MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)
Sponsored by CMR Educational Society
(Affiliated to JNTU, Hyderabad, Approved by AICTE - Accredited by NBA & NAAC – 'A' Grade - ISO 9001:2008 Certified)
Maisammaguda, Dhulapally (Post Via Hakimpet), Secunderabad – 500100, Telangana State, India.
Contact Number: 040-23792146/64634237, E-Mail ID: mrcet2004@gmail.com, website: www.mrcet.ac.in

BACHELOR OF TECHNOLOGY
MECHANICAL ENGINEERING

ACADEMIC REGULATIONS
COURSE STRUCTURE AND SYLLABUS

For
(B.TECH. FOUR YEAR DEGREE COURSE)
(Batches admitted from the academic year 2015 - 2016)

Note: The regulations hereunder are subjected to amendments as may be made by the Academic Council of the College from time to time. Any or all such amendments will be effective from such date and to such batches of candidates (including those already pursuing the program) as may be decided by the Academic Council.

PRELIMINARY DEFINITIONS AND NOMENCLATURES

- ”Autonomous Institution /College” means an institution/college designated as autonomous institute / college by University Grants Commission (UGC), as per the UGC Autonomous College Statutes.

- “Academic Autonomy” means freedom to a College in all aspects of conducting its academic programs, granted by the University for promoting excellence.

- “Commission” means University Grants Commission.

- “AICTE” means All India Council for Technical Education.

- “University” means Jawaharlal Nehru Technological University, Hyderabad.

- “College” means Malla Reddy College of Engineering & Technology, Secunderabad unless indicated otherwise by the context.

- “Program” means:
    - Bachelor of Technology (B.Tech) degree program
    - UG Degree Program: B.Tech

- “Branch” means specialization in a program like B.Tech degree program in Mechanical Engineering, B.Tech degree program in Aeronautical Engineering etc.

- “Course” or “Subject” means a theory or practical subject, identified by its course – number and course-title, which is normally studied in a semester.

- T–Tutorial, P–Practical, D–Drawing, L-Theory, C-Credits

FOREWORD

The autonomy is conferred on Malla Reddy College of Engineering & Technology (MRCET) by UGC based on its performance as well as future commitment and competency to impart quality education. It is a mark of its ability to function independently in accordance with the set norms of the monitoring bodies like UGC and AICTE. It reflects the confidence of the UGC in the autonomous institution to uphold and maintain standards it expects to deliver on its own behalf and thus awards degrees on behalf of the college. Thus, an autonomous institution is given the freedom to have its own curriculum, examination system and monitoring mechanism, independent of the affiliating University but under its observance.

Malla Reddy College of Engineering & Technology (MRCET) is proud to win the credence of all the above bodies monitoring the quality in education and has gladly accepted the responsibility of sustaining, and also improving upon the values and beliefs for which it has been striving for more than a decade in reaching its present standing in the arena of contemporary technical education. As a follow up, statutory bodies like Academic Council and Boards of Studies are constituted with the guidance of the Governing Body of the College and recommendations of the JNTU Hyderabad to frame the regulations, course structure and syllabi under autonomous status.

The autonomous regulations, course structure and syllabi have been prepared after prolonged and detailed interaction with several experts drawn from academics, industry and research, in accordance with the vision and mission of the college which reflects the mindset of the institution in order to produce quality engineering graduates to the society.

All the faculty, parents and students are requested to go through all the rules and regulations carefully. Any clarifications, if needed, are to be sought at appropriate time and with principal of the college, without presumptions, to avoid unwanted subsequent inconveniences and embarrassments. The Cooperation of all the stake holders is sought for the successful implementation of the autonomous system in the larger interests of the institution and brighter prospects of engineering graduates.

"A thought beyond the horizons of success committed for educational excellence"

PRINCIPAL

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

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VISION

- To become a model institution in the fields of Engineering Technology and Management.
- To have a perfect synchronization of the ideologies of MRCET with challenging demands of International Pioneering Organizations

MISSION

- To establish a pedestal for the integral innovation, team spirit, originality and competence in the students, expose them to face the global challenges and become pioneers of Indian vision of modern society

QUALITY POLICY

- To implement best practices in Teaching and Learning process for both UG and PG courses meticulously.
- To provide state of art infrastructure and expertise to impart the quality education.
- To groom the students to become intellectually creative and professionally competitive.
- To channelize the activities and tune them in heights of commitment and sincerity, the requisites to claim the never ending ladder of SUCCESS year after year.

For more information: www.mrcet.ac.in

ACADEMIC REGULATIONS FOR B. TECH. (REGULAR)

Applicable for the students of B. Tech. (Regular) from the Academic Year 2015-16 and onwards

1. Award of B. Tech. Degree

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

1.1 The candidate shall pursue a course of study for not less than four academic years and not more than eight academic years.

1.2 After eight academic years of course of study, the candidate is permitted to write the examinations for two more years.

1.3 The candidate shall register for **192 credits** and secure **192 credits** with compulsory subjects as listed in Table-1

Table 1: Compulsory Subjects

S.No	Subject Particulars
1	All practical Subjects
2	Mini Project
3	Technical Seminar
4	Project Work

1.4 In addition to 1.3, the candidate has to register for Mandatory courses (Non-credit course), 50% of scoring is required for the award of the degree.

2. The students, who fail to fulfill all the academic requirements for the award of the degree within ten academic years from the year of their admission, shall forfeit their seats in B. Tech. course.

3. Courses of study

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

S.No	Department
01	Aeronautical Engineering
02	Computer Science Engineering
03	Electronics & Communication Engineering
04	Information Technology
05	Mechanical Engineering
06	Mining Engineering

4. Credits

Particulars	Semester	
	Periods per week	Credits
Theory	05	04
	04	03
Practical	03	02
Drawing	03	02
	06	04
Mini Project	--	04
Technical Seminar	06	02
Major Project	15	10

***Duration of each period is 50 minutes.**

5. Distribution and Weight age of Marks

5.1 The performance of a student in each semester shall be evaluated subject-wise for a maximum of 100 marks for a theory and 75 marks for a practical subject. In addition, Mini Project, Technical seminar and Major Project work shall be evaluated for 100, 50 and 300 marks, respectively.

5.2 For theory subjects the distribution shall be 25 marks for Internal Evaluation and 75 marks for the End-Examination.

5.3 For theory subjects, during a semester there shall be 2 mid-term examinations. Each mid- term examination consists of a descriptive paper and assignment. The descriptive paper shall be for 20 marks with a total duration of 2 hours. The descriptive paper shall contain 6 full questions out of which, the student has to answer 4 questions, each carrying 5 marks. While the first mid-term examination shall be conducted from 1 to 2 units of the syllabus, the second mid-term examination shall be conducted from 3 to 5 units**.** Five (5) marks are allocated for Assignments (as specified by the subject teacher concerned). The first Assignment should be submitted before the conduct of the first mid-examination, and the second Assignment should be submitted before the conduct of the second mid-examination. The total marks secured by the student in each mid-term examination are evaluated for 25 marks, and the average of the two mid-term examinations shall be taken as the final marks secured by each candidate.
However, if any student is absent/scoring internal marks less than 40% in any subject of a mid-term examination he/she will be given a chance to write the internal exam once again after he/she re-registering for the internal exam in the concerned subject and paying stipulated fees as per the norms.

The end examination will be conducted for 75 marks with Part A as a compulsory question for 25 marks. Part B is for maximum of 50 marks with 5 questions consisting of two parts each (a) and (b), out of which the student has to answer either (a) or (b), not both. Each question in Part B carries 10 marks.

5.4 For practical subjects there shall be a continuous evaluation during a semester for 25 sessional marks and 50 end semester examination marks. Out of the 25 marks for internal evaluation, day-to-day work in the laboratory shall be evaluated for 15 marks and internal practical examination shall be evaluated for 10 marks conducted by the laboratory teacher concerned. The end semester examination shall be conducted with an external examiner and the laboratory teacher. The external examiner shall be appointed from the clusters of colleges which are decided by the examination branch of the College.

5.5 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 semester examination. There shall be two internal tests in a Semester and the average of the two shall be considered for the award of marks for internal tests.

5.6 There shall be a Mini Project 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 Major Project work in IV year II Semester. The Mini Project shall be submitted in a report form and presented before the committee. It shall be evaluated for 100 marks. The committee consists of an External Examiner, Head of the Department, and the Supervisor of the Mini Project and a Senior Faculty member of the department. There shall be no internal marks for Mini Project.

5.7 There shall be a Technical 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 of the topic, and submit it to the department. It 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 the seminar.

5.8 Out of a total of 300 marks for the Major Project work, 100 marks shall be allotted for Internal Evaluation and 200 marks for the End Semester Examination (Viva Voce). The End Semester Examination of the Major Project work shall be conducted by the same committee as appointed for the mini-project. In addition, the project supervisor shall also be included in the committee. The topics for mini project, seminar and project work shall be different from one another. The evaluation of project work shall be made 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.

5.9 The Laboratory marks and the sessional marks awarded by the College are subject to scrutiny and scaling by the college wherever necessary. In such cases, the sessional and laboratory marks awarded by the College will be referred to Academic Council. The Academic Council will arrive at a scaling factor and the marks will be scaled accordingly. The recommendations of the Academic Council are final and binding. The laboratory records and internal test papers shall be preserved in the College as per the Affiliation University rules and produced before the Committees/Academic Council as and when asked for.

6. Attendance Requirements

6.1 A student is eligible to write the University examinations only if he acquires a minimum of 75% of attendance in aggregate of all the subjects.

6.2 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

6.3 Shortage of Attendance below 65% in aggregate shall not be condoned.

6.4 A student who is short of attendance in semester may seek re-admission into that semester when offered within 4 weeks from the date of the commencement of class work.

6.5 Students whose shortage of attendance is not condoned in any semester are not eligible to write their end semester examination of that class and their registration stands cancelled.

6.6 A stipulated fee as determined by the examination branch shall be payable towards condonation of shortage of attendance.

6.7 **A student will be promoted to the next semester if he satisfies the attendance requirement of the present semester, as applicable, including the days of attendance in sports, games, NCC and NSS activities.**

6.8 **If any candidate fulfills the attendance requirement in the present semester, he shall not be eligible for readmission into the same class.**

7. Course Registration:

7.1 Every student has to register for a set of Courses in each Semester, with the total number of their Credits being limited by considering the permissible weekly Contact Hours (typically: 30/Week); For this, an average Course Registration of minimum 20 Credits/Semester (e.g., 6-7 Courses) and a maximum of 28 credits are generally acceptable on recommendation of concerned academic advisor by satisfying the pre-requisite conditions.

7.2 Approval of the Course Registration will be informed by the concerned Head of the Department on the beginning of the semester by taking the number of students registered (minimum **one-third** students per class) and availability of the faculty into consideration.

7.3 Dropping of the Course Registration can be permitted up to two weeks from the commencement of the semester. Thereafter no droppings are permitted.

7.4 Interchanging of Course Registrations are not permitted.

7.5 The Pre-requisite conditions for the additional course(s) registration by the students are based on the slots available in the Time Table, Class rooms and Faculty availability.

8. Minimum Academic Requirements

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

8.1 A student is deemed to have satisfied the minimum academic requirements if he has earned the credits allotted to each theory/practical design/drawing subject/project and secures not less than 35% of marks in the end semester exam, and minimum 40% of marks in the sum total of the mid-term and end semester exams.

8.2 A student will not be promoted from I Year to II Year unless he fulfills the academic requirement of 24 credits out of 48 credits of I year two semesters from all the examinations and secures prescribed minimum attendance in I year.

8.3 A student will not be promoted from II year to III year unless he fulfills the academic requirement of 48 credits out of 96 credits up to II year II semester, from all the examinations, whether or not the candidate takes the examinations and secures prescribed minimum attendance in II year II semester.

8.4 A student shall be promoted from III year to IV year only if he fulfills the academic requirements of 72 credits out of 144 credits up to III year II semester, from all the examinations, whether or not the candidate takes the examinations and secures prescribed minimum attendance in III year II semester.

8.5 A student shall register and put up minimum attendance in all 192 credits and earn 192 credits. Marks obtained in the 192 credits shall be considered for the calculation of percentage of marks.

8.6 Students who fail to earn 192 credits as indicated in the course structure within ten academic years (8 years of study + 2 years additionally for appearing for exams only) from the year of their admission, shall forfeit their seat in B.Tech. course and their admission stands cancelled.

However, the minimum academic requirements in terms of percentage of credits and attendance for the promotion to the next higher semester/year will adhere to affiliating university JNTUH, Hyderabad

9. Course pattern

9.1 The entire course of study is for four academic years. I,II, III and IV years shall be on semester pattern.

9.2 A student, eligible to appear for the end examination in a subject, but absent from it or has failed in the end semester examination, may write the exam in that subject during the period of supplementary exams.

9.3 When a student is detained for lack of credits/shortage of attendance, he may be re-admitted into the next semester. However, the academic regulations under which he was first admitted shall continue to be applicable to him.

10. Award of Class

In assessing the performance of the students in examinations, the usual approach is to award marks based on the examinations conducted at various stages (sessional, mid-term, end-semester etc.,) in a semester. As per UGC Autonomous guidelines, the following system is implemented in awarding the grades and CGPA under the **Choice Based Credit System (CBCS).**

Letter Grades and Grade Points:

The UGC recommends a 10-point grading system with the following letter grades as given below:

Grades	Points	Marks secured (%)
O (Outstanding)	10	≥ 90
A+(Excellent)	9	85 – 89
A(Very Good)	8	75 – 84
B+(Good)	7	70 – 74
B(Above Average)	6	60 – 69
C(Average)	5	50 – 59
P(Pass)	4	40 – 49
F(Fail)	0	<40
Ab(Absent)	0	-

A student obtaining Grade F shall be considered failed and will be required to reappear in the examination

Computation of SGPA and CGPA

The UGC recommends the following procedure to compute the Semester Grade Point Average (SGPA) and Cumulative Grade Point Average (CGPA):

i. The SGPA is the ratio of sum of the product of the number of credits with the grade points scored by a student in all the courses taken by a student and the sum of the number of credits of all the courses undergone by a student, i.e

SGPA (Si) = Σ(Ci x Gi) / ΣCi

where Ci is the number of credits of the ith course and Gi is the grade point scored by the student in the ith course.

ii. The CGPA is also calculated in the same manner taking into account all the courses undergone by a student over all the semesters of a programme, i.e.

CGPA = Σ(Ci x Si) / Σ Ci

where Si is the SGPA of the ith semester and Ci is the total number of credits in that semester.

iii. The SGPA and CGPA shall be rounded off to 2 decimal points and reported in the transcripts.

11 Minimum Instruction Days

The minimum instruction days for each semester shall be 90days.

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

13 WITHHOLDING OF RESULTS

If the student has not paid the dues, if any, to the university or if any case of indiscipline is pending against him, the result of the student will be withheld and he will not be allowed into the next semester. His degree will be withheld in such cases.

14. TRANSITORY REGULATIONS

14.1 Discontinued, detained, or failed candidates are eligible for readmission as and when next offered.

14.2 After the revision of the regulations, the students of the previous batches will be given two chances for passing in their failed subjects, one supplementary and the other regular. If the students cannot clear the subjects in the given two chances, they shall be given equivalent subjects as per the revised regulations which they have to pass in order to obtain the required number of credits.

14.3 In case of transferred students from other Universities, the credits shall be transferred to JNTUH as per the academic regulations and course structure of the MRCET.

15. General

15.1 Wherever the words he , him , his , occur in the regulations, they include she , her , hers .

15.2 The academic regulation should be read as a whole for the purpose of any interpretation.

15.3 In case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Principal is final.

15.4 The regulations hereunder are subject to amendments as may be made by the Academic Council of the College from time to time. Any or all such amendments will be effective from such date and to such batches of candidates (including those already pursuing the program) as may be decided by the Academic Council.

15.5 The students seeking transfer to colleges affiliated to JNTUH from various other Universities/Institutions, have to pass the failed subjects which are equivalent to the subjects of prescribed curriculum of the institute, and also pass the subjects of prescribed curriculum of the institute which the candidates have not studied at the earlier Institution on their own without the right to sessional marks. Further, though the students have passed some of the subjects at the earlier institutions, if the same subjects are prescribed in different semesters of prescribed curriculum of the institute, the candidates have to study those subjects in prescribed curriculum of the institute in spite of the fact that those subjects are repeated.

16. PRE-REQUISITES FOR CORE ELECTIVES

Core Elective Number	Subject Code	Title of the Subject	Pre-Requisite Subject Code	Pre-Requisite Subject Title
1	R15A0317	Alternative fuels for IC Engines	R15A0308	Thermal Engineering
	R15A0318	Vehicular Pollution and Control	R15A0308	Thermal Engineering
	R15A0319	Combustion Technology	R15A0308	Thermal Engineering
2	R15A0325	Compressible Fluid Flow	R15A0309	Fluid mechanics and Hydraulic Machinery
	R15A0326	Computational Fluid Dynamics	R15A0022	Mathematics-II
			R15A0309	Fluid mechanics and Hydraulic Machinery
	R15A0327	Composite Materials	R15A0311	Manufacturing Science
3	R15A0334	Power Plant Engineering	R15A0303	Engineering Thermodynamics
			R15A0308	Thermal Engineering
			R15A0313	Advanced Thermal Engineering
	R15A0335	Jet Propulsion and Rocket Engineering	R15A0303	Engineering Thermodynamics
			R15A0313	Advanced Thermal Engineering
	R15A0336	CNC Technology	R15A0315	Machine Tools
			R15A0311	Manufacturing Science
4	R15A0337	Modern Machining Processes	R15A0315	Machine Tools
	R15A0338	Robotics	R15A0306	Kinematics of Machinery
			R15A0307	Dynamics of Machinery
	R15A0339	Mechanical Vibrations	R15A0306	Kinematics of Machinery
			R15A0307	Dynamics of Machinery
			R15A0314	Machine Design-I
5	R15A0340	Production Planning and Control	R15A0311	Manufacturing Science
	R15A0341	Maintenance and Safety Engineering	R15A0311	Manufacturing Science
			R15A0313	Advanced Thermal Engineering.
	R15A0342	Material Handling Systems	R15A0311	Manufacturing Science
			R15A0314	Machine Design-I
6	R15A0343	Manufacturing Management	R15A0311	Manufacturing Science
			R15A0316	Metrology and Surface Engineering
	R15A0344	Automation in Manufacturing	R15A0331	CAD/CAM
			R15A0315	Machine Tools
	R15A0345	Tribology	R15A0316	Metrology and surface Engineering.

MALPRACTICES RULES

DISCIPLINARY ACTION FOR / IMPROPER CONDUCT IN EXAMINATIONS

S.No	Nature of Malpractices/Improper conduct	Punishment
	If the candidate:	
1. (a)	Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the subject of the examination)	Expulsion from the examination hall and cancellation of the performance in that subject only.
(b)	Gives assistance or guidance or receives it 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 and sent to the University.
3.	Impersonates any other candidate in connection with the examination.	The candidate who has impersonated shall be expelled from examination hall. The candidate is also debarred and forfeits the seat. The performance of the original candidate who has been impersonated, shall be cancelled in all the subjects of the examination (including practicals and project work) already appeared and shall not be

		allowed to appear for examinations of the remaining subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. If the imposter is an outsider, he will be handed over to the police and a case is registered against him.
4.	Smuggles in the Answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
5.	Using objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.	Cancellation of the performance in that subject.
6.	Refuses to obey the orders of the Chief Superintendent/Assistant Superintendent / any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the 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 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

	incharge, 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.	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 University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
8.	Possess any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat.
9.	If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8.	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 University for further action to award suitable punishment.	

Malpractices identified by squad or special invigilators

1. Punishments to the candidates as per the above guidelines.
2. Punishment for institutions: (if the squad reports that the college is also involved in encouraging malpractices)

(i) A show cause notice shall be issued to the college.
(ii) Impose a suitable fine on the college.
(iii) Shifting the examination centre from the college to another college for a specific period of not less than one year.

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PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

PEO1: PROFESSIONALISM & CITIZENSHIP To create and sustain a community of learning in which students acquire knowledge and learn to apply it professionally with due consideration for ethical, ecological and economic issues.
PEO2: TECHNICAL ACCOMPLISHMENTS To provide knowledge based services to satisfy the needs of society and the industry by providing hands on experience in various technologies in core field.
PEO3: INVENTION, INNOVATION AND CREATIVITY To make the students to design, experiment, analyze, interpret in the core field with the help of other multi disciplinary concepts wherever applicable.
PEO4: PROFESSIONAL DEVELOPMENT To educate the students to disseminate research findings with good soft skills and become a successful entrepreneur.
PEO5: HUMAN RESOURCE DEVELOPMENT To graduate the students in building national capabilities in technology, education and research.

PROGRAM OUTCOMES (POs)

Engineering Graduates will be able to:

1. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design / development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multi disciplinary environments.
12. **Life- long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

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COURSE STRUCTURE

I Year B. Tech (MECH) – I Semester

S.NO	SUBJECT CODE	SUBJECT	L	T/P/D	C	MAX.MARKS	
						Int	Ext
1	R15A0001	ENGLISH	3		2	25	75
2	R15A0021	MATHEMATICS-I	5	1	4	25	75
3	R15A0011	ENGINEERING PHYSICS-I	3		2	25	75
4	R15A0014	ENVIRONMENTAL STUDIES	4		3	25	75
5	R15A0501	COMPUTER PROGRAMMING WITH C	4		3	25	75
6	R15A0301	ENGINEERING MECHANICS	5	1	4	25	75
7	R15A0581	COMPUTER PROGRAMMING LAB	-	3	2	25	50
8	R15A0084	IT WORKSHOP/ENGINEERING WORKSHOP	-	3	2	25	50
9	R15A0081	ENGLISH LANGUAGE COMMUNICATION SKILLS LAB-I	-	3	2	25	50
*10	R15A0003	*HUMAN VALUES AND SOCIETAL PERSPECTIVES	2	-	-	50	-
		TOTAL	**26**	**11**	**24**	**275**	**600**

***Mandatory course: Non-credit subject, 50% of scoring is required for the award of the degree**

I Year B. Tech (MECH) – II Semester

S.NO	SUBJECT CODE	SUBJECT	L	T/P/D	C	MAX.MARKS	
						Int	Ext
1	R15A0002	PROFESSIONAL ENGLISH	3		2	25	75
2	R15A0022	MATHEMATICS-II	5	1	4	25	75
3	R15A0012	ENGINEERING PHYSICS-II	3		2	25	75
4	R15A0013	ENGINEERING CHEMISTRY	4		3	25	75
5	R15A0502	OBJECT ORIENTED PROGRAMMING	4	1	3	25	75
6	R15A0302	ENGINEERING DRAWING	2	-3-	4	25	75
7	R15A0582	OBJECT ORIENTED PROGRAMMING LAB	-	3	2	25	50
8	R15A0083	ENGINEERING PHYSICS/ENGINEERING CHEMISTRY LAB	-	3	3	25	50
9	R15A0082	ENGLISH LANGUAGE COMMUNICATION SKILLS LAB-II	-	3	2	25	50
		TOTAL	**21**	**14**	**24**	**225**	**600**

II Year B. Tech (ME) – I Semester (5 Core Subjects + 1 Open Elective + 2 Labs)

S.NO.	SUBJECT CODE	SUBJECT	L	T/P/D	C	MAX MARKS	
						Int	Ext
1	R15A0303	Engineering Thermodynamics	5	1	4	25	75
2	R15A0304	Material Science	4	-	3	25	75
3	R15A0206	Electrical and Electronics Engineering	4	-	3	25	75
4	R15A0305	Strength of Materials	4	-	3	25	75
5	R15A0306	Kinematics of Machinery	4	1	3	25	75
6		**Open Elective- I**	5	1	4	25	75
	R15A0024	Probability and Statistics					
	R15A0507	Java Programming					
	R15A0067	Technology Management					
7	R15A0282	Electrical and Electronics Engineering Lab	-	3	2	25	50
8	R15A0381	Material Science and Strength of Materials Lab	-	3	2	25	50
*9	R15A0004 R15A0005	Foreign Language : French/ Foreign Language : German	2	-	-	50	-
Total			**28**	**09**	**24**	**250**	**550**

***Mandatory course: Non-credit course, 50% of scoring is required for the award of the degree**

II Year B. Tech (ME) – II Semester (5 Core Subjects + 1 Open Elective + 2 Labs)

S.NO.	SUBJECT CODE	SUBJECT	L	T/P/D	C	MAX MARKS	
						Int	Ext
1	R15A0307	Dynamics of Machinery	4	1	3	25	75
2	R15A0308	Thermal Engineering	4	-	3	25	75
3	R15A0309	Fluid Mechanics and Hydraulic Machinery	4	1	3	25	75
4	R15A0310	Machine Drawing	3	3	3	25	75
5	R15A0311	Manufacturing Science	4	-	3	25	75
6		**Open Elective- II**	4	-	3	25	75
	R15A0312	Industrial Engineering					
	R15A0069	Intellectual Property Rights					
	R15A0064	Enterprise Resource Planning					
7	R15A0382	Manufacturing Science Lab	-	3	2	25	50
8	R15A0383	Fluid Mechanics and Hydraulic Machinery Lab	-	3	2	25	50
9*	R15A0006	Gender Sensitization	-	3	2	75	-
Total			23	14	24	275	550

***Mandatory course: Non-credit course, 50% of scoring is required for the award of the degree**

III Year B. Tech (ME) – I Semester (4 Core Subjects+1 Core Elective+1 Open Elective+2 Labs)

S.NO.	SUBJECT CODE	SUBJECT	L	T/P/D	C	MAX MARKS	
						Int	Ext
1	R15A0313	Advanced Thermal Engineering	5	1	4	25	75
2	R15A0314	Machine Design - I	5	1	4	25	75
3	R15A0315	Machine Tools	4	-	3	25	75
4	R15A0316	Metrology and Surface Engineering	4	-	3	25	75
		Core Elective -I		-			
5	R15A0317	Alternative fuels for IC Engines	4	-	3	25	75
	R15A0318	Vehicular Pollution and Control					
	R15A0319	Combustion Technology					
6		**Open Elective -III**	4	-	3	25	75
	R15A0061	Managerial Economics and Financial Analysis					
	R15A0521	Web Technology					
	R15A0320	Solid waste Management					
7	R15A0386	Machine Tools and Metrology Lab	-	3	2	25	50
8	R15A0387	Thermal Engineering Lab	-	3	2	25	50
Total			**26**	**8**	**24**	**200**	**550**

III Year B. Tech (ME) – II Semester (4 Core Subjects+1 Core Elective+1 Open Elective+2 Labs)

S.NO.	SUBJECT CODE	SUBJECT	L	T/P/D	C	MAX MARKS	
						Int	Ext
1	R15A0321	Machine Design -II	5	1	4	25	75
2	R15A0322	Finite Element Method	4	1	3	25	75
3	R15A0323	Heat Transfer	5	1	4	25	75
4	R15A0324	Refrigeration and Air Conditioning	4		3	25	75
5		**Core Elective - II**	4	-	3	25	75
	R15A0325	Compressible Fluid Flow					
	R15A0326	Computational Fluid Dynamics					
	R15A0327	Composite Materials					
6		**Open Elective- IV**	4	-	3	25	75
	R15A0568	Apps Design and					
	R15A0328	Production and Operations Management					
	R15A0329	Nano Materials					
7	R15A0388	Heat Transfer Lab	-	3	2	25	50
8	R15A0389	CAD Lab	-	3	2	25	50
9*	R15A0007	Technical Communication and Soft Skills	2	-	-	50	-
Total			**28**	**9**	**24**	**250**	**550**

***Mandatory course: Non-credit course, 50% of scoring is required for the award of the degree**

IV Year B. Tech (ME) – I Semester (4 Core Subjects+2 Core Electives+2 Labs)

S.NO.	SUBJECT CODE	SUBJECT	L	T/P/D	C	MAX. MARKS	
						Int	Ext
1	R15A0330	Operations Research	5	1	4	25	75
2	R15A0331	CAD/CAM	5	1	4	25	75
3	R15A0332	Mechanical Measurements and Control Systems	4	-	3	25	75
4	R15A0333	Automobile Engineering	4		3	25	75
5		**Core Elective -III**	4	-	3	25	75
	R15A0334	Power Plant Engineering					
	R15A0335	Jet Propulsion and Rocket Engineering					
	R15A0336	CNC Technology					
6		**Core Elective- IV**	4	-	3	25	75
	R15A0337	Modern Machining Processes					
	R15A0338	Robotics					
	R15A0339	Mechanical Vibrations					
7	R15A0390	Computer Aided Design and Computer Aided Manufacturing Lab	-	3	2	25	50
8	R15A0391	Mechanical Measurements and Control Systems Lab / Production Drawing Practice Lab	-	3	2	25	50
Total			**26**	**8**	**24**	**200**	**550**

IV Year B. Tech (ME) – II Semester (2 Core Electives + Project)

S.NO.	SUBJECT CODE	SUBJECT	L	T/P/D	C	MAX. MARKS	
						Int	Ext
1		**Core Elective- V**	5	1	4	25	75
	R15A0340	Production Planning and Control					
	R15A0341	Maintenance and Safety Engineering					
	R15A0342	Material Handling Systems					
2		**Core Elective -VI**	5	1	4	25	75
	R15A0343	Manufacturing Management					
	R15A0344	Automation in Manufacturing					
	R15A0345	Tribology					
3	R15A0392	Mini Project	-	-	4	-	10
4	R15A0393	Technical Seminar	-	6	2	50	-
5	R15A0394	Major Project	-	15	10	100	20
Total			**10**	**23**	**24**	**200**	**450**

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

I Year B. Tech MECH-I Sem **L T/P/D C**

3 - / - / - 2

(R15A0001) ENGLISH

Introduction:

In view of the growing importance of English as a tool for global communication and the consequent emphasis on training students to acquire communicative competence, the syllabus has been designed to develop linguistic and communicative competencies of Engineering students. The prescribed books and the exercises are meant to serve broadly as students' handbooks.

In the English classes, the focus should be on the skills of reading, writing, listening and speaking and for this the teachers should use the text prescribed for detailed study. For example, the students should be encouraged to read the texts/selected paragraphs silently. The teachers can ask comprehension questions to stimulate discussion and based on the discussions students can be made to write short paragraphs/essays etc.

The text for non-detailed study is for extensive reading/reading for pleasure. Hence, it is suggested that they read it on their own the topics selected for discussion in the class. The time should be utilized for working out the exercises given after each section , as also for supplementing the exercises with authentic materials of a similar kind for example, from newspaper articles, advertisements, promotional material etc. However, the stress in this syllabus is on skill development, fostering ideas and practice of language skills.

Objectives:

- To improve the language proficiency of the students in English with emphasis on LSRW skills.
- To equip the students to study academic subjects more effectively using the theoretical and practical components of the English syllabus.
- To develop the study skills and communication skills in formal and informal situations.

SYLLABUS:

Listening Skills:

Objectives

1. To enable students to develop their listening skill so that they may appreciate its role in the LSRW skills approach to language and improve their pronunciation.
2. To equip students with necessary training in listening so that they can comprehend the speech of people of different backgrounds and regions. Students should be given practice in listening to the sounds of the language to be able to recognize them, to distinguish between them to mark stress and recognize and use the right intonation in sentences.
    - Listening for general content

- Listening to fill up information
- Intensive listening
- Listening for specific information

Speaking Skills:

Objectives

1. To make students aware of the role of speaking in English and its contribution to their success.
2. To enable students to express themselves fluently and appropriately in social and professional contexts.
   - Oral practice
   - Describing objects/situations/people
   - Role play – Individual/Group activities (Using exercises from all the nine units of the prescribed text: Learning English : A Communicative Approach)
   - Just A Minute (JAM) Sessions.

Reading Skills:

Objectives

1. To develop an awareness in the students about the significance of silent reading and comprehension.
2. To develop the ability of students to guess the meanings of words from context and grasp the
   overall message of the text, draw inferences etc.
   - Skimming the text
   - Understanding the gist of an argument
   - Identifying the topic sentence
   - Inferring lexical and contextual meaning
   - Understanding discourse features
   - Scanning the text
   - Recognizing coherence/sequencing of sentences

NOTE : The students will be trained in reading skills using the prescribed text for detailed study.

They will be examined in reading and answering questions using 'unseen' passages which may be taken from authentic texts, such as magazines/newspaper articles.

Writing Skills:

Objectives

1. To develop an awareness in the students about writing as an exact and formal skill
2. To equip them with the components of different forms of writing, beginning with the lower order ones.
   - Writing sentences
   - Use of appropriate vocabulary
   - Paragraph writing

- Coherence and cohesiveness
- Narration / description
- Note Making
- Formal and informal letter writing
- Describing graphs using expressions of comparison

TEXTBOOKS PRESCRIBED:

In order to improve the proficiency of the student in the acquisition of the four skills mentioned above, the following texts and course content, divided into Five Units are prescribed in each semester:

For Detailed study

First text book entitled "Skills Annexe: Functional English for Success", published by Orient BlackSwan, Hyderabad.

For Non-detailed study

Second textbook titled "Epitome of Wisdom", published by Maruthi Publications, Guntur.

Unit –I:

1. Chapter entitled 'Mokshagundam Visvesvaraya' from *Epitome of Wisdom*, published by Maruthi Publications, Hyderabad.

L- Listening – Project Based Assignment
S- Speaking – Jam session
R- Reading – The Palm Islands
W- Writing – Writing Paragraphs
G- Grammar – Conjunctions and Adverbs

V- Vocabulary – Prefixes and Suffixes

Unit – II

1. Chapter entitled "Never Never Nest" by Cedric Mount, published in *Ten One Act Plays, 1937*, Willett, Clark and Company, 1937.

L- Listening – Project Based Assignment
S- Speaking – Role plays—Introduction, Greetings, Requests, Permission
R- Reading – Reading for the plot
W- Writing – Note writing
G- Grammar – Articles, Finite and Non-finite Verbs, Auxiliary Verbs and Nouns
V- Vocabulary – Homophones, Homographs and Homonyms

Unit – III

1. Chapter entitled "Risk Management" from *Skills Annexe -Functional English for Success*, published by Orient Black Swan, Hyderabad.

L- Listening – Project Based Assignment
S- Speaking – Role plays – Refusal, Apology, and Complimenting
R- Reading – Shivakasi Accident
W- Writing – Note Making and Note Taking
G- Grammar – Tenses and Punctuation

V- Vocabulary – Synonyms and Antonyms

Unit – IV

1. Chapter entitled 'Leela's Friend' from *Epitome of Wisdom*, published by Maruthi Publications, Hyderabad.

L- Listening – Project Based Assignment
S- Speaking – Role plays—Congratulating, Consolation, and Social Etiquettes
R- Reading – Forensic Science
W- Writing – Letter Writing
G- Grammar – Contractions, Questions, Prepositions
V- Vocabulary – Phrasal Verbs

Unit –V

1. Chapter entitled "Three Days to See" from *Epitome of Wisdom*, published by Maruthi Publications, Hyderabad.

L- Listening – Project Based Assignment
S- Speaking – Professional and Telephone Etiquettes
R- Reading – Reading for Facts
W- Writing – Business Letters, Complaints, Apologies, Requests
G- Grammar – Correction of Sentences and Modal Auxiliaries
V- Vocabulary – Confused Words

* Exercises from the texts not prescribed shall also be used for classroom tasks.

REFERENCES :

1. Contemporary English Grammar Structures and Composition by David Green, MacMillan Publishers, New Delhi. 2010.
2. Innovate with English: A Course in English for Engineering Students, edited by T Samson, Foundation Books.
3. English Grammar Practice, Raj N Bakshi, Orient Longman.
4. Technical Communication by Daniel Riordan. 2011. Cengage Publications. New Delhi.
5. Effective English, edited by E Suresh Kumar, A RamaKrishna Rao, P Sreehari, Published by Pearson.
6. Handbook of English Grammar& Usage, Mark Lester and Larry Beason, Tata Mc Graw – Hill.
7. Spoken English, R.K. Bansal & JB Harrison, Orient Longman.
8. Technical Communication, Meenakshi Raman, Oxford University Press
9. Objective English Edgar Thorpe & Showick Thorpe, Pearson Education
10. Grammar Games, Renuvolcuri Mario, Cambridge University Press.
11. Murphy's English Grammar with CD, Murphy, Cambridge University Press.
12. Everyday Dialogues in English, Robert J. Dixson, Prentice Hall India Pvt Ltd.,
13. ABC of Common Errors Nigel D Turton, Mac Millan Publishers.
14. Basic Vocabulary Edgar Thorpe & Showick Thorpe, Pearson Education
15. Effective Technical Communication, M Ashraf Rizvi, Tata Mc Graw – Hill.
16. An Interactive Grammar of Modern English, Shivendra K. Verma and Hemlatha Nagarajan , Frank Bros & CO
17. A Communicative Grammar of English, Geoffrey Leech, Jan Svartvik, Pearson Education

18. Enrich your English, Thakur K B P Sinha, Vijay Nicole Imprints Pvt Ltd.,
19. A Grammar Book for You And I, C. Edward Good, MacMillan Publish.

Outcomes:

- Usage of English Language, written and spoken.
- Enrichment of comprehension and fluency.
- Gaining confidence in using language in verbal situation.

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I Year B. Tech MECH-I Sem	**L**	**T/P/D**	**C**
	5	**1 / - / -**	**4**

(R15A0021) MATHEMATICS – I

Objectives:

To learn

- Concept of rank of a matrix and applying the concept of rank to know the consistency of linear equations and to find all possible solutions if exist and concept of eigen values and eigen vectors of a matrix
- The mean value theorems and to understand the concepts geometrically , functions of several variables and optimization of these functions.
- Methods of solving the differential equations of 1^{st} and higher order cooling, Natural growth and decay, bending of beams etc.
- Properties of Laplace Transform, Inverse Laplace Transform and Convolution theorem

UNIT - I: Matrix Theory

Introduction to matrices- Elementary row and column operations on a matrix- Finding rank of a matrix by reducing to Echelon and Normal forms-Consistency of system of linear equations (homogeneous and non- homogeneous) using the rank of a matrix-Cayley - Hamilton Theorem (without proof) – Verification- finding inverse of a matrix and powers of a matrix by Cayley-Hamilton theorem- Linear dependence and Independence of Vectors-Eigen values and eigen vectors of a matrix-Properties of eigen values and eigen vectors of real and complex matrices,Diagonalisation of matrix.

UNIT – II: Differential Calculus

Mean Value Theorms: Rolle's Theorem – Lagrange's Mean Value Theorem – Cauchy's mean value Theorems with geometrical interpretations (all theorems without proof)- verification of the Theorems and testing the applicability of these theorems to the given function-Taylor's series -Maclaurin's series.

Functions of Several Variables: Jacobian-Functional dependence- Maxima and Minima of functions of two variables without constraints and with constraints - Method of Lagrange multipliers.

UNIT – III: Ordinary Differential Equations of First Order and Applications

Formation of differential equation- Solution of D.E - Variable Separable form-Homogeneous-Non homogeneous- Exact-Non Exact-Linear and Bernoulli's equations-Applications of first order differential equations – Newton's Law of cooling- Law of natural growth and decay- Orthogonal trajectories

UNIT - IV: Linear Differential Equations of Higher Order and Applications

Linear differential equations of second and higher order with constant coefficients- Non-homogeneous term of the type f(x) = e^{ax} , sinax, cosax, x^n , e^{ax} V and x^n V- Method of variation of parameters-Applications to bending of beams, Electrical circuits and simple harmonic motion.

UNIT – V Laplace Transforms and Applications

Definition of Laplace transform- Domain of the function and Kernel for the Laplace transforms- Existence of Laplace transform- Laplace transform of standard functions- first shifting Theorem,-Laplace transform of functions when they are multiplied or divided by "t"- Laplace transforms of derivatives and integrals of functions – Unit step function – second shifting theorem – Dirac's delta function- Periodic function – Inverse Laplace transform by Partial fractions-Inverse Laplace transforms of functions when they are multiplied or divided by "s", Inverse Laplace Transforms of derivatives and integrals of functions- Convolution theorem –Solving ordinary differential equations by Laplace transforms.

TEXT BOOKS:

1. Engineering Mathematics – I by T.K. V. Iyengar, B. Krishna Gandhi & Others, S. Chand.

2. Higher Engineering Mathematics by B.S. Grewal, Khanna Publishers.

REFERENCES:

1. Advanced Engineering Mathematics by R.K. Jain & S.R.K. Iyengar, 3rd edition, Narosa Publishing House, Delhi.
2. Advanced engineering Mathematics by Kreyszig, John Wiley & Sons Publishers.
3. Engineering Mathematics – I by D. S. Chandrasekhar, Prison Books Pvt. Ltd.

Outcomes:

- After learning the contents of this Unit the student is able to write the matrix representation of a set of linear equations and to analyze solutions of system of equations.
- The student will be able to understand the methods of differential calculus to optimize single and multivariable functions.
- The student is able to identify the type of differential equation and uses the tight method to solve the differential equations. Also able to apply the theory of differential equations to the real world problems.
- The student is able to solve certain differential equations using Laplace Transform. Also able to transform functions on time domain to frequency domain using Laplace transforms.

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I Year B. Tech MECH-I Sem	**L**	**T/P/D**	**C**
	3	**- / - / -**	**2**

(R15A0011) ENGINEERING PHYSICS-I

OBJECTIVES:

The objectives of Engineering Physics are

- To understand wave nature of light in designing powerful light sources for various Engineering applications and enable them to develop communication systems by understanding the working of laser beams as well as Fiber Technology.
- To understand the behavior of electron in a solids and classification of solids based on band theory thereby one can realize conductivity and specific heat values of solids.

To understand the basics of working and design of semiconductor devices.

UNIT-I

OPTICS: Introduction to Interference-Coherence-Coherent sources. Theory of interference fringes, Constructive and destructive interferences-Interference by division of wave front, Interference in thin films by reflected light, Interference due to division of amplitude-Newton's rings Experiment.

Diffraction-Frenel's diffraction, Fraunhoper's diffraction (Single Slit),Difference between interference and diffraction, Resolving Power of Grating.

Introduction to Polarization, representation of various polarized lights, Brewster law, and law of Mauls.

UNIT-II

LASERS: Characteristics of lasers, Spontaneous and Stimulated emissions, Einstein's Coefficients, Population inversion, Meta stable state, pumping, lasing action, Construction and working of Ruby Laser, Helium-Neon Laser, semi conductor lasers. Applications of lasers.

FIBER OPTICS: Advantages of optical fibers over conventional communication system, Construction and Working Principle of an optical fiber, Numerical aperture and Acceptance angle of an optical fiber, Mode and Propagation through step and graded index fibers, Attenuation, Applications of optical fibers.

UNIT-III

PRINCIPLES OF QUANTUM MECHANICS: Introduction-wave nature and particle nature-de Broglie's Hypothesis, Davisson and Germer's experiment, Matter Waves, Heisenberg's

uncertainty principle. Physical significance of wave function, Schrodinger time-independent wave equation, Particle in One dimensional infinite potential box.

UNIT-IV

ELEMENTS OF STATISTICAL MECHANICS & BAND THEORY OF SOLIDS:

Introduction,Micro and Macro states, Maxwell Boltzman, Bose Einstein, Fermi Dirac Statistical distributions(Qualitative), Density of States, Fermi Energy, Introduction to electron theory of metals, Blotch Theorem (Qualitative), Khronig Penny model(Qualitative), EK curve-Effective mass of electron, Origin of energy bands in solids, Classification of solids-conductors, semi conductors and insulators with energy level diagrams.

UNIT-V

SEMICONDUCTOR PHYSICS: Types of semi conductors**,** Carrier concentration and Fermi level of intrinsic and Extrinsic Semiconductors, Direct and indirect band gaps of semi conductors. Hall Effect and features.

SEMICONDUCTOR DEVICES: Formation of PN junction diode, Energy level diagram of PN junction diode. I-V characteristics of PN junction diode-PN junction as half wave rectifier and full wave rectifier.PN junction diode as LED and Solar cell.

OUTCOMES:

- The students would be able to learn the fundamental concepts of wave optics.
- The knowledge on fundamentals of quantum mechanics, statistical mechanics enables the student to apply to various systems like communications solar cells, LED's and so on.
- Finally, Engineering physics course helps the student to develop problem solving skills and analytical, practical skills

TEXT BOOKS:

1. Engineering Physics, V. Rajendran, Tata Mc Graw Hill Book Publishers
2. Engineering Physics, Dr Arumugam, Anuradha Publications

REFERENCES:

1. Text Book of Engineering Physics –P. G. Khirsagar, Avadhanulu– S. Chand
2. Engineering Physics ,P.K. Palaniswamy, Scitech Publishers
3. Solid State Physics, Kittel- Wiley International.
4. Solid State Physics – AJ DekKer-Macmillan Publishers.

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I Year B.Tech. MECH-I Sem	**L**	**T/P/D**	**C**
	4	**-/-/-**	**3**

(R15A0014) ENVIRONMENTAL STUDIES

Objectives:

1. Understanding the importance of ecological balance for sustainable development.
2. Understanding the impacts of developmental activities and mitigation measures.
3. Understanding the environmental policies and regulations

UNIT-I:

Introduction: Definition of Environment and Environmental Sciences.

Ecosystems: Definition, Scope and Importance of ecosystem. Brief Classification, structure and function of an ecosystem, Food chains, food webs and ecological pyramids. Flow of energy, Biogeochemical cycles (Carbon, Oxygen, Nitrogen, Water, phosphorus, sulphur cycle) Bioaccumulation, Biomagnification, and carrying capacity.

UNIT-II:

Natural Resources: Classification of Resources: water resources: use and over utilization of surface and ground water, water conservation Dams: benefits and problems. Forest resources, Deforestation, Energy resources: renewable and non renewable energy sources, use of alternate energy resources.

UNIT-III:

Biodiversity and Biotic Resources: Introduction, Definition, genetic, species and ecosystem diversity. Value of biodiversity; consumptive use, productive use, social, ethical, aesthetic and optional values. Hot spots of biodiversity. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts; conservation of biodiversity: In-Situ and Ex-situ conservation.

UNIT-IV:

Environmental Pollution and Control Technologies: Environmental Pollution: **Classification of pollution, Air Pollution**: Primary and secondary pollutants, Automobile and Industrial pollution, reduction of pollutants. **Water pollution**: Sources and types of pollution, water treatment methods. **Soil Pollution**: Sources and types, Impacts of modern agriculture, degradation of soil. Solid waste and its management, composition and characteristics of e-Waste and its management.

Global Environmental Problems: Green house effect, Global warming, Climate change and impacts on human environment. Ozone depletion and Ozone depleting substances (ODS). Acid rains

Natural Hazards (Droughts, Floods, Cyclone, Landslides, Earthquake, Tsunami) and Disaster Management, Carbon Footprint.

UNIT-V:

Environmental Policy, Legislation & EIA: Environmental Protection act1986, Air Act- 1981, Water Act 1974, Forest conservation act 1980, Wild life Protection Act-1972, Municipal solid waste management and handling rules, biomedical waste management and handling rules,

hazardous waste management and handling rules. International conventions / Protocols: Earth summit, Kyoto protocol and Montréal Protocol.
EIA: EIA structure, methods of baseline data acquisition. Concepts of Environmental Management Plan (EMP).
Towards Sustainable Future: Concept of Sustainable Development, Population and its explosion, Environmental Education, Concept of Green Building.

SUGGESTED TEXT BOOKS:

1. Environmental Studies by Anubha Kaushik, 4th Edition, New age international Publishers.
2. Text book of Environmental Science and Technology - Dr. M. Anji Reddy 2007, BS Publications.
3. Environmental Studies by R. Rajagopalan, Oxford 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.
3. Environmental Science by Daniel B.Botkin & Edward A.Keller, Wiley INDIA edition.
4. Principles of Environmental Science by William . P. Cunnningham & Mary Inn Cunnningham Tata McGRAW –Hill Publishing Company Ltd.
5. Environmental Studies by S. Rama Lakshmi & Purnima Smarath Kalyani Publishers.

Outcomes:

Based on this course, the Engineering graduate will understand /evaluate / develop technologies on the basis of
Ecological principles and environmental regulations which in turn helps in sustainable development.

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I Year B. Tech MECH-I Sem	**L**	**T/P/D**	**C**
	4	**-/-/-**	**3**

(R15A0501) COMPUTER PROGRAMMING WITH C

Objectives

- To understand the various steps in Program development.
- To understand the basic concepts in C Programming Language.
- To learn how to write modular and readable C Programs
- To learn to write programs (using structured programming approach) in C to solve problems.
- To introduce the students to basic data structures such as lists, stacks and queues.
- To make the student understand simple sorting and searching methods

UNIT - I

Introduction to Computing – Computer Systems, Computing Environments, Computer Languages, Creating and running programs, Software Development Life Cycle, Algorithm, Flowchart.

Introduction to C – History of C, Features Of C, Structure Of C Program, Character Set, C Tokens-keywords, Identifiers, Constants, Data types, Variables, Operators, Expressions, Precedence and Associativity, Expression Evaluation, Type conversion, Statements- Selection Statements(Decision Making) – if and switch statements, Repetition statements (loops)- while, for, do-while statements, other statements related to looping –break, continue, goto.

UNIT-II

Functions-Designing Structured Programs, Types of Functions- user defined functions, Standard Functions, Inter function communication, Categories of functions ,Parameter Passing techniques, Scope, Storage classes-auto, register, static, extern, Type qualifiers, Recursion- recursive functions, Preprocessor commands.

UNIT – III

Arrays – Declaration and Initialization, Inter Function Communication, Array Applications, Two dimensional arrays, Multi dimensional arrays.

Strings – Declaration and Initialization, String Input / Output functions, Arrays of strings,

String manipulation functions.

UNIT-IV

Pointers- Introduction, Definition and uses of pointers, address operator, Pointer variables, Pointer constants ,dereferencing pointers, void pointers, Pointer arithmetic, Pointers to Pointers, Pointers and Arrays, Pointers and Functions, Pointers to functions, Array of pointers, Pointers and Strings.

UNIT-V

Structures and Unions - **I**ntroduction, Declaration and Initialization, Structure within a structure, Operations on structures, Array of Structures, Pointer to Structures, Structures and Functions, Self referential structures, Typedef, enum, bitfields, Unions.

Files – Concept of a file, Streams, Text files and Binary files, Opening and Closing files, File input / output functions, File Status functions (Error handling), Positioning functions, Command line arguments.

TEXT BOOKS:

1. Computer Science: A Structured Programming Approach Using C, B.A.Forouzan and R.F. Gilberg, Third Edition, Cengage Learning.
2. Mastering C, K.R.Venugopal, S R Prasad, Tata McGraw-Hill Education.

REFERENCE BOOKS:

1. The C Programming Language, B.W. Kernighan and Dennis M.Ritchie, PHI.
2. Computer Programming, E.Balagurusamy, First Edition, TMH.
3. C and Data structures – P. Padmanabham, Third Edition, B.S. Publications.
4. Programming in *C, Ashok Kamthane*. Pearson Education India.
5. Let us C ,Yashwanth Kanethkar, 13th Edition, BPB Publications.

Outcomes:

- Demonstrate the basic knowledge of computer hardware and Software.
- Ability to apply solving and logical skills to programming in C language and also in other languages.

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(R15A0301) ENGINEERING MECHANICS

Unit – I

Introduction to Engineering Mechanics – Basic Concepts. **Resultants of Force System:** Parallelogram law –Forces and components- Resultant of coplanar Concurrent Forces – Components of forces in Space – Moment of Force - principle of moments – Coplanar Applications – Couples - Resultant of any Force System.

Unit – II

Equilibrium of Force Systems: Free Body Diagrams, Equations of Equilibrium - Equilibrium of planar Systems - Equilibrium of Spatial Systems.

FRICTION: Introduction **–** Theory of Friction – Angle of friction - Laws of Friction – Static and Dynamic Frictions – Motion of Bodies: Wedge, Screw, Screw-jack, and Differential Screw-jack.

Unit – III

Centroids and Centers of Gravity: Introduction – Centroids and Centre of gravity of simple figures (from basic principles) – Centroids of Composite Figures - Theorem of Pappus – Center of gravity of bodies and centroids of volumes.

Unit – IV

Moments of Inertia: Definition – Polar Moment of Inertia –Radius of gyration - Transfer formula for moment of inertia - Moments of Inertia for Composite areas - Products of Inertia, Transfer Formula for Product of Inertia.

Mass Moment of Inertia: Moment of Inertia of Masses- Transfer Formula for Mass Moments of Inertia - mass moment of inertia of composite bodies.

Unit – V

Kinematics of a Particle: Motion of a particle – Rectilinear motion – motion curves – Rectangular components of curvilinear motion– Kinematics of Rigid Body - Types of rigid body motion -Angular motion - Fixed Axis Rotation

Kinetics of particles: Translation -Analysis as a Particle and Analysis as a Rigid Body in Translation – Equations of plane motion - Angular motion - Fixed Axis Rotation – Rolling Bodies.

TEXT BOOKS:

1. Engineering Mechanics/ S. Timoshenko and D.H. Young, Mc Graw Hill Book Company.
2. Engineering Mechanics - Statics and Dynamics by Vijaya Kumar Reddy K , Suresh Kumar J.BS Publications

REFERENCES:

1. Engg. Mechanics / S.S. Bhavikati & K.G. Rajasekharappa
2. A text of Engineering Mechanics / YVD Rao / K. Govinda Rajulu/ M. Manzoor Hussain, Academic Publishing Company
3. Engg. Mechanics / M.V. Seshagiri Rao & D Rama Durgaiah/ Universities Press
4. Engineering Mechanics, Umesh Regl / Tayal.
5. Engg. Mechanics / KL Kumar / Tata McGraw Hill.
6. Engineering Mechanics / Irving Shames / Prentice Hall

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(R15A0581) COMPUTER PROGRAMMING LAB

Objectives:

- Understand the basic concept of C Programming, and its different modules that includes conditional and looping expressions, Arrays, Strings, Functions, Pointers, Structures and File programming
- Acquire knowledge about the basic concept of writing a program.
- Role of constants, variables, identifiers, operators, type conversion and other building blocks of C Language.
- Use of conditional expressions and looping statements to solve problems associated with conditions and repetitions.
- Role of Functions involving the idea of modularity.
- Concept of Array and pointers dealing with memory management.
- Structures and unions through which derived data types can be formed
- File Handling for permanent storage of data or record.
- Programming using gcc compiler in Linux.

Week 1:

a) Write a C program to find sum and average of three numbers.

b)Write a C program to find the sum of individual digits of a given positive integer.

c) Write a C program to generate the first n terms of the Fibonacci sequence.

Week 2:

a)Write a C program to generate prime numbers between 1 to n.

b)Write a C program to Check whether given number is Armstrong Number or Not.

c) Write a C program to evaluate algebraic expression (ax+b)/(ax-b).

Week 3:

a)Write a C program to check whether given number is perfect number or Not.

b)Write a C program to check whether given number is strong number or not.

Week 4:

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

b)Write a C program perform arithmetic operations using switch statement.

Week 5:

a)Write a C program to find factorial of a given integer using non-recursive function.

b)Write a C program to find factorial of a given integer using recursive function.

Week 6:

a)Write C program to find GCD of two integers by using recursive function.

b)Write C program to find GCD of two integers using non-recursive function.

Week 7:

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

b) Write a C Program to Sort the Array in an Ascending Order

c) Write a C Program to find whether given matrix is symmetric or not.

Week 8:

Revision of programs

Week 9:

a)Write a C program to perform addition of two matrices.

b)Write a C program that uses functions to perform Multiplication of Two Matrices.

Week 10:

a)Write a C program to use function to insert a sub-string in to given main string from a given position.

b)Write a C program that uses functions to delete n Characters from a given position in a given string.

Week 11:

a)Write a C program using user defined functions to determine whether the given string is palindrome or not.

b)Write a C program that displays the position or index in the main string S where the sub string T begins, or - 1 if S doesn't contain T.

Week 12:

a)Write C program to count the number of lines, words and characters in a given text.

b)Write a C program to find the length of the string using Pointer.

Week 13:

a) Write a C program to Display array elements using calloc( ) function.

b)Write a C Program to Calculate Total and Percentage marks of a student using structure.

Week 14:

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

i) Reading a complex number ii) Writing a complex number

iii) Addition of two complex numbers iv) Multiplication of two complex numbers

b) Write a C program to display the contents of a file.

Week 15:

a)Write a C program to copy the contents of one file to another.

b)Write a C program to merge two files into a third file.

c)Write a C program to reverse the first n characters in a file.

Week 16:

Revision Of Programs

TEXT BOOKS

1. C Programming and Data Structures, P.Padmanabham, Third Edition, BS Publications
2. Computer programming in C.V.RAjaraman, PHI Publishers.
3. C Programming, E.Balagurusamy, 3rd edition, TMH Publishers.
4. C Programming, M.V.S.S.N Venkateswarlu and E.V.Prasad,S.Chand Publishers
5. Mastering C,K.R.Venugopal and S.R.Prasad, TMH Publishers.

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(R15A0084) IT WORKSHOP LAB / ENGINEERING WORKSHOP

Objective:

The IT Workshop for engineers is a training lab course. The modules include training on PC Hardware, Internet & World Wide Web and Productivity tools including Word, Excel, Power Point and Publisher.

PC Hardware introduces the students to a personal computer and its basic peripherals, the process of assembling a personal computer, installation of system software like MS Windows , Linux and the required device drivers. In addition hardware and software level troubleshooting process, tips and tricks would be covered.

Internet & World Wide Web module introduces the different ways of hooking the PC on to the internet from home and workplace and effectively usage of the internet. Usage of web browsers, email, newsgroups and discussion forums would be covered. In addition, awareness of cyber hygiene, i.e., protecting the personal computer from getting infected with the viruses, worms and other cyber attacks would be introduced.

Productivity tools module would enable the students in crafting professional word documents, excel spread sheets, power point presentations and personal web sites using the Microsoft suite of office tools and LaTeX.

PC Hardware

Week :1

Task 1: Generations of computers, Types of Computers, applications of computers Von Neumann architecture. Identify the different hardware components of a PC & their functions.

Task 2: practice to disassemble and assemble the components of a PC to working condition.

Week 2:

Task 3 : Installation of windows operating system in PC.

Task 4: Exposure to Basic commands in MS-DOS commands like ver, vol, date, time, cls, dir, md, cd, path, rd, copy con, type, copy, move, del, ren, prompt, ipconfig etc.

Week 3:

Task 5: Installation of operating systems LINUX and different packages on a PC.

Task 6: Exposure to Basic commands in Linux General Purpose utilities like man, who, tty, clear, date, cal, passwd; File Handling utilities like pwd, mkdir, rmdir, cp, rm, mv, cat, cd, ls, ln; Filters like wc, cmp, diff, head, tail, sort.

Week 4:

Task 7: Practice hardware troubleshooting exercises related to various components of computer like monitor, drives, memory devices, printers etc. and software troubleshooting related to BIOS etc.

NETWORKING

Week 5:

Task 8: Students should get to know about some of the Communication and Transmission devices, Network cabling, Features of Networking, Communication Protocols, Types of Network Topologies and Types of Networks.

Internet & World Wide Web

Week 6:

Task 9: Orientation & Connectivity Boot Camp and surfing the Web using Web Browsers: Students should get connected to their Local Area Network and access the Internet. In the process they should configure the TCP/IP setting and demonstrate how to access the websites and email. Students customize their web browsers using bookmarks, search toolbars and pop up blockers.

Week 7:

Task 10: Search Engines and Netiquette (Demonstration): Students should know about different search engines and their usage. A few topics would be given to the students for which they need to search on Google etc.

Week 8:

Task 11: Cyber Hygiene (Demonstration): Awareness of various threats on the internet. To install antivirus software and to configure their personal firewall and windows update on their computers.

Productivity Tools

Documentation

Week 9:

Task 12: Word Orientation: The mentor needs to give an overview of LaTeX and Microsoft (MS) office 2007. Importance of LaTeX and MS office 2007. Give the details about LaTeX/MS word accessing, overview of toolbars, saving files and Using help and resources.

Week 10:

Task 13: Using LaTeX/Word to create project certificate. Features to be covered:- Formatting Fonts in word, Drop Cap in word, Applying Text effects, Using Character Spacing, Borders and Colors, Inserting Header and Footer, Using Date and Time option and Mail merge in LaTeX/Word.

Week 11:

Task 14: Creating project abstract Features to be covered:-Formatting Styles, Inserting

table, Bullets and Numbering, Changing Text Direction, Cell alignment, Footnote, Hyperlink, Symbols, Spell Check, Track Changes.

Presentation

LaTeX /MS Power Point

Week 12:

Task15: Students will be working on basic power point utilities and tools which help them create basic power point presentation. Topic covered during this week includes :- PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows in both LaTeX and Power point. Students will be given model power point presentation which needs to be replicated (exactly how it's asked).

Week 13:

Task 16: Second week helps students in making their presentations interactive. Topic covered during this week includes: Hyperlinks, Inserting –Images, Clip Art, Audio, Video, Objects, Tables and Charts.

Excel

Week 14:

Task 17: Excel Orientation: The mentor needs to tell the importance of MS office 2007/ equivalent (FOSS) tool Excel as a Spreadsheet tool, give the details of the two tasks and features that would be covered in each. Using Excel – Accessing, overview of toolbars, saving excel files, Using help and resources.

Week 15:

Task 18: Creating a Scheduler - Features to be covered:- Gridlines, Format Cells, Summation, auto fill, Formatting Text.

Week 16:

Task 19 : Calculating GPA - .Features to be covered:- Cell Referencing, Formulae in excel – average, standard deviation, Charts, Renaming and Inserting worksheets, Hyper linking, Count function, LOOKUP/VLOOKUP, Sorting, Conditional formatting.

REFERENCE BOOKS:

1. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education.
2. IT Essentials PC Hardware and Software Companion Guide Third Edition by David Anfinson and Ken.
3. Quamme. – CISCO Press, Pearson Education.
4. PC Hardware and A+Handbook – Kate J. Chase PHI (Microsoft).

Outcomes:

- Apply knowledge for computer assembling and software installation
- Ability how to solve the trouble shooting problems.

- Apply the tools for preparation of PPT, Documentation and budget sheet etc.

ENGINEERING WORKSHOP

1. TRADES FOR EXERCISES:

At least two exercises from each trade:

1. Carpentry
2. Fitting
3. Tin-Smithy and Development of jobs carried out and soldering.
4. Black Smithy
5. House-wiring

1. TRADES FOR DEMONSTRATION & EXPOSURE:

1. Plumbing
2. Machine Shop
3. Welding
4. Foundry
5. Metal Cutting (Water Plasma)

TEXT BOOK:

1. Work shop Manual - P.Kannaiah/ K.L.Narayana/ Scitech Publishers.
2. Workshop Manual / Venkat Reddy/ BS Publications/Sixth Edition

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(R15A0081) ENGLISH LANGUAGE COMMUNICATION SKILLS LAB

The Language Lab focuses on the production and practice of sounds of language and familiarises the students with the use of English in everyday situations and contexts.

Objectives

- To facilitate computer aided multi-media instruction enabling individualized and independent language learning
- To sensitise the students to the nuances of English speech sounds, word accent, intonation and rhythm
- To bring about a consistent accent and intelligibility in their pronunciation of English by providing an opportunity for practice in speaking
- To improve the fluency in spoken English and neutralize mother tongue influence
- To train students to use language appropriately for interviews, group discussion and public speaking

Syllabus: English Language Communication Skills Lab shall have two parts:

a. Computer Assisted Language Learning (CALL) Lab
b. Interactive Communication Skills (ICS) Lab

The following course content is prescribed for the **English Language Communication Skills Lab**

Exercise –I

CALL Lab: Introduction to Phonetics –Speech Sounds –Vowels and Consonants- Transcriptions

ICS Lab: Ice-Breaking activity - JAM session

Exercise –II

CALL Lab: Pronunciation- Mispronounced sounds, Silent letters-Past Tense Markers and Plural Markers

ICS Lab: Situational Dialogues –Role Plays - Expressions in Various Situations –Self-introduction and Introducing Others –Greetings –Apologies –Requests- Refusal- Permissions – Complementing – Congratulating - Consoling

Exercise -III

CALL Lab: Syllable and Syllabification

ICS Lab: Etiquette – Social and Professional Telephone Etiquette

Outcomes:

- Better Understanding of nuances of language through audio-visual experience and group activities.
- Neutralization of accent for intelligibility
- Speaking with clarity and confidence thereby enhancing employability skills of the students.

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(R15A0003) HUMAN VALUES AND SOCIETAL PERSPECTIVES

(MANDATORY COURSE)

Objective: This introductory course input is intended

a. To help the students appreciate the essential complementarity between 'VALUES' and skills' to ensure sustained happiness and prosperity which are the core aspirations of all human beings.
b. To facilitate the development of a Holiostic perspective among students towards life, profession and happiness, based on a correct understanding of the Human reality and the rest of Existence. Such a holistic perspective form the basis of Value based living in a natural way.
c. To highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually satisfying human behavior and mutually enriching interaction with Nature.

Unit-I:

Course Introduction – Need, Basic Guidelines, Content and Process of Value Education: Understanding the need, basic guidelines, content and process for value Education. Self Exploration-What is it? Its content and process; 'Natural Acceptance' and Experiential validation-as the mechanism for self exploration. Continuous Happiness and Prosperity-A look at basic Human Aspirations. Right understanding , Relationship and physical Facilities – the basic requirements for fulfillment of aspirations of every human being with their correct priority. Understanding Happiness and prosperity correctly – A critical appraisal of the current scenario. Method to fulfill the above human aspirations: understanding and living in harmony at various lavels.

Unit-II:

Understand Harmony in the Human Being – Harmony in Myself: Understanding human being as a co-existence of the sentient 'I' and the material 'Body' understanding the needs of self ('I') and 'Body'-Sukh and Suvidha. Understanding the body as an instrument of 'I'(I being the does, seer and enjoyer). Understanding the characteristics and activities of 'I' and harmony in 'I' . Understanding the harmony of I with the Body: Sanyam and Swasthya: correct appraisal of physical needs, meaning of prosperity in detail. Programs to ensure sanyam and Swasthya.

Unit-III:

Understanding Harmony in the Family and Society-Harmony in Hum an-Human Relationship: Understanding harmony in the Family – the basic unit of human interaction. Understanding values in human-human relationship; meaning of Nyaya and program for its fulfillment to ensure Ubhay-tripti**: Trust (Vishwas) and Respect (Samman) as the foundational values of relationship.** Understanding the meaning of Vishwas: Difference between intention and competence. Understanding the meaning of Samman,Difference between respect and differentiation; the other salient values in relationship. Understanding

the harmony in the society (socity being an extension of family): Samadhan, Samridhi, Abhay, Sah-astitva as comprehensive Human Goals. Visualizing a universal harmonious order in society – Undivided society(Akhand Samaj), Universal Order (Sarvabhaum Vyawastha) –from family to world family!

Unit-IV:

Understanding Harmony in the Nature and Existence – Whole existence as Co-existence: Understanding the harmony in the Nature. Interconnectedness and mutual fulfillment among the four orders of nature recyclability and self-regulation in nature. Understanding Existence as Co-existence (SAh-astiva) of mutually interacting units in all –pervasive space. Holistic perception of harmony at all level of existence.

Unit-V:

Implications of the above Holistic Understanding of Harmony on Societal Perspectives: Natural acceptance of human values. Definitiveness of Ethical Human Conduct. Basis of Humanistic Education, Humanistic Constitution and Humanistic Universal Order. Competence in Societal Perspectives:

a) Ability to utilize the professional competence for augmenting universal human order.
b) Ability to identify the scope and characteristics of people-friendly and eco-friendly production systems.
c) Ability to identify and develop appropriate technologies and management patterns for above production system.

Case studies of typical holistic technologies, management models and production systems. Strategy for transition from the present state to Universal Human Order:

a) At the level of individual: as socially and ecologically responsible engineers, technologists and managers.
b) At the level of society: as mutually enriching institutions and organizations.

TEST BOOKS

1. R R Gaur, R Sangal, G P BAgaria, 2009 A Foundation Course in Human Values and professional Ethics.
2. Prof.KV Subba Raju, 2013, Success secrets for Engineering students , Smart student Publications,3rd Edition.

REFERENCE BOOKS

1. Ivan llich,1974, Energy & Equity, The Trinity press, Worcester and Harpercollins, USA.
2. E.F.Schumacher, 1973, small is Beautiful: a study of economics as if people mattered, Blond & Briggs,Britain.
3. A Nagraj, 1998, Jeevan Vidya ek Parichay, Divya path Sansathan Amarkantak.
4. Sussan George, 1976, How the other Half Dies, Penguin press Reprinted 1986,1991.
5. PL Dhar, RR Gaur,1990 Science and Humanism Commonwealth Publishers.
6. A.N.Tripathy,2003, Human Values, New Age International Publishers
7. Subhas Palekar, 2000, How to practice Natural Farming, Pracheen(Vaidik) Krishi Tantra Shodh, Amravati.

8. Donella H.Meadows,Dennis L. Meadows, Jorgen Randers, Willian A. Behrens lll, 1972, Limits to Growth –Club of Rome's report Universe Books.
9. E.G Seebauer & Robert L. Beery, 2000, Fundamentals of Ethics for Scientists & Engineers, Oxford University Press.
10. M Govindrajran , S Natrajan & V.S Senthil kuma, Engineering Ethichs (including Human Values), Eastern Economy Edition, prentice Hall of India Ltd.

Relevant CD,s Movies, Documentaries & other Literature:

1. Value Education website http://www.uptu.ac.in
2. Story of stuff,htt://www.storyofstuff.com
3. Al Gore, An Inconvenient Truth, Paramount classics,USA
4. Charlie Chaplin, Modern Times, United Artists, USA
5. IIT Delhi, Modern Technology-the Untold Story

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(R15A0002**) PROFESSIONAL ENGLISH**

Introduction:

In view of the growing importance of English as a tool for global communication and the consequent emphasis on training students to acquire communicative competence, the syllabus has been designed to develop linguistic and communicative competencies of Engineering students. The prescribed books and the exercises are meant to serve broadly as students' handbooks.

In the English classes, the focus should be on the skills of reading, writing, listening and speaking and for this the teachers should use the text prescribed for detailed study. For example, the students should be encouraged to read the texts/selected paragraphs silently. The teachers can ask comprehension questions to stimulate discussion and based on the discussions students can be made to write short paragraphs/essays etc.

The text for non-detailed study is for extensive reading/reading for pleasure. Hence, it is suggested that they read it on their own the topics selected for discussion in the class. The time should be utilized for working out the exercises given after each section , as also for supplementing the exercises with authentic materials of a similar kind for example, from newspaper articles, advertisements, promotional material etc. However, the stress in this syllabus is on skill development, fostering ideas and practice of language skills.

Objectives:

- To improve the language proficiency of the students in English with emphasis on LSRW skills.
- To equip the students to study academic subjects more effectively using the theoretical and practical components of the English syllabus.
- To develop the study skills and communication skills in formal and informal situations.

SYLLABUS:

Listening Skills:

Objectives

3. To enable students to develop their listening skill so that they may appreciate its role in the LSRW skills approach to language and improve their pronunciation.
4. To equip students with necessary training in listening so that they can comprehend the speech of people of different backgrounds and regions. Students should be given practice in listening to the sounds of the language to be able to recognize them, to distinguish between them to mark stress and recognize and use the right intonation in sentences.
    - Listening for general content
    - Listening to fill up information
    - Intensive listening

- Listening for specific information

Speaking Skills:

Objectives

3. To make students aware of the role of speaking in English and its contribution to their success.
4. To enable students to express themselves fluently and appropriately in social and professional contexts.
   - Oral practice
   - Describing objects/situations/people
   - Role play – Individual/Group activities (Using exercises from all the nine units of the prescribed text: Learning English : A Communicative Approach)
   - Just A Minute (JAM) Sessions.

Reading Skills:

Objectives

3. To develop an awareness in the students about the significance of silent reading and comprehension.
4. To develop the ability of students to guess the meanings of words from context and grasp the
   overall message of the text, draw inferences etc.
   - Skimming the text
   - Understanding the gist of an argument
   - Identifying the topic sentence
   - Inferring lexical and contextual meaning
   - Understanding discourse features
   - Scanning the text
   - Recognizing coherence/sequencing of sentences

NOTE : The students will be trained in reading skills using the prescribed text for detailed study.

They will be examined in reading and answering questions using 'unseen' passages which may be taken from authentic texts, such as magazines/newspaper articles.

Writing Skills:

Objectives

3. To develop an awareness in the students about writing as an exact and formal skill
4. To equip them with the components of different forms of writing, beginning with the lower order ones.
   - Writing sentences
   - Use of appropriate vocabulary
   - Paragraph writing
   - Coherence and cohesiveness
   - Narration / description
   - Note Making

- Formal and informal letter writing
- Describing graphs using expressions of comparison

TEXTBOOKS PRESCRIBED:

In order to improve the proficiency of the student in the acquisition of the four skills mentioned above, the following texts and course content, divided into Five Units are prescribed in each semester:

For Detailed study

First text book entitled "Skills Annexe: Functional English for Success", published by Orient BlackSwan, Hyderabad.

For Non-detailed study

Second textbook titled "Epitome of Wisdom", published by Maruthi Publications, Guntur.

Unit –I:

1. Chapter entitled "The Road Not Taken", a poem by Robert Frost, from *A Selection of Robert Frost's Poems (Owl Book)*, by Holt Paperbacks: 2 Revised Edition. 2002.

L- Listening – Project Based Assignment on poem 'If' by Rudyard Kipling
S- Speaking – Describing Persons and Places
R- Reading – Comprehending Poem
W- Writing – Business Circulars and Notices
G- Grammar – Adjectives, Comparison of Adjectives
V- Vocabulary – Similes and Metaphors

Unit – II

1. Chapter entitled "Human Values and Professional Ethics" from *Skills Annexe -Functional English for Success*, published by Orient Black Swan, Hyderabad.

L- Listening – Project Based Assignment
S- Speaking – Description of Objects, Events and Experiences
R- Reading – What I Cherish the Most
W- Writing – CV and Cover Letter (Self-Appraisal Letter)
G- Grammar – Transitive and Intransitive Verbs
V- Vocabulary – Collocations

Unit – III

1. Chapter entitled "The Convocation Speech" from *Epitome of Wisdom*, published by Maruthi Publications, Hyderabad.

L- Listening – Project Based Assignment
S- Speaking – Giving Directions and Instructions
R- Reading – What is meant by Entrepreneurship?
W- Writing – Essay Writing (On-the-Spot Organization of Thoughts)
G- Grammar – Active and Passive Voices
V- Vocabulary – One-word Substitutes

Unit – IV

1. Chapter entitled "The Last Leaf" from *Epitome of Wisdom*, published by Maruthi Publications, Hyderabad.

L- Listening – Project Based Assignment

S- Speaking – Oral Presentations

R- Reading – Reading Comprehension

W- Writing – Report Writing

G- Grammar – Concord

V- Vocabulary – Idiomatic Expressions

Unit –V

1. Chapter entitled "Sachin Tendulkar" from *Skills Annexe -Functional English for Success*, published by Orient Black Swan, Hyderabad.

L- Listening – Project Based Assignment

S- Speaking – Project Oral Presentations

R- Reading – Reading Articles

W- Writing – E-mail Writing

G- Grammar – Common Errors

V- Vocabulary – Misspelt Words

* Exercises from the texts not prescribed shall also be used for classroom tasks.

REFERENCES:

1. Contemporary English Grammar Structures and Composition by David Green, MacMillan Publishers, New Delhi. 2010.
2. Innovate with English: A Course in English for Engineering Students, edited by T Samson, Foundation Books.
3. English Grammar Practice, Raj N Bakshi, Orient Longman.
4. Technical Communication by Daniel Riordan. 2011. Cengage Publications. New Delhi.
5. Effective English, edited by E Suresh Kumar, A RamaKrishna Rao, P Sreehari, Published by Pearson.
6. Handbook of English Grammar& Usage, Mark Lester and Larry Beason, Tata Mc Graw – Hill.
7. Spoken English, R.K. Bansal & JB Harrison, Orient Longman.
8. Technical Communication, Meenakshi Raman, Oxford University Press
9. Objective English Edgar Thorpe & Showick Thorpe, Pearson Education
10. Grammar Games, Renuvolcuri Mario, Cambridge University Press.
11. Murphy's English Grammar with CD, Murphy, Cambridge University Press.
12. Everyday Dialogues in English, Robert J. Dixson, Prentice Hall India Pvt Ltd.,
13. ABC of Common Errors Nigel D Turton, Mac Millan Publishers.
14. Basic Vocabulary Edgar Thorpe & Showick Thorpe, Pearson Education
15. Effective Technical Communication, M Ashraf Rizvi, Tata Mc Graw – Hill.
16. An Interactive Grammar of Modern English, Shivendra K. Verma and Hemlatha Nagarajan , Frank Bros & CO
17. A Communicative Grammar of English, Geoffrey Leech, Jan Svartvik, Pearson Education

18. Enrich your English, Thakur K B P Sinha, Vijay Nicole Imprints Pvt Ltd.,
19. A Grammar Book for You And I, C. Edward Good, MacMillan Publish.

Outcomes:

- Usage of English Language, written and spoken.
- Enrichment of comprehension and fluency.
- Gaining confidence in using language in verbal situations.

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(R15A0022) MATHEMATICS – II

Objectives

- The objective of interpolation is to find an unknown function which approximates the given data points and the objective of curve fitting is to find the relation between the variables x and y from given data and such relationships which exactly pass through the data (or) approximately satisfy the data under the condition of sum of least squares of errors.
- The aim of numerical methods is to provide systematic methods for solving problems in a numerical form using the given initial data and also used to find the roots of an equation and to solve differential equations.
- In the diverse fields like electrical circuits, electronic communication, mechanical vibration and structural engineering, periodic functions naturally occur and hence their properties are very required. Indeed, any periodic and non periodic function can be best analyzed in one way by Fourier series method.
- PDE aims at forming a function with many variables and also their solution methods .Method of separation of variables technique is learnt to solve typical second order PDE.
- In many engineering fields the physical quantities involved are vector valued functions. Hence the unit vector calculus aims at basic properties of vector-valued functions and their applications to line, surface and volume integrals.

UNIT – I: Solution of Algebraic and Transcendental Equations and Interpolation

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

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

UNIT – II : Numerical techniques and Curve Fitting

Numerical integration: Generalized Quadrature-Trapezoidal rule, Simpson's $1/3^{rd}$ and $3/8^{th}$ Rule.

Numerical solution of Ordinary Differential equations: Solution by Taylor's series method – Picard's Method of successive Approximation- single step methods-Euler's Method-Euler's modified method, Runge-Kutta Methods.
Curve fitting: Fitting a straight line –Second degree curve-exponential curve-power curve by method of least squares.

UNIT – III: Fourier series

Definition of periodic function. Fourier expansion of periodic functions in a given interval of length 2π. Determination of Fourier coefficients – Fourier series of even and odd functions – Half-range Fourier sine and cosine expansions-Fourier series in an arbitrary interval .

UNIT-IV: Partial differential equations
Introduction -Formation of partial differential equation by elimination of arbitrary constants and arbitrary functions, solutions of first order linear (Lagrange) equation and non-linear equations (Charpit's method), Method of separation of variables for second order equations.

UNIT – V : Vector Calculus
Introduction- Scalar point function and vector point function, Gradient- Divergence- Curl and their related properties - Laplacian operator, Line integral – work done – Surface integrals -Volume integral. Green's Theorem,Stoke's theorem and Gauss's Divergence Theorems (Statement & their Verification).

PRESCRIBED TEXT BOOKS:
1. Mathematical Methods by T.K.V. Iyengar, B.Krishna Gandhi & Others, S. Chand.
2. Higher Engineering Mathematics by Dr. B.S. Grewal, Khanna Publishers.

REFERENCES:
1. Advanced Engineering Mathematics by Kreyszig, John Wiley & Sons.
2. Introductory Methods by Numerical Analysis by S.S. Sastry, PHI Learning Pvt. Ltd.
3. Higher Engineering Mathematics by B.S. Grewal, Khanna Publications.

Outcomes:

- From a given discrete data, one will be able to predict the value of the data at an intermediate point and The student will be able to find a approximate root of a given equation.
- By curve fitting, one can find the most appropriate formula for a guesses relation of the data variables. This method of analysis data helps engineers to understand the system for better interpretation and decision making. and will be able to find a numerical solution for a given differential equation.
- One will be able to find the expansion of a given function by Fourier series.

- After studying this unit, one will be able to find a corresponding Partial Differential Equation for an unknown function with many independent variables and to find their solution.
- The student will be able to evaluate multiple integrals(line, surface volume integrals) and convert line integrals to area integrals and surface integrals to volume integrals.

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	3	**/-/-**	**2**

(R15A0012)ENGINEERING PHYSICS-II

OBJECTIVES:

- To understand the basics of bonding in solids , crystal structures and characterization techniques.
- To make the students aware of X-ray diffraction and different techniques of it.
- To understand the behavior of dielectric materials, magnetic materials and nano materials.

UNIT-I

BONDING IN SOLIDS: Types of bonds- Primary, Secondary, Forces between atoms, Expression for cohesive energy between two atoms**.**

CRYSTALLOGRAPHY: Introduction, Lattice points, Space lattice, Basis, Unit cell, lattice parameters, Crystal systems, Bravais lattices, Atomic number, coordination number, packing factor of SC,BCC,FCC crystals, Lattice planes, miller indices. Expression for inter planar distance in cubic crystal.

UNIT- II

X-RAY DIFFRACTION: Bragg's law**,** Experimental techniques -Laue's method, powder method**.** Applications of x-ray diffraction.

DEFECTS IN CRYSTALS: Types of crystal defects**,** Point defects-Vacancies, Interstitials, Estimation of defect concentrations of Schottky and Frenkel defects, Line defects- edge dislocation and screw dislocation**.** Burger's vector.

UNIT-III

DIELECTRIC PROPERTIES: Electric dipole, Dipole moment, Polarization vector (P) Displacement vector (D), Dielectric constant (K), Electric susceptibility (χ).types of polarizations-Expression for Electronic and Ionic polarization (Qualitative). Internal fields in dielectrics Classius Mosotti relation. Ferro electricity and Piezo electricity, Applications of dielectric materials.

ULTRASONICS: Introduction-generation of Ultrasonic waves-piezoelectric and magneto-striction method. Properties and Detection of Ultrasonic waves, NDT.

Unit-IV

MAGNETIC PROPERTIES: Magnetic permeability, Field intensity, Magnetic field induction, Magnetization, Magnetic susceptibility, Magnetic moment, Bhor magneton**.** Classification of

magnetic materials-Dia, Para and Ferro**.** Ferri and Anti ferro magnetic materials. Explanation of Hysteresis loop on the basis of domain theory of ferromagnetism. Soft and hard magnetic materials.

SUPER CONDUCTIVITY: Super conductivity, General properties of super conductivity Meissner effect**,** Types of super conductors**,** Applications of super conductors.

UNIT-V

NANO SCIENCE & NANO TECHNOLOGY: Nano scale. Types of Nano materials-Surface to volume ratio and Quantum confinement. Synthesis of Nano materials-Bottom up Fabrication and Top down Fabrication- Sol gel, Bcs Theory, Physical Vapour Deposition. Characterisation of Nano particles –XRD and SEM . Applications of Nano materials.

TEXT BOOKS:

1 .Engineering Physics, Dr M Arumugam, Anuradha Publishers
2. A Text Book of Engineering Physics –P. G. Kshirsagar– S. Chand

REFERENCES:

1. Introduction to Solid State Physics – C. Kittel (Wiley Eastern).

2. Nanotechnology – M. Ratner & D. Ratner (Pearson Ed.).

OUTCOMES:

- The students would be able to learn the fundamental concepts on behavior of crystalline solids.
- The student will be able to think about the applications of dielectric, magnetic and nano materials.
- Finally Engineering physics course help the student to develop problem solving skills and analytical skills.

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(R15A0013)ENGINEERING CHEMISTRY

Objectives

- To impart the basic concepts and ideas in chemistry, to develop scientific attitudes and enable the students to correlate the concepts of chemistry with the core programmes.
- Electrochemistry unit give conceptual knowledge about spontaneous processes and how can they be harnessed for producing electrical energy and efficiency of systems. Fuel cells which are the alternate energy sources for generating electrical energy on spot and portable applications.
- Understand various techniques involved in polymerization and application of polymer technology in the area of various engineering fields and manufacturing process of important metallurgical materials.

UNIT I: Electrochemistry: Conductance - Specific, Equivalent, Molar conductance and their units. Applications of Conductance –Conductometric titrations (Acid base and Precipitation titrations); EMF-electrode and electrode potentials; Nernst equation and its applications; Electrochemical cells-Galvanic cell (Daniel cell) and Concentration cell (electrolytic concentration cell); Types of Electrodes–(construction and functioning of Calomel, Quinhydrone and glass electrodes); determination of P^H using glass electrode; Potentiometric titrations (Acid Base and Redox titrations); electrochemical series and its applications; Numerical problems.

Batteries: Primary (lithium cells) and secondary cells (Lead-Acid cell and Ni-Cd cell); **Fuel cells** - Hydrogen -Oxygen fuel cell- construction, functioning, advantages and applications.

Unit II: Corrosion and its Control: Causes and effects of corrosion; Theories of corrosion – Chemical corrosion (oxidation corrosion) & Electrochemicalcorrosion (mechanism of evolution of Hydrogen and Absorption of oxygen); Galvanic corrosion; Factors affecting rate of corrosion – Nature of metal (position of metal in galvanic series, overvoltage, relative areas of anodic and cathodic parts, purity of metal and passivity) and Nature of Environment (temperature, humidity and pH effect)

Corrosion control methods: Cathodic protection (Sacrificial Anodic and Impressed CurrentCathodic protection). Surface coatings: Metallic coatings & methods of application of metallic coatings - hot dipping (galvanization & tinning), cladding, electroplating (Cu plating) and Electroless plating (Ni plating) – advantages of electroless plating.

UNIT- III: Engineering Materials

Polymers: Classification of Polymers, Types of Polymerization (Chain growth, Step growth & Zeigler Natta) **Plastics:** Thermoplastic & Thermosetting resins, Preparation, properties, engineering applications of PVC, Teflon and Bakelite. **Fibers-** Characteristics of fibers – preparation, properties and uses of Nylon – 6,6 and Dacron – Fiber Reinforced Plastics (FRP) – applications. **Rubbers**–Natural rubber and its vulcanization.**Elastomers**–Buna-S, and Butyl rubber; **Conducting polymers:**Polyacetylene-Mechanism of conduction, doping; applications of conducting polymers; **Bio-degradable Polymers:**preparation and applications of Poly vinylacetate and Poly lactic acid.

Lubricants: Characteristics of a good lubricant; Classification with examples; properties of lubricants: viscosity, cloud point, pour point, flash and fire point.

Refractories: Classification of refractories with examples, characteristics of a good refractory and applications of refractories.

Nanomaterials: Introduction and applications of nanomaterials.

UNIT IV: Water and its Treatment:

Hardness of Water: Causes of hardness, types of hardness, units of hardness; determination of hardness of water by EDTA method - numerical problems. Boiler troubles – Scale &sludges, Priming, foaming, and caustic embrittlement; Treatment of boiler feed water – Internal treatment (Phosphate, Colloidal and Calgon conditioning); External treatment– Zeolite process and Ion exchange process.**Potable Water**- Its Specifications–Disinfectation of water by ozonisation, chlorination (break point chlorination and its significance); Reverse Osmosis.

UNIT V: Fuels

Fuels – Characteristics of a good fuel, Classification – solid fuels: coal – analysis of coal - proximate and ultimate analysis and their significance. Liquid fuels – petroleum and its refining; Cracking – types – fixed bed catalytic cracking. Knocking – octane and cetane rating, synthetic petrol, Fischer-Tropsch‘s process: Gaseous fuels - constituents, characteristics and applications of natural gas, LPG and CNG; Calorific value of fuel – HCV, LCV; Determination of calorific value by Junker‘s gas calorimeter.

TEXT BOOKS:

1. Engineering Chemistry by P.C Jain & Monica Jain, Dhanpatrai Publishing Company 14th Edition (2013)

REFERENCE BOOKS

1. Engineering Chemistry by BharathiKumari and JyotsnaCherukuri, VGS Techno Series (2013)
2. Engineering Chemistry by R.P. Mani, K.N. Mishra, B. Rama Devi /CENGAGE learning (2013)

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(R15A0502)OBJECT ORIENTED PROGRAMMING

Objectives

- To teach the student the concepts of object oriented and generic programming.
- To differentiate between object oriented programming andprocedural programming.
- To design applications using object oriented features
- To teach the student to implement object oriented concepts

Unit I

Concepts of Object Oriented programming: Object oriented paradigm - Basic concepts of Object Oriented Programming - differences between Object Oriented Programming and Procedure oriented programming,Overview of OOP principles, Encapsulation, Inheritance and Polymorphism. Benefits of OOP.Structure of a C++ program, Program structure, namespace, Data types, identifiers, variables, constants, enum, operators, typecasting, control structures &loops.

Unit-II

Functions, Classes and Objects:

Introduction of Classes,Class Definition, Defining a Members,Objects,Access Control, Class Scope,Scope Resolution Operator,Inline functions,Memory Allocation for Objects, Static Data Members, Static Member Functions, Arrays of Objects, Objects as Function Arguments, Default Arguments, Function Overloading, Friend Functions

Unit-III

Constructors, Destructors, Inheritance:

Introduction to Constructors, Parameterized Constructors, Multiple Constructors in a Class, Constructors with Default Arguments, Dynamic initialization of Objects, Copy Constructors, Dynamic Constructors, Destructors.

Inheritance : Introduction to inheritance, Defining Derived Classes, Single Inheritance, Multiple Inheritance, Multi-Level Inheritance, Hierarchical Inheritance, Hybrid Inheritance, Abstract Classes, Constructors in Derived Classes,Operator overloading, Rules for Operator overloading, overloading of binary and unary operators .

Unit-IV

Pointers, Virtual Functions and Polymorphism:

Introduction, Memory Management, new Operator and delete Operator, Pointers to Objects, this Pointer, Pointers to Derived Classes, Polymorphism, compile time polymorphism, Run time polymorphism, Virtual Functions, Pure Virtual Functions, Virtual Base Classes, Virtual Destructors.

Unit-V.

Templates and Exception handling:

Introduction, Class Templates, Class Templates with Multiple Parameters, Function Templates, Function Templates with Multiple Parameters, Member Function Templates.

Basics of Exception Handling, Types of exceptions, Exception Handing Mechanism, Throwing and Catching Mechanism, Rethrowing an Exception, Specifying Exceptions

Streams I/O: Stream classes hierarchy, Stream I/O, File streams and String streams, Error handling during file operations

Text Books:

1. Object Oriented Programming with C++ by Balagurusamy
2. C++, the Complete Reference, 4th Edition, Herbert Schildt, TMH.

References:

1. C++ Primer, 3rd Edition, S.B.Lippman and J.Lajoie, Pearson Education.
2. The C++ Programming Language, 3rd Edition, B.Stroutstrup, Pearson Educ

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(R15A0302) ENGINEERING DRAWING

UNIT – I

Introduction To Engineering Drawing: Principles of Engineering Drawing/Graphics – Various Drawing Instruments – Conventions in Drawing – Lettering practice – BIS Conventions.

a) Polygons-Construction of Regular Polygons (General methods only no special methods).
b) Conic Sections Including Rectangular Hyperbola
c) Cycloid, Epicycloid and Hypocycloid
d) Scales-Plain, Diagonal and Vernier Scales

UNIT – II

Projection: Principles of Orthographic Projections – Conventions – First and Third Angle projections.

Projections of Points. Points in all four quadrants.

Projections of Lines - Parallel, perpendicular inclined to one plan and inclined to both planes. True length and true angle of a line. Traces of a line.

Projections Of Planes: Plane parallel, perpendicular and inclined to one reference plane. Plane inclined to both reference planes.

UNIT – III

Projections Of Solids: Projections of regular solids, cube, prisms, pyramids, cylinder and cone, axis inclined to both planes.

Sections and sectional views: Right regular solids-prism, Cylinders, Pyramid, Cone,

Develoment of surfaces: Develoment of surfaces of Right Regular solids-Prism, Cylinder, Pyramids, Cone and their parts. Frustum of solids.

UNIT – IV

Intersection of solids: Intersection of cylinders Vs cylinder, Cylinders Vs Prism , Cylinder Vs Cone.

Isometric Projections: Principles of Isometric Projection – Isometric Scale – Isometric Views– Conventions – Plane Figures, Simple and Compound Solids.

UNIT – V

Persespective projections: Perspective view: Points,Lines, Planes and solids, Visual Ray and vanishing point methods.

Transformation Of Projections: Conversion of Isometric Views to Orthographic Views. Conversion of orthographic views to isometric views – simple objects

TEXT BOOKS

1.Engineering Drawing – Basant, Agrawal, TMH

2. Engineering Drawing, N.D. Bhatt

3. Engineering Drawing by K.Venu Gopal& V.Prabu Raja New Age Publications.

REFERENCES :

1. Engineering drawing – P.J. Shah .S.Chand Publishers.
2. Engineering Drawing- Johle/Tata Macgraw Hill Book Publishers.
3. Engineering Drawing – M.B. Shah and B.C. Rana, Pearson.

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(R15A0582)OBJECT ORIENTED PROGRAMMING LAB

Objectives:

- To strengthen problem solving ability by using the characteristics of an object-oriented approach.
- To design applications using object oriented features
- To handle Exceptions in programs.
- To teach the student to implement object oriented concepts

Week 1:

Study of C++ Standard library functions.

Week2:

a) Write a C++ program to find the sum of individual digits of a positive integer.
b) Write a C++ program to generate the first n terms of the sequence.

Week 3:

a) Write a C++ program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.
b) Write a C++ program to find both the largest and smallest number in a list of integers.

Week 4:

a) Write a C++ program to sort a list of numbers in ascending order.
b) Write a C++ program that uses function templates to find the largest and smallest number in a list of integers.and to sort a list of numbers in ascending order.
c) Write aProgram to illustrate New and Delete Keywords for dynamic memory allocation

Week 5

a) Write a program Illustrating Class Declarations, Definition, and Accessing Class Members.
b) Program to illustrate default constructor, parameterized constructor and copy constructors
c) Write a Program to Implement a Class STUDENT having Following Members:

Member	Description
Data members	
sname	Name of the student
Marks array	Marks of the student
total	Total marks obtained
tmax	Total maximum marks

Member functions	
Member	Description

assign()	Assign Initial Values
compute()	to Compute Total, Average
display()	to Display the Data.

Week 6:

a) Write a Program to Demonstrate the i)Operator Overloading.ii) Function Overloading.
b) Write a Program to Demonstrate Friend Function and Friend Class.

Week 7:

a) Write a Program to Access Members of a STUDENT Class Using Pointer to Object Members.
b) Write a Program to Generate Fibonacci Series use Constructor to Initialize the Data Members.

Week 8:

Revision laboratory

Week 9

Write a C++ program to implement the matrix ADT using a class. The operations supported by this ADT are:

a) Reading a matrix. b) Addition of matrices. c) Printing a matrix.

d) Subtraction of matrices. e) Multiplication of matrices

Week 10

Write C++ programs that illustrate how the following forms of inheritance are supported:

a)Single inheritance b)Multiple inheritance

c)Multi level inheritance d)Hierarchical inheritance

Week 11

a.)Write a C++ program that illustrates the order of execution of constructors and destructors when new class is derived from more than one base class.

b) Write a Program to Invoking Derived Class Member Through Base Class Pointer.

Week 12

Write a Template Based Program to Sort the Given List of Elements.

Week 13

a) Write a Program Containing a Possible Exception. Use a Try Block to Throw it and a Catch Block to Handle it Properly.
b) Write a Program to Demonstrate the Catching of All Exceptions.

Week 14

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

i. Insert a sub-string in to the given main string from a given position.
ii. Delete n characters from a given position in a given string.

Week 15

a) Write a C++ program to display the contents of a text file.
b) Write a C++ program which copies one file to another.

Week 16

Revision laboratory

Text Books:

1. Object Oriented Programming with C++ by Balagurusamy
2. C++, the Complete Reference, 4th Edition, Herbert Schildt, TMH.

References:

1. C++ Primer, 3rd Edition, S.B.Lippman and J.Lajoie, Pearson Education.
2. The C++ Programming Language, 3rd Edition, B.Stroutstrup, Pearson Education.

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(R15A0083) ENGINEERING PHYSICS / ENGINEERING CHEMISTRY LAB

ENGINEERING PHYSICS LAB

(Any EIGHT experiments compulsory)

Objectives:

This course on Physics lab is designed with 10 experiments in an academic year. It is common to all branches of Engineering in B.Tech 1st year.

The objective of the course is that the student will have exposure to various experimental skills which is very essential for an Engineering student.

The experiments are selected from various area of Physics like Physical Optics, Lasers, Fiber Optics, Sound, Mechanics, Electricity & Magnetism and Basic Electronics.

Also the student is exposed to various tools like Screw gauge, VernierCallipers, Physics Balance, Spectrometer and Microscope.

1. The Rigidity modulus (η) of the material of the wire using a Torsional pendulum.
2. Frequency of a vibrating bar, or a tuning fork using Melde's Experimental Arrangement
3. CR Circuit
4. Dispersive power of the material of the given prism-Spectrometer
5. Solar cell characteristics
6. Single slit diffraction Using laser
7. L.C.R. Circuit
8. Determination of the wavelength of sodium light and or (b) the radius of curvature of the surface of the Plano convex lens by forming Newton's rings.
9. Numerical Aperture In Optical Fibers
10. LED Characteristics

LABORATORY MANUAL:

1. Laboratory Manual of Engineering Physics by Dr.Y.Aparna&Dr.K.VenkateswaraRao

(V.G.S Publishers)

2. Engineering Physics Lab Manual by Dr. C .V. MadhusudhanaRao&V.Vasanth Kumar

(SciTech Publishers)

Outcomes:

The student is expected to learn from this laboratory course the concept of error and its analysis. It also allows the student to develop experimental skills to design new experiments in Engineering.

With the exposure to these experiments the student can compare the theory and correlate with experiment.

ENGINEERING CHEMISTRY LAB

List of Experiments (Any Eight experiments compulsory)

Titrimetry:

1. Estimation of hardness of water by EDTA method.
2. Estimation of alkalinity of water.

Mineral analysis:

3. Estimation of manganese dioxide in pyrolusite.

Instrumental Methods:

Colorimetry:

4. Determination of ferrous iron in cement by colorimetric method
5. Estimation of copper by colorimetric method

Conductometry:

6. Conductometric titration of strong acid vs strong base.
7. Conductometric titration of mixture of acids vs strong base.

Potentiometry:

8. Titration of strong acid vs strong base by potentiometry.

Preparation:

9. Preparation of Phenol Formaldehyde Resin
10. Preparation of Aspirin

Physical properties:

11. Determination of viscosity of sample oil by Redwood Viscometer.
12. Determination of Surface tension of liquid by Stalagmometer

TEXT BOOKS:

1. Inorganic quantitative analysis, Vogel.
2. Practical Engineering Chemistry by K. Mukkanti, etal, B.S. Publications, Hyderabad.
3. Laboratory manual of Engineering Chemistry by Y. BharathiKumari and JyotsnaCherukuri (VGS Techno series)

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(R15A0082) ENGLISH LANGUAGE COMMUNICATION SKILLS LAB- II

The Language Lab focuses on the production and practice of sounds of language and familiarises the students with the use of English in everyday situations and contexts.

Objective

- To facilitate computer aided multi-media instruction enabling individualized and independent language learning
- To sensitise the students to the nuances of English speech sounds, word accent, intonation and rhythm
- To bring about a consistent accent and intelligibility in their pronunciation of English by providing an opportunity for practice in speaking
- To improve the fluency in spoken English and neutralize mother tongue influence
- To train students to use language appropriately for interviews, group discussion and public speaking

EXERCISE –IV

CALL Lab: Word Accent – Rules of Stress and Stress shift
ICS Lab: Describing Object, Places, Persons, Events and Experiences.

EXERCISE –V
CALL Lab: Intonation Types
ICS Lab: Giving Instructions and Directions

EXERCISE –VI
CALL Lab: Neutralisation of Mother Tongue Influence
ICS Lab: Oral Presentations Team and Individual
GRAMMAR EXERCISES: Articles, Prepositions, Concord, Correction of Sentences
VOCABULARY EXERCISES: Antonyms, Synonyms, One word substitutes, Prefix and Suffixes.

PROJECTS

Students have to choose one of the following projects for their internals, and submit before the end of the semester. This project carries 25 marks.

1. **Conduct interview using interrogative sentences.**

Students should interview any teacher, or HOD, or Principal, record their responses and submit the project with those questions and answers. The questions asked should not be less than ten.

2. Project on differences between group discussion and debate.

Students are supposed to do research on the differences between GD and debate and submit a project on it. There should a minimum of ten points with detailed explanation. Students can use pictures as well.

3. Book Review

Choose any fiction of your choice and write a book review on the following parameters.

- Characterization, plot, theme, message

Please note that the review is not the summary of the story. The project should not be less than 250 words.

4. Idioms and Phrasal Verbs

Collect at least ten idioms and ten phrasal verbs and concoct a story using those expressions. Word limit is 250.

5. Project on Kinesics

Students are expected to read and research on body language and their implications. You have to make a list of at least ten body movements with pictures and explain them properly.

6. UK and US vocabulary

Find words that are used differently in UK and US English. Make separate lists for different spellings and different pronunciations. The project can answer one or more of the following questions:

- Which pronunciation do you think are Indians following?
- Which one is your choice? Which one do you feel comfortable in speaking?
- Are we Indians influenced by both UK and US English? How can you prove it?

7. Magazine Article Review

Pick a magazine article with a social relevance, which has around 2500 words. Write a review of 250 words as a project. Make sure you voice your opinion in the review.

8. Career Guidance Project

Browse the net and gather information on any professional competitive exam of your choice, like UPSC or GRE. Prepare and present a paper on the scope and relevance of the exam of your choice. The paper should have a minimum of 300-400 words. Students are expected to answer the questions asked by the audience after the paper presentation.

9. Mother Tongue Influence

Choose a particular paragraph of 250 words and ask five of your friends, from different states, to read that. One has to record their accent and pronunciation to check the difference. Make a list of ten words that each one pronounces differently. Find out the reasons behind the differences in pronunciations.

Also, mention the correct pronunciation in your project with transcription.

10. Correction of Letter Writing: Language, Sentences, Spelling, Tone and Format

Teacher will distribute a set of five letters with errors in spelling, tone, grammar and sentence construction. Give the correct form of the letters as the project

ELCS Lab:

1. **Computer Assisted Language Learning (CALL) Lab**:

The Computer aided Language Labfor 40 students with 40 systems, one master console, LAN facility and English language software for self-study by learners.

System Requirement (Hardware component):

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

i) P –IV Processor

a)Speed –2.8 GHZ

b)RAM –512 MB Minimum

c)HardDisk –80 GB

ii) Headphones of High quality

2. Interactive Communication Skills (ICS) Lab :

The Interactive CommunicationSkills Lab: A Spacious room with movable chairs and audio-visual aids with a Public Address System, a T. V., a digital stereo –audio & video system and camcorder etc.

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

1. Suresh Kumar, E. & Sreehari, P. 2009. A Handbook for English Language Laboratories.
2. New Delhi: Foundation
3. Speaking English Effectively 2ndEdition by Krishna Mohan and N. P. Singh, 2011. Macmillan Publishers India Ltd. Delhi.
4. Sasi Kumar, V & Dhamija, P.V. How to Prepare for Group Discussion and Interviews. Tata McGraw Hill
5. Hancock, M. 2009. English Pronunciation in Use. Intermediate. Cambridge: CUP
6. Spoken English: A Manual of Speech and Phonetics by R. K. Bansal & J. B. Harrison. 2013.Orient Blackswan. Hyderabad.
7. Hewings, M. 2009. English Pronunciation in Use. Advanced. Cambridge: CUP
8. Marks, J. 2009. English Pronunciation in Use. Elementary. Cambridge: CUP
9. Nambiar, K.C. 2011. Speaking Accurately. A Course in International Communication. New Delhi: Foundation
10. Soundararaj, Francis. 2012. Basics of Communication in English. New Delhi: Macmillan
11. Spoken English(CIEFL) in 3 volumes with 6 cassettes, OUP.
12. English Pronouncing DictionaryDaniel Jones Current Edition with CD.
13. A textbook of English Phonetics for Indian Studentsby T.Balasubramanian (Macmillan)

DISTRIBUTION AND WEIGHTAGE OF MARKS

English Language Laboratory Practical Examination:

1. The practical examinations for the English Language Laboratory shall be conducted as per the University norms prescribed for the core engineering practical sessions.
2. For the Language lab sessions, there shall be a continuous evaluation during the year for 25 sessional marks and 50 year-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 year-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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(R15A0303) ENGINEERING THERMODYNAMICS

Objectives:

- To understand the concepts of Energy in general and Heat and Work in particular
- To understand the fundamentals of quantification and grade of energy.
- To apply the concepts of thermodynamics to basic energy systems .

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. 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-II

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-III

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. 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-IV

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

Relative Humidity, saturated Air, Vapour pressure, Degree of saturation – Adiabatic Saturation , Carrier's Equation – Psychrometric chart.

UNI-V

Power Cycles : Otto, Diesel, Dual Combustion cycles, Sterling Cycle, Atkinson Cycle, Ericcson Cycle, Lenoir Cycle – Description and representation on P–V and T-S diagram, Thermal Efficiency, Mean Effective Pressures on Air standard basis – comparison of Cycles.Refrigeration Cycles : Brayton and Rankine cycles – Performance Evaluation – combined cycles, BellColeman cycle, Vapour compression cycle-performance Evaluation.

TEXT BOOKS:

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

REFERENCE BOOKS:

1. Engineering Thermodynamics – Jones & Dugan
2. Thermodynamics – An Engineering Approach – Yunus Cengel & Boles /TMH
3. An introduction to Thermodynamics / YVC Rao / New Age 5. Engineering Thermodynamics – K. Ramakrishna / Anuradha Publisher

OUTCOMES:

- Learner should be able to demonstrate understanding of basic concepts of thermodynamics.
- To differentiate between quality and quantity of energy, heat and work, enthalpy and entropy, etc.
- To Analyze basic power cycles, Apply the laws of thermodynamics to various real life systems

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(R15A0304) MATERIAL SCIENCE

Objectives:

- To understand various mechanical properties of materials.
- To understand how and why the properties of materials are controlled by its structure at the microscopic and macroscopic levels.
- To understand how and why the structure and composition of a material may be controlled by processing.

UNIT-I

Structure of Materials : Structure of atom – Atomic models – Bonding in solids – Bonding forces and energies – Ionic, Covalent, metallic and van der Waals Bond - Crystal structure - Unit Cell – Bravais lattice – BCC – FCC – HCP - Interstitial sites – NaCl crystal – CsCl crystal – Perovskite structure – Diamond structure – Graphite – Crystal directions and planes.

UNIT-II

Structure of Metals and Alloys - Imperfection in crystals – Point defects – Dislocations – Slip plane – Movement of dislocations – Planar defects and grain boundaries – solid solutions – Hume Rothery rule – Phase diagram – Lever rule – Gibb's phase rule – Phase diagram for binary alloys – Eutectic – Peritectic – Eutectoid – Zone refining.

UNIT-III

Heat Treatment Methods: Annealing, hardening, tempering, normalizing, surface hardening

Ferrous and Non Ferrous Alloys: Allotropy and phase change of pure iron – Classification of steels and cast iron – iron – carbon equilibrium diagram – Microstructure of iron and steel - Ferrous alloys and their applications –Heat treatment - Factors affecting conductivity of a metal – Electrical Resistivity in alloys – Thermal conductivity of metals and alloys – Silver, Copper and aluminum – High Resistivity alloys – nichrome, manganin, constantan and kanthal and their composition and applications – Super hard materials - Tungsten carbide and Boron nitrides.

UNIT-IV

Ceramic and Composite Materials : Advanced Ceramic Materials - Crystal Structures - Silicate Ceramics - Glasses – Glass Ceramics – Functional properties and applications of ceramic materials – Classification of composites - Fiber reinforced materials – Law of mixtures – Continuous fibers – discontinuous fibers – Particle-reinforced materials – Cermets – Dispersion strengthened materials – Laminates - Application of composites in electrical and mechanical components – nuclear industry.

UNIT-V

Polymer Materials: Classification of polymer – Mechanisms of polymerisation - Some commercially important individual polymer – Thermoplastics - Elastomers – Thermosets – Engineering plastics - Liquid crystal polymers - Conductive polymers – High Performance fibers - Biomedical applications – Photonic polymers.

TEXT BOOKS:

1. William D. Callister, Jr., Materials Science and Engineering an Introduction, 6th Edition , John Wiley & Sons, Inc., 2004
2. V.Raghavan, Materials Science and Engineering, Prentice –Hall of India Pvt. Ltd., 2007
3. Sidney H. Avner, Introduction to physical metallurgy, Tata Mc-Graw-Hill, Inc. 1997.

REFERENCE BOOKS:

1. Donald R. Askeland, Pradeep P. Phule, The Science and Engineering of Materials 4th Edition,Thomson/Brooks/Cole,2003.
2. William F.Smith, Structural Properties of Engineering Alloys, Tata Mc-Graw-Hill, Inc., 1993.
3. Kingery. W.D., Bowen H.K. and Uhlmann D.R., Introduction to Ceramics, 2nd Edition, John Wiley & Sons, New York, 1976.

OUTCOMES:

- Acquire knowledge and hands-on competence in applying the concepts of material science in the design and development of mechanical systems.
- Demonstrate creativeness in designing new systems components and processes in the field of engineering .
- Identify, analysis, and solve mechanical engineering problems useful to the society

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(R15A0206) ELECTRICAL AND ELECTRONICS ENGINEERING

Objectives:

- This course introduces the concepts of electrical DC and AC circuits, basic law's of electricity, instruments to measure the electrical quantities, different methods
- To solve the electrical networks, construction operational features of energy conversion devices i.e. DC and AC machines, transformers.
- It also emphasis on basics of electronics, semiconductor devices and their characteristics and operational features**.**

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.

Instruments: Basic Principle of indicating instruments, Permanent magnet moving coil and moving iron instruments.

UNIT-II

DC Machines: Principle of operation and operation of DC Generator, EMF equation, Types, Losses and efficiency, Magnetization and load characteristics of DC generators. DC Motors-Types, Characteristics, Losses and efficiency, Swinburne's Test, 3-Pont starter, Speed control of DC shunt motor-Flux and armature voltage control methods.

UNIT-III

Transformers: Principle of operation of single phase transformers, EMF equation, Equivalent circuit, Losses, OC and SC tests, Efficiency and regulation.

AC Machines: Principle of operation of induction motor, slip–torque characteristics, Applications. Principle of operation of alternators, Regulation by synchronous impedance method.

UNIT–IV

Diodes: P-n junction diode, symbol, V-I Characteristics, Diode applications, and Rectifiers – Half wave, Full wave and Bridge rectifiers (simple Problems).

Transistors: PNP and NPN Junction transistor, Transistor as an amplifier, SCR characteristics and applications.

UNIT-V

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. Basic Electrical Engineering, Abhijit Chakrabarthi, Sudiptanath, Chandrakumar Chanda,Tata- McGraw-Hill.
2. Basic concepts of Electrical Engineering, PS Subramanyam, BS Publications.
3. Electronic Devices and Circuits, S.Salivahanan, N.Suresh Kumar, A.Vallavaraj,Tata McGraw- Hill companies.

REFERENCE BOOKS:

1. Basic Electrical Engineering, T.K.Nagasarkar and M.S. Sukhija, Oxford University Press.
2. Basic Electrical Engineering by D.P.Kothari, I.J. Nagrath, McGraw-Hill.
3. Millman's Electronic Devices and Circuits,J. Millman, C.C.Halkias, and Satyabrata Jit, Tata McGraw-Hill companies.

OUTCOMES:

- After going through this course the student gets a thorough knowledge on basic electrical circuits, parameters, electromechanical energy conversion, construction and operational characteristics of DC and AC machines
- The constructional features and operation of measuring instruments like voltmeter, ammeter, wattmeter etc., different semiconductor devices, operation of diodes and transistors, their voltage-current characteristics, realization of various electronic circuits with the various semiconductor devices ,and cathode ray oscilloscope,
- With which he/she can able to apply the above conceptual things to real-world electrical, electronic problems and applications.

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(R15A0305) STRENGTH OF MATERIALS

Objectives:

- The objective of this subject is to provide the basic concepts of mechanical behavior of the different materials
- Student able to know about different loads.
- Student able to learn about different stresses and strains.

UNIT-I

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

UNIT-II

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

UNIT-III

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

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

UNIT-IV

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.

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-V

Torsion of Circular Shafts: Theory of pure torsion, Derivation of torsion equations: T/J=q/r=Nθ/L- Assumptions made in theory of pure torsion-Torsional moment of resistance – Polar section modulus – Power transmitted by shaft s

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.

TEXT BOOKS:

1. Strength of materials by Bhavikatti, Lakshmi publications.
2. Solid Mechanics, by Popov
3. Strength of Materials by S.Timshenko

REFERENCE BOOKS:

1. Strength of Materials -By Jindal, Umesh Publications.
2. Analysis of structures by Vazirani and Ratwani.
3. Mechanics of Structures Vol-III, by S.B.Junnarkar.

OUTCOMES:

- The student shall be able utilize the mechanics of solids in day –to -day life for design
- simple structures and for other limited applications
- Student gets the exposure of SFD and BMD.

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(R15A0306) KINEMATICS OF MACHINERY

Objectives :

- Understand the fundamentals of the theory of kinematics and dynamics of machines.
- Understand techniques for studying motion of machines and their components.
- Use computer software packages in modern design of machines.

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.

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

Hooke's Joint: Single and double Hookes joint Universial coupling application problems.

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

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. Maximumm 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-V

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

Gear Trains: Introduction - Train value - Types - Simple and reverted wheel train

Epicycle gear Train. Methods of finding train value or velocity ratio - Epicycle gear trains. Selection of gear box-Differential gear for an automobile.

TEXT BOOKS:

1. Theory of Machines by Thomas Bevan/ CBS
2. Theory of machines/ PL. Balaney/khanna publishers.
3. Theory of Machines and Mechanisms/S.S.Rattan/Tata McGraw Hill Publishers

REFERENCE BOOKS:

1. The theory of Machines /Shiegley/ Oxford.
2. Mechanism and Machine Theory / JS Rao and RV Dukkipati / New Age International Publishers
3. Theory of Machines / R.K Bansal/Fire Wall media Publisher

OUTCOMES:

- Distinguish kinematic and kinetic motion. Identify the basic relations between distance, time velocity, and acceleration. Apply vector mechanics as a tool for solving kinematic problems. Create a schematic drawing of a real-world mechanism.
- Determine the degrees-of-freedom (mobility) of a mechanism. Use graphical and analytic methods to study the motion of a planar mechanism. Use computer software to study the motion of a mechanism. Design basic gear trains. Design basic cam systems.
- This course contributes to the assessment of the following program (student) outcomes: an ability to apply knowledge of mathematics, science and engineering an ability to identify, formulate, and solve engineering problems

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(R15A0024) PROBABILITY AND STATISTICS
(OPEN ELECTIVE-I)

Objectives:

- To understand a random variable that describes randomness or an uncertainty in certain realistic situation. It can be either discrete or continuous type.
- In the discrete case, study of the binomial and the Poisson random variables and the normal random variable for the continuous case predominantly describe important probability distributions. Important statistical properties for these random variables provide very good insight and are essential for industrial applications. To learn functions of many random variables, through joint distributions.
- The types of sampling, Sampling distribution of means, Sampling distribution of variance, Estimations of statistical parameters, Testing of hypothesis of few unknown statistical parameters. The mechanism of queuing system, The characteristics of queue, The mean arrival and service rates, The expected queue length, The waiting line, The random processes, The classification of random processes, Markov chain, Classification of states, Stochastic matrix (transition probability matrix),Limiting probabilities, Applications of Markov chains

UNIT-I

Introduction to Statistics & Probability: Introduction to Statistics**,** Measures of central tendency-Mean, Median and Mode ,dispersion-Variance and Standard Deviation. Correlation -Coefficient of correlation, Rank correlation, Regression- Regression Coefficients, Lines of Regression.

Probability - axioms of probability – some elementary theorems and Examples – conditional probability – Baye's theorem.

UNIT-II

Random Variables and Probability Distributions: Random Variables **-**Single and multiple Random variables -Discrete and Continuous. Probability distribution function, mass function and density function of probability distribution. Mathematical expectation.

Probability distributions: Binomial distribution – properties, mean and variance, Poisson distribution – properties, mean and variance and Normal distribution – properties, mean and variance

UNIT-III

Sampling Distributions and Statistical Inferences Sampling: Definitions of population, sampling, statistic ,parameter-Types of sampling – Expected values of sample mean and variance, Standard error- Sampling distribution of means and variance

Parameter Estimations: likelihood estimate, interval estimate.

Testing of hypothesis: Null and Alternative hypothesis-Type I and Type II errors , Critical region – confidence interval – Level of significance, One tailed and Two tailed test

Large sample Tests: i) Test of significance of single mean and equality of means of two samples(cases of known and unknown variance whether equal or unequal) ii) Tests of significance difference between sample proportion and population proportion and difference between two sample proportions

UNIT-IV

Exact Sampling Distributions(Small samples): Exact Sampling Distributions(Small samples) Student t- distribution – properties i)Test of significant difference between sample and population mean ii)Test of difference between means of two small samples(independent and dependent samples) F- distribution - properties –test of equality of two population varianceshi-square distribution -properties –i)Test of goodness of fit
ii)Test of independence of attributes

UNIT-IV

Queuing Theory and Stochastic process: Structure of a queuing system its characteristics-Arrival and service process-Pure Birth and Death processTerminology of queuing system - Queuing model and its types-M/M/1 model of infinite queue (without proofs)and M/M/1 model of finite queue (without proofs).

Stochastic Process: Introduction to stochastic process-classification and methods of description of Random process i.e,stationary and non-stationary Average values of single and two or more random process Markov process, Markov chain, Examples of Markov chains, Stochastic matrix.

TEXT BOOKS:

1. Probability and Statistics by T.K..V Iyengar& B.Krishna Gandhi Ranganatham,MVSSAN Prasad. SCHAND Publishers
2. Fundamentals of Mathematical Statistics by SC Gupta and V.K. Kapoor.
3. Operation Research by S.D. Sharma

REFERENCE BOOKS:

1. Higher Engineering Mathematics By Dr.B.S.Grewal,Khanna Publishers
2. Probability and Statistics for Engineers and Scientists by Sheldon M.Ross,Academic . Press.
3. Probability and Statistics for Engineers and Scientists by Jay.I.Devor

OUTCOMES:

- Students would be able to identify distribution in certain realistic situation. It is mainly useful for circuit as well as non circuit branches of engineering.Also able to differentiate among many random variables involved in the probability models. It is quite useful for all branches of engineering.
- The student would be able to calculate mean and proportions (small and large samples)and to make important decisions from few samples which are taken out of unmanageably huge populations.It is mainly useful for non-branches of engineering. The student would be able to find the expected queue length, the ideal time the traffic intensity and the waiting time.
- These are very useful tools in many engineering and data management problems in the industry. it is useful for all branches of engineering

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(R15A0507) JAVA PROGRAMMING
(OPEN ELECTIVE-I)

Objectives:

- This subject aims to introduce students to the Java programming language.
- Upon successful completion of this subject.Students should be able to create Java programs that leverage the object-oriented features of the Java language, such as encapsulation, inheritance and polymorphism; use data types, arrays and other data collections;
- Implement error-handling techniques using exception handling, create and event-driven GUI using Swing components

UNIT-I

OOP Concepts:- Data abstraction, encapsulation, inheritance, Benefits of Inheritance, Polymorphism, classes and objects, Procedural and object oriented programming paradigms.

Java Programming- History of Java, comments, Data types, Variables, Constants, Scope and Lifetime of variables, Operators, Operator Hierarchy, Expressions, Type conversion and casting, Enumerated types, Control flow- block scope, conditional statements, loops, break and continue statements, simple java stand alone programs, arrays, console input and output, formatting output, constructors, methods, parameter passing, static fields and methods, access control, this reference, overloading methods and constructors, recursion, garbage collection, building strings, exploring string class.

UNIT–II

Inheritance – Inheritance hierarchies super and sub classes, Member access rules, super keyword, preventing inheritance: final classes and methods, the Object class and its methods.

Polymorphism – dynamic binding, method overriding, abstract classes and methods**.**

Interfaces- Interfaces Vs Abstract classes, defining an interface, implement interfaces, accessing implementations through interface references, extending interface.

Inner classes- Uses of inner classes, local inner classes, anonymous inner classes, static inner classes, examples.

Packages- Defining, creating and accessing a package, Understanding CLASSPATH, importing packages.

UNIT-III

Exception handling- Dealing with errors, benefits of exception handling, the classification of exceptions- exception hierarchy, checked exceptions and unchecked exceptions, usage of try, catch, throw, throws and finally, rethrowing exceptions, exception specification, built in exceptions, creating own exception sub classes.

Multithreading – Differences between multiple processes and multiple threads, thread states, creating threads, interrupting threads, thread priorities, synchronizing threads, inter-thread communication, producer consumer pattern,Exploring java.net and java.text.

UNIT-IV

Collection Framework in Java – Introduction to java collections, Overview of java collection framework, Generics, Commonly used collection classes- Array List, Vector, Hash table, Stack, Enumeration, Iterator, String Tokenizer, Random, Scanner, Calendar and Properties.

Files- Streams- Byte streams, Character streams, Text input/output, Binary input/output, random access file operations, File management using File class.

Connecting to Database – JDBC Type 1 to 4 drivers, Connecting to a a database, querying a a database and processing the results, updating data with JDBC.

UNIT-V

GUI Programming with Java- The AWT class hierarchy, Introduction to Swing, Swing Vs AWT, Hierarchy for Swing components, Containers – Jframe, JApplet, JDialog, JPanel, Overview of some Swing components – Jbutton, JLabel, JTextField, JTextArea, simple Swing applications, Layout management – Layout manager types – border, grid and flow

Event Handling- Events, Event sources, Event classes, Event Listeners, Relationship between Event sources and Listeners, Delegation event model, Examples: Handling a button click, Handling Mouse events, Adapter classes.

Applets – Inheritance hierarchy for applets, differences between applets and applications, Life cycle of an applet, Passing parameters to applets, applet security issues.

TEXT BOOK:

1. Java Fundamentals – A Comprehensive Introduction, Herbert Schildt and Dale Skrien, . TMH.
2. Programming in Java, S. Malhotra and S. Choudhary, Oxford Universities Press.
3. Fundamentals of Java by E. Bala Guruswamy

REFERENCE BOOKS:

1. Java for Programmers, P.J.Deitel and H.M.Deitel, PEA (or) Java: How to Program , . P.J.Deitel and H.M.Deitel, PHI
2. Object Oriented Programming through Java, P. Radha Krishna, Universities Press.
3. Thinking in Java, Bruce Eckel, PE.

OUTCOMES:

- An understanding of the principles and practice of object oriented analysis and design in the construction of robust, maintainable programs which satisfy their requirements .A competence todesign, write, compile, test and execute straightforward programs using a high level language.
- An appreciation of the principles of object oriented programming. An awareness of the need for a professional approach to design and the importance of good documentation to the finished programs. Be able to implement, compile, test and run Java programs comprising more than one class, to address a particular software problem. Demonstrate the ability to use simple data structures like arrays in a Java program.
- Be able to make use of members of classes found in the Java API (such as the Math class).Demonstrate the ability to employ various types of selection constructs in a Java program. Be able to employ a hierarchy of Java classes to provide a solution to a given set of requirements. Able to develop applications using Applet,awt,JDBC and Swings

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(R15A0067)TECHNOLOGY MANAGEMENT
(OPEN ELECTIVE-I)

Objectives:

- The Objective of the course is to expose students to the importance of technology in conduct of business.
- Skillful management for optimum results.
- Financial Evaluation of Research and Development Projects.

UNIT-I

The Process of Technological Innovation: The Need for a Conceptual Approach, Technological Innovation as a Conversion Process, Factors Contributing to Successful Technological Innovation. Strategies For Research and Development: R&D as A Business, Resource Allocation to R&D, R&D Strategy In the Decision Making Process, Selection and Implementation of R&D Strategy, R and D and Competitive Advantage, New Product Development- Techniques For Creative Problem Solving.

UNIT-II

Financial Evaluation of Research and Development Projects: The Need For Cost Effectiveness, R&D Financial Forecasts, Risk as a Factor In Financial Analysis, Project Selection Formulae, Allocation of Resources, DCF and Other Techniques of evaluating R&D ventures.

UNIT-III

Research and Development: Programme Planning and Control, Portfolio Planning, Project Planning and Control, Project Termination, Resource Allocation and Management- New Product Development: New Product Development as a Competitive Strategy, Market Research For Developing New Products, Commercialisation of Research Outcomes, Industrial Design, Product Architecture and Design For Manufacture, Developing Indigenous Substitute For Raw Materials.

UNIT-IV

Technological Forecasting For Decision Making: The Definition of Technological Forecasting, Forecasting System Inputs and Outputs, Classification of Forecasting Techniques, Organisation For Technological Forecasting, Current Status.

UNIT-V

Transfer of Technology: Modes of technology transfer, Price of technology transfer, Negotiation for price of MOT.

TEXT BOOKS:

1. Tarek Khalil: Management of Technology-The Key to Competitiveness and Wealth Creation, McGraw Hill, Boston, 2009.
2. rishnamacharyulu: Management of Technology, HPH, 2009
3. V.K.Narayanan: Managing Technology and Innovation for Competitive Advantage, Pearson Education, 2009.

REFERENCE BOOKS:

1. Krishnamacharyulu & Lalitha: Management of Innovation, Himalaya, 2009.
2. Norma Harison and Samson: Technology management – Text and cases, TMH, 2009
3. Shane: Technology Strategy for Managers and Entrepreneurs, Pearson, 2009

OUTCOMES:

- Improvement of best practices in companies.
- Assessment of impact of technology in different areas to meet desired outputs.
- Identification of tech mgt activities and areas of strength and weaknesses in specific sectors of businesses. Insight into detailed process of key areas of technology

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II Year B. Tech ME - I Sem

L	P	C
0	3	2

(R15A0282) ELECTRICAL AND ELECTRONICS ENGINEERING LAB

Objectives:

- Student able to understanding of basic analog circuit designs Objective
- understanding of amplifiers
- Transistor biasing

SECTION-A: ELECTRICAL ENGINEERING

1. Magnetization characteristics of D.C. shunt generator.
2. Speed control of DC shunt motor.
3. Swinburne's test on DC shunt machine.
4. Brake test on DC shunt motor.
5. OC and SC tests on Single-phase transformer.
6. Brake test on 3-phase induction motor.
7. Regulation of an alternator by synchronous impedance method.

SECTION-B: ELECTRONICS ENGINEERING

8. PN Junction diode characteristics.
9. Zener diode characteristics.
10. Half wave rectifier with and without filter.
11. Full wave rectifier with and without filter.
12. Transistor CB characteristics (Input and Output).
13. Transistor CE characteristics (Input and Output).

Note: Total 10 experiments are to be conducted.

OUTCOMES :

- Students can simulate building and test basic analog circuit Assignments that .. demonstrate accomplishment of this outcome: 1) Lab Exercises and Assignments Objective 2) An understanding of amplifiers
- Students can simulate building and test amplifier circuits Assignments that demonstrate accomplishment of this outcome: 1) Lab Exercises and Assignments

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

II Year B. Tech ME - I Sem

L	P	C
0	3	2

(R15A0381) MATERIAL SCIENCE AND STRENGTH OF MATERIALS LAB

Objectives:

- This course deals with composition of metals, mechanical properties depending upon their micro structure
- Heat treatment methods and their effect on micro structure of materials.
- Able to know about Micro Structure of pure metals

(A) METALLURGY LAB:

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

(B) MECHNICS OF SOLIDS LAB :

1. Direct tension test
2. Bending test on
   a) Simple supported
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

Note: Total 10 experiments are to be conducted.

OUTCOMES:

- Students can understand micro structures of different material
- Different heat treatment methods, change of mechanical properties based on micro structure of methods.
- Iron carbon equilibrium diagrams.

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II Year B. Tech ,ME-I Sem

L	T/P/D	C
2	0	0

(R15A0004) FOREIGN LANGUAGE: FRENCH/ FOREIGN LANGUAGE: GERMAN

Objectives:

- To improve the basic speaking skills of the French language.
- To hone the basic sentence constructions in day to day expressions for communication in their work place.
- Student able to improve Vocabulary.

UNIT-I

Pronunciation guidelines; Single vowels, Vowels and consonants combinations,; Numbers and Genders; , articles verbs and their groups; present tense; adjectives from singular to plural

UNIT-II

Sentences Structures; Prepositions, affirmatives, Negative and, Interrogative Sentences, The Family, Conversation, Notes on Vocabulary, Grammar, Liaisons and mechanisms.

UNIT-III

D'où viens-tu (Where do you come from); Vocabulary, Conversation, Notes on Vocabulary, Liaisons Guidelines. Comparer (Comparing); Vocabulary, Conversation, Liaisons, Ordinal Number up to 100. Grammar.

UNIT-IV

Le temps (Time); Vocabulary, Grammar; Vocabulary related to - The Family, Vocabulary - Some more grammar.

UNIT-IV

French Expressions and Idioms; Day-to-day Life, At Work, about Sports, Specia Events Other French Flavours; country of wine, pefumes and landscapes; - Québec and Accadie, , pass time in Suisse, people of france.

TEXT BOOKS:

1. Le Nouveau Sans Frontiere-1, Cle International, 2003
2. Cahier d' activit'es ov Le Nouveau Sans Frontiere-1 Cle International, 2003/33
3. Easy French Step-by-step by Myrna Bell Rochester

REFERENCE BOOKS:

1. Ultimate French Beginner-Intermediate (Coursebook) By Livid Language
2. Ã L'Aventure: An Introduction to French Language and Francophone Cultures By by Evelyne Charvier-Berman, Anne C. Cummings.

OUTCOMES:

- The student will be in a position to speak in French, Which is the second most widely learned foreign language after English, and the ninth most widely spoken language in the world. French is also the only language, alongside English, that is taught in every country in the world.
- The Student will get the ability to speak French is an advantage on the international job market.
- Students with a good level of French are eligible for French government scholarships to enroll in postgraduate courses in France in any discipline and qualify for internationally recognized French degrees.

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

II Year B. Tech, ME-II Sem

L	T/P/D	C
4	1	3

(R15A0307) DYNAMICS OF MACHINERY

Objectives:

- The objective of this subject is to provide basic concepts of links and their relative motion and forces in different mechanisms.
- Able to learn about Static and Dynamic Force Analysis of Planar Mechanisms.
- Able to learn about Clutches ,Brakes and Dynamometers .

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

Friction: Inclined plane-Friction of screw and nuts – Pivot and collars-uniform pressure, uniform wear-friction circle and friction axis: lubricated surfaces-boundary friction-film lubrication,

UNIT–III

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

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

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–IV

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.

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.

UNIT–V

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

TEXT BOOKS:

1. Theory of Machines / Thomas Bevan / CBS Publishers
2. Theory of Machines / Jagadish Lal & J.M.Shah / Metropolitan.
3. Theory of machines / Khurmi/S.Chand Publications

REFERENCE BOOKS:

1. Theory of Machines / Shiegly / MGH Publishers
2. Mechanism and Machine Theory / JS Rao and RV Dukkipati / New Age International Publishers
3. Theory of Machines / S.S Ratan/ Mc. Graw Hill Publi*sh*ers

OUTCOMES:

- The student will learn about the kinematics and dynamic analysis of machine elements
- Student gets the exposure of linkages, cams, and gears, within the general machine design context
- Student gets the exposure of different governors .

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

II Year B. Tech, ME-II Sem

L	T/P/D	C
4	-	3

(R15A0308) THERMAL ENGINEERING

Objectives:

- Introduction, Engine Types and their Operation. Application of the principles of thermodynamics to components and systems.
- Understand and describe the gas exchange and combustion processes in diesel engines. Good understanding of the various gas turbine, steam turbine and combined cycles for electricity generation.
- The purpose of this course is to enable the student to gain an understanding of how thermodynamic principles govern the behavior of various systems and have knowledge of methods of analysis and design of complicated thermodynamic systems

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.

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-II

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.

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-III

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-IV

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.

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

UNIT-V

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.

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

REFERENCE BOOKS:

1. Thermal Engineering / Rudramoorthy - TMH
2. Thermodynamics & Heat Engines / B. Yadav/ Central Book Depot., Allahabad
3. Thermal Engineering – R.S. Khurmi & J.K.Gupta – S.Chand

OUTCOMES:

- To be able to recognize main and supplementary elements of SI and CI engines and define operational principles. To be able to describe the most important combustion concepts and problems in concern with SI engines and CI engines.
- To be able to analyze energy distribution in an internal combustion engine. Develop problem solving skills through the application of thermodynamics. Solve problems associated with Rotodynamic compressors.
- Solve problems associated with reciprocating compressors and expanders and internal combustion engines .To understand the velocity triangles in compressors.

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II Year B. Tech, ME-II Sem

L	T/P/D	C
4	1	3

(R15A0309) FLUID MECHANICS AND HYDRAULIC MACHINERY

Objectives:

- To understand fluid statics and fluid dynamics.
- To understand application of mass, momentum and energy equation in fluid flow.
- To learn various flow measurement techniques.

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.

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..

UNIT-II

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 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 .

UNIT-III

Basics of Turbo Machinery : Hydrodynamic force of jets on stationary and moving flat, inclined, and curved vanes, jet striking centrally and at tip, velocity diagrams, work don and efficiency, flow over radial vanes. Hydroelectric power stations : Elements of hydro electric power station-types-concept of pumped storage plants-storage requirements, mass curve (explanation only) estimation of power developed from a given catchment area; heads and efficiencies.

UNIT-IV

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 Sfunctions and efficiency. 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-V

Centrifugal Pumps : Classification, working, work done – manomertic 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.
3. Fluid Mechanics and Machinery by D. Rama Durgaiah, New Age International

REFERENCE BOOKS:

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

OUTCOMES:

- Student will be able to Understand properties of fluids and classification of flows.
- Formulate and solve equations of the control volume for fluid flow systems, calculate resistance to flow of incompressible fluids through closed conduits and over surfaces.
- Apply fundamentals of compressible fluid flows to relevant systems.

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

II Year B. Tech, ME-II Sem

L	T/P/D	C
3	3	3

(R15A0310) MACHINE DRAWING

Objectives:

- To visualize an object and convert it into a drawing**,**
- To gain knowledge of conventional representation of various machining and mechanical details as per IS,
- To become conversant with 2-D and 3-D drafting

Machine Drawing Conventions:

Need for drawing conventions – introduction to IS conventions

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

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

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

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

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

I. Drawing of Machine Elements and simple parts

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

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

b) Keys, cottered joints and knuckle joint.

c) Rivetted joints for plates

d) Shaft coupling, spigot and socket pipe joint.

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

II. Assembly Drawings:

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

a) Engine parts – stuffing box, cross heads, Eccentric, Petrol Engine connecting rod.

b) Other machine parts - Screws jack, Machine Vice, Plummer block, Tailstock.

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

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

TEXT BOOKS:

1. Machine Drawing –K.L.Narayana, P.Kannaiah & K. Venkata Reddy / New Age/ Publishers
2. Machine Drawing – Dhawan, S.Chand Publications
3. Machine Drawing By Siddeswar & Kanna

REFERENCE BOOKS:

1. Machine Drawing – P.S.Gill.
2. Machine Drawing – Luzzader
3. Machine Drawing – Rajput

OUTCOMES:

- Student will be able to Visualize and prepare detail drawing of a given object,
- Draw details and assembly of mechanical systems, Read and interpret a given drawing
- Create 2-D and 3-D models using any standard CAD software with manufacturing considerations.

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II Year B. Tech, ME-II Sem

L	T/P/D	C
4	0	3

(R15A0311) MANUFACTURING SCIENCE

Objectives:

- To understand various manufacturing processes & its classifications.
- To understand various Casting processes. To understand various welding processes.
- To understand various metal removal process. To appreciate the capabilities, advantages and the limitations of the processes.

UNIT-I

Casting: Steps involved in making a casting– Types of patterns - Patterns and Pattern making Materials used for patterns, pattern allowances and their Construction, Principles of Gating, Gating ratio and design of Gating systems , Solidification of casting – Concept – Solidification of pure metal and alloys, short & long freezing range alloys. Risers – Types, function and design, casting design considerations, special casting processes 1) Centrifugal 2) Die, 3) Investment. Methods of Melting: Crucible melting and cupola operation, steelmaking processes.

UNIT-II

Welding : Classification of welding process types of welds and welded joints and their characteristics, design of welded joints, Gas welding, ARC welding, Forge welding, resistance welding, Thermit welding and Plasma (Air and water) welding. B) Cutting of Metals: Oxy – Acetylene Gascutting,water plasma. Cutting of ferrous, non-ferrous metals 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-III

Hot working & cold working : Strain hardening, recovery, re crystallisation 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 equirements, plastic blow and injection moulding.

UNIT-IV

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.

UNIT-V

Extrusion of Metals : Basic extrusion process and its characteristics. Hot extrusion and cold extrusion - Forward extrusion and backward extrusion – Impact extrusion Hydrostatic extrusion. Forging processes: Principles of forging – Tools and dies – Types Forging – Smith forging, Drop Forging – Roll forging – Forging hammers: Rotary forging – forging defects.

TEXTBOOKS:

1. ManufacturingTechnology,P.N.Rao,TMH
2. Manufacturing Technology, Kalpak Jain, Pearson education.
3. ProductionTechnology,R.K.Jain

REFERENCE BOOKS:

1. Principles of Metal Castings, Rosenthal.
2. Welding Process, Parmar
3. Manufacturing Technology, R.K. Rajput, Laxmi Pub

OUTCOMES:

- Acquire knowledge and hands-on competence in applying the concepts of manufacturing science in the design and development of mechanical systems.
- Demonstrate creativeness in designing new systems components and processes in the field of engineering in general and mechanical engineering in particular.
- Work effectively with engineering and science teams as well as with multidisciplinary designs. Skillfully use modern engineering tools and techniques for mechanical engineering design, analysis and application

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II Year B. Tech, ME-II Sem

L	T/P/D	C
4	0	3

(R15A0312) INDUSTRIAL ENGINEERING
(OPEN ELECTIVE-II)

Objectives:

- The objective of this subject is to provide knowledge of Planning and control of Industrial and service oriented.
- Student able to learn about different organizational structures.
- Student able to learn about different work study techniques.

UNIT-I

Concepts of Management and Organisation – Functions of Management – Evolution of Management Thought , Taylor's Scientific Management, Fayol's Principles of Management, Douglas Mc-Gregor's Theory X and Theory Y, Mayo's Hawthorne Experiments, Hertzberg's Two Factor Theory of Motivation, Maslow's Hierarchy of Human Needs – Systems Approach to Management.

Designing Organisational Structures : Basic concepts related to Organisation - Departmentation and Decentralisation, Types of mechanistic and organic structures of organisation (Line organization, Line and staff organization, functional organization, Committee organization, matrix organization, Virtual Organisation, Cellular Organisation, team structure, boundaryless organization, inverted pyramid structure, lean and flat organization structure) and their merits, demerits and suitability.

UNIT-II

Plant location: definition, factors affecting the plant location, comparison of rural and urban sites-methods for selection of plant- Matrix approach. Plant Layout – definition, objectives, types of production, types of plant layout – various data analyzing forms-travel chart.

Work Study: Definition, objectives, method study - definition, objectives, steps involved-various types of associated charts-difference between micromotion and memomotion studies. Work measurement- definition, time study, steps involved-equipment, different methods of performance rating- allowances, standard time calculation. Work Sampling – definition, steps involved, standard time calculations, differences with time study.

UNIT-III

Materials Management: Objectives, Inventory – functions, types, associated costs, inventory classification techniques-ABC and VED analysis. Inventory Control Systems-Continuous review system-periodical review system. Stores Management and Stores Records. Purchase management, duties of purchase of manager, associated forms.

TQM: Introduction,- Gurus of TQM,- Historic Review, Benefits of TQM- Leadership, characteristics of Quality leaders.- Performance Measures-Basic concept-Strategy-Quality cost- Bench marking- reasons for bench marking-Process- Benefits of ISO registration-ISO 9000 series Standards-Internal Audits. Environmental Management System-ISO 14000 series-Benefits of EMS- FMEA Documentation-The process of FMEA Documentation-Product liability-Proof and Expert Witness. Total Productive Maintenance- promoting the Philosophy and Training-Improvements and needs-Autonomous Work groups. Design-Hypothesis-

Orthogonal Design-Two factors and Full factors-Quality Strategy for Indian Industries-Quality Management in India.

UNIT-IV

Introduction to PERT / CPM : Project management, network modeling-probabilistic model, various types of activity times estimation-programme evaluation review techniques- Critical Path-probability of completing the project, deterministic model, critical path method (CPM)-critical path calculation-crashing of simple of networks.

UNIT-V

Inspection and quality control: Types of inspections - Statistical Quality Control-techniques-variables and attributes-assignable and non assignable causes- variable control charts, and R charts, attributes control charts, p charts and c charts. Acceptance sampling plan- single sampling and double sampling plans-OC curves. Introduction to TQM-Quality Circles, ISO 9000 series procedures.

Introduction to Human Resource Management, Functions of HRM, Job Evaluation, different types of evaluation methods. Job description, Merit Rating.- difference with job evaluation, different methods of merit ratings, wage incentives, different types of wage incentive schemes. Marketing, marketing vs selling, marketing mix, product life cycle.

TEXT BOOKS:

1. Amrine, Manufacturing Organization and Management, Pearson, 2nd Edition, 2004.
2. Industrial Engineering and Management O.P. Khanna Dhanpat Rai.
3. Dr. C. Nadha Muni Reddy and Dr. K. Vijaya Kumar Reddy, Reliability Engineering & Quality Engineering, Galgotia Publications, Pvt., Limited

REFERENCE BOOKS :

1. Stoner, Freeman, Gilbert, *Management*, 6th Ed, Pearson Education, New Delhi, 2005.
2. Phillip Kotler, Marketing Management, Pearson, 2004.
3. A.R.Aryasri, Management Science for JNTU (B.Tech), Tata McGraw-Hill, 2002.

OUTCOMES:

- Student should be able to understand the Planning, co-ordination between Production, Planning, and Designing.
- Organizational structure, Human resource planning and control systems in manufacturing and service.
- Student gets the exposure of Inspection and quality control techniques.

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II Year B. Tech, ME-II Sem

L	T/P/D	C
4	0	3

(R15A0069) INTELLECTUAL PROPERTY RIGHTS (OPEN ELECTIVE -II)

Objectives:

- The objective of this course is to provide the knowledge on International IPR's and to make students efficient to take decisions in Global Corporate.
- Student able to learn about Managing IP Rights.
- Student able to learn about Parties to IP Rights.

UNIT-I

Introduction: Intellectual property rights basics, the role and value of IP in international commerce, Issues affecting IP internationally. Agreement on trade related aspects of Intellectual Property Rights. (TRIPS) - Agreement on TRIPS and India.

UNIT-II

Parties to IP Rights: Owner, customer, authorized user, licensee, attorney, protection of the weak and strong, finalizing ownership and use rights.

UNIT-III

Ensuring The Value Of Ip: Ensuring the value of IP at creation stage, after creation stage, precise contractual protection of IP rights. Key issues related to IP internationally. IP rights in international forums. Fundamentals in Country legal systems, generalities. Validity of IP rights locally: specifics.

Unit-IV

Managing IP Rights: Acquiring IP Rights: letters of instruction, joint collaboration agreement, work made for hire agreement - Protecting IP Rights: non disclosure agreement, cease and desist letter, settlement memorandum. Transferring IP Rights: assignment contract, license agreement, deed of assignment or license agreement, addendum to unrecorded assignment or license.

UNIT-V

Remedies and IPR Evaluation - GATT - WTO - Role of WTO in solving IPR issues.

TEXT BOOKS:

1. A short course in International Intellectual Property Rights – Karla C. Shippey, World Trade Press – 2nd Edition.
2. Intellectual Property Rights – Heritage, Science, & Society under international treaties – A. Subbian, - Deep & Deep Publications – New Delhi.
3. Intellectual Property Rights: N K Acharya: ISBN: 9381849309

REFERENCE BOOKS:

1. Intellectual Property Rights: C B Raju : ISBN-8183870341
2. Intellectual Property : Examples and Explanation – Stephen M McJohn, 2/e, ISBN-13: 978-0735556652
3. Intellectual Property Rights in the Global Economy – Keith E Maskus, PIIE, ISBN paper 0-88132-282-2.

OUTCOMES:

- It allows students how to prepare and protect the Inventions , start up ideas and rights of patents and copy rights etc.,
- This subject brings awareness to the students the basic legal aspects at present following at Global level.
- Student gets the exposure of license agreement legal systems and generalities.

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II Year B. Tech, ME-II Sem

L	T/P/D	C
4	0	3

(R15A0064) ENTERPRISE RESOURCE PLANNING
(OPEN ELECTIVE-II)

Objectives:

- It enables the student to understand the foundations of Enterprise planning and ERP System Options.
- Student able to learn about ERP System Options & Selection Methods.
- Student able to learn about ERP–Production and Material Management.

UNIT-I

Introduction to ERP: Foundation for Understanding ERP systems-Business benefits of ERP-The challenges of implementing ERP system-ERP modules and Historical Development.

UNIT-II

ERP System Options & Selection Methods: Measurement of project Impact- information Technology Selection-ERP proposal evaluation-Project Evaluation Technique.

UNIT-III

ERP System Installation Options: IS/IT Management results-Risk Identification analysis-System Projects- Demonstration of the system-Failure method-system Architecture & ERP.

UNIT-IV

ERP-Sales and Marketing- Management control process in sales and marking-ERP customer Relationship Management-ERP systems- Accounting & Finance control processes. Financial modules in ERP systems.

UNIT-V

ERP–Production and Material Management-Control process on production and manufacturing-Production module in ERP- supply chain Management & e-market place-e-businesses & ERP-e supply chain & ERP- Future directions for ERP.

TEXT BOOKS:

1. Mary Sumner “Enterprise Resource Planning” Pearson, 2012.
2. David L.Olson “Managerial Issues in ERP systems” TMH 2012.
3. Rajesh Ray “Enterprise Resource Planning” TMH, 2012

REFERENCE BOOKS:

1. Ellen Monk “Enterprise Resource Planning” Cengage, 2012.
2. Alexis Leon “Enterprise Resource Planning” 2nd Edition, TMH ,2012
3. Goyal “Enterprise Resource Planning” TMH, 2012

OUTCOMES:

- The student understands the challenges in implementation of ERP system,
- ERP System Implementations.
- Options, and functional modules of ERP.

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

II Year B. Tech ME - II Sem

L	P	C
0	3	2

(R15A0382) MANUFACTURING SCIENCE LAB

Objectives:

- Student Get Exposed to Different Types of Patterns in a Foundry Shop
- Students will do lap joint & but joint experiments in welding
- To learn the operation of hydraulic press

List of Experiments

1.METAL CASTING LAB :

1.1. Pattern Design and making - for one casting drawing.
1.2. Sand properties testing - Exercise -for strengths, and permeability – 1
1.3. Moulding Melting and Casting - 1 Exercise

2.WELDING LAB:

2.1 ARC Welding Lap & Butt Joint - 2 Exercises
2.2 Spot Welding - 1 Exercise
2.3. TIG Welding - 1 Exercise
2.4. Plasma welding and Brazing - 2 Exercises
(Water Plasma Device)

3.MECHANICAL PRESS WORKING :

3.1.Blanking & Piercing operation and study of simple, compound and progressive press tool.
3.2.Hydraulic Press: Deep drawing and extrusion operation.
3.3.Bending and other operations

4.PROCESSING OF PLASTICS

4.1. Injection Moulding
4.2. Blow Moulding

Note: Total 10 experiments are to be conducted.

OUTCOMES:

- Students Will get expertise in Plasma Arc Welding
- To learn and do various experiments in polymer processing machines
- Will get exposure to spot welding and their applications

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L	P	C
0	3	2

(R15A0383) FLUID MECHANICS AND HYDRAULIC MACHINERY LAB

Objectives:

- Student able to learn about different measuring devices, working Principles and their performances
- To calculate c_d, c_c, c_v and Coefficient of impact of various hydraulic systems
- Student able to learn about different characteristics of Turbines.

List of Experiments

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 Bernoulli's theorem apparatus
13. Turbine flow meter

Note: Total 10 experiments are to be conducted.

OUTCOMES:

- Students exposure to study various operating characteristics of Centrifugal pump and Reciprocating pump.
- Students exposure to study various operating characteristics of Kaplan, Francis and Pelton Wheel Turbines.
- Get Exposure to verification of Bernoulli's Theorem.

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L	P	C
0	3	2

(R15A0006) GENDER SENSITIZATION

(An Activity – based Course)

Objectives :

- To develop students sensibility with regard to issues of gender in contemporary India.
- To provide a critical perspective on the socialization of men and women.
- To introduce students to information about some key biological aspects of genders.
- To expose the students to debates on the politics and economics of work.
- To help students reflect critically on gender violence.
- To expose students to more egalitarian interactions between men and women.

UNIT –I

UNDERSTANDING GENDER:

Gender: Why should we study it? (*Towards a world of Equals: Unit – 1*)

Socialization: Making women, making men (*Towards a World of Equals: Unit – 2*)

Introduction. Preparing for Womanhood. Growing up Male. First lessons in Caste. Different Masculinities.

Just Relationships: Being Together and Equals (*Towards a World of Equals: Unit – 12*)

Mary Kom and Onler. Love and Acid just do not Mix. Love Letters. Mothers and Fathers. Further Reading: Rosa Parks – The Brave Heart.

UNIT –II

GENDER AND BIOLOGY:

Missing Women: Sex Selection and its Consequences (*Towards a World of Equals: Unit – 4)*

Declining Sex Ratio. Demographic Consequences.

Gender Spectrum: Beyond the Binary (*Towards a World of Equals: Unit – 10*)

Two or Many? Struggles with Discrimination.

Additional Reading: Our Bodies, Our Health (Towards a World of Equals: Unit – 13)

UNIT –III

GNNDER AND LABOUR:

Housework: the Invisible Labor *(Towards a World of Equals: Unit – 3)*

"My Mother doesn`t Work". *Share the Load*.

Women`s Work: Its Politics and Economics *(Towards a World of Equals: Unit – 7*)

Fact and Fiction. Unrecognized and Unaccounted work. Further Reading: Wages and Conditions of Work

UNIT –IV

ISSUES OF VIOLENCE:

Sexual Harassment: Say No! (*Towards a World of Equals: Unit – 6*)

Sexual Harassment, not Eve – teasing – Coping with Everyday Harassment – Further Reading: "Chupulu".

Domestic Violence: Speaking Out (Towards a World of Equals: Unit – 8)
Is Home a Safe Place? – When Women Unite [Film]. Rebuilding Lives. Further Reading. New Forums for justice.
Thinking about Sexual Violence (Towards a World of Equals: Unit – 11)
Blaming the Victim – "! Fought for my Life ……" – Further Reading. The Caste Face of Violence.
UNIT – V
GENDERS STUDIES:
Knowledge: Through the Lens of Gender (Towards a World of Equals: Unit – 5)
Point of View. Gender and the Structure of Knowledge. Further Reading. Unacknowledged Women Artists of Telangana
Whose History? Questions for Historians and Others (Towards a World of Equals: Unit – 9)
Reclaiming a Past. Writing other Histories. Further Reading. Missing Pages from Telangana History.
Essential Reading: All the Units in the Text books, "Towards a World of Equals: A Bilingual Textbook on Gender" Written by A. Suneetha, Uma Bhrugubanda, Duggirala Vasanta, Rama Melkote, Vasudha Nagaraj, Asma Rasheed, Gogu Shyamala, Deepa Sreenivas and Susie Tharu.
Note: Since it is Innterdisciplinary Course, reasource Persons can be drawn from the fields of English Literature of Sociology or Political Science or any other qualified faculty who has expertise in this field.
REFERENCE BOOKS:

1. Sen, Amartya. "More than Once Million Women are Missing". New York Review of Books 37.20 (20 December 1990). Print. `We Were Making History……' Life Stories of Women in the Telangana People`s Struggle. New Delhi : Kali for Women, 1989.
2. Tripti Lahiri. "By the Numbers: Where India Women Work." Women`s Studies Journal (14 November 2012) Available online at: http://blogs. Wsj.com/India real time/2012/11/14/by – the –numbers – where- Indian- women-works/>
3. K. Satyanarayana and Susie Tharu (Ed.) Steel Nibs Are Sprouting: New Dalit Writing From South India, Dossier 2: Telugu And Kannada http://harpercollints.co.in/BookDetail.asp?Book Code=3732
4. Vimala "Vantilu (The Kitchen)". Omen Writing in India: 600BC to the Present, Volume II The 20th Century. Ed. Susie Tharu and K. Lalita. Delhi: Oxford University Press, 1995. 599-601.
5. Shatrughna, Veena et al. Women`s Work and its Impact on Child Health and Nutrition, Hyderabad, National Institute of Nutrition, India Council of Medcial Research 1993.
6. Stress Shakti Sanghatana. "We Were Making History….'Life Stories of Women in the Telangana People`s Struggle. New Delhi:Kali of Women, 1989.
7. Menon, Nivedita. Seeing Like a Feminist. New Delhi. Zubaan-Penguin Books, 2012.
8. Jayaprabha, A. "Chupulu (Stares)". Women Writing in India: 600BC to the Present. Volume II: The 20th Century Ed. Susie Tharu and K. Lalita. Delhi: Oxford University Press, 1995. 596-597.
9. Javeed, Shayam and Anupam Manuhaar. "Women and Wage Discrimination in India: A Critical Analysis". International Journal of Humanilities and Social Science Invention 2, 4(2013).

10. Gautam, Liela and Gita Ramaswamy. “A ‘Conversation’ between a Daughter and Mother”. Broadsheel on Contemporany Politics. Special Issue on Sexuality and Harassment: Gender Politics on Campus Today. Ed.Madhumeeta Sinha and Asma Rasheed. Hydrabad: Anveshi research Center for Women`s Studies, 2014.
11. Abdulali Sohaila. “ I Fought For My Life…and Won.” Abailable online at: http://www.thealternative. In/lifestyle/i-fought-for-my lifeand-won-sohaila-abdulal/
12. Jeganathan Pradeep, Partha Chatterjee (Ed). “Community, Gender and Violence Subaltern Studies XI”. Permanent Block and Ravi Dayal Publishers, New Delhi, 2000
13. K. Kapadia. The Violence of Development: The Politics of Identity, Gender and Social Inequalities in India. London: Zed Books, 2002.
14. S. Benhabib. Situating the self: Gender, Community, and Postmodernism in Contemporary Ethics, London:Routledge, 1992.
15. Virginia Woolf A Room of One`s Oxford: Black Swan. 1992.
16. T. Banuri and M. Mahmood, Just Development: Beyond Adjustment with a Human Face, Karachi: Oxford University Press, 1997.

OUTCOMES:

- Students will have developed a better understanding of important issues related to gender in contemporary India.
- Students will be sensitized to basic dimensions of the biological, sociological, psychological and legal aspects of gender. This will be achieved through discussion of materials derived from research, facts, everyday life, literature and film.
- Students will attain a finer grasp of how gender discrimination works in our society and how to counter it.
- Students will acquire insight into the gendered division of labor and its relation to politics and economics.
- Men and women students and professionals will be better equipped to work and live together as equals.
- Students will develop a sense of appreciation of women in all walks of life.
- Through providing accounts of studies and movements as well as the new laws that provide protection and relief to women, the textbook will empower students to understand and respond to gender violence.

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L	T/P/D	C
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(R15A0313) ADVANCED THERMAL ENGINEERING

Objectives:

- Applications and the principles of thermodynamics to components and systems.
- The purpose of this course is to enable the student to gain an understanding of how thermodynamic principles govern the behavior of various systems
- Student have knowledge of methods of analysis and design of complicated thermodynamic systems

UNIT-I

Basic Concepts: Rankine cycle - Schemantic layout, Thermodynamic Analysis, Concept of Mean Temperature of Heat addition, Methods to improve cycle performance - Regeneration & reheating.

UNIT-II

Boilers: Classification - Working principles with sketches including H.P. Boilers - Mountings and Accessories - Working principle.

Steam Nozzles: Function of nozzle - Applications and Types- Flow through nozzles- Thermodynamic analysis.

UNIT-III

Steam Turbines: Classification - Impulse turbine; Mechanical details - Velocity diagram - Effect of friction - Power developed, Axial thrust, Blade or diagram efficiency - Condition for maximum efficiency.

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.Steam Condensers: Requirements of steam condensing plant - Classification of condensers - Working principle of different types.

UNIT-IV

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-V

Jet Propulsion: Principle of Operation - Classification of jet propulsive engines - Working Principles with schemantic diagrams and representation on T-S diagram- Thrust, Thrust Power and Propulsion Efficiency - Turbo jet engines - Needs and Demands met by Turbo jet - Schemantic 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 / Rajput / Lakshmi Publications.
2. Gas Turbines / V. Ganesan / TMH.
3. Thermal Engineering / Ballaney / Khanna Publishers, NewDelhi.

REFERENCE BOOKS :

1. Gas Turbines and Propulsive Systems / P. Khajuria & S.P. Dubey / Dhanapatrai Pub.
2. Thermal Engineering / R.S. Khurmi & J.S. Gupta / S. Chand Pub.
3. Thermodynamics and Heat Engines / R. Yadav / Central Book Depot

OUTCOMES:

- To be able to recognize main and supplementary elements of SI and CI engines and define operational principles.
- To be able to describe the most important combustion concepts and problems in concern with SI engines and CI engines.To be able to analyze energy distribution in an internal combustion engine. Develop problem solving skills through the application of thermodynamics.
- Solve problems associated with rotodynamic compressors. Solve problems associated with reciprocating compressors and expanders and internal combustion engines. To understand the velocity triangles in compressors.

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(R15A0314) MACHINE DESIGN-I

Objectives:

- To study basic principles of machine design.
- To acquaint with the concepts of strength design related to various components.
- To make conversant with preparation of working drawings based on designs.

UNIT-I

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

Stresses in machine members: Simple stresses - Combined stresses - Torsional and Bending stresses - impact stresses - stress strain relation - Various theories of failure - factor of safety – Design for strength and rigidity - preferred numbers. Stress concentration - Theoretical stress Concentration Factor - Fatigue stress concentration factor notch sensitivity - Design for fluctuating stresses –Endurance Limit - Estimation of Endurance strength - Goodman's line - Soderberg's line - Modified Goodman's line.

UNIT-II

Design of fasteners: Riveted and welded joints - Design of joints with initial stresses – strength equations- efficiency of riveted joints-eccentrically loaded riveted joimnts.

Welded joints: Design of fillet welds – axial loads – circular fillet welds- bending and torsion.

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

UNIT-III

Shafts: Design of solid and hollow shafts for strength and rigidity - Design of shafts for combined bending and axial loads - Shaft sizes - BIS code. Use of internal and external circlips, Gaskets and seals (Stationary & rotary).

Shaft coupling: Rigid couplings - Muff, Split muff and Flange couplings. Flexible couplings - Flange coupling (Modified), PIN-Bush coupling.

UNIT–IV

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–V

Mechanical Springs: Stresses and deflections of helical springs - Extension -compression springs - Springs for fatigue loading- natural frequency of helical springs - Energy storage capacity - helical torsion springs - Co-axial springs, leaf springs.

TEXT BOOKS:

1. Machine Design, V.Bandari Tmh Publishers
2. Machine Design, S MD Jalaludin, AnuRadha Publishers
3. Machine Design By Pandya & Shah.

REFERENCE BOOKS:

1. Design of Machine Elements / V.M. Faires
2. Machine Design by Sigheley TMH
3. Machine Design By Khurmi & Guptha s.Chand Publications

OUTCOMES:

- Student will be able to Demonstrate understanding of various design considerations
- Apply basic principles of machine design, Design machine elements on the basis of strength concept**.**
- Acquire skill in preparing production drawings pertaining to various designs.

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L	T/P/D	C
4	0	3

(R15A0315) MACHINE TOOLS

Objectives:

- To introduce students to the basic concepts of manufacturing via shaping, forming, machining and assembly.To develop a knowledge of appropriate parameters to be used for various machining operations.
- To make students aware of the necessity to manage manufacturing processes and systems for the best use of material and human resources with particular emphasis on product safety and environmental considerations.
- To introduce students to the scientific principles underlying material behaviour during manufacturing processes so as to enable them to undertake calculations of forces, tool stresses and material removal rates.

UNIT–I

Elementary treatement 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. Kinematic schemes of machine tools – Constructional features of speed gear box and feed gear box.

UNIT–II

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

UNIT–III

Shaping slotting and planing machines: Principles of working – Principal parts – specification classification,perations performed. Kinematic scheme of the shaping slotting and planning machines, machining time calculations.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. Kinematics scheme of the drilling and boring machines

UNIT–IV

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.

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 Kinematic scheme of grinding machines.

UNIT-V

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 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).hand book
3. Production Technology by P.C .Sharma .

REFERENCE BOOKS:

1. Machine Tools – C.Elanchezhian and M. Vijayan / Anuradha Agencies Publishers.
2. Workshop Technology – B.S.Raghu Vamshi – Vol II
3. Production Technology by P.N.Rao Volume II

OUTCOMES:

- To Analyze various machining processes and calculate relevant quantities such as velocities, forces and powers.
- Identify and explain the function of the basic components of a machine tool.
- Understand the procedures and techniques involved for the manufacturing of components, and keep up to date with innovation through literature search.

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4	0	3

(R15A0316) METROLOGY AND SURFACE ENGINEERING

Objectives:

- The objective of this subject is to provide basic concepts of measuring devices in the manufacturing process.
- Student able to learn Linear Measurements.
- Student able to learn Optical Measuring Instruments.

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 ad 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.

Screw Thread Measurement: Element of measurement – errors in screw threads – measurement of effective diameter, angle of thread and thread pitch, profile thread gauges.

Machine Tool Alignment Tests : Requirements of Machine Tool Alignment Tests, Alignment tests on lathe, milling, drilling machine tools.. Preparation of acceptance charts.

Gear Measurement: Gear measuring instruments, Gear tooth profile measurement. Measurement of diameter, pitch pressure angle and tooth thickness.

Coordinate Measuring Machines: Types of CMM, Role of CMM, and Applications of CMM.

TEXT BOOKS :

1. Engineering Metrology / I C Gupta./ Danpath Rai
2. Engineering Metrology / R.K. Jain / Khanna Publishers
3. Handbook of Tribology: Materials, Coating, and Surface Treatments/ Bharat . Bhushan and B.K.Gupta.

REFERENCE BOOKS:

1. BIS standards on Limits & Fits, Surface Finish, Machine Tool Alignment etc.
2. Fundamentals of Dimensional Metrology 4e / Connie Dotson / Thomson
3. Surface Engineering for corrosion and wear resistance / JR Davis/ Woodhead Publishers.

OUTCOMES:

- The students shall be able to know how to make use of measuring devices effectively.
- Student gets the exposure Machine Tool Alignment Tests.
- Student gets the exposure Measurement through Comparators.

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L	T/P/D	C
4	0	3

(R15A0317) ALTERNATIVE FUELS FOR IC ENGINES (CORE ELECTIVE-I)

Objectives:

- The course provides detailed understanding of internal combustion engines and the factors responsible for the design/ performance.
- Student able to learn about different types of Solid and Liquid fuels.
- Student able to learn about different characteristics and additives of IC engines.

UNIT-I

Introduction : Availability and Suitability and properties of Potential Alternative Fuels – Ethanol, Methanol, DEE, DME, Hydrogen, LPG, Natural Gas, Producer Gas, Bio gas and Bio-diesel, Properties, Merits and Demerits.

UNIT-II

Liquid Fuels for S.I. Engines : Requirements of fuels for SI engines-Different Techniques of utilizing alternative liquid fuels– Blends, Neat form, Reformed Fuels - Manufacturing, Storage and Safety-Performance and Emission Characteristics of alternative liquid fuels.

UNIT-III

Liquid Fuels in C.I. Engines: Requirements of fuels for CI engines- Different Techniques for their utilization-Blends, Fuel modifications to suit CI engines, Neat fuels, Reformed fuels, Emulsions, Dual fuelling, Ignition accelerators and other additives– Performance and emission characteristics.

UNIT-IV

Gaseous Fuels in S.I. Engines: Use of Hydrogen, CNG, LPG, Natural Gas, Producer gas and Bio gas in SI engines– Safety Precautions – Engine performance and emissions.

UNIT-V

Gaseous Fuels in C.I. Engines : Use of Hydrogen, Producer Gas, Biogas, LPG, Naturalgas, CNG in CI engines. Dual fuelling, Performance and emission characteristics.

TEXT BOOKS:

1. Osamu Hi rao and Richard K.Pefley, Present and Future Automotive Fuels, John Wiley and Sons, 1988.
2. Keith Owen and Trevor Eoley, Automotive Fuels Handbook, SAE Publications, 1990.
3. Richard L.Bechtold, Automotive Fuels Guide Book, SAE Publications, 1997.

REFERENCE BOOKS:

1. Automotive Lubricants Reference Book, Second Edition, Roger F. Haycock and John . E. Hillier, SAE InternationalPublications, 2004.
2. IC Engines by V. Ganeshan
3. IC Engines By Doma. Kundawar

OUTCOMES:

- Fundamental understanding of internal combustion engines and its operation, engine design and performance, operating parameters, combustion cycles.
- Comparison between spark ignition and compression ignition engines, thermodynamic analysis of spark ignition engines, different types of diesel combustion systems, and engine tribology,
- Lubrication systems and lubricant requirements, tail pipe emissions, after-treatment devices and awareness of new/upcoming engine technologies

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L	T/P/D	C
4	0	3

(R15A0318) VEHICULAR POLLUTION AND CONTROL
(CORE ELECTIVE – I)

Objectives:

- To provide an introduction to vehicular Pollution.
- To develop an understanding of the causes, chemistry and effects of pollution.
- To build awareness of the strategies used to control and manage vehicular . pollution.To make aware of vehicular emission control Laws& Acts

UNIT-I

Introduction: Vehicle population assessment in metropolitan cities and contribution to pollution, effects on human health and environment, global warming, types of emission, transient operational effects on pollution.

UNIT-II

Pollutant Formation in SI Engines: Pollutant formation in SI Engines, mechanism of HC and CO formation in four stroke and two stroke SI engines, NOx formation in SI engines, effects of design and operating variables on emission formation, control of evaporative emission. Two stroke engine pollution.

UNIT-III

Pollutant Formation in CI Engines: Pollutant formation in CI engines, smoke and particulate emissions in CI engines, effects of design and operating variables on CI engine emissions. Nox formation an.d control.-Noise pollution from automobiles, measurement and standards.

UNIT-IV

Control of Emissions from SI and CI Engines: Design of engine, optimum selection of operating variables for control of emissions, EGR, Thermal reactors, secondary air injection, catalytic converters, catalysts, fuel modifications, fiiel cells, Two stroke engine pollution control.

UNIT-V

Measurement Techniques Emission Standards and Test Procedure: Orsat Apparatus, NDIR, FID, Chemiluminescent analyzers, Gas Chromatograph, smoke meters, emission standards, driving cycles - USA, Japan, Euro and India. Test procedures - ECE, FTP Tests. SHED Test - chassis dynamometers, dilution tunnels.

TEXT BOOKS:

1. Paul Degobert, Automobiles and Pollution, SAE International ISBN-1-56091-563-. 3,1991.
2. Ganesan, V- Internal Combustion Engines- Tata McGraw-Hill Co - 2003.
3. SAE Transactions-Vehicle Emission - 1982 (3 volumes).

REFERENCE BOOKS:

1. Obert.E.F.- Internal Combustion Engines, 1988.
2. Marco Nute- Emissions from two stroke engines, SAE Publication-1998.
3. Vehical Pollution by Anil Gupta & R K Sharma

OUTCOMES:

- Understand contemporary pollution issues. Have insight into specific examples of vehicular pollution.
- Understand the causes and effects of key types of vehicular pollution.
- Appreciate different pollution control strategies. Awareness of vehicular emission control Laws &Acts.

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4	0	3

(R15A0319) COMBUSTION TECHNOLOGY
(CORE ELECTIVE – I)

Objectives:

- The course is intended to Provide students with knowledge of fuel quantity and engine technology effects on emissions.
- Understand the combustion phenomena.
- Understand the concept of laminar and turbulent flame propagation and different methods to reduce air pollution.

UNIT-I

Solid Fuel: Classification of fuel, Origin, Composition, Characteristics and analysis of coal washing & storage of coal, Physical & chemical processing of coal, Various classification systems of coal briquetting, Carbonization, Gasification of coal. Liquid Fuel: Origin, Composition and classification, Properties, Chemical processing – Cracking, Reforming, Polymerization, Alkylation and Isomerization. Gaseous Fuel: Classification of gaseous fuel, Natural gas, LPG, Refinery gas, Producer gas, Water gas.

UNIT-II

Fuel Combustion Calculation: Fundamentals of various combustion calculations with numerical examples.

UNIT-III

Combustion Process: General Principles of combustion, Flame, Draught, Limits of Inflammability, Types of combustion Process- Surface, Submerged, Pulsating, Slow combustion.

UNIT-IV

Energy Conservation: Energy consumption pattern in various sectors, Various ways of energy conservation in various process industries including petroleum.

UNIT-V

Non – Conventional Energy Technologies: General principles with applications and technology of Biomass Energy, Solar Energy, Geothermal Energy, Wind Energy, Nuclear Energy, Hydal, Tidal and Ocean Energy.

TEXT BOOKS:

1. Fuel combustion Energy Technology by S.N. Saha , Dhanpat Rai Publication Co. Pvt. Ltd. New Delhi
2. Combustion Engineering by A. K. Sarkar, New Age International
3. Lean Combustion: Technology and Control 1st Edition by Derek Dunn-Rankin

REFERENCE BOOKS:

1. Green Energy Technology by Maria Carvalho
2. Fundamentals of Combustion Processes (Mechanical Engineering Series) by Karen . Iverson
3. Fundamentals of Combustion ProcessesAuthors: McAllister, Sara, Chen, Jyh-Yuan, Fernandez-Pello, A. craloeo

OUTCOMES:

- Upon completion of the subject, students will be able to Have the knowledge of fuel thermo-chemistry and fuel quality effects on emissions, engine technologies, engine combustion-related emissions and control technologies.
- Extend their knowledge of fuels and engines to different situations of engineering context and professional practice.
- Demonstrate how to design burners and assess their performance **.**

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L	T/P/D	C
4	0	3

(R15A0061) MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS (OPEN ELECTIVE-III)

Objectives:

- To enable the student to understand and appreciate, with a practical insight, the importance of certain basic issues governing the business operations that are needed for sound economic decision making.
- The main purpose is to provide inputs on an overall analysis of an individual firm namely demand and supply, production function, cost analysis, markets etc.
- To understand and analyse the financial formats of the organisation for smooth running of the business.

UNIT-I

Introduction to Managerial Economics: Definition, Nature and scope of Managerial economics, Micro and Macroeconomic concepts.

Demand Analysis: Demand Determinants, Law of Demand and exceptions. Elasticity Of Demand: Definition, Types, Measurement and Significance of elasticity of Demand. Demand Forecasting, Factors governing demand Forecasting, methods of demand Forecasting.

UNIT-II

Production & Cost Analysis: Production Function- Isocost and Isoquants MRTS, Least Cost Combination of Inputs, Cobb-Douglas Production function, Laws of Returns, Internal and External Economies of Scale.

Cost Analysis: Cost concepts. Break-even Analysis (BEA)-Determination of Break-Even Point (simple problems) - Managerial Significance.

UNIT-III

Markets & New Economic Environment: Types of competition and Markets, Features of Perfect competition, Monopoly and Monopolistic Competition. Objectives and Policies of Pricing- Methods of Pricing.

Business: Features of different forms of Business Organisation, Changing Business Environment in Post-liberalization scenario.

UNIT-IV

Introduction to Capital and Financial Accounting: Capital and its significance, Types of Capital, Estimation of Fixed and Working capital requirements, Methods and sources of raising finance – Trading forecast, Capital Budget, Cash Budget. Accounting Definition, Concepts and Conventions (GAAP), Formats for preparation of Trial Balance and Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet).

UNIT-V

Investment Decision: Features of capital budgeting proposals, Methods of Capital

Budgeting: Payback Method, Accounting Rate of Return (ARR) and Net Present Value Method (simple problems).

Financial Analysis: Analysis and Interpretation of Liquidity Ratios, Activity Ratios, and Capital structure Ratios and Profitability ratios.

TEXTBOOKS:

1. Varsheney & Maheswari, Managerial Economics, Sultan Chand, 2009.
2. S.A. Siddiqui & A.S. Siddiqui, Managerial Economics and Financial Analysis, New Age International Publishers, Hyderabad 2013
3. M. Kasi Reddy & Sarawathi, Managerial Economics and Financial Analysis, PHI, New Delhi, 2010.

REFERENCE BOOKS:

1. S.N.Maheswari & S. K. Maheswari, Financial Accounting, Vikas, 2012.
2. D.N. Dwivedi, Managerial Economics, Vikas, 2012.
3. Justin Paul, Leena, Sebastian, Managerial Economics, Cengage, 2012

OUTCOMES:

- Students should be able to understand the basic economic principles, forecast demand and supply.
- Students should be able to estimate cost and understand market structure.
- Students should be able to know pricing practices and able to interpret the financial results of the organization.

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(R15A0521) WEB TECHNOLOGIES
(OPEN ELECTIVE-III)

Objectives:

- Giving the students the insights of the Internet programming and how to design and implement complete applications over the web.
- Design Methodologies with concentration on Object-Oriented concepts, Client-Side Programming, Server-Side Programming, Active Server Pages.
- Database Connectivity to web applications, Adding Dynamic content to web applications.

UNIT-I

Web Basics and Overview: Introduction to Internet, World wide web, Web Browsers, URL, MIME, HTTP, Web Programmers Tool box.

HTML Common tags: List, Tables, images, forms, Frames; Cascading Style sheets. Introduction to Java Scripts, Objects in Java Script, Dynamic HTML with Java Script.

UNIT-II

Introduction to XML: Document type definition, XML Schemas, Document Object model, Presenting XML ,Introduction to XHTML, Using XML Processors: DOM and SAX.

Java Beans: Introduction to Java Beans, Advantages of Java Beans, BDK Introspection, Using Bound properties, Bean Info Interface, Constrained properties Persistence, Customizes, Java Beans API, Introduction to EJB's.

UNIT-III

Web Servers and Servlets: Tomcat web server, Installing the Java Software Development Kit, Tomcat Server & Testing Tomcat, Introduction to Servlets: Lifecycle of a Servlet, JSDK, The Servlet API, The javax. Servlet Package, Reading Servlet 150 parameters, Reading Initialization parameters. The javax.servlet HTTP package, Handling Http Request & Responses, Using Cookies-Session Tracking, Security Issues.

UNIT-IV

Database Access: Database Programming using JDBC, JDBC drivers, Studying Javax.sql.* package, Accessing a Database from a Servlet. Introduction to JSP: The Problem with Servlet. The Anatomy of a JSP Page, JSP Processing. JSP Application Design with MVC Setting Up and JSP Environment.

UNIT-V

JSP Application Development: Generating Dynamic Content, Using Scripting Elements Implicit JSP Objects, Conditional Processing : Displaying Values Using an Expression to Set an Attribute, Declaring Variables and Methods Error Handling and Debugging Sharing Data Between JSP pages, Requests, and Users Passing Control and Date between Pages – Sharing Session and Application Data – Memory Usage Considerations, Accessing a Database from a JSP page, Deploying JAVA Beans in a JSP Page, Introduction to struts framework.

TEXT BOOKS:

1. Web Programming, building internet applications, Chris Bates 2nd edition, WILEY Dreamtech (UNIT s 1, 2)
2. Core SERVLETS ANDJAVASERVER PAGES VOLUME 1: CORE TECHNOLOGIES By Marty Hall and Larry Brown Pearson (UNITs 3,4,5)
3. Core SERVLETS ANDJAVASERVER PAGES VOLUME 1: CORE TECHNOLOGIES By Marty Hall and Larry Brown Pearson

REFERENCE BOOKS:

1. Programming world wide web-Sebesta,Pearson Education ,2007.
2. Internet and World Wide Web – How to program by Dietel and Nieto PHI/Pearson Education Asia.
3. Jakarta Struts Cookbook, Bill Siggelkow, S P D O'Reilly for chap 8.

OUTCOMES:

- Analyze a web page and identify its elements and attributes. Create web pages using XHTML and Cascading Styles sheets.
- Installation and usage of Server software's.
- Database Connectivity to web applications. Build web applications using Served and JSP

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(R15A0320) SOLID WASTE MANAGEMENT
(OPEN ELECTIVE –III)

Objectives:

- To gain insight into the collection, transfer, and transport of municipal solid waste.
- To understand the design and operation of a municipal solid waste landfill.
- Student able to learn about the disposable wastes in the nature.

UNIT-I

Introduction: Types and sources of solid wastes, Municipal, solid waste, Industrial solid wastes andHazardous wastes, Present scenarios of municipal and industrial waste management in India.

UNIT-II

Properties of Solid Wastes: Physical and chemical composition of municipal solid wastes, waste generation rates, factors effecting waste generation rates .

UNIT-III

Management of Solid Wastes in India : Prevalent SWM practices and deficiencies : Storage of waste at source, segregation of wastes, Primary collection of waste, transportation of waste, disposal of wastes, institutional deficiencies.

UNIT-IV

Engineered Systems of Solid Waste Management: Design specifications of primary waste collection tools, waste storage bins, transportation vehicles, route selection and provision of transfer stations.

Disposal of Wastes: Site selection, rapid EIA of proposed sites, disposal technologies such as **Composting :** Aerobic composting, Anaerobic composting, mechanical composting, vermin composting; advantages and limitations of composting technologies, Economics of composting.

Anaerobic digestion : Traditional digestors such as KVIC model, Deenbandhu model, emerging technologies for waste stabilisation. Incineration: Fuel Pellets, Refuse derived fuels, mechanical incinerators; advantages and limitations of incineration.

Sanitary landfilling : Method of preparing sanitary landfill site, land filling techniques, operation and maintenance of landfill sites including leachate collection and treatment, recovery of methane from landfill sites for power generation**.**

UNIT-V

Hazardous Waste Management : The Hazards, Definition & classification of Hazardous Waste Hazardous Waste Management, Treatment Technologies, Land disposal, Biomedical Waste & its Management.

TEXTBOOKS

1. Solid Wastes Energy Principles & Management by Techno banoglus, Theisen & Elvasebm, McGrawHills.
2. Standard handbook of Hazardous Waste Treatment & Disposal, by Freeman H.M., McGraw Hills.
3. Papers published in various Journals & Magazines.

REFERENCE BOOKS:

1. Solid Waste Management Principles and Practice by Chandrappa, Ramesha, Brown, Jeff.
2. Solid Waste Management - An India Perspective by M.S. Bhatt & Asheref Illiyan.
3. Textbook of Solid Wastes Management by Iqbal H.Khan & Naved Ahsan.

OUTCOMES:

- Understand the design and operation of a resource recovery facility.
- Demonstrate the design and operation of a waste-to-energy facility.
- Student able to understand about the different wastages.

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L	P	C
0	3	2

(R15A0386) MACHINE TOOLS AND METROLOGY LAB

Objectives:

- To understand the working principles of various machines viz lathe , Drilling, milling, shaping.
- Student able to learn about Mechanical parameter measuring systems.
- Student able to learn about different alignment techniques.

PART A : MACHINE TOOLS

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 of 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.

PART B : METROLOGY

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

Note: Total 10 experiments are to be conducted.

OUT COMES:

Students get exposure to

- Various job Operation on machine tools.
- To various measuring systems.
- To know about various grinding and shaping machines .

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III Year B. Tech ME - I Sem

L	P	C
0	3	2

(R15A0387) THERMAL ENGINEERING LAB

Objectives :

- Student able to learn about the valve timing and port timing diagrams.
- Student able to learn about the working principles of Two Stroke and Four Stroke engines and their performances .
- Student able to learn about different characteristics IC Engine.

LIST OF EXPERIMENT

1. I.C. Engines Valve / Port Timing Diagrams
2. I.C. Engines Performance Test for 4 Stroke SI engines
3. I.C. Engines Performance Test for 2 Stroke SI engines
4. I.C. Engines Morse, Retradation, Motoring Tests
5. I.C. Engine Heat Balance - CI/SI Engines
6. I.C. Engines Economical speed Test on a SI engine
7. I.C. Engines effect of A/F Ratio in a SI engine
8. Performance Test on Variable Compression Ratio of IC Engine
9. IC Engine Performance Test on a 4S CI Engine at constant speed
10. Volumetric efficiency of Air - Compressor Unit
11. Dis-assembly / Assembly of Engines
12. Study of Boilers

Note: Total 10 experiments are to be conducted.

OUTCOMES:

- Students get exposure to different types of engine power and efficiency calculations
- Students get exposure to study of various operating characteristics of two stroke and four stroke I.C Engines.
- Students get exposure of boilers, mountings and accessories.

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L	T/P/D	C
5	1	4

(R15A0321) MACHINE DESIGN–II

Note: Data Books Permitted (I) Design Data Book by P.S.G. College of Technology
(ii) Design Data Book by P. Mahadevan

Objectives :

- To study functional and strength design of important machine elements**,**
- To study selection of rolling element bearing and design of hydrodynamic bearing,
- To familiarize with use of design data books & various codes of practice.

UNIT–I

Bearings: Types of Journal bearings – Lubrication – Bearing Modulus – Full and partial bearings –Clearance ratio – Heat dissipation of bearings, bearing materials – journal bearing design – Ball and rollerbearings – Static loading of ball & roller bearings, Bearing life.

UNIT–II

Design of IC Engine Parts : Connecting Rod : Thrust in connecting rod – stress due to whipping action onconnecting 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–III

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–IV

Spur & Helical Gear Drives : Spur gears- Helical gears – Load concentration factor – Dynamicload factor. Surface compressive strength – Bending strength – Design analysis of spur gears – Estimationof centre distance, module and face width, check for plastic deformation. Check for dynamic and wearconsiderations.

UNIT–V

Design of Power Screws : Design of screw, Square ACME , Buttress screws, design of nut, compound screw,differential screw, ball screw- possible failures.

Machine Tool Elements : Design of beds, slide ways, spindles- material selection, design of strengthand rigidity of parts.

TEXT BOOK:

1. Machine Design, V.Bandari Tmh Publishers
2. Machine Design, S MD Jalaludin, Anuradha Publishers
3. Machine Design, Kannaiah/ Scietech.

REFERENCE BOOKS:

1. Design Data hand Book, S MD Jalaludin, Anuradha Publishers
2. Machine Design / R.N. Norton
3. Mech. Engg. Design / JE Shigley

OUTCOMES:

- Student be able to Select appropriate gears for power transmission on the basis of given load and speed.
- Select bearings for a given applications from the manufacturers catalogue, Use design data books and various standard codes of practices.
- Student know about ISO, ASME standards.

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4	1	3

(R15A0322) FINITE ELEMENT METHOD

Objectives:

- It covers the fundamental theoretical approach beginning with a review of differential equations, boundary conditions, integral forms, interpolation, parametric geometry, numerical integration, and matrix algebra.
- Next, engineering applications to field analysis, stress analysis and vibrations are introduced. Time dependent problems are also treated.
- Students are also introduced, by means of selected tutorials, to the commercial finite element system SolidWorks which is similar to one they could be expected to use upon graduation.
- Graduate students will also be introduced to the more powerful (and difficult to use) Ansys system.

UNIT–I

Introduction to Finite Element Method for solving field problems. Stress and Equilibrium. Strain – Displacement relations. Stress – strain relations. One Dimensional problems : Finite element modeling coordinates and shape functions. Potential Energy approach : Assembly of Global stiffness matrix and load vector. Finite element equations, Treatment of boundary conditions, Quadratic shape functions.

UNIT–II

Analysis of Beams : Element stiffness matrix for two node, two degrees of freedom per node beam element. Finite element modelling of two dimensional stress analysis with constant strain triangles and treatment of boundary conditions.

UNIT–III

Finite element modeling: Axisymmetric solids subjected to Axisymmetric loading with triangular elements. Two dimensional four noded isoparametric elements and numerical integration.

UNIT–IV

Steady state heat transfer analysis : one dimensional analysis of a fin and two dimensional analysis of thin plate. Analysis of a uniform shaft subjected to torsion.

UNIT-V

Dynamic Analysis : Formulation of finite element model, element matrices, evaluation of Eigen values and Eigen vectors for a stepped bar and a beam.

TEXT BOOK:

1. Introduction to Finite Elements in Engineering / Chandraputla, Ashok and Belegundu /Prentice – Hall.
2. The Finite Element Methods in Engineering / SS Rao / Pergamon.
3. The Finite Element Method for Engineers – Kenneth H. Huebner, Donald L. Dewhirst, Douglas E. Smith and Ted G. Byrom / John Wiley & sons (ASIA) Pte Ltd.

REFERENCE BOOKS:

1. An introduction to Finite Element Method / JN Reddy / Me Graw Hill
2. Finite Element Methods/ Alavala/TMH
3. Finite Element Analysis/ C.S.Krishna Murthy

OUTCOMES:

- Upon completion of the course students should be able to correlate a differential equation and its equivalent integral form.
- Understand parametric interpolation and parametric geometry enforce essential boundary conditions to a matrix system
- Graduate students to know the more powerful and difficult to use Ansys system.

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(R15A0323) HEAT TRANSFER

***Note:** Heat and Mass Transfer data books are permitted

Objective:

- The objective of this subject is to provide knowledge about Heat transfer through conduction, convection and radiation.
- Student able to learn different modes of Heat Transfer.
- Student able to learn about the dimensional analysis .

UNIT-I

Introduction: Basic modes of heat transfer- Rate equations- Generalized heat conduction equation in Cartesian, Cylindrical and Spherical coordinate systems. Steady state heat conduction solution for plain and composite slabs, cylinders and spheres- Critical thickness of insulation- Heat conduction through fins of uniform and variable cross section- Fin effectiveness and efficiency.

Unsteady state Heat Transfer conduction- Transient heat conduction- Lumped system analysis, and use of Heisler charts.

UNIT-II

Convection: Continuity, momentum and energy equations- Dimensional analysis- Boundary layer theory concepts- Free, and Forced convection- Approximate solution of the boundary layer equations- Laminar and turbulent heat transfer correlation- Momentum equation and velocity profiles in turbulent boundary layers- Application of dimensional analysis to free and forced convection problems- Empirical correlation.

UNIT-III

Radiation: Black body radiation- radiation field, Kirchoff's laws- shape factor- Stefan Boltzman equation- Heat radiation through absorbing media- Radiant heat exchange, parallel and perpendicular surfaces- Radiation shields.

UNIT-IV

Heat Exchangers: Types of heat exchangers- Parallel flow- Counter flow- Cross flow heat exchangers- Overall heat transfer coefficient- LMTD and NTU methods- Fouling in heat exchangers- Heat exchangers with phase change.

Boiling and Condensation: Different regimes of boiling- Nucleate, Transition and Film boiling. Condensation: Laminar film condensation- Nusselt's theory- Condensation on vertical flat plate and horizontal tubes- Drop wise condensation.

UNIT-V

Mass Transfer: Conservation laws and constitutive equations- Isothermal equimass, Equimolal diffusion- Fick's law of diffusion- diffusion of gases, Liquids- Mass transfer coefficient.

TEXT BOOKS:

1. Heat Transfer, by J.P.Holman, Int.Student edition, McGraw Hill Book Company.
2. Fundamentals of Heat and Mass Transfer- Incropera and Dewitt
3. Heat transfer by Sukhatme

REFERENCE BOOKS:

1. Heat and Mass Transfer- Arora and Domkundwar
2. Essential of Heat Transfer by Christopher A. Long
3. Heat transfer by Yunus A Cengel

OUTCOMES:

- Knowledge and understanding how heat and energy is transferred between the elements of a system for different configurations.
- Solve problems involving one or more modes of heat transfer**.**
- Student gets the exposure of different modes of Heat Transfer.

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L	T/P/D	C
4	0	3

(R15A0324) REFRIGERATION AND AIR CONDITIONING

Objectives:

- The objective of this subject is to provide knowledge about different cycles
- Student able to learn about refrigeration and air conditioning.
- Student able to learn about deferent air conditioning equipments.

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.

Principles of Evaporators: classification – Working Principles, Expansion devices – Types – Working Principles **Refrigerants** – Desirable properties – classification refrigerants used – Nomenclature – Ozone Depletion– Global Warming.

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

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.

Steam Jet Refrigeration System – Working Principle and Basic Components. Principle and operation of (i) Thermoelectric refrigerator (ii) Vortex tube or Hilsch tube, Pulse tube refrigeration system, Thermionic refrigeration system, Production of low temperature- Dry ice refrigeration system.

UNIT–IV

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-V

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

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 Publishers
2. A Course in Refrigeration and Air conditioning / SC Arora & Domkundwar / . Dhanpatrai Publications
3. Refrigeration and Air Conditioning / R.S. Khurmi & J.K Gupta / S.Chand – Eurasia Publishing House (P) Ltd

REFERENCE BOOKS:

1. Refrigeration and Air Conditioning/ P.L.Bellaney/Khanna Publishers
2. Basic Refrigeration and Air-Conditioning / Ananthanarayanan / TMH Publishers
3. Refrigeration and Air Conditioning / Manohar Prasad / New Age International Publ.

OUTCOMES:

- It will give learners a basic - but solid - understanding of the fundamentals of refrigeration.
- The main system types and components, the range of applications, including air conditioning and heat pumps.
- The use of controls, and the key provisions and impact of recent legislation on the sector.

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4	0	3

(R15A0325) COMPRESSIBLE FLUID FLOW
(CORE ELECTIVE–II)

Objectives:

- Students will be able to Describe assumptions, physical meaning of terms and to utilize key relationships for compressible flow, speed of sound, isentropic and non-isentropic flows, and potential and rotational flows.
- Calculate the effect of area change, shaft work, heat addition, mass addition and friction on flow states in a compressible channel flow, including effects on mass flow capacity and flow regime,
- Estimate the lift and drag for basic aerodynamic shapes in compressible, inviscid flows.

UNIT-I

Basic Concepts and Isentropic Flows : Energy and momentum equations of compressible fluid flows – Stagnation states, Mach waves and Mach cone – Effect of Mach number on compressibility – Isentropic flow through variable ducts – Nozzle and Diffusers – Use of Gas tables.

UNIT-II

Flow through Ducts: Flows through constant area ducts with heat transfer (Rayleigh flow) and Friction (Fanno flow) – variation of flow properties – Use of tables and charts – Generalised gas dynamics.

UNIT-III

Normal and Oblique Shocks : Governing equations – Variation of flow parameters across the normal and oblique shocks –– Prandtl Meyer relations – Use of table and charts – Applications.

UNIT–IV

Jet Propulsion: Theory of jet propulsion – Thrust equation – Thrust power and propulsive efficiency – Operation principle, cycle analysis and use of stagnation state performance of ram jet, turbojet, turbofan and turbo prop engines.

UNIT–V

Space Propulsion: Types of rocket engines – Propellants-feeding systems – Ignition and combustion – Theory of rocket propulsion – Performance study – Staging – Terminal and characteristic velocity – Applications – space flights.

TEXT BOOKS:

1. S.M. Yahya, fundamentals of Compressible Flow, New Age International (P) . Limited, New Delhi,1996.
2. Anderson, J.D., Modern Compressible flow, McGraw Hill, 3rd Edition, 2003.
3. H. Cohen, G.E.C. Rogers and Saravanamutto, Gas Turbine Theory, Longman . Group Ltd., 1980.

REFERENCE BOOKS:

1. V. Ganesan, Gas Turbines, Tata McGraw Hill Publishing Co., New Delhi, 1999.
2. PR.S.L. Somasundaram, Gas Dynamics and Jet Propulsions, New Age . International Publishers,1996.
3. V. Babu, Fundamentals of Gas Dynamics, ANE Books India, 2008

OUTCOMES:

- Students will be able to explain the starting behavior of supersonic diffusers and inlets.
- Characterize quantitatively the links between flow angle and pressure changes in a supersonic flow and the differences with subsonic flows.
- Student gets to exposure of different propulsion units.

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L	T/P/D	C
4	0	3

(R15A0326) COMPUTATIONAL FLUID DYNAMICS (CORE ELECTIVE – II)

Objectives:

- Study basic principles of modeling a system using software**.**
- Study grid generation and discretization methods.
- Student able to learn above difference and Finite volume methods.

UNIT-I

Governing Equations and Boundary Conditions: Basics of computational fluid dynamics – Governing equations of fluid dynamics – Continuity, Momentum and Energy equations – Chemical species transport – Physical boundary conditions – Time-averaged equations for Turbulent Flow – Turbulent–Kinetic Energy Equations – Mathematical behaviour of PDEs on CFD – Elliptic, Parabolic and Hyperbolic equations.

UNIT-II

Finite Difference and Finite Volume Methods for Diffusion: Derivation of finite difference equations – Simple Methods – General Methods for first and second order accuracy – Finite volume formulation for steady state One, Two and Three -dimensional diffusion problems – Parabolic equations – Explicit and Implicit schemes – Example problems on elliptic and parabolic equations – Use of Finite Difference and Finite Volume methods.

UNIT-II

Finite Volume Method for Convection Diffusion: Steady one-dimensional convection and diffusion – Central, upwind differencing schemes properties of discretization schemes – Conservativeness, Boundedness, Transportiveness, Hybrid, Power-law, QUICK Schemes.

UNIT-IV

Flow Field Analysis: Finite volume methods -Representation of the pressure gradient term and continuity equation – Staggered grid – Momentum equations – Pressure and Velocity corrections – Pressure Correction equation, SIMPLE algorithm and its variants – PISO Algorithms.

UNIT-V

Turbulence Models and Mesh Generation: Turbulence models, mixing length model, Two equation (k-Є) models – High and low Reynolds number models – Structured Grid generation – Unstructured Grid generation – Mesh refinement – Adaptive mesh – Software tools.

TEXT BOOKS:

1. Versteeg, H.K., and Malalasekera, W., "An Introduction to Computational Fluid . Dynamics: The finite volume Method", Pearson Education Ltd.Second Edition, 2007.
2. Ghoshdastidar, P.S., "Computer Simulation of flow and heat transfer", Tata McGraw . Hill Publishing Company Ltd., 1998.
3. Patankar, S.V. "Numerical Heat Transfer and Fluid Flow", Hemisphere Publishing Corporation,2004. AULibrary.com 99.

REFERENCE BOOKS:

1. Chung, T.J. "Computational Fluid Dynamics", Cambridge University, Press, 2002.
2. Muralidhar, K., and Sundararajan, T., "Computational Fluid Flow and Heat Transfer", Narosa Publishing House, New Delhi, 1995.
3. ProdipNiyogi, Chakrabarty, S.K., Laha, M.K. "Introduction to Computational Fluid Dynamics", Pearson Education, 2005.

OUTCOMES:

- Demonstrate & explain geometrical model of a fluid flow.
- Describe specific boundary conditions and solution parameters.
- Analyze the results and draw the appropriate inferences.

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III Year B. Tech, ME-II Sem

L	T/P/D	C
4	0	3

(R15A0327) COMPOSITE MATERIALS
(CORE ELECTIVE – II)

Objectives :

- To be familiar with classification and characteristics of composite material and their applications.
- To gain the knowledge about manufacturing methods,
- To testing and environmental issue related with composite material.

UNIT-I

Introduction, Definitions, Composites, Reinforcements and matrices, Types of reinforcements, Types of matrices, Types of composites, Carbon Fibre composites, Properties of composites in comparison with standard materials, Applications of metal, ceramic and polymer matrix composites.

UNIT-II

Manufacturing methods Hand and spray lay - up, injection molding, resin injection, filament winding, pultrusion, centrifugal casting and prepregs. Fibre/Matrix Interface, mechanical. Measurement of interface strength. Characterization of systems; carbon fibre/epoxy, glass fibre/polyester, etc.

UNIT-III

Mechanical Properties Stiffness and Strength: Geometrical aspects – volume and weight fraction. Unidirectional continuous fibre, discontinuous fibers, Short fiber systems, woven reinforcements –Mechanical Testing: Determination of stiffness and strengths of unidirectional composites; tension, compression, flexure and shear.

UNIT-V

Laminates: Plate Stiffness and Compliance, Assumptions, Strains, Stress Resultants, Plate Stiffness and Compliance, Computation of Stresses, Types of Laminates -, Symmetric Laminates, Anti-symmetric Laminate, Balanced Laminate, Quasi-isotropic Laminates, Cross-ply Laminate, Angle-ply Laminate. Orthotropic Laminate, Laminate Moduli, Hygrothermal Stresses.

UNIT-V

Joining Methods and Failure Theories: Joining –Advantages and disadvantages of adhesive and mechanically fastened joints. Typical bond strengths and test procedures.

TEXT BOOKS:

1. K.K. Chawla, (1998), Composite Materials, Springer-Verlag, New York
2. B.T. Astrom, (1997), Manufacturing of Polymer Composites, Chapman & Hall
3. Composite materials by J.N.Reddy

REFERENCE BOOKS:

1. Stuart M Lee, J. Ian Gray, Miltz, (1989), Reference Book for Composites Technology, CRC press
2. Frank L Matthews and R D Rawlings, (2006), Composite Materials: Engineering and Science, Taylor and Francis.
3. D. Hull and T.W. Clyne, (1996), Introduction to Composite Materials, Cambridge University Press

OUTCOMES :

- To provide knowledge on characteristics of composites
- To manufacturing and testing methods, mechanical behavior etc.
- To get the exposure of different materials .

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L	T/P/D	C
4	0	3

(R15A0568) APPS DESIGN AND DEVELOPMENT (OPEN ELECTIVE–IV)

Objectives:

- Knowledge of basic software engineering fundamentals and practices.
- Introducing multimedia practices and graphic fundamental.
- Knowledge of basic java programming under client/server side and data base connection.

UNIT–I

Fundamental concepts: Software Process models**:** The waterfall model, Incremental process models, Evolutionary process models, The Unified process. Multimedia and hypermedia, World Wide Web, overview of multimedia software tools, Graphics data types, file formats, color in image and video: color models in images, color in video.

UNIT–II

HTML Common tags: List, Tables, images, forms, Frames; Cascading Style sheets.

UNIT-III

Introduction to Java Scripts: Objects in Java Script, Dynamic HTML with Java Script.

UNIT-IV

Web Servers: Introduction to Servlets: Lifecycle of a Servlet, The Problem with Servelet. The Anatomy of a JSP Page, JSP Processing, Environment: Installing the Java: Software Development Kit, Tomcat Server. Using Cookies-Session Tracking, Security Issues.

UNIT-V

Database Access: Database Programming using JDBC, Studying Javax.sql.* package, Accessing a Database from a JSP Page, TESTING: Types of software testing, test cases.

TEXT BOOKS:

1. Web Programming ,Building Internet Applications, CHRIS BATES Ii Edition, Wiley Dreamtech.
2. Programming world wide web ,SEBESTA,PEARSON.
3. Java Complete Reference ,7TH EDITION ,HERBERTSCHILDT,TMH.

REFERENCE BOOKS:

1. Core Servlets And Java Servlets Pages Vol-1:Core Technologies BY MARTY HALL,LARRY BROWN PEARSON.
2. Software Engineering ,ROGERS PRESSMEN,TATA McGraw-HILL.
3. Software Testing Techniques, BORIS BEIZER,DREAMTECH,II EDITION.

OUTCOMES:

- Ability to identify the minimum requirements for the development of application.
- Ability to apply different multimedia development tools to produce web based and stand-alone user interfaces.
- Gain knowledge of client side scripting, understanding of server side scripting with java.

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III Year B. Tech, ME-II Sem

L	T/P/D	C
4	-	3

(R15A0328) PRODUCTION AND OPERATIONS MANAGEMENT (OPEN ELECTIVE-IV)

Objectives:

- To provide a comprehensive exposure to Production Planning & Control (PPC) and its significance in Industries.
- To acquaint students with various activities of PPC and to give insight into the ongoing & futuristic trends in the control of inventory.
- To appraise about need and benefits of planning functions related to products and processes.

UNIT–I

Introduction to Operations Management: Introduction to Operations Management - Role of Operations Management in total management System- Interface between the operation systems and systems of other functional areas, Process planning and process design, Production Planning and Control: Basic functions of Production Planning and Control, Production Cycle - characteristics of process technologies. Project, Job Shop, Assembly, batch and Continuous - Inter Relationship between product life cycle and process life cycle.

UNIT–II

Scheduling and control of production operations: Aggregate planning, MPS, Operations scheduling, Product sequencing: Sequencing of products in multi- product multi-stage situations - Plant Capacity and Line Balancing. Plant layout -different types of layouts. Location and the factors influencing location. Maintenance Management: Objectives – Failure Concept, Reliability, Preventive and Breakdown maintenance, Replacement policies

UNIT–III

Quality control: Standards and specifications, Quality Assurance and Quality Circles – Statistical Quality Control – Control Charts for Variables- Average, Range and S.D., Control charts for Attributes- fraction defective and number of defects, Acceptance Sampling Plans, OC Curve Work Study, various techniques in the Methods Study for identifying the most appropriate method. Work measurement - its uses and different methods, computation of allowance and allowed time.

UNIT–IV

Materials Management: Need and importance of Materials management-Materials Requirement Planning-Materials Budgeting- Techniques for prioritization of materials-Sources of Supply of Materials -selection, evaluation and Performance of suppliers-make or buy decisions and its implications under various circumstances Vendor rating - determinants of vendor rating, concept of waste management

UNIT–V

Stores Management: Objectives of Stores Management – Requirements for efficient. Management of Stores - safety stock Inventory Control - Different Systems of Inventory Control, Types of Inventory. Costs - Systems of inventory control – ABC, VED and FNSD analyses. Value Analysis – Importance in cost reduction – concepts and procedures.

TEXT BOOKS:

1. Aswathappa K. and Sridhara Bhat, "Production and Operations Management", 2010, HPH. Mahadevan. B, "Operations Management", 2010, Pearson Education.
2. Danny Samson and Prakash J.Singh, "Operations Management-An integrated . approach", 2009, 1st Ed. Cambridge press.
3. Production and Operations Management by P Rama Murthy

REFERENCE BOOKS:

1. Kanishka Bedi, "Production and Operations Management", 2007, 2nd Ed. Oxford University Press.
2. Everett. Adam, Jr. and Ronald J. Elbert, "Production and Operations Management Concepts, Models and Behaviour", 2003, Prentice Hall of India, 5th Ed.
3. Upendra Kachru, "Production and Operations Management", 2010, Excel Books.

OUTCOMES:

- The student will be able to Illustrate production planning functions and manage manufacturing functions in a better way.
- Develop competency in scheduling and sequencing in manufacturing operations and effect affordable manufacturing lead time.
- Manage and control inventory with cost effectiveness. Get conversant with various documents procedural aspects and preparation of orders for various manufacturing methods.

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L	T/P/D	C
4	-	3

(R15A0329)NANO MATERIALS
(CORE ELECTIVE–IV)

Objectives:

- To learn about basis of Nano material science.
- preparation method, types and application.
- Able to learn about different properties.

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.

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-II

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

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

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

UNIT-III

Process of synthesis of nano powders: Electro deposition, Important naon materials.

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

UNIT-IV

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

UNIT-V

Nano Medicines: Developing of Nanomedicens Nanosytems in use,Protocols for nanodrug Administration, Nanotechnology in Diagnostics applications, materials for used in Diagnostics and Therapeutic applications,

Molecular Nanomechanics, Molecular devices, Nanotribology, studying tribology at nanoscale, Nanotribology applications.

TEXT BOOKS:

1. Nano Materials- A.K.Bandyopadhyay/ New Age Publishers.
2. Nano Essentials- T.Pradeep/TMH
3. G Timp, “Nanotechnology”, AIP press/Springer, 1999.

REFERENCE BOOKS:

1. A.S. Edelstein and R.C. Cammearata, eds., “Nanomaterials: Synthesis, Properties and Applications”, Institute of Physics Publishing, Bristol and Philadelphia, 1996.
2. N John Dinardo, “Nanoscale Characterization of Surfaces & Interfaces”, 2nd Edition, Weinheim Cambridge, Wiley-VCH, 2000.
3. Akhlesh Lakhtakia,“The Hand Book of Nano Technology, Nanometer Structure, . Theory, Modeling and Simulations”. Prentice-Hall of India (P) Ltd, New Delhi, 2007.

OUTCOMES:

- Will familiarize about the science of nanomaterials
- Will demonstrate the preparation of nanomaterials
- Will develop knowledge in characteristic nanomaterial

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L	P	C
0	3	2

(R15A0388) HEAT TRANSFER LAB

Objectives :

- Student able to learn about various modes of heat transfer in Composite walls and Powders
- Learn heat exchanger principles
- Student know about different modes of heat transfer.

LIST OF EXPERIMENTS:

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. Emissive apparatus.
11. Stefan Boltzman Apparatus.
12. Critical Heat flux apparatus.
13. Study of heat pipe and its demonstration.

Note: Total 10 experiments are to be conducted.

OUTCOMES :

Students get exposure to

- Thermal Conductivity measurement, Convection measurement.
- Determination of effectiveness of heat exchangers .
- Student get the exposures of conduction and convection methods.

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III Year B. Tech, ME-II Sem

L	P	C
0	3	2

(R15A0389) CAD LAB

Objectives:

- Model the 3-D geometric information of machine components including assemblies, and automatically generate 2-D production drawings,
- understand the basic analytical fundamentals that are used to create and manipulate geometric models in a computer program.
- Improve visualization ability of machine components and assemblies before their actual fabrication through modeling, animation, shading, rendering, lighting and coloring.

LIST OF EXPERIMENTS:

1. INTRODUCTION to CAD
2. AutoCAD – BASICS
   - 2.1 Starting with AutoCAD
   - 2.2 Layout and sketching
   - 2.3 Drawing environment
   - 2.4 Elements of drawing
     - 2.4.1 Draw commands
   - 2.5. 3D functions
3. 2D – FIGURES for practice USING AutoCAD
4. ISOMETRIC DRAWING for practice USING AutoCAD
5. 3-D SOLID FIGURES USING ACAD
6. INTRODUCTION TO CREO 2.0
   - 6.1 Learning Different Operations like Threading, Sweep, Sweptblend.
   - 6.2 Modeling
   - 6.3 Assembling

Software: Autocad 2013 and CREO - 2

REFERENCE BOOK:

1. Engineering graphics with Auto CAD- R.B. Choudary/Anuradha Publishes

OUTCOMES:

- Develop knowledge in 2D-Transformations, 3D Transformations.
- Understand the Assembly Modeling,
- Assembly tree, and Assembly Methods.

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III Year B. Tech, ME-II Sem

L	T/P/D	C
2	0	0

(R15A0007) TECHNICAL COMMUNICATION AND SOFT SKILLS

Objectives:

- To improve the language proficiency of the students in English with emphasis on LSRW skills.
- To equip the students to approach academic subjects more professionally using the theoretical and practical components of the English syllabus.
- To develop the professional skills and communication skills in formal and informal situations and hone the required professional ethics.

UNIT-I

Factors affecting information and document design: Principles of effective writing , Technical Writing, Grammar and Editing- Technical writing process, Writing drafts and revising, Collaborative writing, technical writing style and language.

UNIT-II

Basics of grammar: study of advanced grammar, editing strategies to achieve appropriate technical style. Introduction to advanced technical communication.

UNIT-III

Communication and Technical Writing: Public speaking, Group discussion, Oral; presentation, Interviews, Graphic presentation, Presentation aids. Writing reports, Email writing, official notes, business letters, memos, progress reports, minutes of meetings, event report.

UNIT-IV

Self Development and Assessment: Self assessment, Awareness, Perception and Attitudes, Values and belief, Personal goal setting, career planning, self esteem.

UNIT-V

Ethics: Business ethics, , Personality Development in social and office settings, netiquettes, Telephone Etiquettes, Engineering ethics, Managing time, Role and responsibility of engineer, Work culture in jobs, Rapid reading, Complex problem solving, Creativity, leadership skills ,cubicle Etiquettes, team building.

TEXT BOOKS:

1. David F. Beer and David Mc Murrey, Guide to writing as an Engineer, John Willey. . NewYork, 2004
2. Diane Hacker, Pocket Style Manual, Bedford Publication, New York, 2003. (ISBN 0312406843)

REFERENCE BOOKS:

1. Dale Jung k, Applied Writing for Technicians, McGraw Hill, New York, 2004. (ISBN: 07828357-4)
2. Sharma, R. and Mohan, K. Business Correspondence and Report Writing, TMH New Delhi 2002.
3. Xebec, Presentation Book, TMH New Delhi, 2000. (ISBN 0402213)

OUTCOMES:

- The student will become proficient in LSRW skills.
- They develop formal LSRW skills approach to different situations.
- They hone professional ethics and learn to be proficient formally

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IV Year B. Tech, ME-I Sem

L	T/P/D	C
5	1	4

(R15A0330)OPERATIONS RESEARCH

Objectives:

- To familiarize the students with the use of practice oriented mathematical applications for optimization functions in an organization.
- To familiarize the students with various tools of optimization, probability, statistics and simulation,
- To applicable in particular scenarios in industry for better management of various resources.

UNIT–I

Introduction : Development – Definition– Characteristics and Phases – Types of models – operation Research models– applications.

Allocation : Linear Programming Problem Formulation – Graphical solution – Simplex method –Artificial variables techniques -Two–phase method, Big-M method – Duality Principle.

UNIT–II

Transportation Problem – Formulation – Optimal solution, unbalanced transportation problem –Degeneracy. Assignment problem – Formulation – Optimal solution - Variants of Assignment Problem-Traveling Salesman problem.

Sequencing – Introduction – Flow **–**Shop sequencing – n jobs through two machines – n jobs through three machines – Job shop sequencing – two jobs through 'm' machines.

UNIT–III

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

Theory of Games: Introduction – Minimax (maximin) – Criterion and optimal strategy – Solution of games with saddle points – Rectangular games without saddle points – 2 X 2 games – dominance principle – m X 2 & 2 X n games -graphical method.

UNIT–IV

Waiting Lines: Introduction – Single Channel – Poisson arrivals – exponential service times – with infinite population and finite population models– Multichannel – Poisson arrivals – exponential service times with infinite population single channel Poisson arrivals.

Inventory: Introduction – Single item – Deterministic models – Purchase inventory models with one price break and multiple price breaks – shortages are not allowed – Stochastic models – demand may be discrete variable or continuous variable – Instantaneous production. Instantaneous demand and continuous demand and no set up cost.

UNIT–V

Dynamic Programming: Introduction – Bellman's Principle of optimality – Applications of dynamic programming- capital budgeting problem – shortest path problem – linear programming problem.

Simulation: Definition – Types of simulation models – phases of simulation– applications of simulation – Inventory and Queuing problems – Advantages and Disadvantages – Simulation Languages.

TEXT BOOK :

1. Operations Research / S.D.Sharma-Kedarnath
2. Introduction to O.R/Hiller & Libermann (TMH).
3. Introduction to O.R /Taha/PHI

REFERENCE BOOKS:

1. Operations Research /A.M.Natarajan,P.Balasubramani,A. Tamilarasi/Pearson . Education.
2. Operations Research / R.Pannerselvam,PHI Publications.
3. Operation Research /J.K.Sharma/MacMilan.

OUTCOMES:

- Student will be able to Illustrate the need to optimally utilize the resources in various types of industries.
- Apply and analyze mathematical optimization functions to various applications.
- Demonstrate cost effective strategies in various applications in industry.

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L	T/P/D	C
5	1	4

(R15A0331) CAD/CAM

Objectives:

- The student able to know about the CAD/CAM software.
- computer graphics, drafting, numerical control, group technology.
- CIM and computer aided quality controls

UNIT–I

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

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

UNIT–II

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

UNIT–III

Drafting and Modeling systems: Basic geometric commands, layers, display control commands, editing, dimensioning, solid modeling.

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

UNIT–IV

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

UNIT–V

Computer Aided Quality Control: Terminology in quality control, the computer in QC, contact inspection methods, noncontact inspection methods-optical, noncontact inspection methods-nonoptical, computer aided testing, integration of CAQC with CAD/CAM.

Computer integrated manufacturing systems: Types of Manufacturing systems, Machine tools and related equipment, material handling systems, computer control systems, human labor in the manufacturing systems, CIMS benefits.

TEXT BOOKS:

1. CAD / CAM Theory and Practice / Ibrahim Zeid / TMH Publishers
2. CAD / CAM /A Zimmers & P.Groover/PE/PHI Publishers
3. Automation, Production systems & Computer integrated Manufacturing/ Groover/ Pearson Education

REFERENCE BOOKS:

1. CAD / CAM / CIM / Radhakrishnan and Subramanian / New Age Publishers
2. Principles of Computer Aided Design and Manufacturing / Farid Amirouche / Pearson Edu
3. CAD/CAM: Concepts and Applications/Alavala/ PHI Publishers Computer Numerical Control Concepts and programming / Warren S Seames / Thomson Publishers

OUTCOMES:

- The learning outcomes are assessed through the assignment and various practical performed modeling, drafting.
- computer aided quality control and computer integrated manufacturing systems.
- Know about different CIM Techniques.

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IV Year B. Tech, ME-I Sem

L	T/P/D	C
4	0	3

(R15A0332) MECHANICAL MEASUREMENTS AND CONTROL SYSTEMS

Objectives:

- To impart knowledge of architecture of the measurement system**.**
- To deliver working principle of mechanical measurement system.
- To study concept of mathematical modeling of the control system**.** To analyse control system under different time domain

UNIT –I

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

Measurement of Displacement: Theory and construction of various transducers to measure displacement – Piezo electric, Inductive, capacitance, resistance, ionization and Photo electric transducers, Calibration procedures.

UNIT –II

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

Measurement of Pressure: Units – classification – different principles used. Manometers, Piston, Bourdon pressure gauges, Bellows – Diaphragm gauges. Low pressure measurement – Thermal conductivity gauges – ionization pressure gauges, Mcleod pressure gauge.

Measurement of Level: Direct method – Indirect methods – capacitative, ultrasonic, magnetic, cryogenic fuel level indicators – Bubler level indicators.

UNIT –III

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

Measurement of Speed: Mechanical Tachometers – Electrical tachometers – Stroboscope, Noncontact type of tachometer

Measurement of Acceleration and Vibration: Different simple instruments – Principles of Seismic instruments – Vibrometer and accelerometer using this principle.

UNIT –IV

Stress Strain Measurements: Various types of stress and strain measurements – electrical strain gauge – gauge factor – method of usage of resistance strain gauge for bending compressive and tensile strains – usage for measuring torque, Strain gauge Rosettes.

Measurement of Humidity – Moisture content of gases, sling psychrometer, Absorption psychrometer, Dew point meter.

UNIT –V

Measurement of Force, Torque And Power- Elastic force meters, load cells, Torsion meters, Dynamometers.

Elements of Control Systems: Introduction, Importance – Classification – Open and closed systems Servomechanisms– Examples with block diagrams–Temperature, speed & position control systems.

TEXT BOOKS:

1. Mechanical Measurements / Beck With, Marangoni, Linehar/ PHI Publisher
2. Measurement Systems: Applications & design / D.S Kumar/McGraw Hill Publishers
3. Mechanical Measurements /sahani/McGraw Hill Publishers

REFERENCE BOOKS:

1. Experimental Methods for Engineers / Holman/ McGraw-Hill Education
2. Mechanical and Industrial Measurements / R.K. Jain/ Khanna Publishers.
3. Instrumentation & mech. Measurements / A.K. Tayal / Galgotia Publications

OUTCOMES:

- Learner should be able to Identify and select proper measuring instrument for specific application Illustrate working principle of measuring instruments**.**
- Explain calibration methodology and error analysis related to measuring instruments
- Mathematically model and analyze.

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(R15A0333) AUTOMOBILE ENGINEERING

Objectives:

- The objective of this subject is to provide knowledge about various systems involved in automobile engine.
- Able to learn about different components of IC Engines.
- Different automobile engine systems line diagrams.

UNIT –I

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

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 –II

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 –III

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.

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 –IV

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 –V

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.

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

TEXT BOOKS:

1. Automobile Engineering / William Crouse/TMH Education.
2. Automobile Engineering / Gupta, Vol – 2/Standard Publications.
3. Automotive Mechanics / Vol. 1 & Vol. 2 / Kripal Sing/Standard Publishers.

REFERENCE BOOKS:

1. Automotive Mechanics / G.B.S. Narang/Khanna Publishers.
2. Automotive Engines / Srinivasan/ Tata McGraw-Hill Education.
3. Automobile Engineering /K.K. Ramalingam / Scitech Publications (India) PVT. LTD.

OUTCOMES:

- The Automotive Engineering program aims to provide practice-oriented education based on the latest scientific results and methods.
- Which enable students to work independently as automotive engineers .
- Enables to face increasing challenges and standards of global markets.

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4	0	3

(R15A0334) POWER PLANT ENGINEERING
(CORE ELECTIVE–III)

Objectives:

- To create awareness about working and availability of product/system as and when required and
- working to its fullest capacity & efficiency to the satisfaction of the end user.
- Able learn about different power plants .

UNIT–I

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

Steam Power Plant: Plant Layout, Working of different Circuits, Fuel and handling equipments, types of coals, coal handling, choice of handling equipment, coal storage, Ash handling systems.

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

UNIT –II

Internal Combustion Engine Plant: DIESEL POWER PLANT: Introduction – IC Engines, types, construction– Plant layout with auxiliaries – fuel supply system, air starting equipment, lubrication and cooling system – super charging.

Gas Turbine Plant: Introduction – classification - construction – Layout with auxiliaries – Principles of working of closed and open cycle gas turbines. Combined Cycle Power Plants and comparision.

UNIT –III

Hydro Electric Power Plant: Water power – Hydrological cycle / flow measurement – drainage area characteristics – Hydrographs – storage and Pondage – classification of dams and spill ways.

Hydro Projects and Plant: Classification – Typical layouts – plant auxiliaries – plant operation pumped storage plants.

Power From Non-Conventional Sources: Utilization of Solar- Collectors- Principle of Working, Wind Energy – types – HAWT, VAWT -Tidal Energy**.**

Direct Energy Conversion: Solar energy, Fuel cells, Thermo electric and Thermo ionic, MHD generation.

UNIT –IV

Nuclear Power Station: Nuclear fuel – breeding and fertile materials – Nuclear reactor – reactor operation.

Types of Reactors: Pressurized water reactor, Boiling water reactor, sodium-graphite reactor, fast Breeder Reactor, Homogeneous Reactor, Gas cooled Reactor, Radiation hazards and shielding – radioactive waste disposal.

UNIT –V

Power Plant Economics and Environmental Considerations: Capital cost, investment of fixed charges, operating costs, general arrangement of power distribution, Load curves, load duration curve. Definitions of connected load, Maximum demand, demand factor, average load, load factor, diversity factor – related exercises. Effluents from power plants and Impact on environment – pollutants and pollution standards – Methods of Pollution control.

TEXT BOOK:

1. A Course in Power Plant Engineering: / Arora and S. Domkundwar/ Dhanpat Rai Publisher
2. Power Plant Engineering / P.C.Sharma / S.K.Kataria Publisher
3. A Text Book of Power Plant Engineering / Rajput / Laxmi Publications

REFERENCE BOOKS:

1. Power Plant Engineering/ P.K.Nag II Edition /TMH Publishers
2. An Introduction to Power Plant Technology / G.D. Rai/Khanna Publishers
3. Power plant Engg /Elanchezhian/I.K. International Publishers

OUTCOMES:

- Students learn about the failures, maintainability and availability of the intended products/systems and services
- Students get the exposure of different pollution standards .
- Students get the exposure of different power distribution techniques.

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L	T/P/D	C
4	0	3

(R15A0335) JET PROPULSION AND ROCKET ENGINEERING (CORE ELECTIVE – III)

Objectives:

- List and explain the characteristics and performance of aerospace propulsion systems.
- Model newly-conceived rocket or air breathing propulsion systems and estimate their performance and behavior.
- Carry out preliminary designs of rocket or air breathing propulsion systems to meet specified requirements

UNIT-I:

Introduction : Ramjet engine, pulse jet engine, turboprop engine, turbojet engine, thrust and thrust equation, specific thrust of turbojet engine, specific thrust of the turbojet engine, efficiencies, parameters effecting the flight performance, thrust augmentation. Duct jet propulsion, rocket propulsion, chemical rocket propulsion, nuclear rocket engines, electric rocket propulsion, applications of rocket propulsion-space launch vehicles, spacecraft, missiles and other applications.

UNIT-II :

Liquid propellant rocket engines: propellants, propellant feed systems, gas feed systems, propellant tanks, tank pressurization, turbo pump feed system and engine cycles, flow and pressure balance, valves and pipe lines, engine support structure. Liquid Propellant properties, liquid oxidizers, liquid fuels liquid monopropellants, gelled propellants, combustion process, analysis, combustion instability.

UNIT-III :

Solid propellant rocket engines : propellant burning rate, basic performance relations, propellant grain and grain configuration, propellant grain stress and strain, attitude control. Motor case – metal cases, wound –filament –reinforced plastic cases, nozzles- classification, design and construction, heat absorption and nozzle materials, rocket motor design approach.

UNIT-IV

Solid propellants: classification, propellant characteristics, propellant ingredients, smokeless propellant, igniter propellants, physical and chemical processes, ignition process, extinction or thrust termination, combustion instability.

UNIT-V

Hybrid propellant rockets: applications and propellants, performance analysis and grain configuration, combustion instability. Rocket propulsion systems - selection process, criteria for selection, interfaces.

TEXT BOOKS:

1. V Ganesan, “Gas Turbines”, Tata McGraw-Hill, 2 nd Edition, 2003.
2. Sutton P and Oscar Biblaz,” Rocket Propulsion Elements”, Wiley India Pvt.Ltd. 2010.
3. Rocket propulsion elements/Sutton/John Wiley & Sons/8th Edition

REFERENCE BOOKS:

1. Khajuria and Dubey, “Gas Turbines & Propulsive System”, DhanpatRai Publications, 2012.
2. Hill and Peterson, “Mechanics and Dynamics of Propulsion”, 2 nd Edition, Prentice Hall,
3. Rocket propulsion/Bevere/

OUTCOMES :

- Explain the different features and capabilities of chemical and non-chemical rocket propulsion systems. Calculate the specific impulse and mass flow for a rocket engine with the fluid considered as an ideal gas with constant specific heats.
- Estimate the specific impulse and mass flow for a rocket engine accounting for chemical reaction and non-constant specific heats.
- Explain the causes of, and estimate, the stress on rocket casings, turbo machine blades, and blade disks in turbomachines. Estimate the heat transfer rates in rocket nozzles and in aeroengine turbine components.

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IV Year B. Tech, ME-I Sem

L	T/P/D	C
4	0	3

(R15A0336)CNC TECHNOLOGY
(CORE ELECTIVE–III)

Objectives:

- The student will be able to know about the Numerical control machines,
- Able to learn programming, CNC and DNC systems and Adaptive control .
- Able to learn different NC and CNC machines.

UNIT-I

Features of NC Machines: Fundamentals of Numerical Control, advantages of NC systems, classifications of NC systems, point to point, NC and CNC, incremental and absolute, open and closed loop systems, Features of N/C Machine Tools, Design consideration of NC machine tool, methods of improving machine accuracy.

NC Part Programming: Manual Programming- Basic concepts, point to point counter programming canned cycles, parametric programming.

UNIT-II

CNC Machine Elements: Machine Structure- Guide ways- feed drives-spindles- spindle bearings – measuring systems-Tool monitoring systems.

Tooling for CNC Machines: Interchangeable tooling system, preset and qualified tools, coolant fed tooling systems, modular fixturing, quick change tooling system, automatic head changers.

UNTI-III

Compute-Aided Programming: General information, APT programming Examples Apt programming problems (2D machining only) NC programming on CAD/CAM Systems, the design and implementation of post processors Introduction to CAD/CAM Software, Automatic Tool path generation

UNIT-IV

DNC Systems and Adaptive control: Introduction type of DNC systems, advantages and disadvantages of DNC, adaptive control with optimization, Adaptive control with constraints, Adaptive control of machining process like turning, grinding.

UNIT-V

Micro Controllers: Introduction, Hardware components, I/O pins, ports external memory, counters, timers and serial data I/O INTERRUPTS. Selection of Micro Controllers, Embedded Controllers, Applications and Programming of Micro Controllers.

Programming Logic Controllers (PLC'S): Introduction, Hardware components of PLC, system, basic structure principles of operations, programming mnemonics timers, Internal relays and counters, Applications of PLC'S in CNCMachines.

TEXT BOOKS:

1. Computer Control of Manufacturing systems / Yoram Koren / Mc Graw Hill . Publishers
2. CAD/CAM- /Michel P.Groover / TMH Publishers
3. Computer Numerical Control: Concepts and Programming by Warren S. Seames

REFERENCE BOOKS:

1. Machining Tools Hand Book / Vol 3, (Automation and Control)/ Manfred Week/ . John Wiley and Sons, 1984.
2. Mechatronics / HMT Publishers.
3. Production Technology / HMT Publishers.

OUTCOMES:

- Learner should be know the specific applications of NC,CNC,DNC Microcontrollers, and PLC's in detailed.
- Learner should be know the different circuit diagrams.
- Learn should know about different micro controllers.

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L	T/P/D	C
4	0	3

(R15A0337)MODERN MACHINING PROCESSES
(CORE ELECTIVE–IV)

Objectives:

- Student get the knowledge about various modern machining methods like Ultrasonic Machining, Abrasive Machining, Water- jet Machining,
- Plasma Machining, Laser Beam Machining and Chemical Machining.
- Student able to know about different Electro Chemical Processes .

UNIT–I

Introduction: Need for non-traditional machining methods-Classification of modern machining processes – considerations in process selection - Materials - Applications.

Ultrasonic machining – Elements of the process, mechanics of metal removal process parameters, economic considerations, applications and limitations, recent development.

UNIT–II

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

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

UNIT-III

Thermal Metal Removal Processes : General Principle and applications of Electric Discharge Machining, Electric Discharge Grinding and electric discharge wire cutting processes – Power circuits for EDM, Mechanics of metal removal in EDM, Process parameters, selection of tool electrode and dielectric fluids, methods surface finish and machining accuracy, characteristics of spark eroded surface and machine tool selection. Wire EDM, principle, applications.

UNIT–IV

Generation and control of electron beam for machining: Theory of electron beam machining, comparison of thermal and non-thermal processes –General Principle and application of laser beam machining – thermal features, cutting speed and accuracy of cut.

UNIT-V

Plasma Machining : Application of plasma for machining, metal removal mechanism, process parameters, accuracy and surface finish and other applications of plasma in manufacturing industries. Chemical machining-principle- maskants –etchants-applications.

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

TEXT BOOKS:

1. Advanced machining processes/ VK Jain/ Allied publishers.
2. Unconventional machining process / P. K. Mishra / Standard Publishers
3. Modern Machining process by Yaron Korien

REFERENCE BOOKS:

1. Modern Machining Process / Pandey P.C. and Shah H.S./ TMH Publishers
2. New Technology / Bhattacharya A/ The Institution of Engineers/ India 1984.
3. Modern Production and Operations Management / Baffa & Rakesh Sarin/ John Wiley & Sons

OUTCOMES:

- Students will understand the principle of operation of the non-conventional machining techniques (eg :Electro discharge machining (EDM), wire erosion, Ultrasonic Machining, Etching of Electronic printed circuit boards (PCBs), Laser-beam Machining, Plasma-jet Machining),
- specification of components for Non-conventional Machining techniques and Tooling requirements.
- Tooling and ancillary equipment needed to perform non-conventional machining processes.

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L	T/P/D	C
4	0	3

(R15A0338) ROBOTICS
(CORE ELECTIVE–IV)

Objectives:

- The objective of this subject is to provide knowledge of automation of Industries.
- To know about design of robot arm, kinematics and dynamics.
- To know about Trajectory planning of robot and its applications.

UNIT–I

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

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

UNIT–II

Motion Analysis: Homogeneous transformations as applicable to rotation and translation – problems.

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

UNIT–III

Differential transformation and manipulators : Jacobians – problems.Dynamics: Lagrange – Euler and Newton – Euler formations – Problems.

Trajectory planning and avoidance of obstacles, path planning, Skew motion, joint integrated motion – straight line motion – Robot programming, languages and software packages.

UNIT-IV

Robot actuators and Feedback components: Actuators: Pneumatic, Hydraulic actuators, electric & stepper motors. Feedback components: position sensors – potentiometers, resolvers, encoders – Velocity sensors.

UNIT-V

Robot Application in Manufacturing: Material Transfer - Material handling, loading and unloading- `Processing - spot and continuous arc welding & spray painting - Assembly and Inspection.

TEXT BOOKS:

1. Industrial Robotics / Groover M P /Pearson Edu.
2. Robotics and Control / Mittal R K & Nagrath I J / TMH.
3. Robotic Engineering / Richard D. Klafter, Prentice Hall

REFERENCE BOOKS:

1. Robotics / Fu K S/ McGraw Hill.
2. An Introduction to Robot Technology, / P. Coiffet and M. Chaironze / Kogam Page Ltd. 1983 London.
3. Introduction to Robotics / John J Craig / Pearson Edu.

OUTCOMES:

After Completion of this course students will be able to

- Classify robots based on joints and arm configurations.
- Design application specific End Effectors for robots.
- Compute forward and inverse kinematics of robots and determine trajectory plan.

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L	T/P/D	C
4	0	3

(R15A0339)MECHANICAL VIBRATIONS
(CORE ELECTIVE–IV)

Objectives:

- Fully understand and appreciate the importance of vibrations in mechanical design of machine parts
- Operate in different vibratory conditions**.**
- To know about different degrees of freedom.

UNIT- I

Single degree of freedom systems : Undamped and damped free vibrations; forced vibrations coulomb damping; Response to excitation; rotating unbalance and support excitation; vibration isolation and transmissibility- Response to Non Periodic Excitations: unit impulse, unit step and unit Ramp functions; response to arbitrary excitations, The Convolution Integral; shock spectrum; System response by the Laplace Transformation method.

UNIT-II

Two degree freedom systems: Principal modes- undamped and damped free and forced vibrations; undamped vibration absorbers.

UNIT-III

Multi degree freedom systems: Matrix formulation, stiffness and flexibility influence coefficients; Eigen value problem; normal modes and their properties; Free and forced vibration by Modal analysis; Method of matrix inversion; Torsional vibrations of multi- rotor systems and geared systems; Discrete- Time systems.

UNIT-IV

Vibration measuring instruments: Vibrometers, velocity meters & accelerometers.

UNIT-V

Numerical methods: Raleigh's stodola's, Matrix iteration, Rayleigh- Ritz Method and Holzer's methods.

TEXT BOOKS:

1. Mechanical Vibrations/Groover/Nem Chand and Bros
2. Elements of Vibration Analysis by Meirovitch, TMH, 2001
3. Mechanical Vibrations/Schaum Series/ McGraw Hill

REFERENCE BOOKS:

1. Mechanical Vibrations / SS Rao/ Pearson/ 2009, Ed 4,
2. Vibration problems in Engineering / S.P. Timoshenko.
3. Theory and Practice of Mechanical Vibrations/JS Rao & K. Gupta/New Age Intl. Publishers/Revised 2nd Edition.

OUTCOMES:

- Ability to analyze the mechanical model of a linear vibratory system
- To get the exposure of its response.
- Know about different Vibrometers.

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IV Year B. Tech ME - I Sem

L	P	C
0	3	2

(R15A0390) COMPUTER AIDED DESIGN AND COMPUTER AIDED MANUFACTURING LAB

Objectives:

The students will learn to:

- Explain basic concepts of CIM systems
- Develop machining programs for CNC equipment
- Develop PLC-based control systems for manufacturing cells

LIST OF EXPERIMENTS:

1) Determination of deflection and stresses in 2D and 3D trusses and beams.
2) Determination of deflections component and principal and Von-mises stresses in . plane stress, plane strain and Axisymmetric components.
3) Determination of stresses in 3D and shell structures (at least one example in each . case)
4) Estimation of natural frequencies and mode shapes, Harmonic response of 2D beam.
5) Steady state heat transfer Analysis of plane and Axisymmetric components.
6) Development of process sheets for various components based on tooling Machines.
7) Development of manufacturing and tool management systems.
8) Study of various post processors used in NC Machines.
9) Development of NC code for free form and sculptured surfaces using CAM packages.
10) Machining of simple components on NC lathe by transferring NC Code / from a CAM package.

Any Three Software Packages from the following:

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

Open source Softwares :

MAT LAB, NASTRON, HYPERMESH, PATRAN

OUTCOMES:

This course primarily contributes to Mechanical Engineering program outcomes:

- An ability to apply knowledge of mathematics, science, and engineering
- An ability to design a system, component, or process to meet desired needs within realistic constraints.
- Economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

IV Year B. Tech ME - I Sem

L	P	C
0	3	2

(R15A0391) MECHANICAL MEASUREMENTS AND CONTROL SYSTEMS LAB / PRODUCTION DRAWING PRACTICE LAB

Objectives:

- To prepare the students have successful career in industry and motivate for higher education.
- To provide strong foundation in basic science and mathematics necessary to formulate, solve and
- analyze Control and Instrumentation problems
- To provide strong foundation in circuit theory, control theory and signal processing concepts.
- To provide good knowledge of Instrumentation systems and their applications.
- To provide knowledge of advanced control theory and its applications to engineering problems.
- Student able to learn about representation of materials, fits and estimation of limits , tolerances

MECHANICAL MEASUREMENTS AND CONTROL SYSTEMS LAB

LIST OF EXPERIMENTS:

1. Calibration of Pressure Gauges
2. Study and calibration of LVDT transducer for displacement measurement.
3. Calibration of strain gauge for temperature measurement.
4. Calibration of thermocouple for temperature measurement.
5. Calibration of capacitive transducer for angular displacement.
6. Study and calibration of photo and magnetic speed pickups for the measurement of speed.
7. Study and calibration of Mcleod gauge for low pressure.
8. Study and use of a seismic pickup for the measurement of vibration amplitude of an engine bed at various loads.

PRODUCTION DRAWING PRACTICE LAB

a) Production Drawing Practice

UNIT-I

Conventional representation of Materials – conventional representation of parts – screw joints, welded joints, springs, gears, electrical, hydraulic and pneumatic circuits – methods of indicating notes on drawings.

UNIT-II

Limits and Fits: Types of fits, exercises involving selection/interpretation of fits and estimation of limits from tables.

UNIT-III

Form and Positional Tolerances: Introduction and indication of the tolerances of from and position on drawings, deformation of runout and total runout and their indication.

UNIT-IV

Surface roughness and its indication: Definitions – finishes obtainable from various manufacturing processes, recommended surface roughness on mechanical components.

UNIT-V

Detailed and Part drawings: Drawing of parts from assembly drawings with indications of size, tolerances, roughness, form and position errors etc.

Heat treatment and surface treatment symbols used on drawings.

TEXT BOOKS:

1. Production and Drawing – K.L. Narayana & P. Kannaiah/New Age
2. Machine Drawing with Auto CAD – Pohit and Ghosh.PE

REFERENCE BOOKS:

1. Geometric dimensioning and tolerancing- James D. Meadows/B.S Publications.
2. Engineering Metrology,R.K. Jain, Khanna Publications

OUTCOMES:

- Ability to understand and apply differential equations, integrals, matrix theory, probability theory and Laplace, Fourier and Z transformations for engineering problems
- Ability to understand and apply basic science, circuit theory, control theory signal processing and apply them to engineering problems.
- Ability to model and analyze transducers.
- Ability to understand and analyze Instrumentation systems and their applications to various industries.
- Student get expourse of limits, fits, tolerences and different symbols used in drawing practice.

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L	T/P/D	C
5	1	4

(R15A0340) PRODUCTION PLANNING AND CONTROL (CORE ELECTIVE – V)

Objectives:

- The objective of this subject is to provide knowledge of Planning and control of Industry.
- Able learn about different forecasting techniques.
- Able learn about Inventory Management.

UNIT –I

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

UNIT –II

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

UNIT –III

Inventory management: Functions of inventories – relevant inventory costs – ABC analysis – VED analysis – EOQ model – Inventory control systems – P–Systems and Q-Systems, Introduction to MRP & ERP, LOB (Line of Balance), JIT inventory, and Japanese concepts.

UNIT –IV

Routing : Definition –Routing procedure –Route sheets – Bill of material – Factors affecting routing procedure. Schedule –definition – Difference with loading, Scheduling Policies – Techniques, Standard scheduling methods,

UNIT –V

Line Balancing: Aggregate planning, Chase planning, Expediting, controlling aspects. Dispatching – Activities of dispatcher – Dispatching procedure – follow-up – definition – Reason for existence of functions – types of follow-up, applications of computer in production planning and control.

TEXT BOOKS:

1. Elements of Production Planning and Control / Samuel Eilon / Macmillan Publishers
2. Modern Production and operation managements / Baffa & Rakesh Sarin / John Wiley Publishers
3. Operations Management / Joseph Monks / McGraw-Hill Ryerson Publishers

REFERENCE BOOKS:

1. Operations Management / S.N. Chary/ TMH Publishers
2. Reliability Engineering & Quality Engineering / Dr. C. Nadha Muni Reddy and Dr. K.Vijaya Kumar Reddy / Galgotia Publications, Pvt., Limited.
3. Production Control A Quantitative Approach / John E. Biegel/ Prentice-Hall

OUTCOMES:

- Student should be able to understand the co-ordination between Production, Planning and control systems in manufacturing.
- Student should know about line balancing.
- Student should know about routing and scheduling.

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IV Year B. Tech, ME-II Sem

L	T/P/D	C
5	1	4

(R15A0341)MAINTANANCE AND SAFETY ENGINEERING (CORE ELECTIVE–V)

Objectives:

- To ensure the desired plant availability at an optimum cost within the safety prescription.
- Student able to know about the objectives of maintenance .
- To minimize the total cost of unavailability and resources.

UNIT-I

Introduction to the Development of Industrial Safety and Management: History and development of Industrial safety: Implementation of factories act, Formation of various councils, Safety and productivity, Safety organizations. Safety committees, safety committee structure, Roll of management and roll of Govt. in industrial safety, Safety analysis.

UNIT-II

Accident Preventions, Protective Equipments and the Acts: Personal protective equipment, Survey the plant for locations and hazards, Part of body to be protected, Education and training in safety, Prevention causes and cost of accident, Housekeeping, First aid, Fire fighting equipment, Accident reporting, Investigations, Industrial psychology in accident prevention, Safety trials.

UNIT-III

Safety Acts: Features of Factory Act, Introduction of Explosive Act, Boiler Act, ESI Act, Workman's compensation Act, Industrial hygiene, Occupational safety, Diseases prevention, Ergonomics, Occupational diseases, stress, fatigue, health, safety and the physical environment, Engineering methods of controlling chemical hazards, safety and the physical environment, Control of industrial noise and protection against it, Code and regulations for worker safety and health.

UNIT-IV

Principles and Practices of Maintenance Planning: Basic Principles of maintenance planning – Objectives and principles of planned maintenance activity – Importance and benefits of sound Maintenance systems – Reliability and machine availability, Equipment Life cycle, Measures for Maintenance Performance: Equipments breakdowns, Mean Time Between Failures, Mean Time To Repair, Factors of availability, Maintenance organization, Maintenance economics.

UNIT-V

Maintenance Policies and Preventive Maintenance:

Maintenance categories – Comparative merits of each category – Preventive maintenance, Maintenance schedules: Repair cycle, Principles and methods of lubrication, Fault Tree Analysis, Total Productive Maintenance: Methodology and Implementation,

TEXT BOOKS:

1) Industrial Maintenance Management Srivastava, S.K. - S. Chand and Co.
2) Occupational Safety Management and Engineering Willie Hammer - Prentice Hall
3) Installation, Servicing and Maintenance Bhattacharya, S.N. - S. Chand and Co.

REFERENCE BOOKS:

1) Occupational Safety Management and Engineering Willie Hammer - Prentice Hall
2) Reliability, Maintenance and Safety Engineering by Dr. A. K. Gupta
3) A Textbook of Reliability and Maintenance Engineering by Alakesh Manna.

OUTCOMES:

- Assemble, dismantle and align mechanisms in sequential order.
- Carry out plant maintenance using tri-bology, corrosion and preventive maintenance.
- Student gets the exposure of Maintenance Policies and Preventive Maintenance

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IV Year B. Tech, ME-II Sem

L	T/P/D	C
5	1	4

(R15A0342)MATERIAL HANDLING SYSTEMS (CORE ELECTIVE–V)

Objectives:

- To provide knowledge of Layout planning and different material handling equipments.
- To provide knowledge of Flexible hoisting appliances.
- To provide knowledge of Load handling attachments and Arresting gear.

UNIT–I

Introduction : Types of intraplant transporting facility, principal groups of material handling equipments, choice of material handling equipment, hoisting equipment, screw type, hydraulic and pneumatic conveyors, general characteristics of hoisting machines, surface and overhead equipments, general characteristics of surface and overhead equipments and their applications. Introduction to control of hoisting equipments.

UNIT–II

Flexible hoisting appliances: Ropes and chains, welded load chains, roller chains, selection of chains hemp rope and steel wire rope, selection of ropes, fastening of chains and ropes , different types of load suspension appliances, fixed and movable pulleys, different types of pulleysystems, multiple pulley systems . Chain and rope sheaves and sprockets.

UNIT–III

Load handling attachments: Standard forged hook, hook weights, hook bearings, cross piece and casing of hook, crane grab for unit and piece loads, carrier beams and clamps, load platforms and side dump buckets, electric lifting magnets, grabbing attachments for loose materials, crane attachments for handling liquid materials.

UNIT–IV

Arresting gear: Ratchet type arresting gear, roller ratchet, shoe brakes and its different types like electromagnetic, double shoe type, thruster operated, controller brakes, shoe brakes, thermal calculations of shoe brakes and life of linings, safety handles, load operated constant force and variable force brakes general theory of band brakes, its types and construction.

UNIT–V

Methods to minimize cost of material handling-Maintenance of Material Handling Equipments, Safety in handling Ergonomics of Material Handling equipment. Design, Miscellaneous equipments.

TEXT BOOK

1. Materials Handling Equipment – N. Rudenko , Envee Publishers , New Delhi
2. Materials Handling Equipment – M.P. Alexandrov. Mie publicat ions, Masko
3. Introduction to Materials Handling Ray, Siddhartha

REFERENCE BOOKS:

1. Material Handling HDBK (Mcgraw-Hill Handbooks) by David E. Mulcahy
2. Materials Handling Equipment by Nikola Ƒeodos'evich Rudenko, Nikolaĭ Feodos'evich Rudenko.
3. Materials Management By P GOPALAKRISHNAN, M SUNDARESAN

OUTCOMES:

- The students shall be able to know different handling equipment in manufacturing industry at different stages.
- Student gets the exposure of Methods to minimize cost of material handling.
- Student gets the exposure of Chain and rope sheaves and sprockets.

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L	T/P/D	C
5	1	4

(R15A0343)MANUFACTURING MANAGEMENT
(OPEN ELECTIVE–VI)

Objectives:

- To plan production facilities in the best possible manner along with the proper systematic planning of production activities.
- Providing men, machines, materials etc. of right quality, quantity and also providing them at the right time forms a very important factor.
- Able to learn about different Forecasting Methods.

UNIT-I

Manufacturing Systems Designs: Definition, Systems, Subsystems, Systems Approach Fundamentals, Systems Approach for designing, Manufacturing Systems, Systematic Layout Planning (SLP),Computerized Plant Layout- CRAFT, ALDEP, CORELAP, Assembly Line balancing, Problems and solutions of assembly lines, Group Technology & Cellular Systems, Classification & Grouping, overview of FMS. Strategic consideration for comparison of various systems.

UNIT-II

Manufacturing Systems Economics: Concept of time value of money, Preparation of time profile of project, Single payment, Equal Series payment, various machine and project selection & evaluation techniques: Payback period, Present worth, Equivalent annual cost, Cost- benefit ratio, Evaluation for both equal & unequal life. Depreciation concept, various methods-straight line, declining balance, Sum of the digits, Sinking fund.

UNIT-III

New Product Development (NPD): Product Development, Customer Need, Strategies for New Product Development, Product life cycle, Product status. PUGH total Design approach, PAHL & BEITZ Approach, Project Approach, Cross functional Integration –Design, manufacturing, Marketing, Concurrent Engineering, Modular Design, Standardization Value Engineering & Analysis.

Manufacturing Planning & Control Systems: Overview of Aggregate Planning Models, Linear Decision Rules, Management Coefficient, Direct Search Methods, Master Production Schedule, Modular Bill and Materials, Capacity planning & control, language, medium range, short range capacity planning, Just- in Time (JIT), Manufacturing –Philosophy, Elements, KANBAN, effects on layout, workers & vendors, Optimized Production Technology (OPT).

UNIT-IV

Forecasting Methods: Forecasting Framework, Forecasting cost and accuracy, Forecasting Uses and Methods – Delphi, Exponential Smoothing, Forecasting 109 Errors – MAD, Regression Methods _ Linear Model for single & multiple variables, Brief idea of computerized forecasting systems.

Material Requirements Planning (MRP): Definition of MRP systems. MRP versus Order point, MRP Elements, Types of MRP – MRP I & II. Structured Bill of Materials. Regenerative & Net change MRP, Operating an MRP, Integration of Production & Inventory Control.

UNIT-V

Maintenance & Reliability: Concept of preventive & breakdown maintenance, maintenance cost, optimal preventive maintenance simple replacement models individual and group replacement, MAPI - methods, reliability definitions, failure analysis and curve, systems reliability- series parallel, redundancy, methods of improving reliability, MTBF, MTTR, Maintainability, availability, brief concept of tero-technology.

TEXT BOOKS:

1. Management in Engineering – FREEMAN-BALL & BALKWILL, PHI, New Delhi.
2. Operations Management – SCHOROEDER, MGH, New York.
3. Production Operations Management – CHARY, TMH, New Delhi.

REFERENCE BOOKS:

1. Production Operations Management – ADAM & EBERT, PHL, New Delhi
2. Operational Management –MONKS, McGraw Hill, Int.
3. evolutionizing Product Development – WHEELWRIGHT & CLARK, Free Press.

OUTCOMES:

- Apply advanced manufacturing concepts and the technologies that will support manufacturers which replace obsolete methods and processes within an overall structure.
- Explore the evolution of ERP/MRP systems, how a variety of manufacturing companies use this tool to plan, monitor and improve productivity, and
- Student expose to use the data generated to support strategic decision making.

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5	1	4

(R15A0344) AUTOMATION IN MANUFACTURING (CORE ELECTIVE–VI)

Objectives:

- To perform one or more processing and/or assembly operations on a starting raw material, part, or set of parts.
- To perform a sequence of automated or mechanized assembly operations Flexible manufacturing system (FMS)—a highly automated machine cell that produces part
- To product families often consists of workstations comprising CNC machine tools.

UNIT –I

Introduction: Types and strategies of automation, pneumatic and hydraulic components circuits, Automation in machine tools, Mechanical Feeding and to changing and machine tool control transfer the automation.

UNIT –II

Automated flow lines: Methods or work part transport transfer Mechanical buffer storage control function, design and fabrication consideration.

Analysis Automated flow lines: General terminology and analysis of transfer lines without and with buffer storage, partial automation, implementation of automated flow lines .

UNIT –III

Assembly system and line balancing: Assembly process and systems assembly line, line balancing methods, ways of improving line balance, flexible assembly lines.

UNIT –IV

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

Automated storage systems, Automated storage and retrieval systems : work in process storage, interfacing handling and storage with manufacturing.

UNIT –V

Fundamentals of Industrial controls: Review of control theory, logic controls, sensors and actuators, Data communication and LAN in manufacturing.

Business process Re-engineering: Introduction to BPE logistics, ERP, Software configuration of BPE.

TEXT BOOKS:

1. Automation, Production Systems and Computer Integrated Manufacturing: . M.P.Groover 3e./PE/PHI,2009.
2. Automation and Controls by Nick Dawkins
3. Industrial Automation by by Frank Lamb

REFERENCE BOOKS:

1. Computer Aided Manufacturing, Tien-Chien Chang, Richard A. Wysk and Hsu-Pin Wang, Pearson,2009
2. Automation by W. Buekinsham.
3. Automation Made Easy by Peter G. Martin and Gregory Hale

OUTCOMES:

- Students will get exposure to workstation, which refers to the location in the factory where some well-defined task or operation is accomplished by an automated machine.
- Worker-and-machine combination, or a worker using hand tools
- Student gets exposure on portable power tools.

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IV Year B. Tech, ME-II Sem

L	T/P/D	C
5	1	4

(R15A0345) TRIBOLOGY
(CORE ELECTIVE–VI)

Objectives:

- After successful completion of this course, students will be ableto know about properties of lubricants, modes of lubrication, additives etc.
- To Select suitable/proper grade lubricant for specific application.
- To select suitable material combination for tribological contact.

UNIT-I

Study of various parameters: Viscosity, flow of fluids, viscosity and its variation -absolute and kinematic viscosity, temperature variation, viscosity index determination of viscosity, different viscometers used. Hydrostatic lubrication: Hydrostatic step bearing, application to pivoted pad thrust bearing and other applications, hydrostatic lifts, hydrostatic squeeze films and its application to journal bearing.

UNIT-II

Hydrodynamic theory of lubrication: Various theories of lubrication, petroffs equation, Reynold's equation in two dimensions -Effects of side leakage - Reynolds equation in three dimensions, Friction in sliding bearing, hydro dynamic theory applied to journal bearing, minimum oil film thickness, oil whip and whirl anti-friction bearing.

UNIT–III

Friction and power losses in journal bearings : Calibration of friction loss friction in concentric bearings,bearing modulus, Sommerfield number, heat balance, practical consideration of journal bearing design considerations.

UNIT-IV

Air lubricated bearing: Advantages and disadvantages application to Hydrodynamic journal bearings, hydrodynamic thrust bearings. Hydrostatic thrust bearings. Hydrostatic bearing Analysis including compressibility effect.

Bearing materials : General requirements of bearing materials, types of bearing materials.

UNIT-V

Types of bearing oil pads: Hydrostatic bearing wick oiled bearings, oil rings, pressure feed bearing, partial bearings -externally pressurized bearings. Study of current concepts of boundary friction and dry friction.

TEXT BOOKS:

1. Fundamentals of Tribology, Basu, SenGupta and Ahuja/PHI
2. Tribology in Industry **:** Sushil Kumar Srivatsava, S. Chand &Co.
3. Neale MJ, (Editor) — Tribology hand Book||Neumann Butterworths, 1975

REFERENCE BOOKS:

1. Tribology – B.C. Majumdar
2. Rowe WW& O' Dionoghue,||Hydrostatic and Hybrid bearing design — Butterworths . & Co.Publishers Ltd,1983.
3. Collacott R.A,|| Mechanical Fault diagnosis and condition monitoring||, Chapman and Hall, London 1977.

OUTCOMES:

- For these simplified course contents, student develops confidence in him/her to fulfill course objectives.
- He/she proves himself/herself to be excellent practical engineer in any tribological industry.
- To get the exposure about suggest an explanation to the cause of tribological failures.

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

IV Year B. Tech, ME-II Sem

L	T/P/D	C
0	0	4

(R15A0392) MINI PROJECT

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

IV Year B. Tech, ME-II Sem

L	T/P/D	C
0	6	2

(R15A0393) TECHNICAL SEMINAR

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IV Year B. Tech, ME-II Sem

L	T/P/D	C
0	15	10

(R15A0394)MAJOR PROJECT