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 2022 - 23)

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

R22 ACADEMIC REGULATIONS FOR B. TECH. (REGULAR)

Applicable for the students of B. Tech. (Regular) from the Academic Year 2022-23 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.

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:

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

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

The candidate shall register for 160 credits and secure 160 credits.

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
01	Aeronautical Engineering
02	Computer Science Engineering
03	Computer Science Engineering (AIML)
04	Computer Science Engineering (DS)
05	Computer Science Engineering (CS)
06	Computer Science Engineering (IoT)
07	Artificial Intelligence & Machine Learning
08	Artificial Intelligence & Data Science
09	Information Technology
10	Computer Science & Information Technology
11	Electronics & Communication Engineering
12	Mechanical Engineering
13	Electrical and Electronics Engineering

4.0 Credits

Particulars	Semester	
	* Periods per week	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

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, Mini Project and Major Project work shall be evaluated for 100 and 300 marks, respectively.

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 15 marks with a total duration of 2 hours as follows:

1. Mid_Term Examination for 25 marks:
   a. Part - A : Objective/quiz paper for 10 marks.
   b. Part – B : Descriptive paper for 15 marks.

The remaining 15 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 25 marks. The remaining 15 marks are evaluated from Assignment/Subject Viva-Voce/Seminar/Case Study on a topic in the concerned subject, and the average of the two mid-term examinations shall be taken as the final marks secured by each candidate.

However, if any student is absent/scoring internal marks less than 40% in any subject of a mid-term examination he/she will be given a chance to write the internal exam once again after he/she re-registering for the internal exam in the concerned subject and paying stipulated fees as per the norms.

The end examination will be conducted for 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.

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 10 marks
2. **10 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 shallbe evaluated for 10 marks.
4. The remaining 10 marks are for Laboratory Project, which consists of the Design (or) Software / Hardware Model Presentation (or) App Development (or) Prototype Presentation submission which shall be evaluated after completion of laboratory course and before semester end practical examination.

The Semester End Examination 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 University.

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. The end semester examination shall be conducted with an external examiner and the laboratory teacher. The external examiner shall be appointed from the clusters of colleges which are decided by the examination branch of the College.

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.

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.

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.

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 topics for Industry Oriented Project and Project work shall be different from one another. The evaluation of project work shall be made at the end of the IV year. The Internal Evaluation shall be on the basis of two seminars given by each student on the topic of his/her project.

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

6.0 Attendance Requirements

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.

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

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

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.

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.

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

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.

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:

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.

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.

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

Interchanging of Course Registrations are not permitted.

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.

Minimum Academic Requirements

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

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.

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.

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.

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.

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.

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.

Course pattern

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

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.

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.

Grading Procedure

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.

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.

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

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

$$SGPA\ (Si) = \Sigma(Ci \times Gi) / \Sigma Ci$$

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

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

$$CGPA = \Sigma(Ci \times Si) / \Sigma Ci$$

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

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

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.

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.

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.

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.

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

The student passes the subject/ course only when **GP ≥ 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

SGPA = 152/21 = 7.24

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

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

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

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.

Passing standards

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.

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.

Declaration of results

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

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

% of Marks = (final CGPA – 0.5) x 10

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).**

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.

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

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

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

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

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.

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.

Students fulfilling the conditions listed under item 13.3 alone will be eligible for award of **'university rank'** and **'gold medal'.**

Award of 2-Year B.Tech Diploma Certificate

i. **A student is awarded 2-Year B.Tech 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 B.Tech 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.**

ii. **A student may be permitted to take one year break after completion of II Year – II Semester or B. Tech III Year – II Semester (with university permission through the principal of the college well in advance) and can re-enter the course in next Academic Year in the same college and complete the course on fulfilling all the academic credentials within a stipulated duration i.e. double the duration of the course (Ex. within 8 Years for 4-Year program).**

Withholding of results

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.

Transitory regulations.

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).

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.

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.

16 Minimum Instruction Days

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

General

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

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

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

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.

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.

Scope

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

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

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 2022-23

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 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**
   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.
   A student will be eligible to be promoted from II year to III year, upon fulfilling the academic requirements of 60 % credits up to II-year II semester examinations and secures prescribed minimum attendance in II year.
   A student will be eligible to be promoted from III year to IV year, upon fulfilling the academic requirements of 60 % 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)**

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-in-charge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the College campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	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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COURSE STRUCTURE AND SYLLABUS (R-22)

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

B TECH AERONAUTICAL ENGINEERING- COURSE STRUCTURE

I Year B. Tech – I Semester

S.No	Subject Code	SUBJECT	L	T	P	C	MAX. MARKS	
							INT	EXT
1	R22A0001	English	2	0	0	2	40	60
2	R22A0023	Mathematics –I	3	1	0	4	40	60
3	R22A0021	Applied Physics	3	1	0	4	40	60
4	R22A0022	Engineering Chemistry	3	0	0	3	40	60
5	R22A0501	Programming for Problem Solving	3	0	0	3	40	60
6	R22A0082	Applied Physics/Engineering Chemistry Lab	-	0	3	1.5	40	60
7	R22A0083	Engineering and Computing Hardware Workshop	-	0	2	1	40	60
8	R22A0581	Programming for Problem Solving Lab	-	0	3	1.5	40	60
9	R22A0003	Human Values and Professional Ethics	2	0	0	0	40	60
		Total	**16**	**2**	**8**	**20**	**360**	**540**

I Year B. Tech – II Semester

S.No	Subject Code	SUBJECT	L	T	P	C	MAX. MARKS	
							INT	EXT
1	R22A0002	Professional English	2	0	0	2	40	60
2	R22A0024	Mathematics – II	3	1	0	4	40	60
3	R22A0201	Principles of Electrical and Electronics Engineering	3	0	0	3	40	60
4	R22A0301	Computer Aided Engineering Graphics	2	0	3	4	40	60
5	R22A0502	Python Programming	3	0	0	3	40	60
6	R22A0081	English Language and Communication Skills Lab	-	0	2	1	40	60
7	R22A0281	Principles of Electrical and Electronics Engineering Lab	-	0	3	1.5	40	60
8	R22A0582	Python Programming Lab	-	0	3	1.5	40	60
9	R22A0004	Environmental Science	2	0	0	0	40	60
		Total	**15**	**1**	**11**	**20**	**360**	**540**

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

B TECH AERONAUTICAL ENGINEERING- COURSE STRUCTURE

II Year B. Tech – I Semester

S.No	Subject Code	SUBJECT	L	T	P	C	MAX. MARKS	
							INT	EXT
1	R22A2101	Applied Mechanics	3	0	0	3	40	60
2	R22A2102	Fluid Mechanics	3	0	0	3	40	60
3	R22A2103	CAD/CAM	3	0	0	3	40	60
4	R22A2104	Aircraft Production technology	3	0	3	3	40	60
5	R22A2105	Elements of Aeronautical Engineering	3	0	0	3	40	60
6	R22A2106	Engineering Thermodynamics	3	0	3	3	40	60
7	R22A2181	Aircraft Production Technology Lab	-	0	2	1	40	60
8	R22A2182	Aircraft Engineering Drawing Lab Using Cad	-	0	2	1	40	60
9	*R22A0006	Foreign Language: GERMAN	2	0	0	0	100	-
		Total	**20**	**0**	**10**	**20**	**420**	**480**

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

II Year B. Tech – II Semester

S.No	Subject Code	SUBJECT	L	T	P	C	MAX. MARKS	
							INT	EXT
1	R22A2107	Aerodynamics	3	0	0	3	40	60
2	R22A2108	Solid Mechanics	4	0	0	4	40	60
3	R22A2109	Air Breathing Propulsion	3	0	0	3	40	60
4	R22A2110	Aircraft Performance	3	0	3	3	40	60
5	R22A0026	Probability and Statistics	3	0	0	3	40	60
6	R22A2183	Fluid Mechanics and Solid Mechanics Lab	0	0	2	1	40	60
7	R22A2184	Aerodynamics and Propulsion Lab	-	0	2	1	40	60
8	R22A2185	Industry Oriented Project	-	0	4	2	40	60
9	*R22A0061	Public Policy and Governance	2	0	0	0	100	-
		Total	**18**	**0**	**11**	**20**	**420**	**480**

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

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

B TECH AERONAUTICAL ENGINEERING- COURSE STRUCTURE

III Year B. Tech – I Semester

S.No	Subject Code	SUBJECT	L	T	P	C	MAX. MARKS	
							INT	EXT
1	R22A2111	Aircraft Structures	4	0	0	4	40	60
2	R22A2112	Aircraft Composite Materials	3	0	0	3	40	60
3	R22AXXXX	Cyber Security	3	0	3	3	40	60
4	R22AXXXX	**Open Elective-I**	3	0	0	3	40	60
5	R22A2131 R22A2132 R22A2133 R22A2134	**Professional Elective-I** Aircraft Stability and Control Experimental Stress Analysis Rocket Technology Space Science	3	0	3	3	40	60
6	R22A2186	Aircraft Composite Materials and Metrology Lab	-	0	2	1	40	60
7	R22A2187	Aircraft Structures Lab	-	0	2	1	40	60
8	R22A2188	Application Development-I	0	0	4	2	40	60
		Total	**16**	**0**	**14**	**20**	**320**	**480**

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

Open Elective-I		
S. No	**SUBJECT CODE**	**SUBJECT**
1	R22A0551	JAVA PROGRAMMING
2	R22A1251	WEB DEVELOPMENT
3	R22A2151	INTELLECTUAL PROPERTY RIGHTS
4	R22A0351	ROBOTICS AND AUTOMATION
5	R22A0451	ELECTRONICS FOR HEALTH CARE
6	R22A0251	RENEWABLE ENERGY SOURCES
7	R22A6751	PRINCIPLES OF DATA SCIENCE
8	R22A0063	BUSINESS ANALYTICS

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

B TECH AERONAUTICAL ENGINEERING- COURSE STRUCTURE

III Year B. Tech – II Semester

S.No	Subject Code	SUBJECT	L	T	P	C	MAX. MARKS	
							INT	EXT
1	R22A2113	Flight Vehicle Design	3	0	0	3	40	60
2	R22A2114	Compressible Flow Aerodynamics	4	0	0	4	40	60
3	R22AXXXX	Artificial Intelligence and Machine Learning	3	0	3	3	40	60
4	R22AXXXX	**Open Elective -II**	3	0	0	3	40	60
5	R22A2135 R22A2136 R22A2137 R22A2138	**Professional Elective-II** Airframe Structural Design Mechanisms and Machine Design Wind Tunnel Techniques **Spacecraft Structures**	3	0	3	3	40	60
6	R22A2189	Flight Vehicle Design Lab	-	0	2	1	40	60
7	R22AXXXX	Artificial Intelligence and Machine Learning Lab	-	0	2	1	40	60
8	R22A2190	Application Development-II	0	0	4	2	40	60
		Total	**16**	**0**	**14**	**20**	**320**	**480**

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

Open Elective-II		
S. No	**SUBJECT CODE**	**SUBJECT**
1	R22A6651	DATABASE SYSTEMS
2	R22A6753	BIG DATA ARCHITECTURE
3	R22A0352	DESIGN THINKING
4	R22A0552	PRINCIPLES OF CLOUD COMPUTING
5	R22A6951	INTERNET OF THINGS AND ITS APPLICATIONS
6	R22A2152	NANO TECHNOLOGY
7	R22A0252	ELECTRICAL AND HYBRID VEHICLES
8	R22A6251	CYBER GOVERNANCE

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

B TECH AERONAUTICAL ENGINEERING- COURSE STRUCTURE

IV Year B. Tech – I Semester

S.No	Subject Code	SUBJECT	L	T	P	C	MAX. MARKS	
							INT	EXT
1	R22A2115	Computational Aerodynamics	4	0	0	4	40	60
2	R22A2116	Artificial Intelligence and Digital Twin in Aerospace Engineering	3	0	0	3	40	60
3	R22A2117	Data Driven in Aerospace Engineering with Machine Learning	3	0	0	3	40	60
4	R22A2139 R22A2140 R22A2141 R22A2142	**Professional Elective-III** Finite Element Analysis Airline and Airport Management Civil Aviation Rules and Regulations **Spacecraft System Engineering**	3	0	0	3	40	60
5	R22A2143 R22A2144 R22A2145 R22A2146	**Professional Elective-IV** Avionics Heat Transfer Aircraft Maintenance Engineering **Astrodynamics**	3	0	3	3	40	60
6	R22A2191	Computational Aerodynamics Lab	-	0	2	1	40	60
7	R22A2192	Project Phase-I	-	0	6	3	40	60
		Total	**16**	**0**	**11**	**20**	**280**	**420**

IV Year B. Tech – II Semester

S.No	Subject Code	SUBJECT	L	T	P	C	MAX. MARKS	
							INT	EXT
1	R22A03XX	Innovation, Start-Up and Entrepreneurship	3	0	0	4	40	60
2	R22A2147 R22A2148 R22A2149 R22A2150	**Professional Elective-V** Aircraft Systems and Instrumentation Air Transportation Systems Aero-elasticity **Space Mission**	3	0	0	3	40	60
3	R22A2151 R22A2152 R22A2153 R22A2154	**Professional Elective-VI** Flight Scheduling Operations Helicopter Engineering Aero-elasticity Space Exploration Technology	3	0	0	3	40	60
4	R22A2193	Project Phase-II	0	0	20	10	80	120
		Total	**9**	**0**	**20**	**20**	**200**	**300**

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

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

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(R22A0001) ENGLISH

INTRODUCTION

English is a global language which is a means to correspond globally. Keeping in account of its vital role in the global market, emphasis is given to train the students to acquire language and communication skills. The syllabus is designed to develop and attain the competency in communicative skills.

The lectures focus on the communication skills and the selected excerpts support as resources for the teachers to develop the relevant skills in the students. The lessons stimulate discussions and help in comprehending the content effectively. The focus is on skill development, nurturing ideas and practicing the skills.

COURSE OBJECTIVES:

1. To enable students to enhance their lexical, grammatical and communicative competence.
2. To equip the students to study the academic subjects with better perspective through theoretical and practical components of the designed syllabus.
3. To familiarize students with the principles of writing and to ensure error-free writing
4. To sharpen the speaking skills of learners by involving them in diverse activities such as group discussions, debates, conversations and role plays.
5. To train students in soft skills with the help of case studies.

SYLLABUS

Reading Skills:

Objectives

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

NOTE:
The students will be trained in reading skills using the prescribed text for detailed study. They will be examined in reading and answering questions using 'unseen' passages which may be taken from authentic texts, such as magazines/newspaper articles.

Writing Skills:
Objectives

1. To develop an awareness in the students about basic formal writing skills.
2. To equip students with the components of different forms of writing, beginning with the required ones:
   - Writing sentences
   - Use of appropriate vocabulary
   - Coherence and cohesiveness
   - Formal and informal letter writing

Unit –I
J K Rowling's Convocation Speech at Harvard

Grammar – Tenses and Question Tags
Vocabulary – word Formation - Affixes Writing
Writing – Paragraph Writing
Reading – The art of skimming and scanning
- Reading Exercise Type 1 (Match the statements to the text they refer to)

Unit – II
"The Road not taken" by Robert Frost

Grammar – Direct and Indirect Speech
Vocabulary – One-Word Substitutes, Standard Abbreviations, Synonyms and Antonyms
Writing – Essay Writing (Introduction, body and conclusion)
Reading – Reading –The art of Intensive and Extensive -Reading Exercise Type 2

Unit – III
Satya Nadella's Email to His Employees on his First Day as CEO of Microsoft

Grammar – Voices
Vocabulary – Transitive and Intransitive
Writing – E-mail Writing, Letter Writing (complaints, requisitions, apologies).
Reading – Reading Comprehension- Reading Exercise Type 3 (Reading between the lines)

Unit – IV
"Abraham Lincoln's Letter to His Son's Teacher"

Grammar – Articles, Punctuation
Vocabulary – Phrasal Verbs
Writing – Précis Writing
Reading – Reading Exercise Type 4 (Cloze test)

Unit –V

Abdul Kalam's Biography

Grammar – Subject-Verb Agreement, Noun-Pronoun Agreement Vocabulary– Commonly Confused Words
Writing –Memo Writing
Reading - Reading Exercise Type 5 (Identifying errors)

* Exercises apart from the textbook shall also be used for classroom tasks.

REFERENCE BOOKS:

1. Practical English Usage. Michael Swan. OUP. 1995.
2. Remedial English Grammar. F.T. Wood. Macmillan.2007
3. https://www.britannica.com/biography/A-P-J-Abdul-Kalam
4. Study Writing. Liz Hamp-Lyons and Ben Heasly. Cambridge University Press.2006.
5. Communication Skills. Sanjay Kumar and Pushpa Lata. Oxford University Press. 2011.

COURSE OUTCOMES:

After completion of the course students will be able to:

1. Gain competence and proficiency in 'productive' skills, i.e., writing and speaking with the recognition of the need for life-long learning of the same
2. Hone their language abilities in terms of comprehending complex technical texts with a potential to review literature
3. Present ideas clearly and logically to analyze data and provide valid conclusions in written communication
4. Enrich their grammatical accuracy and fluency to be adept at both the active and passive skills
5. Represent old conventions with a set of the new by professional verbal communicative ability.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

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

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(R22A0023) MATHEMATICS -I

COURSE OBJECTIVES: To learn

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

UNIT I: Matrices

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 Gauss-Siedel iteration method.

UNIT II: Eigen values and Eigen vectors

Linear dependence and independence of vectors, Eigen values and Eigen vectors and their properties, 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)

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

Exact, Equations reducible to exact form, Applications of first order differential equations - Newton's law of cooling, Law of natural growth and decay, Equations not of first degree- Equations solvable for p, equations solvable for y, equations solvable for x and Clairaut's type

UNIT V : Differential Equations of Higher Order

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, Equations reducible linear ODE with constant coefficients-Cauchy's Euler equation and Legendre's equation.

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.
6. Analyze the nature of sequence and series.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

I Year B. TECH I – SEM **L/T/P/C**

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(R22A0201) PRINCIPLES OF ELECTRICAL AND ELECTRONICS ENGINEERING

COURSE OBJECTIVES:

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 and three 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, Meshanalysis, Nodal analysis

NETWORK THEOREMS: Thevenin's Theorem, Norton's Theorem and Superposition Theorem (for independent sources).

UNIT–II: 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, Sinusoidal response of pure R, L, C.
THREE PHASE A.C. CIRCUITS: Advantages of Three phase over single phase, Voltage and Current relationship in star and delta connections.

UNIT-III:MACHINES:
DC Generator: principle of operation and working, Action of commutator, 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, 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 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 Characterstics, MOSFET (Enhancement and Depletion mode) Symbol, Construction, Principle of Operation and its Characteristics.

TEXT BOOKS:

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, McGrawHill.
6. ElectronicDevicesandCircuits, S.Salivahanan, N.Sureshkumar, McGrawHill.

REFERENCE BOOKS

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, NewDelhi,2006.

COURSE OUTCOMES:

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 diode, rectifiers and Zener diode
6. To understand the concepts of BJTs, JFET and MOSFETs

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

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

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(R22A0301) 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 1

Introduction to Auto CAD: Introduction to software interface Standard toolbar/menu, Understanding the co-ordinate systems-2D and 3D Visualisation, 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 2

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 3

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

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

UNIT 4

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

UNIT 5

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 capable to

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 AND TECHNOLOGY

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

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(R22A0501) PROGRAMMING FOR PROBLEM SOLVING

COURSE OBJECTIVES:

1. To Understand the use of computer system in problem solving and to build program logic with algorithms and flowcharts.
2. To learn the syntax and semantics of C programming language.
3. To learn the usage of structured programming approach in solving problems.
4. To learn the usage of strings and pointers.
5. Understand the usage of structures and files.

UNIT - I: Introduction to Programming:

Computer Languages, Compilers, Compiling and executing a program, Representation of Algorithms and Flowcharts with examples.

Introduction to C Programming Language:

Structure of a C Program**,** I/O: Simple input and output with scanf() and printf(), C Tokens- Keywords, Identifiers, Constants, Variables, Data types, Operators, Expressions and precedence, Expression evaluation, Type conversion.

UNIT - II: Conditional Branching and Arrays:

Control Structures – Selection Statements (Decision Making)- if and switch statements, nested if-else, Iteration and loops: use of while, do-while and for loops, nested loops, use of goto, break and continue statements.

Arrays: Definition, one and two dimensional arrays, creating, accessing and manipulating elements of arrays.

UNIT - III: Designing Structured Programs using Functions:

Functions: Declaring a function, Categories of functions, passing parameters to functions: call by value, call by reference, passing arrays to functions, Scope- Local Vs Global, Storage classes, Recursion with example programs.

UNIT - IV: Strings and Pointers:

Strings: Introduction to strings, Declaration and Initialization, String input/output functions, String manipulation functions with example programs, Array of Strings.

Pointers: Defining pointers, Declaration and Initialization, accessing variables through pointers, Pointers to arrays, Pointers to functions, Pointers to structures, Command line arguments, Enumeration data type, Dynamic Memory Management Functions: malloc(), calloc(), realloc() and free().

UNIT - V: Structures and File handling in C:

Structures: Defining structures, Declaration and Initialization, Array of structures, unions.

Files: Text and Binary files, Opening and Closing files, File input /output functions, Creating and Reading and writing text files, Appending data to existing files.

TEXT BOOKS:

1. Jeri R. Hanly and Elliot B.Koffman, Problem solving and Program Design in C 7th Edition,Pearson.
2. Mastering C, K.R.Venugopal, S R Prasad, Tata McGraw-Hill Education.
3. Computer Programming, E.Balagurusamy, First Edition, TMH.
4. Computer Science: A Structured Programming Approach Using C, B.A.Forouzan and R.F. Gilberg, Third Edition, Cengage Learning.

REFERENCE BOOKS:

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall ofIndia.
2. Yashavant Kanetkar, Let Us C, 18th Edition, BPB.
3. Programming in C, Stephen G. Kochan, Fourth Edition, Pearson Education.
4. Herbert Schildt, C: The Complete Reference, Mc Graw Hill, 4th Edition.

COURSE OUTCOMES: The student will be able

1. To write algorithms and to draw flowcharts for solving problems.
2. To convert the algorithms/flowcharts to C programs.
3. To code and test a given logic in the C programming language.
4. To decompose a problem into functions and to develop modular reusable code.
5. To use arrays, pointers, strings, structures and files to write C programs.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

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

3/1/-/4

(R22A0021) APPLIED PHYSICS

COURSE OBJECTIVES:

1 To understand the basic principles of lasers and optical fibers.
2 To interpret dual nature of the matter and behavior of a particle quantum mechanically.
3 To classify the solids depending upon electrical conductivity.
4 To understand the concepts of semiconductors and devices.
5 To analyze dielectric and magnetic properties of the materials.

UNIT – I

LASERS & FIBER OPTICS (15 Hours)

Lasers: Characteristics of lasers, Absorption, Spontaneous and stimulated emissions, Einstein's Coefficients,Population inversion, meta stable state, types of pumping, lasing action, construction and working of Ruby Laser, Helium-Neon 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,Losses in optical fiber, Optical Fiber in Communication System, Applications of optical fibers.

UNIT – II

QUANTUM MECHANICS (10 Hours)

Wave nature of particles, de Broglie's hypothesis, matter waves, Heisenberg's uncertainty principle, Davisson and Germer's experiment, G.P Thomson experiment, Schrodinger time-independent wave equation-significance of wave function, Particle in one dimensional square well potential.

UNIT – III

FREE ELECTRON THEORY OF METALS (12 Hours)

Free electron theory (Classical & Quantum)- Assumptions, Merits and drawbacks, Fermi level, Density of states, Periodic potential, Bloch's theorem, Kronig – Penny model (qualitative) , E –k diagram, Effective mass, Origin of energy bands in solids, Classification of materials : Metals, semiconductors and insulators.

UNIT-IV

SEMICONDUCTOR PHYSICS (15 Hours)

Intrinsic and Extrinsic semiconductors, Direct and Indirect band gap semiconductors, Carrier concentration 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, semiconductor materials for optoelectronic devices - LED, Photo diode, Solar cell.

UNIT – V

DIELECTRICS AND MAGNETIC PROPERTIES OF MATERIALS (12 Hours)

Dielectrics: Introduction, Types of polarizations – Electronic, Ionic and Orientation polarization (qualitative) and calculation of polarizabilities, Internal fields in Solid, Clausius-Mossotti relation, Piezo-electricity and Ferro-electricity.

Magnetism: Introduction, Classification of Dia, Para, Ferro magnetic materials based on magnetic moment, Properties of Anti-Ferro and Ferri magnetic materials, Hysteresis curve based on domain theory, Soft and Hard magnetic materials.

COURSE OUTCOMES:

1 Can apply the principles of laser to understand various lasers and fiber optic systems.
2 Basic principles of quantum mechanics can be used to analyze the microscopic behavior of a particle.
3 Classification of solids can be made by understanding the band structure of solids.
4 Concepts of semiconductors can be applied to predict the importance of electronic devices relevant to engineering domains.
5 Examine dielectric, magnetic properties of the materials and apply them in material technology.

TEXT BOOKS:

1. Engineering Physics by Kshirsagar&Avadhanulu, S. Chand publications.
2. Modern Engineering Physics-Dr K Vijaya Kumar & Dr S Chandralingam, S. Chand Publications.
3. Engineering Physics- B.K.Pandey, S.Chaturvedi, Cengage Learning.

REFERENCES:

1. Engineering Physics – R.K. Gaur and S.L. Gupta, DhanpatRai Publishers.
2. Engineering Physics, S Mani Naidu- Pearson Publishers.
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.

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I Year B. TECH I - SEM **L/T/P/C**
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(R22A0022) ENGINEERING CHEMISTRY

COURSE OBJECTIVES: The students will be able to

1. Acquire the knowledge of electrochemistry and batteries which are essential for the engineers and in industry.
2. Analyze engineering problems related to corrosion and develop different corrosion control techniques.
3. Identify different types of polymers, composites and their applications in various engineering fields.
4. Gain knowledge on wide variety of advanced materials like nano and smart materials which have excellent engineering properties.
5. Analyze water for its various parameters and its significance in industrial and domestic applications.

Unit I Electrochemistry (8 hours)

Introduction - Types of cells - Electrolytic and Electrochemical cells (construction and working of Galvanic Cell) - Electrode potential- Cell potential (EMF); Nernst equation and its applications; Electrochemical series and its applications. Batteries - Classification of batteries - primary, secondary and fuel cells with examples. Primary cells - Lithium cells; Secondary cells - Lead acid battery and Lithium ion battery; Fuel cells - Differences between battery and a fuel cell; Construction, working and applications of H_2-O_2 fuel cell.

Unit II Corrosion: (8 hours)

Causes and effects of corrosion – Theories of corrosion - Chemical (oxidation) and Electrochemical corrosion – mechanism of electrochemical corrosion (Evolution of Hydrogen and Absorption of Oxygen); Corrosion control methods - Cathodic protection - Sacrificial anode and Impressed current cathodic methods; Surface coatings – methods of application - Electroplating (Cu-plating) and Electroless plating (Ni-plating) - advantages and applications of electroplating/electroless plating.

Unit III 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; Potable water and its specifications; Disinfectation of water by chlorination and ozonization. Boiler troubles - caustic embrittlement, scales and sludges; External treatment of water – Ion exchange process; Desalination of water – Reverse osmosis.

Unit IV Polymers: (10 hours)

Introduction - Classification of polymers; Types of polymerization - addition and condensation polymerisation with examples. **Plastics** - thermoplastic and thermosetting resins; preparation, properties and engineering applications of Polyvinylchloride (PVC), Teflon (PTFE), and Bakelite. **Rubbers -** Natural rubber and its vulcanization. **Conducting polymers** - classification of conducting polymers – mechanism of conduction in trans-Polyacetylene and applications of conducting polymers. **Bio-degradable polymers** – preparation, properties and applications of Poly-Lactic acid. **Composite materials:** Introduction - Fibre reinforced plastics (FRPs) - Glass fibre reinforced, Carbon fibre reinforced plastics and their applications.

Unit V Advanced Materials: (8 hours)

Nanomaterials: Introduction and classification of nanomaterials; preparation of nanomaterials - Sol-gel method; applications of nanomaterials (industrial and medicinal); Carbon nanotubes (CNTs)-applications.

Smart materials: Introduction - Types of smart materials - examples and applications of piezoelectric materials and shape memory alloys.

Suggested Text Books:

1. Engineering Chemistry by P.C. Jain & M. Jain: Dhanpat Rai Publishing Company (P) Ltd, New Delhi. 16thEdition.
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, NewDelhi.
3. P.W. Atkins, J.D. Paula, “Physical Chemistry”, Oxford, 8thedition (2006).
4. B.R. Puri, L.R. Sharma and M.S. Pathania, “Principles of Physical Chemistry”, S. Nagin Chand & Company Ltd., 46thedition (2013).

COURSE OUTCOMES: The student will be able to

1. Relate the knowledge of operating principles of various types of electrochemical cells, including batteries, to optimize the need for sustainable development.
2. Analyze and develop technically sound, economic and sustainable solutions for complex engineering problems related to corrosion and its effects.
3. Identify, formulate and develop polymeric compounds used in various engineering materials for futuristic engineering applications.
4. Apply the knowledge of nanotechnology and smart materials to find solutions for various engineering problems.
5. Familiarize with the fundamentals of water treatment technologies and the considerations for its design and implementation in water treatment plants.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

I Year B. TECH - II- SEM **L/T/P/C**
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(R22A0002) PROFESSIONAL ENGLISH

INTRODUCTION:

English is a tool for global communication and is the dominant language, which is sweeping almost all the fields in the world. It has become a necessity for people to speak in English comfortably, if they want to enter the global workforce. Hence, the course is designed to help the students to meet the global standards. Each unit focuses on English skill-set to improve: Interview skills, giving presentations and professional etiquette.

COURSE OBJECTIVES:

1 To enrich students to express themselves appropriately and fluently in professional contexts.
2 To enhance their employability through regular participation in group discussions and interview skills.
3 To lay foundation with writing strategies for the future workplace needs.
4 To acquaint students with different components of professional presentation skills.
5 To equip students with necessary training in listening to comprehend dialects of English language.

UNIT-I

"Mokshagundam Visvesvaraya"

Speaking	- Description of Pictures, Places, Objects and Persons
Grammar	- 'If' Clauses
Vocabulary	- Homonyms, homophones and homographs
Writing	- Paragraph Writing

NOTE: Listening and speaking tasks are solely for lab purpose and not for testing in the examinations.

UNIT –II

Speaking	- Small Talks
Grammar	- Finite and Non-finite verbs
Vocabulary	- Standard Abbreviations (Mini Project)
Writing	- Job Application – Cover letter

NOTE: Listening and speaking tasks are solely for lab purpose and not for testing in the examinations.

Unit –III

Speaking	- Oral presentations
Grammar	- Transformation of Sentences
Vocabulary	- Idioms
Writing	- Abstract Writing

NOTE: Listening and speaking tasks are solely for lab purpose and not for testing in the examinations.

Unit – IV

'How a Chinese Billionaire Built Her Fortune'

Speaking	- Telephonic Expressions and Conversations
Grammar	- Auxiliary verbs & model
Verbs, Degrees of Comparison	
Vocabulary	- Word Analogy
Writing	- Job Application - Resume

NOTE: Listening and speaking tasks are solely for lab purpose and not for testing in the examinations.

Unit – V

Speaking	- Group discussion
Grammar	- Common Errors, Prepositions
Vocabulary	- Technical Vocabulary
Writing	- Report Writing

NOTE: Listening and speaking tasks are solely for lab purpose and not for testing in the examinations.

REFERENCE BOOKS:

1. Practical English Usage. Michael Swan. OUP. 1995.
2. Remedial English Grammar. F.T. Wood. Macmillan.2007
3. Skills Annexe & Epitome of Wisdom - B.Tech 1st Year English Study Material, JNTUH.
4. Study Writing. Liz Hamp-Lyons and Ben Heasly. Cambridge University Press.2006.
5. Communication Skills. Sanjay Kumar and Pushpa Lata. Oxford University Press. 2011.
6. Exercises in Spoken English. Parts. I-III. CIEFL, Hyderabad. Oxford University Press
7. 'English for Engineers'. Cambridge University Press

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

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

(R22A0024) MATHEMATICS-II

OBJECTIVES:

- The aim of numerical methods is to 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.
- The objective of interpolation is to find an unknown function which approximates the given data points and the objective of curve fitting is to find the relation between the variables x and y from given data and such relationships which exactly pass through the data (or) approximately satisfy the data under the condition of sum of least squares of errors.
- PDE aims at forming a function with many variables and also their solution methods, Method of separation of variables technique is learnt to solve typical second order PDE.
- Evaluation of multiple integrals.
- In many engineering fields the physical quantities involved are vector valued functions. Hence the vector calculus aims at basic properties of vector-valued functions and their applications to line, surface and volume integrals.

UNIT – I: Interpolation

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

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

Numerical integration : Generalized quadrature - 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: Partial Differential Equations

Introduction, formation of partial differential equation by elimination of arbitrary constants and arbitrary functions, solutions of first order Lagrange's linear equation and non-linear equations, Charpit's method, Method of separation of variables for second order equations and applications of PDE to one dimensional equation (Heat equation).

Unit IV: Double and Triple Integrals

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

Unit V: Vector Calculus

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

Text Books:

a. Higher Engineering Mathematics by B V Ramana ., Tata McGraw Hill.
b. Higher Engineering Mathematics by B.S. Grewal, Khanna Publishers.
c. 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 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.
2. Find the roots of algebraic, non algebraic equations.
3. Solve first order linear and non-linear partial differential equations.
4. Evaluate multiple integrals.
5. Evaluate the line, surface, volume integrals and converting them from one to another using vector integral theorems.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

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

(R22A0502) PYTHON PROGRAMMING

COURSE OBJECTIVES:

This course will enable students

1. To read and write simple Python programs.
2. To develop Python programs with conditional and loops.
3. To develop Python programs with using arrays and functions.
4. To use Python data structures–-lists, tuples, dictionaries.
5. To do input/output with files in Python.

UNIT-I

Introduction to Python Programming Language: Introduction to Python Language, Features of Python, Python Installation, Python Input and Output Statements, Numeric Data Types: int, float, boolean, complex and string and its operations, Standard Data Types: List, Tuples, Sets and Dictionaries, Data Type conversions, Comments in Python.

UNIT-II

Variables and Operators: Understanding Python variables, multiple variable declarations, 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, Types of arrays, working with arrays using numPy, Creating arrays using numpy functions-array(),linespace(),logspace(),arrange(),zeros() and ones(),Creating arrays using numpy Attributes-ndim,shape,size,itemsize,dtype,nbytes,reshape(),flatten(),Matrices in numpy.

UNIT-IV

Functions: Defining a function, Calling Functions, 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, Fruitful

Functions, Higher order functions, Anonymous functions or Lambda functions, Powerful Lambda functions in Python.

UNIT-V

File Handling in Python: Introduction to files, Text files and Binary files, Access Modes, Writing Data to a File-write() and writelines(), Reading Data from a File-read(),readline() and readlines(), 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.

TEXT BOOKS

1. R.NageswaraRao,"Core Python Programming",dream tech.
2. Allen B. Downey,``Think Python: How to Think Like a Computer Scientist" 2nd edition,Updated for Python3, Shroff/O'Reilly Publishers,2016.
3. Python Programming: A Modern Approach,Vamsi Kurama,Pearson.

REFERENCEBOOKS:

1. Core Python Programming,W.Chun,Pearson.
2. Introduction to Python,Kenneth A. Lambert, Cengage.
3. Learning Python,Mark Lutz,Orielly.

COURSE OUTCOMES:

Upon completion of the course, students will be able to

1. Read, write, execute by hand simple Python programs.
2. Structure simple Python programs for solving problems.
3. Decompose a Python program into arrays and functions.
4. Represent compound data using Python lists, tuples, dictionaries.
5. Read and write data from/to files in Python programs.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

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

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(R22A0081) ENGLISH LANGUAGE AND COMMUNICATION SKILLS LAB

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

OBJECTIVES:

1. To facilitate computer-aided 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 their pronunciation, ample speaking opportunities are provided.
4. To improve the fluency in spoken English and neutralize mother tongue influence
5. To train students to use language appropriately for interviews, group discussions and public speaking

English Language and Communication Skills Labs two parts:

A.Computer Assisted Language Learning (CALL) Lab

B.Interactive Communication Skills (ICS) Lab

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

UNIT –I
CALL Lab: Introduction to Phonetics –Speech Sounds –Vowels and Consonants- Transcriptions
ICS Lab: Ice-Breaking activity - JAM session

UNIT –II
CALL Lab: Pronunciation: Past Tense Markers and Plural Markers
ICS Lab: Situational Dialogues/Role Plays-–Greetings - Taking Leave – Introducing Oneself and Others - Requests and Seeking Permissions

UNIT–III
CALL Lab: Syllable and Syllabification
ICS Lab: Communication at Workplace- Situational Dialogues/Role Plays – Seeking Clarifications – Asking for and Giving Directions – Thanking and Responding – Agreeing and Disagreeing – Seeking and Giving Advice

UNIT –IV
CALL Lab: Word Stress and Intonation
ICS Lab:Information transfer – from visual to verbal - maps, charts, tables and graphs

UNIT –V

CALL Lab: Errors in Pronunciation- Accent - the Influence of Mother Tongue (MTI)
ICS Lab: Making a Short Speech - Extempore

ELCS Lab:

1. Computer Assisted Language Learning (CALL) Lab:

The Computer aided Language Lab for 60 students with 60 systems, one master console, LAN facility and English language software for self-study by learners.

System Requirement (Hardware component):

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

i) P –IV Processor
   a) Speed –2.8 GHZ
   b) RAM –512 MB Minimum
   c) HardDisk –80 GB

ii) Headphones of High quality

2. Interactive Communication Skills (ICS) Lab :

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

DISTRIBUTION AND WEIGHTAGE OF MARKS

English Language Laboratory Practical Examination:

1. The practical examinations for the English Language Laboratory shall be conducted as per the University norms prescribed for the core engineering practical sessions.
2. For the Language lab sessions, there shall be a continuous evaluation during the year for 30 marks and 70 year-end Examination marks. Of the 30 marks, 20 marks shall be awarded for day-to-day work and 10 marks to be awarded by conducting Internal Lab Test(s). The year-end Examination shall be conducted by the teacher concerned with the help of another member of the staff of the same department of the other institution.

OUTCOMES:

1. Learning with precision through computer-assisted individualized and independent language learning to work independently in engineering set up.
2. Improved conversational reception and articulation techniques in the course of repetitive instruction thereby gaining confidence both in institutional and professional environment.
3. Accuracy in pronunciation and restoring Standard English thereby crafting better command in English language so that the students have a cutting edge over others in society.
4. Imbibing appropriate use of language in situations to work as an individual and as o leader in diverse teams
5. Equip themselves with the pre-requisites, and relevant techniques to effectively attend corporate interviews

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

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

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(R22A0281) 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 AND TECHNOLOGY

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

-/-/3/1.5

(R22A0581) PROGRAMMING FOR PROBLEM SOLVING LAB

COURSE OBJECTIVES:

1. To work with an IDE to create, edit, compile, run and debug programs.
2. To analyze the various steps in program development.
3. To develop programs to solve basic problems by understanding basic concepts in C likeoperators, control statements etc.
4. To develop modular, reusable and readable C Programs using the concepts like functions,arrays etc.
5. To create, read from and write to text and binary files.

Syllabus

Week 1:

a) Write a program to find sum and average of three numbers.
b) Write a program to calculate simple interest (SI) for a given principal (P), time (T), and rate of interest (R) (SI = P*T*R/100).

Week 2:

a) Write a program to swap two variable values with and without using third variable.
b) Write a program to find the roots of a quadratic equation.

Week 3:

a) Write a program to find the sum of individual digits of a given positive integer.
b) Write a program, which takes two integer operands and one operator from the user, performs the operation and then prints the result.
(Consider the operators +,-,*, /, % and use Switch Statement)

Week 4:

a) Write a program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.
b) A Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Write a C program to generate the first n terms of the sequence.

Week 5:

a) Write a program to find both the largest and smallest number in a list of integers.
b) Write a program to find the sum of integer array elements.

Week 6:

a) Write a program to perform addition of two matrices.
b) Write a program to perform multiplication of two matrices.

Week 7:

a) Write a function that returns the sum of two numbers.
b) Write a function to find the factorial of a given integer.

Week 8:

a) Write a function to swap the values of two variables using call by value.
b) Write a function to swap the values of two variables using call by reference.

Week 9:

a) Write a recursive function to find the factorial of a given number.
b) Write a recursive function to find GCD of two integers.

Week 10:

a) Write a program to check whether the given string is palindrome or not.
b) Write a program to sort the given names in alphabetical order.

Week 11:

a) Write a program to find the sum of integer array elements using pointers.
b) Write a program to find the length of the given string using pointers.

Week 12:

a) Write a program to create a structure named book and display the contents of a book.
b) Write a program to calculate total and percentage marks of a student using structure.

Week 13:

a) Write a program to create a structure Complex and use functions to perform the following operations:
i) Reading a complex number ii) Writing a complex number
iii) Addition of two complex numbers iv) Multiplication of two complex numbers
b) Write a program to write given text to a file and also display the contents of a file.

Week 14:

a) Write a program to copy the contents of one file to another.
b) Write a program to merge two files into a third file (i.e., the contents of the first file followed by those of the second are put in the third.

TEXT BOOKS

1. Mastering C, K.R.Venugopal and S.R.Prasad, TMH Publishers.
2. C Programming, E. Balagurusamy, 3rd edition, TMHPublishers.
3. Computer programming in C.V.RAjaraman, PHI Publishers.
4. C Programming, M.V.S.S.N Venkateswarlu and E.V.Prasad,S.Chand Publishers

COURSE OUTCOMES:

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

1. Formulate the algorithms for simple problems.
2. Translate given algorithms to a working and correct program.
3. Identify and correct logical errors encountered during execution.
4. Represent and manipulate data with arrays, strings and structures and pointers. Create, read and write to and from simple text and binary file

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

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

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(R22A0082) APPLIED PHYSICS LAB/ENGINEERING CHEMISTRY LAB

COURSE OBJECTIVES:

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

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 -Wave length of light by using Diffraction grating.
4. CR circuit – Time constant of RC circuit.
5. LCR Circuit- Quality factor and resonance frequency of LCR circuit.
6. LED -Characteristics of LED.
7. Solar cell -Characteristics of Solar cell.
8. Optical fiber- Numerical aperture of an optical fiber.
9. Torsional pendulum- Rigidity modulus of given wire (demonstrative).
10. Hall Effect – Hall coefficient of semiconducting samples (demonstrative).

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 compare the elastic constants of different metallic wires, and also determine the ac frequency of vibrating bar.
2. Students can illustrate the interference of light phenomena.
3. Wavelength of the given laser can be determined by using diffraction phenomenon
4. By understanding electrical principles, Time constant of RC and resonance phenomenon of LCR circuits can be analyzed.
5. V-I characteristics of various semiconductor devices can be illustrated.

(R22A0082) 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 aspects 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 concentration of HCl by Potentiometric titrations.
6. Estimation of amount of Fe^{2+} by Potentiometric titration using $KMnO_4$.

Colorimetry:

7. Estimation of Copper by Colorimetric method.

Preparation

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

Physical Property

9. Determination of Surface Tension of a given liquid by Stalagmometer.

Corrosion control method

10. Electroplating of Copper on an Iron object.

Text Book:

1. Inorganic quantitative analysis, Vogel
2. A text book on experiments and calculation in Engineering Chemistry by S.S. Dara

Suggested Readings:

1. Practical Engineering Chemistry by K. Mukkanti, etal, B.S. Publications, Hyderabad.
2. Text Book of engineering chemistry by R. N. Goyal and HarrmendraGoel, Ane Books Private Ltd.

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 conductometric and potentiometric methods.
3. To find the amount of Cu^{2+} present in unknown sample using colorimetric method.
4. To prepare a thermosetting polymer.
5. To determine the surface tension of a given liquid.
6. To understand the electroplating method for corrosion protection of metals.

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(R22A0083) 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 equipments and processes which are common in the engineering field.
- To develop professional attitude, team work, precision and safety practices at work place.

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 forms 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 lampwiring
3. Stair casewiring
4. Soldering and Desoldering practice – components, devices and circuits using general

1. Purpose PCB.

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

A. TRADES FOR EXERCISES:

At least two exercises from each trade:

1. Carpentry:

To prepare T-Lap Joint, Dovetail Joint.

To prepare 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 need 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.

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(R22A0582) PYTHON PROGRAMMING LAB

COURSE OBJECTIVES:

This course will enable the students:

1. Able to understand Syntax and Semantics and create Arrays and Functions in Python.
2. Able to learn different data types Lists, Dictionaries in Python.
3. Able to know how to execute the programs using loops and control statements.
4. Able to learn decision making and Functions in Python.
5. Able to know how to handle Files and exceptions in Python.

Week 1:

A) Write python program to print HelloWorld.

B) Write a python program to get string,int,float input from user.

C) Write a python program to add 2 numbers.

Week 2:

A) Create a list and perform the following methods

1) insert() 2)remove() 3)append() 4)len() 5)pop() 6) clear()

B) Write a python program to find the length of list.

C) Write a python program to find the smallest and largest number in the list.

Week 3:

A) Create a tuple and perform the following methods

1) Add items 2) len() 3)check for item in tuple 4)Access iems

B) Write a python program using the following methods: 1)count 2)index

C) Write a python program using “+” and “*” operations which resulting a new tuple.

Week 4:

A) Create a dictionary and apply the following methods

1) Print the dictionary items 2)access items 3)use get() 4)change values 5)use len()

B) Write a python code to convert list of tuples into dictionaries.

C) Write python program to store data in list, tuple, set, dictionary and then try to print them.

Week 5:

A) Write a python program to perform arithmetic, assignment, logical and comparison operators.

B) Write a Python program to add two positive integers without using the '+' operator. (use bitwise operator)

C) Write a Python program to perform the basic four operators(+,-,*,/).

Week 6:

A) Write a simple python program to declare a variable in different possible ways.

B) Write a python program to show precedence of operators using the expression: z=(v+w)*x/y

C) Write a python program to check whether the values of a list exist or not (use membership operator) and also perform identity operation.

Week 7:

A) Write a python program to print a number is positive/negative using if-else.

B) Write a python program to find largest number among three numbers.

C) Write a python Program to read a number and display corresponding day using if-elif-else.

D) Write a python program to print list of numbers using range and for loop.

Week 8:

A) Write a python code to print the sum of natural numbers using while loop.

B) Write a python program to print the factorial of given number.

C) Write a python program to find the sum of all numbers stored in a list using for loop.

Week 9:

A) Using a numpy module create an array and check the following:

1. Type of array 2. Axes of array 3. Shape of array 4. Type of elements in array

B) Using a numpy module create array and check the following:

1. List with type float 2. 3*4 array with all zeros 3. From tuple 4. Random values

C) Write a python program to perform matrix operations like transpose, addition and matrix multiplication using numpy.

Week10:

A) Write python program in which a function is defined and calling that function prints Hello World.

B) Write python program in which a function (with single string parameter) is defined and calling that function prints the string parameters given to function.

C) Write a python program using with any one of python function argument.

Week11:

D) Write a program to double a given number and add two numbers using lambda().

E) Write a program for filter() to filter only even numbers from a given list.

F) Write a program for map() function to double all the items in the list?

G) Write a program to find sum of the numbers for the elements of the list by using reduce().

Week12:

A) Write a python program to open and write “hello world” into a file.

B) Write a python program to write the content “hi python programming” for the existing file.

C) Write a python program to read the content of a file.

Week 13:

A) Write a python program to append data to an existing file and then displaying the entire file.

B) Write a python program to open a new file, add some data into it and display the contents of that file.

Week 14:

A) Write a python program to handle the Zero Division Error exception.

B) Write a python program to demonstrate multiple except block with a single try block.

TEXT BOOKS:

1. R.NageswaraRao,"Core Python Programming",dream tech.
2. Allen B. Downey,"Think Python: How to Think Like a Computer Scientist",Second Edition,Updated for Python3,Shroff /O' Reilly Publishers,2016.

COURSE OUTCOMES:

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

1. Evaluate Problem solving and programming capability.
2. Describe the Numbers, Math functions, Strings, List, Tuples and Dictionaries in Python.
3. Implement conditional and loop for python programs.
4. Express different Decision Making statements, Arrays and Functions.
5. Understand and summarize different File handling operations and exceptions.

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

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(R22A0004) ENVIRONMENTAL SCIENCE

COURSE OBJECTIVES: On successful completion of this course, students will be able:

1. CO1: To distinguish the inter relationship between living organism and environment.
2. CO2: To categorize various types of natural resources available on the earth surface.
3. CO3: To detect the causes, and control measures of various types of environmental pollution.
4. CO4: To articulate the issues related to solid waste and its management.
5. CO5: To explain and understand the importance of Sustainable development.

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

1. CO1: Differentiate between various biotic and abiotic components of ecosystem.
2. CO2: Describe the various types of natural resources.
3. CO3: Examine the problems associated with waste management.
4. CO4: Evaluate the causes, and apply control measures of various types of environmental pollutions.
5. CO5: Develop technologies on the basis of ecological principles on environment which in turn helps in sustainable development.

UNIT-I ECOSYSTEMS (6 hours)

Definition, Scope and Importance of Ecosystem; Structure of an Ecosystem - abiotic and biotic component; Functions of an ecosystem- food chains, food webs and ecological pyramids.

Activities: **Activities**: Case studies, poster making, Essays on biotic components.

UNIT-II NATURAL RESOURCES (6hours)

Classification of Resources: Definition of natural resource - renewable and non -renewable resources. Forest resources - functions and uses of forests, Deforestation - causes and consequences. Water resources – Dams - benefits and environmental problems over dams. Renewable resources - solar energy (solar cells), hydro power, biogas and bio-fuel.

Activities: Case studies, seminars, Group Project works, to prepare rain water harvesting models, to demonstrate the generation of electricity with the utilization of non-conventional energy resources.

UNIT-III ENVIRONMENTAL POLLUTION AND TECHNIQUES (6 hours)

Definition, Types of pollution- Air pollution- causes, effects, control measures of air pollution and prevention techniques. Water pollution- causes, effects, control measures and techniques.

Activities: Work sheets, Debate, seminars, surrounding case studies.

UNIT-IV SOLID WASTE MANAGEMENT (5 hours)

Definition of Solid waste, characteristics of solid waste; Solid waste management- collection, transportation, processing treatment and disposal methods; e-waste management; 3R techniques- reduce, reuse and recycle.

Activities: Quiz, Puzzles, Seminars, Case studies.

UNIT-V SUSTAINABLE DEVELOPMENT (4 hours)

Definition of sustainable development, sustainable development goals, threats to sustainability, strategies to achieve sustainable development.

Activities: Worksheets, seminars, slogans, group projects.

TEXT BOOKS

1. Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha 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 Anubha Kaushik, 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

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

I Year B. TECH - II- SEM **L/T/P/C**
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(R22A0003) 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: Understanding the need, basic guidelines, content and process for Value Education. Self-Explorjation - what is it? - its content and process; 'Natural Acceptance' and Experiential Validation - as the mechanism for self-exploration. Continuous Happiness and Prosperity A look at basic Human Aspirations- Right understanding, Relationship and Physical Facilities- the basic requirements for fulfillment of aspirations of every human being with their correct priority. Understanding Happiness and Prosperity correctly - A critical appraisal of the current scenario. Method to fulfill the above human aspirations: understanding and living in harmony at various 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' - Sukh and Suvidha. 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; correct appraisal of Physical needs, meaning of Prosperity in detail. Programs to ensure Sanyam and Swasthya.

UNIT - III:

Understanding Harmony in the Family and Society - Harmony in Human - Human Relationship: Understanding harmony in the Family the basic unit of human interaction. Understanding values in human - human relationship; meaning of Nyaya and program for its fulfillment to ensure Ubhay-tripti; Trust (Vishwas) and Respect (Samman) as the foundational values of relationship.

Understanding the meaning of Vishwas; Difference between intention and competence. Understanding the meaning of Samman, Difference between respect and differentiation; the other salient values in relationship.

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

UNIT - IV:

Understanding Harmony in the nature and Existence - Whole existence as Coexistence: 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: Natural acceptance of human values, Definitiveness of Ethical Human Conduct, Basic for Humanistic Education, Humanistic Constitution and Humanistic Universal Order. Competence in professional ethics:

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

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, 3rd Edition.

REFERENCE BOOKS:

1. Ivan IIlich, 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, Commonwealth 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 Humna 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 AND TECHNOLOGY

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

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(R22A2101) APPLIED MECHANICS

Course Objectives:

1. Introducing the concepts of forces acting on a system, types of forces and importance of freebody diagram.
2. Have an overall understanding of the concept's centroids and center of gravity, frames of reference.
3. Calculate the moments of inertia and understand the significance.
4. The concepts of kinematics and importance in mechanics
5. Give the concepts of structural members used in various machine parts.

UNIT – I

Introduction Resultants of Force System Parallelogram law –Forces and components-Resultant ofcoplanar Concurrent Forces Moment of Force-problems.

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

Unit – II

Centroid 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 – III

Moments of Inertia: Definition – Perpendicular and parallel axes theorems, 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

Unit – IV

Kinematics: Motion of a particle – Rectilinear motion – motion curves – Rectangular components ofcurvilinear motion.

Kinetics of particles: D'Alembert's principle for plane motion and connected bodies.

Unit – V

Introduction to structural members: Introduction to different beams with end conditions and loadings with applications in aircraft (Theory only), columns with different end conditions with applications in aircraft (Theory only), Introduction to truss and frames, joints-pin, hinge etc, (Theory only) degrees of freedom for different structures (Theory only).

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 KumarJ.B S Publications

REFERENCES:

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

Course Outcomes:

1. Understand and Apply the concept of drawing free bodydiagram forvariousmachine components.
2. Evaluate forces in various frames of structural members and estimatethe locationofcenter of gravity theoretically.
3. Calculate the moment of inertia in various sectional componentsand apply this toreallife structures.
4. Understand the importance of kinetics and kinematics in mechanicsand applytheprinciples to various frames.
5. Distinguish between various structural members according totheir loadcarryingcapacity.

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

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(R22A2102) FLUID MECHANICS

Objectives:

1. To introduce and explain about fundamentals of Fluid Mechanics,
2. To give fundamental knowledge of fluid, its properties and behavior under various conditions of internal and external flows
3. To develop understanding about hydrostatic law, and application of mass ,momentum and energy equation in fluid flow
4. Understand boundary layer concepts and flow through pipes.
5. To make students understand about dimensional analysis and similitude. With which Students can able to create models for experimental analysis.

UNIT-I:

Fluid Properties: Density, specific weight, specific gravity, surface tension &capillarity, Newton's law of viscosity, incompressible &compressible fluid.

Hydrostatic forces on submerged bodies: Pressure at a point, Pascal's law, pressure variation with temperature and height, Center of pressure on vertical surfaces.

Manometers- simple and differential manometers, inverted manometers, micro manometers, Pressure gauges.

UNIT-II:

Fluid Kinematics: Stream line, path line, streak line, stream tube, Classification of flows: steady, unsteady, uniform, non-uniform, laminar, turbulent flows. One dimensional &two-dimensional approximation, 2-D flow in wind tunnel, Continuity equations for 1-D and 2-Dflowsbothcompressibleandincompressible,Velocity potential function and stream function.

UNIT-III:

Fluid Dynamics: Surface &body forces, momentum equation, Euler equation, Bernoulli's equation for flow along a stream line.

Flow measurements: pressure, velocity and mass flow rate, viscosity, venturi meter and orifice meter.

Flow of through pipes: Darcy's Weisbach Equation, major and minor losses.

UNIT-IV:

Boundary Layer flows: Introductory concepts of boundary layer, Prandtl's boundary layer hypothesis, Boundary layer growth along a flat plate. Boundary layer thickness (Displacement, Energy and Momentum), Von Karman's Momentum Integral Equation, Drag forces due to laminar and turbulent boundary layer on flat plate.

Separation of boundary layer: Adverse pressure gradient and Sharp bending/turning of surface. Methods of preventing separation of boundary layer.

UNIT-V:

Dimensional and Model Analysis: Dimensional homogeneity, Methods of Dimensional Analysis, Buckingham's π-theorem, Model Analysis, Similitude: Types of similarities, Dimensionless numbers, Similarity laws.

Text Books:

1. Engineering Fluid mechanics–K.L.Kumar,S.Chand &Co.
2. Introduction to Fluid Mechanics and Fluid machines–S.K.Som and G.Biswas
3. Fluid Mechanics and Hydraulic Machines–RK Bansal, Laxmi Publications
4. Fundamentals of Aerodynamics, Anderson, Jr., J.D., International edition, McGraw Hill,2001, ISBN:0-07-118146-6.

Reference Books:

1. Fluid Mechanics–Frank M and White, Mc-Graw hill.
2. Fluid Mechanics-Fox and McDonald
3. Fluid Mechanics–E.Ratha krishnan

Outcomes:

1. Understands different types of manometers and explain buoyancy force, stability of floating bodies by determining its meta center height
2. Basic concepts of fluid kinematics and classification of flows, concepts of stream function and velocity potential function which provides solution for velocity and acceleration of fluid flow in real time applications
3. Recognize the surface and body forces required for obtaining momentum equation and energy equation and explain types of derivatives utilized in various flow field conditions.
4. Understands the concepts of boundary layer and qualitative description of boundary layer thickness and velocity profile on a flat plate
5. Develop Buckingham's π theorem and explain similarity parameters used for scale-down models and explain flow measurements with dimensionless parameters.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

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

3/-/-/3

(R22A2103) CAD/CAM

Objectives:

1. To provide an overview of how computers are being used in design, development of manufacturing plans and manufacture
2. To get effective knowledge on the usage of mathematical equations in model development through the computer.
3. To understand different functions of computers in design and manufacturing.
4. To understand the need for integration of CAD and CAM
5. Study of different types of production, Knowledge of group technology (GT).
6. Detailed study of Computer Aided Quality Control.

UNIT–I

Introduction: Computers in Industrial Manufacturing, Product cycle, CAD / CAM Hardware, Basic structure.

Computer Graphics: Raster scan graphics coordinate system, database structure for graphics modeling, transformation of geometry, 3D transformations, clipping.

UNIT–II

Geometric modeling: Requirements, geometric models, geometric construction models, curve representation methods, surface representation methods, modeling facilities desired.

UNIT–III

Numerical control: NC, NC modes, NC elements, NC machine tools, structure of CNC machine tools, features of Machining center, turning center, CNC Part Programming fundamentals, manual part programming methods, Computer Aided Part Programming.

UNIT–IV

Group Technology: Part family, coding and classification, production flow analysis, advantages and limitations, Computer Aided Processes Planning, Retrieval type and Generative type.

UNIT–V

Computer Aided Quality Control: Terminology in quality control, the computer in QC, contact inspection methods, noncontact inspection methods-optical, noncontact inspection methods-nonoptical, computer aided testing, integration of CAQC with CAD/CAM. **Computer integrated manufacturing systems:** Types of Manufacturing systems, Machine tools and related equipment, material handling systems, computer control systems, human labor in the manufacturing systems, CIMS benefits.

TEXT BOOKS:

1. CAD / CAM Theory and Practice / Ibrahim Zeid / TMH Publishers
2. CAD / CAM /A Zimmers & P.Groover/PE/PHI Publishers
3. Automation, Production systems & Computer integrated Manufacturing/ Groover/Pearson Education

REFERENCE BOOKS:

1. CAD / CAM / CIM / Radhakrishnan and Subramanian / New Age Publishers
2. Principles of Computer Aided Design and Manufacturing / Farid Amirouche / PearsonEdu
3. CAD/CAM: Concepts and Applications/Alavala/ PHI Publishers Computer Numerical Control Concepts and programming / Warren S Seames / Thomson Publishers
4. CAD / CAM – P N RAO McGraw Hill Publications

OUTCOMES: Student will be able to:

1. Understand the applications of computer in the design and manufacturing.
2. Understand and develop the Mathematical representations of curves used in geometric construction.
3. Understand the concept and working principle of NC, CNC, and DNC and can develop a program using G and M codes.
4. Make use of GT, FMS and CAPP concepts and are able to apply these conceptsin bringing the benefits of mass production in real working environment.
5. Plan the computer integrated production planning in working environment and ableto analyze the quality of a product through computer aided quality control

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

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

3/-/3/3

(R22A2104) AIRCRAFT PRODUCTION TECHNOLOGY

Objectives:

1. Students gain the knowledge of different casting and welding processes involved in manufacturing with hands on experience.
2. Acquire theoretical and practical knowledge of Conventional and unconventional processes
3. Able to know the importance and applications of Sheet metal in Aircraft Industry
4. Students acquire knowledge of Material processing and property improvements techniques
5. Students gain the importance of NDT in Aircraft Industry

UNIT–I: Casting and Welding Techniques:

Various molding process employed in aircraft industry, Types of patterns, Casting Process involved in Sand casting, die casting, centrifugal casting, investment casting and shell molding. Working Principles and equipment used with emerging trends in arc welding, gas welding, resistance welding, Laser welding, Soldering and brazing techniques.

UNIT–II: Machining and Forming:

Classification of machining processes, Types of chips, working principles (with schematic diagram only), types-lathe, shaper, milling machines, grinding (designation of grinding wheel), drilling m/c, CNC machining (overview of G-Codes, M-Codes). Sheet metal operations -shearing, punching, super plastic forming and diffusion bonding. Bending, Automation in bend forming and different operations in bending like stretch forming, spinning, drawing etc.

UNIT–III: Unconventional Technology:

Principles of working and applications of abrasive jet machining, ultrasonic machining, electron beam,EDM,EBM, and plasma arc machining, Waterjet machining, Ion beam machining, 3D Printing Technology.

UNIT–IV: Heat Treatment and Surface Finishing:

Heat treatment of Aluminum alloys, titanium alloys, steels, case hardening. Corrosion prevention, protective treatment for aluminum alloys, steels, anodizing of titanium alloys, organic coating, and thermal spray coatings.

UNIT–V: Jigs & Fixtures:

Jigs, fixtures, stages of assembly, types and equipment for riveted joints, bolted joints (only).Aircraft Tooling Concepts.-Types of tools used in A/C industry.

NDT and Other Inspection Techniques: comparison of NDT&DT, process involved in Dye Penetrate Test, X-ray, and magnetic particle and ultrasonic testing.

Text Books:

1. "Manufacturing Engineering and Technology" by Kalpajikau-AddisonWesley.
2. "Aircraft production techniques' Keshu S.C, Ganapathy K.K, Interline Publishing House,Bangalore-1993.

Reference Books:

1. "Production technology"-R.K.Jain-KhannaPublishers-2002.
2. "Production technology" - O.P. Khan naandlal.M.Dhanpatrai publications-Newdelhi-1997.

Outcomes:

1. The student can correlate the various methods of manufacturing employed for different materials.
2. Students acquire Knowledge on various processes involved in Sheet metal for aircraft production
3. Gain knowledge of Machining and correlate various applications to aircraft industry
4. Gain a knowledge and importance of heat treatment and surface finishing aircraft manufacturing
5. Able to gain knowledge in differentiating and applying DT and NDT in Aircraft Industry

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

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

3/-/-/3

(R22A2105) ELEMENTS OF AERONAUTICAL ENGINEERING

Objectives

1. The goal is to obtain the knowledge in understanding the principles, concepts andfacts of the airplane.
2. The goal of the objective is to use the principles of aerodynamics and their realization to aircraft.
3. After the learning of course, students will be able to differentiate and will have sufficient knowledge on engine timeline.
4. The objective is to make student to understand the importance of the structural configuration and its role in design.
5. At the end of the session, the objective is to enable students to device performance of aircraft.

UNIT-1 History and first principles of flight

Evolution of Flight- Hot air balloons, Airships, Heavier than air, Wright flyer to commercial transportation, rotorcraft, missiles, standard atmosphere. Understanding space- environment, laws of gravitation, keppler's law, micro-gravity, rockets, spacecrafts and planetary environment. Basic forces on an aircraft, aerofoil nomenclature and types and airflow distribution, types of air-breathing engines-rocket engines-missiles, loads on aircraft, Structural components and members of an aircraft-schematics and purpose.

UNIT-2 Aerodynamics

Aerodynamics and its importance, Flow regimes based on Mach number, forces and Moments, Derivation of Lift, Drag and moment Coefficients with pressure distribution, Variation of pressure distribution with respect to angle of attack, Airfoil- nomenclature and types. Control surfaces, High Lift devices, Spoilers, Propeller, Rotary wing aircraft concepts, Compressible flow aerodynamics, shock and expansion waves.

UNIT-3 Propulsion

Basic forces on an aircraft, need for thrust, working of reciprocating enegines (2/4 stroke variants), types and working of air-breathing engines, rocket engines-types and principles, missiles and their types, Introduction to ramjet and scramjet engines.

UNIT-4 Aircraft Performance

The role and design mission of an aircraft, Specification of the performance requirements and mission profile. Off-standard and design atmosphere. Measurement of air data. Air data computers. Equations of motion for performance - the aircraft force system. The propulsive forces – the thrust production engines, power producing engines, variation of thrust, propulsive power and specific fuel consumption with altitude and flight speed.

UNIT-5 Aircraft Measurement Instrumentation

Sensors and Instrumentation-pitot static tube, primary flight instruments, principles of gyro and accelerometer, hydraulics and pneumatic systems, high lift devices, engine and navigation instruments.

Course Outcomes

1. At Introduction to evolution of flight and characteristics of environment and space.
2. Understanding Flight in aerodynamic point of view.
3. Analyze the importance of Flight as a means of transport, development of engines.
4. Evaluate the stability and size of the aircraft, a structural perspective.
5. Estimate performance and devise new technologies to improve performance.

TEXT BOOKS:

1. Anderson, J.D., Introduction to Flight, fifth edition, Tata McGraw-Hill, 2007, ISBN: 0-07-006082-4.
2. Kermode, Flight Without Formulae, fifth edition, Pearson Education, 2004, ISBN-10:0273403605; ISBN- 13: 978-0273403609.
3. V. Ganesan, Gas Turbines, Tata McGraw-Hill, 1999, ISBN, 0070681929
4. Turner, M.J.L., Rocket and Spacecraft Propulsion, Springer, 2001.
5. Fundamentals of Aerodynamics, Anderson, Jr., J.D., International edition, McGraw Hill,2001, ISBN: 0-07-118146-6.
6. Eshelby, M.E., Aircraft Performance; Theory and Practice, AIAA Education Series, AIAA, 2000, ISBN: 1-56347-398-4.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

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

3/-/3/3

(R22A2106) ENGINEERING THERMODYNAMICS

Objectives:

1. Learn about concepts and laws of thermodynamics.
2. Studentsacquireknowledgeandrelationofvariousthermodynamicproperties.
3. Students can learn about transfer of energies.
4. Students acquire knowledge on mixture of gases.
5. Students gain information about the working principle of different engines.

UNIT-I

Introduction: Basic Concepts: System, Control Volume, Surrounding, Boundaries, Universe, Types of Systems, Macroscopic and Microscopic view points, Thermodynamic Equilibrium, State, Property, Process, Cycle - Quasi - static Process, Work, Displacement & Other forms of Work, Heat, Point and Path functions, Zeroth Law of Thermodynamics-Concept of Temperature - First law of Thermodynamics – applied to a process and system, Energy, specific heats, Enthalpy, Steady Flow Energy Equation.

UNIT-II

Second Law of Thermodynamics ,Kelvin-Planck and Clausius Statements and their Equivalence/Corollaries, PMM of Second kind, Reversible and Irreversible processes, Carnot's principle, Carnot cycle and its specialties, Thermodynamic scale of Temperature, Clausius Inequality, Entropy, Principle of Entropy Increase - Energy Equation, Availability and Irreversibility

UNIT-III

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. Perfect Gas Model, derivations – Vander Waals Equation of State-Compressibility charts-variable specific Heats-Gas Tables -Dryness Fraction-Clausius-Clapeyr on Equation Property tables.

UNIT-IV

MixturesofperfectGases-MoleFraction,Massfraction,GravimetricandvolumetricAnalysis - Dalton's law of partial pressure, Avogadro's Laws of additive volumes- Mole fraction, Volume fraction and partial pressure, Equivalent Gas const. and Molecular Internal Energy. Enthalpy, specific heats and Entropy of Mixture of perfect Gases.

UNIT-V

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

Text Books:

1. EngineeringThermodynamics,SpecialEdition-MRCET,McGrawHillPublishers-2017
2. Engineering Thermodynamics/PKNag/TMH,5thEdition
3. Engineering Thermodynamics/E Ratha krishnan/PHI/Second Edition/2013

Reference Books:

1. EngineeringThermodynamics/DPMishra/CengageLearning/Secondimpression2012
2. Thermodynamics-An Engineering Approach-Yunus Cengel &Boles/TMH
3. Thermodynamics-J.P.Holman/Mc Graw Hill
4. Engineering thermodynamics-Jones &Dugan
5. Engineering Thermodynamics /P.Chattopadhyay/Oxford higher Education/Revised First Edition
6. Thermodynamics & Heat Engines-Yadav-Central Book Dept. Allahabad

Outcomes:

1. Basic concepts of thermodynamic laws can be applied by the students
2. Analyze about the direction of process and conversion of energy to useful work.
3. Gains the knowledge of problem-solving gases in different phases.
4. Able to understand the composition of gas mixtures.
5. Students should be able to analyze the relationship between various processes and working mechanisms of the engines.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

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

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(R22A2181) AIRCRAFT PRODUCTION TECHNOLOGY LAB

Objectives:

1. The main objective of this course is to impart practical exposure on various aircraft production technologies used in industry.
2. Impart the fundamental aspects of the metal cutting principles
3. application in studying the behavior of various machining processes
4. train in knowing the fundamental parts of various machining operations and theirkinematic schemes.
5. Basic Exercises in Lathe, Shaper, Milling, Slotting, CNC and Grinding machines welding equipment comprising Microscopes polishing disc grinders as under.

PRODUCTION LAB

1. Plain Turning, Facing, Knurling, Taper turning, And Thread Cutting.
2. Drilling, boring, counter boring, counter sinking.
3. Simple exercises on shaping
4. Simple exercises in Planing
5. Plain Milling
6. Gear Milling
7. Sheet metal joining by Soldering.
8. Simple exercises on 3D printing.
9. Simple exercises in Gas welding
10. Simple exercises in Arc Welding.
11. Aircraft wood gluing practice
12. Study of properties of sandwich structures

Note: Any 10 experiments can be conducted.

Equipment needed: Lathe, Shaper, Milling, Slotting, EDM, CNC and Grinding machines welding equipment and metallurgy equipment comprising Microscopes polishing disc grinders.

Reference Books:

1. "Aircraft production techniques" Keshu S.C, Ganapathy K.K., Interline Publishing House,Banglore- 1993.
2. "Manufacturing Engineering and Technology" by Kalpakajam - Addison Wesley.

Outcomes:

After completion of the course students will be able to

1. Impart the desired size and shape to work pieces, the desired accuracy is achieved by removing excess metal in the form of chips.
2. In this lab, students perform different operations on the lathe such asturning,facing, taper turning, thread cutting and grooving.
3. They also cut different types of gears on the milling machine that is provided with an indexing mechanism and Identify basic parts and operations of machines including lathe, shaper, planer, drilling and milling machine.
4. Exhibit the ability in developing sequence of machining operations required for industry. Capable of manufacturing components according to given drawings using various machines.
5. Student will have hands on experience on various production techniques.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

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

-/-/2/1

(R22A2182) AIRCRAFT ENGINEERING DRAWING LAB USING CAD

OBJECTIVES:

1. To expose them to existing national standards related to technical drawing.
2. To understand the limits and tolerance system
3. To give external and internal details of the machine components.
4. To understand the usage of computers in engineering field.
5. To understand how to model a component by using a software.

Unit 1 Machine Drawing Conventions:

Need for drawing conventions – introduction to IS conventions - Conventional representation of materials, common machine elements

Unit 2 Limits and tolerances:

Limit System – Tolerances – Fits - Tolerances of Form and Position – Standards followed in Industry

Unit 3 Assembly Drawings:

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

a) Engine parts – stuffing boxes, Knuckle joint, Eccentric.
b) Wing, Landing gear, horizontal stabilizer.

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

Unit 4

1. INTRODUCTION to CAD and AutoCAD – BASICS
2. 2D – FIGURES for practice USING AutoCAD (Orthographic Projection)
3. ISOMETRIC DRAWING for practice USING AutoCAD

Unit 5

1. Introduction to CREO – 3.0
2. INTRODUCTION TO CREO 3.0
3. Modeling of 3-D FIGURES USING CREO
   - Modeling of Knuckle Joint
   - Modeling of stuffing box

Outcomes:

On completion of the course, the student will be able to

1. Understand and apply the knowledge of machine drawing as a system of communicationin which, iexposed clearly and all information is fully conveyed.
2. Apply the limits and tolerances
3. Produce the assembly drawing from list of components.
4. Apply AutoCAD commands to draw 2D drawing and 3D drawings.
5. Apply CREO commands to model any solid component.

TEXT BOOK

1. Machine Drawing by K. L. Narayana, P. Kannaiah, K. Venkata Reddy New Age International
2. Raymer, D.P., Aircraft Design: A Conceptual Approach, third edition, AIAA Education Series, AIAA, 1999, ISBN: 1-56347-281-0.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

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

2/-/-/-

(R22A0006) 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 language in the world. This course is customized according to the demand of the requirement in job industries.

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.

SYLLABUS

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 YearVocabulary, 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 IntroductionAsking 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 StationAt 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

OUTCOMES

After completion of the course, Student will be able to:

1. Stand ahead of getting the opportunity in the Job market by learning Germanlanguage.
2. Learn German language with engineering degree that will give them a sense ofidentity among the competitive global engineering industry.
3. Learn German language on a regular basis that will help them in improving multi-lingual ability

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

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

3/-/-/3

(R22A2107) AERODYNAMICS

Objectives:

1. To introduce the concepts of mass, momentum and energy conservation relating to aerodynamics.
2. To make the student understand the concept of vorticity, irrotationality, theory of airfoils and wing sections.
3. To introduce the basics of viscous flow.

UNIT – I: Basics of Aerodynamics: Aerodynamic forces and Moments, Derivation of Lift, Drag and moment Coefficientswithpressuredistribution,Variationofpressuredistributionwithrespect to angle of attack, Governing equations of flow- Continuity, momentum and Energy equations in differential form.Flow regimes based on Mach number.

UNIT-II

Inviscid Incompressible Flow over Airfoil: Governing Equation for incompressible and irrotational flow, Elementary flows and their combinations, Magnus effect ,D'Alembert's Paradox, Kutta-Joukowsky theorem, kutta condition. Kelvin's circulation theorem & starting vortex, thin airfoil theory, expressions for calculating the aerodynamic center and Center of pressure.

UNIT–III

Inviscid Incompressible Flow over Wings: Vortex filament statement of Helmholtz's vortex theorems, Biot - Savart Law, horse shoe vortex, Prandtl's Lifting line theorem - downwashandinduceddrag,Ellipticloading&wingsofellipticplanforms,expressionforinduceddrag.

UNITIV

Applied Aerodynamics: Lift augmentation and Drag Reduction methods - Flaps, slats, slots, winglets ,Leading edge root extensions, Large Eddy Breakup device, Co-flow jet, Cuffs and vortex generators. NACA Airfoils, Circulation control, strakes. Drag augmentation methods – spoilers, Airbrakes.

UNIT–V

Experimental Aerodynamics Windtunnelandits Components,types of wind tunnels and Model testing in wind tunnels. Pressure, Temperature, Velocity measurements–Hot wire and Laser – Doppler anemometer. Force measurements– Wind tunnel balances. Flow visualization techniques-schlieren and shadow graph methods.

Textbooks:

1. Fundamentals of Aerodynamics, Anderson,Jr.,J.D.,International edition, McGrawHill, 2001, ISBN:0-07-118146-6.
2. Aerodynamics byL.J.Clancy
3. Compressible Aerodynamics, JohnD.Anderson

Reference Books:

1. AerodynamicsforEngineers,fourthedition,Bertin,J.J.,PearsonEducation,2012,ISBN:81-297-0486-2.
2. Kuchemann,D., The AerodynamicDesignofAircraft,Pergamon,1978.
3. Shevell,R.S.,FundamentalsofFlight,Indianreprint,PearsonEducation,2004,ISBN:8

1-297-0514-1.
4. McCormick,B.W.,Aerodynamics,Aeronautics&FlightMechanicssecondeditionJohn Wiley,1995,ISBN:0-471-575062.

Outcomes:

1. An ability to apply thin airfoil theory to predict aerodynamic characteristics of airfoil
2. Application of Elementary flows to develop real problems.
3. Development of devices to enhance aerodynamic characteristics of aircraft components.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

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

4/-/-/4

(R22A2108) SOLID MECHANICS

OBJECTIVES:

The course should enable the students to:

1. Acquire knowledge on the fundamental concepts of stress and strain in materials
2. Describe beams and analyze Shear Force and Bending moments
3. Find the slope and deflection in different types of beam
4. Determine critical loads of columns
5. Obtain knowledge on Strain Energy

Unit – I

Analysis of stress: Introduction to Solid Mechanics – Basic Concepts, Types of Stress, General State of Stress at a Point, State of stress at a point, Complimentary Shear stresses, Stresses on Oblique planes

- Materials Subjected to pure shear, Material subjected to two mutually perpendicular direct stresses.

Unit – II

Members Subjected to Flexural Loads: Geometric Forms of beams, Classifications of beams, statistically determinate Beams, Concept of Shear Force and bending moment in beams, Cantilever Beam and Simply Supported Beam- Shear Force and Bending Moment Diagrams, Simple Bending theory and Derivation of flexuralequation.

Unit – III

Deflection of beams: for a simply supported and Cantilever beam with problems using Double Integration methodand Macaulay's method.

Unit – IV

Elastic stability of Columns: Euler's theory, Critical load determination of columns with different endconstraints.

Unit – V

Theories of failures: Von-mises theory, octahedral shears distortion energy theory, Maximum principle elastic strain theory, Maximum principle shear strain theory, Maximum shear stress theory.

TEXT BOOKS:

1. Strength of Materials by R S Khurmi, S Chand and company Ltd
2. Strength of Materials by S Ramamrutam, DhanpatRai Publications

REFERENCES:

1. Aircraft Structures for Engineering Students by THG Megson, Elsevier Aerospace Engineering Series.

COURSE OUTCOMES:

Upon the successful completion of the course, students will be able to:

1. Understand the fundamental concepts of stress and strain in materials
2. Analyze Shear Force and bending moments on different types of beams
3. Apply the basic concepts to find the slope and deflection in simply supported and Cantilever beam
4. Define critical loads of columns with different end Conditions
5. Acquire knowledge on Strain Energy in axial, bending, torsion and shear loads

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

3/-/-/3

(R22A2109) AIR BREATHING PROPULSION

Objective:

1. Students can focus on various propulsion systems available in aerospace industry and also understand the future scenario.
2. Students will study the design aspects of inlet and Nozzles and their importance in performance of engine
3. To provide an exposure with compressor and turbine design features
4. Evaluate design aspects of burner
5. Understand the performance aspects at the design point and off design operations

UNIT I FUNDAMENTALSOFPROPULSION:

Aircraft Engine Components - Performance Requirements, Thermodynamic Processes - Representation by T-s and p-v diagrams - Pressureratios, Temperature ratios. Energy transfer, losses; Polytropic and Stage Efficiencies; Engine Station Numbering, thrust generation, Equation of Thrust for installed and uninstalled cases, Factors affecting thrust, Role of propulsion in aircraft performance.

UNIT II ANATOMYOFJET ENGINE-I

INLETS:Locations, Types of inlets, operating principle, functions, geometry, operating conditions, flow field, capture area, flow distortion, drag, and diffuser losses and methods of mitigation, performance; Numericals on inlets.

NOZZLE: Function, Types, Engine Back-pressure control, Exhaust nozzle Area Ratio; Thrust Vectoring, Types; Thrust Reversal, Types of Thrust Reversal Systems; Nozzle Coefficients, Gross Thrust coefficient, Discharge Coefficient, Velocity coefficient, Angularity coefficient

UNIT III ANATOMY OF JETENGINE-II

COMPRESSOR & TURBINE: Types, construction, stage, cascade, blade geometry, velocity triangles, Euler equation, types of flow analysis, diffusion factor, stage loading, Performance Maps, Off-design Performance, Multi-spooling; Axial flow turbines, Velocity diagram analysis, no exit swirl condition, flow losses, causes tangential stresses, repeating stages, Typical blade profiles, turbine performance maps, Blade cooling, materials, Similarities and differences with compressors; Numericals on turbo-machinery

UNIT IV ANATOMYOFJETENGINE-III

BURNER: Essential considerations in Design of Burners; Primary Burners-types, components, schematic diagram, operation; airflow distribution, Flamestability, Ignition and Engine starting; Factors effecting Combustion Chamber Performance; Flame tube Cooling; Fuel injection, After burners, flame stabilization, flame holders; fuels-composition and properties

UNITV:

DESIGN OF GAS TURBINE ENGINE: Aircraft Mission Analysis, Engine Selection-Performance and Parametric Analysis, Sizing the Engine, Major Considerations in Engine Components Design.

SYSTEM MATCHING AND ANALYSIS: Component Matching of Gas Turbine Engine, Gas Generator, Component Modeling, Equilibrium Points; Solution of Matching Problem, Dynamic and Transient Response, Matching of Engine and Aircraft.

Text Books:

1. Mattingly,J.D., Elements of GasTurbine Propulsion,McGraw-Hill,1996,ISBN0-07-912196-9.
2. Flack,R.D., Fundamentals of Jet Propulsion with applications, Cambridge UniversityPress, 2005, ISBN0-521-81983-0.
3. JackD Mattingly.,William Heiser & DavidPratt.,Aircraft Engine Design

References:

1. V.Ganesan.,GasTurbines,TataMcGraw-Hill,1999,ISBN,0070681929.

Course Outcomes

1. Understand operation of different air breathing propulsion systems and their applications
2. Learn construction and design features of inlets and nozzles
3. Develop knowledge on function of compressors and turbines and their performance measurement techniques
4. Develop knowledge on function of combustors and their performance criteria
5. Identify problems of matching components of gas turbine engine and their design features

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

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

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(R22A2110) AIRCRAFT PERFORMANCE

OBJECTIVES OF THE COURSE:

1. To equip the students with fundamental understanding of aircraft performance in various flight regimes.
2. To familiarize the concepts and parameters affecting flight performance.

UNIT – I: INTRODUCTION TO AIRCRAFT PERFORMANCE- THE FORCE SYSTEMS OF THEAIRCRAFT

The role and design mission of an aircraft. Specification of the performance requirements and mission profile. Importance of performance analysis, estimation, measurement, operational safety and economy. The Standard Atmosphere. Off-standard and design atmosphere. Measurement of air data. Air data computers. Equations of motion for performance - the aircraft force system. The propulsive forces - the thrust production engines, power producing engines, variation of thrust, propulsive power and specific fuel consumption with altitude and flight speed.

UNIT – II: CRUISE PERFORMANCE

Maximum and minimum speeds in level flight. Range and endurance with thrust production, and power producing engines. Cruise techniques - constant angle of attack, constant Mach number; constant altitude, methods- comparison of performance. The effect of alternative fuel flow laws, weight, altitude and temperature on cruise performance. Cruise performance with mixed power-plants.

UNIT – III: CLIMB & DESCENT PERFORMANCE

Climb and descent techniques, safety considerations, performance analysis- maximum climb gradient,climb rate. Energy height and specific excess power, optimal climbs - minimum time, minimum fuel climbs. Measurement of climb performance. Descent performance in aircraft operations. Effect of wind on climb and descent performance.

UNIT – IV: MANEUVER PERFORMANCE

Accelerated motion of aircraft - equations of motion- the maneuver envelope. Longitudinal maneuvers the pull-up, push over maneuvers. Lateral maneuvers- turn performance- turn rates, turn radius- limiting factors. Maneuver boundaries, Maneuver performance of military aircraft, transport aircraft.

UNIT-V: TAKE-OFF AND LANDING- SAFETY REQUIREMENTS - FLIGHT PLANNING

Estimation of take-off distances. The effect on the take-off distance with respect to weight, wind,runway conditions, ground effect. Take off safety factors. The estimation of landing distances, the discontinued landing, baulked landing, air safety procedures and requirements on performance. The effect on the landing distance, of weight, wind, runway conditions, ground effect. Fuel planning, fuel requirement, trip fuel, reserve and tankering.

TEXT BOOKS:

Eshelby, M.E., Aircraft Performance; Theory and Practice, AIAA Education Series, AIAA, 2000, ISBN: 1-56347-398-4

REFERENCE BOOKS:

1. Raymer, D.P., Aircraft Design: A Conceptual Approach, third edition, AIAA Education Series, AIAA, 1999,ISBN: 1-56347-281-0.
2. Yechout, T.R. et al., Introduction to Aircraft Flight Mechanics, AIAA Education Series, AIAA,2003, ISBN:1-56347-577-4.

Outcomes:

1. The student will have a clear understanding of the fundamental concept leading to aircraft performance including military and passenger aircraft.

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(R22A0026) PROBABILITY AND STATISTICS

COURSE OBJECTIVES:

1. To identify a random variable that describes randomness or an uncertainty in certain realistic situation. It can be either discrete or continuous type.
2. 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.
3. To build the linear relationship between two variables and also to predict how a dependent variable changes based on adjustments to an independent variable.
4. To interpret the types of sampling, sampling distribution of means and variance, Estimations of statistical parameters.
5. To give comprehensive knowledge of probability theory to make inferences about a population from large and small samples.

UNIT – I: Random Variables

Single Random Variables -Discrete and Continuous, Probability distribution function, Probability mass and density functions, mathematical expectation and variance.

Multiple Random variables: Discrete and Continuous, Joint probability distribution, Marginal probability density functions, conditional probability distribution function 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: Sampling and Testing of Hypothesis for Large Samples

Sampling: Definitions - Types of sampling - Expected values of sample mean and variance, Standard error - Sampling distribution of means and variance. 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.

Unit-V: Testing of Hypothesis for Small Samples

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.

TEXT BOOKS:

1. Fundamental of Statistics by S.C. Gupta, 7th Edition,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.

REFERENCES BOOKS:

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 completion of the course, the student will be able to

1. Evaluate randomness in certain realistic situation which can be either discrete or continuous type and compute statistical constants of these random variables.
2. Provide very good insight which is essential for industrial applications by learning probability distributions.
3. Higher up thinking skills to make objective, data-driven decisions by using correlation and regression.
4. Assess the importance of sampling distribution of a given statistic of a randomsample.
5. *Analyze and interpret statistical inference* using samples of a given size which istaken from a population.

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(R22A0083) FLUID MECHANICS AND SOLID MECHANICS LAB

Objectives:

1. To supplement the theoretical knowledge gained in Mechanics of Solids with practical testing for determining the strength of materials under externally appliedloads.
2. To analyze various strength of materials
3. To understand various characterization methods
4. To conduct experiments to verify fundamental principles of fluid mechanics.
5. To calibrate measuring devices and analyze experimental data

(A) SOLID MECHANICS LAB:

1. Direct tension test
2. Torsion test
3. Hardness test

a) Brinells hardness test

b) Rockwell hardness test

4. Test on springs
5. Compression test on cube
6. Impact test
7. Punch shear test

(B) FLUID MECHANICS LAB

8. Calibration of Venturimeter
9. Calibration of orifice meter
10. Verification of Bernoulli's apparatus.
11. Pipe friction.
12. Determination of co-efficient of discharge for external Mouth Piece.

Note: Any 10 experiments can be conducted minimum five from each section.

Equipment needed

SM – lab

1. UTM – 20 / 40 Tons with load Vs Elongation graphical attachment and provision for Bending and sheering along with accessories and end grips
2. Deflection test rig (Fabricated hardware + precession dial gauge)
3. Torsion testing Machine
4. Hardness testing Machine (Brinnel and Rockwell)
5. Impact Testing Machine
6. Spring testing Machine.

FM – lab

1. Venturimeter test rig
2. Test rig for Flow over notch
3. Pipe friction apparatus
4. Bernoulli's apparatus
5. test rig for Orifice meter
6. Mouthpiece apparatus.

Outcomes:

1. Prove good understanding of concepts and their applications in the laboratory
2. Analyze various strength of materials through characterization
3. Understand various characterization methods depending on the type of loading.
4. Ability to use equipment for flow measurements.
5. Ability to analyze experimental data and develop empirical equations.

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(R22A0084) AERODYNAMICS AND PROPULSION LAB

Objectives:

1. Determine the functions of wind tunnel components.
2. Analyze experimental procedure to summarize aerodynamic characteristics
3. Summarize the difference aerodynamics properties for various models
4. To familiarize students and to expose them practically with various aircraft piston and gas turbine Engines.
5. Evaluate various engine performance characteristics

AERODYNAMICS

1. Calibration of Wind Tunnel.
2. Pressure Distribution over a symmetric Airfoil
3. Pressure Distribution on a cylinder
4. Pressure Distribution over a sphere
5. Estimation of aerodynamics characteristics of NACA0012 airfoil
6. Efficiency of Vanes in Centrifugal blower

PROPULSION

7. Performance estimation for single cylinder four stroke Petrol engines.
8. Performance estimation and heat balance test for single cylinder four stroke Dieselengines.
9. Determination of Port timing and sketching for two stroke petrol engines.
10. Determination of Valve timing and sketching for four stroke diesel engines.
11. Estimating the efficiency of centrifugal compressor.
12. Estimating the efficiency of axial flow compressor.

Note: Any 10 Experiments can be conducted minimum 5 from each section

Equipment needed:

1. Low Speed Wind-tunnel Test Rig with a test section of 1-meter X 1 meter with necessary accessories.
2. Test Rig for Axial flow Compressor
3. Test rig for centrifugal flow compressor.
4. Heat Engine Test Rig.
5. Balancing test Rig
6. Piston Engine

Reference Books:

1. Low speed wind tunnel testing, W.E. Rae & Allen Pope, John Willey &sons
2. Fundamentals of Aerodynamics by John D Anderson TATA MC GRAW HILL
3. Internal Combustion Engines by RK Rajput Laxmi Publications.

Outcomes

1. The student can analyze aerodynamic performance of various geometries.
2. Ability to understand details of piston and gas turbine engine
3. Acquire knowledge of evaluation of performance
4. Demonstrate and visualize the lift and drag variations on different components
5. Correlate various engines based on the application

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(R22A0061) PUBLIC POLICY AND GOVERNANCE

Course objectives:

- To make the students understand in-depth analysis of public policyand to solve its illsprevailing in the society.
- To provide an opportunity for the students to learn the basic areas of public policy analysis,implementation and evaluation.
- To make understand the process and various approaches in public policy making
- To understand the theories and issues of social coordination and the nature of all patternsof rule.
- To make the students understand the techniques of governance and emerging trends inpublic 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, Perspectivesof 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 Hindmoor, A. (2009) Rethinking Governance: The Centrality of the State in Modern Society, Cambridge: Cambridge University Bell, Stephen and Andrew Hindmoor.
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, NewDelhi, 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 governanceand various theories in public policy making
4. Understands various concepts, and techniques of governance and its policy-making decisions