyber Crime: Social Engineering, Categories of Cyber Crime, Property Cyber Crime. CYBER CRIME ISSUES: Unauthorized Access to Computers, Computer Intrusions, White collar Crimes, Viruses and Malicious Code, Internet Hacking and Cracking, Virus Attacks, Pornography, Software Piracy, Intellectual Property, Mail Bombs, Exploitation ,Stalking and Obscenity in Internet, Digital laws and legislation, Law Enforcement Roles and Responses. Security Policy Design, Designing Security Procedures, Risk Assessment Techniques, Security standards, Biba Model, Chinese wall, Bell La Pedula Model.

UNIT II:

SERVICE DELIVERY PROCESS- Service Delivery Process, Service Level Management, Financial Management, Service Management, Capacity Management, Availability Management.

SERVICE SUPPORT PROCESS- Service Support Process, Configuration Management, Incident Management, Problem Management, Change Management, Release Management.

UNIT III:

STORAGE MANAGEMENT- Backup & Storage, Archive & Retrieve, Disaster Recovery, Space Management, Database & Application Protection, Bare Machine Recovery, Data Retention

SECURITY MANAGEMENT- Security, Computer and internet Security, Physical Security,Identity Management, Access Management. Intrusion Detection, Security Information Management.

UNIT IV:

Cyber Forensics- Introduction to Digital Forensics, Forensic Software and Hardware, Analysis and Advanced Tools, Forensic Technology and Practices, Forensic Ballistics and Photography, Face, Iris and Fingerprint Recognition, Audio Video Analysis, Windows System Forensics, Linux System Forensics, Network Forensics Evaluation of crime scene and evidence collection ,Usage of tools for disk imaging and recovery processes.

UNIT V

Introduction to Information Security Standards , Laws and Acts: Laws and Ethics, Digital Evidence Controls, Evidence Handling Procedures, Basics of Indian Evidence ACT IPC and CrPC , Electronic Communication Privacy ACT, Legal Policies,ISO 27001,PCI DSS,IT Act, Copy Right Act.

Textbooks:

1. Nelson Phillips and Enfinger Steuart, "Computer Forensics and Investigations", Cengage Learning, New Delhi, 2009.
2. "Management of Information Security", M. E. Whitman, H. J. Mattord, Nelson Education / CENGAGE Learning, 2011, 3rd Edition.
3. "Guide to Computer Forensics and Investigations", B. Nelson, A. Phillips, F. Enfinger, C. Steuart, Nelson Education / CENGAGE Learning, 2010, 4th Edition.
4. Goel Ritendra, Computer Application in Management, New Age International Publishers, New Delhi.
5. Chowdhury G.G., Text Retrieval Systems in information Management, New Age International Publishers, New Delhi.

VNR Vignana Jyothi Institute of Engineering and Technology

	L	T/P/D	C
IV Year B.Tech ME/AE I Sem			
Open Elective I	**3**	**0**	**3**

(ITD1116) COMPUTER FORENSICS

UNIT I
COMPUTER FORENSICS FUNDAMENTALS:
What is Computer Forensics, Use of Computer Forensics in Law Enforcement, Computer Forensics in Law Enforcement, Computer Forensics Assistance to Human Resources/Employment Proceedings, Computer Forensics Services, Benefits of professional Forensics Methodology, Steps taken by computer Forensics Specialists.
TYPES OF COMPUTER FORENSICS TECHNOLOGY:
Types of Military Computer Forensics Technology, Types of Law Enforcement - Computer Forensic Technology - Types of Business Computer Forensics Technology.
COMPUTER FORENSICS EVIDENCE AND CAPTURE:
Data Recovery Defined- Data Back-up and Recovery- The Role of Back-up in Data Recovery- The Data Recovery Solution.
UNIT II
EVIDENCE COLLECTION AND DATA SEIZURE:
Why Collection Evidence? Collection Options – Obstacles – Types of Evidence – The Rules of Evidence- Volatile Evidence- General Procedure – Collection and Archiving – Methods of Collection – Artifacts – Collection Steps – Controlling Contamination: The chain of Custody.
DUPLICATION AND PRESERVATION OF DIGITAL EVIDENCE:
Preserving the Digital Crime Scene – Computer Evidence Processing Steps – Legal Aspects of Collecting Preserving Computer Forensics Evidence. Computer Image Verification and Authentication: Special Needs of Evidential Authentication – Practical Consideration – Practical Implementation.
UNIT III
COMPUTER FORENSICS ANALYSIS AND VALIDATION:
Determining what data to collect and analyze, validating forensic data, addressing data – hiding techniques, performing remote acquisitions.
NETWORK FORENSICS:
Network Forensics overview, performing live acquisitions, developing standard procedures for network forensics, using network tools, examining the honeynet project.

UNIT IV

PROCESSING CRIME AND INCIDENT SCENES:

Identifying digital evidence, collecting evidence in private-sector incident scenes, processing law enforcement crime scenes, preparing for a search, securing a computer incident or crime scene, seizing digital evidence at the scene, storing digital evidence, obtaining a digital hash, reviewing a case.

CURRENT COMPUTER FORENSIC TOOLS:

Evaluating computer forensic tool needs, computer forensics software tools, computer forensics hardware tools, validating and testing forensics software.

UNIT V

E-MAIL INVESTIGATIONS:

Exploring the role of E-mail in investigation, exploring the role of the client and server in E-mail, investigating e-mail crimes and violations, understanding e-mail servers, using specialized e-mail forensic tools.

CELL PHONE AND MOBILE DEVICE FORENSICS:

Understanding mobile device forensics, understanding acquisition procedures for cell phones and mobile devices.

WORKING WITH WINDOWS AND DOS SYSTEMS:

Understanding file systems, exploring Microsoft File Structures, Examining NTFS Disks, Understanding whole disk encryption, windows registry, Microsoft startup tasks, MS-DOS Startup tasks, virtual machines.

TEXT BOOKS:

1. Computer forensics, computer crime investigation by John R.Vacca, Firewall Media, New Delhi.
2. Computer forensics and investigations by Nelson, Phillips Enfinger Steuart, CENGAGE Learning.

REFERENCES:

1. Real Digital Forensics by Keith J.Jones, Rechard Bejtlich, Curtis W.Rose, Addison-Wesley Pearson Education.
2. Forensic compiling, A Tractitioneris Guide by Tony Sammes and Brain Jenkinson, Springer International Edition.
3. Computer Evidence Collection & Presentation by Christopher L.T.Brown, Firewall Media.
4. Homeland Security, Techniques & Technologies by Jesus Mena, Firewall Media
5. Software forensics Collecting Evidence from the scene of a digital crime by Robert M.Slade, TMH 2005.
6. Windows forensics by Chad Steel, Wiley India Edition.

VNR Vignana Jyothi Institute of Engineering and Technology

IV Year B.Tech ME/AE I Sem	L	T/P/D	C
Open Elective I	3	0	3

(ITD1105) OBJECT ORIENTED PROGRAMMING THROUGH JAVA

UNIT I
INTRODUCTION TO JAVA
Introduction: Creation of Java, Java buzzwords, OOP Principles, Encapsulation, Inheritance and Polymorphism, Classes and Objects: Creating and usage objects, introducing methods, constructors, usage of static with data and methods, usage of final with data, access control, this key word, garbage collection, overloading methods and constructors, parameter passing, recursion, nested classes and inner classes, String Handling

UNIT-II
INHERITANCE, PACKAGES AND INTERFACES
Basic concepts, member access rules, usage of super key word, forms of inheritance, method overriding, abstract classes, dynamic method dispatch, using final with inheritance, the Object class.

Defining, Creating and Accessing a Package, Understanding CLASSPATH, importing packages, differences between classes and interfaces, defining an interface, implementing interface, applying interfaces, variables in interface and extending interfaces.

UNIT-III
EXCEPTION HANDLING AND MULTITHREADING
Concepts of Exception handling, types of exceptions, usage of try, catch, throw, throws and finally keywords, Built-in exceptions, creating own exception sub classes, Concepts of Multithreading, differences between process and thread, thread life cycle, creating multiple threads using Thread class, Runnable interface, Synchronization, thread priorities, inter thread communication, daemon threads, deadlocks, thread groups.

UNIT-IV
EVENT HANDLING, AWT CONTROLS
Events, Event sources, Event classes, Event Listeners, Delegation event model, handling mouse and keyboard events, Adapter classes.

AWT : Concepts of components, container, panel, window, frame, canvas, Font class, Color class and Graphics, AWT Controls.

Applets - Concepts of Applets, differences between applets and applications, life cycle of an applet, types of applets, creating applets, passing parameters to applets.

UNIT-V

NETWORKING, JAVA LIBRARY, JDBC

Networking: Inet address, TCP/IP sockets, Datagrams, URL, URL connection, String handling, java. util, java.io and java.net packages.

JDBC: Different type of Drivers, Connection establishment, Retrieving and manipulation data from client and storing in data base.

Java Library: explore io, util, net, lang, sql, awt packages.

Introduction to Java APIs: what is API, discuss APIs in Java SS, Java EE, Java ME

TEXT BOOKS:

1. The Complete Reference Java J2SE 5th Edition, Herbert Schildt, TMH Publishing Company Ltd, NewDelhi.
2. Big Java 2nd Edition, Cay Horstmann, John Wiley and Sons.

REFERENCES:

1. Java How to Program, Sixth Edition, H.M.Dietel and P.J.Dietel, Pearson Education/PHI
2. Core Java 2, Vol. 1, Fundamentals, Cay.S.Horstmann and Gary Cornell, Seventh Edition, Pearson Education.
3. Core Java 2, Vol. 2, Advanced Features, Cay.S.Horstmann and Gary Cornell, Seventh Edition, Pearson Education.
4. Beginning in Java 2, Iver Horton, Wrox Publications.
5. Java, Somasundaram, Jaico.
6. Java Networking and AWT API Super Bible, Natraj Nagaratnam, Brian Masco, Arvind Srinivasan, White Group Press

VNR Vignana Jyothi Institute of Engineering and Technology

IV Year B.Tech ME/AE I Sem	L	T/P/D	C
Open Elective I	3	0	3

(ITD1126) GREEN IT

UNIT I
TRENDS AND REASONS TO GO GREEN:
Overview and Issues, Problems, Cost savings, Current Initiatives and standards, Global Initiatives

UNIT II
CONSUMPTION ISSUES
Minimizing Power Issues, Cooling, Changing the way we work, Going Paper less, Recycling, Hardware Considerations,

UNIT III
THE GREENING PROCESS
Data Center Design and Redesign, Greening your Information Systems, Staying Green

UNIT IV
VIRTUALIZATION
Virtual Server Implementation Plan, Desktop Virtualization, Benefits, Desktop access, Virtual Printing,

UNIT V
DATA REPLICATION AND DISK TECHNOLOGY ADVANCEMENTS
Data Replication Methods, Disk Technology Advancements, The Green data Center, Cloud Computing, Remote Monitoring

TEXT BOOKS:
1. Green IT-Reduce your information system's Environmental Impact while adding to the bottom line Toby J Velte, Anthony T Velte, Robert Elsenpeter – McGraw Hill Publications, 2008
2. Foundation Of Green It, Consolidation, Virtualization, Efficiency, and Roi in The Data Center, Marty Poniatowski- Prentice Hall Publications

REFERENCES:
1. Green Computing and Green IT Best Practices on Regulations and Industry Initiatives, Virtualization, Power Management, Materials Recycling and Telecommuting By Jason Harris.
2. Green IT for Sustainable Business Practice- Mark G. O' Neil, BCS The chartered institute for IT
3. The Greening of IT: How Companies Can Make a Difference for the Environment, John P. Lamb, Kindle Edition, IBM Press 2009

VNR Vignana Jyothi Institute of Engineering and Technology

IV Year B.Tech ME/AE I Sem	**L**	**T/P/D**	**C**
Elective II	**3**	**1**	**3**

(MED1129) ROBOTICS

UNIT I
INTRODUCTION
Automation & Robotics, An overview of Robotics, Classification by Coordinate Systems and control systems.

Components of the Industrial Robotics: Degrees of freedom, End effectors – Mechanical gripper, Magnetic, Vacuum cup and other types of grippers, General consideration on gripper selection and design.

Motion Analysis: Basic rotation matrices, Composite rotation matrices, Euler angles, Equivalent angle and axis, Homogeneous transformation, Problems.

UNIT II
KINEMATICS AND DYNAMICS
Manipulator Kinematics: D-H notations, Joint coordinates and world coordinates, Forward and Inverse kinematics, Problems.

Differential Kinematics: Differential kinematics of planar and spherical manipulators, Jacobians, Problems.

Robot Dynamics: Lagrange-Euler formulations, Newton-Euler formulations, Problems on planar two link manipulators.

UNIT III
TRAJECTORY PLANNING
Joint space scheme, Cubic polynomial fit, Avoidance of obstacles, Types of motions: Skew motion, Joint interpolated motion, Straight line motion, Problems.

UNIT IV
ROBOT ACTUATORS AND FEEDBACK COMPONENTS
Actuators – Pneumatic, Hydraulic and Electric actuators, DC Servo motors, Stepper motors.

Feedback components – Position sensors, Potentiometers, Resolvers and Encoders, Velocity sensors, Tactile sensors.

UNIT V
ROBOT APPLICATION IN MANUFACTURING
Material Handling and transfer, Welding, Assembly, Inspection, Future applications

TEXT BOOKS:
1. Industrial Robotics by M. P. Groover; Publisher: Pearson Education
2. Introduction to Robotic Mechanics and Control, by J. J. Craig, Publisher: Pearson Education

REFERENCES:
1. Robot Dynamics and Control by M.W.Sponge and M.Vidyasagar; Publisher: John Wiley.
2. Robotics by K.S.Fu; Publisher: McGraw Hill.
3. Robotic Engineering by Richard Klafter, Publisher: Prentice Hall
4. Robot Analysis and Intelligence by Asada & Slotine, Publisher: Wiley Interscience
5. Robotics & Control by Mittal R. K. & Nagrath I. J., Publisher: Tata McGraw Hill

VNR Vignana Jyothi Institute of Engineering & Technology

IV Year B.Tech AE– I Sem	L	T/P/D	C
(ELECTIVE II)	3	1	3

(AED1108) AUTOMOTIVE CHASSIS AND SUSPENSION

UNIT-I
Introduction to Chassis System:
Introduction: Requirements of an automobile with types of automobiles, layout of an automobile with reference to power plant, power required for propulsion, various resistances to motion of the automobile.
Frames: Types of frames, materials, calculation of stresses on sections, constructional details, loading points, testing of frames. Wheels and tyres: Types of wheels, construction. structure and function of tyres, static and function of tyres.

UNIT-II
Steering systems: Types of steering gears, front axle, under steer and over steer, wheel alignment, power steering, steering geometry, wheel balancing, centre point steering, steerability.
Brakes: Necessity of brake, stopping distance and time, brake efficiency, weight transfer, brake shoe theory, determination of braking torque, braking systems,mechanical, hydraulic, disc, parking and emergency brakes, servo and electrical brakes, details of hydraulic system, mechanical system and components. types of master cylinders, factors influencing operation of brakes such as operating temperature, lining, brake clearance, pedal pressure, linkages etc.

UNTI-III
Suspension: Types of suspension, leaf springs, materials, independent suspension, torsion bar, air bellows or pneumatic, suspension, hydraulic suspension, constructional details of telescopic shock absorbers, types, vibrations and riding comfort, role axis of spring suspension. Front Wheel Mounting, Rear Wheel Mounting, Engine mounting, Various types of springs used in suspension system. Requirements and various types, Material.

UNIT-IV
Testing: Testing procedures, types of tests and chassis components, equipment for lab and road tests, preparation of test reports.

UNIT-V
Two and Three wheelers: Classification of two and three wheelers, construction details, construction details of frames and forks, suspension systems and shock absorbers, different arrangement of cylinders. Carburetion system and operation.

TEXTBOOK:
1.   Automotive chassis and body, P. L. Kohli, TMH

REFERENCE BOOKS

1.   Introduction to automobile engineering, N.R. Khatawate. Khanna publications
2.   Automotive mechanics, Joseph I heitner. Affiliated East West Press
3.   Problems in Automobile Engineering, N.K.Giri, Khanna Publications
4.   Automotive Chassis, P.M. Heldt, Chilton & Co.
5.   Automobile Engineering, T.R. Banga & Nathu Singh, Khanna publications

VNR Vignana Jyothi Institute of Engineering and Technology

IV Year B.Tech AE I Sem   **L**   **T/P/D**   **C**
Elective II   **3**   **1**   **3**

(MED1132) PRODUCT LIFE CYCLE MANAGEMENT

UNIT I
INTRODUCTION TO PLM:
Need for PLM, opportunities and benefits of PLM, different views of PLM, components of PLM, phases of PLM, PLM feasibility study, PLM visioning.
PLM STRATEGIES:
Industrial strategies, strategy elements, its identification, selection and implementation, change management for PLM.

UNIT II
PRODUCT DATA MANAGEMENT (PDM):
PDM systems and importance, reason for implementing a PDM system, financial justification of PDM, barriers to PDM implementation.
PRODUCT DESIGN:
Engineering design, organization and decomposition in product design, product design process, methodical evolution in product design, concurrent engineering, design for 'X' and design central development model. Strategies for recovery at end of life, recycling, human factors in product design. Modeling and simulation in product design.

UNIT III
NEW PRODUCT DEVELOPMENT:
Structuring new product development, building decision support system, Estimating market opportunities for new product, new product financial control, implementing new product development, market entry decision, launching and tracking new product program, Concept of redesign of product.

UNIT IV
TECHNOLOGY FORECASTING:
Future mapping, invocating rates of technological change, methods of technology forecasting such as relevance trees, morphological methods and mission flow diagram, combining forecast of different technologies, uses in manufacture alternative.

UNIT V
PRODUCT CONCEPTION PROCESS:
Business processes, data-process relationship, from the idea to waste disposal Product structures: Variant management, product configuration, material master data, product description data, Data models,   Life cycles of individual items, status of items.

TEXT BOOKS:
1. Fabio Giudice, Guido La Rosa, Product Design for the environment-A life cycle approach, Taylor and Francis 2006.
2. Robert J. Thomas, NPD: Managing and forecasting for strategic processes.
3. Martins Joseph, Technological Forecasting for decision Making, 2nd edition, North Holland.

REFERENCES:
1. John Stark, Springer-Verlag, "Product Lifecycle Management Paradigm for 21st century Product Realization", London, 3rd printing (2006). 441 pp., ISBN: 1-85233-810-5.
2. Product Lifecycle Management, Michael Grieves, Tata McGraw Hill

VNR Vignana Jyothi Institute of Engineering and Technology

IV Year B.Tech ME/ AE I Sem	**L**	**T/P/D**	**C**
Elective II	**3**	**1**	**3**

(MED1130) COMPOSITE MATERIALS

UNIT I
INTRODUCTION:
Introduction to Composite Materials: Introduction, definition of composite materials, Classification of composites: Polymer Matrix Composites, Metal Matrix Composites, Ceramic Matrix Composites, Carbon-Carbon Composites, Fiber reinforced Composites and Nature made composites, and applications

UNIT II
REINFORCEMENTS:
Introduction, Classification of reinforcements, Flexibility, Fibers: Glass-Fabrication, structure, properties and applications, Boron-Fabrication, structure and morphology, properties and its applications, Carbon preparation, processing, properties and applications, Preparation, properties and applications of: Organic fibers–Polyethylene, Aramid, Ceramic, Non oxide-Silicon carbide, Whiskers

UNIT III
MATRIX MATERIALS:
Introduction, Polymers matrix materials-Thermoplastics and Thermosets, copolymers, molecular weight, degree of crystallinity, stress strain behavior Common thermoset matrix materials- epoxy, polyster, polyimides common thermoplastic matrix materials-polyphenylene sulfide, polyaryl sulfone, Metal matrix materials- structure, properties of metals, common metals applied as matrix metals, Ceramix matrix materials-types, properties.

Interfaces-wettability, effect of surface roughness, crystallographic nature of interface, Types of bonding at the interface-mechanical, physical, Chemical bonding.

Tests for measuring interfacial strength-Flexural tests, three point bending, four point bending, short beam shear test, iosipescu shear test, Single fiber pullout test, curved neck specimen test, instrumented indentation test, fragmentation test., Laser spallation technique.

UNIT IV
MANUFACTURING METHODS:
Polymer matrix composites(PMC)-Processing of thermoset matrix composites, Handy Lay –Up and Spray Techniques, Filament winding, pultrusion, resin transfer molding, Tape-Laying and fiber placement systems, Autoclave –based methods, Thermoplastic

matrix composites-Film stacking, Diaphraming, Thermoplastic Tape laying, Injection Moulding, sheet moulding compound (SMC)

Types of Metal Matrix composites, processing-liquid state process, solid state process, In situ process, properties and applications.

Ceramic matrix composites(CMC)-processing OF CMC, Cold pressing and sintering, Hot pressing, Reaction bonding process, Liquid infiltration, Lanxide process, In Situ chemical Reactions Techniques-chemical vapour deposition and chemical vapour impregnation, sol-gel and polymer pyrolysis, Properties and applications of CMC, Carbon Fiber composites-processing, properties and its applications.

UNIT V

MICROMECHANICS OF COMPOSITES:

Introduction, Density, Volume, and Mass fractions, void contents, Mechanical Properties: Prediction of elastic constants,

Halpin-Tsai Equations, Thermal properties: Thermal expansion coefficients of composites, thermal conductivity of composites, Hygral and Thermal stress

MACROMECHANICS OF COMPOSITES:

Introduction, elastic constants of an isotropic material, elastic constants of a Lamina, Relationships between engineering constants and reduced stiffness and compliances, Fracture modes in composites: single and multiple fracture, debonding, fiber pullout, delamination, fracture, fatigue and creep properties of composites, Design with composites: Advantages of composites in structural design, Fundamental characteristics of composites.

TEXT BOOKS:
1. Composite Materials Science and Engineering by Krishan K. Chawla; Publisher: Springer
2. Engineering Mechanics of Composite Materials by Isaac and M. Daniel; Publisher: Oxford University Press, 1994

REFERENCES:
1. Mechanics of Composites Material by R. M. Jones, Publisher: McGraw Hill
2. Mechanics of Composite materials and Structures by Madhuji Mukhopadyaya Publisher: University Press
3. Analysis and performance of Fiber Composites by B. D. Agarwal, L. J. Broutman, and K. Chandrasekhara; Publisher: John Wiley.

VNR Vignana Jyothi Institute of Engineering and Technology

IV Year B.Tech ME/AE I Sem   **L**   **T/P/D**   **C**
Elective II   **3**   **1**   **3**

(MED1135) SURFACE MODIFICATION TECHNIQUES

UNIT I
INTRODUCTION TO SURFACE ENGINEERING:
Differences between surface and bulk, Properties of surfaces-wear, corrosion, optical, roughness, electrical and thermal properties, wetability. Surface protection (physical), surface modification (chemical) techniques: classification, principles, methods, and technology.

UNIT II
CONCEPTS OF COATING:
Coatings- Concepts of coatings , Electroplating and electroless plating -Metallic and non metallic coatings- chemical vapour deposition, physical vapour deposition, Galvanizing – Thermal Spray, types of thermal spray and their advantages and disadvantages - conventional verses nanocoatings.

UNIT III
PLASMA COATING TECHNOLOGY:
Process parameters, thermal and kinetic history of inflight particle, micro structural features of plasma sprayed coatings, single splat studies, process-structure property relationship challenges in preparation, plasma spraying of nanopowders - its microstructure – properties–Liquid precurser plasma spray- applications.

UNIT IV
CHARACTERIZATION OF COATINGS:
Coatings –thickness-porosity-hardness, fracture toughness-elastic modulus –adhesion bending strength-fracture strength- tensile strength- wear and corrosion measurement phase analysis

UNIT V
HARD AND SOFT COATINGS:
Laser cladding- laser alloying, Electron beam hardening-ion beam implantation- sol –gel coatings –electrophoretic deposition –DLC and diamond coatings, antifriction and antiscratch coatings.

SPUTTERING TECHNIQUES:
Methods, applications, plasma treatments, nitriding–carbonising – boriding, titanizing methods, applications.

TEXT BOOKS:

1. Surface Engineering of Metals, Principles, equipments and Technologies-Tadeusz Burakowski, Padeusg and Weirzxhon, CRC press, 1998
2. Surface coatings for protection against wear edited by BG Miller, Woodhead publishing - 2006

REFERENCES:

1. Surface coatings ASM handbook
2. Characterization Techniques ASM Handbook
3. P. Fauchais, A. Vardelle, and B. Dussoubs, "Quo Vadis Thermal Spraying? "Journal of Thermal Spray Technology, Volume 10(1) March2001
4. H. Herman and S. Sampath "Thermal Spray Coatings" Published in 1996 by Chapman and Hall, London. Edited by Kurt H Sien.

VNR Vignana Jyothi Institute of Engineering & Technology

	T	T/P/D	C
IV Year B.Tech AE I Sem			
Elective II	3	1	3

(AED1109)GAS DYNAMICS

UNIT I:

Introduction: Compressibility, Temperature Rise, Mach Angle, Thermodynamics of Fluid Flow, Thermal and Caloric Properties, The Perfect Gas, Wave Propagation: Velocity of Sound, Subsonic and Supersonic Flows.

UNIT II:

Steady One-Dimensional Flow: Introduction, The Fundamental Equations, Discharge from a Reservoir, Stream tube Area-Velocity Relation, De Laval Nozzle, Supersonic Flow Generation, Diffusers, Dynamic Head Measurement in Compressible Flow, Pressure Coefficient.

UNIT III:

Normal Shock Waves: Introduction, Equations of Motion for a Normal Shock Wave, The Normal Shock Relations for a Perfect Gas, Change of Stagnation or Total Pressure across, Hugoniot Equation, The Propagating Shock Wave, Reflected Shock Wave, Centered Expansion Wave, Shock Tube.

UNIT IV:

Oblique Shock and Expansion Waves: Introduction, Oblique Shock Relations, Relation between β and θ, Shock Polar, Supersonic Flow over a Wedge, Weak Oblique Shocks, Supersonic Compression, Supersonic Expansion by Turning, The Prandtl—Meyer Expansion, Simple and Non simple Regions, Reflection and Intersection of Shocks, and Expansion Waves, Detached Shocks, Mach Reflection, Shock-Expansion Theory, Thin Aerofoil Theory,

UNIT V:

Potential Equation for Compressible Flow: Introduction, Crocco's Theorem, The General Potential Equation for Three-Dimensional Flow, Linearization of the Potential Equation, Potential Equation for Bodies of Revolution, Boundary Conditions, Pressure Coefficent.

TEXT BOOKS

    1.   Gas Dynamics By E. Rathakrishnan PHI Learning Pvt. Ltd.

REFERENCES

    1.   Gas Dynamics   James E. A. John, Theo G. Keith

    2.   Elements of Gas Dynamics By Hans Wolfgang Liepmann, Anatol Roshk Dover Publications.

VNR Vignana Jyothi Institute of Engineering and Technology

IV Year B.Tech AE I Sem	**L**	**T/P/D**	**C**
Elective III	**3**	**1**	**3**

(MED1139) UNCONVENTIONAL MACHINING PROCESSES

UNIT- I
INTRODUCTION:
Unconventional Machining Process, Need, Classification, Brief overview of all techniques, Study of material removal phenomena.

UNIT-II
MECHANICAL ENERGY BASED PROCESSES:
Abrasive Jet Machining – Water Jet Machining – Abrasive Water Jet Machining- Ultrasonic Machining (AJM, WJM, AWJM, USM). Working Principles – equipment used – Process parameters – MRR – Applications.

UNIT-III
ELECTRICAL ENERGY BASED PROCESSES:
Electric Discharge Machining (EDM) - working Principles-equipments-Process Parameters-MRR- electrodes Used – Power Circuits – Dielectric – Flushing – Applications, Wire Cut EDM- Applications

UNIT-IV
CHEMICAL AND ELECTRO-CHEMICAL ENERGY BASED PROCESSES:
Chemical Machining and Electro-Chemical machining (CHM and ECM)-Etchants-maskants -techniques of applying maskants-Process Parameters – MRR-Applications-Principles of ECM-equipments-MRR-Processes Parameters.

UNIT-V
THERMAL ENERGY BASED PROCESSES:
Laser Beam Machining (LBM), Plasma Arc Machining (PAM) and Electron Beam Machining (EBM), Principles-Equipment-Process Parameters - Applications.

TEXT BOOKS:
1. Advanced Machining Processes by Vijay K. Jain; Publisher: Allied Publishers

REFERENCES:
1. Nontraditional Manufacturing Processes by Benedict. G. F; Publisher: Marcel Dekker
2. Advanced Methods of Machining by McGeough; Publisher: Chapman and Hall, London
3. Unconventional Machining Processes by P. K. Mishra; Publisher: Narosa

IV Year B.Tech AE I Sem	T	T/P/D	C
Elective III	3	1	3

(AED1110) VEHICLE BODY ENGINEERING AND SAFETY

UNIT I

STRUCTURAL MATERIALS: Aluminium alloy sheet, extrusion and casting, Austenitic and Ferritic stainless steels. alloy steels. Different types of composites, FRP and Metal Matrix Composites. Structural timbers, properties designing in GRP and high strength composites different manufacturing techniques of composites. Thermo plastics, ABS and styrenes. Load bearing plastics, semi-rigid PUR foams and sandwich panel construction

UNIT II

SHAPING AND PACKAGING: Product design and concepts, Aesthetics and industrial design, formal aesthetics and shape. Computer aided drafting, surface development, interior ergonomics. Ergonomics system design, dashboard instruments, advances in electronic display, CV legal dimension. CV- cab ergonomics, mechanical package layout.

UNIT III

AERODYNAMICS: Basics, aerofoils, aerodynamics drag lift, pitching, yawing and rolling moments, determination of aerodynamic coefficients (wind tunnel testing). racing car aerodynamics. bluff body aerodynamics, local air flows.

LOAD DISTRIBUTION: Types of load carrying structures,closed, integral, open, flat types. Calculation of loading cases- static, asymmetric, vertical loads. Load distribution, stress analysis of structure, body shell analysis.

UNIT IV

NOISE, VIBRATION, HARSHNESS: Noise and vibration basics. body structural vibrations, chassis bearing vibration, designing against fatigue, rubber as an isolator. CV body mountings. automatic enclosures, sandwich panels, structure dynamics applied, surety under impact: Impact protection basics. design for crash worthiness, occupant and cargo restraints. Passive restraint systems, slide impact analysis, bumper system, energy absorbant foams, laws of mechanisms applied to safety.

VEHICLE STABILITY: Steering geometry vehicle and a curvilinear path, and lateral stability. etfects of tyre factors. mass distribution and engine location on stability.

UNIT V

BODY FITTING AND I CONTROLS: Driver's seat, window winding mechanism, Door lock mechanism, other interior mechanisms, driver's visibility' and tests for, visibility, minimum space, requirements and methods or improving space in cars. electric wiring and electronic control systems, advanced body electronics, networking or body systems controls.

VANS, TRUCKS AND BUSES: Types of mini coach with trailers, single and double deckers. design criteria based on passenger capacity; goods to be transported and distance to be Covered, constructional details: weights and dimensions; conventional and integral type.

TEXT BOOKS

      1. Body Engineering,by Sydney F Page

      2. Vehicle body engineerin by Gilcs J Pawlowski,

REFERENCES

      1. Automotive chassis,P.M. Heldt. chilton and Co

      2. Handbook on vehicle body design,SAE Publications.

VNR Vignana Jyothi Institute of Engineering and Technology

IV Year B.Tech ME/AE I Sem	L	T/P/D	C
Elective III	3	1	3

(MED1121) FINITE ELEMENT METHOD

UNIT I
FUNDAMENTAL CONCEPTS
Introduction; Historical background; Stresses and equilibrium; Boundary conditions; Strain-displacement relations; Stress-strain relations; Temperature effects.
ONE-DIMENSIONAL PROBLEMS
Introduction; Finite element modeling; Co-ordinates and shape functions; The potential energy approach; Rayleigh-Ritz method; Galerkin's method, The Galerkin approach; Assembly of the global stiffness matrix (**K**) and load vector; Properties of **K**; The finite element equations; Treatment of boundary conditions; Quadratic shape functions; Temperature effects.

UNIT II
TRUSSES
Introduction; Plane trusses; Three-dimensional trusses; Assembly of global stiffness matrix for the banded and skyline solutions.
TWO-DIMENSIONAL PROBLEMS USING CONSTANT STRAIN TRIANGLES
Introduction; Finite element modeling; Constant strain triangle (CST); Problem modeling and boundary conditions.

UNIT III
TWO-DIMENSIONAL ISOPARAMETRIC ELEMENTS AND NUMERICAL INTEGRATION
Introduction; The four-node quadrilateral; Numerical integration; Higher-order-elements.
DYNAMIC ANALYSIS USING FINITE ELEMENT METHOD
Introduction; Vibration problems; Equations of motion based on weak form; Longitudinal vibrations of bars; consistent mass matrices; element equations; solution of Eigen value problems.

UNIT IV
AXISYMMETRIC SOLIDS SUBJECTED TO AXISYMMETRIC LOADING
Introduction; Axisymmetric formulation; Finite element modeling - triangular element; Problem modeling and boundary conditions.
STEADY STATE HEAT TRANSFER ANALYSIS:
One dimensional analysis of Slab, fin and two dimensional analysis of thin plate.

UNIT V
BEAMS
Introduction; Finite element formulation; Hermite shape function, Load vector; Boundary considerations; Shear force and bending moment; Beams on elastic supports;

TEXT BOOKS:
1. Introduction to Finite Elements in Engineering, 2E, by Tirupathi R. Chandrupatla, Ashok D. Belegundu; Publisher: Prentice Hall of India.

REFERENCES:
1. Finite Element Method by Zienkiewicz.
2. An Introduction to Finite Element Methods by J. N. Reddy.
3.   Finite Element Method by S. S. Rao.

VNR Vignana Jyothi Institute of Engineering and Technology

IV Year B.Tech ME/AE I Sem	L	T/P/D	C
Elective III	3	1	3

(MED1171) INTRODUCTION TO AIRCRAFT INDUSTRY AND AIRCRAFT SYSTEMS

UNIT- I

AIRCRAFT INDUSTRY OVERVIEW

Evolution and History of Flight, Types Of Aerospace Industry, Key Players in Aerospace Industry, Aerospace Manufacturing, Industry Supply Chain, Prime contractors, Tier 1 Suppliers, Key challenges in Industry Supply Chain, OEM Supply Chain Strategies, Mergers and Acquisitions, Aerospace Industry Trends, Advances in Engineering/CAD/CAM/CAE Tools and Materials technology, Global and Indian Aircraft Scenario.

UNIT- II

INTRODUCTION TO AIRCRAFTS

Basic components of an Aircraft, Structural members, Aircraft Axis System, Aircraft Motions, Control surfaces and High lift Devices. Types of Aircrafts - Lighter than Air/Heavier than Air Aircrafts Conventional Design Configurations based on Power Plant Location, Wing vertical location, intake location, Tail Unit Arrangements, Landing Gear Arrangements. Unconventional Configurations-Biplane, Variable Sweep, Canard Layout, Twin Boom Layouts, Span loaders, Blended Body Wing Layout, STOL and STOVL Aircraft, Stealth Aircraft, Advantages and disadvantages of these Configurations.

UNIT- III

INTRODUCTION TO AIRCRAFT SYSTEM

Types of Aircraft systems, Mechanical systems. Electrical and Electronic Systems. Auxiliary systems. Mechanical Systems: Environmental control systems (ECS), Pneumatic systems, Hydraulic systems, Fuel systems, Landing gear systems, Engine Control Systems, Ice and rain protection systems, Cabin Pressurization and Air Conditioning Systems, Steering and Brakes Systems Auxiliary Power Unit, Electrical systems: Avionics, Flight controls, Autopilot and Flight Management Systems, Navigation Systems, Communication, Information systems, Radar System.

UNIT – IV

BASIC PRINCIPLES OF FLIGHT

Significance of speed of Sound, Air speed and Ground Speed, Properties of Atmosphere, Bernoulli's Equation, Forces on the airplane, Airflow over wing section, Pressure Distribution over a wing section, Generation of Lift, Drag, Pitching moments, Types of

Drag, Lift curve, Drag Curve, Lift/Drag Ratio Curve, Factors affecting Lift and Drag, Center of Pressure and its effects. Aerofoil

Nomenclature, Types of Aerofoil, Wing Section- Aerodynamic Center, Aspect Ratio, Effects of lift, Drag, speed, Air density on drag.

UNIT - V

BASICS OF FLIGHT MECHANICS

Mach Waves, Mach Angles, Sonic and Supersonic Flight and its effects

STABILITY AND CONTROL

Degree of Stability- Lateral, Longitudinal and Directional Stability and controls of Aircraft. Effects of Flaps and Slats on Lift Coefficients, Control Tabs, Stalling, Landing, Gliding Turning, Speed of Sound, Mach Numbers, Shock Waves.

AIRCRAFT PERFORMANCE AND MANEUVERS

Power Curves, Maximum and minimum speeds of horizontal flight, Effects of Changes of Engine Power, Effects of Altitude on Power Curves, Forces acting on a Aeroplane during a Turn, Loads during a Turn, Correct and incorrect Angles of Bank, Aerobatics, Inverted Maneuvers, Maneuverability.

REFERENCES:

1. Flight without Formulae by A.C Kermode, Pearson Education,10th Edition
2. Mechanics of Flight by A.C. Kermode, Pearson Education,5th Edition
3. Fundamentals of Flight by Shevell, Pearson Education, 2nd Edition
4. Introduction to Flight by Dave Anderson
5. Aircraft Systems: Mechanical, Electrical & Avionics Subsystems Integration by Ian Moir, Allan Seabridge
6. Aircraft Design-A Conceptual Approach by Daniel P. Raymer, AIAA education series,6th Edition
7. Airframe Structural Design by Michael Niu, Conmilit Press, 1988, 2nd Edition
8. Airframe Stress Analysis and Sizing by Michael Niu, Conmilit Press, 1999, 3rd Edition
9. The Elements of Aircraft Preliminary Design by Roger D. Schaufele, Publisher: Aries
10. Aircraft Structural Maintenance by Dale Hurst, Publisher: Avotek
11. Aircraft Maintenance and Repair by Frank Delp, Michael J. Kroes & William A. Watkins, Glencoe, Publisher: McGraw-Hill
12. An Introduction to Aircraft Certification; A Guide to Understanding Jaa, Easa and FAA by Filippo De Florio; Publisher: Butterworth-Heinemann

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

IV Year B.Tech ME/AE I Sem	L	T/P/D	C
Elective III	**3**	**1**	**3**

(MED1142) FLUID POWER SYSTEMS

UNIT-I
HYDRAULIC POWER SYSTEMS:

Introduction, Classification of Power Systems - Mechanical Power Systems, Electrical Power Systems, Pneumatic Power Systems, Hydrodynamic Power Systems, Hydrostatic Power Systems, Basic Hydraulic Power Systems, The Advantages and Disadvantages of Hydraulic Systems, Comparing Power Systems.

Basic Properties of Hydraulic Oils, Classification of Hydraulic Fluids, Typically Used Hydraulic Fluids, Mineral Oils, Fire-Resistant Fluids, Additives, Requirements Imposed on the Hydraulic Liquid

UNIT-II
HYDRAULIC PUMPS:

Introduction, Classification of Pumps – Bent Axis Axial Piston Pumps, Swash Plate Pumps with Axial Pistons, Swash Plate Pumps with Inclined Pistons, Axial Piston Pumps with Rotating Swash Plate-Wobble Plate, Radial Piston Pumps with Eccentric Cam Ring, Radial Piston Pumps with Eccentric Shafts, Radial Piston Pumps of Crank Type, External Gear Pumps, Internal Gear Pumps, Gerotor Pumps, Screw Pumps, Vane Pumps, Variable Displacement Pumps, Rotodynamic Pumps

UNIT-III
HYDRAULIC CONTROL VALVES:

Introduction, Pressure-Control Valves, Direct-Operated Relief Valves, Pilot-Operated Relief Valves, Pressure-Reducing Valves, Sequence Valves, Accumulator Charging Valve, Directional Control Valves – types, Check Valves – types, Flow Control Valves – types

ACCESSORIES:

Hydraulic Accumulators - Classification, Construction, Operation and Applications of Hydraulic Accumulators, Hydraulic Filters, Hydraulic Pressure Switches – types.

UNIT-IV
HYDRAULIC ACTUATORS:

Hydraulic Cylinders – Construction, Classification, Hydraulic Rotary Actuators – types, Hydraulic Motors – types, Hydraulic Circuits.

HYDRAULIC SERVO ACTUATORS:

Construction, Operation and Applications of Hydraulic Servo Actuators, Valve-Controlled Actuators.

UNIT-V
PNEUMATIC SYSTEMS:
Introduction, Peculiarities of Pneumatic Systems, Advantages and Disadvantages of Pneumatic Systems, Basic Elements of Pneumatic Systems, Basic Pneumatic Circuits, Air Compressors, Pneumatic Reservoirs, Air Filters, Air Lubricators, Pneumatic Control Valves, Manual Control of a Single- Acting Cylinder, Unidirectional Speed Control of a Single-Acting Cylinder, Bidirectional Speed Control of a Single-Acting Cylinder, Bidirectional Speed Control of a Double-Acting Cylinder, Unidirectional and Quick Return Control of a Double-Acting Cylinder.

TEXT BOOKS:
1.   Fluid Power Engineering - M. Galal Rabie - McGraw-Hill publications

REFERENCES:
1.   Design of Hydraulic Control Systems - Ernest e. Lewis, Hansjoerg stern - McGraw-hill Publications,
2.   Fluid Power Control - John f. Blackburn, Gerhard Reethof, J. Lowen shearer - John Wiley and sons inc.

VNR Vignana Jyothi Institute of Engineering and Technology

IV Year B.Tech ME/AE I Sem	L	T/P/D	C
Elective III	3	1	3

(MED1144) RENEWABLE ENERGY SOURCES

UNIT-I
PRINCIPLES OF RENEWABLE ENERGY:
Introduction; Energy and sustainable development; Fundamentals; Scientific principles of renewable energy; Technical Implications; Social implications.
Introduction to Wind energy, Geothermal energy and Tidal energy.

UNIT-II
SOLAR RADIATION:
Introduction; Extraterrestrial solar radiation; Components of radiation; Geometry of Earth and Sun; Geometry of collector and solar beam; Effects of Earths atmosphere; Measurements of solar radiation; Estimation of solar radiation.

SOLAR WATER HEATING:
Introduction; Calculation of heat balance-general remarks; Uncovered solar water heaters-progressive analysis; Improved solar water heaters; Systems with separate storage; Selective surfaces; Evacuated collectors; Social and environmental aspects.

UNIT-III
BUILDINGS AND OTHER SOLAR APPLICATIONS:
Introduction; Air heaters; Energy-efficient buildings; Crop driers; Space cooling; water desalination; Solar ponds; Solar concentrators; Solar thermal electric power systems ;Social and environmental aspects.

UNIT-IV
PHOTVOLTAIC GENERATION:
Introduction; The silicon P-N junction; Photon absorption at the junction; Solar radiation absorption Maximising cell efficiency; Solar cell construction; Types and adaptation of photovoltaics; Photovoltaic circuit properties; Applications and systems; Social and environmental aspects.

UNIT-V
BIOMASS AND BIOFUEL:
Introduction; Biofuel classification; Biomass production for energy farming; Direct combustion for heat; Pyrolysis (destructive distillation); Further thermochemical processes; Alcoholic fermentation; Anaerobic digestion for biogas; wastes and residues; Vegetable oils and biodiesel; social and environmental aspects

TEXT BOOKS:
1. Non Conventional Energy Sources by G. D. Rai;
2. Renewable Energy Resources by Tiwari & Ghosal; Publisher: Narosa
3. Solar Energy by Sukhatme

REFERENCES:
1. Principles of Solar Energy by Frank Krieth & J. F. Kreider
2. Solar Power Engineering by B. S. Magal, Frank Krieth & J. F. Kreider
3. Renewable Energy sources by John Twidell & Tony Weir; Publisher: Taylor and Francis

VNR Vignana Jyothi Institute of Engineering and Technology

IV Year B.Tech ME/AE I Sem	L	T/P/D	C
	0	3	2

(MED1209) CAD/CAM LAB

12 exercises from the following syllabus:

1. CAD:

i)	2D Drawing using Sketcher workbench	–	2 drawings
ii)	3D Modeling and drafting using 3D features	–	2 models
iii)	Assembly and drafting	–	2 assemblies
iv)	Surface Modeling	–	1 exercise
v)	Sheet Metal Working	–	1 exercise

Softwares: **AutoCAD, IronCAD, CATIA, CREO**

2. CAM:

i) Part programming for Turning, Facing, Chamfering, Grooving, Step turning, Taper turning operations.

ii) Part programming for Point to point motions, Linear motions, Circular interpolation, Contour motion, Pocket milling - Circular, Rectangular and Mirror commands.

iii) Part Programming using Fixed or Canned Cycles for Drilling, Peck drilling, Boring, Tapping, Turning, Facing, Taper turning, Thread cutting.

iv) Generation of tool path, NC part program and its simulation.

v) Machining of small components using CNC Lathe, CNC Mill and CNC Turning center.

Softwares: **CNC Offline Simulation, EdgeCAM**

3. CAE:

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

b) Determination Principal/ Von-mises stresses and deflections, in plane stress/ plane strain/ axisymmetric models.

c) Determination of stresses in 3D and shell structures.

Softwares: **Ansys**

VNR Vignana Jyothi Institute of Engineering & Technology

IV Year B.Tech AE – I Sem

(AED1203) AUTOMOBILE ENGINEERING LAB & INSTRUMENTATION LAB

1. Dismantling, Inspection for wear and tear, crack, material breakdown of different engines components. Servicing of engines by paraffin and degreasing methods, decarburizing procedure.
2. Dismantling, Inspection and Assembly of different parts of 2 wheelers, 3 wheelers, & Heavy duty engines covering 2-stroke and 4 stroke, SI and CI engines.
3. Measurement of dimensions of different components of the above engines and compare the same with standard specifications.
4. Assembling the engines with using special tools, necessary adjustments of the engine components. Valve spring testing, connecting rod alignment, piston ring testing procedure for dismantling and assembling.
5. Dismantling and assembly of LMV components as following:
   a. Gear box b) clutch assembly c) Propeller shaft d) differential gear box e) rear axle f) suspension system g) steering mechanism.
6. Dismantling and assembly of door frames, door locks and window locks
7. Study of driver's seat layout in anyone LMV and anyone HMV.
8. Testing, servicing and charging of batteries
9. Servicing of generator, alternator and starter motor with dismantling, testing, inspection and assembly.
10. Servicing of ignition systems
11. Drawing of general electrical wiring diagrams of various vehicles two and four wheelers.
12. Measurement of base circle diameter and tooth thickness of spur and helical gears Use of slip gauges, measurement of screw threads using screw thread micrometer, use of comparators, experiments involving profile projectors.
    Note: Driving practice of a geared two wheeler and anyone LMV for a minimum of 10 hours during 5th &6th semester must be provided.
    Instrumentation Lab: Six experiments
1. Calibration of pressure gauge using dead pressure gauge wait test
2. Study and calibration of LVDT transducer for displacement measurement.
3. Calibration of thermistor for temperature measurement.
4. Calibration of thermocouple for temperature measurement.
5. Calibration of capacitive transducer for angular displacement.
6. Study and calibration of photo and magnetic speed pickups for the measurement of speed.

7   Calibration of resistance temperature detector for temperature measurement.
8.   Study and calibration of a rotameter for flow measurement.
9.   Study and use of a seismic pickup for the measurement of vibration amplitude of an Engine bed at various loads.
10. Calibration of stain gauges for force measurement

VNR Vignana Jyothi Institute of Engineering and Technology

IV Year B.Tech ME/AE II Sem   **L**   **T/P/D**   **C**
                                          3   **1**   **3**

(MED 1138) INDUSTRIAL ENGINEERING AND MANAGEMENT

UNIT I
INTRODUCTION TO INDUSTRIAL ENGINEERING AND MANAGEMENT:
Concept of Industrial Engineering (I.E),History and Development of I.E, Role of I.E, Applications of I.E, Production Management vs I.E, Principles of Management, Functions of Management, Taylor's Scientific Management, Maslow's Theory of Human Needs, Leadership Styles, Principles of Organization, Types of Organization Structures their Merits and Demerits, Entrepreneurship.

UNIT II
PRODUCTION AND OPERATIONS MANAGEMENT:
Plant Location, Principles of Plant Layout, Different Types of Plant Layouts, different Types of Production Systems, Travel Chart Technique, Simple Problems on Assembly Line Balancing.
Production Planning and Control: Production Cycle, Product Design and Development, Production Planning and Control Techniques, Simple problems.

PLANT MAINTENANCE:
Objectives and Types, Equipment Selection, Maintenance Planning.
Materials Handling- Principles, Concept of Unit Load, Containerization, Selection of Material Handling Equipment, Applications of Belt Conveyors, Cranes, Forklift Trucks in Industry.

UNIT III
WORK STUDY:
Concept of Productivity, Method Study - Basic steps in Method Study, Process Charts, Diagrams, Models and Templates, Principles of Motion Economy, Micro Motion Study, Therbligs, SIMO Chart. Work Measurement - Stop Watch Procedure of Time Study, Performance Rating, Allowances, Work Sampling, Simple Problems.

MATERIALS MANAGEMENT:
Introduction, Purchasing, Objectives of Purchasing Department, Buying Techniques, Purchase Procedure, Stores and Material Control, Inventory Control, EOQ Model(Simple Problems), Supply Chain Management.
Quality Control - Statistical Quality Control, Control Charts for Variables and Attribute, Simple Problems, Acceptance Sampling, Deming's Contribution to Quality. Total

Quality Management, Taguchi's Quality Engineering, Value Analysis and Value Engineering

UNIT IV

MARKETING:

Functions of Marketing, Marketing Mix, Product Life Cycle. Channels of Distribution and Sales Management.

Manufacturing planning: MRP, MRP-II, JIT, CIM

Materials Handling- Principles, Concept of Unit Load, Containerization, Pelletization, Selection of Material Handling Equipment, Applications of Belt Conveyors, Cranes, Forklift Trucks in Industry.

UNIT V

HUMAN RESOURCES MANAGEMENT (HRM):

Concepts of HRM, Basic Functions of HR Manager: Manpower Planning, Recruitment, Selection, Training and Development, Placement, Wage and Salary Administration, Promotion, Transfer, Separation, Performance Appraisal.

INDUSTRIAL RELATIONS:

Trade Unions, Industrial Disputes, Strikes, Lock-Out, Picketing, Gherao, Settlement of Industrial Disputes, Collective Bargaining, Industrial Dispute Act 1947 and Factories Act 1948.

TEXT BOOKS:

1. Aryasri: Management Science, TMH, New Delhi, 2009
2. Industrial Engineering Management, by Dr. O. P .Khanna.

REFERENCES:

1. Principles of Management by Koontz and ODonnel.
2. Production and Operations Management by Everette Adamand Ronald Ebert.
3. Operations Management by John McClain and Joseph Thames.
4. Industrial Engineering and Production Management by Tulsa, S. Chand and Co.

VNR Vignana Jyothi Institute of Engineering and Technology

IV Year B.Tech ME/ AE II Sem	**L**	**T/P/D**	**C**
Elective IV	**4**	**0**	**4**

(MED1145) NANOTECHNOLOGY

UNIT-I:

Introduction to Nano: Importance, Definition and scope, Nano size, challenges, applications. Electrons**,** Atoms and Ions, Molecules**,** Metals**,** Other Materials**.**

History of nano-science & technology :nano magnetism as a case study; Fundamental terms (Physics & Chemistry) in nano-science and technology; Feynman's perspective; Scaling laws pertaining to mechanics, optics, electromagnetism; Importance of Quantum mechanics, statistical mechanics and chemical kinetics in nano-science and technology;

UNIT-II:

Classification of nano materials: scientific basis for top-down and bottom-up approaches to synthesize Nanomaterials; How to characterize Nanomaterials? Electrons in Nanomaterials

Tools of the Nanoscience: Tools for Measuring Nanostructures, Tools to Make Nanostructures. Nano scale Biostructures, Energy Capture, Transformation, and Storage Optics, Magnets, Fabrication, Electronics, Electronics Again Modelling

UNIT-III:

Nano-Biotechnology: Bio-molecules; Biosensors; Nanomaterials in drug delivery; Working in clean room environments; Safety and related aspects of Nanomaterials

UNIT - IV:

Carbon Nanotubes & Structures: Carbon Nano structures and types of Carbon Nano tubes, growth mechanisms of carbon nanotubes. Carbon clusters and Fullerenes, Synthesis of CNTs by Flame, CVD, Laser & Arc-discharge process.

UNIT - V:

Lithium & Hydrogen adsorption & storages, Fuel cell applications and energy storage, Chemical Sensors applications of CNTs

TEXT BOOKS & REFERENCES:

1. Nanotechnology Fundamentals and Applications- by Manasi Karkare I.K International
2. Nanoscience and Nanotechnology in engineering – by Vijay K Varadan A Sivathanupillai Word scientific
3. Nanotechnology applications to telecommunications and networking By Daniel Minoli, Wiley Interscience
4. Nanotechnology Principles and Applications by Sulabha Kulkarni

VNR Vignana Jyothi Institute of Engineering & Technology

IV Year B.Tech AE II Sem	**T**	**T/P/D**	**C**
Elective IV	**4**	**0**	**4**

(AED1111) ALTERNATE FUELS FOR AUTOMOBILES

Unit-I

Compressed Natural Gas(CNG) : Introduction-History of CNG-Production of CNG-properties of CNG-CNG storage-Piping for CNG-Advantages and Disadvantages of CNG-CNG dispensing systems-CNG transportation-Material compatibility for CNG-CNG fuel kits-Engine modifications for CNG operations-CNG combustion-Stoichiometric vs. Lean burn CNG engines- Engine optimization- Vehicle emission from CNG- After treatment of CNG exhaust – CNG fuelling station safety systems-CNG standards and regulations - Third - party inspection for alternative fuels vehicles. CNG vehicles world wide –in India.

Unit-II

Liquefied Natural Gas (LNG): Introduction-history LNG-production of LNG – properties-economics of LNG- Advantages and Disadvantages-transportation and storage of LNG-Piping for LNG-LNG dispensers-LNG to CNG conversion system-regulations for LNG-LNG vehicle world wide- Vehicle performance characteristics for LNG- Vehicle emissions from LNG-LNG India.

Liquefied Petroleum Natural Gas (LPG): Introduction-History of LPG- Production of LPG- properties, Storage of LPG-dispensing of LPG-LPG nozzles and receptacles-material compatibility for LPG- Piping, safety systems and transportation of LPG-Advantages and disadvantages of LPG-LPG engine developments-LPG fuel kits and combustion, Emission from LPG-LPG Standards-LPG Vehicle world wide-LPG Scenario in India

Unit-III

Liquefied Hydrogen: Properties of Hydrogen- Production of hydrogen-photochemical production of Hydrogen – Algal production of Hydrogen(Bio Hydrogen)-On- board storage of Hydrogen-metal hydrates-compressed hydrogen gas- activates carbon storage-Hazards with LH_2- Advantages and Disadvantages of LH_2- Transportation of LH_2-Piping for LH_2- Dispensers for LH_2. vehicle emissions from LH_2- BMW liquid hydrogen cars - liquid hydrogen in India.

Bio-Fuels: Bio gas – Methanol- Ethanol- Butanol- straight vegetable oil – bio diesels- properties – production- storage methods – power densities- advantages and disadvantages over conventional fuels- specific deign criteria use in automobiles.

Unit-IV

Electric vehicles: Introduction- batteries electric vehicle-components of EV- EV batteries- EV chargers- EV drives- EV tractive force -EV transmission-EV motor design- EV Power devices and controllers-Advantages and Disadvantages-

Performance characteristics- testing –EV challengers- EV scenario in India-Hybrid electric vehicles- International status of Hybrid EVs-HEV batteries- HEV ultra capacitors- HEV motors- HEV transmissions- drive train components, HEV performance specifications.

Unit V

Fuel cell Power vehicles: Fuel cell vehicle-Benefits of fuel cells for automotive industry- Basics, efficiency and types of fuel cells-Fuel cell options for fuel cell vehicle-fuel regulations- Fuel cell hybrid vehicle- Fuel cell solar vehicle, Solar photovoltaic cell, Solar car electrical system and drive train, solar array-solar car body and chassis-Hybrid gas turbine EV – Nuclear car-road map for alternative power trains.

TEXT BOOKS:
1. Alternative fuels/ SS Thipse/ JAICO Publishers/ 2010
2. Alternative fuel technology/ Erjavec, Arias/ Yesdee Publications/ 2009

REFERENCES:
1. A text book of alternative fuel of Automobile Engine, Ramireddy and Yousuf, Front line Publishers
2. The Complete Idiot's Guide to Hybrid and Alternative Fuel Vehicles by Jack R. Nerad.
3. Hybrid and Alternative Fuel Vehicles **(**New Edition)by James D. Halderman
4. Powering Your Vehicle With Straight Vegetable Oil by Forest Gregg

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

		L	T/P/D	C
IV B.Tech ME/AE II Sem				
Elective IV		**4**		**0** **4**

(MED1146) MAINTENANCE AND SAFETY ENGINEERING

UNIT I

Introduction – Need for Maintenance – Facts and Figures Modern Maintenance – Problem and Maintenance Strategy for the 21st Century – Engineering Maintenance, Objectives – Maintenance in Equipment Life Cycle – Terms and Definitions.

Maintenance Management And Control - Maintenance Manual Maintenance Facility Evolution – Functions Of Effective Maintenance Management – Maintenance Project Control Methods – Maintenance Management Control Indices.

UNIT II

Types of Maintenance - Preventive Maintenance - Elements Of Preventive Maintenance Programme Evolution And Improvement – PM measures – PM models – Corrective Maintenance – Types – Steps – Down Time Components – Measures and Models.

Inventory Control In Maintenance–Objectives, Basics Of Inventory Control – Inventory Decision – ABC Inventory Control Method – Inventory Control Models – Two Bin Inventory Control – Safety Stock – Spare Parts Management – Determination – Factors – Spares Calculation   - Methods

UNIT III

Quality and Safety in Maintenance - Need for Quality Maintenance – Processes – Maintenance of Work Quality – Use of Control Charts in Maintenance – Work Sampling – Post Maintenance Testing – Reasons for Safety Problems in Maintenance – Guide Lines to Improve Safety in Maintenance Work – Safety Officers Role in Maintenance Work – Protection Of Maintenance Workers.

UNIT IV

Maintenance Costing – Reasons for Maintenance Costing – Maintenance Budget Preparation – Methods and Steps – Maintenance Labor Cost Estimation – Material Cost Estimation – Equipment Life Cycle Maintenance Cost Estimation – Maintenance Cost Estimation Models

UNIT V

Reliability Reliability Centered Maintenance (RCM) – Goals and Principals – RCM Process and Associated Questions – RCM Benefits and Reasons for its Failure – Reliability VS Maintenance – Reliability in Support Phase – Bathtub Hazard Rate Concept – Reliability Measures and Formulas – Reliability Networks – Reliability Analysis Techniques

Maintainability Importance and Objectives – Maintainability in Systems Life Cycle – Maintainability Design Characteristics – Maintainability Functions and Measures – Common Maintainability Design Errors.

TEXT BOOKS
1.   Reliability , Maintenance and Safety Engineering by Dr. A.K.Gupta / Laxmi Publications
2.   Industrial Safety Management by L.M. Desh Mukh/ TML publications

REFERENCES
1.   Maintenance Engineering & Management by R.C. Mishra – PHI
2.   Reliability Engineering by Elsayed / Pearson
3.   Engineering Maintenance – a Modern Approach – B.S. Dhailon 2002, C.R.R. Publishers.

VNR Vignana Jyothi Institute of Engineering and Technology

IV Year B.Tech AE II Sem	**L**	**T/P/D**	**C**
Elective IV	**4**	**0**	**4**

(MED1136) TRIBOLOGY

UNIT – I
STUDY OF VARIOUS PARAMETERS:
Viscosity of fluid flow, Absolute and Kinematic Viscosity, Variation of viscosity with temperature, Viscosity Index and determination of viscosity, Viscometry.

UNIT – II
HYDROSTATIC LUBRICATION:
Hydrostatic Step bearing, application to pivoted pad thrust bearing and other applications, Hydrostatic lubrication systems, Multirecess journal bearing, Hydrostatic lifts and its application to journal bearing.

UNIT – III
HYDRODYNAMIC THEORY OF LUBRICATION:
One dimensional Journal bearing , Infinitely long and short journal bearings, Petroffs equation, Reynolds equation, pressure distribution and load carrying capacity, sommerfeld number, bearing modulus, and oil film thickness

UNIT – IV
BEARING MATERIALS:
General requirements of bearing materials, types of bearing materials

UNIT – V
FRICTION, WEAR AND LUBRICATION:
Laws of friction, Friction Theories and Mechanisms, Types, Wear and influence of operating conditions, manufacturing methods, improved wear resistance, wear testing methods, wear of metals, ceramics and polymers, Lubrication and Lubricants

TEXT BOOKS:
1. Fundamentals of Tribology by S. K. Basu, S. N. Sengupta & B. B. Ahuja; Publisher: Prentice Hall International
2. Introduction to Tribology of Bearings by B. C. Majundar; Publisher: Wheeler

REFERENCES:
1. Engineering Tribology by Prasanta Sahoo; Publisher: Prentice Hall International
2. Friction, Wear and Lubrication, Vol. I, II, III by Kargelski; Publisher: MIR Publishers, 1983
3. Tribology for Engineers: A Practical Guide by Paulo Davim; Publisher: Woodhead Publishing 2011.

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

IV Year B.Tech ME/AE II Sem	L	T/P/D	C
Elective IV	4	0	4

(MED1153) PRINCIPLES OF ENTREPRENEURSHIP

UNIT I
INTRODUCTION TO ENTREPRENEURSHIP
Definition of Entrepreneur, Entrepreneurial Traits, Entrepreneur vs. Manager, Entrepreneur vs Intrapreneur, The Entrepreneurial decision process, Role of Entrepreneurship in Economic Development, Ethics and Social responsibility of Entrepreneurs, Opportunities for Entrepreneurs in India and abroad, Woman as Entrepreneur.

UNIT II
CREATING AND STARTING THE VENTURE
Sources of new Ideas, Methods of generating ideas, creating problem solving, product planning and development process.

UNIT III
THE BUSINESS PLAN, NEW VENTURE EXPANSION STRATEGIES AND ISSUES
Nature and scope of Business plan, Writing Business Plan, Evaluating Business plans, Using and implementing business plans. Marketing plan, financial plan and the organizational plan, Launching formalities. Features and evaluation of joint ventures, acquisitions, merges, franchising. Public issues, rights issues, bonus issues and stock splits.

UNIT IV
FINANCING AND MANAGING THE NEW VENTURE
Sources of capital, Record keeping, Recruitment, Motivating and leading teams, Financial controls, Marketing and sales controls, E-commerce and Entrepreneurship, Internet advertising.

UNIT V
INSTITUTIONAL SUPPORT TO ENTREPRENEURSHIP AND LABOUR LEGISLATION
Role of Directorate of Industries, District Industries Centres (DICs), Industrial Development Corporation (IDC), State Financial Corporation (SFCs), Small Scale Industries Development Corporations (SSIDCs), Khadi and Village Industries Commission (KVIC), Technical Consultancy Organisation (TCO), Small Industries Service Institute (SISI), National Small Industries Corporation (NSIC), Small Industries Development Bank of India(SIDBI). Salient Provision under Indian Factories Act,

Industrial Disputes Act, Employees State Insurance Act, Workmen's Compensation Act and payment of Bonus Act.

TEXT BOOKS:

1. Robert Hirsch and Michael Peters: Entrepreneurship, TMH, 5th Edition.
2. Dillinger: Entrepreneurship, 4/e, Pearson, 2004.

REFERENCES:

1. Vasant Desai**:** Dynamics of Entrepreneurial Development and management, Himalaya   Publishing House, 2004.
2. Harvard Business Review on Entrepreneurship, HBR Paper Back, 1999.
3. Robert J.Calvin**:** Entrepreneurial Management, TMH, 2004.
4. Gurmeet Naroola**:** The Entrepreneurial Connection, TMH, 2001.
5. Bolton and Thompson**:** Entrepeneurs- Talent, Temperament, Technique, Butterworth Heinemann, 2001.
6. Agarwal: Indian Economy, Wishwa Prakashan 2005.
7. Duttand Sundaram: Indian Economy. S. Chand, 2005.
8. Srivastava**:** Industrial Relationsand Labour Laws, Vikas, 2005.
9. Aruna Kaulgud**:** Entrepreneurship Management by Vikas Publishing House, 2003.
10. Thomas W. Zimmererand Norman M. Scarborough**:** Essential of Entrepreneurship and Small Business Management,
    PHI, 4/e, 2005.
11. Mary Coulter**:** Entrepreneurship in Action, PHI, 2/e, 2005.
12. Kaplan**:** Patterns of Entrepreneurship, Willey, 2005.
13. ND Kapoor**:** Industrial Law, Sultan Chandand Sons, 2005.

VNR Vignana Jyothi Institute of Engineering and Technology

	L	T/P/D	C
IV Year B.Tech ME/AE II Sem			
Elective IV	**4**	**0**	**4**

(MED1154) INTERACTIVE COMPUTER GRAPHICS

UNIT I
INTRODUCTION:
Introduction, Application area of Computer graphics, Overview of graphic system, Display devices, Raster-scan systems, Random Scan Systems, Graphics Monitors and Work stations and Input devices

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 GEOMETRICAL TRANSFORMATIONS:
Translation, scaling, rotation, reflection and shear transformation matrix representations and homogeneous co-ordinates, composite transformations, transformations between coordinates

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

UNIT IV
3-D OBJECT REPRESENTATION:
Polygon surfaces, Quadric surfaces, Spline representation, Hermite curve, Bezier curve and B-spline curve, Bezier and B-spline surfaces, Basic illumination models, Shading algorithms

3-D GEOMETRIC TRANSFORMATIONS:
Translation, Rotation, Scaling, Reflection and Shear transformation, Composite transformations

UNIT V
HIDDEN LINE REMOVAL:
Visibility of object views, Visibility techniques, Sorting, Coherence, Formulation and implementation, Sample hidden line algorithms and hidden line removal for curved surfaces

HIDDEN SURFACE REMOVAL:
Z-buffer algorithm and Warnock's algorithm
HIDDEN SOLID REMOVAL:
Ray-tracing algorithm
SHADING:
Shading models, shading surfaces, Shading enhancements and Shading solids
COLORING:
Color models, User interface or shading and coloring.
TEXT BOOKS:
1. Computer Graphics C version by Donald Hearn & M. Pauline Baker; Publisher: Pearson/PHI
2. Computer Graphics Principles and Practice / 2 edition in C/ Foley, VanDam, Feiner and Hughes/Pearson Education
3. CAD/CAM - Theory and Practice / Ibrahim Zeid / TMH
REFERENCES:
1. Computer Graphics/ 2 edition / Zhig and kiang, Roy Plastic, Schaum's outlines/TMH.
2. Procedural elements for Computer Graphics / David F Rogers / Tata Mc Graw hill/2nd edition.
3. Principles of Interactive Computer Graphics/Neuman and Sproul/TMH.
4. Principles of Computer Graphics/Shalini Govil

VNR Vignana Jyothi Institute of Engineering and Technology

IV Year B.Tech ME/AE II Sem	L	T/P/D	C
Elective V	4	0	4

(MED1147) DESIGN FOR MANUFACTURING

UNIT I
INTRODUCTION:
Design philosophy, Steps in design process, General design rules for manufacturability, Basic principles of designing for economical production, Creativity in design.

MATERIALS:
Selection of materials for design, Criteria for material selection, Material selection interrelationship with process selection, Process Selection charts.

UNIT II
MACHINING PROCESS:
Overview of various machining processes, General design rules for machining, Dimensional tolerance and surface roughness, Design for machining ease, Redesigning of components for machining ease with suitable examples, General design recommendations for machined parts.

METAL CASTING:
Appraisal of various casting processes, Selection of casting process, General design considerations for casting, Casting tolerances, Use of solidification simulation in casting design, Product design rules for sand casting.

UNIT III
METAL JOINING:
Appraisal of various welding processes, Factors in design of weldments, General design guidelines - Pre and post treatment of welds, Effects of thermal stresses in weld joints, Design of brazed joints.

FORGING:
Design factors for Forging, Closed die forging design, Parting lines of die drop forging die design, General design recommendations.

EXTRUSION AND SHEET METAL WORK:
Design guidelines for extruded sections, Design principles for Punching, Blanking, Bending, Deep Drawing, Keeler Goodman Forming Line Diagram, Component design for Blanking.

UNIT-IV

ASSEMBLY ADVANTAGES:

Development of the assembly process, Choice of assembly method, Assembly advantages, Social effects of automation.

AUTOMATIC ASSEMBLY TRANSFER SYSTEMS:

Continuous transfer, Intermittent transfer, Indexing mechanisms and operator - paced free transfer machine.

UNIT-V

DESIGN OF MANUAL ASSEMBLY:

General design guidelines for manual assembly, Development of the systematic DFA methodology, Assembly efficiency, Classification system for manual handling, Classification system for manual insertion and fastening, Effect of part symmetry on handling time, Effect of part thickness and size on handling time, Effect of weight on handling time.

TEXT BOOKS:

1. Assembly Automation and Product Design by Geoffrey Boothroyd, Publisher: Marcel Dekker Inc.,
2. Engineering Design – Material and Processing Approach by George E. Dieter, Publisher: McGraw Hill Intl.

REFERENCES:

1. Hand Book of Product Design by Geoffrey Boothroyd, Publisher: Marcel and Dekker
2. Computer Aided Assembly Planning by A. Delchambre, Publisher: Springer

VNR Vignana Jyothi Institute of Engineering and Technology

IV Year B.Tech ME/AE II Sem	**L**	**T/P/D**	**C**
Elective V	**4**	**0**	**4**

(MED1148) NON-DESTRUCTIVE TESTING AND EVALUATION

UNIT I
INTRODUCTION TO NON DESTRUCTIVE TESTING
Scope and advantages of NDT, Comparison of NDT with DT, Overview of the Non Destructive Testing Methods used, terminology, Comparison of advantages and limitations of different NDT methods. Visual inspection and equipment used for visual inspection.

UNIT II
COMMON NDT METHODS
Die Penetrate Test (liquid penetrate inspection), Principle, scope. Equipment and techniques, Test stations, Advantage, types of penetrant and developers, Illustrative examples
Magnetic Particle Inspection: Scope, principle, Ferro Magnetic and Non-ferro magnetic materials, equipment and testing. Advantages, limitations Interpretation of results.

UNIT III
RADIOGRAPHIC METHODS
Radiant energy and radiography, practical applications , X-ray and Gamma – ray equipment, effect of variables on radiographs, requirement of a good radiograph, interpretation of radiograph, safety precautions, Xeroradiography – case study – X –ray of human body

UNIT IV
ULTRASONIC TESTING (UT) AND ACOUSTIC EMISSION (AE)
Introduction, Principle of operation, Piezoelectricity. Ultrasonic probes, CRO techniques, advantages, Limitation and applications. Applications in inspection of castings, welding - bars, pipes, and rails. Case study – Ultrasonography of human body.

 UNIT V
EDDY CURRENT INSPECTION
Principle, Methods, Advantages, Scope and limitations, Types of Probes, Case studies.

TEXT BOOKS:

1. Prakash Ravi, "Nondestructive Testing Techniques", New Age International Publishers, 1st edition, 2007
2. Paul E Mix, "Introduction to non-destructive testing: a training guide", Wiley, 2nd edition New Jersey, 2005
3. ASM Handbook Vol. 11, 8th Edition – Non-destructive Testing and Evaluation

REFERENCES:

1. Baldev Raj, B. Venkataraman, D. J. Varde, Nerulikar, "Practical Magnetic Particle Testing", Narosa Publishing House, 2007 96
2. Charles, J. Hellier, "Handbook of non-destructive evaluation", McGraw Hill, New York 2001.
3. ASNT, American Society for Non Destructive Testing, Columbus, Ohio, NDT Handbook.
4. Barry Hull and Vernon John: Non-Destructive Testing, Mac Milan Education Ltd., Hound mills, Basingstoke, Hampshire, 1988

VNR Vignana Jyothi Institute of Engineering and Technology

IV Year B.Tech AE II SEM	L	T/P/D	C
Elective V	4	0	4

(AED 1113) AUTOMOTIVE POLLUTION AND CONTROL

UNIT – I

INTRODUCTION: Vehicle population assessment in metropolitan cities and contribution to pollution, effects on human health and environment, global warming, types of emission, transient operational effects on pollution.

UNIT – II

POLLUTANT FORMATION IN SI ENGINES: Pollutant formation in SI Engines, mechanism of HC and CO formation in four stroke and two Stroke SI engines, NO_x formation in SI engines, effects of design and operating variables on emission formation, control of evaporative emission, Two stroke engine pollution.

UNIT – III

POLLUTANT FORMATION IN CI ENGINES: Pollutant formation in CI engines, smoke and particulate emissions in CI engines, effects of design and operating variables on CI engine emissions, No_x formation and control, Noise pollution from Automobiles, measurement and standards.

UNIT – IV

CONTROL OF EMISSIONS FROM SI AND CI ENGINES: Design of engine, optimum selection of operating variables for control of emissions, EGR (Exhaust Gas Recirculation), Thermal reactors, secondary air injection, catalytic converters, catalysts, fuel Modifications, fuel cells, Two stroke engine pollution control.

UNIT – V

MEASUREMENT TECHNIQUES EMISSION STANDARDS AND TEST PROCEDURE: Orsat Apparatus, NDIR (Non Dispersive Infra Red),FID (Flame Ionization Detector), Chemiluminescent analyzers, Gas Chromatograph, smoke meters, emission standards, driving cycles – USA, Japan, Euro and India. Test procedures – ECE (Electronic Concentration Emission), FPT (Federal Procedure Tests), SHED (Sealed Housing Evaporating Determination) Test – chassis dynamometers, dilution tunnels.

TEXT BOOKS

1. Paul Degobert – Automobiles and Pollution – SAE International ISBN-1-56091-563-3
2. Ganesan, V- "Internal Combustion Engines"- Tata McGraw-Hill Co.

REFERENCES

1. Obert.E.F.- "Internal Combustion Engines"- 1988
2. SAE Transactions- "Vehicle Emission"- 1982 (3 volumes).
3. Marco Nute- "Emissions from two stroke engines, SAE Publication

VNR Vignana Jyothi Institute of Engineering and Technology

IV Year B.Tech ME/AE II Sem	L	T/P/D	C
Elective V	**4**	**0**	**4**

(MED1141) COMPUTATIONAL FLUID DYNAMICS

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 for instability, computational methods for error estimation, convergence of sequences.
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 - II
FINITE DIFFERENCE APPLICATIONS IN HEAT CONDUCTION AND CONVECTION
Heat conduction, steady heat conduction in a rectangular geometry, transient heat conduction, finite difference application in convective heat transfer, closure.
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 - III
INTRODUCTION TO FIRST ORDER WAVE EQUATION
Stability of hyperbolic and elliptic equations, fundamentals of fluid flow modeling, conservative property, the upwind scheme.

UNIT - IV
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-V
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/Hemashava Publishers Corporation &McGraw Hill.
2. Computational Fluid Flow and Heat Transfer/ Muralidaran/Narosa Publications

REFERENCES:

1. Computational Fluid Dynamics: Basics with applications/John D. Anderson/ McGraw Hill.
2. Fundamentals of Computational Fluid Dynamics/Tapan K. Sengupta / Universities Press.
3. Introduction to Theoretical and Computational Fluid Dynamics/C. Pozrikidis/Oxford University Press/2nd Edition

VNR Vignana Jyothi Institute of Engineering and Technology

IV Year B.Tech ME/AE II Sem	L	T/P/D	C
Elective V	4	0	4

(MED1140) PLANT LAYOUT AND MATERIAL HANDLING SYSTEMS

UNIT I
PLANT LAYOUTS
Fundamentals of plant layouts, Classification of layout, Advantages and limitations of different layouts. Layout design procedures. Process Layout and Product Layout: Comparison, Selection, Specification, Implementation and follow up.
UNIT II
Group Layout and Fixed Position Layout, Quadratic assignment model, Branch and bound method. Software tools used for making plant layouts – ALDEP, CORELAP, CRAFT; Case studies
UNIT III
ELEMENTS OF MATERIAL HANDLING SYSTEM
Importance; Terminology; Objectives and benefits of better material handling; Principles and features of Material Handling System; Interrelationships between material handling and plant layout; Physical facilities and other organizational functions; Classification of material handling equipments.
SELECTION OF MATERIAL HANDLING EQUIPMENTS
Factors affecting for selection; Material handling equation; Choices of material handling equipment; General analysis procedures; Basic analytical techniques; The unit load concept; Selection of suitable types of systems for applications; Activity cost data and economic analysis for design of components of material handling systems; Functions and parameters affecting service; Packing and storage of materials.
UNIT IV
HOISTS
Drives for hoisting; Components and hoisting mechanisms; Rail traveling components and mechanisms; Hoisting gear operation during transient motion; Selecting the motor rating and determining breaking torque for hoisting mechanisms.
CRANES
Hand-propelled and electrically driven E.O.T. overhead traveling cranes; Traveling mechanisms of cantilever and monorail cranes; Design considerations for structures of rotary cranes with fixed radius; Fixed post and overhead traveling cranes; Stability of stationary rotary and traveling rotary cranes.

ASRS

Introduction to ASRS and AGVS

UNIT V

LOAD LIFTING ATTACHMENTS

Load chains and types of ropes used in material handling system; Forged, Standard and ramshorn hooks; Crane grabs and clamps; Grab buckets; Electromagnet; Design consideration for conveyor belts; Application of attachments.

STUDY OF SYSTEMS AND EQUIPMENTS USED FOR MATERIAL STORAGE

Objectives of storage; Bulk material handling; Gravity flow of solids through slides and chutes; Storage in bins and hoppers; Belt conveyors; Bucket-elevators; Screw conveyors; Vibratory conveyors; Cabin conveyors; Mobile racks etc.

TEXT BOOKS:

1. Operations Management A Quantitative Approach by P. B. Mahapatra, Publisher: Prentice Hall International
2. Operations Management by S. Anil Kumar, N. Suresh, Publisher: New Age Publishers
3. Material Handling Equipment by N. Rudenko; Publisher: Peace publishers.
4. Facility Layout, Location and Analytical Approach by R. L. Francis, L. F. McLinnis Jr., White; Publisher: Prentice Hall International
5. Aspects of Material Handling by Dr. K. C. Arora & Shinde; Publisher: Lakshmi Publications

VNR Vignana Jyothi Institute of Engineering and Technology

IV Year B.Tech ME/AE II Sem	**L**	**T/P/D**	**C**
Elective V	**4**	**0**	**4**

(MED1172) DESIGN OF AIRCRAFT STRUCTURES

UNIT-I
OVERVIEW OF THE AIRCRAFT DESIGN PROCESS
Introduction, Phases of Aircraft Design, Aircraft Conceptual Design Process, Conceptual Stage, Preliminary Design, Detailed Design, Design Methodologies.

FUNDAMENTALS OF STRUCTURAL ANALYSIS
Review of Hooke's Law, Principal stresses, Equilibrium and Compatibility, Determinate Structures, St Venant's Principle, Conservation of Energy, Stress Transformation, Stress Strain Relations.

UNIT- II
INTRODUCTION TO AIRCRAFT STRUCTURES
Types of Structural members of Fuselage and wing section Ribs, Spars, Frames, Stringers, Longeron, Splices, Sectional Properties of structural members and their loads, Types of structural joints, Type of Loads on structural joints.

AIRCRAFT LOADS
Aerodynamic Loads, Inertial Loads, Loads due to engine, Actuator Loads, Maneuver Loads, VN diagrams, Gust Loads, Ground Loads, Ground conditions, Miscellaneous Loads.

UNIT-III
AIRCRAFT MATERIALS AND MANUFACTURING PROCESSES
Material selection criteria, Aluminum Alloys, Titanium Alloys, Steel Alloys, Magnesium Alloys, copper Alloys, Nimonic Alloys, Non Metallic Materials, Composite Materials, Use of Advanced materials Smart materials, Manufacturing of A/C structural members, Overview of Types of manufacturing processes for Composites, Sheet metal Fabrication ,Machining, Welding, Superplastic Forming And Diffusion Bonding.

UNIT-IV
STRUCTURAL ANALYSIS OF AIRCRAFT STRUCTURES
Theory of Plates- Analysis of plates for bending, stresses due to bending, Plate deflection under different end conditions, Strain energy due to bending of circular, rectangular plates, Plate buckling, Compression buckling, shear buckling, Buckling due to in plane bending moments, Analysis of stiffened panels in buckling, Rectangular plate buckling, Analysis of Stiffened panels in Post buckling, Post buckling under shear, **Sample Exercises**.

Theory of Shells-Analysis of Shell Panels for Buckling, Compression loading, Shear Loading / Shell Shear Factor, Circumferential Buckling Stress, **Sample Exercises.**

Theory of Beams-Symmetric Beams in Pure Bending, Deflection of beams, Unsymmetrical Beams in Bending, Plastic Bending of beams, Shear Stresses due to Bending in Thin Walled Beams, Bending of Open Section Beams, Bending of Closed Section Beams, Shear Stresses due to Torsion in Thin Walled Beams. **Sample Exercises**.

Theory of Torsion- Shafts of Non-Circular Sections, Torsion in Closed Section Beams, Torsion in Open Section Beams, Multi Cell Sections, **Sample Exercises**.

UNIT-V

AIRWORTHINESS AND AIRCRAFT CERTIFICATION

Definition, Airworthiness Regulations, Regulatory Bodies, Type certification, General Requirements, Requirements Related to Aircraft Design Covers, Performance and Flight Requirements, Airframe Requirements, Landing Requirements, Fatigue and Failsafe requirements, Emergency Provisions, Emergency Landing requirements

AIRCRAFT STRUCTURAL REPAIR

Types of Structural damage, Nonconformance, Rework, Repair, Allowable damage Limit, Repairable Damage Limit, Overview of ADL Analysis, Types of Repair, Repair Considerations and best practices

REFERENCES:

1. Flight without Formulae by A.C Kermode, Pearson Education,10th Edition
2. Mechanics of Flight by A.C Kermode, Pearson Education,5th Edition
3. Fundamentals of Flight, Shevell, Pearson Education, 2nd Edition
4. Introduction to Flight by Dave Anderson
5. Aircraft Systems: Mechanical, Electrical and Avionics Subsystems Integration by Ian moir, Allan Seabridge
6. Aircraft Design - A Conceptual Approach by Daniel P.Raymer, AIAA education series,6th Edition
7. Airframe Structural Design by Michael Niu, Conmilit Press, 1988,2[nd] Edition
8. Airframe Stress Analysis and Sizing by Michael Niu, Conmilit Press, 1999,3[rd] Edition
9. The Elements of Aircraft Preliminary Design – Roger D. Schaufele, Aries Publications, 2000
10. Aircraft Structural Maintenance by Dale Hurst, Avotek publishers, 2nd Edition, 2006
11. Aircraft Maintenance and Repair by Frank Delp, Michael J. Kroes & William A. Watkins, Glencoe and McGraw-Hill,6th Edition, 1993
12. An Introduction to Aircraft Certification; A Guide to Understanding Jaa, Easa and FAA by Filippo De Florio, Butterworth-Heinemann