

**ACHARYA NAGARJUNA UNIVERSITY :: NAGARJUNA NAGAR**  
**Faculty of Engineering**  
**Academic Regulations 2015 (R-15) for B. Tech (Regular)**

(Applicable for the students admitted during the  
Academic Year 2015-2016 and onwards)

**1. Eligibility for Admission:**

Admission to the above program shall be made subject to the eligibility, qualification and specialization prescribed by the University for each program from time to time.

- i. Admission shall be made either on the basis of merit/rank obtained by the qualifying candidates in EAMCET/ECET or otherwise specified, whichever is relevant.

The duration of B.Tech program is of four academic years divided into eight semesters comprising of two semesters in each academic year. A student is required to choose a branch of study at the time of admission. Students under lateral entry will be admitted straightaway into Third semester of B.Tech course in the respective branch. No change of branch shall be allowed after the admissions are closed.

**2. Award of B.Tech. Degree:**

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

- i. Regular entry students shall pursue a course of study for not less than four academic years and in not more than eight academic years.
- ii. Student's who fail to fulfill all the academic requirements for the award of the degree within eight academic years (for Regular Entry) / six academic years (for Lateral Entry) from the year of their admission, shall forfeit their seat in B.Tech course and their admission is cancelled.

*Completing the course of study shall mean not only satisfying the attendance requirements but also passing of all the subjects within the respective stipulated period*

**3. Branches of study:**

The following Branches of study are offered at present for B. Tech. degree

<b>S.No.</b>	<b>Branch</b>
1.	Civil Engineering
2.	Electrical and Electronics Engineering.
3.	Mechanical Engineering.
4.	Electronics and Communication Engineering
5.	Computer Science and Engineering.
6.	Chemical Engineering
7.	Electronics & Instrument Engineering
8.	Information Technology
9.	BioTechnology

and any other branch as approved by the authorities of the University from time to time.

Each Branch will have a curriculum with a syllabi that shall consist of the following:

- i. General Core Courses
  1. Basic Sciences
  2. Engineering Sciences
  3. Humanities and social sciences
- ii. Program core courses in Engineering / Technology
- iii. Elective courses of Engineering / Technology / Management Entrepreneurship / Business Communication and allied fields.
- iv. Open Electives/CBCS
- v. Mandatory learning courses
- vi. Project work

#### **4. Credits:**

- i. *Academic Year*: Two consecutive (one odd + one even) semesters constitute one academic year.
- ii. *Choice Based Credit System (CBCS)*: The CBCS provides choice for students to select from the prescribed courses (core, elective or minor or soft skill courses).
- iii. *Credit*: A unit by which the course work is measured.

#### **5. Distribution and Weightage of Marks (Internal & External):**

- 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 subject. In addition internship & project work shall be evaluated for 100 and 200 marks respectively.
- ii. For theory subjects the distribution shall be 40 marks for Internal Evaluation and 60 marks for the External Evaluation.
- iii. There shall be four units in each of the theory subjects.
- iv. For theory subjects, there shall be two midterm examinations during the semester. Each midterm examination shall consist of assignment for 12 marks and sessional test for 18marks with duration of 120 minutes respectively.

First midterm examination shall be conducted for 50% coverage of syllabus and second midterm examination shall be conducted for remaining 50% of syllabus. Both the midterm exams are compulsory. Final midterm examination marks for a total of 30marks shall be arrived at, by considering the 80% weightage (24 marks) to that midterm examination in which the student scores more marks and the remaining 20% (6 marks) for other midterm exam.

\*Note 1: The assignment test paper shall contain 5 questions of equal weightage and student is asked to answer any 2 questions randomly and shall be condensed for 12 marks, any fraction rounded off to the next higher mark.

\*Note 2: The sessional examination shall contain 3 questions out of which first question is objective and compulsory and remaining two questions having internal choice and shall be considered for 18 marks, any fraction rounded off to the next higher mark.

\*Note 3: For the remaining 10 marks in internal evaluation, 5 marks allotted for attendance as indicated in CLAUSE(\_6\_) and the faculty members teaching the

subject shall evaluate remaining 5 marks through quiz/online/objective examination at the end of semester.

V. For theory subjects, there will be 5 questions with following pattern in the End-Examination.

- a. All Questions have to be answered compulsorily.
- b. Question I shall contain 12 short Answer questions “a” to “l” each of 1 mark. (Total 12 marks) covering one question from each unit.
- c. Out of the remaining four questions, EITHER/OR type shall be followed with 12 marks for each.
- d. In each question as mentioned in (c), one, two or more bits can be set.

vii. Further, whenever any theory subject with two parts is offered (combined subject), for ex:

Electrical & Mechanical Technology, then there shall be only two parts Part A, Part B in the question paper.

First question objective can be equally divided into two parts.

Part – A: shall contain two questions, EITHER/OR type shall be followed with 12 marks for each.

Part – B: shall also contain two questions, EITHER/OR type shall be followed with 12 marks for each.

viii. Model Question paper for each theory course shall be prepared by the teacher within 15 days from the commencement of the semester and the same shall be forwarded to the Controller of Examinations through the Chairman, BOS concerned.

ix. For practical subjects there shall be a continuous evaluation during the semester for 40 internal marks and 60 end examination marks. Day-to-day work in the laboratory shall be evaluated for 25 marks by the concerned laboratory teacher based on the report of experiments/jobs ( 10 marks for the record submitted and 15 marks for day to day work). The internal examination for 15 marks (10 marks for experiment and 5 marks for viva-voce) shall be conducted by the laboratory teacher and another examiner from the same department.

\*Note: Day to day performance shall be recorded in student record (each experiment carries 15 marks, at least ten experiments should be done and average marks must be taken at the end of semester).

x. There shall be an audit pass (Mandatory learning Course) course in Human Values & Professional Ethics, Life skills and Advanced Communication Skills lab with no credits. There shall be no external examination. However, attendance in the audit course shall be considered while calculating aggregate attendance and student shall be declared pass in the audit course when he/she secures 40% or more in the internal examinations.

xi. There shall be an Discipline centric Elective Course through Massive Open Online Course (MOOC) in III year II semester (For EEE, ECE and CSE branches) and in IV year I semester (For Civil, Mechanical and Chemical branches), where in the student shall register the course offered by authorized institutions/Agencies, through online with the approval of Head of the Department. The Certificate

issued by the institution/agency after successful completion of the course will be considered for the award of grade to that course.

- xii. For the subject having design and / or drawing, such as Engineering Drawing, Machine Drawing and Estimation, the distribution shall be 40 marks for internal evaluation and 60 marks for end examination. The Internal evaluation will be 20 marks for day-to-day work in the class that shall be evaluated by the concerned subject teacher based on the reports/submissions prepared in the class. Further, there shall be two midterm exams in a Semester for a duration of 2hrs each, evenly distributed over the syllabi for 20 marks and the average marks of both the mid examinations shall be considered as internal test marks. The sum of day to day evaluation and the internal test marks will be the final internal marks for the subject.
- xiii. There shall internship at the end of III year II Semester. For the internship, the student/institute shall select any organization and a minimum of 4 weeks work must be carried at the organization. A report on work done shall be evaluated by the external supervisor/mentor and department committee. The internship shall be evaluated for 100marks(60 marks shall be awarded by external supervisor and 40 marks by departmental committee). There shall be no external examination for internship.

A student shall acquire 2 credits assigned to the internship only when he/she secures 40 marks on aggregate out of 100 marks allocated.

- xiv. Out of a total of 200 marks for the project work, 80 marks shall be for Internal Evaluation and 120 marks for the End Semester Examination (Viva-voce). The viva-voce shall be conducted by a committee consisting of Head of the Department, Project Supervisor and an External Examiner nominated by the Principal from the panel of 3 members proposed by Head of the Department. The project work shall start in IV year I semester and shall continue in the semester break. The evaluation of project work shall be conducted at the end of the IV year II semester. The Internal Evaluation shall be made on the basis of weekly progress (a minimum of 12 weeks and 3 marks for each week progress) and at least two seminars(one at the beginning of IV B.Tech II semester (20 marks) and the other before submission of project work(24 marks) given by each student on the topic of his project.
- xv. The laboratory records and internal test papers shall be preserved for minimum of 2 years in the respective departments and shall be produced to the Committees of the college as and when the same are asked for.

#### **6. Attendance Requirements:**

- i. A student shall be eligible to appear for end examinations if he/she acquires a minimum of 75% of attendance in aggregate of all the subjects in a semester.
- ii. **Shortage of Attendance below 65% in aggregate shall in NO case be condoned.**
- iii. Condonation of shortage of attendance in aggregate up to 10% (65% and above and below 75%) in each semester may be granted by the College Academic Committee.

- iv. Students whose shortage of attendance is not condoned in any semester are not eligible to take their end examination of that class and their registration shall stand cancelled.
- v. A student will not be promoted to the next semester unless he satisfies the attendance requirements of the present semester, as applicable. They may seek readmission for that semester when offered next.
- vi. A stipulated fee shall be payable towards condonation of shortage of attendance to the college.
- vii. A weightage in sessional marks upto a maximum of 5 marks out of 40 marks in each theory subject shall be given for those students who put in a minimum of 75% attendance in the respective subject in a graded manner as indicated below.

Attendance of 90% and above	5marks
Attendance of 85% and above and less than 90%	3marks
Attendance of 80% and above and less than 85%	2marks
Attendance of 75% and above and less than 80%	1mark

**7. Minimum Academic Requirements (For Regular Entry Students):**

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

- i. A student who could not secure a minimum of 50% aggregate from midterm examination marks is not eligible to appear for the semester end examination and shall have to repeat that semester.
- ii. A student shall be deemed to have satisfied the minimum academic requirements and earned the credits allotted to each theory, design, drawing subject or project if he secures not less than 40% of marks in the semester end examination. In the internship & project he/she should secure not less than 40% and for practical examination not less than 50% of marks in the semester end examination.
- iii. A student shall be promoted from I to II year only if he/she fulfils the academic requirements of attendance and internal marks as stipulated in clause 6 and 7 irrespective of back log subjects in I/IV B.Tech.
- iv. A student shall be promoted from II to III year only if he/she fulfils the academic requirements of attendance and internal marks as stipulated in clause 6 and 7 and also must secure 70% of the credits of the subjects that have been studied up to I year II semester from irrespective of whether the candidate takes the end examination or not as per the normal course of study. At the time of commencement of class work, he must attain the required credits
- v. A student shall be promoted from third year to fourth year only if he fulfils the academic requirements of attendance and internal marks as stipulated in clause 6 and 7 and also must secure 70% of the credits of the subjects that have been studied upto II year II semester. At the time of commencement of class work, he must attain the required credits

And in case of getting detained for want of credits by sections ii and iii above, the student may make up the credits through supplementary exams of the above exams before the date of class work commencement of Third or Fourth year I semester respectively.

## 8. Minimum Academic Requirements (For Lateral Entry Students):

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

- i. A student shall be deemed to have satisfied the minimum academic requirements and earned the credits allotted to each theory, practical, design, drawing subject or project if he secures not less than 40% of marks in the end examination and a minimum of 50% of marks in the sum total of the internal evaluation and end examination taken together. In the Seminar & Comprehensive viva-voce he/she should secure 40%.
- ii. A student who could not secure a minimum of 50% aggregate from midterm examination marks is not eligible to appear for the semester end examination and shall have to repeat that semester.
- iii. A student shall be promoted from II to III year only if he/she fulfils the academic requirements of attendance and internal marks as stipulated in clause 6 and 7 irrespective of back log subjects in II/IV B.Tech
- iv. A student shall be promoted from III to IV year only if he/she fulfils the academic requirement of attendance and internal marks as stipulated in clause 6 and 7 and also must secure **70%** of the subjects that have been studied up to III year I semester from

## 9. Grading:

After each subject is evaluated for 100 marks, the marks obtained in each subject will be converted to a corresponding letter grade as given below, depending on the range in which the marks obtained by the student fall.

**Table – Conversion into Grades and Grade Points assigned**

Range in which the marks in the subject fall	Grade	Grade points assigned
$\geq 90$	O (Outstanding)	10
80-89	A+ (Excellent)	9
70-79	A (Very Good)	8
60-69	B+ (Good)	7
50-59	B (Above Average)	6
45-49	C (Average)	5
40-44	D (Pass)	4
< 40	F (Fail)	0
Absent	Ab (Absent)	0

- i. A student obtaining Grade F shall be considered failed and will be required to reappear for that subject when the next supplementary examination offered.
- ii. For non credit courses ‘Satisfactory’ or ‘Unsatisfactory’ shall be indicated instead of the letter grade and this will not be counted for the computation of SGPA/CGPA.

### 9.1. Semester Grade Point Average (SGPA) and Cumulative Grade Point Average (CGPA):

- i. The Semester Grade Point Average (SGPA) is the ratio of sum of the product of the number of credits with the grade points scored by a student in all the courses taken by a student and the sum of the number of credits of all the courses undergone by a student, i.e.

$$SGPA = \frac{\sum (C_i \times G_i)}{\sum C_i}$$

Where,  $C_i$  is the number of credits of the  $i^{\text{th}}$  subject and  $G_i$  is the grade point scored by the student in the  $i^{\text{th}}$  course.

- ii. The Cumulative Grade Point Average (CGPA) will be computed in the same manner taking into account all the courses undergone by a student over all the semesters of a program, i.e.

$$CGPA = \frac{\sum (C_i \times S_i)}{\sum C_i}$$

Where 'S<sub>i</sub>' is the SGPA of the  $i^{\text{th}}$  semester and  $C_i$  is the total number of credits in that semester.

- iii. Both SGPA and CGPA shall be rounded off to 2 decimal points and reported in the transcripts.
- iv. While computing the GPA/CGPA the subjects in which the student is awarded Zero grade points will also be included.

*Grade Point:* It is a numerical weight allotted to each letter grade on a 10-point scale.

*Letter Grade:* It is an index of the performance of students in a said course. Grades are denoted by letters O, A+, A, B+, B, C, P and F.

*Grade Conversion to Percentage:*  $\% = CGPA \times 9.25$

### 10. Gap - Year:

Gap Year – concept of Student Entrepreneur in Residence shall be introduced and outstanding students who wish to pursue entrepreneurship are allowed to take a break of one year at any time after I year/II year/III year to pursue entrepreneurship full time. This period may be extended to two years at the most and these two years would not be counted for the time for the maximum time for graduation. An evaluation committee shall be constituted to evaluate the proposal submitted by the student and the committee shall decide on permitting the student for having the Gap Year.

### 11. Transitory Regulations:(old regulations changed)

1. Candidates who admitted into the four year B.Tech degree course under R-15 regulations but who got detained in any year for want of attendance/minimum aggregate sessional marks may join the appropriate year /semester in the semester system applicable for that batch and be governed by the regulations of that batch from then onwards unless otherwise specified.
2. A student admitted under credit based regulations(CR) detained due to lack of sessional marks/attendance at the end of the first semester of II/IV B.Tech shall join II/IV first semester of R-15 batch . Such students will study all the courses prescribed for that R-15 in which the student joins. However the student has to clear all the first year backlog subjects by appearing the supplementary examination. Such candidates will be

governed by the regulations applicable to lateral entry candidates of R-15 batch for the award of the degree.

3. A student admitted under CR, detained due to lack of sessional marks/attendance at the end of the second semester of II/IV B.Tech /at the end of subsequent semesters shall follow the credit based regulations only (CR).

**12. With-holding of results:**

If the candidate has any dues not paid to the college or if any case of indiscipline or malpractice is pending against him, the result of the candidate shall be withheld and he will not be allowed / promoted into the next higher semester. The issue of awarding degree is liable to be withheld in such cases.

**13. Award of Class:**

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

<b>Class Awarded</b>	<b>CGPA Secured</b>
First Class with Distinction	$\geq 8.0$
First Class	$\geq 6.5 < 8.0$
Second Class	$\geq 5.5 < 6.5$
Pass Class	$\geq 4.0 < 5.5$

**14. Minimum Instruction Days:**

The minimum instruction period for a semester is 16 weeks. The minimum instruction days including exams for each semester shall be for 90days.

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

**16.General:**

- i. The academic regulations should be read as a whole for purpose of any interpretation.
- ii. Malpractice rules- nature and punishments is appended
- iii. Where the words “he”, “him”, “his”, occur in the regulations, they include “she”, “her”, “hers”.
- iv. In the case of any doubt or ambiguity in the interpretation of the above rules, the decision of the BOS is final.
- v. The University may from time to time, revise, amend or change the Regulations, Schemes of Examinations, and/or Syllabi.

**17. Conduct and discipline**

Students shall conduct themselves within and outside the premises of the institute in a manner befitting the students of our institution.

(b) As per the order of Honorable Supreme Court of India, ragging in any form is considered as a criminal offence and is banned. Any form of ragging will be severely dealt with.

(c) The following acts of omission and / or commission shall constitute gross violation of



the code of conduct and are liable to invoke disciplinary measures with regard to ragging.

- (i) Lack of courtesy and decorum, indecent behavior anywhere within or outside the campus.
  - (ii) Willful damage of college / individual property
  - (iii) Possession, consumption or distribution of alcoholic drinks or any kind of narcotics or hallucinogenic drugs.
  - (iv) Mutilation or unauthorized possession of library books.
  - (v) Noisy and unseemly behavior, disturbing studies of fellow students.
  - (vi) Hacking of computer systems (such as entering into other person's areas without prior permission, manipulation and / or damage of computer hardware and software or any other cyber-crime etc.)
  - (vii) Usage of camera / cell phone in the campus
  - (viii) Plagiarism of any nature
  - (ix) Any other acts of gross indiscipline as decided by the academic council from time to time.
- (d) Commensurate with the gravity of offense, the punishment may be reprimand, fine, expulsion from the institute / hostel, debar from examination, disallowing the use of certain facilities of the institute, rustication for a specified period or even outright expulsion from the institute or even handing over the case to appropriate law enforcement or the judiciary, as required by the circumstances.
- (e) For an offence committed in (i) a hostel (ii) a department or in a class room and (iii) elsewhere, the chief warden, the head of the department and the principal respectively, shall have the authority to reprimand or impose fine.
- (f) Cases of adoption of unfair means and / or any malpractice in an examination shall be reported to the principal for taking appropriate action.
- (g) All cases of serious offence, possibly requiring punishment other than reprimand, shall be reported to the academic council.
- (h) The institute level standing disciplinary action committee constituted by the academic council shall be the authority to investigate the details of the offence, and recommend disciplinary action based on the nature and extent of the offence committed.
- (i) The principal shall deal with any academic problem, which is not covered under these rules and regulations, in consultation with the programmes committee in an appropriate manner, and subsequently such actions shall be placed before the academic council for ratification. Any emergency modification of regulation, approved by the appropriate authority, shall be reported to the academic council for ratification.
- (j) "Grievance and Redressal Committee" (General) constituted by the Principal shall deal with all grievances pertaining to the academic / administrative / disciplinary matters

### **18. Punishments for Malpractice Cases - Guidelines**

The examinations committee may take the following guidelines into consideration while dealing with the suspected cases of malpractice reported by the invigilators/squad

members etc; during end examinations. The punishment may be more severe or less severe depending on the merits of the individual cases.

S. No	Nature of Malpractices/Improper conduct	Punishment
1.	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 student 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.
2.	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.
3.	Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.	Cancellation of the performance in that subject and all other subjects the candidate has appeared including practical examinations and project work of that semester/year examinations.
4.	Gives assistance or guidance or receives it from any other student orally or by any other body language methods or communicates through cell phones with any other student or persons in or outside the exam hall in respect of any matter.	Expulsion from the examination hall and cancellation of the performance in that subject only of all the students involved. In case of an outsider, he will be handed over to the police and a case is registered against him.
5.	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 student is appearing.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects including practical examinations and project work of that semester/year.
6.	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 including practical examinations and project work of that semester/year.

7.	Smuggles in the Answer book or takes out or arranges to send out the question paper during the examination or answer book during or after the examination	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects including practical examinations and project work of that semester/year. The student is also debarred for two consecutive semesters from class work and all examinations. The continuation of the course by the student is subject to the academic regulations in connection with forfeiture of seat.
8.	Refuses to obey the orders of the Chief Superintendent/Assistant – Superintendent / any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the officer-in charge or any person on duty in or outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the officer-in-charge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the College campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that subject and all other subjects of that semester/year. The students also are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is registered against them.
9.	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 including practical examinations and project work 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.

10.	Possesses any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects including practical examinations and project work of that semester/year. The student is also debarred and forfeits the seat.
11.	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 7 to 9.	For Student of the college: Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects including practical examinations and project work 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.
12.	Impersonates any other student in connection with the examination	The student who has impersonated shall be expelled from examination hall. The student is debarred from writing the remaining exams, and rusticated from the college for one academic year during which period the student will not be permitted to write any exam. If the imposter is an outsider, he will be handed over to the police and a case is registered against him. The performance of the original student who has been impersonated, shall be cancelled in all the subjects of the examination including practicals and project work of that semester/year. The student is rusticated from the college for two consecutive years during which period the student will not be permitted to write any exam. The continuation of the course by the student is subject to the academic regulations in connection with forfeiture of seat
13.	If any malpractice is detected which is not covered in the above clauses 1 to 12 it shall be reported to the college academic council for further action to award suitable punishment.	
14.	Malpractice cases identified during sessional examinations will be reported to the examination committee nominated by Academic council to award suitable punishment.	

**Program Codes.**

ESC: Engineering Science Core  
BSC: Basic Science Core  
DEC: Departmental Elective Course  
OPC: Open Elective Course  
PCC: Program Core Course  
PRC: Program Major Project

**Acharya Nagarjuna University  
Faculty of Engineering**

**B.TECH COURSE STRUCTURE**

**For Non Circuit Branches: ME/CE/CHE/BT  
(2015-16)**

**I YEAR I SEMESTER**

Course Details		Scheme of instruction			Scheme of Examination				
Code	Subject	L	T	P	Maximum Internal Marks	Maximum External Marks	Total	Credits	Cat. Code
BT/CE/ME /CHE 111	Mathematics-I	4	1	-	40	60	100	4	BSC
BT/CE/ME /CHE112	Physics-I	3	-	-	40	60	100	3	BSC
BT/CE/ME /CHE113	Chemistry-I	3	-	-	40	60	100	3	BSC
BT/CE/ME /CHE114	Engineering Mechanics – I	4	1	-	40	60	100	4	BSC
BT/CE/ME /CHE115	Problem solving using C	3	1	-	40	60	100	3	BSC
BT/CE/ME /CHE116	Engineering Drawing – I	2	-	4	40	60	100	3	ESC
BT/CE/ME /CHE151	Chemistry lab	-	-	3	40	60	100	2	BSC
BT/CE/ME /CHE152	Computer Programming lab	-	-	6	40	60	100	2	BSC
BT/CE/ME /CHE153	Work shop	-	-	3	40	60	100	2	ESC
	<b>Total</b>	19	3	16	360	540	900	26	

**I YEAR II SEMESTER**

Course Details		Scheme of instruction			Scheme of Examination				
Code	Subject	L	T	P	Maximum Internal Marks	Maximum External Marks	Total	credits	Cat. Code
BT/CE/ME/CHE 121	Mathematics-II	4	1	-	40	60	100	4	BSC
BT/CE/ME/CHE 122	Physics-II	3	-	-	40	60	100	3	BSC
BT/CE/ME/CHE 123	Chemistry-II	3	-	-	40	60	100	3	BSC
BT/CE/ME/CHE 124	Engineering Mechanics – II	3	1	-	40	60	100	3	BSC
BT/CE/ME/CHE 125	Environmental Science and Engineering	3	-	-	40	60	100	3	BSC
BT/CE/ME/CHE 126	Engineering Drawing-II	2	-	4	40	60	100	3	ESC
BT/CE/ME/CHE 127	Basic English for Engineers	4	-	-	40	60	100	3	BSC
BT/CE/ME/CHE 161	Physics lab	-	-	3	40	60	100	2	ESC
BT/CE/ME/CHE 162	English Communication Lab	-	-	3	40	60	100	2	BSC
	<b>Total</b>	<b>22</b>	<b>2</b>	<b>10</b>	<b>360</b>	<b>540</b>	<b>900</b>	<b>26</b>	

**CE/ME/CHE– 111  
4-1-0**

**MATHEMATICS – I**

### **Unit-I**

Matrices: Rank of a matrix, Consistency of linear system of equations, Linear transformations, vectors, Linear dependence, Eigen values and Eigen vectors, Properties of eigen values, Cayley- Hamilton theorem (without proof), Reduction to diagonal form, reduction of Quadratic form to canonical form, Complex matrices.

### **Unit-II**

Rolle's Theorem( without proof), Lagrange's Mean value theorem ( without proof), Taylor's theorem (without proof), Expansions of functions: Maclaurin's series, Taylor's series, Maxima and Minima of functions of two variables, Lagrange's method of undetermined multipliers, Principle of least squares, method of least squares, fitting of other curves.

### **Unit-III**

Double integrals, Change of order of integration , Double integrals in polar coordinates, Area enclosed by plane curves, Triple integrals, Change of variables, Beta function, Gamma function, Relation between beta and gamma functions, error function.

### **Unit-IV**

Fourier Series: Introduction and Euler's formulae, Conditions for a Fourier expansion, Functions having points of discontinuity, Change of interval, Even and Odd functions, Half range series, Typical wave forms and Parseval's formulae, Complex form of the Fourier series.

Text book

1]. Higher Engineering Mathematics by B.S. Grewal, 43<sup>rd</sup> edition, Khanna publishers, New Delhi.

Reference books:

[1]. Advanced Engineering Mathematics by kreyszig.

[2]. Engineering Mathematics by Babu Ram

[3] Engineering Mathematics – I BY N.P. Bali, Satyanarayana Bhavanari and Indrani Kelker Laxmipublications, New Delhi.

[4] Mathematical Foundations for Computer Sciences- by Satyanarayana Bhavanari,

Pradeep Kumar T.V, Shaik Mohiddin shaw, BSP Publications.



## **UNIT-I**

Ultrasonics

**12 Periods**

Production of Ultrasonics by Piezo electric oscillator method, Detection by Acoustic grating method, Applications - Pulse echo technique, ultrasonic imaging and some general applications.

Interference

Stokes principle (Phase change on reflection), Interference in thin films due to reflected light (Cosine law), Newton's rings experiment – Determination of radius of curvature, Michelson's interferometer: Principle, construction working and its application (Determination of wavelength of monochromatic source).

## **UNIT-II**

**10 Periods**

Diffraction – Single slit (Qualitative and quantitative treatment).

Polarisation – Polarisation by reflection, Refraction and double refraction in uniaxial crystals, Nicol prism, Quarter and half wave plate, circular and elliptical polarization and detection.

## **UNIT-III**

**14 Periods**

**Lasers:** Laser characteristics, Spontaneous and Stimulated emissions, Basic requirements of a laser, Population inversion – Solid state laser (Ruby laser), Gas (He-Ne) laser, Semiconductor (GaAs) laser, Applications of lasers.

**Holography:** Principle, recording, reproduction and applications.

**Fiber optics:** Structure of optical fiber, Types of optical fibers, Numerical aperture, Fiber optics in communications and advantages.

## **UNIT -IV**

**14 Periods**

Electricity and Magnetism

Gauss's law in electricity (statement & proof), Coulomb's law from Gauss law, Gauss law for magnetism, Faraday's law of electromagnetic induction, Lenz's law, Self Inductance, Mutual inductance, energy stored in a magnetic field, Displacement current, Maxwell's equations (qualitative treatment), electromagnetic wave equation and Velocity, A.C. circuit containing series LCR circuit (resonance condition).

### **TEXT BOOKS:**

1. Engineering Physics - R .K. Gaur & S. L. Gupta , Danpati Rai Publications, Delhi, 2001.
2. Engineering Physics - Hitendra K. Malik & A.K.Singh, Tata MacGraw Hill, New Delhi,2009.

### **REFERENCE BOOKS:**

1. Fundamentals of Physics - Resnick & Halliday, John Wiley sons ,9th Edition.
2. Applied Physics-S. Mani Naidu, Pearson Publishers, Chennai
3. Engineering Physics - M.Arumugam, Anuradha Publications, Chennai ,5thEdition , 2006.
4. Engineering Physics - B. K. Pandey & S. Chaturvedi, Cengage LearningIndia Pvt. Ltd., Delhi.

## ENGINEERING CHEMISTRY – I

## UNIT-I: WATER TECHNOLOGY

Various impurities of Water, WHO guidelines, Hardness units and determination by EDTA method (simple problems), water treatment for drinking purpose- sedimentation, coagulation, filtration (slow sand filter), various methods of chlorination, breakpoint chlorination.

Water treatment for industrial purpose: Boiler troubles, scales, sludges, caustic embrittlement, boiler corrosion, priming and foaming- causes and prevention, Internal conditioning -Phosphate, Calgon and carbonate treatment, External conditioning- Lime Soda process (simple problems), softening by ion exchange process, Desalination of brackish water by electro dialysis and reverse osmosis.

## UNIT-II: ELECTROCHEMICAL ENERGY SYSTEMS

Primary and Secondary batteries, Reserve batteries, Solid state and molten solvent batteries, Recent technological trends, Lithium ion batteries, Nanostructured electrode materials, Lithium and carbon based nanomaterials and nanocomposites, Solid-state Lithium ion batteries, Energy storage and backup. Fuel cells, Scientific prospects of fuel cells, Electrochemistry, In-situ and ex-situ electrochemical characterizations, Current-Voltage measurement, Current Interrupt measurements, Porosity, BET surface area analysis, Gas permeability, Hydrogen as future fuel, Alkaline-, acid- and molten carbonate-fuel cells, Solid oxide fuel cells.

## UNIT-III: CORROSION AND ITS PREVENTION

Introduction, electrochemical theory of corrosion, dry corrosion, corrosion due to differential aeration, Types of corrosion-galvanic corrosion (galvanic series), Pitting, Stress and microbiological corrosion, Factors affecting corrosion-oxidizers, pH, over voltage and temperature.

Protection methods: Cathodic protection, (Impressed current and sacrificial anode) anodic protection, corrosion inhibitors- types and mechanism of inhibition

## UNIT-IV: POLYMERSS

Monomer functionality, degree of polymerization, Tacticity, classification of polymerization- addition, condensation and co-polymerization, mechanism of free radical polymerization.

Plastics- Thermoplastic and thermosetting resins, preparation, properties and uses of Bakelite, and PVC. Compounding of plastics.

Conducting polymers: Polyacetylene, mechanism of conduction, examples and applications.

Rubber- Processing of latex, Drawbacks of natural rubber- Vulcanization, Synthetic rubbers- Buna-S and Buna-N.

Prescribed Text Books

1. Engineering Chemistry, P.C. Jain and M. Jain - Dhanapathi Rai & Sons, Delhi
2. A text book of Engineering Chemistry, S.S. Dara - S. Chand & Co. New Delhi
3. Engineering Chemistry, B.K. Sharma - Krishna Prakashan, Meerut
4. Shashi chawla, A text book of engineering chemistry, 3<sup>rd</sup> Edition, Dhanpat rai & co new delhi, 2007.

**ENGINEERING MECHANICS -I****UNIT- I****Concurrent Forces in a Plane:**

Principles of statics, Force, Addition of two forces: Parallelogram law – Composition and resolution of forces – Constraint, Action and Reaction. Types of supports and support reactions. Free body diagram. Equilibrium of concurrent forces in a plane – Method of projection, method of moments, resultant and equilibrium of concurrent forces in space.

**UNIT-II**

**Friction:**Introduction, laws of friction, coefficient of friction, angle of friction, problems involving dry friction, wedges.

**Parallel Forces in a Plane:**Types of parallel forces, couple, resolution of a force into a force and a couple, general case of parallel forces in a plane.

**UNIT-III**

**Centroid and Centre of Gravity:**Concept of centroid and centre of gravity, centroids of simple figures from basic principles, centroid of composite plane figures and curves, centre of gravity of three dimensional bodies.

**General cases of Forces in a Plane:**Composition of forces in a plane, Equilibrium of forces in a plane, plane trusses-method of joints and method of sections.

**UNIT-IV**

**Moments of Inertia of Plane Figures:**Introduction, moment of inertia of a plane figure with respect to an axis in its plane, polar moment of inertia, parallel axis theorem, moment of inertia of composite areas.

**Moment of Inertia of Material Bodies:**Moment of Inertia of solid rectangular plate, circular plate, solid right circular cone, solid sphere.

**LEARNING RESOURCES (For both I and II semesters)****TEXT BOOKS:**

1. *Engineering Mechanics* by S. Timoshenko, D.H. Young and J V Rao –Tata McGraw-Hill publishing Company Limited, New Delhi(For concepts), 2009
2. *Engineering mechanics –statics and dynamics* by A.K TAYAL –UMESH publications, Delhi (For numerical problems), 2008

**REFERENCE BOOKS:**

1. *Engineering Mechanics* by S.S.Bhavikatti, New Age International publishers, 2012
2. *Engineering Mechanics- Statics and Dynamics* by Irving H. Shames, Pearson Education, 2006.
3. *Singer's Engineering Mechanics: Statics and Dynamics*, K. Vijaya Kumar Reddy and J Suresh Kuma, 3<sup>rd</sup> Edition SI Units-BS Publications, 2010.
4. *A Textbook of Engineering mechanics statics and dynamics* by J.L. Meriam and L. Kraige, 6<sup>th</sup> Edition, Wiley & Sons ,2010.

**Problem Solving using C****UNIT-1 (16 Periods)**

Computer Basics: The Computer System, Generations of Computer, Classification of Computer, Block diagram of digital Computer, Inside the Computer-Processor, Memory, External Ports, PCI Card, Formatting Hard disk, Understanding BIOS, BIOS Commands, Algorithm, Flowchart, Programming Paradigms.

C-Basics: C-character set, Data types, Constants, Expressions, Structure of C program, Operators and their precedence & associativity, Simple programs in C using all the operators, Type casting, type coercion.

**UNIT-II (16 Periods)**

Control Structures, Basic input and output statements, Preprocessor directives. Functions: Concept of a function, passing the parameters, automatic variables, scope and extent of variables, storage classes, recursion, iteration vs recursion, types of recursion, Simple recursive and non recursive programs, Towers of Hanoi problem.

**UNIT-III (16 Periods)**

Arrays: Single and multidimensional Arrays, Character array as a string, string functions, Programs using arrays and string manipulation.  
Pointers: Pointers declarations, Pointer expressions, Pointer parameters to functions. Pointers, Pointers and array, Pointer arithmetic.

**UNIT-IV (16 Periods)**

Structures: Declaring and using structures, operations on structures, structures and arrays, user defined data types, pointers to structures. Command line arguments.  
Files: Introduction, file structure, file handling functions, file types, file error handling, Programs using file functions.

**Text Books:**

1. Programming with C-Gottfried-Schaums Outline Series-TMH
2. C Programming – Anitha Goel/Ajay Mittal/E.Sreenivasa Reddy-Pearson India

**References :**

1. Problem Solving with C- Somasekharan-PHI.
2. C Programming- Behrouz A forouzan – CENGAGE Learning
2. Test your c skills-Yaswanth kanithker
3. Let us C- Yaswanth kanithker

**ENGINEERING DRAWING - 1****Unit – I**

**General:** Use of Drawing instruments, Lettering .-Single stroke letters, Dimensioning- Representation of various type lines. Geometrical Constructions..Representative fraction, Scales.-Plain Scales, Diagonal Scales, Comparative Scales, Vernier Scales.

**Unit – II**

**Curves :** Curves used in Engineering practice - conic sections - general construction and special methods for ellipse, parabola and hyperbola. cycloid, epicycloids, hypocycloid involute of circle and Archimedean Spiral.

**Unit – III**

**Method of Projections:** Principles of projection - First angle and third angle projection of Points. Projection of Straight lines. Traces of lines. (Limited to first angle projection only)

**Projections of Planes :** Projections of planes, projections on auxiliary planes.

**Unit – IV**

**Projections of Solids :** Projections of Cubes, Prisms, Pyramids, Cylinders and Cones with varying positions.

**Sections Of Solids:** Sections of Cubes, Prisms, Pyramids, cylinders and Cones, true shapes of sections. (Limited to the Section Planes perpendicular to one of the Principal Planes).

**Unit - V(Demonstration only).**

**Computer Aided Drafting (using any Standard Package):** Setting up a drawing, starting main menu (New, Open Save, Save As etc), Opening Screen error correction on screen units,

co-ordinate system, limits, grid, snap, ortho.

Tool bars: Draw tool bar, object snap, tool bar, modify tool bar, dimension tool bar

**TEXT BOOK:**

- Engineering Drawing by N.D. Bhatt & V.M. Panchal. (Charotar Publishing House,Anand).

**REFERENCE BOOK:**

- Engineering Drawing by Prof.K.L.Narayana & Prof. R.K.Kannaiah. SciTech Publisher.

**ENGINEERING CHEMISTRY LABORATORY**

**LIST OF EXPERIMENTS:**

1. Determination of purity of washing soda
2. Determination of alkalinity of water
3. Determination of iron from Mohr's salt by permanganometry
4. Determination of iron from hematite by dichrometry
5. Determination of copper from brass by iodometry
6. Determination of available chlorine in bleaching powder.
7. Determination of hardness of water by EDTA method
8. Determination of tin and lead from solder by complex metric titrations
9. Determination of chloride by precipitation titration method
10. Determination of calcium by semi gravimetric method
11. Preparation of phenol-formaldehyde resin
12. Chemistry of blue printing

**DEMONSTRATION:**

13. Acid-Base titration by pH meter, conductivity meter and potentiometer
14. Determination of viscosity of viscosity of lubricating oil.

**Computer Programming Lab****CYCLE-I Basics of Hardware and Software Exercises:**

1. Explore Mother Board components and Layouts, identifying external ports and interfacing, identifying PCI cards and interfacing.
2. Practice partitioning and formatting Hard disks.
3. Install and Uninstall system and application software.
4. Understand BIOS configuration.
5. Connect 2 or more computers in a LAN network.
6. Assembling a Computer and troubleshooting a Computer.
7. Study and practice of operating system commands
  - a. Study and practice of directory Related Utilities.
  - b. Study and practice of file and Text Processing Utilities.
  - c. Study and practice of disk, Compress and Backup Utilities.
  - d. Study and practice of Networking Utilities

**CYCLE-II Programming Exercises:****1.Exercises on data types and operators?**

- a) Practice exercises 3.1 to 3.16 and 4.1 to 4.17 and 14.1 to 14.20 Test your C Skills - yaswanth kanitkar text book.
- b) Write a program which determines the largest and the smallest number that can be stored in different data types of like short, int., long, float and double. What happens when you add 1 to the largest possible integer number that can be stored?
- c) Write a program to find greatest of three numbers using conditional operator?
- d) Write a program to swap two numbers with and without temp variable?
- e) Practice a program using multiple unary increment and decrement operators in arithmetic expressions?

**2. Exercises on control structures?**

- a) Practice exercise 2.1 to 2.15 Test your C Skills - yaswanth kanitkar text book.
- b) Write a program to find greatest of three numbers? Use nested if, if else if and switch statements?
- c) Write a program to read marks of a student and print the sum and average? Display the grade based on the sum of marks?
- e) write a program to count the digits of a number? Use for loop
- f) Write a program to check whether a number is perfect or not? Use do-while
- g) Write a program to check whether a number is strong or not? Use while
- h) Write a program to check whether a number is amstrong or not? Use for
- i) Write a program to check whether a number is palindrome or not? Use for
- j) Write a program to find the Fibonacci series upto the given number? Use while
- k) Write a program to print the pascals triangle? Used do-while
- l) Write a program to print the result of the series  $1+x^2/2+x^3/3+\dots+x^n/n$

### **3. Exercises on functions?**

- a) Practice exercise 5.1 to 5.14 Test your C skills -yaswanth kanitkar text book.
- b) Write program to swap two variables using functions?  
Write a program to perform menu driven arithmetic operations using functions?
- c) Write a program to find the factorial of a number using recursive and non- recursive functions?
- d) Write a program to find the Fibonacci series using recursive functions?
- e) Write a program to find the solution for towers of Hanoi using recursive function?
- f) Write a program to pass parameters to a functions using call by value and call by reference?

### **4. Exercises on Arrays?**

- a) Practice exercise 9.1 to 9.17 Test your C skills - yaswanth kanitkar text book.
- b) Write a program to read n numbers and sort them?
- c) Write a program to find the minimum and maximum numbers of the array?
- d) Write a program to read two matrices and find their sum, difference and product of them?
- e) Find the transpose of a matrix?
- f) Write a program to print upper and lower triangle of a given matrix?

### **5. Exercises on strings?**

- a) Practice exercise 10.1 to 10.15 yaswanth kanitkar text book.
- b) Write a program to demonstrate the use of string manipulation functions?
- c) Write a program to compare two strings?
- d) Write a program to sort the names in Alphabetical order?

### **6. Exercises on pointers?**

- a) Practice exercise 7.1 to 8.26 yaswanth kanitkar text book.
- b) Write a program to read dynamic array and sort the elements?
- c) Write a program to read dynamic array and find the minimum and maximum of the elements?
- d) Write a program to perform pointer arithmetic?
- e) Write a program on pointers for strings?
- f) Write a program to use array of pointers?

### **7. Exercises on structures?**

- a) Practice exercise 11.1 to 11.30 yaswanth kanitkar text book.
- b) Write a program to create student structure and read marks of three subjects and find the sum and total of the student?
- c) Write a program on arrays of structures for 60 students record using the above student structure?
- d) Write a program for complex structure? Perform addition, subtraction and multiplication of two complex numbers?
- e) Write a program for addition and multiplication of two polynomials?



### **8. Write a program on Files?**

- a) Practice exercise 12.1 to 12.20 yaswanth kanitkar text book.
- b) write a program to append content of a file?
- c) Write a program to display the content of a file?
- d) Write a program to copy content of one file to other file?
- e) Write a program to count the no of characters in a file?
- f) Write a program to compare the contents of two files?

### References:

1. Test your C Skills by – Yaswanth Kanithkar-BPB Publishers
2. C programming; Test your skills-A.N.Kamthane-Pearson India

**WORKSHOP**

**LIST OF EXPERIMENTS:**

**Minimum three experiments should be conducted from each trade**

**1. CARPENTRY**

**To make the following jobs with hand tools**

- a) Lap joint b) Lap Tee joint c) Dove tail joint d) Mortise & Tenon joint
- e) Cross-Lap joint

**2. WELDING USING ELECTRIC ARC WELDING PROCESS / GAS WELDING.**

**The following joints to be welded.**

- a) Lap joint b) Tee joint c) Edge joint d) Butt joint e) Corner joint

**3. SHEET METAL OPERATIONS WITH HAND TOOLS.**

- a) Rectangular Tray b) Triangular Tray c) Pipe Joint d) Funnel e) Rectangular Scoop

**4. HOUSE WIRING**

- a) To connect one lamp with one switch
- b) To connect two lamps with one switch
- c) To connect a fluorescent tube
- d) Stair case wiring
- e) Go down wiring

**REFERENCE BOOKS:**

- 1. Kannaiah P. & Narayana K. C., "Manual on Work Shop Practice", Scitech Publications, Chennai, 1999.
- 2. Workshop Lab Manual, R.V.R. & J.C. College of Engineering, Guntur

**Mathematics-II****Unit-I**

Ordinary differential equations (first order): Introduction, variables separable equations, Linear equations, Bernoulli's equations, Exact equations, equations reducible to exact equations, Orthogonal trajectories, Newton's law of cooling, Rate of Decay of Radio-Active Materials.

**Unit-II**

Ordinary differential equations (higher order): Linear Differential equations: Definition, Theorem, Operator D, Rules for finding the complementary function, Inverse operator, Rules for finding the particular integral, Working procedure to solve the equation, Linear dependence of solutions, Method of variation of parameters, Equations reducible to linear equations, Cauchy's homogeneous linear equation, Legendre's linear equation, Simultaneous linear equations with constant coefficients.

**Unit-III**

Laplace Transforms : Introduction, Transforms of elementary functions, Properties of Laplace Transforms, existence conditions, Transforms of derivatives, Integrals, multiplication by  $t^n$ , division by  $t$ , Evaluation of integrals by Laplace Transforms, Inverse transforms, convolution theorem, Application to Differential equations with constant coefficients, transforms of unit step function, unit impulse function, periodic function.

**Unit-IV**

**Vector Calculus:** Scalar and vector point functions, Del applied to scalar point functions. Gradient, Del applied to vector point functions, Physical interpretation of divergence, Del applied twice to point functions, Del applied to products of point functions, Integration of vectors, Line integral, Surfaces, Green's theorem in the plane (without proof), Stoke's theorem (without proof), Volume integral, Gauss divergence Theorem (without proof),.

Text book

1]. Higher Engineering Mathematics by B.S. Grewal, 43<sup>rd</sup> edition, Khanna publishers, New Delhi.

**Reference books:**

- [1]. Advanced Engineering Mathematics by kreyszig.
- [2]. Engineering Mathematics by Babu Ram.
- [3] Engineering Mathematics – I BY N.P. Bali, Satyanarayana Bhavanari and Indrani Kelker Laxmipublications, New Delhi.
- [4] Mathematical Foundations for Computer Sciences- by Satyanarayana Bhavanari, Pradeep Kumar T.V, Shaik Mohiddin shaw, BSP Publications

**Engineering Physics-II****Unit-I****12 Periods****Principles of Quantum Mechanics**

Dual nature of light, Matter waves & properties, de Broglie's concept of matter waves, Davisson and Germer experiment, Heisenberg's uncertainty principle and applications (non-existence of electron in nucleus). One dimensional time independent Schrodinger's wave equation, Physical significance of the wave function, Particle in a box (one dimensional).

**Unit-II****12****Periods**

**ELECTRON THEORY OF METALS:** Classical free electron theory - Mean free path - Relaxation time and drift velocity - Quantum free electron theory - Fermi - Dirac (analytical) and its dependence on temperature - Fermi energy, Hall effect and its uses.  
**BAND THEORY OF SOLIDS:** Bloch theorem (qualitative) - Kronig - Penney model - Origin of energy band formation in solids - Classification of materials into conductors, semi- conductors & insulators -Concept of effective mass of an electron.

**Unit-III****12****Periods****Dielectric and Magnetic Materials**

Electric dipole moment, polarization, dielectric constant, polarizability, types of polarizations, internal fields (qualitative), Clausius-Mossotti equation, Frequency dependence of polarization, Ferroelectrics and their applications.

Origin of magnetic moment of an atom, Bohr magneton, classification of dia, para and ferro magnetic materials on the basis of magnetic moment, Hysteresis curve, soft and hard magnetic materials, Ferrites and their applications.

**UNIT –IV****Advanced Materials of Physics****14****Periods**

**Optoelectronic devices:** Qualitative treatments of Photo diode, LED and LCD; Solar cell and its characteristics.

**Superconductivity:** First experiment, critical parameters ( $T_c$ ,  $H_c$ ,  $I_c$ ), Meissner effect, types of superconductors, BCS Theory (in brief) and Applications of superconductors.

**NanoTechnology :** Introduction to nano materials, nano scale, surface to volume ratio, fabrication of nanomaterials, sol-gel and chemical vapour deposition methods, Carbon nano tubes-preparation and properties (thermal, electrical and mechanical - in brief), some applications of nanomaterials.

**TEXT BOOKS**

1. Engineering Physics - R .K. Gaur & S. L. Gupta , Danpati Rai Publications, Delhi, 2001.
2. Engineering Physics – V. Rajendran, Tata MacGraw Hill, New Delhi, 2009.

**REFERENCE BOOKS**

1. Engineering Physics-P.K. Palanisamy, Scitech Publications PVT. Ltd, New Delhi
2. Engineering Physics – M.R. Srinivasan, New age International Publishers, New Delhi
3. Materials science – M.Vijaya and G.Rangarajan, TMH, New Delhi
4. Engineering Physics, D.K. Bhattacharya and Poonam Tandon, Oxford university Press, New Delhi

**ENGINEERING CHEMISTRY -II****UNIT-I: CHEMISTRY OF NANOMATERIALS**

Introduction to nano chemistry, preparation of nano materials - carbon nanotubes and fullerenes and their engineering applications.

**UNIT-II: INSTRUMENTAL METHODS OF ANALYSIS**

Basic principles, instrumentation and applications of UV-Visible, Infra-Red, Nuclear Magnetic Resonance (NMR), Gas Chromatography and High Performance Liquid Chromatography.

**UNIT-III: SOLID STATE CHEMISTRY**

Band theory of solids, types of semiconductors, preparation of semiconductors and semiconductor devices.

**UNIT-IV: SOLAR ENERGY HARNESSING**

Fundamentals, Conversion into electrical energy, Photovoltaic and Photogalvanic energy storage, Semiconductor photoelectrochemical cells, Photoelectrochemical reactions, Regenerative photoelectrochemical cells, Basic problems, Photocorrosion and protection of semiconductor electrodes, Protective coatings, Coatings of metals and electrically conductive polymers, Electrodes with chemically modified surfaces.

**Prescribed Text Books**

1. Engineering Chemistry, P.C. Jain and M. Jain – Dhanapath Rai & Sons, Delhi
2. Text book of Nano Science and Nano technology, B.S. Murthy and P. Shankar, University press.
3. Text book of engineering chemistry, Shashi chawla, Dhanapath rai & sons, Delhi.
4. Gurudeep raj & chatwal anand , “Instrumental methods of analysis “, 7<sup>th</sup> edition, CBS publications, 1986.
5. Quantitative analysis by day&underwood.
6. A Text book of Instrumental methods by Skoog and West.
7. H.W. Wilard and demerit, “Instrumental methods of analysis “, 7<sup>th</sup> edition, CBS publications, 1986.

**ENGINEERING MECHANICS -II****UNIT- I**

**Kinematics of Rectilinear Motion:**Introduction to dynamics, displacement, velocity, acceleration, motion with uniform and variable acceleration.

**Kinetics of Rectilinear Motion:**Equations of rectilinear motion - motion of a particle acted upon by a constant force – D’Alemberts principle, work and energy, impulse momentum, conservation of energy, collision of elastic bodies – direct central impact.

**UNIT-II**

**Kinematics of Curvilinear Motion:**Introduction, components of motion- rectangular components – normal and tangential components.

**Kinetics of Curvilinear Motion:**Equations of motion- Rectangular components- tangential and normal components, Equations of dynamic equilibrium- D’Alembert’s principle, Work and Energy.

**UNIT-III**

**Rotation of a rigid body about a fixed axis:**Kinematics of rotation, Equation of motion for a rigid body rotating about a fixed axis, rotation under the action of constant moment.

**UNIT-IV**

**Kinematics of Plane Motion:**Concepts of Relative velocity and instantaneous center.

**Kinetics of Plane Motion:**Equations of motion, Dynamic equilibrium of symmetrical rolling bodies.

**LEARNING RESOURCES (For both I and II semesters)****TEXT BOOKS:**

3. *Engineering Mechanics* by S. Timoshenko, D.H. Young and J V Rao –Tata McGraw-Hill publishing Company Limited, New Delhi(For concepts), 2009
4. *Engineering mechanics –statics and dynamics* by A.K TAYAL –UMESH publications, Delhi (For numerical problems), 2008

**REFERENCE BOOKS:**

5. *Engineering Mechanics* by S.S.Bhavikatti, New Age International publishers, 2012
6. *Engineering Mechanics- Statics and Dynamics* by Irving H. Shames, Pearson Education, 2006.
7. *Singer’s Engineering Mechanics: Statics and Dynamics*, K. Vijaya Kumar Reddy and J Suresh Kuma, 3<sup>rd</sup> Edition SI Units-BS Publications, 2010.

*A Textbook of Engineering mechanics statics and dynamics* by J.L. Meriam and L. Kraige, 6<sup>th</sup> Edition, Wiley & Sons ,2010.

**ENVIRONMENTAL SCIENCE AND ENGINEERING****UNIT-I****Introduction:**

Definition, Scope and Importance.

**Natural Resources:**

Forest Resources – Use and over-exploitation, Deforestation, Mining, dams and their effects on forests and tribal people; Water Resources – Use and over-utilization of surface and ground water, floods and droughts, Water logging and salinity, Dams – benefits and problems, Conflicts over water; Energy resources – Energy needs, Renewable and non-renewable energy sources; Land resources – Land as a resource, land degradation, soil erosion & desertification, Effects of modern agriculture on land resources.

**Ecosystems:**

Definition, Structure and functions of an Ecosystems, Biogeochemical cycles-water, carbon, nitrogen and water cycles, Types-Forest, Grassland, Desert, Aquatic ecosystem.

**UNIT-II****Biodiversity and its Conservation:**

Definition, Value of biodiversity. Bio-geographical classification of India, India as a mega-diversity nation, Hot-spots of biodiversity, Threats to bio-diversity, Endemic and endangered species of India, Conservation of biodiversity.

**Environmental Pollution:**

Causes, effects and control measures of Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, nuclear pollution, Solid waste management.

**UNIT-III****Social Issues and Environment:**

From unsustainable to sustainable development, Population growth and environment, Green revolution, Rain water harvesting, watershed management, cloud seeding, Resettlement and rehabilitation of people - problems and concerns, Environmental Impact Assessment.

**Climate Changes:** Global warming & Green house effect, Acid rain, Ozone layer depletion.

**UNIT-IV****Environmental acts:**

Prevention and Control of Water pollution & Air Pollution act, Environmental protection act, Wildlife protection act, Forest Conservation act.

**International Conventions:**

Stockholm Conference 1972, Earth Summit 1992. Copenhagen Summit 2009.

**Case Studies:** Chipko movement, Narmada Bachao Andolan, Silent Valley Project, Madhura Refinery and TajMahal, Chernobyl Nuclear Disaster, Ralegaon Siddhi, Florosis and Bhopal Tragedy.

**Field work:**

Visit to a local area to document environmental assets – river/ forest/ grassland / hill /mountain. Study of local environment-common plants, insects, birds. Study of simple

ecosystems – pond, river, hill, slopes etc. Visits to industries, water treatment plants, effluent treatment plants.

**Text Books**

1. Environmental Studies, by Dr. Suresh K. Dhameja, Published by S.K. Kataria & Sons, Ludhiana.

**Reference Books**

1. Environmental studies by Anubha Kaushik and C.P.Kaushik., New Age International Publishers, New Delhi.

2. T Benny Joseph, Environmental Studies, the Tata McGraw-Hill Publishing Company Limited, New Delhi.

3.Environmental chemistry by A.K.De.



**CE/ME/CHE-126**

**2-0-3**

**ENGINEERING DRAWING -II**

**Unit – I**

**Development of surfaces:** Lateral development of cut sections of Cubes, Prisms, Pyramids, Cylinders and Cones.

**Unit – II**

**Intersection of solids:** Interpenetration of Right Regular solids. Intersection of Cylinder Vs Cylinder, Cylinder Vs Cone, Cylinder Vs Prism.

**Unit – III**

**Isometric projections :** Isometric Projection and conversion of Orthographic Projections into isometric views. (Treatment is limited to simple objects only).

**Orthographic projections:** Conversion of Pictorial views into Orthographic views.

**Unit – IV**

**Perspective projections:** Perspective View: Points, Lines, Plane figures and Simple Solids, Vanishing Point Methods(General Method only).

**Unit - V(Demonstration only).**

**Computer Aided Drafting (using any Standard Package):**

Practice of 2 D drawing: Exercise of orthographic views for simple solids using all commands in various tool bars.

**TEXT BOOK:**

- Engineering Drawing by N.D. Bhatt & V.M. Panchal. (Charotar Publishing House, Anand).
- AutoCAD for Engineering Drawing Made Easy by P.Nageswara Rao

**REFERENCE BOOK:**

- Engineering Drawing by Prof.K.L.Narayana & Prof. R.K.Kannaiah. SciTech Publisher.
- Engineering Graphics with AutoCAD by James D. Bethune

**Basic English for Engineers**

## UNIT-1:

1. Listening Skills: The boy who broke the bank (English and Soft Skills)
2. Sonnet - To Science (The Siren's Song)
3. Vocabulary Building: One-Word Substitutes, Words Often Confused
4. Reading Comprehension

## UNIT- II:

1. Written Communication Skills: Gateman's Gift (English and Soft Skills)
2. Work without Hope (The Siren's Song)
3. Grammar: Correction of Sentences
4. Writing: Letter Writing-- Formal and Informal Letters

## UNIT - III:

1. Assertive Skills: The Verger (English and Soft Skills)
2. Seven Ages of Man (The Siren's Song)
3. Writing: Note- Taking, Note-Making
4. Paragraph Writing: Technical Description-Process, Object

## UNIT - IV:

1. Teamwork Skills: Whitewashing the fence (English and Soft Skills)
2. Ozymandias (The Siren's Song)
3. Vocabulary Building: Idioms
4. Writing: Essay Writing

**TEXTBOOKS:**

1. S.P.Dhanavel, *English and Soft Skills*, New Delhi: Orient Black Swan Pvt. Ltd., 2013.
2. David Murdoch, *The Siren's Song: An Anthology of British and American Verse*, Madras, Orient Longman, 1993.
3. V.R.Narayanaswami, *Strengthen Writing 3rd Edition* New Delhi: Orient Blackswan Private Ltd., 2009.

**REFERENCE BOOKS:**

1. Dr. Shalini Verma, *Word Power Made Handy*, S.Chand & Co Ltd., 2009.
2. Sharon J.Gerson, Steven M.Gerson, *Technical Writing*, New Delhi: Pearson education, 2007.
3. Sanjay Kumar and Pushp Lata, *Communication Skills*, Noida: Oxford University Press, 2012.
4. M. Ashraf Rizvi, *Effective Technical Communication*, New Delhi: Tata Mc-Grew Hill, 2009.
5. Bikram K. Das, Kalyani Samantray, Rath Nayak, Susmita Pani & Saveeta Mohanty, *An Introduction to Professional English and Soft Skills*, New Delhi: Foundation Books, 2009.

**Engineering Physics Lab**

**Any 15 experiments from the following list**

**LIST OF EXPERIMENTS**

1. Compound pendulum –Determination of acceleration due to gravity (g)
2. Interference fringes - measurement of thickness of a foil / diameter of Wire using wedge method.
3. Sensitive galvanometer - Determination of figure of merit
4. Newton's rings – Measurement of radius of curvature of plano convex lens
5. Lissajous' figures –Calibration of an audio oscillator
6. Photo cell – I-V Characteristic curves and determination of stopping potential
7. Diffraction grating – Measurement of wavelengths
8. Torsional pendulum- Determination of rigidity modulus of the wire material.
9. Carey- Foster's bridge: Determination of specific resistance/Temperature coefficient of resistance.
10. Photo voltaic cell - Determination of fill-factor
11. Variation of magnetic field along the axis of a current carrying circular coil.
12. Series LCR resonance circuit - Determination of "Q" factor.
13. Thomson's method - determination of e/m of an electron.
14. Determination of a.c. Frequency – Sonometer.
15. Prism/Grating - Determination of dispersive power.
16. To determine the wavelength of Laser source.
17. Hall effect – Determination of Hall coefficient.
18. Determination of energy band gap.
19. Determination of Numerical Aperture of an optical fiber.
20. Determination of Amplitude and Frequency of an AC signal using a CRO.

**English Communication Lab**

Module-1 Communication Skills

- a) Types of Communication
- b) Barriers to Communication
- c) Strategies for Effective Communication
- d) Verbal Communication Skills
- e) Non- verbal Communication Skills

Module-2: Advanced Vocabulary

- a) Word List (GRE & TOEFL related)
- b) Catchphrases
- c) Idioms

Module-3: Employability Skills

- a) Interview Skills
- b) Group Discussion
- c) Debate
- d) Resume Writing

Module-4: Telephonic Skills

- a) Formal & Informal interaction
- b) Receiving Messages & Complaints
- c) Tone modulation

Module-5: Descriptive Skills

- a) Process Description
- b) Picture Description
- c) Narration
- d) Email Etiquette

Module-6: Behavioural Skills

- a) Dress code & Conduct
- b) Personality Development
- c) Team Work
- d) Motivation
- e) Organization Skills

**Suggested Software:**

1. Globarena Software
2. K-Van Solutions Software
3. Centronix Software
4. Clarity English Software
5. Train 2 Success- CD Series (Zenith Global Consultancy)

### Suggested List of Tasks:

<b>Module 1</b>	1. Tips for effective communication 2. Videos can be shown to make the students learn the importance of non-verbal communication
<b>Module 2</b>	3. Number of Worksheets will be given on Vocabulary enhancement 4. By conducting Quiz
<b>Module 3</b>	5. Mock Interviews can be conducted 6. Peer Discussions can be conducted
<b>Module 4</b>	7. Listening to Mock-Telephoning Skills 8. Role Plays can be conducted on telephonic conversations
<b>Module 5</b>	9. Pictorial descriptions 10. Narrating situations/stories
<b>Module 6</b>	11. Tips to improve personality development 12. Case studies on team work and organizational skills

**NOTE:** 10 Lab Activities are minimum in Record.

**Reference Books:** Books Suggested for English Language Lab Library (to be located within the lab in addition to the CDs of the text book which are loaded on the systems):

1. *Communicate to Conquer: A Handbook of Group Discussions and Job Interviews* with CD, PHI Publications.
2. *The ACE of Soft Skills: Attitude, communication and Etiquette for Success*, by Pearson Publications.
3. Leena Sen, *Communication Skills 2<sup>nd</sup> Edition*, PHI, 2007.
4. Stephen P. Robbins and Timothy A. Judge, *Organizational Behavior 13<sup>th</sup> Edition*, PHI, 2009.
5. Meenakshi Raman and Prakash Singh, *Business Communication*, Oxford University Press, 2006.
6. Sanjay Kumar and Pushp Lata, *Communication Skills*, Oxford University Press, 2011.
7. Dr. Shalini Verma, *Word Power Made Handy*, S.Chand & Co Ltd., 2009.

## II YEAR I SEMESTER

Course Details		Scheme of instruction			Scheme of Examination				
Code	Subject	L	T	P	Maximum Internal Marks	Maximum External Marks	Total	Credits	Cat. Code
ME 211	Engineering Mathematics-III	4	1	0	40	60	100	4	BSC
ME 212	Kinematics of Machines	4	1	0	40	60	100	4	PCC
ME 213	Mechanics of Materials - I	4	1	0	40	60	100	4	ESC
ME 214	Material science & Metallurgy	4	0	0	40	60	100	3	ESC
ME 215	Basic Thermodynamics	4	1	0	40	60	100	4	PCC
ME 216	Electrical Technology	4	0	0	40	60	100	3	ESC
ME 251	Advanced Communication Skills Lab (Audit)	0	0	4	40	60	100	0	BSC
ME 252	Machine Drawing & Computer Aided Drafting Lab	0	0	4	40	60	100	2	PCC
ME 253	Material Testing Laboratory	0	0	4	40	60	100	2	ESC
	<b>Total</b>	<b>24</b>	<b>4</b>	<b>12</b>	<b>360</b>	<b>540</b>	<b>900</b>	<b>26</b>	

## II Year II-Semester

Course Details		Scheme of instruction			Scheme of Examination				
Code	Subject	L	T	P	Maximum Internal Marks	Maximum External Marks	Total	Credits	Cat. Code
ME 221	Engineering Mathematics-IV	4	1	0	40	60	100	4	BSC
ME 222	Casting Welding & Metal Working	4	0	0	40	60	100	3	PCC
ME 223	Mechanics of Materials - II	4	1	0	40	60	100	4	ESC
ME 224	Fluid Mechanics & Hydraulic Machines	4	1	0	40	60	100	4	ESC
ME 225	Applied Thermodynamics	4	1	0	40	60	100	4	PCC
ME 226	Human values and Prof. Ethics/Life Skills (Audit)	2	0	0	40	60	100	0	BSC
ME 261	Basic Manufacturing Process Lab	0	0	4	40	60	100	2	PCC
ME 262	F.M & H.M Lab	0	0	4	40	60	100	2	ESC
ME 263	Soft Skills Lab	0	0	4	40	60	100	2	BSC
	<b>Total</b>	<b>22</b>	<b>4</b>	<b>12</b>	<b>360</b>	<b>540</b>	<b>900</b>	<b>25</b>	

Lectures : 4+1 Periods / week  
University Exam. : 3 hrs.

Sessional Marks : 40  
University Exam. Marks : 60

### **UNIT-I**

#### **Partial Differential Equations :**

Introduction, Formation of Partial Differential Equations, Solutions of a Partial Differential Equation, Equations solvable by direct Integration, Linear Equations of the first Order, Non-Linear Equations of the first Order, Charpit's Method, Homogeneous Linear Equations with Constant Coefficients, Rules for finding the Complementary Function, Rules for finding the Particular Integral, Non-Homogeneous Linear Equations.(18)

### **UNIT-II**

#### **Integral Transforms:**

Introduction, Definition, Fourier Integrals-Fourier sine and cosine integrals, Complex form of the Fourier Integral, Fourier Transforms, Properties of Fourier Transforms, Finite Fourier sine and cosine transforms, Convolution theorem( without proof), Parseval's Identity for Fourier Transforms(without proof), Fourier Transforms of the derivatives of a function. (18)

### **UNIT-III**

#### **Solution of Algebraic and Transcendental Equations:**

Introduction, Newton- Raphson Method, Solutions of Simultaneous Linear Equations: Direct Methods of Solution- Crout's triangularisation method (LU – decomposition method), Iterative Methods of Solution - Gauss-Seidel Iteration Method.(8)

#### **Finite Differences and Difference Equations:**

Introduction, Finite Difference operators, Symbolic relations, Differences of a polynomial, Newton's forward and backward difference interpolation Formulae, Central Difference Interpolation Formulae-Gauss's Forward and Stirling's formulae, Interpolation with Unequal- Intervals-Lagrange's Interpolation , inverse interpolation. Difference Equations: Introduction, Formation, Linear difference equations - Rules for Finding the Complementary Function, Rules for Finding the Particular Integral.(10)

### **UNIT-IV**

#### **Numerical Differentiation:**

Finding First and Second order Differentials using Newton's formulae , Numerical Integration : Trapezoidal rule , Simpson's one-third rule, Numerical Solution of Ordinary and Partial Differential Equations - Euler's Method, Picard's Method, Runge- Kutta Method of fourth order (for first order equations , Simultaneous equations) Classification of Partial Differential Equation of second order, Solutions of Laplace's and Poisson's Equations by iteration methods.(18)

**Text Book:** Higher Engineering Mathematics by B.S.Grewal Khanna publishers, 39<sup>th</sup> edition.

#### **Reference Books:**

A textbook of Engineering Mathematics by N.P. Bali  
Advanced Engineering Mathematics by Erwin Kreyszig John Willy and sons



**ME 212 KINEMATICS OF MACHINES***II Year B.Tech. (Mech) First Semester*

Lectures / Tutorials : 4+1 Periods / week      Sessional Marks : 40  
 University Exam. : 3 hrs.      University Exam. Marks : 60

**UNIT I**

**Introduction:** Mechanisms and machines, Rigid and resistant bodies, Link, Kinematic pair, Degrees of Freedom, Classifications of Kinematic pairs, kinematic-chain, Linkage, Mechanism, and structure, Classification of mechanisms, Equivalent Mechanisms, Four - Link (bar) Mechanism, Inversions of Slider - Crank Chain, Double – Slider Chain.(8)

**Velocity Analysis:** Introduction, Absolute and Relative Motion, Vectors, Addition and subtraction of Vectors, Motion of a Link, Four Link Mechanism, Angular Velocity of Links, Velocity of Rubbing, Slider - Crank Mechanism, Crank and Slotted Lever Mechanism. (10)

**UNIT II**

**Instantaneous centre:** Notation, Number of I - Centres, Kennedy's theorem, Locating I - Centres, Angular velocity by I - Centre Method. (6)

**Acceleration Analysis:** Acceleration, Four-Link Mechanism, Angular acceleration of Links, Acceleration of Intermediate and offset points, slider-Crank Mechanism, Coriolis acceleration component, Crank and slotted lever Mechanism.(12)

**UNIT III**

**Kinematic Synthesis:** Stages of synthesis-Concepts of type, Number and dimensional synthesis - Tasks of dimensional synthesis, Concepts of function generation, Rigid body guidance and path generation, Freudenstein equation for function generation using three precision points.(8)

**Cams :**Introduction, Types of cams, Types of Followers, Definitions, Graphical synthesis of cam profile.(Knife Edge, Roller and Flat faced Followers). (10)

**UNIT IV**

**Gears:** Introduction, Classification gear terminology, Law of Gearing, Velocity of Sliding, Forms of Teeth, Cycloidal Profile Teeth, Involute Profile Teeth, Path of contact, Arc of contact, Number of pairs of Teeth in contact, Interference in Involute Gears, Minimum number of Teeth, Interference between Rack and Pinion, Undercutting, Comparison of Cycloidal and Involute tooth forms. (10)

**Gear Trains:** Introduction, simple Gear Train, Compound Gear Train, Reverted Gear train, Planetary or Epicyclic Gear Train, Analysis of Epicyclic Gear Train, Torques in Epicyclic Trains. Tabular and Algebraic Methods. (8)

**TEXT BOOKS:**

1. Theory of Machines of by S.S.Rattan. TMH.
2. Theory of Mechanisms and Machines by C.S.Sharma, KamleshPurohit, PHI

**REFERENCE BOOK:**

1. Theory of Mechanisms and Machines by Ghosh and Mallik
2. Mechanism and Machine Theory by J.E. Shigley, MGH

**ME 213 MECHANICS OF MATERIALS- I**

II Year B.Tech. (Mech) First Semester

Lectures : 4 +1 Periods / week      Sessional Marks : 40  
 University Exam. : 3 hrs.                      University Exam. Marks : 60

**UNIT I**

**Tension, Compression and Shear** : Introduction, Normal Stress and Strain, Stress- Strain Diagrams, Elasticity and Plasticity, Linear Elasticity and Hooke's Law, Shear Stress and Strain, Allowable Stresses and Loads.(10)

**Axially Loaded Members:** Introduction, Deflections of Axially loaded Members, Displacement diagrams (8)

**UNIT II**

**Statically Indeterminate Axially Loaded Members:** Statically indeterminate structures (Flexibility method and Stiffness method) (8)

Temperature and Pre-strain effects, Strain energy of axially loaded members subjected to static load, Dynamic loading (10)

**UNIT III**

**Torsion** : Introduction, Torsion of Circular Bars, Pure Shear, Relationship between Modulo of Elasticity E and G, Transmission of power by circular shafts, Strain Energy in pure Shear and uniform Torsion for Statically determinate Members.(7)

**Shear Force and Bending Moment** : Types of Beams, Shear Force and Bending Moment, Relationships between Load, Shear Force and Bending Moment, Shear Force and Bending Moment Diagrams.(11)

**UNIT IV**

**Stresses in Beams:** Introduction, Normal Strains in Beams, Normal Stresses in Beams Strain Energy, Shear Stresses in Rectangular Beams, Shear Stresses in Webs of Beams with flanges.(10)

**Analysis of Stress and Strain:** Plane Stress, Principal Stresses and Maximum Shear Stress, Mohr's Circle for Plane Stress, Hooke's Law for Plane Stress, Unit Volume change, Strain Energy Density. Plane Strain, Mohr's Circle for Plane Strain.(8)

**TEXT BOOKS:**

1. Mechanics of Materials by Gere and Timoshenko, C B S Publishers
2. Mechanics of Solids by Singh, Pearson Education.

**REFERENCE:**

1. Strength of materials by Sadhu Singh, Khanna Publishers.

**ME214 MATERIAL SCIENCE & METALLURGY**

II Year B.Tech. ( Mech) First Semester

<i>Lectures</i>	: 4 Periods / week	<i>Sessional Marks</i>	: 40
<i>University Exam.</i>	: 3 hrs.	<i>University Exam. Marks</i>	: 60

**UNIT I**

**Crystallography:** Classification of crystals – Bravi's lattices – Miller Indices – Packing factor in cubic systems – coordination number – crystal imperfections – crystal deformation – Slip and Twinning. (8)

**Phase Diagrams:** Binary phase diagrams – Phase rule – one component system, two component system, isomorphous, eutectic, eutectoid, peritectic and peritectoid systems. (8)

**UNIT II**

**Heat Treatment of Steels:** Iron–Iron carbide equilibrium diagram, TTT diagrams for eutectoid, hypo and hyper eutectoid steels, martensite and bainitic transformation. (8)

**Heat Treatment:** Annealing, normalizing, hardening, tempering, surface hardening, age hardening, austempering, martempering and hardenability concept and experimental determination. (8)

**UNIT III**

**Strengthening Mechanisms:** Strain hardening, solid solution strengthening, grain refinement, dispersion strengthening. (6)

**Composite Materials:** Properties and applications of Particulate-reinforced composites, fibereinforced composites, Laminar composites and metal matrix composites. (5)

**Nano materials** – Introduction and Applications (2)

**UNIT IV**

**Powder Metallurgy:** Powder metallurgy process, preparation of powders, characteristics of metal powders, mixing, compacting, sintering, Applications of Powder Metallurgy. Forming and shaping of plastics – Extrusion and Injection moulding. (8)

**Ferrous And Non Ferrous Materials:** Composition, properties and application of ferrous and non ferrous metals and their alloys. Brief study of cast iron, steels, copper and aluminium (7)

**TEXT BOOKS:**

1. Introduction to Physical Metallurgy - Avner, McGrawHill
2. Material Science and Metallurgy - V. Raghavan, Pearson Education / PHI.
3. Material Science and Metallurgy - R.B.Choudary - Khanna Pub.

**REFERENCE BOOK:**

1. Material Science and Metallurgy - Dr.V.D.Kodgire, Everest Publishers
2. Nano materials – J.Dutta&H.Hofman
3. Manufacturing Engineering & Technology – Kalpak Jain &Schmid, Pearson / PHI.

**ME 215 BASIC THERMODYNAMICS**

II Year B.Tech. (Mech) ---First Semester

Lectures / Tutorials : 4+1 Periods / week      Sessional Marks : 40

University Exam. : 3 hrs.      University Exam. Marks : 60

**UNIT I**

**Fundamental Concepts and Definitions:** Introduction, Macroscopic and microscopic points of view, Thermodynamic system and control volume, Perfect gases, properties and state of a substance, Thermodynamic equilibrium and Quasi-static Process, thermodynamic path, reversible and irreversible processes, factors that render a process irreversible, cycle, Zeroth law of thermodynamics, concept of temperature. (10)

**Work and Heat:** Definitions and units, Work done at the moving boundary of a system, work done in various non-flow processes, comparison of heat and work. (8)

**UNIT II**

**First Law of Thermodynamics for Non-Flow Systems:** First law for a system undergoing a cycle and for a change in state of system, internal energy and enthalpy, constant volume and constant pressure specific heats and their relation to internal energy and enthalpy of ideal gases (8)

**First Law of Thermodynamics for Flow Systems:** Control mass and control volume, first law of thermodynamics for a control volume, Steady flow energy equation and its application to engineering equipment. (10)

**UNIT III**

**Second Law of Thermodynamics:** Limitations of first law, PMM of first kind, Heat engines and Refrigerators, Statements of Second law, PMM of second kind, Carnot cycle and Carnot theorems, Thermodynamic temperature scale. (8)

**Entropy:** Inequality of Clausius, Entropy change in reversible process, T-ds relations, Entropy change of a system during an irreversible process, Principle of increase of entropy, Applications, Entropy change of an ideal gas, Availability, Maximum work. (10)

**UNIT IV**

**Gas Power Cycles:** Air standard Carnot cycle, Otto cycle, Diesel cycle, Dual Combustion cycle and Brayton cycle, Air standard efficiency and MEP. (8)

**Pure Substance:** Definition, process of steam generation, P-v, T-s and h-s diagrams, properties of saturated and superheated steam, Use of Steam Tables, Mollier chart. (10)

**TEXT BOOKS:**

1. Engineering Thermodynamics- P.K.Nag, TMH, New Delhi.
2. Thermal Science and Engineering- D.S.kumar, S.K.Katariapubl, New Delhi.
3. Thermodynamics—Rajput, LaxmiPubl, New Delhi.

**REFERENCE BOOKS:**

1. Fundamentals of Engineering Thermodynamics-Rathakrishnan-PHI, New Delhi.
2. Thermodynamics -- J.P.Holman, MGH, New York.
3. Engineering Thermodynamics—Cengel& Boles, TMH

**Note: Use of Steam Tables is permitted in University Examinations.**

**ME 216 ELECTRICAL TECHNOLOGY***II Year B.Tech. (Mech) First Semester*

<i>Lectures</i>	<i>: 4 Periods / week</i>	<i>Sessional Marks</i>	<i>: 40</i>
<i>University Exam.</i>	<i>: 3 hrs.</i>	<i>University Exam. Marks</i>	<i>: 60</i>

**UNIT I**

**DC and AC circuits:** Kirchoffs laws, simple circuits -Alternating current - waveforms -RMS - Average values-simple R-L-C- circuits. Power factor, 3-phase Balanced circuits. (7)

**D.C. Machines** - Constructional features - Methods of excitation-Load characteristics of shunt, series, compound generators-Torque development in motor-Torque equation. (8)

**UNIT II**

Load and speed control Characteristics of shunt, Series and compound motors-losses and efficiency of motors and generators-principle of starters-3 point starter only. (8)

**Transformers** :E.M.F. equation-equivalent circuit - regulation - losses and efficiency - open circuit and short-circuit tests. (7)

**UNIT III**

**Induction machines** :Constructional features-Principle of operation- concept of rotating magnetic field, torque-slip characteristics - Principle of starters, Fundamentals of single- phase induction motors and their starting. (8)

**Synchronous machines** :Principle - constructional features E.M.F. equation-applications of synchronous motors. (7)

**UNIT IV**

**Measuring Instruments** :Principles and operation of moving - coil and moving-iron instruments-Dynamometer-type wattmeter. (8)

**Utilization:** Principles of resistance and induction heating - principles of electrical traction-speed time characteristics. (7)

**TEXT BOOKS :**

1. Electrical Technology by B.L. Theraja, (S. Chand & Co.)
2. A course in Electrical Power by Soni, Gupta, Bhatnagar.

**REFERENCE BOOKS :**

1. Electrical Technology by H. Cotton (Sir Issac Pittman & Sons Ltd., London).
2. Utilization of Electrical Energy by Openshaw& Taylor
3. Electrical Machinery by P.S. Bimbira
4. Electrical Technology by B. Hughes (ELBS)

## ME 251 Advanced English Communication Skills Lab (Audit)

*(Common to CE/ME branches)*

Lectures: 3 Periods

Sessional Marks: 40

University Exam: 3 hours

University Examination Marks: 60

### Course Objectives:

The main course objective of *Advanced English Communication Skills Lab* is to develop the student's Verbal and Non-Verbal Communication, Cognitive and Poignant Skills, Interview Skills, Employability and Interpersonal skills, which relate to situations in the work place. The skills imparted to the learners are body language, leadership, time management, team management, assertive skills, group discussions, interview techniques and positive work ethics ...etc.

The methodology includes Interactive sessions, Role Play, Team Work/Group Work/Pair Work and Peer Evaluation. The emphasis is on learning by doing to improve the learners' life skills.

### Course Outcomes:

<b>CO1</b>	To realize the importance of communication skills in job arena To enhance the students ability to communicate
<b>CO2</b>	Able to realize the importance of body language while communicating with others in professional life
<b>CO3</b>	Able to learn vocabulary for GRE, TOEFL, IELTS, IES etc

	and written communication skills
<b>CO4</b>	Capable to participate in all recruitment procedures
<b>CO5</b>	Able to communicate effectively over a phone and proficient to demonstrate telephoning skills
<b>CO6</b>	Able to know the importance of personality development

### **Syllabus:**

#### **Module- I Communication Skills (Ref: 3**

##### **I. Verbal Communication:**

- f) Types of Communication
- g) Barriers to Communication
- h) Strategies for effective communication

#### **Module- II Nonverbal Communication:**

- a) Body Language – Voluntary and Involuntary
- b) Kinesics
- c) Facial Expressions
- d) Proxemics
- e) Oculistics
- f) Haptics and Chronemics

#### **Module- III : Vocabulary and Written Communication Skills:**

- a) Word list (GRE & TOEFL related)
- b) One-word Substitutes
- c) Idiomatic Expressions
- d) Email etiquette

#### **Module- IV: Employability Skills (Ref: 6)**

- e) Interview Skills
- f) Group Discussion
- g) Debate
- h) Resume Writing

**Module- V: Telephonic Skills:**

- a) Formal & Informal interaction
- b) Receiving Messages & Complaints
- c) Tone modulation

**Module-VI: Behavioural Skills:**

- f) Dress code & Conduct
- g) Personality Development
- h) Team Work
- i) Motivation
- j) Organization Skills

**Suggested List of Tasks**

<b>Module 1</b>	<ul style="list-style-type: none"> <li>3. Tips for verbal communication</li> <li>4. Videos can be shown to make the students learn the importance of verbal communication</li> </ul>
<b>Module 2</b>	<ul style="list-style-type: none"> <li>1. Tips for Nonverbal communication</li> <li>2. Videos can be shown to make the students learn the importance of non-verbal communication</li> </ul>
<b>Module 3</b>	<ul style="list-style-type: none"> <li>1. Number of Worksheets will be given on Vocabulary enhancement</li> <li>2. By conducting Quiz</li> </ul>
<b>Module 4</b>	<ul style="list-style-type: none"> <li>1. Mock Interviews can be conducted</li> <li>2. Peer Discussions can be conducted</li> </ul>
<b>Module 5</b>	<ul style="list-style-type: none"> <li>1. Listening to Mock-Telephoning Skills</li> <li>2. Role Plays can be conducted on telephonic conversations</li> </ul>
<b>Module 6</b>	<ul style="list-style-type: none"> <li>1. Pictorial descriptions</li> <li>2. Narrating situations/stories</li> </ul>

**NOTE:** 10 Lab Activities are minimum in Record (100 pages single side book) with

*Contents: Name of the Activity, Source, Skill Improved.*

**Minimum Requirements:**

The Advanced English Communication Skills Lab shall also need two labs. One is Communication Skills Lab with LAN facilitated 60 multimedia systems and software



of the Soft Skills suggested by the concern faculty. The other, Conversational Skills Lab with 5 to 6 round tables, 60 movable chairs and audio-visual Devices with LCD Projector.

**Suggested Software:**

6. Globberena Software
7. K-Van Solutions Software
8. Centronix Software
9. Train 2 Success- CD Series (Zenith Global Consultancy)

**Reference Books:** Books Suggested for English Language Lab Library (to be located within the lab in addition to the CDs of the text book which are loaded on the systems):

8. Communicate to Conquer: A Handbook of Group Discussions and Job Interviews with CD, PHI Publications.
9. The ACE of Soft Skills: Attitude, communication and Etiquette for Success, by Pearson Publications.
10. Communication Skills, Leena Sen, 2<sup>nd</sup> Edition, PHI, 2007.
11. Introduction to Psychology, Dennis Coon and John O. Mitterer, 11<sup>th</sup> Edition, Thompson Wadsworth, 2007.
12. Organizational Behavior, Stephen P. Robbins and Timothy A. Judge, 13<sup>th</sup> Edition, PHI, 2009.
13. Business Communication, Meenakshi Raman and Prakash Singh, Oxford University Press, 2006.

**DISTRIBUTION AND WEIGHTAGE OF MARKS**

***Soft Skills Laboratory Practical Paper:***

1. The practical examinations for the Soft Skills Laboratory shall be conducted as per the University norms prescribed for the Core Engineering Practical Sessions.
2. For the ***Advanced English Communication Skills lab*** sessions, there shall be a continuous evaluation during the year for 40 sessional marks and 60 year-end

Examination marks. Of the 40 marks, 30 marks to be allotted for Internal Lab examination, 10 (5+5) marks to be allotted to their attendance and attitude in the lab sessions. The year- end Examination shall be conducted by the teacher concerned with the help of another member of the staff of the same department. Of 60 marks, 40 marks shall be equally distributed to LSRW Skills, 10 marks shall be awarded for day-to-day performance (i.e. ***Final Grade in the Record***) and 10 marks to be allotted for Vice-a-voce by the external examiner to evaluate the learners Interpersonal Skills and Soft Skills.

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**ME 252 MACHINE DRAWING & COMPUTER AIDED DRAFTING  
LABORATORY**

II Year B.Tech. (Mech) First Semester

<i>Practicals</i>	: 4 Periods / week	<i>Sessional Marks</i>	: 40
<i>University Exam.</i>	: 3 hrs.	<i>University Exam. Marks</i>	: 60

**MACHINE DRAWING:**

1. **Sectional views** : Introduction, full & half section
2. **Screwed fasteners**: Screw thread nomenclature – types & classification of screw threads, Square & Hexagonal headed bolted joints.
3. **Keys, Cotters and Pin joints** : Saddle & Sunk Keys, Cotter Joint with sleeve ,Knuckle Joint
4. **Assembly Drawings** : Stuffing Box , Screw Jack , Eccentric , Pipe - Vice

**COMPUTER AIDED DRAFTING (CAD) :**

1. **Introduction:**  
Basic Drawing, Modify, editing & dimensioning commands, layers, AutoCAD - Screen Menus
2. **Sectional views of castings**
3. **Assembly Drawings :**  
a. Pipe vice, b. Lathe Tail Stock ; c. Swivel Bearing ; d. Screw Jack (**Any Two**)
4. **Part Drawings** : a. Single tool post ; b. Petrol Engine Connecting Rod ; c. Angular – plumber block (**Any Two**)

**Text Book:**

1. Machine Drawing by K.L.Narayana, P.Kannaiah&K.Venkata Reddy
2. AutoCAD-14 for Engineering Drawing Made Easy by P.Nageswara Rao, TMH.

**Reference Books:**

1. Machine Drawing by K.R.Gopala Krishnan
2. An Introduction to AutoCAD 2000 by A.Yarwood, Longman Publishers.

**ME253 MATERIALS TESTING LABORATORY**

II/IV B.Tech (Mech.) First Semester

*Practicals* : 4 Periods / week *Sessional Marks* : 40  
*University Exam.* : 3 hrs. *University Exam. Marks* : 60

Note : A minimum of 10 experiments shall be conducted done and record.

1. To study the stress – strain characteristics of mild steel bars by UTM.
2. To find young's modulus of the given material (steel or wood) by conducting bending test on simply supported beam.
3. To find modulus of rigidity by conducting torsion test on solid circular shaft.
4. To find the hardness of the given material by Brinell's Hardness Tester.
5. To determine the hardness of the given material by Vicker's / Rockwell hardness tester.
6. To find impact resistance of the given material by conducting Charpy / Izod test on impact testing machine.
7. To determine the ultimate shear strength of steel rod in single and double shear.
8. To determine the modulus of rigidity of the spring.
9. Compression test on wood.
10. To determine fatigue strength of Mild steel.
11. To determine stress concentration factor.
12. Compression test on concrete Cubes.

CE/CHE/CS/EC/EEE/EI/IT/ME ...211

**ME221 ENGINEERING MATHEMATICS – IV**

II Year B.Tech. (Mech) Second Semester

Lectures / Tutorials : 4 + 1 Periods / week Sessional Marks : 40

University Exam. : 3 hrs. University Exam. Marks : 60

**UNIT-I**

**One Dimensional Wave Equation and Heat Equation:** Derivation of one dimensional wave equation-Transverse Vibration of finite elastic string with fixed ends-Boundary value and initial value problems- Fourier series Solution. Derivation of one dimensional heat equation-Steady and unsteady states-Boundary value and initial value problems- Fourier series solution.(11)

**Two Dimensional Heat Equation :** Two dimensional heat equation- Steady state heat flow in two dimensions- Laplace equation in Cartesian and polar coordinates (including annulus). Fourier series solution. (7)

**UNIT-II**

**Calculus of Complex Functions :** Introduction - continuity, Cauchy-Riemann equations, Analytic Functions, Harmonic Functions, orthogonal system, Line integrals in complex plane, Cauchy integral theorem, Existence of indefinite integral, Cauchy's integral formula. (18)

**UNIT-III**

Derivatives of Analytic function, Laurent series, Singularities and zeroes, Residue theorem, Evaluation of Real integrals, Further types of real integrals.(18)

**UNIT-IV**

**Conformal Mapping :**Conformal Mapping, Linear fractional transformations, special linear fractional transformations, Mapping by other functions, Electrostatic fields, use of conformal mapping, Heat problems, fluid flow, Poisson's integral formula. (18)

**TEXT BOOKS:**

1. Higher Engineering Mathematics by B.S. Grewal, Khanna publishers, 39th edition.
2. Advanced Engineering Mathematics by Erwin Kreyszig, 8<sup>th</sup> edition, John willy 2000.

**REFERENCE BOOKS:**

1. Engineering Mathematics by M.K. Venkataraman
2. Engineering Mathematics by P. Kandaswamy, etal.

**ME222 CASTING, WELDING METAL WORKING PROCESSES**

II Year B.Tech. (Mech) Second Semester

<i>Lectures</i>	: 4 Periods / week	<i>Sessional Marks</i>	: 40
<i>University Exam.</i>	: 3 hrs.	<i>University Exam. Marks</i>	: 60

**UNIT I**

**Metal Casting:** Introduction, advantages of Casting method, pattern: types, materials and allowances. Sand moulding procedure, Moulding materials and equipment. Preparation, control and testing of moulding sands. Cores, Cupola: Description, operation and zones. (15)

**UNIT- II**

**Gating Design:** Design Considerations

**Special Casting Methods:** Permanent Mould Casting, Die Casting, Centrifugal casting, Investment casting, shell moulding, CO<sub>2</sub> process and continuous casting. Fettling of castings, casting defects : causes, remedies and testing.(15)

**UNIT- III**

**WELDING:** Gas and arc welding - Principles of oxy-acetylene welding, oxyacetylene flame cutting, MMAW(Manual metal arc welding), TIG, MIG, submerged arc welding. Resistance welding principles - Butt welding, Spot welding, Seam welding. Thermit Welding, Electro slag welding. Laser beam welding. Brazing & Soldering, welding defects - causes and remedies.(15)

**UNIT- IV**

**Metal Working Processes:** Introduction, Hot and Cold working of metals.

**Rolling :**Types of rolling mills, roll passes

**Forging :**Types, description and types of forging, defects in forged parts.

**Extrusion :**Classification, description and application of extrusion process  
Tube making, Swaging Spinning, Coining, Embossing and Wire drawing  
Explosive forming and electro hydraulic forming.(15)

**Text Books:**

1. Manufacturing Technology-Vol- I by PN Rao, TMH
2. Workshop Technology Vol.1 by S.K.HazraChowdary. Khanna Publishers
3. A course in Work shop technology, Vol-I by B.S.Raghuvanshi, Dhanpatrai& Sons.

**Reference Books:**

1. Welding Technology by Little, TMH
2. Principles of Metal Casting by Heine, Loper, Rosenthal, TMH.
3. Manufacturing Engineering & Technology, Kalpakjain, Pearson Education / PHI

**ME 223 MECHANICS OF MATERIALS- II**

	II Year B.Tech. (Mech)	Second Semester	
Lectures	: 4 +1 Periods / week	Sessional Marks	: 40
University Exam.	: 3 hrs.	University Exam. Marks	: 60

**UNIT I**

**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. Introduction to Moment Area Method, Macaulay's Method (10)

**Columns** :Buckling and Stability, Columns with Pinned ends, Columns with other support conditions, Limitations of Euler's Formula, Rankine's Formula, Columns with eccentric Axial Loads, Secant formula. (8)

**UNIT II**

**Statically Indeterminate Beams** :Statically indeterminate Beams, Analysis by the differential equations of the Deflection curve, Moment Area Method. (9)

**Continuous Beams** :Clapeyron's theorem of three moments, Beams with constant and varying moments of inertia. (9)

**UNIT III**

**Pressure Vessels**: Thin Spherical and Cylindrical Pressure Vessels [Biaxial Stresses], Thick Cylinders: Lamé's theory, Radial Deflection, Compound Cylinders. (8)

**Curved Beams** :Stresses in Beams of small and large initial curvature, The Winkler-Bachtheory, Stresses in Crane Hook and C-Clamp with Rectangular, Circular and Trapezoidal cross-sections. (10)

**UNIT IV**

**Shear Centre** :Bending Axis and Shear Centre, Position of Shear Centre, Shear flow, Shear Centre of Channel section, Angle section, T- section and I- section. (9)

**Centrifugal Stresses** :Introduction, Rotating Ring, Rotating Disc, Rotating Disc of uniform strength.(9)

**TEXT BOOK :**

1. Mechanics of Materials by Gere and Timoshenko, CBS Publishers & Distributors.
2. Mechanics of Solids by Singh, Pearson Education.

**REFERENCE:**

1. Strength of materials by Sadhu Singh, Khanna Publishers
2. Advanced Solid Mechanics by L.S. Srinath

**ME 224 FLUID MECHANICS & HYDRUALIC MACHINES**

II Year B.Tech. (Mech) Second Semester

Lectures / Tutorials : 4+1 Periods / week      Sessional Marks : 40  
 University Exam. : 3 hrs.                              University Exam. Marks : 60

**UNIT I**

**Introduction:** Definition of fluid, Properties of a fluid – density, specific weight, specific gravity, viscosity, compressibility, surface tension, capillarity, vapor pressure, Classification of fluids. (6)

**Fluid Statics:** Pressure, variation of pressure in fluid, measurement of pressure – simple and differential manometers, pressure head, Pascal's law, Total pressure and center of pressure on submerged plates, Buoyancy and Metacentric height. (12)

**UNIT II**

**Fluid Kinematics:** Type of fluid flow, flow patterns, Rotation and irrotational flow, velocity potential, stream function, flow net, continuity equation & Bernoulli's equation (6)

**Impulse Momentum Equation:** Impulse momentum Principle, Equation and Application, Force on pipe bend. (3)

**Flow Through Pipes:** Laws of fluid friction, minor losses, hydraulic gradient line, total energy line, pipes in series and parallel, water hammer (9)

**UNIT III**

**Impact Of Jets:** Introduction, Force exerted by a fluid jet on stationary and moving flat plate and curved vanes, flow over radial curved vanes.(6)

**Hydraulic Turbines:** Elements of hydro-electric power plants: Heads and Efficiencies of Pelton wheel, Francis turbine and Kaplan turbine. (8)

**Performance Of Turbines:** Performance under unit quantities, Performance under specific conditions - Specific speed, Performance characteristic curves.(4)

**UNIT IV**

**Pumps:** Working principles of Centrifugal and Reciprocating Pumps. (3)

**Dimensional Analysis & Model Similitude:** Introduction, Buckingham's Pi theorem, Types of similarities, Force ratios, Dimensionless numbers, Model Laws-Reynolds and Froude law, Types of models, Scale effect.(Qualitative treatment only) (9)

**Boundary Layer Concepts:** Introduction, boundary layer thickness, displacement thickness, momentum thickness, energy thickness, boundary layer growth on a flat plate, separation of boundary layer. (6)

**TEXT BOOK:**

1. Hydraulics and Fluid Mechanics --P.N.Modi& S.M. Seth,
2. Fluid Mechanics & Fluid Power Engineering - D.S.Kumar, SK Kataria&sons, New Delhi.
3. Fluid Mechanics and Fluid machines – Agarwal, TMH.

**REFERENCE BOOKS:**

1. Fluid Mechanics & Hydraulic Machines - R.K.Bansal
2. Fluid mechanics including Hydraulic machines - A.K.Jain.
3. Fluid Mechanics-K.L.Kumar



**ME 225 APPLIED THERMODYNAMICS**

II Year B.Tech. (Mech) Second Semester

<i>Lectures</i>	: 4+1 Periods / week	<i>Sessional Marks</i>	: 40
<i>University Exam.</i>	: 3 hrs.	<i>University Exam. Marks</i>	: 60

**UNIT I**

**Vapor Power Cycles:** Rankine cycle, Effect of pressure and temperature on the Rankine cycle, reheat cycle, regenerative cycle. (11)

**Steam Boilers:** Function, classification, working of Babcock and Wilcox boiler, Mountings & Accessories.(7)

**UNIT II**

**Steam Nozzles:** Types of nozzles, isentropic flow through nozzles, Effect of friction, Nozzle efficiency, Critical pressure ratio and maximum discharge, calculation of throat and exit areas using Mollier diagram. (10)

**Steam Condensers:** Jet and Surface condensers, condenser vacuum and vacuum efficiency, Condenser efficiency, Thermodynamic analysis, Air pumps, Capacity of air extraction pump. (8)

**UNIT III**

**Steam Turbines:** Types of steam turbines, Impulse turbines, pressure and velocity compounding, velocity diagrams, work output, power, blade efficiency and stage efficiency, Reaction turbines, velocity diagrams, degree of reaction, work output, power, blade efficiency and stage efficiency, Governing of turbines, Overall efficiency and reheat factor.(18)

**UNIT IV**

**Refrigeration:** Need for Refrigeration, Definitions, Methods of refrigeration, Working of Refrigerator & Heat pump, Bell - Coleman cycle, Refrigerating effect, COP, vapor compression refrigeration system, influence of various parameters on cycle performance, Vapor absorption refrigeration cycle. (10)

**Psychrometry and Air Conditioning:** -Introduction, Psychrometric properties, Psychrometric chart, Psychrometric processes, Types of Air conditioning systems.(8)

**TEXTBOOKS:**

1. Treatise on Heat Engineering-V.P.Vasandani and D.S.Kumar, Metropolitan Book co, New Delhi.
2. Thermal Engineering ---Rajput, LaxmiPubl, New Delhi.
3. Thermal Science and Engineering- D.S.kumar, S.K.katariaPubl, New Delhi.

**REFERENCE BOOKS:**

1. Engineering Thermodynamics----Cengel and Boles, TMH.
2. Refrigeration and Air Conditioning -- C.P. Arora, TMH.
3. Engineering Thermodynamics—Achuthan, PHI, New Delhi.

**Note: Use of Steam Tables and Refrigeration and Air-Conditioning Tables is permitted in University Examinations.**

**ME 226 HUMAN VALUES AND PROFESSIONAL ETHICS / LIFE SKILLS  
(AUDIT)**

II Year B.Tech. (Mech) :: Second Semester

<i>Lectures</i>	: 2 Periods / week	<i>Sessional Marks</i>	: 40
<i>University Exam.</i>	: 3 hrs.	<i>University Exam. Marks</i>	: 60

**UNIT – I**

**Human Values** : Morals, Values And Ethics – Integrity – Work Ethics – Service Learning – Civic Virtue- Respect For Others – Living Peacefully – Caring – Sharing – Honesty – Courage – Valuing Time – Co-Operation – Commitment – Empathy – Self-Confidence – Character - Spirituality.(8)

**UNIT – II**

**Engineering Ethics** :Senses Of Engineering Ethics – Variety Of Moral Issued – Types Of Inquiry – Moral Dilemmas – Moral Autonomy – Kohlberg’s Theory – Gillian’s Theory – Consensus And Controversy – Professions And Professionalism- Professional Ideals And Virtues - Theories About Right Action – Self-Interest – Customs And Religion – Uses Of Ethical Theories.(7)

**UNIT – III**

**Engineering As Social Experimentation** :Engineering As Experimentation – Engineers As Responsible Experimenters – Codes Of Ethics – Balanced Outlook On Law .

**Safety, Responsibilities And Rights** :Safety And Risk – Assessment Of Safety And Risk –Risk Benefit Analysis And Reducing Risk.

**Collegiality And Loyalty** – Respect For Authority – Collective Bargaining – Confidentiality – Conflicts Of Interest – Occupational Crime – Professional Rights – Employee Rights – Intellectual Property Rights (IPR) – Discrimination. (8)

**UNIT – IV**

**Global Issues** : Multinational Corporations – Environmental Ethics – Computer Ethics – Weapons Development – Engineers As Managers – Consulting Engineers – Engineers As Expert Witnesses And Advisors – Moral Leadership Sample Code Of Ethics Like ASME, ASCE, IEEE, Institution Of Engineers (India), Indian Institute Of Materials Management, Institution Of Electronics And Telecommunication Engineers (IETE), India Etc., (7)

**Text Books :**

1. Mike martin and Ronald Schinzinger, “Ethics in Engineering” McGraw-Hill, NY 1996
2. Govindarajan M, Natarajan S, Senthil Kumar V.S., “Engineering Ethics”, PHI, 2004

**References :**

1. Charles D,Fleddermann, “Engineering Ethics”, Pearson / PHI, New Jersey 2004 (Indian Reprint)
2. Charles E Harris, Michael S.Protchard and Michael J Rabins, “Engineering Ethics – Concepts and Cases” Wadsworth Thompson Learning, US, 2000 (Indian Reprint)
3. John R Boatright, “Ethics and the conduct of business” Pearson, New Delhi, 2003.
4. Edmund G.Seebauer and Robert L Barry, “Fundamentals of Ethics for Scientists and Engineers” Oxford University Press, Oxford, 2001.

**ME 261 BASIC MANUFACTURING PROCESSES LABORATORY**

II Year B.Tech. (Mech) Second Semester

*Practicals* : 4 Periods / week      *Sessional Marks* : 40

*University Exam.* : 3 hrs.      *University Exam. Marks* : 60

**PATTERN MAKING** :Solid pattern , Split pattern .

**MOULDING** :Stepped cone pulley, Hand wheel, Bush.

**FITTING** :Six Standard Exercises

**TURNING**: Plain, Step and Taper turning, Right-hand and Left-hand threads, Eccentric turning, Knurling and contour turning.

**ME 262 FLUID MECHANICS & HYDRAULIC MACHINES LABORATORY**

II Year B.Tech. (Mech) Second Semester

Lectures / Tutorials : 4 Periods / week      Sessional Marks : 40  
University Exam. : 3 hrs.                      University Exam. Marks : 60

**Note : A minimum of 10 experiments are to be performed**

1. Verification of Bernoulli's theorem
2. Venturimeter: Determination of coefficient of discharge
3. Orificemeter: Determination of coefficient of discharge
4. Orifices: Determination of coefficient of discharge by steady and unsteady flow methods.
5. Mouthpieces: Determination of coefficient of discharge by steady and unsteady flow methods.
6. Characterization of laminar and turbulent flows by Reynolds apparatus
7. Determination of friction factor of pipes
8. Determination of loss of head in pipes due to bends, sudden contractions and sudden expansion.
9. Measurement of force due to impact of jets on vanes of different types
10. Performance studies on Pelton turbine
11. Performance studies on Francis turbine / Kaplan turbine
12. Performance studies on single stage centrifugal pump
13. Performance studies on Reciprocating pump
14. Performance studies on Gear oil pump

**ME 263 SOFT SKILLS LABORATORY**

II Year B.Tech. (Mech) Second Semester

Lectures / Tutorials : 4 Periods / week      Sessional Marks : 40  
 University Exam. : 3 hrs.                      University Exam. Marks : 60

**Module-1: Non-Verbal Communication Skills**

- a) Body Language – Voluntary and Involuntary
- b) Kinesics
- c) Facial Expressions
- d) Proxemics
- e) Oculistics
- f) Haptics and Chronemics

**Module-2: Cognitive Skills**

- a) Creative Thinking
- b) Lateral Thinking
- c) Critical Thinking

**Module-3: Motivation and Emotional Intelligence**

- a) Motivation
- b) Internal Motivation, External Motivation and Incentive Motivation
- c) Emotions and Emotional Intelligence

**Module-4: Employability Skills**

- a) Role-Play
- b) Time Management
- c) Interview Techniques
- d) Group Discussion
- e) Team Work

**Module-5: Interpersonal Skills**

- a) Stress Management
- b) Perception
- c) Effective Listening

**Suggested Software:**

1. GLOBERENA Software
2. K-VAN SOLUTIONS Software
2. CENTRONIX Software
3. TRAIN 2 SUCCESS- CD Series (Zenith Global Consultancy)

**Reference Books:**

Books Suggested for English Language Lab Library (to be located within the lab in addition to the CDs of the text book which are loaded on the systems):

1. Soft Skills: Know Yourself & Know the World, Dr.K.Alex, S.Chand Publications.
2. The ACE of Soft Skills: Attitude, communication and Etiquette for Success, by Pearson Publications.
3. Communication Skills, Leena Sen, 2nd Edition, PHI, 2007.
4. Organizational Behavior, Stephen P. Robbins and Timothy A. Judge, 13<sup>th</sup> Edition, PHI, 2009.
5. Business Communication, Meenakshi Raman and Prakash Singh, Oxford University Press, 2006.
6. Conversation Developing Soft Skills,4thEdition,pearson Publication.
7. Managing Soft Skills, K.R.Lakshminarayanan and T.Murugavel, Scitech Publications.
8. Communicate to Conquer: A Handbook of Group Discussions and Job Interviews

with CD, PHI Publications.