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 9001:2015 Certified)

Maisammaguda, Dhulapally (Post Via. Kompally), Secunderabad – 500100, Telangana State, India.

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BACHELOR OF TECHNOLOGY

UNDERGRADUATE PROGRAM

ACADEMIC REGULATIONS

(Batches admitted from the academic year 2024 - 25)

Note: 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.

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 the 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” the 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 Electronics & Communication Engineering, B.Tech degree program in Computer Science and 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 of 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 JNTUH 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 with principal of the college, without presumptions, to avoid unwanted subsequent inconveniences and embarrassments. The cooperation of all the stakeholders 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 establish a pedestal for the integral innovation, team spirit, originality and competence in the students, expose them to face the global challenges and become technology leaders of Indian vision of modern society.

MISSION

❖ To become a model institution in the fields of Engineering, Technology and Management.

❖ To impart holistic education to the students to render them as industry ready engineers.

❖ To ensure synchronization of MRCET ideologies with challenging demands of International Pioneering Organizations.

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 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

Graduates Attributes (GAs) as per NBA

1. Engineering Knowledge: Apply knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.

2. Problem Analysis: Identify, formulate, 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 specified needs with appropriate consideration for public health and safety, cultural, societal and environmental considerations.

4. Conduct investigations of complex problems using research-based knowledge and research methods including design of experiments, analysis and interpretation of data and synthesis of 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 contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice.

7. Environment and Sustainability: Understand the impact of professional engineering solutions in societal and environmental contexts and demonstrate knowledge of and need for sustainable development.

8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice.

9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams and in multi-disciplinary 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 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 multidisciplinary 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.

ENGINEERING GRADUATE

R24 ACADEMIC REGULATIONS FOR B. TECH (REGULAR)

Applicable for the students of B. Tech. (Regular) from the Academic Year 2024-25 and onwards.

The college affiliating to JNTUH, Hyderabad offers a 4-year (8 semesters) Bachelor of Technology (B.Tech.) degree programme, under Choice Based Credit System (CBCS) for the following branches of Engineering.

1.0 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 160 credits and secure 160 credits (With CGPA $\geq$ 5.0)

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

2.0 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.

3.0 Courses of study

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

S.No	Department	Department Code
01	Aeronautical Engineering	21xx
02	Computer Science Engineering	05xx
03	Computer Science Engineering (AIML)	66xx
04	Computer Science Engineering (DS)	67xx
05	Computer Science Engineering (CS)	62xx
06	Electronics & Communication Engineering	04xx
07	Mechanical Engineering	03xx
08	Electrical and Electronics Engineering	02xx

4.0 Credits

Particulars	Semester	
	* Periods perweek	Credits
Theory	04	04
	03	03
Practical	02	01
Drawing (Theory)	02	02
Drawing (Practical)	02	01
Industry Oriented Mini Project	04	02
Application Development	04	02
Project Phase-I	06	03
Project Phase-II	20	10

*Duration of each period is 60 minutes.

5.0 Distribution and Weightage 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 100 marks for a practical subject. In addition, Industry Oriented Mini Project and Major Project work shall be evaluated for 100 and 300 marks, respectively.

5.2 For theory subjects the distribution shall be 40 marks for Internal Evaluation and 60 marks for the End-Examination. For theory subjects, during a semester there shall be 2 mid-term examinations. Each mid- term examination consists of i) **Part – A** for 10 marks, ii) **Part – B** for 20 marks with a total duration of 2 hours as follows:

    1. Mid_Term Examination for 30 marks:
       a. Part - A : Objective/quiz paper for 10 marks.
       b. Part – B : Descriptive paper for 20 marks.

The remaining 10 marks of Continuous Internal Assessment (out of 40) are distributed for Assignment/Subject Viva-Voce/Seminar/Case Study on a topic in the concerned subject.

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. While the first mid-term examination shall be conducted from 1 to 2.5 units of the syllabus, the second mid-term examination shall be conducted from the remaining units. The total marks secured by the student in each mid-term examination are evaluated for 30 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 35% 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 60 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 and each question carrying 12 marks.

5.3 For practical subjects, there shall be a continuous evaluation during a semester for 40 sessional marks and 60 end semester examination marks. Out of the 40 marks for internal evaluation,

1. A write-up on day-to-day experiment in the laboratory (in terms of aim, components/procedure, expected outcome) which shall be evaluated for 15 marks

2. 5 marks for viva-voce **(**or) tutorial (or) case study (or) application (or) poster presentation of the course concerned.

3. Internal practical examination conducted by the laboratory teacher concerned shall be evaluated for 20 marks.

4. The Internal marks shall be evaluated after completion of laboratory course and before semester end practical examination.

The Semester End Examination for 60 marks shall be conducted with an external examiner and the laboratory teacher. The external examiner shall be appointed from the cluster / other colleges which will be decided by the examination branch of the Institution on par with the affiliating University.

There shall be two internal lab examinations in a Semester and the average of the two shall be considered for the award of marks for internal evaluation.

For the subject having design and/or drawing, (such as Engineering Graphics, Engineering Drawing, Machine Drawing) and Estimation, the distribution shall be 40 marks for internal evaluation (20 marks for day-to-day work and 20 marks for internal tests) and 60 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.

5.4 There shall be an Industry Oriented Project to be taken in II-year II Semester examination which carries 2 credits. The Mini Project shall be submitted in a report form and presented before the committee. It shall be evaluated for 100 marks out of which 40 marks for Internal and 60 marks External evaluation. 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.

5.5 Out of a total of 300 marks for the Major Project work which is implemented in two phases i.e., Project I and Project II out of which Project I has to be implemented in IV Year I Semester for which 100 marks shall be allotted. Out of the 100 marks, 40 marks for Internal and 60 marks for External evaluation. Project I shall carry 3 credits and the Internal evaluation shall be on the basis of one seminar given by each student on the topic of his/her project.

5.6 Project II has to be implemented in IV Year II Semester for which 200 marks shall be allotted. Out of the 200 marks, 80 marks are for Internal and 120 marks are for External evaluation. The End Semester Examination of the Major Project work shall be conducted by the same committee as appointed for the Project I. In addition, the project supervisor shall

also be included in the committee. 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/her project.

5.7 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 College Academic Committee. The College Academic Committee will arrive at a scaling factor and the marks will be scaled accordingly. The recommendations of the College Academic Committee 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.

6.0 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 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/she satisfies the attendance requirement of the present semester, as applicable, including the days of attendance in sports, games, NCC and NSS activities.

6.8 The candidate fulfills the attendance requirement in the present semester, he/she shall not be permitted 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 15 Credits/Semester (e.g., 6-7 Courses) and a maximum of 24 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.

8.0 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 mid examination (rounded to 14 marks out of 40 marks) and also not less than 35% in end semester examination and minimum 40% of marks in the sum total of the mid-term and end semester exams put together.

8.2 A student will be eligible to be promoted from I year to II year, upon fulfilling the academic requirements of 50 % credits up to I year II semester examinations and secures prescribed minimum attendance in I year.

8.3 A student will be eligible to be promoted from II year to III year, upon fulfilling the academic requirements of 50 % credits up to II year II semester examinations and secures prescribed minimum attendance in II year.

8.4 A student will be eligible to be promoted from III year to IV year, upon fulfilling the academic requirements of 50 % credits up to III year II semester examinations and secures prescribed minimum attendance in III year.

8.5 A student shall register and put up minimum attendance in all 160 credits and shall earn total 160 credits for the award of B.Tech degree. Further, marks obtained in the 160 credits shall be considered for the calculation of percentage of marks as well as overall CGPA.

8.6 Students who fail to earn 160 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.

9.0 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 for 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/she will not be promoted to the next semester for that particular academic year. However, the academic regulations under which he was first admitted shall continue to be applicable to him.

10.0   Grading Procedure

10.1   Marks will be awarded to indicate the performance of student in each theory subject, laboratory/practicals, seminar, UG mini project and UG major project. Based on the percentage of marks obtained (Continuous Internal Evaluation plus

Semester End Examination, both taken grade together) as specified in item 8 above, a corresponding letter shall be given.

10.2   As a measure of the performance of student, a 10-point absolute grading system using the following letter grades (as per UGC/AICTE guidelines) and corresponding percentage of marks shall be followed.

10.3 Letter Grades and Grade Points:

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

Letter Grade	Points	% of Marks secured in a subject or course (Class Intervals)
O (Outstanding)	10	Greater than or equal to 90
A+(Excellent)	9	80 and less than 90
A(Very Good)	8	70 and less than 80
B+(Good)	7	60 and less than 70
B(Average)	6	50 and less than 60
C(Pass)	5	40 and less than 50
F(Fail)	0	Below 40
Ab (Absent)	0	-

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

10.4 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):

Credit points (CP) = grade point (GP) x credits …. For a course

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 C_i is the number of credits of the ith course and G_i 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 S_i is the SGPA of the ith semester and C_i 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.

10.5. A student obtaining 'F' grade in any subject shall be deemed to have 'failed' and is required to reappear as a 'supplementary student' in the semester end examination, as and when offered. In such cases, internal marks in those subjects will remain the same as those obtained earlier.

10.6 A student who has not appeared for examination in any subject '**Ab'** grade will be allocated in that subject, and student shall be considered **'failed'**. Student will be required to reappear as a 'supplementary student' in the semester end examination, as and when offered.

10.7 A letter grade does not indicate any specific percentage of marks secured by the student, but it indicates only the range of percentage of marks.

10.8 A student earns grade point (GP) in each subject/ course, on the basis of the letter grade secured in that subject/ course. The corresponding 'credit points' (CP) are computed by multiplying the grade point with credits for that particular subject/ course.

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Credit points (CP) = grade point (GP) x credits …. For a course

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10.9 The student passes the subject/ course only when **GP $\geq$ 5 ('C' grade or above)**

Illustration of calculation of SGPA

Course/Subject	Credits	Letter Grade	Grade Points	Credit Points
Course 1	4	A	8	4 x 8 = 32
Course 2	4	O	10	4 x 10 = 40
Course 3	4	C	5	4 x 5 = 20
Course 4	3	B	6	3 x 6 = 18
Course 5	3	A+	9	3 x 9 = 27
Course 6	3	C	5	3 x 5 = 15
	21			152

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SGPA = 152/21 = 7.24

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Illustration of calculation of CGPA:

Course/Subject	Credits	Letter Grade	Grade Points	Credit Points
I Year I Semester				
Course 1	4	A	8	4 x 8 = 32
Course 2	4	A+	9	4 x 9 = 36
Course 3	4	B	6	4 x 6 = 24
Course 4	3	O	10	3 x 10 = 30
Course 5	3	B+	7	3 x 7 = 21
Course 6	3	A	8	3 x 8 = 24

Course/Subject	Credits	Letter Grade	Grade Points	Credit Points
I Year II Semester				
Course 7	4	B+	7	4 x 7 = 28
Course 8	4	O	10	4 x 10 = 40
Course 9	4	A	8	4 x 8 = 32
Course 10	3	B	6	3 x 6 = 18
Course 11	3	C	5	3 x 5 = 15
Course 12	3	A+	9	3 x 9 = 27
	Total Credits = 42			Total Credit Points = 327

CGPA = 327/42 = 7.79

10.10   For merit ranking or comparison purposes or any other listing, **only** the **'rounded off'** values of the CGPAs will be used.

10.11   For calculations listed in regulations 10.4 to 10.9, performance in failed subjects/ courses (securing **F** grade) will also be taken into account, and the credits of such subjects/courses will also be included in the multiplications and summations. After passing the failed subject(s) newly secured letter grades will be taken into account for calculation of SGPA and CGPA. However, mandatory courses will not be taken into consideration.

11.0   Passing standards

11.1   Student shall be declared successful or 'passed' in a semester, if student secures a GP ≥ 5 ('C' grade or above) in every subject/course in that semester (i.e. when student gets an SGPA ≥ 5.00 at the end of that particular semester); and a student shall be declared successful or 'passed' in the entire under graduate programme, only when gets a CGPA ≥ 5.00 for the award of the degree as required.

11.2   After the completion of each semester, a grade card or grade sheet (or transcript) shall be issued to all the registered students of that semester, indicating the letter grades and credits earned. It will show the details of the courses registered (course code, title, no. of credits, and grade earned etc.), credits earned, SGPA, and CGPA.

12.0   Declaration of results

12.1   Computation of SGPA and CGPA are done using the procedure listed in 10.4 to 10.9.

12.2   For final percentage of formula marks equivalent to the computed final CGPA, the following formula maybe used.

<div align="center">

% of Marks = (final CGPA – 0.5) x 10

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13.0 Award of Degree

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).**

13.1   A student shall register and put up minimum attendance in all 160 credits and shall earn a total of 160 credits for the award of B.Tech degree. Further, marks obtained in the 160 credits shall be considered for the calculation of percentage of marks as well as overall CGPA ≥ 5.0, within 8 academic years from the date of commencement of the first academic year, shall be declared to have **'qualified'** for the award of the B.Tech. Degree in the chosen branch of Engineering as selected at the time of admission.

13.2   A student who qualifies for the award of the degree as listed in 13.1 shall be placed in the following classes.

13.3   Students with final CGPA (at the end of the under graduate programme) ≥ 7.50, and shall be placed in **'First class with Distinction'**.

13.4   Students with final CGPA (at the end of the under graduate programme) ≥ 6.50 but < 7.50, shall be placed in **'First class'**.

13.5   Students with final CGPA (at the end of the under graduate programme) ≥ 5.50 but < 6.50, shall be placed in **'Second class'.**

13.6   All the other students who qualify for the award of the degree (as per item 13.1), with final CGPA (at the end of the under graduate programme) ≥ 5.00 but < 5.50, shall be placed in **'pass class'** provided they secure a total of 160 credits.

13.7 A student with final CGPA (at the end of the under graduate programme) < 5.00 will not be eligible for the award of the degree.

13.8 Students fulfilling the conditions listed under item 13.3 alone will be eligible for award of **'University Rank'** and **'Gold Medal'.**

13.9 **Award of 2-Year UG Diploma Certificate**

   i. **A student is awarded 2-Year UG Diploma Certificate in the concerned engineering branch on completion of all the academic requirements and earned all the 80 credits (within 4 years from the date of admission) up to B. Tech II Year – II Semester, if the student want to exit the 4-Year B. Tech. program. The student once opted and awarded for 2-Year UG Diploma Certificate, the student will not be permitted to join in B. Tech. III Year – I Semester and continue for completion of remaining years of study for 4-Year B. Tech. Degree.**

14.0 Withholding of results

14.1 If the student has not paid the fees to the university/ college at any stage, or has dues pending due to any reason whatsoever, or if any case of indiscipline is pending, the result of the student may be withheld, and student will not be allowed to go into the next higher semester. The award or issue of the degree may also be withheld in such cases.

15.0 Transitory regulations.

15.1 A student who has discontinued for any reason, or has been detained for want of attendance or lack of required credits as specified, or who has failed after having undergone the degree programme, may be considered eligible for readmission to the same subjects/ courses (or equivalent subjects/ courses, as the case may be), and same professional electives/ open electives (or from set/category of electives or equivalents suggested, as the case may be) as and when they are offered (within the time-frame of 8 years from the date of commencement of student's first year first semester).

15.2 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.

15.3 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.

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 Minimum Instruction Days

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

17.0 General

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

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

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

17.4 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.

18.0   Scope

18.1   The academic regulations should be read as a whole, for the purpose of any interpretation.

18.2   In case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Academic senate is final.

18.3   The college may change or amend the academic regulations, course structure or syllabi at any time, and the changes or amendments made shall be applicable to all students with effect from the date notified by the academic senate of the college.

Academic Regulations for B.Tech. (Lateral Entry Scheme) w.e.f the AY 2024-25

1.   **Eligibility for award of B. Tech. Degree (LES)**
     The LES students after securing admission shall pursue a course of study for not less than three academic years and not more than six academic years.

2.   The student shall register for 120 credits and secure total 120 credits with CGPA ≥ 5.0 from II year to IV year B.Tech. programme (LES) for the award of B.Tech. degree.

3.   The students, who fail to fulfill the requirement for the award of the degree in six academic years from the year of admission, shall forfeit their seat in B.Tech.

4.   The attendance requirements of B. Tech. (Regular) shall be applicable to B.Tech. (LES).

5.   **Promotion rule**
5.1   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 mid examination (rounded to 14 marks out of 40 marks) and also not less than 35% in end semester examination and minimum 40% of marks in the sum total of the mid-term and end semester exams put together.
5.2   A student will be eligible to be promoted from II year to III year, upon fulfilling the academic requirements of 50 % credits up to II-year II semester examinations and secures prescribed minimum attendance in II year.
5.3   A student will be eligible to be promoted from III year to IV year, upon fulfilling the academic requirements of 50 % credits up to III-year II semester examinations and secures prescribed minimum attendance in III year.

6.   **All the other regulations as applicable to B. Tech. 4-year degree course (Regular) will hold good for B. Tech. (Lateral Entry Scheme). LES Students are not eligible for 2 Year UG Diploma Certificate.**

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	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

	by visible representation, assaults the officer-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.	semester/year. The candidates also are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is registered against them.
7.	Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all 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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MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

www.mrcet.ac.in

Department of Mechanical Engineering

VISION

To become an innovative knowledge center in mechanical engineering through state-of-the-art teaching-learning and research practices, promoting creative thinking professionals.

MISSION

The Department of Mechanical Engineering is dedicated for transforming the students into highly competent Mechanical engineers to meet the needs of the industry, in a changing and challenging technical environment, by strongly focusing in the fundamentals of engineering sciences for achieving excellent results in their professional pursuits.

QUALITY POLICY

- ❖ To pursuit global Standards of excellence in all our endeavors namely teaching, research and continuing education and to remain accountable in our core and support functions, through processes of self-evaluation and continuous improvement.
- ❖ To create a midst of excellence for imparting state of art education, industry-oriented training research in the field of technical education.

PROGRAM OUTCOMES

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 multidisciplinary 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.

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

The Programme Educational Objectives of the programme offered by the department are broadly listed below:

1. **PREPARATION**

   To provide sound foundation in mathematical, scientific and engineering fundamentals necessary to analyze, formulate and solve engineering problems.

2. **CORE COMPETANCE**

   To provide thorough knowledge in Mechanical Engineering subjects including theoretical knowledge and practical training for preparing physical models pertaining to Thermodynamics, Hydraulics, Heat and Mass Transfer, Dynamics of Machinery, Jet Propulsion, Automobile Engineering, Element Analysis, Production Technology, Mechatronics etc.

3. **INVENTION, INNOVATION AND CREATIVITY**

   To make the students to design, experiment, analyze, interpret in the core field with the help of other inter disciplinary concepts wherever applicable.

4. **CAREER DEVELOPMENT**

   To inculcate the habit of lifelong learning for career development through successful completion of advanced degrees, professional development courses, industrial training etc.

5. **PROFESSIONALISM**

   To impart technical knowledge, ethical values for professional development of the student to solve complex problems and to work in multi-disciplinary ambience, whose solutions lead to significant societal benefits.

PROGRAM SPECIFIC OUTCOMES (PSOs)

The Program Specific Outcomes of the programme offered by the department are broadly listed below:

1. Ability to analyze, design and develop Mechanical systems to solve the Engineering problems by integrating thermal, design and manufacturing Domains.

2. Ability to succeed in competitive examinations or to pursue higher studies or research.

3. Ability to apply the learned Mechanical Engineering knowledge for the Development of society and self.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY
B TECH MECHANICAL ENGINEERING
COURSE STRUCTURE
Applicable from AY 2024-25 Batch

I Year B. Tech – I Semester

S.No	Subject Code	SUBJECT	L	T	P	C	MAX. MARKS INT	MAX. MARKS EXT
1	R24A0023	Linear Algebra and Ordinary Differential Equations	3	1	0	4	40	60
2	R24A0201	Principles of Electrical and Electronics Engineering	3	1	0	4	40	60
3	R24A0022	Engineering Chemistry	3	0	0	3	40	60
4	R24A0501	Programming for Problem Solving	3	0	0	3	40	60
5	R24A0083	Engineering Chemistry Lab	-	0	3	1.5	40	60
6	R24A0582	Programming for Problem Solving Lab	-	0	3	1.5	40	60
7	R24A0281	Principles of Electrical and Electronics Engineering	-	0	3	1.5	40	60
8	R24A0084	Engineering and Computing Hardware Workshop	-	0	3	1.5	40	60
9	R24A0003	Human Values and Professional Ethics	2	0	0	0	100	-
		Total	**14**	**2**	**12**	**20**	**420**	**480**

I Year B. Tech – II Semester

S.No	Subject Code	SUBJECT	L	T	P	C	MAX. MARKS INT	MAX. MARKS EXT
1	R24A0001	English for skill Enhancement	2	0	0	2	40	60
2	R24A0024	Numerical Methods and Vector Calculus	3	1	0	4	40	60
3	R24A0021	Applied Physics	3	1	0	4	40	60
4	R24A0301	Computer Aided Engineering Graphics	2	0	2	3	40	60
5	R24A0502	Data structures and Algorithms	3	0	0	3	40	60
6	R24A0081	English Language and Communication Skills Lab	-	0	2	1	40	60
7	R24A0082	Applied Physics Lab	-	0	3	1.5	40	60
8	R24A0582	Data structures and Algorithms Lab	-	0	3	1.5	40	60
9	R24A0004	Environmental Science	2	0	0	0	100	-
		Total	**15**	**2**	**11**	**20**	**420**	**480**

II YEAR I SEMESTER

S.No	Subject Code	SUBJECT	L	T	P	C	MAX. MARKS	
							INT	EXT
1	R24A0302	Engineering Mechanics	3	0	0	4	40	60
2	R24A0303	Engineering Thermodynamics	3	0	0	3	40	60
3	R24A0304	Fluid Mechanics & Hydraulic Machines	3	0	0	3	40	60
4	R24A0305	Materials Engineering	2	1	0	3	40	60
5	R24A0306	Kinematics of Machinery	3	0	0	3	40	60
6	R24A0307	Computer Aided Machine Drawing	2	0	2	2	40	60
7	R24A0381	Fluid Mechanics & Hydraulic Machines Lab	-	0	2	1	40	60
8	R24A0382	Materials Engineering lab and Fuels & Lubricants Laboratory	-	0	2	1	40	60
9	* R24A00xx	Foreign Language: German	2	0	0	0	100	-
		Total	**18**	**1**	**6**	**20**	**420**	**480**

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

II YEAR II SEMESTER

S.No	Subject Code	SUBJECT	L	T	P	C	MAX. MARKS	
							INT	EXT
1	R24A0308	Thermal Engineering - I	3	0	0	3	40	60
2	R24A0309	Strength of Materials	3	0	0	3	40	60
3	R24A0310	Dynamics of Machinery	3	0	0	3	40	60
4	R24A0311	Manufacturing Processes	3	0	2	3	40	60
5	R24A00xx	Probability, Statistics and Queuing Theory	3	1	0	4	40	60
6	R24A0383	Manufacturing Processes Lab	0	0	2	1	40	60
7	R24A0384	Strength of Materials Lab	-	0	2	1	40	60
8	R24A0391	Industry Oriented Project	-	0	4	2	40	60
9	* R24A00xx	Public Policy & Governance	2	0	0	0	100	-
		Total	**17**	**1**	**10**	**20**	**420**	**480**

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

MALLA REDDY COLLEGE OF ENGINEERING ANDTECHNOLOGY

I Year B. TECH -I-SEM   **L/T/P/ C**
3/1/0/ 4

(R24A0023) LINEAR ALGEBRA AND ORDINARY DIFFERENTIAL EQUATIONS
(Common to All Branches)

Course Objectives: To learn

1. The concept of a Rank of the matrix and applying the concept to know the consistency and solving the system of linear equations.
2. The concept of Eigen values, Eigen vectors and Diagonolisation.
3. The maxima and minima of functions of several variables.
4. The Applications of first order ordinary differential equations.
5. The methods to solve higher order differential equations.

UNIT I: Matrices   **[10 hours]**

Introduction, Types of matrices, Rank of a matrix - Echelon form and Normal form, Consistency of system of linear equations (Homogeneous and Non-Homogeneous)-Gauss elimination method and LU Decomposition method.

UNIT II: Eigen values and Eigen vectors   **[12 hours]**

Linear dependence and independence of vectors, Eigen values and Eigen vectors and their properties (without proof), Diagonalisation of a matrix. Cayley-Hamilton theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton Theorem; Quadratic forms and Nature of the Quadratic Forms; Reduction of Quadratic form to canonical forms by Orthogonal Transformation.

UNIT III: Multi Variable Calculus (Differentiation**)**   **[10 hours]**

Functions of two variables-Limit, Continuity, Partial derivatives, Total differential and differentiability, Derivatives of composite and implicit functions, Jacobian-functional dependence and independence, Maxima and minima and saddle points, Method of Lagrange multipliers, Taylors theorem for two variables.

UNIT IV: First Order Ordinary Differential Equations   **[12hours]**

Exact, Equations reducible to exact form, Applications of first order differential equations - Orthogonal Trajectories (Cartesian form), Newton's law of cooling, Law of natural growth and decay.

UNIT V: Differential Equations of Higher Order   **[11 hours]**

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.

Text Books:

i. Higher Engineering Mathematics by B V Ramana., Tata McGraw Hill.
ii. Higher Engineering Mathematics by B.S. Grewal, Khanna Publishers.
iii. Advanced Engineering Mathematics by Kreyszig ,John Wiley & Sons .

Reference Books :

i. Advanced Engineering Mathematics by R.K Jain & S R K Iyenger, Narosa Publishers.
ii. Ordinary and Partial Differential Equations by M.D. Raisinghania, S.Chand Publishers
iii. Engineering Mathematics by N.P Bali and Manish Goyal.

Course Outcomes: After learning the concepts of this paper the student will be able to

1) Analyze the solution of the system of linear equations and to find the Eigen values and Eigen vectors of a matrix.
2) Reduce the quadratic form to canonical form using orthogonal transformations.
3) Find the extreme values of functions of two variables with / without constraints.
4) Solve first order, first degree differential equations and their applications.
5) Solve higher order differential equations.

MALLA REDDY COLLEGE OF ENGINEERING ANDTECHNOLOGY

I Year B. TECH -I-SEM
L/T/P/C
3/1/0/4

(R24A0201) PRINCIPLES OF ELECTRICAL AND ELECTRONICS ENGINEERING

COURSEOBJECTIVES:

1. To understand the basic concepts of electrical circuits and analyze Circuits using Network Theorems.
2. To get overview of single phase A.C. Circuits.
3. To introduce the concept of DC Machines and Single-Phase Transformers.
4. To study the concepts of p-n diodes, rectifiers and Zener diodes.
5. To study the concepts of BJTs, JFET and MOSFETs.

UNIT – I: **INTRODUCTION TO ELECTRICAL CIRCUITS**: Concept of Circuit and Network, R-L-C Parameters, Ohms law and its limitations, Kirchhoff's Laws-KVL, KCL.
NETWORK ANALYSIS (D. C EXCITATION): Series and parallel connections of Resistive Networks, voltage division and current division, Mesh analysis, Nodal analysis.

UNIT–II: NETWORK THEOREMS: Thevenin's Theorem, Norton's Theorem and Superposition Theorem (for independent sources).
SINGLE PHASE A.C. CIRCUITS: Average value, R.M.S. value, Form factor and Peak factor for sinusoidal wave form. Concept of phase, Phasor representation of sinusoidal quantities, Phase difference, Active power, Reactive power and Apparent power. Sinusoidal response of pure R, pure L and pure C.

UNIT-III: MACHINES:

DC GENERATOR: Principle of operation and working, constructional features, basic concept of Lap and wave windings, emf equation.
DC MOTOR: Principle of operation, Back emf and its significance, torque equation-Gross torque and Shaft torque.
SINGLE PHASE TRANSFORMER: Principle of operation, emf equation, transformation ratio, problems on emf equation.

UNIT–IV:

P-N JUNCTION DIODE: P-N junction diode, symbol and forward biased and reverse biased conditions, V-I characteristics of P-N junction diode, Half wave, Full wave-Centre tap and Bridge rectifiers. **ZENER DIODE**: Symbol, construction, principle of operation and its applications.

UNIT–V:

BIPOLAR JUNCTION TRANSISTOR: Symbols, types, Construction and Principle of Operation of N-P-N and P-N-P transistors, Amplifying Action, Common Emitter, Common Base and Common Collector configurations.

JFET: Symbol, Construction, Principle of operation, and its Characteristics, MOSFET (Enhancement and Depletion mode): Symbol, Construction, Principle of Operation and its Characteristics.

TEXTBOOKS:

1. Engineering Circuit Analysis - William Hayt, Jack E. Kemmerly, S M Durbin, Mc GrawHill Companies.
2. Electric Circuits - A. Chakrabarhty, Dhanipat Rai & Sons.
3. Electrical Machines – P.S.Bimbra, Khanna Publishers.
4. "Electronic Devices & Circuits", Special Edition–MRCET, McGrawHillPublications,2017.
5. Integrated Electronics Analog Digital Circuits, Jacob Millman and D.Halkias, Mc GrawHill.
6. Electronic Devices and Circuits, S.Salivahanan, N.Sureshkumar, McGrawHill.

REFERENCEBOOKS

1. Network Analysis by M.E Van Valkenburg, PHI learning publications.
2. Network Analysis - N.C Jagan and C. Lakhminarayana, BS publications.
3. Electrical Circuits by A. Sudhakar, Shyammohan and S Palli, Mc Graw Hill Companies.
4. Electrical Machines by I.J. Nagrath & D. P. Kothari, Tata Mc Graw-Hill Publishers.
5. Electronic Devices and Circuits, K.LalKishore, B.S Publications
6. Electronic Devices and Circuits, G.S.N.Raju, I.K.International Publications, New Delhi, 2006.

COURSEOUTCOMES:

 After the course completion the students will be able to

1. Apply the basic RLC circuit elements and its concepts to networks and circuits.
2. Analyze the circuits by applying network theorems to solve them to find various electrical parameters.
3. Illustrate the single-phase AC circuits along with the concept of impedance parameters and power.
4. Understand the Constructional Details and Principle of Operation of DC Machines and Transformers
5. To understand the concepts of p-n junction diode, rectifiers and Zener diode
6. To understand the concepts of BJTs, JFET and MOSFETs

MALLA REDDY COLLEGE OF ENGINEERING ANDTECHNOLOGY

I Year B. TECH -I-SEM   **L/T/P/C**
                                                          3/0/0/3

(R24A0022) ENGINEERING CHEMISTRY

COURSE OBJECTIVES: The students will be able

1. To analyze water for its various parameters for sustainable living and interpret different problems involved in industrial utilization of water.
2. To acquire the knowledge on fundamental aspects of battery chemistry, significance of corrosion and it's control to protect the metallic structures.
3. To identify different types of polymers and their applications in various engineering fields.
4. To understand the basic concepts of fuels and its products.
5. To gain knowledge on wide variety of engineering materials like composite materials, smart materials and lubricants which have excellent engineering properties.

Unit –I Water and its treatment: **(8 hours)**
Introduction – hardness of water – causes of hardness; Types of hardness - temporary and permanent – expression and units of hardness-numerical problems on hardness; Potable water and its specifications - Steps involved in the treatment of potable water-Disinfection of potable water by chlorination and break -point chlorination.
Boiler troubles: Sludges, Scales and Caustic embrittlement. Internal treatment of Boiler feed water - Calgon conditioning - Phosphate conditioning; External treatment methods - Softening of water by ion -exchange process. Desalination of water – Reverse osmosis.

Unit–II Battery Chemistry & Corrosion: **(8 hours)**
Introduction - Classification of batteries-primary, secondary and reserve batteries with examples. Basic requirements for commercial batteries. Construction and working of Lithium- ion battery; Applications of Li-ion battery to electrical vehicles. Fuel Cells- Differences between battery and a fuel cell, Construction and applications of Methanol Oxygen fuel cell. Solar cells - Introduction and applications of Solar cells.
Corrosion: Causes and effects of corrosion – theories of chemical (oxidation) and electrochemical corrosion – mechanism of electrochemical corrosion, Types of corrosion: Galvanic, waterline and pitting corrosion. Factors affecting rate of corrosion- nature of metal (position, passivity, purity, relative areas of anode and cathode); nature of environment (temperature, pH and humidity); Corrosion control methods- Cathodic protection – Sacrificial anode and impressed current methods.

Unit-III: Polymeric materials: **(8 hours)**
Definition–Classification of polymers based on source with examples–Types of polymerization– characteristics of addition and condensation polymerization with examples.
Plastics: Definition and characteristics-thermoplastic and thermosetting plastics, Preparation, properties and engineering applications of PVC, Teflon and Bakelite.
Fibers: preparation, properties and applications of Nylon 6,6.

Rubbers: Natural rubber and its vulcanization.

Conducting polymers: Characteristics and classification with examples-mechanism of conduction in trans-polyacetylene and applications of conducting polymers.

Biodegradable polymers: Concept and advantages – preparation, properties of Polylactic acid and its applications.

Unit-IV: Energy Sources: **(8 hours)**

Introduction- Calorific value of fuel – HCV and LCV. Classification- solid fuels: coal – analysis of coal – proximate and ultimate analysis and their significance. Liquid fuels – petroleum and its refining, cracking types – moving bed catalytic cracking. Knocking – octane and cetane rating, synthetic petrol - Fischer-Tropsch's process; Gaseous fuels – composition and uses of natural gas, LPG and CNG.

Unit- V Engineering Materials: **(8 hours)**

Composite materials: Introduction-Fiber reinforced plastics (FRPs) - Glass fiber reinforced plastics, Carbon fiber reinforced plastics and their applications.

Smart materials and their engineering applications

Shape memory materials- Poly L–Lactic acid. Thermo-responsive materials-Polyacryl amides, Polyvinyl amides.

Lubricants: Classification of lubricants with examples-characteristics of a good lubricant - properties of lubricants- definition and significance of viscosity, cloud and pour point, flash and fire point.

Suggested Text Books:

1.   Engineering Chemistry by P.C. Jain & M. Jain: Dhanpat Rai Publishing Company (P) Ltd, New Delhi. 16th Edition, 2010.

2.   Engineering Chemistry by Prasanta Rath, B. Rama Devi, C. H. Venkata Ramana Reddy, Subhendu Chakroborty, Cengage Learning Publication, India Private Limited, 2018.

3.   Engineering Analysis of Smart Material Systems by Donald J. Leo, Wiley, 2007.

Reference Books:

1.   Engineering Chemistry by Shashi Chawla, Dhanpat Rai Publishing Company (P) Ltd, New Delhi.

2.   Engineering Chemistry, by S. S. Dara, S. Chand & Company Ltd, New Delhi.

3.   P.W. Atkins, J.D. Paula, "Physical Chemistry", Oxford, 8th edition (2006).

4.   B.R. Puri, L.R. Sharma and M.S. Pathania, "Principles of Physical Chemistry", S. Nagin Chand & Company Ltd., 46th edition (2013).

COURSE OUTCOMES: At the end of the course the student is expected to know the fundamental principles of Engineering Chemistry required for solving engineering problems.

The students will be able

1. To identify water as an engineering material and develop innovative methods to produce soft water for industrial use and potable water at cheaper cost.

2. To relate the knowledge of operating principles of batteries and different corrosion control techniques for sustainable development.

3. To recognize the significance of polymeric compounds in various engineering applications and biodegradable polymers to reduce environmental pollution.

4. To analyze the importance of various energy resources in day-to-day life.

5. To interpret the role of engineering materials for technological improvements in various sectors.

MALLA REDDY COLLEGE OF ENGINEERING ANDTECHNOLOGY

I Year B. TECH -I-SEM   **L/T/P/C**
                                                                    3/0/0/3

(R24A0501) Programming for Problem Solving

COURSE OBJECTIVES:

The students will be able

1. To understand basics of programming.
2. To learn how to use conditional statements and loops.
3. To structure Python programs using arrays.
4. To know the need and usage of functions
5. To learn file operations and exception handling

UNIT – I

Introduction to Programming – Computer Systems, Computer Languages, Algorithms and Flowcharts
Introduction to Python Language: Introduction to Python Language, Features of Python, Comments in Python.
Tokens- Keywords, Identifiers, Constants, Variables, Python Input and Output Statements
Basic Data Types: int, float, Boolean, complex and string and its operations.
Collection Data Types: List, Tuples, Sets and Dictionaries. Data Type conversions,

UNIT – II

Operators in Python: Arithmetic operators, Assignment operators, Comparison operators, Logical operators, Identity operators, Membership operators, Bitwise operators, Precedence of operators, Expressions.
Control Flow and Loops: Indentation, if statement, if-else statement, nested if else, chained conditional if- Elif -else statement, Loops: while loop, for loop using ranges, Loop manipulation using break, continue and pass.

UNIT- III

Arrays: Definition**,** Advantages of Arrays, Creating an Array, Operations on Arrays, Arrays vs List, Importing the Array Module, Indexing and Slicing on Arrays,
working with arrays using NumPy - Creating arrays using NumPy, NumPy Attributes and functions, Matrices in NumPy.

UNIT-IV

Functions: Defining a function, calling a Function, Passing parameters and arguments, Python Function arguments: Positional Arguments, Keyword Arguments, Default Arguments, Variable-length arguments, Scope of the Variables in a Function–Local and Global Variables.
Recursive functions, Anonymous functions, Higher order functions - map (), filter () and reduce () functions in Python, command-line arguments.

UNIT-V

File Handling in Python: Introduction to files, Text files and Binary files, Access Modes, Writing Data to a File-write () and write lines(), Reading Data from a File-read(),read line() and read lines(), Random access file operations-seek() and tell().

Error Handling in Python: Introduction to Errors and Exceptions: Compile-Time Errors, Logical Errors, Runtime Errors, Types of Exceptions, Python Exception Handling Using try, except and finally statements.

COURSE OUTCOMES:

Upon completion of the course, students will be able to

1. Express proficiency in handling data types in python.

2. Understand the syntax and semantics of python control flow statements

3. Develop programs using arrays

4. Know how to write modular programs using functions.

5. Perform file operations and handle exceptions

TEXT BOOKS

1. "Mastering C", K R Venugopal, S R Prasad, Tata McGraw Hill Education (India) Private Limited.

2. R.NageswaraRao,"Core Python Programming", Dreamtech.

3. Allen B. Downey,``Think Python: How to Think Like a Computer Scientist" 2nd edition, Updated for Python3, Shroff/O'Reilly Publishers,2016.

4. Python Programming: A Modern Approach, Vamsi Kuramanchi,Pearson.

REFERENCEBOOKS:

1. Core Python Programming,W.Chun,Pearson.

2. Introduction to Python,Kenneth A. Lambert, Cengage.

3. Learning Python, Mark Lutz,Orielly.

MALLA REDDY COLLEGE OF ENGINEERING ANDTECHNOLOGY

I Year B. TECH -I-SEM   **L/T /P /C**
                                                                                        -/0/3/1.5

(R24A0083)Engineering Chemistry Lab

COURSE OBJECTIVES:

The students will be able:

1. To understand and explain scientifically the various chemistry related problems in the industry/engineering and develop experimental skills for building technical competence.
2. To familiarize with the practical implementation of fundamental concepts.
3. To gain hands on experience in handling the instruments.
4. To demonstrate the digital and instrumental methods of analysis.
5. To correlate the practical aspect with theoretical concepts.

List of Experiments

Titrimetry:

1. Estimation of Hardness of water by EDTA method.
2. Estimation of Ferrous ion by Dichrometry

Instrumental Methods

Conductometry:

3. Estimation of concentration of HCl by Conductometric titrations.
4. Estimation of concentration of Acetic acid by Conductometric titrations.

Potentiometry:

5. Estimation of amount of $Fe^{2+}$by Potentiometric titration using $KMnO_4$.

pH Metry:

6. Determination of an acid concentration using pH meter.

Preparation

7. Preparation of a Polymer-**Bakelite**

Physical Property

8. Determination of Surface Tension of a given liquid by Stalagmometer.
9. Determination of Viscosity of a given liquid using Ostwald's Viscometer.

Corrosion control method

10. Electroplating of Copper on an Iron object.

Virtual lab experiments

1. Construction of Fuel cell and it's working.
2. Smart materials for Biomedical applications
3. Batteries for electrical vehicles.
4. Functioning of solar cell and its applications.

Text Book:
1. In organic quantitative analysis, Vogel
2. A text book on experiments and calculation in Engineering Chemistry by S.S.Dara

Suggested Readings:

1. Lab manual for Engineering chemistry by B.Ramadevi and P.Aparna, S Chand Publications, New Delhi (2022)
2. Practical Engineering Chemistry by K.Mukkanti, etal, B.S.Publications, Hyderabad.

Course outcomes:

The students will be able:
1. To estimate the total hardness present in a sample of water.
2. To know the strength of an acid by conductometry, potentiometry and pHmetry.
3. To prepare a thermo setting polymer.
4. To determine the surface tension and viscosity of a given liquid.
5. To understand the electroplating method for corrosion protection of metals.

MALLA REDDY COLLEGE OF ENGINEERING ANDTECHNOLOGY

I Year B. TECH -I-SEM **L/T /P /C**
-/0/3/1.5

(R24A0581) Programming for Problem Solving Lab

COURSE OBJECTIVES:

This course will enable the students:

1) to understand syntax and semantics of different data types in python
2) to learn categories of operators and control structures.
3) to know how to use arrays in python scripts.
4) to learn usage of functions.
5) to know how to handle Files and exceptions in Python.

Week 1:

Introduction to OS
Steps for creating and running python code

Week 2:

Programs using output statement
Simple programs on usage of variables and constants
Programs to read different kinds of data from user

Week 3:

Programs on creation of strings and its methods
Programs on List creation, indexing and slicing and methods

Week 4:

Programs on tuples, sets and dictionaries

Week 5 & 6:

Programs on different categories of operators and conditional statements

Week 7 & 8:

Programs using iterative statements

Week 9 & 10:

Programs on arrays using array module and NumPy module

Week 11 & 12:

Programs using functions

Week 13 & 14:

Implementation of operations on files and exception handling

TEXT BOOKS:

1. R. Nageswara Rao, "Core Python Programming", dream tech
2. Allen B. Downey , " Think Python: How to Think Like a Computer Scientist", Second Edition, Updated for Python 3, Shroff/O'Reilly Publishers, 2016.

COURSE OUTCOMES:

After completion of the course, Students will be able to**:**

1. Build basic programs using python statements and expressions.
2. Use python data structures like lists, tuples and dictionaries to represent compound data.
3. Implement conditional and loop statements in python programs.
4. Express usage of arrays and functions in code
5. Understand and summarize different file handling operations and exceptions.

MALLA REDDY COLLEGE OF ENGINEERING ANDTECHNOLOGY

I Year B. TECH -I-SEM　　　　　　　　　　　　　　　　　　**L/T/P/C**
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(R24A0281) PRINCIPLES OF ELECTRICAL AND ELECTRONICS ENGINEERING LAB

COURSE OBJECTIVES:

1. To design an electrical system.
2. To analyze a given network by applying various circuit laws and network theorems.
3. To expose the students to the operation of DC machine and transformer.
4. To exhibit the students to the operation of PN junction diode and Zener diode.
5. To expose the students to the operation of Rectifier.

Among the following experiments any 10 are to be conducted

1. Verification of KVL and KCL.
2. Verification of Thevenin's theorem.
3. Verification of Norton's theorem.
4. Verification of Super position theorem.
5. Magnetization characteristics of DC shunt generator.
6. Speed control of DC shunt motor using armature control method.
7. Speed control of DC shunt motor using flux control method
8. Load test on single phase transformer.
9. PN Junction diode characteristics.
10. Zener diode characteristics.
11. Half wave rectifier.
12. Full wave rectifier.

COURSE OUTCOMES:

At the end of the course, students would be able to

1. Explain the concept of circuit laws and network theorems and apply them to laboratory measurements.
2. Be able to systematically obtain the equations that characterize the performance of an electric circuit as well as solving them.
3. Perform the required tests on transformers and DC motors.
4. Plot the characteristics of Zener diodes.
5. Determine the working of rectifiers in detail.

MALLA REDDY COLLEGE OF ENGINEERING ANDTECHNOLOGY

I Year B. TECH -I-SEM　　　　　　　　　　　　　　　　　　　　　**L/T/P/C**
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(R24A0084) Engineering and Computing Hardware Workshop

It is consisting of 2 parts: **Part I**: Computing Hardware Workshop
　　　　　　　　　　　　　Part II: Engineering Workshop

COURSE OBJECTIVES:

- Understand the internal structure of computer system and learn to diagnose minor problems with the computer functioning.
- Know the proper usage and threats of the World Wide Web & Study in detail about the various features of MS-Word, Excel, PowerPoint and Google Forms
- To obtain the knowledge about Electrical wiring and Soldering – Desoldering procedures.
- To provide hands on experience in usage of different engineering materials, tools equipment's and processes which are common in the engineering field.
- To develop professional attitude, team work, precision and safety practices at workplace.

Part I: COMPUTING HARDWARE WORKSHOP

Task- 1: PC HARDWARE

Identification of the peripherals of a computer, components in a CPU and its functions. Block diagram of the CPU along with the configuration of each peripheral. Functions of Motherboard. Assembling and Disassembling of PC. Installation of OS. Basic Linux commands.

Task- 2: TROUBLESHOOTING

Hardware Troubleshooting: Students are to be given a PC which does not boot due to proper assembly or defective peripherals and the students should be taught to identify and correct the problem.

Software Troubleshooting: Students have to be given a malfunctioning CPU due to system software problems. They should identify the problem and fix it to get the computer back to working condition.

Task 3: INTERNET

Web Browsers, Access of websites, Surfing the Web, Search Engines, Customization of web browsers, proxy settings, bookmarks, search toolbars, pop-up blockers. Antivirus downloads, Protection from various threats.

MS OFFICE

Task 4: MICROSOFT WORD

Overview of MS word features. Usage of Hyperlink, Symbols, Spell Check, Track Changes. Table of Content, Newspaper columns, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Textboxes, Paragraphs and Mail Merge in word. Using Word to create Project Certificate, Project Abstract, News Letter, Resume.

Task 5: MICROSOFT EXCEL

Overview of Excel Features Excel formulae & Functions, conditional formatting, Charts, Hyper linking, Renaming and Inserting worksheets, Data Analysis functions.

Creating a Scheduler (Features: - Gridlines, Format Cells, Summation, auto fill, Formatting)

Calculating GPA (Features: - Cell Referencing, Formulae and functions in excel

Task 6: MICROSOFT POWER POINT

Overview of PowerPoint features, Insertion of images, slide transition, Custom animation, Hyperlinks.

Task 7: GOOGLE FORMS

Google form's introduction, opening Google forms, editing forms, add questions, copy duplicate questions, delete questions, required questions, more button, form color and themes, preview form, advance form settings, send form, view responses, close form

PART II: ENGINEERING WORKSHOP

A. LIST OF EXPERIMENTS:

1. Residential house wiring using switches, fuse, indicator, lamp and energy meter.
2. Fluorescent lamp wiring
3. Stair case wiring
4. Soldering and Desoldering practice – components, devices and circuits using general Purpose PCB.

Note: Minimum ONE experiment needs to be conducted in each trade

B. TRADES FOR EXERCISES:

At least two exercises from each trade:

1. **Carpentry:**
   To prepare T-Lap Joint, Dovetail Joint.
   To pre pare Mortise & Tenon Joint.
2. **Fitting:**
   To prepare V-Fit, Dovetail Fit & Semi-circular fit.
3. **Tin-Smithy:**
   To make Square Tin, Rectangular Tray & Conical Funnel.
   Note: Minimum ONE experiment needs to be conducted in each trade

Trades to demonstrate:

1. Plumbing
2. Foundry
3. Welding
4. Black smithy
5. Metal cutting (Water Plasma)

Note: Minimum a total of 3 trades to be demonstrated.

TEXT BOOKS – IT WORKSHOP

1. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education
2. Excel Functions and Formulae, Bernd held, Theodor Richardson, Third Edition

TEXT BOOKS – ENGINEERING WORKSHOP

1. Workshop Manual, P. Kannaiah and K. L. Narayana, 3rd Edition, Scitech,2015
2. Printed Circuit Boards - Design, Fabrication, Assembly and Testing, R. S. Khandpur, Tata McGraw-Hill Education, 2005.

COURSE OUTCOMES:

- Ability to identify, assemble and troubleshoot the major components of a computer and perform the installation of Operating System.
- Capacity to make effective usage of the internet for academics and develop professional documents, spreadsheets and presentations.
- Students will be able to understand the domestic, illumination, stair-case wiring procedures and soldering de soldering practice
- The student will have hands-on experience on manufacturing of components using different trades of engineering processes.
- The student will be able to perform in a team, adhering to industrial safety practices and follow professional working standards.

MALLA REDDY COLLEGE OF ENGINEERING ANDTECHNOLOGY

I Year B.TECH –I-SEM   **L/T/P/C**
                                               2/0/0 /0

(R24A0003) HUMAN VALUES AND PROFESSIONAL ETHICS

COURSE OBJECTIVES:

This introductory course input is intended:

1. To help the students appreciate the essential complementarily between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity which are the core aspirations of all human beings.
2. To facilitate the development of a holistic 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 forms the basis of value-based living in a natural way.
3. 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 for Value Education.

Self-Exploration – Definition, content and process., A look at basic Human Aspirations- Continuous Happiness and Prosperity, Right understanding of Relationships and Physical Facilities, Method to fulfill the above human aspirations. Understanding and living in harmony at various levels.

UNIT - II:

Understanding 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'. Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer).

Understanding the harmony of I with the Body- Sanyam and Swasthya, Programs to ensure Sanyam and Swasthya.

UNIT - III:

Understanding Harmony in the Family and Society- Understanding harmony in the Family- 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 harmony in the society- Samadhan, Abhay, Sah-astiva as comprehensive Human Goals, Undivided Society (Akhand Samaj), Universal Order.

UNIT - IV:

Understanding Harmony in the Nature and 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-astitva) of mutually interacting units in all- pervasive space. Holistic perception of harmony at all levels of existence.

UNIT - V:

Implications of the above Holistic Understanding of Harmony on Professional Ethics: Basic concepts of Professional Ethics, Natural acceptance of human values, Definitiveness of Ethical Human Conduct, Competence in Professionalethics, Ethical dilemmas, Role of Emotional intelligence in ethical decision-making

TEXT BOOKS:

1. R. R. Gaur, R Sangal, G P Bagaria, 2009, A Foundation Course in Human Values and Professional Ethics.

2. Prof. K. V. Subba Raju, 2013, Success Secrets for Engineering Students, Smart Student Publications, 3rdEdition.

REFERENCE BOOKS:

1. Ivan IIIich, 1974, Energy & Equity, The Trinity Press, Worcester, and HarperCollins, USA
2. E. F. Schumancher, 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 Sansthan, Amarkantak.
4. Sussan George, 1976, How the Other Half Dies, Penguin Press, Reprinted 1986,1991.
5. P. L. Dhar, R. R. Gaur, 1990, Science and Humanism, Common wealth Publishers. A. N. Tripathy, 2003, Human Values, New Age International Publishers.
6. Subhas Palekar, 2000, How to practice Natural Farming, Pracheen (Vaidik) Krishi Tantra Shodh, Amravati.
7. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, Limits to Growth - Club of Rome's report, Universe Books.
8. E G Seebauer & Robert L.Berry, 2000, Fundamentals of Ethics for Scientists & Engineers, Oxford University Press.
9. M Govindrajan, S Natrajan & V. S Senthil kumar, Engineering Ethics (including Human Values), Eastern Economy Edition, Prentice Hall of India Ltd.

Relevant CDs, Movies, Documentaries & Other Literature:

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

COURSE OUTCOMES:

1. The students will be able to obtain happiness and prosperity in their life.
2. They will develop harmony at all levels.
3. They can have satisfying human behavior throughout their life

MALLA REDDY COLLEGE OF ENGINEERING ANDTECHNOLOGY

I Year B. TECH -II-SEM   **L/T/P/C**
2/0/0/2

(R24A0001) ENGLISH FOR SKILL ENHANCEMENT

Course Objectives: This course will enable the students to:

1. Improve the language proficiency of students in English with an emphasis on Vocabulary, Grammar, Reading and Writing skills.
2. Develop study skills and communication skills in various professional situations.
3. Equip students to study engineering subjects more effectively and critically using the Theoretical and practical components of the syllabus.

Course Outcomes: Students will be able to:

1. Understand the importance of vocabulary and sentence structures.
2. Choose appropriate vocabulary and sentence structures for their oral and written communication.
3. Demonstrate their understanding of the rules of functional grammar.
4. Develop comprehension skills from the known and unknown passages.
5. Take an active part in drafting paragraphs, letters, essays, abstracts, précis and reports in various contexts.
6. Acquire basic proficiency in reading and writing modules of English.

UNIT-I

Chapter entitled '*Toasted English***' by R.K.Narayan from** *"English: Language, Context and Culture"* **published by Orient Black Swan, Hyderabad.**

Vocabulary   **: T**he Concept of Word Formation
Grammar   : Articles and Prepositions.
Reading   : Reading and Its Importance-Techniques for Effective Reading.
Writing   : Sentence Structures-Use of Phrases and Clauses in Sentences-Importance of Proper Punctuation-Techniques for writing precisely–Paragraph Writing–Types, Structures and Features of a Paragraph – Creating Coherence-Organizing Principles of Paragraphs in Documents.

UNIT-II

Chapter entitled **'Appro JRD' by Sudha Murthy** from *"English: Language, Context and Culture"* **published** by Orient Black Swan, Hyderabad.

Vocabulary   : Words Often Miss pelt- Homophones, Homonyms and Homographs
Grammar   : Noun- pronoun Agreement and Subject- verb Agreement.
Reading   : Sub- Skills of Reading– Skimming and Scanning– Exercises for Practice
Writing   : Defining/ Describing People, Objects, Places and Events–Classifying-Providing Examples or Evidence.

UNIT-III

Chapter entitled **'Abraham Lincoln's Letter to His Son's Teacher'**

Vocabulary	: Idioms & Words Often Confused.
Grammar	: Misplaced Modifiers and Tenses.
Reading	: Intensive Reading and Extensive Reading – Exercises for Practice.
Writing	: Format of a Formal Letter-Writing Formal Letters E.g.., Letter of Complaint, Letter of Requisition, Email Etiquette, Job Application with CV/Resume.

UNIT-IV

Chapter entitled **'Art and Literature 'by Abdul Kalam** from *"English: Language, Context and Culture"* published by Orient Black Swan, Hyderabad.

Vocabulary	: Standard Abbreviation sin English
Grammar	: Transitive and Intransitive and Voices
Reading	: Survey, Question, Read, Recite and Review (SQ3RMethod)-Exercises for Practice
Writing	: Writing Practices-Essay Writing-Writing Introduction and Conclusion-Précis Writing.

UNIT-V

Chapter entitled **'Go, Kiss the World' by Subroto Bagchi** fro *"English: Language, Context and Culture"* published by Orient Black Swan, Hyderabad.

Vocabulary	: Technical Vocabulary and their Usage
Grammar	: Direct and Indirect Speech and Degrees of Comparison
Reading	: Reading Comprehension-Exercises for Practice
Writing	: Technical Reports- Introduction – Characteristics of a Report – Categories of Reports Formats- Structure of Reports (Manuscript Format) -Types of Reports - Writing a Report.

Note: Listening and Speaking Skills which are given under Unit-6 in AICTE Model Curriculum are covered in the syllabus of ELCS Lab Course.

➢ **Note: 1**. As the syllabus of English given in AICTE *Model Curriculum-2018 for B.Tech First Year is Open-ended,* besides following the prescribed textbook, it is required to prepare teaching/learning materials **by the teacherscollectively**intheformofhandoutsbasedont heneedsofthestudentsintheirrespective colleges for effective teaching/learning in the class.

➢ **Note: 2**.Based on the recommendations of NEP2020, teachers are requested to be flexible to adopt Blended Learning in dealing with the course contents .They are advised to teach 40percentofeachtopicfromthe syllabus in blended mode.

TEXTBOOK:
1. English: Language, Context and Culture" by Orient Black Swan Pvt. Ltd, Hyderabad.2022.Print.

REFERENCEBOOKS:

1. Effective Academic Writing by Liss and Davis(OUP)
2. Richards, Jack C. (2022) Interchange Series. Introduction, 1,2,3.CambridgeUniversityPress
3. Wood,F.T.(2007).Remedial English Grammar Macmillan.
4. Chaudhuri, Santanu Sinha.(2018).Learn English: A Fun Book of Functional Language, Grammar and Vocabulary.(2nd ed.,).Sage Publications India Pvt. Ltd.
5. (2019).Technical Communication. Wiley India Pvt. Ltd.
6. Vishwamohan,Aysha.(2013).EnglishforTechnicalCommunicationforEngineeringStudents.Mc Graw-HillEducationIndia Pvt.Ltd.
7. Swan, Michael. (2016).Practical English Usage. Oxford University Press. Fourth Edition.

MALLA REDDY COLLEGE OF ENGINEERING ANDTECHNOLOGY

I Year B. TECH -II-SEM

L / T / P / C

3 / 1/ 0 /4

(R24A0024) NUMERICAL METHODS AND VECTOR CALCULUS

Course Objectives: To Learn

1) Numerical methods which provide systematic methods for solving problems in a numerical form using the given initial data, also used to find the roots of an equation and to solve differential equations.

2) The Concept of interpolation 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.

3) The concept of multiple integrals.

4) The physical quantities involved in engineering field related to vector valued functions.

5) The basic properties of vector-valued functions and their applications to line, surface and volume integrals.

UNIT – I: Interpolation and Curve fitting [12 hrs]

Interpolation: Introduction, errors in polynomial interpolation, Finite differences - Forward differences, Backward differences, central differences. Newton's formulae for interpolation, Gauss's central difference formulae, Interpolation with unevenly spaced points - Lagrange's Interpolation.

Curve Fitting: Fitting a straight line, second degree curve, exponential curve, power curve by method of least squares.

UNIT – II: Numerical Methods [12 hrs]

Solution of algebraic and transcendental equations: Introduction, Bisection Method, Method of false position, Newton Raphsonmethod and their graphical interpretations.

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

Numerical solution of ordinary differential equations: Solution by Taylor's series method, Euler's method, Euler's modified method, Runge - Kutta fourth order method.

UNIT - III: Double and Triple Integrals [12 hrs]

Double integrals (Cartesian and polar), Change of order of integration in double integrals, Change of variables (Cartesian to polar), Triple integrals (Cartesian form). Applications: Areas (by double integrals) and volumes (by triple integrals).

UNIT-IV: Vector Differentiation [8hrs]

Introduction, Scalar point function and Vector point function, Gradient, Directional derivative, Divergence and Curl- Solenoidal and irrotational vectors,Vector identities.

UNIT-V: Vector Integration [10hrs]

Line integral - Work done, Surface integrals, Volume integral. Vector integral theorems - Green's theorem, Stoke's theorem and Gauss's Divergence theorems (Statement & their Verification).

Text Books:

 i) Higher Engineering Mathematics by B V Ramana ., Tata McGraw Hill.
 ii) Higher Engineering Mathematics by B.S. Grewal, Khanna Publishers.
iii) Mathematical Methods by S.R.K Iyenger,R.K.Jain,Narosa Publishers.

Reference Books:

i)   Elementary Numerical Analysis by Atkinson-Han, Wiley Student Edition.
ii)   Advanced Engineering Mathematics by Michael Greenberg –Pearson publishers.
iii) Introductory Methods of Numerical Analysis by S.S. Sastry, PHI

Course Outcomes: After learning the contents of this paper, the student will be able to

1. Find the roots of algebraic, non-algebraic equations and predict the value at an intermediate point from a given discrete data.
2. Find the most appropriate relation of the data variables using curve fitting and this method of data analysis helps engineers to understand the system for better interpretation and decision making.
3. Evaluate multiple integrals.
4. Find Gradient, Divergence, Directional Derivative and Curl.
5. Evaluate the line, surface, volume integrals and converting them from one to another using vector integral theorems.

MALLA REDDY COLLEGE OF ENGINEERING ANDTECHNOLOGY

I Year B. TECH -II-SEM   **L / T / P / C**
                                                                            3 / 1 / 0 / 4

(R24A0021) APPLIED PHYSICS

COURSE OBJECTIVES:

1 To understand the basic principles of lasers and optical fibers.
2 To interpret dual nature of the matter quantum mechanically and classify the solids based on electrical conductivity.
3 To understand the concepts of semiconductors and devices.
4 To analyze dielectric, magnetic and superconducting properties of the materials.
5 To understand the properties of nano materials and analyze its characterization techniques.

UNIT – I

LASERS & FIBER OPTICS   **(15 Hours)**

Lasers: Characteristics of lasers, Absorption, Spontaneous and Stimulated emissions, Einstein's coefficients, Meta stable state, Population inversion, Types of pumping, Components of Laser, Lasing action, Construction and working of Ruby Laser, He-Ne Laser, Semiconductor diode Laser, Applications of lasers.

Fiber Optics: Introduction to optical fiber, Construction and working principle of an Optical Fiber, Acceptance angle and Numerical aperture, Types of Optical fibers - Mode and index profile, Optical Fibers in Communication System, Applications of optical fibers.

UNIT – II

QUANTUMMECHANICS AND FREE ELECTRON THEORY OFSOLIDS   **(15 Hours)**

Introduction, wave and particle, de-Broglie's hypothesis, Matter waves, Davisson and Germer's experiment, Heisenberg's uncertainty principle, Schrodinger's time-independent wave equation-Physical significance of wave function, Particle in one dimensional square well potential.

Classical free electron theory-Assumptions and drawbacks, Quantum free electron theory-Assumptions and drawbacks, Fermi-Dirac statistical distribution, Fermi level , Electron in a periodic potential - Bloch's theorem(qualitative), Kronig–Penny model (qualitative), E-k curve, Effective mass of an electron ,Origin of energy bands in solids, Classification of materials: Metals, semiconductors and insulators.

UNIT-III

SEMICONDUCTOR PHYSICS   **(15Hours)**

Intrinsic and Extrinsic semiconductors, Carrier concentration of electrons and holes in intrinsic and extrinsic semiconductors. Dependence of Fermi level on carrier concentration and temperature, Formation of PN Junction, V-I characteristics of PN Junction diode, Energy Diagram of PN diode, Hall effect, Construction and working of LED, Solar cell.

UNIT – IV

DIELECTRICS, MAGNETIC AND SUPERCONDUCTING MATERIALS   (12 Hours)

Dielectrics: Introduction, Types of polarizations – Electronic, Ionic polarizations and calculation of polarizabilities, Internal field, Clausius Mossotti relation.

Magnetic materials: Introduction, Bohr magneton, Classification of Dia, Para, Ferro magnetic materials based on magnetic moment, Properties of Anti-Ferro and Ferri magnetic materials, Hysteresis curve , Soft and Hard magnetic materials.

Super conductivity: Introduction, Meissener effect, Types of superconductors.

UNIT-V

NANO SCIENCE & NANO TECHNOLOGY   (8 Hours)

Nano scale, Types of Nano materials , Surface to volume ratio, Quantum confinement, Bottom-up synthesis : Precipitation, Sol-gel method, Top-down synthesis: Ball milling, Physical vapor deposition (PVD), Chemical vapor deposition (CVD),Characterization techniques - XRD, SEM, Applications of nano materials.

COURSE OUTCOMES:

At the end of the course students,

1. Can apply the principles of lasers and optical fibers in various industrial applications.
2. Basic principles of quantum mechanics can be applied to analyze the band structure of solids.
3. Concepts of semiconductors can be applied to predict the importance of electronic devices relevant to engineering domains.
4. Examine the dielectric, magnetic and superconducting properties of the materials and apply them in engineering material technology.
5. Can identify and compare the nano fabrication methods and gaining insight to the nano materials.

TEXT BOOKS:

1. Engineering Physics by Kshirsagar & Avadhanulu, S. Chand publications.
2. Engineering Physics - B.K.Pandey, S.Chaturvedi, Cengage Learning
3. Essentials of Nano science & Nano technology by Narasimha Reddy Katta,Typical Creative's NANODIGEST,1stEdition,2021.

REFERENCES:

1. Engineering Physics – R.K. Gaur and S.L. Gupta, DhanpatRai Publishers.
2. A.K.Bhandhopadhya- Nano Materials, New Age International, 1stEdition, 2007.
3. Engineering physics 2nd edition –H.K. Malik and A.K. Singh.
4. Engineering Physics – P.K. Palaniswamy, Scitech publications.
5. Physics by Resnick and Haliday.

MALLA REDDY COLLEGE OF ENGINEERING ANDTECHNOLOGY

I Year B. TECH -II-SEM   **L/T/P/C**
                                                                                                        2/0/2/3

(R24A0301) COMPUTER AIDED ENGINEERING GRAPHICS

Course Objectives:

1. To learn basic engineering graphics and Auto CAD concepts.
2. To learn the 2D principles of orthographic projections and Multiple views of the same
3. To know the planes and solid Projection
4. To gain the capability of designing 3D objects with isometric principles by using computer aided sketches
5. To know the conversion of Orthographic Views to isometric Views and isometric to Orthographic views

UNIT-I

Introduction to Auto CAD: Introduction to software interface, Standard toolbar/menu; Understanding the co-ordinate systems-2D and 3D Visualization; Setting the Paper sizes and title block importance, printing and plotting; Draw commands: line, arc, circle, rectangle, polygons, ellipse, polyline, splines, text; Modify commands: copy, mirror, offset, arrays, move, extend, break, trim, lengthen, chamfer, fillet, etc.; Constraints: horizontal, vertical, parallel, concentric, perpendicular, symmetric, equal, collinear; Dimensioning Commands: Dimensioning and Dimension Style; Division: Line division, and circle division; Polygons: Constructing regular polygons - inscribed and circumscribed methods and general method**.**

UNIT-II

Projection of Points: Introduction to reference planes, four quadrants, importance of reference lines; Projection of points in all the four quadrants.

Projection of Lines: Parallel to both the reference planes, Parallel to one plane and perpendicular to other plane, Inclined to one plane and parallel to other plane, Inclined to both planes.

UNIT-III

Projection of Planes: Introduction to Regular planes, Parallel/Perpendicular to one reference plane, Inclined to one reference plane, Inclined to both the reference planes.

Projection of Solids: Introduction - Prisms, Pyramids, Cone and Cylinder, Axis parallel and perpendicular to one reference plane, Axis inclined to one reference plane.

UNIT-IV

Isometric Projection: Introduction, Isometric projection of simple plane figures, Solids - right regular prisms, pyramids, cylinder, cone on H.P, V.P.

UNIT -V

Conversions: Conversion of Isometric Views to Orthographic Views and Orthographic Views to Isometric Views.

TEXT BOOKS:

1. Engineering Drawing – N.D. Bhatt & V.M. Panchal, 48th edition, 2005 Charotar Publishing House, Gujarat.
2. "Computer Aided Engineering Drawing" by Dr. M H Annaiah, Dr C N Chandrappa and Dr B Sudheer Prem Kumar Fifth edition, New Age International Publishers

REFERENCE BOOKS:

1. Computer Aided Engineering Drawing – S. Trymbaka Murthy, - I.K. International Publishing House Pvt. Ltd., New Delhi, 3rd revised edition-2006.
2. Engineering Graphics - K.R. Gopalakrishna, 32nd edition, 2005- Subash Publishers, Bangalore.

COURSE OUTCOMES:

After the completion of course the student will be able:

1. To produce geometric construction, dimensioning & Curves and detail drawings.
2. To compile Projections of points, lines, then create virtual drawing by using computer
3. To sketch the Planes and Solid Projections
4. To develop isometric drawings of simple objects reading the orthographic projections of those objects.
5. To understand and visualize the 3-D view of engineering objects. Elaborate the conversions of 2D -3D and Vice-Versa.

MALLA REDDY COLLEGE OF ENGINEERING ANDTECHNOLOGY

I Year B. TECH –II-SEM   **L/T /P/C**

3/0/0/3

(R24A0502) Data structures and Algorithms

COURSE OBJECTIVES:

This course will enable students to

1. Understand Algorithm complexities and build program logic on Array-Based Search and Sorting Techniques.
2. Learn Object Oriented Programming concepts in Python.
3. Understand the usage of linear data structures.
4. Implement graphs and its traversal techniques in Python.
5. Analyse how non- linear data structures will work.

UNIT – I

Data Structures: Introduction to Algorithm and their properties, Concepts of Analysis of algorithm with asymptotic notations (Big Oh) and their properties, time and space complexities
Types of Data Structures in Python: Built-in and user-defined data structures.
Searching - Linear Search and Binary Search
Sorting - Bubble Sort, Selection Sort, Merge Sort, Quick Sort - efficiency of algorithms - notation of time and space complexity; notations of best, worst and average case performance analysis.

UNIT – II

Oops Concepts - class, object, constructors, types of variables, types of methods. Inheritance: single, multiple, multi-level, hierarchical, hybrid, Polymorphism: with functions, with class methods, with inheritance, Abstraction: abstract classes.

UNIT – III

Stacks - Overview of Stack, Implementation of Stack (List), Applications of Stack
Queues: Overview of Queue, Implementation of Queue (List), Applications of Queues,
Linked Lists – Implementation of Singly Linked Lists, Doubly Linked Lists, Circular Linked Lists.
Implementation of Stack and Queue using Linked list.

UNIT – IV

Non-linear Data Structure - **Graphs** - Introduction, Characteristics of a Graphs, Graph Traversals: Breadth First Search, Depth First Search - Applications of Graphs.

UNIT –V

Non-linear Data Structure: Trees- Tree Terminologies, Characteristics of Trees, Operations on Binary Trees and Binary Search Trees: find, insert and delete.
Tree traversal techniques: Inorder, Preorder, Postorder Traversal, Applications of Trees.

TEXTBOOKS:

1. Core Python Programming -Second Edition ,R. Nageswara Rao, Dreamtech Press
2. Data structures and algorithms in python by Michael T. Goodrich
3. Data Structures and Algorithmic Thinking with Python by Narasimha Karumanchi

REFERENCE BOOKS:

1. Hands-On Data Structures and Algorithms with Python: Write complex and powerful code using the latest features of Python 3.7, 2nd Edition by Dr. Basant Agarwal, Benjamin Baka.
2. Data Structures and Algorithms with Python by Kent D. Lee and Steve Hubbard.
3. Problem Solving with Algorithms and Data Structures Using Python by Bradley N Miller and David L.Ranum.

COURSE OUTCOMES:

The students should be able to:

1. Interpret the concepts of Object-Oriented Programming as used in Python.
2. Know the usage of various searching and sorting techniques
3. Design programs using linear and non-linear data structures, including stacks, queues and Linked lists
4. Develop few Graph traversal techniques
5. Design programs for implementing Tree data structure.

MALLA REDDY COLLEGE OF ENGINEERING ANDTECHNOLOGY

I Year B. TECH -II-SEM **L/T/P/C**
-/0/2/1

(R24A0081) English Language and Communication Skills Lab

The English Language and Communication Skills (ELCS) Lab focuses on the production and practice of sounds of language and familiarizes the students with the use of English in everyday situations both in formal and informal contexts.

Course Objectives:

1. To facilitate computer-assisted multi-media instruction enabling individualized and Independent language learning
2. To sensitize the students to the nuances of English speech sounds, word accent, intonation and rhythm
3. To bring about a consistent accent and intelligibility in students' pronunciation of English by providing an opportunity for practice in speaking
4. To improve the fluency of students in spoken English and neutralize the impact of dialects.
5. To train students to use language appropriately for public speaking, group discussions and interviews

Course Outcomes: Students will be able to:

1. Understand the nuances of English language through audio- visual experience and group activities
2. Neutralise their accent for intelligibility
3. Speak with clarity and confidence which in turn enhances their employability skills

Syllabus: English Language and Communication Skills Lab (ELCS) shall have two parts:

a. Computer Assisted Language Learning (CALL) Lab

b. Interactive Communication Skills (ICS) Lab

Listening Skills:

Objectives

1. To enable students develop their listening skills so that they may appreciate the 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 and find the distinction between different sounds, to be able 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 involve students in speaking activities in various contexts
2. To enable students express themselves fluently and appropriately in social and professional
contexts

• Oral practice

• Describing objects/situations/people

• Role play – Individual/Group activities

• Just A Minute (JAM) Sessions

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

Lab.

Exercise – I

CALL Lab:

Understand: Listening Skill- Its importance – Purpose- Process- Types- Barriers- Effective Listening.

Practice: Introduction to Phonetics – Speech Sounds – Vowels and Consonants – Minimal Pairs Consonant Clusters- Past Tense Marker and Plural Marker- Testing Exercises

ICS Lab:

Understand: Spoken vs. Written language- Formal and Informal English.

Practice: Ice-Breaking Activity and JAM Session- Situational Dialogues – Greetings – Taking Leave –Introducing Oneself and Others.

Exercise – II

CALL Lab:

Understand: Structure of Syllables – Word Stress– Stress pattern in sentences – Intonation.

Practice: Basic Rules of Word Accent - Stress Shift - Weak Forms and Strong Forms- Stress pattern in sentences – Intonation - Testing Exercises

ICS Lab:

Understand: Features of Good Conversation – Strategies for Effective Communication.

Practice: Situational Dialogues – Role Play- Expressions in Various Situations –Making Requests and Seeking Permissions - Telephone Etiquette.

Exercise - III

CALL Lab:

Understand: Errors in Pronunciation-Neutralising Mother Tongue Interference (MTI).

Practice: Common Indian Variants in Pronunciation – Differences between British and American Pronunciation -Testing Exercises

ICS Lab:

Understand   : Descriptions- Narrations- Giving Directions and Guidelines – Blog Writing

Practice   : Giving Instructions – Seeking Clarifications – Asking for and Giving Directions – Thanking and Responding – Agreeing and Disagreeing – Seeking and Giving Advice – Making Suggestions.

Exercise – IV

CALL Lab:

Understand   : Listening for General Details.

Practice   : Listening Comprehension Tests - Testing Exercises

ICS Lab:

Understand   : Public Speaking – Exposure to Structured Talks - Non-verbal Communication Presentation Skills.

Practice   : Making a Short Speech – Extempore- Making a Presentation.

Exercise – V

CALL Lab:

Understand   : Listening for Specific Details.

Practice   : Listening Comprehension Tests -Testing Exercises

ICS Lab:

Understand   : Group Discussion

Practice   : Group Discussion

Minimum Requirement of infrastructural facilities for ELCS Lab:

1. Computer Assisted Language Learning (CALL) Lab:

The Computer Assisted Language Learning Lab has to accommodate 40 students with 40 Systems, with one Master Console, LAN facility and English language learning software for self-study by students.

System Requirement (Hardware component):

Computer network with LAN facility (minimum 40 systems with multimedia) with the following Specifications:

i) Computers with Suitable Configuration

ii) High Fidelity Headphones

2. Interactive Communication Skills (ICS) Lab:

The Interactive Communication Skills Lab: A Spacious room with movable chairs and audiovisual aids with a Public Address System, a T. V. or LCD, a digital stereo –audio & video systemand camcorder etc.

Source of Material (Master Copy):

Exercises in Spoken English. Part 1,2,3. CIEFL and Oxford University Press

Note: Teachers are requested to make use of the master copy and get it tailor-made to suit the contents of the syllabus.

Suggested Software:

- Cambridge Advanced Learners' English Dictionary with CD.
- Grammar Made Easy by Darling Kindersley.
- Punctuation Made Easy by Darling Kindersley.
- Oxford Advanced Learner's Compass, 10th Edition.
- English in Mind (Series 1-4), Herbert Puchta and Jeff Stranks with Meredith Levy, Cambridge.
- English Pronunciation in Use (Elementary, Intermediate, Advanced) Cambridge University
- Press.
- English Vocabulary in Use (Elementary, Intermediate, Advanced) Cambridge University
- Press.
- TOEFL & GRE (KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS).
- Digital All
- Orell Digital Language Lab (Licensed Version)

REFERENCE BOOKS:

1. (2022). English Language Communication Skills – Lab Manual cum Work book. Cengage Learning India Pvt. Ltd.
2. Shobha, KN &Rayen, J. Lourdes. (2019). Communicative English – A workbook. Cambridge University Press
3. Kumar, Sanjay &Lata, Pushp. (2019). Communication Skills: A Workbook. Oxford University Press
4. Board of Editors. (2016). ELCS Lab Manual: A Workbook for CALL and ICS Lab Activities. Orient Black Swan Pvt. Ltd.
5. Mishra, Veerendra et al. (2020). English Language Skills: A Practical Approach. Cambridge University Press

MALLA REDDY COLLEGE OF ENGINEERING ANDTECHNOLOGY

I Year B. TECH -II-SEM   **L/T/P/C**
-/0/3/1.5

(R24A0082)Applied Physics Lab

COURSE OBJECTIVES:

1. To experience the mechanical oscillations and resonance phenomena.
2. To verify the basic concepts of magnetism
3. To understand the concepts of laser and optical fibers.
4. To analyze voltage/current phase behavior of RC and LCR circuits.
5. To study the characteristics of semiconductor devices.

LIST OF EXPERIMENTS:

1. Melde's experiment –Frequency of electrical vibrator.
2. Stewart and Gee's method- Variation of magnetic field along the axis of current carrying coil.
3. Laser-Wavelength of light by using Diffraction grating.
4. CR circuit – Time constant of an RC circuit.
5. LCR Circuit- Quality factor and resonant frequency of LCR circuit.
6. LED -Characteristics of LED.
7. Solar cell -Characteristics of a Solar cell.
8. Optical fiber- Numerical aperture of an optical fiber.
9. Semiconductor-Energy gap of a given semiconductor.
10. Hall Effect – Hall coefficient of semiconducting samples.

REFERENCE BOOKS:

1. Practical physics by Dr. Aparna, Dr K.V Rao, V.G.S. Publications.
2. Engineering physics practical lab manual – MRCET.

COURSE OUTCOMES:

1. Students can analyze how stationary waves are produced to determine the frequency of vibrating bar in different modes.
2. Students can realize Tangent and Biot-Savart law of magnetism.
3. Wavelength of the given laser can be determined by using diffraction phenomenon.
4. By understanding basic electrical principles, Time constant of RC and resonance phenomenon of LCR circuits can be analyzed.
5. Energy gap and V-I characteristics of various semiconductor devices can be illustrated.

MALLA REDDY COLLEGE OF ENGINEERING ANDTECHNOLOGY

I Year B. TECH -II-SEM   **L / T / P / C**

- /0 /3/1.5

(R24A0582) Data Structures And Algorithms Lab

COURSE OBJECTIVES:

1. To simulate searching and sorting techniques.
2. To understand a range of Object-Oriented Programming, as well as in-depth data and information processing techniques.
3. To know how linear data structures work
4. To illustrate non-linear data structures.
5. To develop programs for performing operations on Trees and Graphs.

LIST OF PROGRAMS:

1.   a. Write a program to implement Linear Search
     b. Program on Binary search using oops concepts in python (iterative or non recursive function)

2.   a. Write a program to arrange the following list in ascending order using bubble sort
     b. Write a program to arrange all the alphabets of "CSIPLEARNING" hubinto descending order using bubble sort

3.   a. Write a python program to sort the following data using Selection sort
     b. Write a python program to sort the following data using Selection sort
        14, 21, 27, 41, 43, 45, 46, 57, 70

4.   Write a Python program for implementation of MergeSort

5.   a. Write a python program to implement Quick Sort Algorithm
     b. Write a python program to implement Quick sort using following list
        50, 23, 9, 18, 61, 32

6.   a. Write a simple program to create class and object to access the class members
     b. Write a python program to Create Student Class
     c. Write a python program to Create Student Class with Constructor and Destructor

7.   a. Write a program to implement single Inheritance
     b.Write a python program to implement multiple or multilevel inheritance
     c.Write a program to implement abstract classes

8.   a. Write a program to implement Method Overloading
      b.   Write a program to implement Method Overriding
      c.   Write a python program to implement operator Overloading

9.   Implement the following stack operations in python
      a. Insertion   b. Deletion   c. Display
      d. Implement a python program to reverse a string using stack

10.   Implement the following Queue operations in python
      a. Insertion   b. Deletion   c. Display

11.   Write a python program to implement a following singly linked list operation.
      a.   Create a singly linked list
      b.   Add the elements in single linked list
      c.   Access elements from the singly linked list
      d.   Remove elements from the singly linked list

12.   Write a python program to implement a doubly linked list.
      a.   Create a doubly linked list
      b.   Add elements to a doubly linked list
      c.   Access elements from the doubly linked list
      d.   Remove elements from the doubly linked list.

13. a. Write a python program to implement stack a using list
     b. Write a python program to implement Queue using list

14.   a. Write a program to implement any one operation on Binary Search Tre
       b. Write a python program to implement Binary tree traversal
       i. Preorder   ii. Inorder   iii. Post order

COURSE OUTCOMES:

After completion of the course, the students should be able to:
1. Illustrate how searching and sorting can be done.
2. Interpret the concepts of Object-Oriented Programming as used in Python.
3. Implement stacks, queues and linked list.
4. Implement Non-Linear data structures like graphs
5. Solve problems using various trees

MALLA REDDY COLLEGE OF ENGINEERING ANDTECHNOLOGY

I Year B.TECH –II-SEM   **L/T/P/C**
                                                                                                            2/0/0 /0

(R24A0004) ENVIRONMENTAL SCIENCES
(Mandatory Course)

Course Objectives: On successful completion of this course, students will be able:

1. To differentiate the inter relationship between biotic and abiotic component.
2. To categorize various types of natural resources available on the earth surface.
3. To detect the causes, and control measures for various environmental pollution.
4. To articulate the issues related to solid waste and its management.
5. To understand the importance of ecological balance for sustainable development.

UNIT-I ECOSYSTEM (6 hours)
Definition: Scope, and Importance of ecosystem. **Classification**: natural and artificial ecosystems, **Structure**- abiotic and biotic component, functions of an ecosystem, food chains, food webs and ecological pyramids, biomagnification and bioaccumulation, ecosystem value, services and carrying capacity.
Activities: Case studies, poster making

UNIT-II NATURAL RESOURCES (6 hours)
Classification of Resources: Definition of natural resource, renewable and non -renewable resources.
Renewable resources: water resources: use and over utilization of surface and ground water, floods and droughts, Dams: benefits and problems. **Land resources:** Forest functions and deforestation. **Energy resources:** growing energy needs-solar energy, hydro energy, biogas and biofuel.
Non-Renewable Resources: Fossil fuels, refining of coal, petroleum, and natural gas.
Activities: Case studies, News articles

UNIT-III ENVIRONMENTAL POLLUTION AND CONTROL MEASURES (6 hours)
Definition, Types of pollution: **Air Pollution:** Primary and secondary pollutants, Automobile and Industrial pollution, Ambient air quality standards, control measures of air pollution and prevention techniques. **Water pollution:** causes, effects, control measures and techniques.
Activities: Work sheets, Debate

UNIT-IV SOLID WASTE MANAGEMENT AND GLOBAL ISSUES (6 hours)
Definition of Solid waste, characteristics of solid waste, solid waste management: collection to disposal methods, e-waste management techniques. **Global environmental Issues and efforts:** Climate change and impacts on human environment. Ozone depletion and Ozone depleting

substances (ODS).**International conventions/protocols:** Earth summit, Kyoto protocol, and Montreal Protocol, NAPCC-GOI Initiatives.

Activities: Quiz, seminars

UNIT-V SUSTAINABLE DEVELOPMENT (6 hours)

Introduction to concept of sustainable development: Sustainable development goals, threats and strategies to achieve sustainability. Sustainable developmental activities: Green building concept, Crazy Consumerism, Ecological Foot Print, Low carbon life style.

Activities: Seminars, slogans

SUGGESTED TEXT BOOKS

1. Textbook of Environmental Studies for Undergraduate Courses by ErachBharucha for University Grants Commission.
2. Environmental Studies by R. Rajagopalan, Oxford University Press.
3. Textbook of Environmental Science and Technology - Dr. M. Anji Reddy 2007, BS Publications.
4. Dr. P. D Sharma, "Ecology and Environment", Rastogi Publications, New Delhi, 12 Edition, 2015.

REFERENCE BOOKS

1. Environmental Studies by AnubhaKaushik, 4 Edition, New age international publishers.
2. Environmental Science: towards a sustainable future by Richard T. Wright. 2008 PHL Learning Pvt. Ltd, New Delhi.
3. Environmental Engineering and science by Gilbert M. Masters and Wendell P. Ela. 2008 PHL Learning Pvt. Ltd, New Delhi.
4. Environmental Science by Daniel B. Botkin& Edward A. Keller, Wiley INDIA edition.

COURSE OUTCOMES: The basic concepts included in this course will help the student to:

1. Gain knowledge and appreciate the interdependence of environment with ecosystem.
2. Learn about natural resource, its importance and environmental impacts of human activities on natural resources.
3. Understand severity of environmental pollution, its impact on environment and evaluate relevant practices.
4. Develop empathy towards environment and apply the knowledge of recycling techniques associated with waste management.
5. Adopting sustainability as a practice into their lifestyle on the basis of ecological principles.

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

II Year B. TECH - I- SEM   **L/T/P/C**

3/-/-/4

(R24A0302) ENGINEERING MECHANICS

COURSE OBJECTIVES:
1. To understand the resolution of a system of forces, compute their resultant and solve problems using equations of equilibrium.
2. Perform analysis of bodies lying on rough surfaces. To understand the concept of analysis of trusses using method of joints and method of sections.
3. Locate the centroid of a simple figure and composite figures.
4. Locate the centroid of a body and compute the area moment of inertia and mass momentof inertia of standard and composite sections.
5. To understand kinetics and kinematics of particles motion of rigid bodies.

UNIT I

Resultants of Force System: Introduction, Parallelogram law **–**Forces and components- Resultant of coplanar Concurrent Forces Moment of Force-problems.

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

UNIT II

Friction: Introduction **–** Theory of Friction – Angle of friction - Laws of Friction – Static and Dynamic Frictions

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 cantilevers & simply–supported trusses-by method of joints, method of sections

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.

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- Rectangular motion-motion curves-Rectangular components of curvilinear motion.

Kinetics of Particles: D'Alemberts Principle for plane motion and connected 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
3. Engineering Mechanics / S.S. Bhavikati & K.G. Rajasekharappa

REFERENCES:

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

COURSE OUTCOMES:

1. Gain the knowledge on the concepts of force and moment also apply the knowledge on drawing free body diagrams in problem solving.
2. Students able to do analysis of trusses using method of joints and method of sections.
3. Students are capable of finding centroid and Centre of gravity of simple and composite Figures.
4. Students are capable of finding centroid and moment of inertia, mass moment of Inertia of simple and composite figures.
5. Students able to understand the motion of a particle in a straight line and apply concepts of D'Alemberts principle in particle motion.

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

II Year B. TECH - I- SEM   **L/T/P/C**

3/-/-/3

(R24A0303) ENGINEERING THERMODYNAMICS

COURSE OBJECTIVES:

1. To understand the concepts of energy transformation, conversion of heat into work.
2. To acquire knowledge about the fundamentals of thermodynamic laws, the concept of entropy,and principles.
3. To understand how the change of state results in a process.
4. To understand the various gas laws, psychrometric properties and chart.
5. To learn the importance of thermodynamic cycles, and the derivation of efficiency.

UNIT-I

Basics of thermodynamics: System - Types of Systems - Control Volume - Macroscopic and Microscopic viewpoints - Thermodynamic Equilibrium- State, Property, Process, Cycle – Reversibility – Quasi static Process, Irreversible Process, Causes of Irreversibility – Work and Heat, Point and Path functions. Zeroth Law of Thermodynamics– PMM I - Joule's Experiment – First law of Thermodynamics and its Corollaries – First law applied to a Process– Steady Flow Energy Equation.

UNIT-II

Entropy: 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 - 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

Properties of pure substances: p-V-T- surfaces, T-S and h-s diagrams, Phase Transformations – Triple point at critical state properties during change of phase - Dryness Fraction – 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.

UNIT-IV

Mixtures of perfect Gases: Mole Fraction, Mass fraction Gravimetric and volumetric Analysis – Dalton's Law of partial pressure Avogadro's 's law of additive volumes – Mole fraction , Volume fraction and partial pressure - Equivalent Gas constant, Enthalpy, Specific Heats and Entropy of Mixture of perfect Gases- Vapour, and 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 – Psychrometric chart.

UNI-V

Power Cycles: Otto cycle, Diesel cycle, Dual Combustion cycle and Brayton cycle description andrepresentation on P–V and T-S diagram, Thermal Efficiency, Mean Effective Pressures on Air standard basis – Comparison of Cycles. Basic Rankine cycle – Performance Evaluation.

TEXT BOOKS:

1. Engineering Thermodynamics, Special Edition. MRCET, McGrahill Publishers.
2. Engineering Thermodynamics / PK Nag /TMH, III Edition
3. Thermodynamics – J.P.Holman / McGrawHill
   REFERENCE BOOKS:

1. Engineering Thermodynamics – Jones & Dugan
2. Thermodynamics – An Engineering Approach – YunusCengel& Boles /TMH
3. An introduction to Thermodynamics / YVC Rao / New Age
4. Engineering Thermodynamics – K. Ramakrishna / Anuradha Publisher
   COURSE OUTCOMES:

1. Analyse the work and heat interactions associated with a prescribed process path and toperform an analysis of a flow system.
2. Quantify the irreversibility associated with each possibility and choose an optimal cycle.
3. Able to analyse Mollier chart, and to find the quality of steam.
4. Able to analyse psychrometric chart, to estimate thermodynamic properties such as WBT, DBT,RH, etc.
5. Analyse the thermodynamic cycles and evaluate performance parameters.

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

II Year B. TECH - I- SEM **L/T/P/C**
2/1/-/3

(R24A0304) FLUID MECHANICS & HYDRAULIC MACHINES

COURSE OBJECTIVES:

1. To give insight knowledge on fluid statics.

2. To gain knowledge on fluid kinematics and dynamics.

3. To give basic understanding of boundary layer concept and analyze different types of losses and measurement of flow.

4. To become familiar about different types of turbines & able to analyze their performance characteristics of various turbines.

5. To be able to understand the working of power absorbing devices like pumps & able to analyze their performance characteristics.

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

UNIT-II:
Fluid Kinematics: Stream line, path line and streak lines and stream tube, classification of flows-steady & unsteady, uniform, non-uniform, laminar, turbulent, rotational, and ir-rotational flows-equation of continuity for one dimensional flow.
Fluid Dynamics: Surface and body forces –Euler's and Bernoulli's equations for flow along a stream line, momentum equation and its application on force on pipe bend.

UNIT-III:
Boundary Layer Concept: Definition, thickness, characteristics along thin plate, laminar and turbulent boundary layers (No derivation).
Closed conduit flow: Reynold's experiment- Darcy Weisbach equation- Major and Minor losses - pipes in series and pipes in parallel- total energy line-hydraulic gradient line. Measurement of flow: Pitot tube, Venturi meter and Orifice meter.

UNIT-IV:
Basics of Turbo Machinery: Hydrodynamic force of jets on stationary and moving flat, inclined, and curved vanes.
Hydraulic Turbines: Classification of turbines, impulse and reaction turbines, Pelton wheel turbine, Francis turbine and Kaplan turbine-working proportions, work done, efficiencies. Hydraulic design- draft tube theory- functions and efficiency.
Performance of hydraulic turbines: Geometric similarity, Unit and specific quantities, characteristic curves, cavitation, surge tank, water hammer.

UNIT-V:
Centrifugal Pumps: Classification, working, work done – manometric head and efficiencies specific speed- 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).

COURSE OUTCOMES:

1. Students will gain the knowledge on fluid mechanics fundamentals like fluid statics.

2. Student will have basic idea on fluid dynamics and kinematics which are used in real working environment.

3. Student will study the fundamental of boundary layer concepts and its applications.

4. Student will understand the principles of turbo machinery and measure the performance of different types of turbines.

5. Student will calculate the performance of different types of pumps.

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(R24A0305) MATERIALS ENGINEERING

COURSE OBJECTIVES:
1. To understand the basic structure, mechanism of crystallization and imperfections incrystals.
2. To study the importance of binary phase diagrams.
3. To acquire knowledge on properties and structure of ferrous and nonferrous alloys and to select suitable materials for various engineering applications.
4. To learn various methods of heat treatment processes.
5. To gain knowledge on advanced Composite materials.

UNIT I

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

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

UNIT II

Equilibrium Diagrams

Experimental methods of construction of equilibrium diagrams, Isomorphous alloy systems, equilibrium cooling and heating of alloys, Lever rule, eutectic systems, congruent melting intermediate phases, peritectic reaction.

Transformations in the solid state, allotropy, eutectoid, peritectoid reactions, phase rule, relationship between equilibrium diagrams and properties of alloys. Study of binary phase diagram of Fe-Fe3C.

UNIT III

Cast Iron & Steel: Structure and properties of White Cast iron, Malleable Cast iron, Grey cast iron, Spheroidal graphite cast iron, Alloy cast irons. Classification of steels, structure and properties of plain carbon steels, Low alloy steels, had field manganese steels, tool and die steels.

Nonferrous metals & Alloys: Structure and properties of copper and its alloys, Aluminium and its alloys, Titanium and its alloys.

UNIT IV

Heat treatment of Alloys: Effect of alloying elements on Iron – Iron carbon system, Annealing, normalizing, Hardening, TTT diagrams, tempering, Harden ability, surface - hardening methods, Age hardening

Ceramic Materials: Crystalline ceramics, glasses, cermets.

UNIT V

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

TEXT BOOKS:

1. Kodgire, Material Science and Metallurgy, 42nd edition Everest Publishing House2017.
2. Donald R.Askeland, Essential of Materials Science and Engineering. Thomson Publications2014.
3. V.Raghavan, Material Science and Engineering, Prentice –Hall of India Pvt. Ltd., 2007
4. Sidney H. Avner, Introduction to physical metallurgy, Tata Mc-Graw-Hill, Inc. 1997.

REFERENCES:

1. Sidney H. Avener, Introduction to Physical Metallurgy, TMH
2. William and collister, Materials Science and Engineering, wiley pub. 2014.
3. V. Raghavan, Material scienceand engineering, PH Pub. 2015.
4. R.K.Rajput, Engineering materials and metallurgy. S.Chand & Co. 2006.
5. O.P. Khanna, Material Science and Metallurgy. Dhanpatrai Pub. 2014

COURSE OUTCOMES:

1. Understand the mechanism of crystallization, methods of determining grain size andfactors affecting the solid solubility.
2. Use the phase diagrams of binary systems and iron-carbide diagram to select the material composition.
3. Understand the structure and properties of various cast irons, steels and nonferrousalloys.
4. Apply the various heat treatment processes, TTT diagram, surface hardening methods &coatings depending on material requirements.
5. Understand the importance of ceramics, composites and concepts of metallurgy.

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(R24A0306) Kinematics of Machinery

Course Objectives:
1. To impart knowledge on various types of links and synthesis and to understand the conceptof machines, mechanisms and related terminologies.
2. To understand the principles and working of various straight line motion mechanisms. To analyze Steering gear mechanisms.
3. Formulate the concept of synthesis and analysis of different mechanisms and working of hooks joint.
4. Distinguish a mechanism for displacement, velocity and acceleration at any point in a movinglink this is prerequisite for dynamics of machines.
5. To understand the theory of gears, gear trains and cams.

UNIT-I
Introduction of Mechanisms and Machines:
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, 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 Russell Grasshopper Watt T. Chebicheff and Robert Mechanisms and straight- l i n e motion, Pantograph.
Steering Gear Mechanisms: Conditions for correct steering Davis Steering gear Mechanism, Ackerman's steering gear mechanism.

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.
Hooke's Joint: Single and double Hook's joint Universal coupling application problems.

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. Maximum velocity and maximum acceleration during outward and return strokes in the above 2 cases.

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: cycloid and involutes profiles. Velocity of slidingphenomena of interferences.

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. Rattan S.S, "Theory of Machines" Tata McGraw-Hill Publishing Company Ltd., New Delhi, and 2ndedition -2005.
 2. Sadhu Singh, "Theory of Machines," Pearson Education (Singapore) Pvt. Ltd., Indian Branch, New
Delhi, 2ND Edi. 2006.
3. Theory of machines, (4th Edition), by R.S. Khurmi, S.chand Publications.

REFERENCE BOOKS:
1. Shigley. J. V. and Uickers, J.J., "Theory of Machines & Mechanisms" OXFORD University press.2004
2. "Theory of Machines -I", by A.S.Ravindra, Sudha Publications, Revised 5th Edi. 2004

Course outcomes:
At the end of course the students will be able to:
1. Build up critical thinking and problem-solving capacity of various mechanical engineering problems related to kinematics of machines.
2. Asses various concepts of mechanisms like straight line motion mechanisms, Steering gear mechanisms and working principles of power elements (Gears, gear trains, Cams, Belt and Chain drives) and design related problems effectively.
3. Utilize analytical, mathematical and graphical aspects of kinematics of Machines for effective design.

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(R24A0307) COMPUTER AIDED MACHINE DRAWING

COURSE OBJECTIVES:

1. To familiarize with the standard conventions for different materials and machine parts in working drawings.
2. To gain knowledge of conventional representation of various machining and mechanical details as per IS.
3. To gain knowledge of threads, bolts, nuts, stud bolts, tap bolts, set screws, Keys, cottered joints and knuckle joint.
4. To make part drawings including sectional views for various machine elements.
5. To prepare assembly drawings given the details of part drawings.

Part A: Drawing of Machine Elements and simple parts

1. Selection of Views, additional views for the following machine elements and parts with every drawing proportion.
2. Popular forms of Screw threads, bolts, nuts, stud bolts, tap bolts, setscrews.
3. Keys, cottered joints and knuckle joint.
4. Rivetted joints for plates
5. Solid Journal Bearing & Couplings

Part B: Assembly Drawings

1. Drawings of assembled views for the part drawings of the following using conventions and easy drawing proportions.
2. Steam engine parts– Stuffing box, Crosshead, Eccentric.
   Machine parts-Screw jack.
3. Petrol engine connecting rod

NOTE:

1. First angle projection to be adopted. The student should be able to provide working drawings of actual parts.
2. Part A need to be done by using AUTOCAD and Part B need to be done by using Creo.

TEXT BOOKS:
1. Machine Drawing –K.L. Narayana, P.Kannaiah & K.Venkata Reddy / New Age/ Publishers
2. Machine Drawing with Auto CAD / Goutham Pohit, Goutam Ghosh / Pearson
3. Machine Drawing / N.D. Bhatt / Charotar

REFERENCE BOOKS:

1. Machine Drawing by / Bhattacharyya / Oxford
2. Machine Drawing / Ajeet Singh / Mc Graw Hill
3. Machine Drawing –P.S.Gill.

COURSE OUTCOMES:

1. Preparation of engineering and working drawings with dimensions and bill of material during design and development. Developing assembly drawings using part drawings of machine components.
2. Conventional representation of materials, common machine elements and parts such as screws, nuts, bolts, keys, gears, webs, ribs.
3. Types of sections – selection of section planes and drawing of sections and auxiliary sectional views. Parts not usually sectioned.
4. Methods of dimensioning, general rules for sizes and placement of dimensions for holes, centers, curved and tapered features.
5. Title boxes, their size, location and details - common abbreviations and their liberal usage. Types of drawings – working drawings for machine parts.

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(R24A0381) Fluid Mechanics & Hydraulic Machines Lab

COURSE OBJECTIVES:

1. To gain knowledge in performance testing of Hydraulic Turbines and Hydraulic Pumps at constant speed and head.
2. To provide practical knowledge in verification of principles of fluid flow.
3. To calculate cd, cc, cv and Coefficient of impact of various hydraulic systems
4. To understand Major and minor losses.
5. Student able to learn about measuring pressure, discharge and velocity of fluid flow.

LIST OF EXPERIMENTS

1. Determination of coefficient of discharge of Orifice meter.
2. Determination of coefficient of discharge of Venturimeter.
3. Determination of friction factor for a given pipe line.
4. Verification of Bernoulli's theorem.
5. Determination of loss of head in a pipeline.
6. Performance Test on Single Stage Centrifugal Pump.
7. Performance Test on Multi Stage Centrifugal Pump.
8. Performance Test on Reciprocating Pump.
9. Performance Test on Pelton Wheel.
10. Performance Test on Francis Turbine.
11. Performance Test on Kaplan Turbine.
12. Determination of Impact of Jet on Vanes

NOTE: Minimum a total of 8 experiments are to be conducted.

COURSE OUTCOMES:

1. To provide the students' knowledge in calculating performance analysis in turbines.
2. Students exposure to study various operating characteristics of Centrifugal pump and Reciprocating pump.
3. Analyze a variety of fluid flow devices and utilize fluid mechanics principles in design.
4. Get Exposure to verification of Bernoulli's Theorem.
5. To provide the students with a solid foundation in fluid flow principles.

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(R24A0382) MATERIALS ENGINEERING AND FUELS & LUBRICANTS LAB

COURSE OBJECTIVES:

1. Analyze the tensile and compressive strength of a specimen.
2. Determine the hardness, impact strength, fatigue strength
3. To analyze the application of a specific material for a given design requirement
4. Understanding the bending in beams and to analyze the bending stresses
5. Evaluate the capacity of a material to withstand torsional stresses for a safe and sustainable

LIST OF EXPERIMENTS

1. Direct Tension Test.
2. Brinell's Hardness Test.
3. Rockwell Hardness Test.
4. Charpy Impact Test.
5. Izod Impact Test.
6. Torsion Test.
7. Compression test on spring.
8. Tension test on spring.
9. Deflection of Simply supported beam.
10. Deflection of Cantilever beam.
11. Shear Test.
12. Compressive Test on Cube

   NOTE: Minimum a total of 8 experiments are to be conducted.

COURSE OUTCOMES:

1. To provide the students' knowledge in finding the materials testing of metals and alloys.
2. To know the hardness of metals.
3. Get Exposure different kinds of materials testing.
4. To provide students hands on experience to handle the machines.

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(*R22A00XX) Foreign Language: German

INTRODUCTION

This is the age of globalization. Faster communication, extensive travel, greater interaction, outsourcing of jobs, demand of skilled person had made the engineering graduates to learn GERMAN language. Nowadays Aircraft and mechanical domain require more and more graduates with minimum knowledge to speak in German language.

German language has been one of the fastest learning languages in the world. This course iscustomized according to the demand of the requirement in job industries.

COURSE OBJECTIVES:

1.To equip with the vocabulary to create new sentences, sentence pattern, correct pronunciation.
2. To make the students an efficient German language speaker.
3. To focus on basic linguistic and communicative structures of the German language.

UNIT 1: Basics of Deutsch

Introduction – (About German Country, Language & Culture)

Formal and Informal Greetings

Alphabet

Numbers (0-50)

Days of The Week and Months of The Year

Vocabulary, Exercises and Assignments

UNIT 2: Getting closer with Deutsch

Family

Seasons & Weather

Time & Directions, Days of Weak, Months

Colours & Shapes, Numbers (51 – 100)

Subject Pronouns

Vocabulary, Exercises and Assignments

Unit 3: Construction of Simple Sentences

Formal Introduction

Asking Questions

Responding to the Questions

Simple Sentences

Articles, Numbers (101 And
Above)Vocabulary, Exercises
and Assignments

Unit 4: Dialogue Writing

Introduce Oneself
Introduce Others
At the Restaurant
At the Railway Station
At the University
Vocabulary, Exercises and Assignments

REFERENCE BOOKS
1. Collins easy learning GERMAN dictionary
2. Hallo deutsch – Parul sharma
3. Studio D A1 – Hermann
4. So geht das – New Saraswati book house
5. Practice German language for beginners – Dominic
6. German Made easy – Diego Agundez.

COURSE OUTCOMES
After completion of the course, Student will be able to:
1. stand ahead of getting the opportunity in the Job market by learning German language.
2. learn German language with engineering degree that will give them a sense of identity among
the competitive global engineering industry.
3. learn German language on a regular basis that will help them in improving multi-lingual ability

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(R24A0308) Thermal Engineering - I

COURSE OBJECTIVES:

1. To have Knowledge in steam power plants and their components, performance and analysis of Steam Turbines, Gas Turbines.
2. To understand Steam nozzles, Steam Condensers and their performances in Industries.
3. The purpose of this course is to enable the student to gain an understanding of how thermodynamic principles govern the behavior of various systems.
4. Evaluate the performance of critical components and accessories steam and gas power plants.
5. To understand the concept of jet propulsion, Rockets and their propellants.

UNIT-I

Basic Concepts: Rankine cycle – Schematic layout, Thermodynamic Analysis, Concept of Mean Temperature of heat addition, Methods to improve cycle performance Regeneration& reheating

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

UNIT-II

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

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

UNIT-III

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

Reaction Turbine: Mechanical details - Principle of operation, Thermodynamic analysis of astage, Degree of reaction - Velocity diagram - Parson's reaction turbine - Condition for Maximum efficiency.

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.

UNIT-V

Jet Propulsion: Principle of Operation - Classification of jet propulsive engines – Working Principles with schematic diagrams and representation on T-S diagram- Thrust, Thrust Power and Propulsion Efficiency - Turbo jet engines - Needs and Demands met by Turbo jet

-Schematic Diagram, Thermodynamic Cycle, Performance Evaluation Thrust Augmentation - Methods.

Rockets: Application - Working Principle - Classification- Solid and Liquid propellant Rocket Engines

TEXT BOOKS:
1. Thermal Engineering / Rajput / Lakshmi Publications.
2. Gas Turbines / V. Ganesan / TMH.
3. Thermal Engineering /P.L. 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.K. Gupta / S. Chand Pub.
3. Thermodynamics and Heat Engines / R. Yadav / Central Book Depot

COURSE OUTCOMES:

1. Describe knowledge of Rankine cycle and heat equation in different processes, and improving efficiency techniques.
2. Demonstrate knowledge of ability to identify & apply fundamentals to solve problems involving nozzles and turbines, jet propulsion systems and rockets.
3. Design nozzles, turbines and condensers with desired needs within realistic constraints related thermal fields like different types of power plants etc.
4. Explore their knowledge & ability to design the constructional features of various types of boilers in various fields of energy transfer equipment's and to understand the velocity triangles in Steam Turbines & Reaction Turbines
5. Knowledge of impact of engineering solutions on the society and also on contemporary issues related to different types of steam cycles and propulsion systems.

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(R24A0309) Strength of Materials

Course Objectives:

1. To impart preliminary concepts of Strength of Material and Principles of Elasticity and Plasticity Stress conditions and to develop diagrams of variation of various stresses across the length.
2. To give concepts of stresses developed in the cross section and bending equations calculation of section modulus of sections with different cross sections
3. The concepts above will be utilized in measuring deflections in beams under various loading and support conditions
4. To classify cylinders based on their thickness and to derive equations for measurement of stresses across the cross section when subjected to external pressure.

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 modules & the relationship between them – Deformation in Bars of varying cross section – composite bars – Thermal stresses. Strain energy – Resilience – Gradual, sudden, impact and shock loadings.

UNIT-II

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

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 circularsections (Solid and Hollow), I, T -sections, Angle and Channel Sections.

Shear Stresses:

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

UNIT-IV

Deflection of Beams: Bending into a circular arc – slope, deflection and radius of curvature – Differential equation for the elastic curve of a beam – Double integration and Macaulay's methods – Determination of slope and deflection for cantilever, simply supported and overhanging beams subjected to point loads, uniformly distributed loads, uniformly varying

loads, partial uniformly distributed loads, couple and combination of these loads. Mohr's theorems – Moment area method – application to simple cases of cantilever

UNIT-V

Thin cylinders & spheres: Hoop and axial stresses and strain, Volumetric strain. Thick cylinders: Radial, axial and circumferential stresses in thick cylinders subjected to internal or external pressures, Compound cylinders. Stress due to interference fits.

Torsion of Circular Shafts: Theory of pure torsion, Derivation of torsion equations: $T/J=q/r=N\theta/L$. Assumptions made in theory of pure torsion-Tensional moment of resistance – Polar section modulus – Power transmitted by shafts.

TEXT BOOKS:
1. A Textbook of Strength of Materials, by R. K. Rajput, 7e (Mechanics of Solids) SI Units S. Chand & Co, NewDelhi
2. Strength of Materials by R.K. Bansal, Laxmi Publications 2010.
3. Strength of materials by S. Ramamrutham, Dhanpat Rai and Sons, Delhi
4. Strength of materials by Sadhu Singh. Khanna Publications.

REFERENCE BOOKS:
1. Strength of Materials -By Jindal, Umesh Publications.
2. Strength of materials by Bhavikatti, Lakshmi publications.
3. Mechanics of Structures Vol-III, by S.B. Junnarkar.

Course Outcomes:
1. The student will be able to understand the basic materials behavior under the influence of different external loading conditions and the support conditions
2. The student will be able to draw the diagrams indicating the variation of the key performance features like bending moment and shear forces
3. The student will have knowledge of bending concepts and calculation of section modulus and for determination of stresses developed in the beams and deflections due to various loading conditions
4. The student will be able to assess stresses across section of the thin and thick cylinders to arrive at optimum sections to withstand the internal pressure using Lame's equation

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(R24A0310) Dynamics of Machinery

Course objectives:
1. To analyze the forces in clutches, brakes and dynamometers involving friction.
2. To Understand the effect gyroscopic couple in motor cycles, aero planes and ships.
3. To understand the static and dynamic force analysis of four bar and slider crank mechanisms.
4. To study the turning moment diagrams of reciprocating engines and to learn design procedure of a flywheel
5. To learn analytical and graphical methods for calculating balancing of rotary and reciprocating masses
6. Understanding of vibrations and its significance on engineering design

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'Alemberts Principle – planar rotation about a fixed centre.
Friction and Friction Drives: Introduction to friction, Laws of friction, Coefficient of friction, Inclined plane, Pivot and Collars, Friction clutches-centrifugal clutch.

UNIT–III
Brakes and Dynamometers: Simple block brakes, internal expanding brake, band brake of vehicle. Dynamometers – absorption and transmission types.
Turning moment Diagrams: Single cylinder double acting steam engine, Four Stroke Cycle Internal Combustion Engine, Multi-cylinder Engine, and Flywheel.

UNIT–IV
Balancing: Balancing of rotating masses Single and multiple – single and different planes. Balancing of Reciprocating Masses- Primary, Secondary balancing of reciprocating masses using Analytical methods.
Governors: Introduction, its types, pendulum, and Gravity Governors

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

TEXT BOOKS:
1. Rattan S.S, "Theory of Machines" Tata McGraw-Hill Publishing Company Ltd., New Delhi, and 2nd edition -2005.
2. Sadhu Singh, "Theory of Machines," Pearson Education (Singapore) Pvt. Ltd., Indian Branch, New Delhi, 2NDEdi. 2006.
3. Theory of machines, (4th Edition), by R.S. Khurmi, S. Chand Publications.

REFERENCE BOOKS:
1. Shigley. J. V. and Uickers, J.J., "Theory of Machines & Mechanisms" OXFORD University press.2004
2. "Theory of Machines -I", by A.S. Ravindra, Sudha Publications, Revised 5th Edi. 2004

Course outcomes:

1. To compute the frictional losses and transmission in clutches, brakes and dynamometers
2. To determine the effect of gyroscopic couple in motor vehicles, ships and aero planes
3. To analyze the forces in four bar and slider crank mechanisms and design a flywheel
4. To determine the rotary unbalanced mass in reciprocating equipment
5. To determine the unbalanced forces and couples in reciprocating and radial engines
6. To determine the natural frequencies of discrete systems undergoing longitudinal, torsional and transverse vibrations.

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(R24A0311) Manufacturing Processes

COURSE OBJECTIVES:

1. The primary objective of this course is to introduce the concept of manufacturing technology with the help of various casting processes widely employed in industries.
2. The course consists of welding and its classifications with the related details of equipment and applications.
3. To understand various metal forming, hot and cold working process. To appreciate the capabilities, advantages and the limitations of the processes.
4. To understand the various concepts of extrusion, forging processes, drawing, its classification and their applications.
5. To understand the various concepts of additive manufacturing and its advance techniques along with their applications.

UNIT-I
Casting: Pattern, Pattern materials, Pattern making, allowances of pattern and Pattern types., Casting process
Types of casting: Continuous casting, Squeeze casting, vacuum mould casting, Evaporative pattern casting, ceramic shell casting, Casting defects., Molding process, Types of Molding process: Injection Molding, Blow molding.

UNIT-II:
Welding: Introduction, Types of weld joints, Types of welding process: Gas welding, Arc welding, Electron beam Welding, Laser beam welding, Friction Stir Welding, Ultrasonic Welding, Thermite welding., Types of Arc welding process: Shielded metal arc welding, Submerged arc welding., Types of Gas welding process: GTAW, GMAW., Types of Resistance welding process: Spot welding, Seam welding., welding defects – causes and remedies, Heat affected zones in welding.

UNIT-III:
Extrusion and Forging: Basic Extrusion process and types, Forging operations and its Classification. Drawing: wire and tube drawing, Swaging, Blanking, Piercing, Punching and Trimming.
Cutting of Metals: Oxy – Acetylene Gas cutting, Water Plasma Cutting, TIG cutting, MIG cutting, Soldering, Brazing.

UNIT-IV:

Metal Forming: Introduction, forming processes - Bending, Coining, embossing, rolling: types of Rolling and Roll mills, Strain Hardening, Recovery, Recrystallization and Grain growth

Advanced Metal Forming Process: Details of High energy rate forming process, Electro Magnetic Forming, Explosive Forming, Electro-Hydraulic Forming, Contour Roll forming.

UNIT-V:

Additive manufacturing: Introduction to Rapid Prototyping, material, applications, limitations., Techniques: Photo polymerization, Stereo lithography, Powder Bed Fusion, Selective Laser Sintering, 3D Printing, Laminated Object Manufacturing.

TEXTBOOKS:

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

REFERENCE BOOKS:

1. Principles of Metal Castings, Rosenthal.
2. Welding Process, Parmar
3. Manufacturing Technology, R.K. Rajput, Laxmi Pub
4. Manufacturing Engineering &Technology, Kalpak Jain,S.

COURSE OUTCOMES:

1. Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. Acquire knowledge and hands-on competence in applying the concepts of manufacturing science in the design and development of mechanical systems.
3. Competence to design a system, component or process to meet societal needs within realistic constraints.
4. Demonstrate creativeness in designing new systems components and processes in the field of engineering in general and mechanical engineering in particular.
5. An ability to formulate solve complex engineering problem using modern engineering and information Technology tools.

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II Year B. TECH - II- SEM   **L/T/P/C**
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(R24A00XX) Probability, Statistics and Queuing Theory

COURSE OBJECTIVES:

• To understand a random variable that describes randomness or an uncertainty in certain realistic situation. It can be either discrete or continuous type.

• To learn important probability distributions like: in the discrete case, study of the Binomial and the Poisson Distributions and in the continuous case the Normal Distributions.

• To Understand linear relationship between two variables and also to predict how a dependent variable changes based on adjustments to an independent variable.

• To learn the types of sampling, sampling distribution of means and variance, Estimations of statistical parameters.

• Use of probability theory to make inferences about a population from large and small samples.

• To understand different queuing models.

UNIT – I: Basic Probability and Random Variables

Basic Probability: Definition, The axioms of probability and basic problems. Single Random Variables: Discrete and Continuous. Probability distribution function, Probability mass and density functions, mathematical expectation.

Multiple Random variables: Discrete and Continuous, Joint probability distributions-Joint probability mass and density functions, Marginal probability mass and density functions.

UNIT-II: Probability Distributions

Binomial distribution – properties, mean, variance and recurrence formula for Binomial distribution, Poisson distribution – Poisson distribution as Limiting case of Binomial distribution, properties, mean variance and recurrence formula for Poisson distribution, Normal distribution – mean, variance, median, mode and characteristics of Normal distribution.

UNIT -III: Correlation and Regression

Correlation -Coefficient of correlation, Rank correlation, Regression- Regression coefficients, Lines of regression.

Multiple correlation and regression- Coefficient of multiple Correlation, multiple regression, Multiple linear regression equations.

UNIT –IV: Testing of Hypothesis

Sampling: Definitions, Standard error. Estimation - Point estimation and Interval estimation.

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: Test of significance - large sample test for single mean, difference of means, single proportion, and difference of proportions.

Small samples: Test for single mean, difference of means, paired t-test, test for ratio of variances (F-test) ,Chi- square test for goodness of fit and independence of attributes.

UNIT V: Queuing Theory

Queuing theory – Structure of a queuing system and its characteristics-Arrival pattern and service pattern-Pure birth and Death process.

Terminology of Queuing systems-queuing models and its types - M/M/1 Model of infinite queue (without proofs) and M/M/1 Model of finite queue (without proofs).

Suggested Text Books:

1. Fundamental of Statistics by S.C. Gupta,7thEdition,2016.
2. Fundamentals of Mathematical Statistics by SC Gupta and V.K.Kapoor
3. Higher Engineering Mathematics by B.S. Grewal, Khanna Publishers, 35th Edition,2000.
4. R. A. Johnson, Miller and Freund's "Probability and Statistics for Engineers", Pearson

Publishers, 9th Edition, 2017.

References :

1. Introduction to Probability and Statistics for Engineers and Scientists by SheldonM.Ross.
2. Probability and Statistics for Engineers by Dr. J. Ravichandran.

Course Outcomes: After learning the contents of this paper the student must be able to

1. Describe randomness in certain realistic situation which can be either discrete or continuoustype and compute statistical constants of these random variables.
2. Provide very good insight which is essential for industrial applications by learning probability distributions.
3. Make objective, data-driven decisions by using correlation and regression.
4. Draw statistical inference using samples of a given size which is taken from a population.
5. To design balanced systems that serve customers quickly and efficiently but it is not cost effective.

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(R24A0383) MANUFACTURING PROCESSES LAB

COURSE OBJECTIVES:

1. Ability to function on multi-disciplinary teams in the area of materials processing.
2. Ability to use the techniques, skills and modern engineering tools necessary for handling welding techniques.
3. Understanding of professional and ethical responsibility in the areas of materials management.
4. Ability to communicate effectively the joining processes in welding.

LIST OF EXPERIMENTS

1. To design and making of pattern - for one casting drawing.
2. To determine sand properties- Exercise -for strengths, and permeability.
3. To Prepare Mould for Casting.
4. To prepare a butt joint with the specimens by Arc Welding.
5. To join the specimens by gas welding process.
6. To perform Plasma welding operation
7. To perform Spot welding operation.
8. To perform blanking & piercing operation.
9. To perform deep drawing and extrusion operation.
10. To prepare the product by Injection Moulding machine.
11. To prepare the product by Blow Moulding machine.
12. To manufacture components using by 3D printing.

NOTE: Minimum a total of 8 experiments are to be conducted.

COURSE OUTCOMES:

1. To provide the students' knowledge in finding the different techniques in manufacturing processes.
2. To gain knowledge on welding techniques.
3. Get Exposure different types of plastic moulding processes.
4. To provide students hands on experience to handle the joing processes.

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(R24A0384) Strength of Materials Lab

COURSE OBJECTIVES:
1. Analyze the tensile and compressive strength of a specimen.
2. Determine the hardness, impact strength, fatigue strength
3. to analyze the application of a specific material for a given design requirement
4. Understanding the bending in beams and to analyze the bending stresses
5. Evaluate the capacity of a material to withstand torsional stresses for a safe and sustainable

LIST OF EXPERIMENTS
1. Direct Tension Test.
2. Brinell's Hardness Test.
3. Rockwell Hardness Test.
4. Charpy Impact Test.
5. Izod Impact Test.
6. Torsion Test.
7. Compression test on spring.
8. Tension test on spring.
9. Deflection of Simply supported beam.
10. Deflection of Cantilever beam.
11. Shear Test.
12. Compressive Test on Cube

NOTE: Minimum a total of 8 experiments are to be conducted.

COURSE OUTCOMES:
1. To provide the students' knowledge in finding the materials testing of metals and alloys.
2. To know the hardness of metals.
3. Get Exposure different kinds of materials testing.
4. To provide students hands on experience to handle the machines.

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(R24A0391) Industry Oriented Project

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(*R24A00XX) Public Policy & Governance

Course objectives:

1.To make the students understand in-depth analysis of public policy and to solve its ills prevailing in the society.

2. To provide an opportunity for the students to learn the basic areas of public policy analysis, implementation and evaluation.

3. To make understand the process and various approaches in public policy making.

4. To understand the theories and issues of social coordination and the nature of all patterns of rule.

5. To make the students understand the techniques of governance and emerging trends in public and private governance its policy-making and implementation.

Unit-I

Introduction of Public Policy: Definition, Nature, Scope and Importance of Public Policy, Evolution of Public Policy and Policy Sciences, Public Policy and Public Administration. **Approaches to Public Policy Analysis:** The Process Approach, The Logical Positivist Approach, The Phenomenological Approach, The Participatory Approach and Normative Approach.

Unit-II

Theories and Process of Public Policy Making: Theories and Models of Policy Making, Perspectives of Policy Making Process, Institutions of Policy Making.

Unit-III

Policy Implementation and Evaluation: Concept of Policy Implementation, Techniques of Policy Implementation, Concept of Policy Evaluation, Constraints of Public Policy Evaluation.

Unit-IV

Introduction of Governance: Definitions, Issues and Controversies, Reinventing Government, Reforming Institutions: The State, Market and Public domain. **State and Governance:** Origin and types of State, Democratic State and Democratic Administration, Neo-Liberalism and Rolling Back State and Governance as Government.

Unit-V

Citizen and Techniques of Governance: Rule of Law and Human Rights, Accountability, Participation, Representation. **Techniques of Governance**: Openness and Transparency, Citizen Charter, Social Audit. **Emerging Trends in Public and Private Governance:** An Overview, Market, Civil Society, Information and Communication Technology.

TEXT AND REFERENCE BOOKS:

1.Introduction to Public Policy- Charles Wheelan, Naked Economics 2010.

2. Birkland Thomas A., (2005), An Introduction to The Policy Process: Theories, Concepts, And Models of Public Policy Making, Armonk; M.E. Sharpe.

3.Anderson J.E., (2006) Public Policy-Making: An Introduction, Boston, Houghton

4. Bardach, Eugene (1977), The Implementation Game: What Happens After a Bill Becomes a Law,Cambridge, MA: MIT.

5. Bell, S., and Hind moor, A. (2009) Rethinking Governance: The Centrality of the State in ModernSociety, Cambridge: Cambridge University Bell, Stephen and Andrew Hind moor.

6. Joyee M. Mitchell & William C. Mitchell, Political Analysis & Public Policy: An Introduction to Political Science, Thomson Press Limited, New Delhi, 1972.

7. R.K. Sapru, Public Policy, Art and Craft of policy Analysis, PHI learning private limited, New Delhi, 2011.

8. Brian W. Hogwood & Lewis A. Gunn, Policy Analysis for the Real world, Oxford University, Press, 1986.

COURSE OUTCOMES

After completion of the course, student will be able to

1.Understand public policy analysis and they will be able to understand policy evaluation andimplementation.

2. Understand the public policy and governance on the largest gamut of its canvas.

3. Students will understand the what are emerging trends in public and private governance and varioustheories in public policy making.