

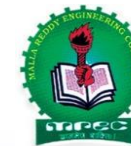
ACADEMIC REGULATIONS COURSE STRUCTURE AND DETAILED SYLLABUS

U3

Mechanical Engineering

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

(II & III year's syllabus only)



MALLA REDDY ENGINEERING COLLEGE
(AUTONOMOUS)

(Approved by AICTE & Affiliated to JNTUH)
Maisammaguda, Dhulapally (Po) Via (Hakimpet), Secunderabad- 500 014.

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MALLA REDDY GROUP OF INSTITUTIONS

ACADEMIC REGULATIONS
COURSE STRUCTURE
AND
DETAILED SYLLABUS

Information Technology

For
B.Tech Four Year Degree Course
(Applicable for the batch admitted in 2011-2012)
(II & III year's syllabus only)

MALLA REDDY ENGINEERING COLLEGE
(AUTONOMOUS)
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**MALLA REDDY ENGINEERING COLLEGE
(AUTONOMOUS)**

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

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

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

1. Award of B.Tech. Degree

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

- i. Pursued a course of study for not less than four academic years and not more than eight academic years.
- ii. Register for 200 credits and secure 200 credits

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

3. Courses of study

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

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

4. Credits

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

5. Distribution and Weightage of Marks

- i. The performance of a student is evaluated in each semester or I year, subject-wise, with a maximum of 100 marks for theory and 75 marks for practical examinations. The subject –wise syllabus is spread over 1-8 units. Out of 100 marks in Theory, 25 marks are for internal exam and out of 75 marks in practicals, 25 marks are for internal assessment. In semester system, **two midterm examinations are conducted for 25 marks each. Each midterm examination comprises of an internal test for 20 marks and an assignment for 5 marks. Better of the two midterm examinations shall be taken as the final marks secured by each candidate.**
- ii. However for first year, there shall be 3 midterm examinations as in the above pattern and the average marks of the best two examinations secured in each subject shall be considered as final marks for sessionals.
- iii. For practical subjects there shall be a continuous evaluation during the semester for 25 internal marks and 50 end examination marks. Out of the 25 marks for internal, day-to-day work in the laboratory shall be evaluated for 15 marks and internal examination for practical shall be evaluated for 10 marks conducted by the concerned laboratory teacher. The end examination shall be conducted by an external examiner and internal examiner being the laboratory teacher. The external examiner shall be appointed by the Principal/Controller of examinations.
- iv. For the subject having design and / or drawing, (such as Engineering Graphics, Engineering Drawing, Machine Drawing) and estimation, the distribution shall be 25 marks for internal evaluation (15 marks for day-to-day work and 10 marks for internal tests) and 75 marks for end examination. There shall be two internal tests in a Semester and the better of the two shall be considered for the award of marks for internal tests. However in the I year class, there shall be three tests and the average of best two will be taken into consideration.
- v. There shall be an industry-oriented mini-Project, in collaboration with an industry of their specialization, to be taken up during the vacation after III year II Semester examination. However, the mini project and its report shall be evaluated along with the project work in IV year II Semester. The industry oriented mini project shall be submitted in report form and should be presented before the committee, which shall be evaluated for 50 marks. The committee consists of an external examiner, head of the department, the supervisor of mini project and a senior faculty member of the department. There shall be no internal marks for industry oriented mini project.

- vi. There shall be a seminar presentation in IV year II Semester. For the seminar, the student shall collect the information on a specialized topic and prepare a technical report, showing his understanding over the topic, and submit to the department, which shall be evaluated by the Departmental committee consisting of Head of the department, seminar supervisor and a senior faculty member. The seminar report shall be evaluated for 50 marks. There shall be no external examination for seminar.
- vii. There shall be a Comprehensive Viva-Voce in IV year II semester. The Comprehensive Viva-Voce will be conducted by a Committee consisting of (i) Head of the Department (ii) two Senior Faculty members of the Department. The Comprehensive Viva-Voce is aimed to assess the students' understanding in various subjects he / she studied during the B.Tech course of study. The Comprehensive Viva-Voce is evaluated for 100 marks by the Committee. There are no internal marks for the Comprehensive viva-voce.
- viii. Out of a total of 200 marks for the project work, 50 marks shall be for Internal Evaluation and 150 marks for the End Semester Examination. The End Semester Examination (viva-voce) shall be conducted by the same committee appointed for industry oriented mini project. In addition the project supervisor shall also be included in the committee. The topics for industry oriented mini project, seminar and project work shall be different from each other. The evaluation of project work shall be conducted at the end of the IV year. The Internal Evaluation shall be on the basis of two seminars given by each student on the topic of his project.
- ix. Laboratory marks and the sessional marks awarded by the concerned teacher are not final. They are subject to scrutiny and scaling by the Principal/Controller of examinations wherever necessary. In such cases, the sessional and laboratory marks awarded by the concerned teacher will be referred to a Committee **consisting of HOD, Senior professor in that particular department headed by Principal**. The Committee will arrive at a scaling factor and the marks will be scaled as per the scaling factor. The recommendations of the Committee are final and binding. The laboratory records and internal test papers shall be preserved in the respective departments/exam branch **for a minimum period of 6 years from the commencement of the batch**, as per the University norms and shall be produced to the Committees of the University as and when the same is asked for.

6. Attendance Requirements:

- i. A student shall be eligible to appear for End examinations if he acquires a minimum of 75% of attendance in aggregate of all the subjects.
- ii. Shortage of Attendance below 65% in aggregate shall in NO case be condoned.
- iii. Condonation of shortage of attendance in aggregate up to 10% (65% and above and below 75%) in each semester or I year may be granted by the College Academic Committee.
- iv. A student will not be promoted to the next semester unless he satisfies the attendance requirement of the present semester / I year, as applicable. They may seek re-admission for that semester / I year when offered next.
- v. Students whose shortage of attendance is not condoned in any semester / I year are not eligible to take their end examination of that class and their registration shall stand cancelled.
- vi. A stipulated fee shall be payable towards condonation of shortage of attendance.

7. Minimum Academic Requirements:

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

- i. A student shall be deemed to have satisfied the minimum academic requirements and earned the credits allotted to each theory or practical design or drawing subject or project if he secures not less than 35% of marks in the end examination and a minimum of 40% of marks in the sum total of the internal evaluation and end examination taken together.
- ii. A student shall be promoted from II to III year only if he fulfills the academic requirement of 37credits from one regular and one supplementary examinations of I year, and one regular examination of II year I semester irrespective of whether the candidate takes the examination or not. Or as stipulated by affiliating University from time to time.
- iii. A student shall be promoted from third year to fourth year only if he fulfills the academic requirements of total 62 credits from the following examinations, whether the candidate takes the examinations or not. Or as stipulated by affiliating University from time to time.
 - a. Two regular and two supplementary examinations of I year.
 - b. Two regular and one supplementary examinations of II year I semester.

- c. One regular and one supplementary examinations of II year II semester.
 - d. One regular examination of III year I semester.
- iv. A student shall register and put up minimum attendance in all 200 credits and earn the 200 credits. Marks obtained in all 200 credits shall be considered for the calculation of percentage of marks.
- v. Students who fail to earn 200 credits as indicated in the course structure within eight academic years from the year of their admission shall forfeit their seat in B.Tech course and their admission shall stand cancelled.
- 8. Course pattern:**
- i. The entire course of study is of four academic years. The first year shall be on yearly pattern and the second, third and fourth years on semester pattern.
 - ii. A student eligible to appear for the end examination in a subject, but absent at it or has failed in the end examination may appear for that subject at the supplementary examination.
 - iii. When a student is detained due to lack of credits / shortage of attendance he may be re-admitted when the semester / year is offered after fulfilment of academic regulations, whereas the academic regulations hold good with the regulations he was first admitted.
- 9. Award of Class:**
- After a student has satisfied the requirements prescribed for the completion of the program and is eligible for the award of B. Tech. Degree he shall be placed in one of the following four classes:

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

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

- 10. Minimum Instruction Days:**
- The minimum instruction days for each semester / I year shall be 90/180 clear instruction days.
- 11.** There shall be no branch transfers after the completion of admission process.
- 12.** Transfer from other colleges will be permitted, as per rules stipulated by the affiliating University and State government.
- 13.** Detained candidates, either due to lack of credits or attendance, will be admitted to the class work, after successful completion of academic requirements and after obtaining permission from affiliating University.
- 14. General:**
- i. Where the words “he”, “him”, “his”, occur in the regulations, they include “she”, “her”, “hers”.
 - ii. The academic regulation should be read as a whole for the purpose of any interpretation.
 - iii. In the case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Vice-Chancellor is final.
 - iv. The University may change or amend the academic regulations or syllabi at any time and the changes or amendments made shall be applicable to all the students with effect from the date notified by the University.

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Academic Regulations for B. Tech.

(Lateral Entry Scheme)

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

1. The Students have to acquire 150 credits from II to IV year of B.Tech. Program (Regular) for the award of the degree.
Register for **150** credits and secure **150** credits.
2. Students, who fail to fulfil the requirement for the award of the degree in 6 consecutive academic years from the year of admission, shall forfeit their seat.
3. The same attendance regulations are to be adopted as that of B. Tech. (Regular).

4. Promotion Rule:

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

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

5. Award of Class:

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

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

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

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

MALPRACTICES RULES

DISCIPLINARY ACTION FOR / IMPROPER CONDUCT IN EXAMINATIONS

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

| | | |
|----|---|--|
| 3. | Impersonates any other candidate in connection with the examination. | The candidate who has impersonated shall be expelled from examination hall. The candidate is also debarred and forfeits the seat. The performance of the original candidate, who has been impersonated, shall be cancelled in all the subjects of the examination (including practical's and project work) already appeared and shall not be allowed to appear for examinations of the remaining subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all End examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. If the imposter is an outsider, he will be handed over to the police and a case is registered against him. |
| 4. | Smuggles in the Answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination. | Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all End examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with |

| | | |
|----|--|---|
| | | forfeiture of seat. |
| 5. | Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks. | Cancellation of the performance in that subject. |
| 6. | Refuses to obey the orders of the Principal/Controller of examinations any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the officer-in charge or any person on duty in or outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the officer-in-charge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the College campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination. | In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that subject and all other subjects the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. The candidates also are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is registered against them. |
| 7. | Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall. | Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including |

| | | |
|----|---|--|
| | | practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all End examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. |
| 8. | Possess any lethal weapon or firearm in the examination hall. | Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat. |
| 9. | If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8. | Student of the colleges expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat. Person(s) who do not belong to the College will be handed over to police and, a police case will be registered against |

| | | |
|-----|--|--|
| | | them. |
| 10. | Comes in a drunken condition to the examination hall. | Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. |
| 11. | Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny. | Cancellation of the performance in that subject and all other subjects the candidate has appeared including practical examinations and project work of that semester/year examinations. |
| 12. | If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to the Principal/Controller of examination for further action to award suitable punishment. | |

Malpractices identified by squad or special invigilators

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

**MALLA REDDY ENGINEERING COLLEGE
(AUTONOMOUS)
B. TECH. MECHANICAL ENGINEERING
I YEAR COURSE STRUCTURE**

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

**MALLA REDDY ENGINEERING COLLEGE
(AUTONOMOUS)
B. TECH. MECHANICAL ENGINEERING**

II Year **I Semester**
COURSE STRUCTURE

| Code | Subject | L | T/P/D | C |
|----------|--|-----------|-----------|-----------|
| MR11U301 | Machine Drawing | - | 6 | 4 |
| MR11U0M5 | Probability and Statistics | 3 | 1 | 3 |
| MR11U246 | Electrical and Electronics Engineering | 4 | 1 | 4 |
| MR11U302 | Mechanics of Solids | 3 | 1 | 3 |
| MR11U303 | Thermodynamics | 4 | 1 | 4 |
| MR11U304 | Metallurgy and Materials Science | 3 | 1 | 3 |
| MR11U247 | Electrical and Electronics Engineering Lab | - | 3 | 2 |
| MR11U305 | Metallurgy and Mechanics of Solids Lab | - | 3 | 2 |
| | Total | 17 | 17 | 25 |

**MALLA REDDY ENGINEERING COLLEGE
(AUTONOMOUS)
B. TECH. MECHANICAL ENGINEERING**

II Year **II Semester**
COURSE STRUCTURE

| Code | Subject | L | T/P/D | C |
|----------|--|-----------|-----------|-----------|
| MR11U306 | Production Technology | 4 | 1 | 4 |
| MR11U307 | Kinematics of Machinery | 4 | 1 | 4 |
| MR11U308 | Applied Thermodynamics-I | 3 | 1 | 3 |
| MR11U309 | Mechanics of Fluids and Hydraulic Machines | 4 | 1 | 4 |
| MR11U154 | Environmental Studies | 3 | 1 | 3 |
| MR11U0M6 | Numerical Methods | 3 | 1 | 3 |
| MR11U310 | Production Technology Lab | - | 3 | 2 |
| MR11U311 | Mechanics of Fluids and Hydraulic Machines Lab | - | 3 | 2 |
| | Total | 21 | 12 | 25 |

**MALLA REDDY ENGINEERING COLLEGE
(AUTONOMOUS)
B. TECH. MECHANICAL ENGINEERING**

III Year **I Semester**
COURSE STRUCTURE

| Code | Subject | L | T/P/D | C |
|----------|---|-----------|-----------|-----------|
| MR11UB01 | Managerial Economics and Financial Analysis | 4 | - | 4 |
| MR11U312 | Metrology & Surface Engineering | 3 | 1 | 3 |
| MR11U313 | Dynamics of Machinery | 4 | 1 | 4 |
| MR11U314 | Machine Tools | 3 | 1 | 3 |
| MR11U315 | Design of Machine Members – I | 4 | 1 | 4 |
| MR11U316 | Applied Thermodynamics-II | 3 | 1 | 3 |
| MR11U317 | Machine Tools & Metrology Lab | - | 3 | 2 |
| MR11U0E1 | Advanced English Communication Skills Lab | - | 3 | 2 |
| | Total | 21 | 11 | 25 |

**MALLA REDDY ENGINEERING COLLEGE
(AUTONOMOUS)**

B. TECH. MECHANICAL ENGINEERING

III Year

II Semester

COURSE STRUCTURE

| Code | Subject | L | T/P/D | C |
|----------------------------------|---|----|-------|----|
| MR11UB03 | Industrial Management | 4 | - | 4 |
| MR11U318 | Finite Element Methods | 3 | 1 | 3 |
| MR11U319 | Refrigeration and Air Conditioning | 4 | 1 | 4 |
| MR11U320 | Design of Machine Members – II | 3 | 1 | 3 |
| MR11U321 | Heat Transfer | 4 | 1 | 4 |
| MR11U322 MR11U323 MR11U324 | Elective: 1. Engineering optimization 2. Nanotechnology 3. Automobile Engineering | 3 | 1 | 3 |
| MR11U325 | Heat Transfer Lab | - | 3 | 2 |
| MR11U326 | Thermal Engineering Lab | - | 3 | 2 |
| | Total | 21 | 11 | 25 |

**MALLA REDDY ENGINEERING COLLEGE
(AUTONOMOUS)**

B. TECH. MECHANICAL ENGINEERING

IV Year

I Semester

COURSE STRUCTURE

| Code | Subject | L | T/P/D | C |
|--|---|----|-------|----|
| MR11U327 | Operations Research | 4 | 1 | 4 |
| MR11U328 | Power Plant Engineering | 3 | 1 | 3 |
| MR11U329 | CAD/CAM | 4 | 1 | 4 |
| MR11U330 | Instrumentation and Control Systems | 4 | - | 4 |
| MR11U331 MR11U332 MR11U333 MR11U334 | Elective-I: Robotics, Mechanical Vibrations, Mechatronics, Composite Materials. | 3 | 1 | 3 |
| MR11U335 MR11U336 MR11U337 MR11U338 | Elective-II: Unconventional Machining Process, CNC Technology, Automation in Manufacturing, Design for Manufacturing | 3 | 1 | 3 |
| MR11U339 | CAD/CAM Lab | -- | 3 | 2 |
| MR11U340 | Production Drawing Practice & Instrumentation Lab | -- | 3 | 2 |
| | Total | 21 | 11 | 25 |

**MALLA REDDY ENGINEERING COLLEGE
(AUTONOMOUS)**

B. TECH. MECHANICAL ENGINEERING

IV Year

II Semester

COURSE STRUCTURE

| Code | Subject | L | T/P/D | C |
|--|--|----|-------|----|
| MR11U341 | Production Planning & Control | 3 | 1 | 3 |
| MR11U546 MR11U342 MR11U343 MR11U344 | Elective-III: Artificial Neural Networks, Reliability Engineering, Maintenance & Safety Engineering, Plant Layout & Material Handling | 3 | 1 | 3 |
| MR11U345 MR11U346 MR11U347 MR11U348 | Elective-IV: Renewable Energy sources, Jet Propulsion & Rocket Engineering , Computational Fluid Dynamics, Gas Dynamics | 3 | - | 3 |
| MR11U349 | Seminar | -- | 6 | 2 |
| MR11U350 | Industry Oriented Mini Project | -- | -- | 2 |
| MR11U351 | Project Work | -- | 15 | 10 |
| MR11U352 | Comprehensive Viva | -- | -- | 2 |
| | Total | 9 | 23 | 25 |

Note: All End Examinations (Theory and Practical) are of three hours duration.
T – Theory P – Practical C – Credits

Machine Drawing**Machine Drawing Conventions :**

Need for drawing conventions - introduction to IS conventions

- Conventional representation of materials, common machine elements and parts such as screws, nuts, bolts, keys, gears, webs, ribs.
- Types of sections - selection of section planes and drawing of sections and auxiliary sectional views. Parts not usually sectioned.
- Methods of dimensioning, general rules for sizes and placement of dimensions for holes, centers, curved and tapered features.
- Title boxes, their size, location and details - common abbreviations & their liberal usage
- Types of Drawings - working drawings for machine parts.

I. Drawing of Machine Elements and simple parts:

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

- Popular forms of Screw threads, bolts, nuts, stud bolts, tap bolts, set screws.
- Keys, cottored joints and knuckle joint.
- Rivetted joints for plates
- Shaft coupling, spigot and socket pipe joint.
- Journal, pivot and collar and foot step bearings.

II. Assembly Drawings:

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

- Engine parts - stuffing boxes, cross heads, Eccentrics, Petrol Engine connecting rod, piston assembly.
- Other machine parts - Screws jacks, Machine Vices Plummer block, Tailstock.
- Valves : Steam stop valve, spring loaded safety valve, feed check valve and air cock.

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

TEXT BOOKS :

- Machine Drawing - Dhawan, S.Chand Publications
- Machine Drawing -K.L.Narayana, P.Kannaiah & K. Venkata Reddy / New Age/ Publishers
- Machine Drawing – N.D.Bhatt.

REFERENCES :

- Machine Drawing - P.S.Gill.
- Machine Drawing – Luzzader
- Machine Drawing - Rajput

Probability and Statistics**UNIT-I: Probability:**

Sample space and events – Probability – The axioms of probability – Addition, Multiplication theorems - Conditional probability – Baye’s theorem. and problems.

UNIT-II: Random variables:

Discrete and continuous – Distribution – Distribution function., expectation and covariance Distribution - Binomial, Negative Binomial, Poisson, Uniform, Normal, exponential , geometric, Beta and Gamma distributions – related properties and computation of Mean and variance, Central limit theorem (without proof).

UNIT-III: Sampling distribution: [large sampe tests]

Definition of Population and sample - Sampling distributions of mean (known and unknown) proportions, sums and differences.

Estimation: Point estimation – interval estimation - Bayesian estimation.

UNIT-IV: Test of Hypothesis:[sample tests]

Means and proportions – Hypothesis concerning one and two means – Type I and Type II errors. One tail, two-tail tests calculation of P-Value .Tests of significance – Student’s t-test, F-test, Z test., χ^2 goodness of fit .

UNIT-V: Curve fitting:

The method of least squares –Straight line, parabola, goodness of fit, power curve, exponential curve. Inferences based on the least squares estimations –

UNIT- VI: Correlation and Regression:

Coefficient of correlation –Regression Coefficient – the lines of regression – the rank correlation Curvilinear regression, multiple regressions for three variables– correlation for bivariate distributions.

UNIT-VII: Queuing Theory:

Introduction to queuing problem, Poisson process, Arrival and departure distributions- Pure Birth and Death Process M/M/1 Model and Simple Problems.

UNIT-VIII: Stochastic Process:

Introduction to stochastic process- Markov process classification of states – Examples of Markov Chains, Stochastic matrix, limiting probabilities.

TEXT BOOKS:

- Probability and statistics for engineers (Erwin Miller And John E.Freund), R A Johnson And C.B.Gupta.. 7th edition, Pearson Education / PHI.
- Introduction to Probability and Statistics, 12th edition, W.Mendenhall, R.J.Beaver and B.M.Beaver, Thomson. (Indian edition).
- Mathematical statistics by VK Kapoor & Guptha
- OR by Manmohan & VK Kapoor & Guptha

REFERENCE BOOKS:

1. Text book of Probability and Statistics Dr.Shahnaz Bathul, V.G.S.Publishers 2003.
2. Probability and Statistics in Engineering, 4th Edition, William W.Hines, Douglas. C.Montgomery, David M.Goldsman, Connie M.Borror, Wiley Student Edition.
3. Probability, Statistics and Queuing Theory, 2nd Edition, Trivedi, John Wiley and Sons
4. Introduction to Probability and Statistics, J.S.Milton, Jesse C.Arnold, 4th edition, TMH.
5. Probability, Statistics and Random Processes, Dr.K.Murugesan, P.Guruswamy, Anuradha Agencies, Deepti Publications.

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II Year B.Tech. ME – I Sem

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Electrical and Electronics Engineering**UNIT - I****ELECTRICAL CIRCUITS:** Basic definitions, Types of elements, Ohm's Law, Resistive networks, Kirchhoff's Laws, Inductive networks, capacitive networks, Series, Parallel circuits and Star-delta and delta-star transformations.**UNIT - II****DC MACHINES :** Principle of operation of DC Generator – emf equation - types – DC motor types –torque equation – applications – three point starter.**UNIT - III****TRANSFORMERS :** Principle of operation of single phase transformers – emf equation – losses –efficiency and regulation**UNIT - IV****AC MACHINES :** Principle of operation of alternators – regulation by synchronous impedance method –Principle of operation of induction motor – slip – torque characteristics – applications.**UNIT - V****INSTRUMENTS :** Basic Principle of indicating instruments – permanent magnet moving coil and moving iron instruments.**UNIT - VI****DIODE AND IT'S CHARACTERISTICS :** P-n junction diode, symbol, V-I Characteristics, Diode Applications, Rectifiers – Half wave, Full wave and Bridge rectifiers (simple Problems)**UNIT - VII****TRANSISTORS :** PNP and NPN Junction transistor, Transistor as an amplifier, SCR characteristics and applications**UNIT - VIII****CATHODE RAY OSCILLOSCOPE :** Principles of CRT (Cathode Ray Tube), Deflection, Sensitivity, Electrostatic and Magnetic deflection, Applications of CRO - Voltage, Current and frequency measurements.**TEXT BOOKS:**

1. Essentials of Electrical and Computer Engineering by David V. Kerns, JR. J. David Irwin/Pearson.
2. Principles of Electrical and Electronics Engineering by V.K.Mehta, S.Chand & Co.

REFERENCES:

1. Introduction to Electrical Engineering – M.S Naidu and S. Kamakshaiyah, TMH Publ.
2. Basic Electrical Engineering by Kothari and Nagarath, TMH Publications, 2nd Edition

Mechanics of Solids

UNIT – I

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

UNIT – II

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

UNIT – III

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

UNIT – IV

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

UNIT – V

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

UNIT – VI

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

UNIT – VII

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

UNIT – VIII

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

TEXT BOOKS :

1. Strength of materials by Bhavikatti, Lakshmi publications.
2. Solid Mechanics, by Popov

REFERENCES :

1. Strength of Materials -By Jindal, Umesh Publications.
2. Analysis of structures by Vazirani and Ratwani.
3. Mechanics of Structures Vol-III, by S.B.Junnarkar.
4. Strength of Materials by S.Timshenko
5. Strength of Materials by Andrew Pytel and Ferdinond L. Singer Longman.

Thermodynamics**UNIT I**

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

UNIT II

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

UNIT – III

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

UNIT IV

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

UNIT - V

Perfect Gas Laws – Equation of State, specific and Universal Gas constants – various Non-flow processes, properties, end states, Heat and Work Transfer, changes in Internal Energy – Throttling and Free Expansion Processes – Flow processes – Deviations from perfect Gas Model – Vander Waals Equation of State – Compressibility charts – variable specific Heats – Gas Tables.

UNIT – VI

Mixtures of perfect Gases – Mole Fraction, Mass fraction Gravimetric and volumetric Analysis – Dalton's Law of partial pressure, Avogadro's Laws of additive volumes – Mole fraction, Volume fraction and partial pressure, Equivalent Gas const. And Molecular Internal Energy, Enthalpy, sp. Heats and Entropy of Mixture of perfect Gases and Vapour, Atmospheric air -

UNIT - VII

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

UNIT VIII

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

Introduction to Psychrometry: Psychrometric Properties – Dry bulb Temperature, Wet Bulb Temperature, Dew point Temperature, Thermodynamic Wet Bulb Temperature, Specific Humidity, Relative Humidity, saturated Air, Vapour pressure, Degree of saturation – Adiabatic Saturation, Carrier's Equation – Psychrometric chart.

TEXT BOOKS :

1. Engineering Thermodynamics / PK Nag /TMH, III Edition
2. Fundamentals of Thermodynamics – Sonntag, Borgnakke and van wylen / John Wiley & sons (ASIA) Pte Ltd.

REFERENCES :

1. Engineering Thermodynamics – Jones & Dugan
2. Thermodynamics – An Engineering Approach – Yunus Cengel & Boles /TMH
3. Thermodynamics – J.P.Holman / McGrawHill
4. An introduction to Thermodynamics / YVC Rao / New Age
5. Engineering Thermodynamics – K. Ramakrishna / Anuradha Publishers.

Metallurgy and Materials Science**UNIT – I**

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

UNIT - II

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

UNIT -III

Equilibrium of Diagrams : Experimental methods of construction of equilibrium diagrams, Isomorphous alloy systems, equilibrium cooling and heating of alloys, Lever rule, coring miscibility gaps, eutectic systems, congruent melting intermediate phases, peritectic reaction. Transformations in the solid state – allotropy, eutectoid, peritectoid reactions, phase rule, relationship between equilibrium diagrams and properties of alloys. Study of important binary phase diagrams of Cu-Ni-, Al-Cu, Bi-Cd, Cu-An, Cus-Sn and Fe-Fe₃C.

UNIT -IV

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

UNIT – V

Heat treatment of Alloys : Effect of alloying elements on Fe-Fe₃C system, Annealing, normalizing, Hardening, TTT diagrams, tempering , Hardenability, surface - hardening methods, Age hardening treatment, Cryogenic treatment of alloys.

UNIT - VI

Non-ferrous Metals and Alloys : Structure and properties of copper and its alloys, Aluminium and its alloys, Titanium and its alloys.

UNIT – VII

Ceramic materials : Crystalline ceramics, glasses, cermaets, abrasive materials, nano materials –definition, properties and applications.

UNIT - VIII

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

TEXT BOOKS :

- 1.Introduction to Physical Metallurgy / Sidney H. Avener.
- 2.Essential of Materials science and engineering/ Donald R.Askeland/Thomson.

REFERENCES :

- 1.Material Science and Metallurgy/kodgire.
- 2.Science of Engineering Materials / Agarwal
- 3.Materials Science and engineering / William and collister.
- 4.Elements of Material science / V. Rahghavan
- 5.An introduction to materials science / W.g.vinas & HL Mancini
- 6.Material science & material / C.D.Yesudian & harris Samuel
- 7.Engineering Materials and Their Applications – R. A Flinn and P K Trojan / Jaico Books.
- 8.Engineering materials and metallurgy/R.K.Rajput/ S.Chand.

MALLA REDDY ENGINEERING COLLEGE
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Electrical and Electronics Engineering Lab

Section A: Electrical Engineering:

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

- 1.Swinburne's test on D.C. Shunt machine. (Predetermination of efficiency of a given D.C. Shunt machine working as motor and generator).
- 2.OC and SC tests on single phase transformer (Predetermination of efficiency and regulation at given power factors)
- 3.Brake test on 3-phase Induction motor (Determination of performance characteristics)
- 4.Regulation of alternator by Synchronous impedance method.

In addition to the above four experiments, any one of the experiments from the following list is required to be conducted :

- 5.Speed control of D.C. Shunt motor by
 - a) Armature Voltage control b) Field flux control method
- 6.Brake test on D.C Shunt Motor

Section B: Electronics Engineering :

- 1.Transistor CE Characteristics (Input and Output)
- 2.Full wave Rectifier with and without filters.
- 3.CE Amplifiers.
- 4.RC Phase Shift Oscillator
- 5.Class A Power Amplifier
- 6.Micro Processor

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Metallurgy and Mechanics of Solids Lab

(A) METALLURGY LAB :

1. Preparation and study of the Micro Structure of pure metals like Iron, Cu and Al.
2. Preparation and study of the Microstructure of Mild steels, low carbon steels, high – C steels.
3. Study of the Micro Structures of Cast Irons.
4. Study of the Micro Structures of Non-Ferrous alloys.
5. Study of the Micro structures of Heat treated steels.
6. Hardeneability of steels by Jominy End Quench Test.
7. To find out the hardness of various treated and untreated steels.

(B) MECHANICS OF SOLIDS LAB :

1. Direct tension test
2. Bending test on
 - a) Simple supported b) Cantilever beam
3. Torsion test
4. Hardness test
 - a) Brinells hardness test b) Rockwell hardness test
5. Test on springs
6. Compression test on cube
7. Impact test
8. Punch shear test

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Production Technology

UNIT - I

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

UNIT - II

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

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

UNIT - III

A) Welding : Classification of welding process types of welds and welded joints and their characteristics, design of welded joints, Gas welding, ARC welding, Forge welding, resistance welding, Thermit welding.

B) Cutting of Metals: Oxy - Acetylene Gas cutting, Cutting of ferrous.

UNIT - IV

Inert Gas welding, TIG & MIG, welding, Friction welding, Induction welding, Explosive welding, Laser welding, Soldering & Brazing. Heat affected zones in welding; welding defects - causes and remedies - destructive nondestructive testing of welds.

UNIT - V

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

UNIT - VI

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

UNIT- VII

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

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

UNIT- VIII

Processing of Plastics: Types of Plastics, Properties, applications and their Processing Methods.

Moulding Equipment: Injection moulding, Types of Injection moulding, Blow moulding.

TEXT BOOKS :

1. Manufacturing Technology / P.N. Rao/TMH.
2. Manufacturing Engineering and Technology/Kalpajin S/ Pearson Edu.

REFERENCES :

1. Production Technology / R.K. Jain
2. Process and materials of manufacturing -Lindberg/PE
3. Principles of Metal Castings / Roenthal.
4. Welding Process / Paramar /
5. Production Technology /Sarma P C /
6. Production Engineering - Suresh Dalela & Ravi Shankar / Galgotia Publications Pvt. Ltd.

Kinematics of Machinery**UNIT - I**

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

MACHINES : Mechanism and machines, classification of machines, kinematic chain , inversion of mechanism, inversion of mechanism , inversions of quadric cycle, chain , single and double slider crank chains.

UNIT - II

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

UNIT - III

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

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

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

UNIT - IV

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

HOOKE'S JOINT: Single and double Hookes joint Universal coupling application problems.

UNIT - V

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

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

UNIT - VI

Higher pairs, friction wheels and toothed gears types law of gearing, condition for constant velocity ratio for transmission of motion, Form of teeth: cycloidal and involute profiles. Velocity of sliding phenomena of interferences Methods of interference. Condition for

minimum number of teeth to avoid interference, expressions for arc of contact and path of contact - Introduction to Helical, Bevel and worm gearing.

UNIT - VII

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

UNIT - VIII

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

TEXT BOOKS :

1. Theory of Machines and Mechanisms-S.S.Rattan, Tata McGraw Hill Publishers
2. Theory of Machines R.S Khurmi & J.K Gupta

REFERENCES :

1. Theory of Machines by Thomas Bevan/ CBS
2. Theory of Machines / R.K Bansal
3. Theory of Machines Sadhu Singh Pearsons Edn
4. Mechanism and Machine Theory / JS Rao and RV Dukkipati / New Age
5. The theory of Machines /Shiegley/ Oxford.
6. Theory of machines - PL. Balaney/khanna publishers.

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Applied Thermodynamics-I

UNIT – I

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

UNIT-II

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

UNIT – III

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

UNIT IV

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

UNIT – V

Testing and Performance : Parameters of performance - measurement of cylinder pressure, fuel consumption, air intake, exhaust gas composition, Brake power – Determination of frictional losses and indicated power – Performance test – Heat balance sheet and chart.

UNIT – VI

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

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

UNIT VII

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

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

UNIT-VIII

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

TEXT BOOKS:

1. I.C. Engines / V. GANESAN- TMH
2. Thermal Engineering / Rajput / Lakshmi Publications.

REFERENCES:

1. IC Engines – Mathur & Sharma – Dhanpath Rai & Sons.
2. Engineering fundamentals of IC Engines – Pulkrabek / Pearson /PHI
3. Thermal Engineering / Rudramoorthy - TMH
4. Thermodynamics & Heat Engines / B. Yadav/ Central Book Depot., Allahabad
5. I.C. Engines / Heywood /McGrawHill.
6. Thermal Engineering – R.S. Khurmi & J.K.Gupta – S.Chand
7. IC Engines/ Ramalingam/ Scietech publishers
8. Thermal engineering data book-B.Srinivasulu Reddy/JK International Pub.

Mechanics of Fluids and Hydraulic Machines

UNIT I

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

UNIT II

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

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

UNIT III

Closed conduit flow: Reynold's experiment- Darcy Weisbach equation- Minor losses in pipes- pipes in series and pipes in parallel- total energy line-hydraulic gradient line. Measurement of flow: pilot tube, venturimeter, and orifice meter, Flow nozzle, Turbine flow meter (Ref.4)

UNIT IV

BOUNDARY LAYER CONCEPTS: Definition, thickness, characteristics along thin plate, laminar and turbulent boundary layers (No derivation) boundary layer in transition, separation of boundary layer, submerged objects – drag and lift.

UNIT V

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

UNIT VI

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

UNIT VII

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

UNIT VIII

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

Reciprocating pumps : Working, Discharge, slip, indicator diagrams.

TEXT BOOKS :

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

REFERENCES :

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

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Environmental Studies

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

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

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

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

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

UNIT-VI: ENVIRONMENTAL IMPACT ASSESSMENT (EIA) AND ENVIRONMENTAL MANAGEMENT PLAN: Definition of Impact: classification of impacts, Positive and Negative, Reversible and irreversible, light, moderate and severe, methods of baseline data acquisition.

Impacts on different components: such as human health resources, air, water, flora, fauna and society. Prediction of impacts and impact assessment methodologies. Environmental Impact Statement (EIS). Environmental Management plan (EMP): Technological Solutions, preventive methods, Control technologies, treatment technologies: green-belt-development, rain water harvesting, Remote sensing and GIS methods.

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

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

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

TECT BOOKS:

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

REFERENCE BOOKS:

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

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Numerical Methods

UNIT-I: Roots of Non Linear Equations

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

UNIT-II: Solutions of Linear Equations:

Existence of Solutions – Gauss Elimination Method – Gauss Elimination with pivoting. Gauss Jordan Method – III Conditioned Systems – Jacobi Iterative Method – Gauss Seidel Method – Convergence of Iterative Methods.

UNIT-III: Interpolation

Introduction- Errors in Polynomial Interpolation – Finite differences- Forward Differences- Backward differences – Symbolic relations and separation of symbols – Difference Equations – Difference of a polynomial- Newton's formulae for interpolation – Interpolation with unevenly spaced points- Lagrange's Interpolation formulae- Cubic spline – Piecewise Cubic interpolation using Hermite type data.

UNIT-IV: Least squares method

Linear, Non linear and curvilinear curve fitting- Multiple linear regression

UNIT- V: Numerical differentiation and integration

Numerical differentiation and integration Trapezoidal rule, Simpson's 1/3 rule and 3/8 rule, Romberg Integration, Double Integration – Trapezoidal Rule and Simpson's Methods,

UNIT-VI: Numerical solution of Initial Value Problems in Ordinary Differential Equations

Numerical Solution of Ordinary Differential equations: Solutions by Taylor's series- picard's Method of Successive Approximations- Euler's Method-Runge Kutta Methods- Predictor – Corrector Methods- Adams- Bashforth Method

UNIT-VII: Boundary values and Eigen value problems

Shooting Method, Finite difference method and solving eigen values problems, power method

UNIT-VIII: Solutions of partial differential equations

Classification of partial differential equation – Finite difference methods for: Elliptic equations – Laplace equations – Leibmann's iterative method – Parabola equations- Solution of heat equation (One dimensional)..

Text Books:

1. Numerical Methods by E. Balaguruswamy by Tata – Mc Graw Hill.
2. An introduction to Numerical Analysis by S.S.Sastry – PHI Learning

Reference:

1. Numerical Methods by S.Armugam & Others Scitech

2. Introduction to Numerical Analysis by K.E. Aitkison, Wiley Publications
3. Numerical Analysis by Scarborough, Oxford IVH
4. Elements of Numerical Analysis by Radha S. Gupta McMillan
5. Numerical Methods for Scientific and Engineering Computation by M.K. Jain, S.R.K. Iyengar & R.K. Jain

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Production Technology Lab

Minimum of 12 Exercises need to be performed

I. METAL CASTING LAB :

1. Pattern Design and making - for one casting drawing.
2. Sand properties testing - Exercise -for strengths, and permeability - 1
3. Moulding Melting and Casting - 1 Exercise

II WELDING LAB :

1. ARC Welding Lap & Butt Joint - 2 Exercises
2. Spot Welding - 1 Exercise
3. TIG Welding - 1 Exercise
4. Plasma welding and Brazing - 2 Exercises (Water Plasma Device)

III MECHANICAL PRESS WORKING :

1. Blanking & Piercing operation and study of simple, compound and progressive press tool.
2. Hydraulic Press : Deep drawing and extrusion operation.
3. Bending and other operations

IV PROCESSING OF PLASTICS:

1. Injection Moulding
2. Blow Moulding

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Mechanics of Fluids and Hydraulic Machines Lab

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

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

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Managerial Economics and Financial Analysis

UNIT I

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

UNIT II

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

UNIT III

THEORY OF PRODUCTION AND COST ANALYSIS: Production Function – Isoquants and Isocosts, MRTS, Least Cost Combination of Inputs, Cobb-Douglas Production function, Laws of Returns, Internal and External Economies of Scale.

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

UNIT IV

INTRODUCTION TO MARKETS & PRICING POLICIES: Market structures: Types of competition, Features of Perfect competition, Monopoly and Monopolistic Competition. Price-Output Determination in case of Perfect Competition and Monopoly.

Objectives and Policies of Pricing - Methods of Pricing:

Cost Plus Pricing, Marginal Cost Pricing, Sealed Bid Pricing, Going Rate Pricing, Limit Pricing, Market Skimming Pricing, Penetration Pricing, Two-Part Pricing, Block Pricing, Bundling Pricing, Peak Load Pricing, Cross Subsidization.

UNIT V

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

UNIT VI

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

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

UNIT VII

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

UNIT VIII

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

TEXT BOOKS:

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

REFERENCES:

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

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Metrology & Surface Engineering

UNIT – I

SYSTEMS OF LIMITS AND FITS: Introduction, normal size, tolerance limits, deviations, allowance, fits and their types – unilateral and bilateral tolerance system, hole and shaft basis systems – interchangeability and selective assembly. Indian standard Institution system – British standard system, International Standard system for plain and screwed work.

UNIT – II

LINEAR MEASUREMENT : Length standard, line and end standard, slip gauges – calibration of the slip gauges, Dial indicator, micrometers.

MEASUREMENT OF ANGLES AND TAPERS : Different methods – Bevel protractor – angle slip gauges – spirit levels – sine bar – Sine plate, rollers and spheres used to determine the tapers.

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

UNIT – III

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

FLAT SURFACE MEASUREMENT : Measurement of flat surfaces – instruments used – straight edges – surface plates – optical flat and auto collimator.

UNIT – IV

SURFACE ROUGHNESS MEASUREMENT : Differences between surface roughness and surface waviness-Numerical assessment of surface finish – CLA,R, R.M.S Values – Rz values, Rz value, Methods of measurement of surface finish-profilograph. Talysurf, ISI symbols for indication of surface finish.

UNIT-V

MEASUREMENT THROUGH COMPARATORS: Comparators – Mechanical, Electrical and Electronic Comparators, pneumatic comparators and their uses in mass production.

UNIT -VI

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

UNIT- VII

SURFACE ENGINEERING : Surface texture and properties, Surface cleaning techniques, Surface integrity, Wear and its measurements, Lubricants and its selection for reducing wear, Principles of corrosion and remedial measures, Laser applications for surface modifications.

UNIT – VIII

SURFACE TREATMENTS: Mechanical Surface treatment and coating, casehardening and surface coating, Thermal spraying, Vapour deposition, Ion implantation, Diffusion coating, Electro plating, Electro plating and Electro forming, Ceramic, Organic and Diamond coating

TEXT BOOKS :

1. Engineering Metrology / I C Gupta./ Danpath Rai
2. Engineering Metrology / R.K. Jain / Khanna Publishers

REFERENCES :

1. BIS standards on Limits & Fits, Surface Finish, Machine Tool Alignment etc.
2. Fundamentals of Dimensional Metrology 4e / Connie Dotson / Thomson
3. Handbook of Tribology: Materials, Coating, and Surface Treatments/ Bharat Bhushan and B.K.Gupta.
4. Surface Engineering with Lasers/ Dehossan J.T.
5. Surface Engineering for corrosion and wear resistance / JR Davis/ Woodhead Publishers.

Dynamics of Machinery

UNIT – I

PRECESSION : Gyroscopes, effect of precession motion on the stability of moving vehicles such as motor car, motor cycle, aero planes and ships.

UNIT – II**STATIC AND DYNAMIC FORCE ANALYSIS OF PLANAR MECHANISMS:**

Intoduction -Free Body Diagrams – Conditions for equilibrium – Two, Three and Four Members – Inertia forces and D’Alembert’s Principle – planar rotation about a fixed centre.

UNIT –III

SYNTHESIS OF LINKAGES: Three position synthesis – Four position Synthesis – Precision positions – Structural error – Chebychev’s spacing, Freudentein’s equation, Problems

UNIT –IV

Clutches: Friction clutches- Single Disc or plate clutch, Multiple Disc Clutch, Cone Clutch, Centrifugal Clutch.

BRAKES AND DYNAMOMETERS : Simple block brakes, internal expanding brake, band brake of vehicle. Dynamometers – absorption and transmission types. General description and methods of operations.

UNIT – V

TURNING MOMENT DIAGRAM AND FLY WHEELS: Turning moment – Inertia Torque connecting rod angular velocity and acceleration, crank effort and torque diagrams – Fluctuation of energy – Fly wheels and their design.

UNIT-VI

GOVERNERS : Watt, Porter and Proell governors. Spring loaded governors – Hartnell and hartung with auxili ary springs. Sensitiveness, isochronism and hunting.

UNIT – VII

BALANCING : Balancing of rotating masses Single and multiple – single and different planes. Balancing of Reciprocating Masses- Primary, Secondary, and higher balancing of reciprocating masses. Analytical and graphical methods. Unbalanced forces and couples – examination of “V”, multi cylinder in line and radial engines for primary and secondary balancing, locomotive balancing.

UNIT – VIII

VIBRATION: Free Vibration of mass attached to vertical spring – Simple problems on forced damped vibration, Vibration Isolation & Transmissibility Whirling of shafts, critical speeds, torsional vibrations, two and three rotor systems.

TEXT BOOKS :

1. Theory of Machines / S.S Ratan/ Mc. Graw Hill Publ.
2. Theory of Machines / Jagadish Lal & J.M.Shah / Metropolitan.

REFERENCES :

1. Mechanism and Machine Theory / JS Rao and RV Dukkupati / New Age
2. Theory of Machines / Shiegly / MGH
3. Theory of Machines / Thomas Bevan / CBS Publishers
4. Theory of machines / Khurmi/S.Chand.

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Machine Tools

UNIT – I

ELEMENTARY TREATMENT OF METAL CUTTING THEORY – Element of cutting process – Geometry of single point tool and angles chip formation and types of chips – built up edge and its effects chip breakers. Mechanics of orthogonal cutting –Merchant’s Force diagram, cutting forces – cutting speeds, feed, depth of cut, tool life, coolants, machinability – Tool materials. Cutting tool temperature measuring methods.

UNIT – II

ENGINE LATHE – Principle of working, specification of lathe – types of lathe – work holders tool holders – Box tools Taper turning thread turning – for Lathes and attachments. Turret and capstan lathes – collet chucks – other work holders – tool holding devices – box and tool layout. Principal features of automatic lathes – classification – Single spindle and multi-spindle automatic lathes – Cam design and applications.

UNIT – III

SHAPING SLOTTING AND PLANING MACHINES – Principles of working – Principal parts – specification classification, operations performed. machining time calculations.

UNIT – IV

Drilling and Boring Machines – Principles of working, specifications, types, operations performed – tool holding devices – twist drill – Boring machines – Fine boring machines – Jig Boring machine. Deep hole drilling machine.

UNIT – V

Milling machine – Principles of working – specifications – classifications of milling machines – Principal features of horizontal, vertical and universal milling machines – machining operations Types geometry of milling cutters – milling cutters – methods of indexing – Accessories to milling machines, kinematic scheme of milling cutters – milling cutters – methods of indexing.

UNIT –VI

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

UNIT - VII

Lapping, honing and broaching machines – comparison to grinding – lapping and honing. Kinematics scheme of Lapping, Honing and Broaching machines. Constructional features of speed and feed Units, machining time calculations

UNIT - VIII

Principles of design of Jigs and fixtures and uses. Classification of Jigs & Fixtures – Principles of location and clamping – Types of clamping & work holding devices. Typical examples of jigs and fixtures.

TEXT BOOKS :

1. Production Technology by R.K. Jain and S.C. Gupta.
2. Production Technology by H.M.T. (Hindustan Machine Tools).

REFERENCES:

1. Machine Tools – C.Elanchezian and M. Vijayan / Anuradha Agencies Publishers.
2. Workshop Technology – B.S.Raghu Vamshi – Vol II

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Design of Machine Members – I

UNIT – I

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

STRESSES IN MACHINE MEMBERS: Simple stresses – Complex stresses – impact stresses – stress strain relation – Various theories of failure – factor of safety – Design for strength and rigidity – preferred numbers. The concept of stiffness in tension, bending, torsion and combined situations.

UNIT – II

FATIGUE LOADING: Stress concentration – Theoretical stress Concentration factor – Fatigue stress concentration factor notch sensitivity – Design for fluctuating stresses – Endurance limit – Estimation of Endurance strength – Fatigue theories of failure - Goodman and Soderberg.

UNIT – III

RIVETED AND WELDED JOINTS: Riveted joints: Modes of failure of riveted joints – Strength equations – efficiency of riveted joints – Design of Boiler joints - eccentrically loaded riveted joints.

Welded joints: Design of Fillet welds – axial loads – Circular fillet welds – bending and torsion - eccentrically loaded joints.

UNIT – IV

BOLTED JOINTS: – Design of bolts with pre-stresses – Design of joints under eccentric loading –bolt of uniform strength, Cylinder cover joints

UNIT – V

AXIALLY LOADED JOINTS: Keys, Cotters and Knuckle Joints: Design of Keys-stresses in keys-cottered joints-spigot and socket, sleeve and cotter, jib and cotter joints- Knuckle joints.

UNIT – VI

DESIGN OF SHAFTS : Design of solid and hollow shafts for strength and rigidity – Design of shafts for combined bending and axial loads – Shaft sizes – BIS code – Design of shaft for a gear and belt drives.

UNIT – VII

SHAFT COUPLING : Rigid couplings – Muff, Split muff and Flange couplings. Flexible couplings – Pin - Bush coupling

UNIT – VIII

MECHANICAL SPRINGS : Stresses and deflections of helical springs – Extension - compression springs – Springs for static and fatigue loading – natural frequency of helical springs – Energy storage capacity – helical torsion springs – Co-axial springs.

TEXT BOOKS :

1. Machine Design, V.Bandari Tmh Publishers
2. Machine Design, S MD Jalaludin, AnuRadha Publishers
3. Design Data hand Book, S MD Jalaludin, AnuRadha Publishers

REFERENCES :

1. Design of Machine Elements / V.M. Fai res
2. Machine design / Schaum Series.
3. Machine design – Pandya & shah.

Applied Thermodynamics-II

UNIT – I

Basic Concepts : Rankine cycle - Schematic layout, Thermodynamic Analysis, Concept of Mean Temperature of Heat addition, Methods to improve cycle performance – Regeneration & reheating. Combustion: fuels and combustion, concepts of heat of reaction, adiabatic flame temperature, stoichiometry, flue gas analysis

UNIT II

Boilers : Classification – Working principles – with sketches including H.P.Boilers – Mountings and Accessories – Working principles, Boiler horse power, equivalent evaporation, efficiency and heat balance – Draught, classification – Height of chimney for given draught and discharge, condition for maximum discharge, efficiency of chimney – artificial draught, induced and forced.

UNIT – III

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

UNIT – IV

Steam Turbines : Classification – Impulse turbine; Mechanical details – Velocity diagram – effect of friction – power developed, axial thrust, blade or diagram efficiency – condition for maximum efficiency. De-Laval Turbine - its features. Methods to reduce rotor speed-Velocity compounding and pressure compounding, Velocity and Pressure variation along the flow – combined velocity diagram for a velocity compounded impulse turbine.

UNIT V

Reaction Turbine : Mechanical details – principle of operation, thermodynamic analysis of a stage, degree of reaction –velocity diagram – Parson's reaction turbine – condition for maximum efficiency.

UNIT VI

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

UNIT – VII

Gas Turbines : Simple gas turbine plant – Ideal cycle, essential components – parameters of performance – actual cycle – regeneration, inter cooling and reheating –Closed and Semi-closed cycles – merits and demerits, Brief concepts about compressors, combustion chambers and turbines of Gas Turbine Plant.

UNIT – VIII

Jet Propulsion : Principle of Operation –Classification of jet propulsive engines – Working Principles with schematic diagrams and representation on T-S diagram - Thrust, Thrust Power and Propulsion Efficiency – Turbo jet engines – Needs and Demands met by Turbo jet – Schematic Diagram, Thermodynamic Cycle, Performance Evaluation Thrust Augmentation – Methods.

Rockets : Application – Working Principle – Classification – Propellant Type – Thrust, Propulsive Efficiency – Specific Impulse – Solid and Liquid propellant Rocket Engines.

TEXT BOOKS :

1. Thermal Engineering / R.K. Rajput / Lakshmi Publications
2. Gas Turbines – V.Ganesan /TMH

REFERENCES :

1. Thermodynamics and Heat Engines / R. Yadav / Central Book Depot
2. Gas Turbines and Propulsive Systems – P.Khajuria & S.P.Dubey – /Dhanpatrai
3. Gas Turbines / Cohen, Rogers and Saravana Muttoo / Addison Wesley – Longman
4. Thermal Engineering-R.S Khurmi/JS Gupta/S.Chand.
5. Thermal Engineering-P.L.Bellaney/ khanna publishers.
6. Thermal Engineering-M.L.Marthur & Mehta/Jain bros.

Machine Tools & Metrology Lab**Section A :**

1. Measurement of lengths, heights, diameters by vernier calipers micrometers etc.
2. Measurement of bores by internal micrometers and dial bore indicators.
3. Use of gear teeth, vernier calipers and checking the chordal addendum and chordal height of spur gear.
4. Machine tool —alignment test on the lathe.
5. Machine tool alignment test on milling machine.
6. Tool makers microscope and its application
7. Angle and taper measurements by Bevel protractor, Sine bars, etc.
8. Use of spirit level in finding the flatness of surface plate.
9. Thread measurement by Two wire/ Three wire method or Tool makers microscope.
10. Surface roughness measurement by Taly Surf.
11. Surface Wear Resistances Test using Electro Spark Coating Device.

Section B :

1. Introduction of general purpose machines -Lathe, Drilling machine, Milling machine, Shaper,
2. Planing machine, slotting machine, Cylindrical Grinder, surface grinder and tool and cutter grinder.
3. Step turning and taper turning on lathe machine
4. Thread cutting and knurling on -lathe machine.
5. Drilling and Tapping
6. Shaping and Planing
7. Slotting
8. Milling
9. Cylindrical Surface Grinding
10. Grinding of Tool angles.

Advanced English Communication Skills Lab**1. Introduction**

The introduction of the English language lab is considered essential at 3rd year level. At this stage the students need to prepare themselves for their careers which may require them to hone further their listening, reading, speaking and writing skills in English both for their professional and interpersonal communication in the globalised context. It is also essential for them to understand how effective communication is connected with the personality of a person and thus understand the role of soft skills.

The proposed course should be an integrated theory and lab course to enable students to use good English and perform the following:

- Gather ideas and information, to organize ideas relevantly and coherently.
- Engage in debates.
- Participate in group discussions.
- Face interviews.
- Write project/research/technical reports.
- Write essays.
- Make oral presentation.
- Write formal letters.
- Transfer information from non-verbal to verbal texts and vice versa.
- To take part in social and professional communication.

2. Objectives:

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

- To improve the students' fluency in English, through a well developed vocabulary and then to listen to English spoken at normal conventional speed by educated English speakers and respond appropriately in different socio-cultural and professional contexts.
- Further, they would be required to communicate their ideas relevantly and coherently in writing.

3. Syllabus;

The following course content is prescribed for the advanced communication Skills Lab:

Unit I

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

Unit II

Reading skills –types of reading–reading for facts, guessing meaning from context, strategies of reading- scanning, skimming, inferring meaning, critical reading

Unit III

Technical Report Writing- types of formats and styles, subject matter organization, clarity, coherence and style, planning, data –collection, tools analysis.

Unit IV

Resume' writing-structure and presentation, planning defining the career objective, projecting ones strengths and skills set, summary, formats and styles, cover letter-writing.

Unit V

Writing and composition skills

Warm up activities- (expansion, condensation and paragraph building) , sequencing the ideas, three "C"s in writing, complete, comprehensive, and clear, Statement Of Purpose writing, e-correspondence.

Unit VI

Group Discussions

Warm up activities –(brain storming, ideation) dynamics of group discussions, interventions, summarizing, modulation of voice, body language, relevance, fluency and coherence.

Unit VII

Presentation Skills—

Warm up activities- (writing abstracts, synopsis etc.) types of presentations, graphical representation, making power point presentations, audio—video - Assessment

Unit VIII

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

note: unit VI and VIII are for internal examination.

4. Minimum Requirement:

The English language lab shall have two parts:

1. **The computer aided language lab** for 60 students with 60 systems, one master console, LAN

Facility and English language software for self-study by learner's

2. **The communication skills lab** with movable chairs and audio-visual aids with a P.A system. a TV., a digital stereo-audio video system and camcorder etc

System Requirements (Hardware component):

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

- P-IV Processor
- Speed-2.8 GHZ
- Ram-512mb
- Hard Disk-80-Gb
- Head phones of high quality

5.suggested software:

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

Suggested software:

- **Clarity pronunciation power**-Part II
- **Oxford Advanced learner's compass**, 7th Edition.
- **DELTA's key to the Next Generation TOFEL Test: Advanced Skills Practice.**

Lingua TOFEL CBT Insider, by Dreamtech

- **TOFEL &GRE (KAPLAN,AARCO&BARRONS,USA,Cracking GRE by CLIFFS)**

- The following software from train2success.com

- **Preparing for being interviewed,**
- **Positive thinking,**
- **Interviewing Skills, Telephone Skills,**
- **Time management,**
- **Team building,**

➤ **Decision making,**

English In Mind, Herbert Puchat and Jeff Stranks with Meredith Levy, Cambridge.

6. Books Recommended

Prescribed lab manual cum record

1. **Advanced Communication Skills Laboratory Manual** : Sudha Rani. D. Pearson Publications, New Delhi,2011.

References:

1. **Effective Technical Communication:** M.Asharf Rizvi. Tata McGraw-Hill Publishing Company ltd.
2. **A course On English Communication** By Madhavi Apte, Prentice-Hall Of India,2007
3. **Communication Skills** By Leene Sen, Prentice-Hall Of India,2005.
4. **Academic Writing-A Practical Guide for Students** By Stephen Bailey, Rontledge Flamer, London &Newyork, 2004.
5. **English Language Communication:** A reader Cum Lab Manual Dr. A Rama Krishna Rao , Dr. G.Natanam & Proof SA Sankaranarayana, Anuradha Publications, Chennai.
6. **Body Language-Youre Success Mantra** By Dr. Shalini Verma, S.Chand,2006.
7. **Delta's Key To The Next Generation TOFEL Test:** Advanced Skills Practice: New Age International (P) Ltd, Publishers, Newdelhi.
8. **Books On TOFEL/GRE/GMAT/CAT** By Barron's/Cup
9. **IELTS Series With CDS** By Cambridge University Press.
10. **Technical Report Writhing Today** By Daneial G. Riordan & Steven E. Paule, Biztantra Publishers,2005
11. **Basic Communication Skill For Technology** Byandra J. Rutherford, 2nd Edition ,Pearson Education,2007
12. **Communication Skills For Engineers** By Sunitha Mishara & C. Muralikrishna, Pearson Education,2007
13. **Objective English** By Edgar Thorpe & Shopwick Thorpe, 2nd Edition, Pearson Education,2007.
14. **Cambridge Preparation For The TOFEL Test** By Jolene Gear & Robert Gear, 4th Edition
15. **Technical Communication** by Meennakhi Raman & Sangeeta Sharma, Oxford University Press.

Distribution and weight of marks:

Advanced English communication skills lab Practical:

1. The practical's examinations for the English language laboratory practice shall be conducted as per the university norms prescribed for the core engineering practical sessions.
2. For the English language lab sessions there shall be a continuous evolution during the year for 25 session marks and 50 end examination marks. Of the 25 marks, 15 marks shall be awarded for day-to day work and 10 marks to be awarded by conducting internal lab test(s).the end examination shall be conducted by the teacher concerned with the help of another member of the staff of the same department of the same institution.

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Industrial Management

UNIT I

INTRODUCTION TO MANAGEMENT: Entrepreneurship and organization-nature and importance of management, Functions of management, Taylor's scientific Management Theory, Fayols Principles of management. Maslows Theory of Human Needs, Douglas McGregor's Theory X and Theory Y, Herzberg's Two-Factor Theory of Motivation, system Approach to Management, Leadership Styles, Social responsibilities of Management.

UNIT II

Designing Organizational Structures: Departmentation and decentralization, Types of Organizational Structures-line Organization, Line and Staff Organization, functional Organization, committee Organization, matrix Organization, Virtual Organization, Cellular Organization, Team structure, boundary less organization, inverted pyramid structure lean and flat organization structure and their merits, demerits and suitability.

UNIT III

Operations Management: Principles and Types of Plant Layout-Methods of production (Job, batch and Mass production), Work Study –Basic procedure involved in Method Study and Work Measurement-Statistical

Quality Control: X chart, R chart, C chart, P chart, (simple problems), Acceptance Sampling, Deming's contribution to quality,

UNIT IV

A) **Material Management:** Objectives, Need for Inventory Control, EOQ, ABC Analysis, Purchase procedure, Store Management and Stores Records –Supply Chain Management

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

UNIT V

Human Resource Management (HRM): Evolution of HRM, Concepts of HRM, Basic functions of HR Manager: Manpower Planning, Recruitment, Selection, Training and Development, Placement, Wage and salary Administration, Promotion, Transfer, Separation, Performance Appraisal, Grievance Handling and Welfare Administration, Job Evaluation and Merit Rating.

UNIT VI

Project Management: (PERT/CPM): Network Analysis, Evaluation and Review Technique (PERT), Critical Path Method (CPM), Identifying critical path, Probability of completing the project within given time, Project Cost Analysis, Project Crashing. (Simple problems)

UNIT VII

Strategic Management: Mission, Goals, Objectives, Policy, Strategy, Programmes, Elements of corporate planning process, Environmental Scanning, SWOT Analysis, Steps in Strategy Formulation and Implementation, generic Strategy Alternatives.

UNIT VIII

Contemporary Management Practices: Basic Concepts of Just -In-Time (JIT) systems, Total Quality Management (TQM), Six sigma and capability maturity modal (CMM) levels, Value Chain Analysis, Entrepreneurship Resource Planning (ERP), Performance Management, business process Outsourcing (BPO), Business process re-engineering 5s Model, Deming's PDCA, Kaizen, Poka-Yoke, Muda, Bench marking, Balanced Score Card.

TEXT BOOKS

1. Aryasri: Management Science, TMH, New Delhi, 2009.

REFERENCE BOOKS

1. Stoner, Management, Person, 2009.
2. Kotler Philip and Keller Kevin Lane: Marketing Management PHI, 2009.
3. Koontz, Wehrich, and Aryasri: Principles of Management, TMH, 2009.
4. Thomas N. Duening & John M. Ivancevich Management, Principles and Guidelines, Cengage, 2009.
5. Kaniska Bedi, Production and Operations management, Oxford University Press, 2009.
6. Memoria & S.V. Ganker, Personnel Management, Himalaya, 2009.
7. Schermerhon: Management, Wiley, 2009.
8. Parnell: Strategic Management, Biztantra, 2009.
9. L.S.Srinath: PERT/CPM, Affiliated East-West Press, 2009.
10. William J. Stevenson & Ceyehun Ozgur: Introduction to Management Science, TMH, 2007.

Pre-requisites: Managerial Economics

Objective: To formalize with the process of management and to provide basic insight into select contemporary management practices.

Codes/tables: Normal distribution function table need to be permitted into the examination Hall.

Question Paper pattern: 5 questions to be answered out of 8 questions. The question should contain at least 2 practical problems, one each from units-III & IV. Each question should not have more than 3 bits.

UNIT VIII will have only short Questions, not essay questions.

Finite Element Methods (Elective-I)

UNIT I

Introduction to FEM: basic concepts, historical back ground, application of FEM, general description, comparison of FEM With other methods. Basic Equation of elasticity. Stress-strain and strain-Displacement relations. Raleigh-Ritz method, weighted residual methods.

UNIT II

One Dimensional Problems: Stiffness equation for a axial bar element in local co-ordinates using Potential energies approach and Virtual energy principle-Finite Elements analysis of uniforms, stepped and tapered bars subjected to mechanical and thermal loads-assembly of Global Stiffness matrix and load vector-quadric shape functions –properties of stiffness matrix.

UNIT III

Stiffness equation for a truss bar element oriented in 2D plane-Finite Element analysis of trusses-plane truss and Space truss elements-methods of assembly

UNIT IV

Analysis of Beams: Hermite shape functions – Element stiffness matrix-Load vector –problems.

UNIT V

2-D Problems: CST – stiffness matrix and load vector –Isoperimetric element representation – shape function –convergence requirements-problems.

UNIT VI

Two dimensional four noded Isoperimetric elements – Numerical integration- Finite Element Modeling of Ax symmetric solids subjected to Axisymmetric loading with triangular elements-3D Problems-Tetrahedran elements

UNIT-VII

Scalar field problems : 1D Heat conduction- 1 D Fin Elements – 2D Heat Conduction- Analysis of thin plates-Composite slabs- Problems

UNIT VIII:

Dynamic Analysis: Dynamic equations-Lumped and Consistent Mass Matrices- Eigen Values and Eigen Vectors-Mode shapes- Model Analysis for Bars and Beams

Text Books:

1. The Finite Element Methods in Engineering- S.S.Rao-Elsevier-4th Edition
2. Introduction to finite elements in engineering – Tirupati.K Chandrupatla and Ashok.D. Belagunda

REFERENCES:

1. Finite Element Methods/Alavala/TMH
2. An Introduction to finite element methods – J.N.Reddy – McGrawhill
3. The Finite element method in engineering science – O.C.Zienkowitz, McGrawhill
4. Concepts and Applications of finite element analysis- Robert Cook-Wiley.
5. Introduction to Finite Element Analysis- S.Md.Jalaludeen- Anuradha publications

Refrigeration and Air Conditioning

UNIT – I

Introduction to Refrigeration : Necessity and applications – Unit of refrigeration and C.O.P. – Mechanical Refrigeration – Types of Ideal cycles of refrigeration.

Air Refrigeration: Bell Coleman cycle and Brayton Cycle, Open and Dense air systems – Actual air refrigeration system problems – Refrigeration needs of Air crafts.

UNIT – II

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

UNIT III

Principles of Evaporators: classification – Working Principles, Expansion devices – Types – Working Principles

Refrigerants – Desirable properties – classification refrigerants used – Nomenclature – Ozone Depletion– Global Warming .

UNIT IV

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

UNIT V

Steam Jet Refrigeration System – Working Principle and Basic Components. Principle and operation of (i) Thermoelectric refrigerator (ii) Vortex tube or Hilsch tube.

UNIT – VI

Introduction to Air Conditioning: Psychometric Properties & Processes – Characterization of Sensible and latent heat loads — Need for Ventilation, Consideration of Infiltration – Load concepts of RSHF, GSHF- Problems, Concept of ESHF and ADP.

UNIT VII

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

UNIT – VIII

Air Conditioning systems - Classification of equipment, cooling, heating humidification and dehumidification, filters, grills and registers, fans and blowers. Heat Pump – Heat sources – different heat pump circuits.

TEXT BOOKS :

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

REFERENCES :

1. Refrigeration and Air Conditioning / Manohar Prasad / New Age.
2. Principles of Refrigeration - Dossat / Pearson Education.
3. Refrigeration and Air Conditioning-P.L.Bellaney
4. Basic Refrigeration and Air-Conditioning – Ananthanarayanan / TMH
5. Refrigeration and Air Conditioning – R.S. Khurmi & J.K Gupta – S.Chand – Eurasia Publishing House (P) Ltd.

III Year B.Tech. ME II-Sem

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Design of Machine Members – II

UNIT – I

SLIDING CONTACT BEARINGS : Types of Journal bearings – Basic modes of Lubrication – Bearing construction –bearing design –bearing materials – Selection of Lubricants

UNIT – II

ROLLING CONTACT BEARINGS: Types of Rolling Contact bearings – Selection of bearing type – Selection of Bearing life – Design for cyclic loads and speeds – Static and Dynamic loading of ball & roller bearings.

UNIT –III

DESIGN OF IC ENGINE PARTS: Connecting Rod: Thrust in connecting rod – stress due to whipping action on connecting rod ends – Cranks and Crank shafts, strength and proportions of over hung and center cranks – Crank pins, Crank shafts. Pistons, Forces acting on piston – Construction Design and proportions of piston. Cylinder, Cylinder liners,

UNIT – IV

POWER TRANSMISSIONS SYSTEMS, PULLEYS : Transmission of power by Belt and Rope drives , Transmission efficiencies, Belts – Flat and V types – Ropes - pulleys for belt and rope drives, Materials, Chain drives

UNIT – V

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

UNIT – VI

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

UNIT – VII

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

UNIT – VIII

DESIGN OF WORM GEARS: Worm gears – Properties of Worm gears – Selection of materials – Strength and wear rating of worm gears – Force analysis – Friction in worm gears – thermal considerations.

TEXT BOOK :

1. Machine Design, V.Bandari Tmh Publishers

2. Machine Design, S MD Jalaludin, Anuradha Publishers
3. Machine Design, Kannaiyah/ Scietech.

REFERENCES :

1. Design Data hand Book, S MD Jalaludin, Anuradha Publishers
2. Machine Design / R.N. Norton
3. Data Books : (I) P.S.G. College of Technology (ii) Mahadevan
4. Mech. Engg. Design / JE Shigley
5. Thermal Engineering – R.S. Khurmi & J.S.Gupta / S.Chand Pub.

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Heat Transfer

UNIT – I

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

Conduction Heat Transfer : Fourier rate equation – General heat conduction equation in Cartesian, Cylindrical and Spherical coordinates.

UNIT – II

Simplification and forms of the field equation – steady, unsteady and periodic heat transfer – Initial and boundary conditions.

One Dimensional Steady State Conduction Heat Transfer : Homogeneous slabs, hollow cylinders and spheres – overall heat transfer coefficient – electrical analogy – Critical radius of insulation

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

UNIT III

One Dimensional Transient Conduction Heat Transfer : Systems with negligible internal resistance – Significance of Biot and Fourier Numbers - Chart solutions of transient conduction systems- Concept of Functional Body

UNIT – IV

Convective Heat Transfer : Classification of systems based on causation of flow, condition of flow, configuration of flow and medium of flow – Dimensional analysis as a tool for experimental investigation –Buckingham Pi Theorem and method, application for developing semi – empirical non- dimensional correlation for convection heat transfer – Significance of non-dimensional numbers – Concepts of Continuity, Momentum and Energy Equations.

Forced convection: External Flows : Concepts about hydrodynamic and thermal boundary layer and use of empirical correlations for convective heat transfer -Flat plates and Cylinders.

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

UNIT – V

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

UNIT VI

Heat Transfer with Phase Change: Boiling: – Pool boiling – Regimes Calculations on Nucleate boiling, Critical Heat flux and Film boiling.

Condensation: Film wise and drop wise condensation –Nusselt’s Theory of Condensation on a vertical plate - Film condensation on vertical and horizontal cylinders using empirical correlations.

UNIT VII

Heat Exchangers:

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

UNIT VIII

Radiation Heat Transfer:

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

TEXT BOOKS :

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

REFERENCE BOOKS:

1. Fundamentals of Engg. Heat and Mass Transfer / R.C.SACHDEVA / New Age International
2. Heat Transfer – Ghoshdastidar – Oxford University Press – II Edition
3. Heat and Mass Transfer –Cengel- McGraw Hill.
4. Heat and Mass Transfer – R.K. Rajput – S.Chand & Company Ltd.
5. Essential Heat Transfer - Christopher A Long / Pearson Education
7. Heat and Mass Transfer – D.S.Kumar / S.K.Kataria & Sons
8. Heat and Mass Transfer-Kondandaraman
9. Fundamentals of Heat Transfer & Mass Transfer- Incropera & Dewitt / John Wiley Pub.

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Engineering optimization

(Elective - 1)

UNIT-I

Introduction: Optimal problem formulation: Design Variables- Constraints- Objective function- Variable bounds. Engineering Optimization problems: Classification & Some examples (Just theory and discussion) : Truss structure, Ammonia Structure, Transit schedule and Car suspension.

UNIT-II

Single variable non-linear optimization problems: Local minimum Global minimum & Inflection point. Necessary and sufficient Conditions theorems, some problems based on this. Numerical methods: Exhaustive search methods- Fibonacci method, Golden section method & Comparison. Interpolation methods: Quadratic.

UNIT-III

Multivariable unconstrained non-linear optimization problems: Numerical methods part a: Direct search methods: Univariate method, pattern Search methods: Powell, Hook-Jeeve's, Rosen Brock's search Simplex methods

UNIT-IV

Multivariable unconstrained non-linear optimization problems: Numerical methods part b: Gradient methods: Gradient of a function- Importance- Gradient direction search based methods: Steepest Descent/ascent method, Conjugate gradient method and variable metric method.

UNIT-V

Multivariable constrained non-linear optimization problems Classical optimization techniques: Constraints- equations- Lagrangian method- inequalities- Kuhn- Tucker necessary and sufficient conditions- Quadratic problem- statement- Wolfe's and Beale's methods.

UNIT-VI

- a) Geometric Programming: Polynomials- arithmetic-geometric inequality- unconstrained GP-constrained GP (dⁿ type only)
- b) Integer Programming: Introduction- formulation- Gomory cutting plane algorithm- branch and bound method

UNIT-VII

Sensitivity Analysis: Linear programming- Formulation- Simplex method and Artificial variable techniques- Big-M & two-phase methods- change in the cost coefficients & constants of the constraints, addition of variables.

UNIT-VIII

- a) Simulation- Definition- Steps involved- Types of simulation Models- Advantages and disadvantages. Simplex problems on queuing & inventory.

b) Non-traditional optimization algorithms: Genetic algorithms: working principles differences and similarities between Genetic and traditional methods. Simulated annealing.

TEXT BOOKS:

1. Engineering optimization: Theory & Practice- S.S.Rao- New Age International Publications- Third Edition-2003.
2. Optimization for Engineering Design- Kalyanmoy Deb- Prentice Hall of India Pvt Ltd, New Delhi-2005.
3. Operation Research- S.D.Sharma- Kedar Nath & Ram Nath Co. New Delhi.

REFERENC TEXT BOOKS:

1. Optimization Theory and Practice : Beveridge & Schechter Mc Graw-Hill International Student Edition.
2. Optimization in Operation Research Ronald L.Rardin Pearson Education, Low Price Edition
3. Optimization Theory and practice: Mohan. C. Joshi & KM Moudgalaya Narosa Publishing House Chennai
4. Operation Research: A.P.VermaS.K.Kataria & Sons, New Delhi 110006.

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Nanotechnology

(Elective - 1)

UNIT-I

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

UNIT-II

Silicon Carbide: Application of Silicon carbide, nano materials preparation, Sintering of SiC, X-ray Diffraction data, electron microscopy sintering of nano particles,
Nano particles of Alumina and Zirconia: Nano materials preparation, Characterization, Wear materials and nano composites,

UNIT-III

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

Unit -IV

Electrical properties: Switching glasses with nanoparticles, Electronic conduction with nano particles

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

UNIT-V

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

UNIT-VI:

Investigating and manipulating materials in the nanoscale: Electron microscopies, scanning probe microscopies, optical microscopies for nano science and technology, X-ray diffraction.

UNIT-VII

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

UNIT-VIII

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

TEXT BOOKS:

1. Nano Materials- A.K.Bandyopadhyay/ New Age Publishers.
2. Nano Essentials- T.Pradeep/TMH

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Automobile Engineering
(Elective - 1)

UNIT – I

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

UNIT – II

Fuel System : S.I. Engine : Fuel supply systems, Mechanical and electrical fuel pump – filters – carburettor – types – air filters – petrol injection.

C.I. Engines : Requirements of diesel injection systems, types of injection systems, fuel pump, nozzle, spray formation, injection timing, testing of fuel pumps.

UNIT – III

Cooling System : Cooling Requirements, Air Cooling, Liquid Cooling, Thermo, water and Forced Circulation System – Radiators – Types – Cooling Fan - water pump, thermostat, evaporating cooling – pressure sealed cooling – antifreeze solutions.

Ignition System : Function of an ignition system, battery ignition system, constructional features of storage, battery, auto transformer, contact breaker points, condenser and spark plug – Magneto coil ignition system, electronic ignition system using contact breaker, electronic ignition using contact triggers – spark advance and retard mechanism.

Unit – IV

Emission from Automobiles: – Pollution standards National and international – Pollution Control – Techniques – Multipoint fuel injection for SI Engines. Common rail diesel injection Energy alternatives – Solar, Photo-voltaic, hydrogen, Biomass, alcohols, LPG,CNG, liquid Fuels and gaseous fuels, electrical-their merits and demerits.

UNIT – V

Electrical System : Charging circuit, generator, current – voltage regulator – starting system, bendix drive mechanism solenoid switch, lighting systems, Horn, wiper, fuel gauge – oil pressure gauge, engine temperature indicator etc.

UNIT – VI

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

UNIT – VII

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

Braking System : Mechanical brake system, Hydraulic brake system, Master cylinder, wheel cylinder tandem master cylinder Requirement of brake fluid, Pneumatic and vacuum brakes.

UNIT – VIII

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

TEXT BOOKS :

1. Automotive Mechanics – Vol. 1 & Vol. 2 / Kripal Sing.
2. Automobile Engineering / William Crouse

REFERENCES :

1. Automotive Engineering / Newton Steeds & Garrett
2. Automotive Mechanics / G.B.S. Narang
3. Automotive Mechanics / Heitner
4. Automotive Engines / Srinivasan
5. Automobile Engineering – K.K. Ramalingam / Scitech Publications (India) PVT. LTD.

Heat Transfer Lab

1. Composite Slab Apparatus – Overall heat transfer co-efficient.
2. Heat transfer through lagged pipe.
3. Heat Transfer through a Concentric Sphere
4. Thermal Conductivity of given metal rod.
5. Heat transfer in pin-fin
6. Experiment on Transient Heat Conduction
7. Heat transfer in forced convection apparatus.
8. Heat transfer in natural convection
9. Parallel and counter flow heat exchanger.
10. Emissivity apparatus.
11. Stefan Boltzman Apparatus.
12. Heat transfer in drop and film wise condensation.
13. Critical Heat flux apparatus.
14. Study of heat pipe and its demonstration.
15. Study of Two – Phase flow.

Thermal Engineering Lab

Perform any 10 out of the 12 exercises

1. I.C. Engines Valve / Port Timing Diagrams
2. I.C. Engines Performance Test(4 -Stroke Diesel Engines)
3. I.C. Engines Performance Test on 2-Stroke Petrol
4. Evaluation of Engine friction by conducting Morse test on 4-Stroke Multi cylinder Petrol Engine
5. Evaluate of engine friction by conducting motoring /retardation test on 4 stroke diesel Engine.
6. Heat balance on IC Engines.
7. Determination of A/F Ratio and Volumetric Efficiency on IC Engines.
8. Determine of Economical speed test for fixed load on 4-stroke Engine.
9. Determine optimum cooling water temperature on IC Engine
10. Dis-assembly / Assembly of Engines.
11. Performance test on Reciprocating Air-compressor unit.
12. Study of Boilers.