

(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. Contact Number: 7207034237/9133555162, E-Mail ID: <u>mrcet2004@gmail.com</u>, website: <u>www.mrcet.ac.in</u>

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



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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

	Semester				
Particulars	* Periods per week	Credits			
Theory	04	04			
Theory	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 midexamination. 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,

- 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.

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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

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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) = Σ (Ci x Gi) / Σ 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 \geq 5 ('C' grade or

Course/Subject	Credits	Letter Grade	Grade Points	Credit Points
Course 1	4	А	8	4 x 8 = 32
Course 2	4	0	10	4 x 10 = 40
Course 3	4	С	5	4 x 5 = 20
Course 4	3	В	6	3 x 6 = 18
Course 5	3	A+	9	3 x 9 = 27
Course 6	3	С	5	3 x 5 = 15
	21			152

above) Illustration of calculation of SGPA

SGPA = 152/21 = 7.24

Illustration of calculation of CGPA:

Course/Subject	Credits	Letter Grade	Grade Points	Credit Points					
l Year l Semester									
Course 1	4	А	8	4 x 8 = 32					
Course 2	4	A+	9	4 x 9 = 36					
Course 3	4	В	6	4 x 6 = 24					
Course 4	3	0	10	3 x 10 = 30					
Course 5	3	B+	7	3 x 7 = 21					
Course 6	3	А	8	3 x 8 = 24					

	I Year II Semester									
Course 7	4	B+	7	4 x 7 = 28						
Course 8	4	О	10	4 x 10 = 40						
Course 9	4	А	8	4 x 8 = 32						
Course 10	3	В	6	3 x 6 = 18						
Course 11	3	С	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

 \geq 5 ('C' grade or above) in every subject/course in that semester (i.e. when student gets an SGPA \geq 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 \geq 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 \geq 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) \geq 7.50, and shall be placed in **'first class with distinction'**.

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

Students with final CGPA (at the end of the under graduate programme) \geq 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) \geq 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.
- 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. <u>Eligibility for award of B. Tech. Degree (LES)</u>

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.

- 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. <u>Promotion rule</u>

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

C NI-	Nature of Malpractices/Improper conduct	Punishment
S.No	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	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.	orderly conduct of the examination. 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)

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B TECH AERONAUTICAL ENGINEERING – COURSE STRUCTURE

I Year B. Tech –I Semester

S. No	Subject Code	SUBJECT	L	т	Р	С	MAX.MARKS	
3. NO	Subject code	SOBJECT	-	•	r		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 Software and Hardware Tools Lab	-	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	oject Code SUBJECT L		т	Р	с	MAX.N	ARKS
3.140	Subject code	JOBJECT	•	•	F		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	Data Structures and its Applications	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	Data Structures and its Applications Lab	-	0	3	1.5	40	60
9	R22A0004	Environmental Science	2	0	0	0	40	60
		Total	15	1	11	20	360	540

B TECH AERONAUTICAL ENGINEERING – COURSE STRUCTURE

II Year B. Tech – I Semester

S. No	Subject Code	ect Code SUBJECT L T		т	Р	С	MAX.MARKS	
3. 140	Subject code	5055C1	-		· ·		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	т	Р	С	MAX.MARKS	
5.140	Subject code	JOBJECT	-		· ·		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 and Queuing Theory	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

B TECH AERONAUTICAL ENGINEERING – COURSE STRUCTURE

III Year B.Tech – I Semester

S.No	Subject Code SUBJECT	SUBJECT		т	Р	С	MAX.MARKS	
5.140	Subject code						INT	EXT
1	R22A2111	Aircraft Structures	3	0	0	3	40	60
2	R22A2112	Computational Aerodynamics	3	0	0	3	40	60
3	R22A2113	Aircraft Stability And Control	3	0	3	3	40	60
4		Open Elective-I	3	0	0	3	40	60
5	R22A2131 R22A2132 R22A2133 R22A6214	Professional Elective-I Experimental Stress Analysis Rocket Technology Space Science Fundamentals Of Cyber Security	3	0	3	3	40	60
6	R22A2186	Computational Aerodynamics 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
9	R22A0084	Professional Development Skill -I	2	0	0	1	40	60
		Total	17	0	14	20	360	540

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

	OpenElective-I						
S.No	SUBJECTCODE	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					

B TECH AERONAUTICAL ENGINEERING – COURSE STRUCTURE

III Year B. Tech- II Semester

S.No	Subject Code	SUBJECT		т	Р	С	MAX.MARKS	
5.140	Subject code	SOBJECT	-			J	INT	EXT
1	R22A2114	Compressible Flow Aerodynamics	3	0	0	3	40	60
2	R22A2115	Finite Element Analysis	3	0	0	3	40	60
3	R22A0566	Artificial Intelligence and Machine Learning	3	0	3	3	40	60
4		Open Elective-II	3	0	0	3	40	60
5	R22A2134 R22A2135 R22A2136 R22A2137	Professional Elective-II Airframe Structural Design Mechanisms and Machine Design Wind Tunnel Techniques Space craft Structures	3	0	3	3	40	60
6	R22A2189	Aircraft Computational Structures Lab	-	0	2	1	40	60
7	R22A0580	Artificial Intelligence and Machine Learning Lab	-	0	2	1	40	60
8	R22A2190	Application Development-II	0	0	4	2	40	60
9	R22A0085	Professional Development Skill -II	2	0	0	1	40	60
		Total	17	0	14	20	360	540

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

OpenElective-II						
S.No	SUBJECTCODE	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	ubject Code SUBJECT L		т	Р	С	MAX.MARKS	
3. 140	Subject code	JOBJECT	-	L 1			INT	EXT
1	R22A2116	Aircraft Systems And Instrumentation	4	0	0	4	40	60
2	R22A2117	Flight Vehicle Design	3	0	0	3	40	60
3	R22A2118	AVIONICS	3	0	0	3	40	60
4	R22A2138 R22A2139 R22A2140 R22A2141	Professional Elective-III Satellite Technology Airline and Airport Management Civil Aviation Rules and Regulations Spacecraft System Engineering	3	0	0	3	40	60
5	R22A2142 R22A2143 R22A2144 R22A2144 R22A2145	Professional Elective-IV Aircraft Maintenance Engineering Heat Transfer Rocketry And Space Mechanics Astrodynamics	3	0	3	3	40	60
6	R22A2191	Flight Vehicle Design 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	т	Р	С	MAX.MARKS	
5.140	Jubjeercoue	SOBJECT	-				INT	EXT
1	R22A0337	Innovation, Start-Up and Entrepreneurship	3	0	0	4	40	60
		Professional Elective-V						
	R22A2146	Aircraft Composite Materials						
2	R22A2147	Air Transportation Systems	3	0	0	3	40	60
	R22A2148	Aero-Elasticity						
	R22A2149	Space Mission						
		Professional Elective-VI						
	R22A2150	Flight Scheduling Operations						
3	R22A2151	Helicopter Engineering	3	0	0	3	40	60
	R22A2153	Analysis Of Composite Structure						
	R22A2154	Space Exploration Technology						
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 L/T/P/C I Year B. TECH I - SEM

2/-/-/2

(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 Vocabulary Writing Reading	 Tenses and Question Tags word Formation - Affixes Writing Paragraph Writing 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 Ro	bert 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 Hi	s 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

Grammar – S	oubject-verb Agreement, Noun-
Pronoun Agreement Vocabulary-	 Commonly Confused Words
Writing –N	/lemo Writing
Reading - R	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

L/T/P/C 3/1/-/4

(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: Nonhomogeneous 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.

I Year B. TECH I – SEM

L/T/P/C 3/-/-/ 3

(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

I Year B. TECH I - SEM

L/T/P/C 2/-/2/3

(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.
- 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

3/-/-/3

(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

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.

(12 Hours)

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY I Year B. TECH I - SEM L/T/P/C

L/T/P/C 2/0/0/2

(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 H₂-O₂ 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 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).
- 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 2 /- /-/2 2 /- /-/2

(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"

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

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.

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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 1/3rd and Simpson's 3/8th 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 functionsarray(),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.

- 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 -/-/2/1

(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

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

I Year B. TECH - II- SEM

L/T/P/C -/-/3/1.5

(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

R22

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 -/-/3/1.5

(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 KMnO₄.

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 Cu²⁺ 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.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

I Year B. TECH - II- SEM

L/T/P/C -/-/2/1

(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.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY I Year B. TECH - II- SEM L/T/P/C

L/T/P/C -/-/3/1.5

(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:

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.

Malla Reddy College of Engineering and Technology

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.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY I Year B. TECH - II- SEM L/T/P/C

(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 2/-/ - / 2/-/ - /

(R22A0003) HUMAN VALUES AND PROFESSIONAL ETHICS

COURSE OBJECTIVES:

This introductory course input is intended:

- 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.
- 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 allpervasive 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 Illich, 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 TECHNOLOGYII Year B. TECH – I- SEM ANEL/T/P/C

L/1/P/C 3/-/-/3

(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 of coplanar 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 of curvilinear 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).

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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
- 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 estimate the location of center of gravity theoretically.
- 3. Calculate the moment of inertia in various sectional components and 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 to their load carrying capacity.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY L/T/P/C II Year B. TECH – I- SEM ANE

3/-/-/3

(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
- Understand boundary layer concepts and flow through pipes. 4.
- 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 &twodimensional 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.

Malla Reddy College of Engineering and Technology

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 TECHNOLOGYII Year B. TECH – I- SEM ANEL/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 / Pearson Edu
- 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 concepts in 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 and facts 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:

- Anderson, J.D., Introduction to Flight, fifth edition, Tata McGraw-Hill, 2007, ISBN: 0-07-006082-4.
- 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 TECHNOLOGYII Year B. TECH – I- SEM ANEL/T/P/C

-/-/2/1

(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.

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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 TECHNOLOGYII Year B. TECH – I- SEM ANEL/T/P/C

(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

-/-/2/1

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 communication in 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 TECHNOLOGYII Year B. TECH – I- SEM ANEL/T/P/C2/-/-/-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

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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 of identity among the competitive global engineering industry.
- 3. Learn German language on a regular basis that will help them in improving multi-lingual ability

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY L/T/P/C II Year B. TECH – II- SEM ANE

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 Coefficients with pressure distribution, Variation of pressure distribution with respect 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.
- Shevell, R.S., Fundamentals of Flight, Indian reprint, Pearson Education, 2004, ISBN:8 3.

1-297-0514-1.

4. McCormick, B.W., Aerodynamics, Aeronautics & Flight Mechanicssecondedition John 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 TECHNOLOGYII Year B. TECH – II- SEM ANEL/T/P/C4/-/-/44/-/-/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 flexural equation.

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 andCantilever beam
- 4. Define critical loads of columns with different end Conditions
- 5. Acquire knowledge on Strain Energy in axial, bending, torsion and shear loads

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGYII Year B. TECH – II- SEM ANEL/T/P/C

(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

3/-/-/3

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, ISBN 0-07-912196-9.
- 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 TECHNOLOGYII Year B. TECH – II- SEM ANEL/T/P/C

(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

3/-/3/3

REFERENCE BOOKS:

- 1. Raymer, D.P., Aircraft Design: A Conceptual Approach, third edition, AIAA EducationSeries, 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.

MALLA REDDY COLLEGE OF ENGINEERING ANDTECHNOLOGY II Year B. TECH – II- SEM ANE L/T/P/C

3/-/-/3

(R22A0026) PROBABILITY, STATISTICS AND QUEUEING THEORY

COURSEOBJECTIVES:

- 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: Testing of Hypothesis

Sampling: Definitions ,Standard error . Estimation - Point estimation and Interval estimation. Testing of hypothesis: Null and Alternative hypothesis - Type I and Type II errors, Critical region confidence interval - Level of significance, One tailed and Two tailed test. Large sample Tests: Test of significance - Large sample test for single mean, difference of means, single proportion, difference of proportions. Small samples: Test for single mean, difference of means, paired t-test, test for ratio of variances (Ftest) ,Chi- square test for goodness of fit and independence of attributes. **UNIT V:** Queuing Theory Queuing theory –Structure of a queuing system and its characteristics-Arrival pattern and service pattern- Pure birth and Death process.

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

TEXT BOOKS:

- 1. Fundamental of Statistics by S.C. Gupta, 7thEdition, 2016.
- 2. Fundamentals of Mathematical Statistics by SC Gupta and V.K.Kapoor
- 3. Higher Engineering Mathematics by B.S. Grewal, Khanna Publishers, 35th Edition, 2000.

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

COURSEOUTCOMES: 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 is taken from a population.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

II Year B. TECH – II- SEM ANE

L/T/P/C -/-/2/1

(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.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY II Year B. TECH – II- SEM ANE L/T/P/C

L/T/P/C -/-/2/1

(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

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGYII Year B. TECH – II- SEM ANEL/T/P/C

(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, Perspectives of Policy Making Process, Institutions of Policy Making. **Unit-III**

Policy Implementation and Evaluation: Concept of Policy Implementation, Techniques of Policy Implementation, Concept of Policy Evaluation, Constraints of Public Policy Evaluation **Unit-IV**

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

Unit-V

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

2/-/-/-

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 and implementation.
- 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

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

III Year B. TECH – I- SEM ANE

L/T/P/C 4/-/-/4

(R22A2111) AIRCRAFT STRUCTURES

OBJECTIVES:

The course should enable the students to:

- 1. Familiarize with modern aircraft structures.
- 2. Investigate buckling of plates
- 3. Obtain knowledge on Strain Energy
- 4. Idealize a real aircraft structure
- 5. Analyze various structural components like wing and fuselage

UNIT–I

THEORY OF THIN PLATES AND THIN WALLED BEAMS

Analysis of thin rectangular plates subject to bending, distributed transverse load, combined bending and twisting, Wagner beam analysis.

UNIT –II

UNSYMMETRICAL BENDING

Unsymmetrical bending-resolution of bending moments - direct stress distribution, shear flowin open section beams, shear centre, Torsion of thin walled closed section- Bredth - Batho shear flow.

UNIT-III

STRUCTURAL IDEALIZATION AND LOADING DISCONTINUITIES IN THIN WALLED BEAMS

Structural idealization of different aircraft components, shear stress distribution at a built in end of a closed section beam.

UNIT-IV

STRESS ANALYSIS OF AIRCRAFT COMPONENTS

Wing and Fuselage - Direct stress and shear flow distribution -Wing spars, tapered wing and fuselage frames.

UNIT –V

ENERGY METHODS

Strain Energy due to axial, bending and torsional loadings. Deflection in beams- Castigliano'stheorem

Text Books:

- 1. Aircraft structures for engineering students by TH G Megson
- 2. Strength of materials by Hibler.
- 3. Strength of materials by R.S.Khurmi.

Reference Books:

- 1. David J. Peery "Aircraft Structures" McGraw Hill Book Company.
- 2. Argyris J.H. and Kelsey S.Energy theorems and structural analysis, Butterworths Scientific Publications 1960.

COURSE OUTCOMES:

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

- 1. Understand theoretical foundations, complexities, and design of modern aircraftstructures.
- 2. Analyze Rectangular sheets under compression and Local buckling stress of thinwalled sections
- 3. Acquire knowledge on Strain Energy in axial, bending, torsion and shear loads
- 4. Idealize a real aircraft structure and apply theoretical foundations to convert into an analytical form.
- 5. Analyze various structural components like wing and fuselage subject to differentloading conditions

MALLA REDDY COLLEGE OF ENGINEERING ANDTECHNOLOGY

III Year B. TECH – I- SEM ANE

L/T/P/C 3/-/-/3

(R22A2112) COMPUTATIONAL AERODYNAMICS

Objectives:

The course should enable the students to:

- 1. Application of CFD tovarious engineering problems.
- 2. Understand the physics of mathematical equations governing aerodynamic flows.
- 3. Understand discretization methods to solve fluid flow problems
- 4. Generation of grid and its importance
- 5. Various CFD techniques

UNIT-I-INTRODUCTION TO COMPUTATIONAL FLUID DYNAMICS

CFD and its importance as research and design tool, General Procedure of CFD, Application of CFD to various Engineering problems. Models of fluid flow- Finite Control Volume, Infinitesimal Fluid Element. substantial derivatives, divergence of Velocity.

UNIT-II-GOVERNING EQUATIONS OF FLUID DYNAMICS

The continuity equation, momentum equation, energy equation, physical boundary conditions. Form of Governing equation suited for CFD - Conservation form - shock fitting and shock capturing. Impact of partial differential equations on CFD. Classification of Quasi-Linear Partial differential equation, The Eigen value method, General behavior of different classes of Partial differential equation – elliptic, parabolic and hyperbolic with examples.

UNIT-III – DISCRETIZATION TECHNIQUES

Introduction, Finite differences and formulas for first and second derivatives, difference equations, Explicit and implicit approaches. Basis of finite volume method- conditions on the finite volume selections- approaches - Cell-centered and cell-vertex. Definition of finite volume discretization general formulation of a numerical scheme.

UNIT-IV - GRID GENE RATION

Need for grid generation. Structured grids- Cartesian grids, elliptic grid, body fitted structured grids, Multi-block grids - overset grids with applications. Unstructured grids- triangular/ tetrahedral cells, hybrid grids, quadrilateral/hexahedra cells. Grid Generation techniques - Delaunay triangulation, Advance font method. Grid quality parameters.

UNIT-V – CFD TECHNIQUES

Lax-Wendroff technique, MacCormack's technique, Crank Nicholson technique, Relaxation technique, Alternating-Direction-Implicit (ADI) Technique. Pressure correction technique Numerical procedures-SIMPLE algorithm. Boundary conditions for the pressure correction method.

TEXT BOOKS

- 1. John .D. Anderson "Computational Fluid Dynamics", McGraw Hill
- 2. Charles Hirsch "Numerical computation of internal and external flows" Second Edition Butterworth-Heinemann is an imprint of Elsevier

REFERENCES

- 1. Hoffmann, K.A: Computational Fluid Dynamics for Engineers, Engineering Education System, Austin, Tex., 1989
- 2. J Blazek "Computational Fluid Dynamics: Principles and Applications" Elsevier.
- 3. Introduction to Computational Fluid Dynamics, Chow CY, John Wiley, 1979

Outcomes:

The student should be able to

- 1. Solve differential equations governing fluid flow problems.
- 2. The student will demonstrate an ability to recognize the type of fluid flow that is occurring in a particular physical system and to use the appropriate model equations to investigate the flow.
- 3. Generation of grid according to geometry of flow.
- 4. The student can able to select appropriate discretization method to solve given problem.
- 5. Application of CFD techniques for aerospace problems.

MALLA REDDY COLLEGE OF ENGINEERING ANDTECHNOLOGYIII Year B. TECH – I- SEM ANEL/T/

L/T/P/C 3/-/3/3

(R22A2113) AIRCRAFT STABILITY AND CONTROL

Objectives:

- 1. To understand the concepts of stability and control of aircraft.
- 2. To familiarize with various Aircraft motions and related stability
- 3. To analyze the different type of modes in longitudinal, lateral and directional motion of aircraft, and recovery from those modes.
- 4. To understand the basic components of control systems.
- 5. To acquire knowledge on augmentation and auto-pilot systems

UNIT –I: Stability, Control Requirements &Static Longitudinal Stability and Control: Degree of freedom of a system -Static and dynamic stability -Purpose of controls -Inherently and marginally stable airplanes. Stick Fixed-Basic equilibrium equation-stability criterion- contribution of wing, tail, fuselage-the most aft center of gravity, Power effects-elevator power, stick fixed neutral point-stick free stability-Hinge moment coefficient-stick free neutral points- maneuvers-stick force gradients-stick force per'g'-Aerodynamic balancing.

UNIT –II: **Aircraft Equations of motion- Perturbed Motion- Linearized, Decoupled Equations**: Aircraft Equations of Motion (EOM), Aircraft Position and Orientation, Stability-Frame andBody-Frame, Euler's Equations, Small Disturbance Theory and Linearization of EOM, Decouplinginto longitudinal and lateral-directional motions- conditions for validity- role of symmetry.

UNIT –III: Lateral, Directional & Dynamic Stability-Response To Control: Lateral and directional stability-definition, static directional stability rudder fixed , directional control, stick – free directional stability, dihedral effect and lateral control, estimation of airplane dihedral effect, lateral control introduction , estimation of lateral control power, Adverse yaw , aileron control forces.

Solutions to the stability quartic of the linearized equations of motion, the principal mode- phugoid, short period, Dutch roll and spiral modes-further approximations, restricted degrees of motion-solutions, response to controls, auto rotation and spin.

UNIT –IV: Control System Modeling and Feedback Control

Basic components of control system, open loop system, closed loop system, Types. Reduction of block diagrams - rules and conventions. Stability analysis- Routh Hurwitz, Bode Plot, Polar plot, - determination of gain margin and phase margin.

UNIT-V: Design of Aircraft Controller, Stability and Control Augmentation & Auto Pilots

Design of Stability Augmentation System (SAS) using displacement & rate feed-back, Control augmentation system, Full authority fly-by-wire control, need for automatic control. Auto pilots-purpose, functioning, displacement auto pilot, pitch, yaw, bank, altitude and velocity hold auto pilot. **Text Books:**

- 1. Yechout, T. R. et al., Introduction to Aircraft Flight Mechanics, AIAA education Series, 2003, ISBN 1-56347-577-4.
- 2. Airplane performance stability and control by Courtland D.Perkins ,Robert E.Hage Johnwiley& sons.

Reference Books:

- 1. Etkin, B. and Reid, L. D., Dynamics of Flight, 3rd Edition. John Wiley, 1998, ISBN 0-47103418-5.
- 2. Schmidt, L. V., Introduction to Aircraft Flight Dynamics, AIAA Education Series, 1998, ISBN A-56347-226-0.
- 3. McCormick, B. W., Aerodynamics, Aeronautics and Flight Mechanics, 2nd Edition., WileyIndia, 1995, ISBN 978-]
- 4. Nelson, R. C., Flight Stability and Automatic Control, 2nd Edition., Tata Mc Graw Hill,2007, ISBN 0-07-066110-3.

Outcomes:

- 1. An understanding of the static stability of aircraft and describe stick fixed and stick free neutral point
- 2. Can able to linearize equations of motion
- 3. Able to understand the dihedral effect and adverse yaw and understands about the longitudinal modes and lateral –directional modes
- 4. The student should be able to model and analyze controlsystem components.
- 5. Students will be able to analyze the working principle of augmentation an auto-pilot systems.

OPEN ELECTIVE

MALLA REDDY COLLEGE OF ENGINEERING ANDTECHNOLOGY III Year B. TECH – I- SEM ANE L/T

L/T/P/C 3/-/-/3

(R22A0551) JAVA PROGRAMMING

COURSE OBJECTIVES:

- 1. To create Java programs that leverage the object-oriented features of the Java language, such as encapsulation, inheritance and polymorphism; Use data types, arrays and strings.
- 2. Implement error-handling techniques using exception handling,
- 3. To know about Applets and Event Handling
- 4. Create and event-driven GUI using AWT components.
- 5. To learn Multithreading concepts.

UNIT I:

Java Programming-OOP Concepts, History of Java, Java buzzwords, Data types, Variables, Constants, Scope and Life time of variables, Operators, Type conversion and casting, Control Flow Statements, simple java programs, concepts of classes, objects, arrays, strings, constructors, methods, access control, this keyword, overloading methods and constructors, garbage collection, recursion.

UNIT II:

Inheritance – Types of Inheritance, super keyword, and preventing inheritance: final classes and methods.

Polymorphism – Dynamic binding, method overriding, abstract classes and methods.

Interfaces-Interfaces Vs Abstract classes, defining an interface, implement interfaces, extending interface.

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

UNIT III:

Exception handling - Benefits of exception handling, exception hierarchy, Classification of exceptions - checked exceptions and unchecked exceptions, usage of try, catch, throw, throws and finally, built in exceptions.

Multi-threading- Differences between multi-threading and multitasking, thread life cycle, creating threads, synchronizing threads.

UNIT IV

Applets – Concepts of Applets, differences between applets and applications, life cycle of an applet, types of applets, creating applets, passing parameters to applets.

Event Handling: Events, Handling mouse and keyboard events.

Files- Streams, Byte streams, Character streams, Text input/output.

UNIT V

GUI Programming with Java – AWT class hierarchy, AWT controls - Labels, button, text field, check box, and graphics. Layout Manager – Layout manager types: border, grid and flow. Swing – Introduction, limitations of AWT, Swing vs AWT.

Malla Reddy College of Engineering and Technology

TEXT BOOKS:

- 1. Java- The Complete Reference, 7th edition, Herbert schildt, TMH.
- 2. Understanding OOP with Java, updated edition, T. Budd, Pearsoneducation.
- **3.** Core Java an integrated approach, dreamtech publication, Dr.R.NageswaraRao.

REFERENCE BOOKS:

1. Java for Programmers, P.J.Deitel and H.M.Deitel, PEA (or) Java: How to Program, P.J.Deitel and H.M.Deitel, PHI

2. Object Oriented Programming through Java, P. Radha Krishna, Universities Press.

COURSE OUTCOMES:

- An understanding of the principles and practice of object-oriented programming and design in the construction of robust, maintainable programs which satisfy their requirements;
- 2. A competence to design, write, compile, test and execute straightforward programs using a high-level language;
- 3. An awareness of the need for a professional approach to design and the importance of good documentation to the finished programs.
- 4. Be able to make use of members of classes found in the Java API.
- **5.** Demonstrate the ability to employ various types of constructs and a hierarchy of Java classes to provide solution to a given set of requirements.

MALLA REDDY COLLEGE OF ENGINEERING ANDTECHNOLOGY

III Year B. TECH – I- SEM ANE

L/T/P/C 3/-/-/3

(R22A1251) WEB DEVELOPMENT

COURSE OBJECTIVES:

- 1. To learn the basics of web & html programming
- 2. To learn about CSS and its style
- 3. To learn about Java Scripting & Dynamic Html
- 4. To learn about web server software AJAX
- 5. To learn about PHP

Unit I

Web Basics- Introduction, Concept of Internet- History of Internet, Protocols of Internet, World Wide Web, URL, Web Server, Web Browser, HTML-Introduction HTML-Basic Formatting Tags, HTML- Grouping Using Div Span, HTML-Lists,: HTML-Images, HTML- Hyperlink, HTML-Table, HTML- Iframe, HTML – Form HTML – Headers, HTML-Miscellaneous using tool Dreamweaver/ Visual studio

Unit II

CSS –Introduction, Syntax, CSS-Selectors, CSS-Color Background Cursor, CSS-Text Fonts, CSS- Lists Tables, CSS -Box Model, CSS-Display Positioning, CSS Floats. Using tool using tool Dreamweaver/ Visual studio, Net Bean

Unit III

Introduction of Java Script, JavaScript characteristics, Objects in Java Script, Dynamic HTML with Java Script. XMLHttpRequest- Introduction, XMLHttpRequest, The XMLHttpRequest Object, Events for the XMLHttpRequest Object, Request Object for XMLHttpRequest, Response Object for XMLHttpRequest. Using tool using tool Visual studio, Net Bean & Eclipse

Unit IV

AJAX Introduction- Introduction, AJAX Introduction, AJAX Components, Handling Dynamic HTML with Ajax, CSS to Define Look and Feel, Understand the XML Mark-up, XMLHttpRequest. AJAX using XML and XML HttpRequest- Introduction, Ajax Using XML and XMLHttpRequest, Accessing, Creating and Modifying XML Nodes, Loading XML Data into an HTML Page, Receiving XML Responses, Handling Response XML. Using tool using tool Visual studio, Net Bean & Eclipse

Unit V

PHP Introduction- PHP Introduction, Structure of PHP, PHP Functions, AJAX with PHP, PHP Code and the Complete AJAX Example. AJAX with Database- Introduction, AJAX Database, Working of AJAX with PHP, Ajax PHP Database Form, AJAX PHP MySQL Select Query. Using tool using tool Visual studio, Net Bean & Eclipse.

TEXT BOOKS:

1. Web Programming, Building Internet Applications, CHRIS BATES II Edition, Wiley Dreamtech.

2. Programming world wide web ,SEBESTA,PEARSON.

REFERENCE BOOKS:

1. Internet and World Wide Web – How to program, Dietel and Nieto PHI/Pearson

- 2. Ajax: The Complete Reference By Thomas Powell
- 3. PHP: The Complete reference-steven Holzner Tata McGraw-Hill.
- 4. An Introduction to web Design and Programming –Wang-Thomson
- 5. Web Warrior Guide to Web Programming -Bai/Ekedaw-Thomas
- 6. Beginning Web Programming-Jon Duckett WROX

COURSE OUTCOMES:

- 1. Ability to learn to web application.
- 2. To develop a own style sheet
- 3. Ability to create a own java scripting web application.
- 4. Ability to create a own web design using of AJAX
- 5. Ability to create a own web design using of PHP

MALLA REDDY COLLEGE OF ENGINEERING ANDTECHNOLOGY

III Year B. TECH – I- SEM ANE

L/T/P/C 3/-/-/3

(R22A2151) INTELLECTUAL PROPERTY RIGHTS

COURSE OBJECTIVES:

- To understand the concepts IPR
- To understand Trademarks, Trade Secretes and GI of goods.
- To understand Copyrights, Patents and Industrial Designs.
- To learn about how to manage IP rights and legal aspects.
- To understand the concepts of Cyber laws in IPR.

UNIT-I:

Introduction: Introduction to Intellectual Property Rights, types of intellectual property, importance of intellectual property rights, Evolution of IP acts and treaties, Agencies responsible for IPR registrations, Role and value of IP in international commerce, Issues affecting IP internationally. UNIT-II

Trade Marks: Purpose and function of trademarks, Acquisition of trade mark rights, transfer of rights, Selecting and evaluating trademark, registration of trademarks, claims.

Trade Secrets: Trade secret law, determination of trade secret status, liability for misappropriation of trade secrets, trade secret litigation.

Geographical Indication of Goods: Basic aspects and need for the registration UNIT – III

Copyrights: Fundamentals of copyright law, originality of material, right of reproduction, right to perform the work publicly, copyright ownership issues, notice of copyright.

Patents: Foundation of patent law, patent searching process, Basic Criteria of Patentability

Industrial Designs: Kind of protection provided in Industrial design

UNIT – IV:

Managing IP Rights: Acquiring IP Rights: letters of instruction, joint collaboration agreement, Protecting IP Rights: non disclosure agreement, cease and desist letter, settlement memorandum. Transferring IP Rights: Assignment contract, license agreement, deed of assignment UNIT- V

Introduction to Cyber law: Information Technology Act, cyber crime and e-commerce, data security, confidentiality, privacy, international aspects of computer and online crime.

COURSE OUTCOMES:

- Learner should be able to demonstrate understanding of basic concepts of IPR.
- Able to differentiate between Trademarks, Trade secrets and GI of goods.
- Able to understand Copyrights, Patents and Industrial Designs..
- Able to manage and protect IP
- Will gain Knowledge on Cyber law

TEXT BOOKS:

- 1. Intellectual property right by Deborah E Bouchoux
- 2. Cyber law, Text and cases South western special topics collection.
- 3. Intellectual property rights by N.K Acharya
- 4. Fundamentals of IPR for engineers, BY komal bansalREFERENCES:
- 5. Intellectual property rights by P. Radhakrishnan.

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(R22A0351) ROBOTICS AND AUTOMATION

COURSE OBJECTIVES:

- 1. To study overview of Embedded Systems, Robots, Microprocessors & Microcontrollers.
- 2. To study in detail about Robotics and sensors.
- 3. To study about AVR RISC Microcontroller architecture in detail.
- 4. To study about ARM Processor in detail.
- 5. To study about Artificial Intelligence in Robotics.

UNIT-I

Introduction to Embedded System Design, Categories of ES, Overview of Embedded System Architecture, Recent Trends in Embedded Systems, Hardware Architecture of Embedded System, Real-time Embedded Systems and Robots, Robots and Robotics, Microprocessors and Microcontrollers, Microcontroller or Embedded Controller

UNIT - II

Robotics: Classification of Robots, Degree of freedom, Kinematics; Multidisciplinary approach: Motors-DC motors, Stepper Motors, Servo Motors; Power Transmission-Type of Gears, Gear Assembly, CAM follower, Sensors, Open loop and Closed-loop Controls, Artificial Intelligence.

UNIT- III

The AVR RISC microcontroller architecture: Introduction, AVR family architecture, register file, the ALU, memory access and instruction execution, I/O memory ,EEPROM ,I/O ports, timers, UART, Interrupt structure.

UNIT-IV

ARM Processor: Fundamentals, Registers, current program status register, pipeline concept, Interrupt and the vector table.

UNIT V

AI IN ROBOTICS: Robotic perception, localization, mapping- configuring space, planning uncertain movements, dynamics and control of movement, Ethics and risks of artificial intelligence in robotics.

TEXT BOOKS:

- 1. Subrata Ghoshal, "Embedded Systems & Robots", Cengage Learning
- 2. Stuart Russell, Peter Norvig, "Artificial Intelligence: A modern approch", Pearson Education, India2003.
- 3. ARM System Developer's Guide: Designing and Optimizing System Software- Andrew N. Sloss, Dominic Symes, Chris Wright, Elsevier Inc., 2007

REFERENCE BOOKS:

- 1. M.A. Mazidi, J.G. Mazidi, R.D. Mckinlay, "8051 Microcontroller and Embedded Systems", Pearson.
- 2. Dr. K.V.K. Prasad, "Embedded/Real-Time Systems: Concepts Design & Programming", Dreamtech
- 3. Microcontrollers and applications, Ajay V Deshmukh, TMGH, 2005

COURSE OUTCOMES:

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

- 1. Understand the overview of Embedded Systems, Robots, Microprocessors & Microcontrollers.
- 2. Understand in detail about Robotics and sensors.
- 3. Understand AVR RISC Microcontroller architecture in detail.
- 4. Understand about ARM Processor in detail.
- 5. Understand about Artificial Intelligence in Robotics.

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R22A6751) PRINCIPLES OF DATA SCIENCE

Course Objectives:

- To gain knowledge in the basic concepts of Data Analysis
- To acquire skills in data preparatory and preprocessing steps.
- To understand the mathematical skills in statistics.
- To understand the concepts of Artificial Intelligence Roles and Skills in Data Science.
- To understand the role of Data Science in Real-time applications

UNIT I INTRODUCTION Need for data science – benefits and uses – facets of data – data science process – setting the research goal – retrieving data – cleansing, integrating, and transforming data – exploratory data analysis – building the models – presenting and building applications.

UNIT II DESCRIBING DATA - I Frequency distributions – Outliers – relative frequency distributions – cumulative frequency distributions – frequency distributions for nominal data – interpreting distributions – graphs – averages – mode – median – mean – averages for qualitative and ranked data – describing variability – range – variance – standard deviation – degrees of freedom – inter quartile range – variability for qualitative and ranked data.

UNIT III DESCRIBING DATA - **II** Normal distributions – z scores – normal curve problems – finding proportions – finding scores – more about z scores – correlation – scatter plots – correlation coefficient for quantitative data – computational formula for correlation coefficient – regression – regression line – least squares regression line – standard error of estimate – interpretation of r2 – multiple regression equations – regression toward the mean.

UNIT IV AI: ROLES AND SKILLS AI: Cognitive Computing: Learning Perceptions – Terminologies - Machine Learning – Neural Networks – Deep Learning - NLP – Speech Processing – Big Data and AI – Ethics in AI Research - Advanced Applications – AI Myths – Data Science Roles Data Scientist, Data Architect, Data Analyst – Machine Learning Engineer – Skills.

UNIT V DATA SCIENCE USE CASES Data Science Use cases Specifications and Discussion – Data Sources Identification – Data Types –Data Classification – Data Characteristics of Big V^{*}s – Data Science P^{*}s – Applications of AI: Domains: Customer Insights – Behavioral Analysis –- Marketing – Retails – Insurance – Risk and Security – Health care – Supply Chain Logistics.

TextBooks:

1. DavidCielen, ArnoD.B. Meysman, and MohamedAli, "IntroducingDataScience", Manning Publications, 2016. (first two chapters for Unit I)

2. Robert S. WitteandJohn S.Witte, "Statistics", Eleventh Edition, Wiley Publications, 2017. (Chapters 1–7 for Units II and III)

3. JoelGrus, "DataSciencefromScratch", 2ndEdition, O'ReillyPublisher, ISBN: 9781492041139, May 2019 (for Unit IV and V)

Reference Books:

- 1. Lillian Pierson, Jake Porway, "Data Science for Dummies", SecondEdition, John Wiley & Sons, Publishers, ISBN: 9781119327639, 2017 (EBook)
- 2. Sinan Ozdemir, Sunil Kakade, "Principles of Data Science", Second Edition (EBook) E-Learning Resources: Related Online Contents[MOOC, SWAYAM, NPTEL, Websitesetc.]

Course Outcomes:

On successful completion of this course, students would be able to

- Understand the foundational concepts of Data Science.
- Understand the nature of Data.
- Determine the relationship between data dependencies using statistics.
- Understand the concepts of Artificial Intelligence Roles and Skills in Data Science.

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(R22A0063) BUSINESS ANALYTICS

CourseAim/s:

• To help students in understanding how the managers use business analytics for managerial decision making.

LearningOutcome/s:

• The students will be familiar with the practices of analyzing and reporting the business data useful for the insights of business growth and development.

Unit-I: Understanding Business Analytics

Introduction: Meaning of Analytics - Evolution of Analytics - Need of Analytics – Business Analysis vs. Business Analytics - Categorization of Analytical Models - Data Scientist vs. Data Engineer vs. Business Analyst-Business Analytics in Practice-Types of Data-Role of Business Analyst.

Unit-II:Dealing with Data and Data Science

Data: Data Collection - Data Management - Big Data Management - Organization/Sources of Data- Importance of Data Quality-Dealing with Missing or Incomplete Data-DataVisualization-Data Classification.

Data Science Project Life Cycle: Business Requirement-Data Acquisition-Data Preparation

- Hypothesis and Modeling - Evaluation and Interpretation - Deployment - Operations -Optimization-Applications for Data Science

Unit-III:Data Mining and Machine Learning

Data Mining: The Origins of Data Mining - Data Mining Tasks - OLAP and Multidimensional Data Analysis-Basic Concept of Association Analysis and Cluster Analysis.

Machine Learning: History and Evolution - AI Evolution - Statistics vs. Data Mining vs. Data Analytics vs. Data Science - Supervised Learning - Unsupervised Learning – Reinforcement Learning-Frame works for Building Machine Learning Systems.

Unit-IV:Applications of Business Analytics

Overview of Business Analytics Applications: Financial Analytics - Marketing Analytics – HR Analytics -Supply Chain Analytics - Retail Industry - Sales Analytics - Web & Social Media Analytics-Health care Analytics-Energy Analytics-Transportation Analytics-Lending Analytics – Sports Analytics-Future of Business Analytics.

Unit-V:Ethical,LegalandOrganizationalIssues

Issues & Challenges: Business Analytics Implementation Challenges-Privacy and Anonymizaiton- Hacking and Insider Threats – Making Customer Comfortable.

REFERENCES:

- JamesREvans,Business Analytics,Global Edition,Pearson Education
- UDineshKumar, BusinessAnalytics, WileyIndiaPvt.Ltd.,NewDelhi
- GerKoole, An Introduction to Business Analytics, Lulu.com, 2019
- J.D.Camm, J.J.Cochran, M.J.Fry, J.W.Ohlmann, D.R.Anderson, D.J.Sweeney, T.A. Williams-*Essentials* of *Business Analytics*, 2e; Cengage Learning.
- VipinKumar,Introduction to Data Mining,Pang-NingTan,MichaelSteinbach,Pearson Education India
- Bhimasankaram Pochiraju, Sridhar Seshadri, Essentials of Business Analytics: An Introduction to the Methodology and its Application, Springer

PROFESSIONAL ELECTIVE-1

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(R22A2131) EXPERIMENTAL STRESS ANALYSIS (PROFESSIONAL ELECTIVE – I)

Objectives:

- To bring awareness on experimental method of finding the response of the structure to different types of load.
- How to calibrate of different machines with various techniques.
- To understand the working principles of strain gauges.
- To learn about concept of photo elasticity
- NDT applications in experimental stress analysis

UNIT I

MEASUREMENTS: Principles of measurements, Accuracy, Sensitivity and range of measurements.

UNIT II

EXTENSOMETERS: Mechanical, Optical, Acoustical and Electrical extensometers and their uses. Advantages and disadvantages.

UNIT III

ELECTRICAL RESISTANCE STRAIN GAUGES: Principle of operation and requirements of electrical strain gauges. Types and their uses, Materials for strain gauge. Calibration and temperature compensation, cross sensitivity, Rosette analysis. Wheatstone bridge and potentiometer circuits for static and dynamic strain measurements, strain indicators.

UNIT IV

PHOTOELASTICITY: Two dimensional photo elasticity, Concept of light – photo elastic effects, stress optic law, Interpretation of fringe pattern, Compensation and separation techniques, Photoelastic materials. Introduction to three dimensional photo elasticity.

UNIT V

NON–DESTRUCTIVE TESTING: Fundamentals of NDT. Radiography, ultrasonic, magnetic particle inspection, Fluorescent penetrant technique, Eddy current testing, Acoustic Emission Technique, Fundamentals of brittle coating methods, Introduction to Moiré techniques, Holography, ultrasonic C- Scan, Thermograph, Fiber – optic Sensors. 161.

Text Books:

1. Experimental Stress Analysis , Srinath, L.S., Raghava, M.R., Lingaiah, K., Garagesha, G., Pant B., and Ramachandra, K., Tata McGraw-Hill, New Delhi, 1914.

Reference Books:

- 1. Experimental Stress Analysis, Dally, J.W., and Riley, W.F., McGraw-Hill Inc., New York, 1991.
- 2. Hand book of Experimental Stress Analysis, Hetyenyi, M., John Wiley and Sons Inc., New York, 1972.
- 3. Acoustic Emission in Acoustics and Vibration Progress, Pollock A.A., Ed. StephensR.W.B., Chapman and Hall, 1993.

Outcomes:

- 1. Accurately measures the displacement/deflection with precision.
- 2. Usage of resistance strain gauges.
- 3. Distribution stress on a three point bens specimen.
- 4. Use of MEMS/NEMS and sensors to find temperature and strain accurately.
- 5. Use of testing tools in NDT

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(R22A2132) ROCKET TECHNOLOGY (PROFESSIONAL ELECTIVE – I)

Course Objectives:

- Understand the basic principles of rocket propulsion.
- Learn about the different types of rocket engines.
- Study the materials used in rocket construction.
- Analyze the structural and aerodynamic considerations in rocket design.
- Gain insights into the design, testing, and launching of rockets.

UNIT 1:

Introduction to Rocket Technology: History of rocketry, Overview of modern rocket applications, Basic principles of rocket flight, Introduction to rocket terminology

Fundamentals of Rocket Propulsion: Newton's laws of motion, Thrust equation, Types of rocket propulsion systems (chemical, electric, nuclear), Specific impulse and efficiency

UNIT 2:

Chemical Rocket Engines: Solid rocket engines, Liquid rocket engines, Hybrid rocket engines,

Propellants: types, properties, and selection

Liquid Propellant Rocket Engines: Components and design of liquid engines, Propellant feed systems, Cooling methods (regenerative, radiative), Ignition systems

Solid Propellant Rocket Engines: Types of solid propellants, Grain design and burn characteristics, , Case bonding and insulation, Ignition and thrust modulation

UNIT 3:

Electric and Nuclear Propulsion Systems: Principles of electric propulsion (ion, Hall Effect thrusters), Principles of nuclear thermal and nuclear electric propulsion, Comparative analysis with chemical propulsion

Rocket Materials and Structural Design: Materials used in rocket construction (metals, composites, ceramics), Structural design and load considerations, Thermal protection systems, Manufacturing processes and techniques

UNIT 4:

Aerodynamics and Flight Mechanics: Aerodynamic forces on rockets, Stability and control, Flight trajectories and orbital mechanics, Re-entry dynamics

Launch Operations: Launch site selection and preparation, Countdown and launch procedures, telemetry and tracking, Post-launch analysis

UNIT 5:

Advanced Topics and Future Trends: Reusable rockets, Small satellite launchers, Space exploration missions (Moon, Mars), Emerging technologies in rocketry

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Textbooks:

- "Rocket Propulsion Elements" by George P. Sutton and Oscar Biblarz
- "Introduction to Rocket Science and Engineering" by Travis S. Taylor
- "Modern Engineering for Design of Liquid-Propellant Rocket Engines" by Dieter K. Huzel and David H. Huang

Course Outcomes:

- 1. Understand the Historical and Modern Context of Rocketry
- 2. Apply the Principles of Rocket Propulsion
- 3. Analyze Chemical Rocket Engines
- 4. Design and Evaluate Liquid Propellant Rocket Engines
- 5. Explore Electric and Nuclear Propulsion Systems

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OBJECTIVES OF THE COURSE:

(R22A2133) SPACE SCIENCE

(PROFESSIONAL ELECTIVE - I)

- 1. To equip the students with fundamental understanding of space science in physics of planetary systems and astronomy.
- 2. To familiarize the interplanetary concepts with fundamental particles and basic forces.
- 3. To teach students about the origins and evolution of the universe, the different types of stars and galaxies, and the laws of physics that govern the cosmos.
- 4. To understand the basics of space, planets and life in the universe, including astrophysics, biology, chemistry, geology, meteorology and physics.
- 5. To acquire the knowledge about fundamental particles and forces.

Unit I

Introduction to Planetary and Interplanetary Space:

Solar System, Kepler's Laws, Earth-Moon System, Solar and Lunar types, Exploration of Solar System by Telescopes, Rockets and Satellites.

Unit II

Structure of Earth's Atmosphere:

Lower, Middle and Upper Troposphere (0-10km), Stratosphere (10-50km), Ionosphere (50-1000 km), Protono sphere (10,000 to 60,000 km towards sun), Interplanetary space (Beyond 60,000km towards the sun), Earth as a Magnetic Comet

Unit III

The Sun and Planets:

Origin of the solar system, Internal structure and surface features of sun, Sun spots and Magnetic field on the sun and Solar activity. Surface features of planets, Atmospheres and Magnetic fields of Planets and their moons.

Unit IV

Observational and Experimental tools for Astronomy and Space Science:

In-situ measurements of chemical, physical and dynamical parameters using Kites, Balloons, Aeroplanes, Rockets and Satellite Payloads.

Unit V

Fundamental Particles and basic forces:

Protons, Electrons, Neutrons, Neutrinos, Mesons, leptons, and quarks. The concept of Basic forces viz., strong, weak, electromagnetic and gravitational forces.

OUTCOMES

- 1. Students will be able to analyze the trajectory requirements for launching a vehicle or missile.
- 2. Understanding the structure of earth's atmosphere and interplanetary space.
- 3. Knowing the importance of solar system and its origin.
- 4. Covers a broad range of observational and Experimental tools for Astronomy and Space Science
- 5. Having the ability of understanding the fundamental Particles and basic forces including the electromagnetic forces.

R22

TEXT BOOKS:

- 1. J.W.Cornelisse, H.F.R. Schoyer, and K.F. Wakker, Pitman, 1979, Rocket Propulsion and Spaceflight Dynamics,
- 2. William Wiesel, McGraw-Hill, 1997, Spaceflight Dynamics.

References:

- 1. Ionospheric Radio Propagation by Kenneth Davis. National Bureau of Standards Monograph 80(1965), US Government Printing office, Washington D.C.
- 2. Physics of the Upper Atmosphere edited by J, A. Ratcliffe, Cavendish Laboratory, University of Cambridge. Academic Press New York and London (1960)
- 3. Research in Geophysics:Vol.1- Sun, Upper Atmosphere and space edited by Hugh Odishaw, National Academy of Sciences. Washington D.C.
- 4. Source book on the Space Sciences Samuel Glasstone, Princeton, New Jersey.
- 5. The Upper Atmosphere S K Mitra

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(R22A6214) FUNDAMENTALS OF CYBER SECURITY (PROFESSIONAL ELECTIVE-I)

OBJECTIVES:

- 1. To understand the basic concepts of cyber-Security.
- 2. To study different attacks in cyber-crimes.
- 3. To understand different tools and methods used in cyber-crime.
- 4. To study cyber security challenges and implications.
- 5. To know about Cyber Security Organizational Issues, Policies.

UNIT I-Introduction to Cyber Security: Basic Cyber Security Concepts, layers of security, Vulnerability, threat, Harmful acts, Internet Governance – Challenges and Constraints, Computer Criminals, CIA Triad, Assets and Threat, motive of attackers, active attacks, passive attacks, Software attacks, hardware attacks, Spectrum of attacks, Taxonomy of various attacks, IP spoofing, Methods of defense, Security Models, risk management, Cyber Threats-Cyber Warfare, Cyber Crime, Cyber terrorism, Cyber Espionage, etc., Comprehensive Cyber Security Policy

UNIT II-Cyber Offenses: How Criminals Plan Them: Introduction, How Criminals plan the Attacks, Social Engineering, Cyber stalking, Cyber cafe and Cybercrimes, Botnets: The Fuel for Cybercrime, Attack Vector, Cloud Computing.

UNIT III

Cybercrime: Mobile and Wireless Devices: Introduction, Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit card Frauds in Mobile and Wireless Computing Era, Security Challenges Posed by Mobile Devices, Registry Settings for Mobile Devices, Authentication service Security, Attacks on Mobile/Cell Phones, Mobile Devices: Security Implications for Organizations, Organizational Measures for Handling Mobile, Organizational Security Policies an Measures in Mobile Computing Era, Laptops.

UNIT IV

Types of Attacks and Cybercrime: Introduction, Proxy Servers and Anonymizers, Phishing, Password Cracking, Keyloggers and Spywares, Virus and Worms, Trojan Horse and Backdoors, Steganography, DoS and DDoS attacks, SQL Injection, Buffer Overflow.

UNIT V

Cyber Security Organizational Policies, Risk and Chanllenges: Organizational Implications. Introduction, Cost of Cybercrimes and IPR issues, Web threats for Organizations, Security and Privacy Implications, Social media marketing: Security Risks and Perils for Organizations, Social Computing and the associated challenges for Organizations.

TEXT BOOKS:

1. **Cyber Security:** *Understanding Cyber Crimes, Computer Forensics and Legal Perspectives*, Nina Godbole and Sunil Belapure, Wiley INDIA.

REFERENCE BOOKS:

- 1. Cyber Security Essentials, James Graham, Richard Howard and Ryan Otson, CRC Press.
- 2. Introduction to Cyber Security , Chwan-Hwa(john) Wu,J.David Irwin.CRC Press T&F Group

COURSE OUTCOMES: Student will be able to

- 1. Understand basic concepts of Cyber Crimes.
- 2. Ability to identify the attacks inCyber Crimes
- 3. Able tospecify thesuitable methods used in Cyber Crime
- 4. Ability to face cybersecurity challenges
- 5. Understand Cyber Security

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(R22A2186) COMPUTATIONAL AERODYNAMICS LAB

Objectives:

The course should enable the student to:

- 1. Understand the use of modern CFD software, including geometry building, mesh generation, solution techniques, and flow visualization.
- 2. Understand various numerical methods to solve fluid flow problems.
- 3. Gain knowledge towards the investigation of various fluid flow systems aimed at a deeper understanding of the basic principles of fluid mechanics.
- 4. Experience with some of the difficulties that one may encounter in CFD, such as geometry simplification, mesh problems, convergence problems, multiple solutions, etc.
- 5. Carry out an individual CFD project from a set contributed by the instructor or from the student's own experience.

LIST OF EXPERIMENTS:

- 1. Numerical simulation of Flow over an airfoil using commercial software
- 2. Numerical simulation of Supersonic flow over a wedge using commercial Software
- 3. Numerical simulation of Flat plate boundary layer using commercial software
- 4. Numerical simulation of Laminar flow through pipe using commercial software
- 5. Numerical simulation of Flow past cylinder using commercial software
- 6. Numerical simulation of flow through nozzle using commercial software
- 7. Numerical simulation of flow over wing using commercial software
- 8. Numerical simulation of combustion using commercial software
- 9. Solution for the one dimensional wave equations using explicit method of lax using finite Difference method (code development)
- 10. Solution for the one dimensional heat conduction equation using explicit method using finite difference method (code development)
- 11. Generation of the Algebraic Grid (code development)
- 12. Generation of the Elliptic Grids (code development)

Note: Any 10 Experiments can be conducted.

Equipment Needed:

- 1. Computers: Core 2 duo processor with 1 GB RAM
- 2. Software: MATLAB or SCILAB and ANSYS or equivalent software

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(R22A2187) AIRCRAFT STRUCTURES LAB

Objectives:

- 1. Tostudy the properties of materials used in Aircraft structure.
- 2. To know the different structures involved in aircraft.
- 3. To know the influence of size, shape, thickness of structures on structural behavior
- 4. Tostudy the failure of different component under different loading condition
- 5. To know the technique to avoid the structural twisting

LIST OF EXPERIMENTS:-

- 1. Tensile testing using universal Testing Machine Stress strain curves and strength tests for various engineering materials.
- 2. Bending tests Stress and deflection of beams for various end conditions
- 3. Compression tests on long columns –Critical buckling loads
- 4. Compression tests on short columns -Critical buckling loads
- 5. Failure strength of riveted joints.
- 6. Failure strength of bolted joints.
- 7. NDT inspection methods.
- 8. Shear Center of open and closed sections.
- 9. To calculate instability of a Wagner beam
- 10. Deflection of a simply supported beam with varying load conditions.
- 11. Unsymmetrical bending of cantilever beam
- 12. Verification of principle of superposition

Note: Any10Experiments should be conducted

Equipment needed

- 1. UTM 20 / 40 Tons with. Jigs and Fixtures
- 2. Deflection test rig (Fabricated hardware + precession dial gauge)
- 3. NDT Equipment. a) Ultrasonic apparatus, b) Magnetic Particle test rig, c) Dye penetration test.
- 4. Various Hardware rigs desired in the lab for specific test.
- 5. Photo and magnetic speed setup
- 6. Vibration beam setup
- 7. ShearCenter of open and closed section setup.

Reference Books:

- 1. Megson, T.M.G., Aircraft Structures for Engineering Students, Edward Arnold, 1985.
- 2. Bruhn. E.H, Analysis and Design of Flight Vehicles Structures, tri -state off set company, USA, 1965

Outcomes:

- 1. Experimental and theoretical studies of beams under different boundary conditions
- 2. Student will be attained knowledge about structures under different size
- 3. Understanding of Failure strength in joints
- 4. Student will be identified material defect using NDT techniques
- 5. Symmetric and Un-symmetric structures differentiation will be identified

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(R22A2188) APPLICATION DEVELOPMENT-I

LIST OF EXPERIMENTS:-

- 1. Installation of Android studio.
- 2. Development Of Hello World Application.
- 3. Create an application that takes the name from a textbox and shows hello message along with thename entered in textbox, when the user clicks the OK button.
- 4. Create a screen that has input boxes for User Name, Password, and Address, Gender (radio buttons for male and female), Age (numeric), Date of Birth (Date Picket), State (Spinner) and a Submit button. On clicking the submit button, print all the data below the Submit Button (use any layout).
- 5. Design an android application to create page using Intent and one Button and pass the Values from oneActivity to second Activity.
- 6. Design an android application Send SMS using Intent.
- 7. Create an android application using Fragments.
- 8. Design an android application Using Radio buttons.
- 9. Design an android application for menu.
- 10. Create a user registration application that stores the user details in a database table.

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(R22A0084) PROFESSIONAL DEVELOPMENT SKILL -I

OBJECTIVES:

- 1. To strengthen the students with the professional skill set.
- 2. To make the students recognize the role of technical English in their academic and professional fields.
- 3. To improve language proficiency and to develop the required professional ethics.
- 4. To equip students, organize, comprehend, write, and present, short and long forms of any technical work within the broad framework of the Scientific Method.
- 5. To facilitate communication about projects and ideas throughout the industry and also to the nontechnical people.

UNIT-I:

- Communication Skills: Verbal & Non-verbal communication
- Body Language: Facial expressions, Gestures, Eye Contact, Shrugging, and Standing Postures
- Writing: Letter Writing: requisition, complaint, Enquiry and response
- Exploring Career Opportunities

UNIT-2:

- Self-Introduction
- Ice-Breaking
- Writing: E-Mail Writing, Email Etiquette
- Social and Cultural Etiquette

UNIT-3:

- Oral Presentation Skills: PPTs, Paper Presentation, Poster Presentation etc.,
- JAM Session
- Writing: Paragraph writing and Types of Paragraph Writing (descriptive, narrative, expository, and persuasive)
- Ethics and Integrity

UNIT-4:

- Describing People, Places, things etc.
- Telephonic Conversation: Telephonic Expressions, and Etiquette
- Writing: Essay writing and Types of Essay Writing
- Digital Literacy and Social Media

UNIT-5:

- Extempore
- Role play and Situational dialogues
- Writing: Memo Writing
- Digital Ethics and Cyber Security

OUTCOMES:

Students will be able to

- 1. Understand information which assists in completion of the assigned job tasks more successfully
- 2. Market them with the rich professional skills that they acquire.
- 3. Adhere to ethical norms of scientific communication
- 4. Strengthen their individual and collaborative work strategies
- 5. Successfully market them and sell themselves to the employer of their choice.

REFERENCE BOOKS:

- 1. Curriculum and Guide line for Life Skills, By UGC, August 2023
- 2. David F. Beer and David McMurrey, Guide to writing as an Engineer, John Willey. New York, 2004
- 3. Diane Hacker, Pocket Style Manual, Bedford Publication, New York, 2003. (ISBN 0312406843)
- 4. Shiv Khera, You Can Win, Macmillan Books, New York, 2003.
- 5. Raman Sharma, Technical Communications, Oxford Publication, London, 2004.
- 6. Meenakshi Raman, Prakash Singh, Business communication, Oxford Publication, New Delhi 2012.
- 7. Dale Jung k, Applied Writing for Technicians, McGraw Hill, New York, 2004. (ISBN: 07828357-4)
- 8. Sharma, R. and Mohan, K. Business Correspondence and Report Writing, TMH New Delhi 2002.
- 9. Xebec, Presentation Book, TMH New Delhi, 2000. (ISBN 0402213)

MALLA REDDY COLLEGE OF ENGINEERING ANDTECHNOLOGY

III Year B. TECH – II- SEM ANE

L/T/P/C 3/-/-/3

(R22A2114) COMPRESSIBLE FLOW AERODYNAMICS

Course objectives:

- 1. Study the basic governing equations of compressible flows and its parameters.
- 2. Study the effects of Shock and Expansion waves on aerodynamic characteristics.
- 3. Learn about mathematical modeling and the corresponding corrections in the equations of incompressible flows for modeling compressible flows.
- 4. Learn about mathematical equations to predict lift and drag of any object in supersonic and hypersonic flows.
- 5. Learn about the experimental methods to study about compressible flows.

Tables: Isentropic, Normal Shock, Oblique Shock, Prandtl Meyer function.

UNIT-I-ONEDIMENSIONAL COMPRESSIBLE FLOWS

Review of Thermodynamics. Definition of Compressibility, Stagnation conditions, Speed of sound, Mach number, shock waves. One dimensional flow governing equations. Alternative forms of Energy equations, Normal shock relations with numerical.

UNIT-II-OBLIQUESHOCK AND EXPANSION WAVES

Oblique shock waves. Supersonic flow over a wedge Θ - β - M relations strong and weak shock solutions, regular reflection from a solid boundary. Expansion waves, Prandtl – Meyer Expansion. Shock Expansion theory.

UNIT-III-SUBSONIC COMPRESSIBLE FLOW OVER AIRFOIL

Introduction - Velocity potential equation –small perturbation equation - Prandtl-Glauert compressibility corrections - Critical Mach number with numericals - Drag divergence Mach number - Area rule - Supercritical airfoil.

UNIT – IV-LINEARIZED SUPERSONIC FLOWS AND HYPERSONIC FLOWS

Linearized supersonic pressure coefficient, application to airfoils, lift and drag for flat plate, comparison with shock expansion theory.

Qualitative aspects of hypersonic flows, Newtonian theory, modified Newtonian theory, lift and drag.

UNIT-V-FLOWTHROUGH NOZZLES AND VARIABLEAREA DUCTS

Quasi one dimensional flow, Area-velocity relation, Isentropic flow through Convergent –Divergent nozzles. Choked flow conditions. Under and Over expansion conditions. Flow through diffusers – wave reflections from a free boundary. Application to supersonic wind tunnel.

Text Books:

1. Anderson, J.D., Fundamental of Aerodynamics, Mc Graw-Hill International thirdditionSingapore-2001.

Reference Books:

- 1. Radhakrishnan, E, E., Gas Dynamics, Prentice Hall of India, 1995.
- 2. Anderson, J.D., Modern Compressible Flow with Historical Perspective, Mc Graw-Hill International thirdedition Singapore-2004.

Outcomes:

- 1. A fundamental understanding of the effect of compressibility at high-speeds and the ability to make intelligent design decisions based on this understanding.
- 2. A fundamental understanding of shock formation, dynamics, and the ability to estimate the shock location.
- 3. The ability toestimate drag and lift forces on basic aerodynamic (lifting) shapes traveling at high-speed.
- 4. The ability todetermine the full high-speed flow field onthin airfoils, wedges, and in nozzles.
- 5. An ability to analyze airfoils at subsonic, transonic, supersonic and hypersonic flight conditions

MALLA REDDY COLLEGE OF ENGINEERING ANDTECHNOLOGY

III Year B. TECH – II- SEM ANE

L/T/P/C 3/-/-/3

(R22A2115) FINITE ELEMENT ANALYSIS

Objectives:

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

UNIT – I

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

UNIT – II

Analysis of Beams: Element stiffness matrix for two node, two degrees of freedom per node beam element.

Analysis of Trusses: Stiffness matrix for plain truss elements, stress calculations and problems.

UNIT – III

Finite element modelling of two dimensional stress analysis with constant strain triangles and treatment of boundary conditions. Finite element modelling of Axisymmetric solids subjected to Axisymmetric loading with triangular elements. Two dimensional four noded isoparametric elements and numerical integration.

UNIT-IV

Steady state heat transfer analysis: one dimensional analysis of a fin and two dimensional analysis of thin plate.

UNIT-V

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

Text Books:

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

Reference Books:

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

Outcomes:

Upon completion of the course students should be able to:

- 1. Correlate a differential equation and its equivalent integral form.
- 2. Understand parametric interpolation and parametric geometry enforces essential boundary conditions to a matrix system.
- 3. Capable of doing thermal analysis.
- 4. Capable of doing vibrational analysis
- 5. Capable of doing structural analysis on two and three Dimensional components.

MALLA REDDY COLLEGE OF ENGINEERING ANDTECHNOLOGY

III Year B. TECH – II- SEM ANE

L/T/P/C 3/-/3/3

(R22A0566) ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

COURSE OBJECTIVES:

- 1. To train the students to understand different types of AI agents.
- 2. To understand various AI search algorithms.
- 3. Fundamentals of knowledge representation, building of simple knowledge-based systems and to apply knowledge representation.
- 4. To introduce the basic concepts and techniques of machine learning and the need for Machinelearning techniques for real world problem
- 5. To provide understanding of various Machine learning algorithms and the way to evaluate the performance of ML algorithms

UNIT - I:

Introduction: AI problems, Agents and Environments, Structure of Agents, Problem Solving Agents Basic Search Strategies: Problem Spaces, Uninformed Search (Breadth-First, Depth-First Search, Depth-first with Iterative Deepening), Heuristic Search (Hill Climbing, Generic Best-First, A*), Constraint Satisfaction (Backtracking, Local Search)

UNIT - II:

Advanced Search: Constructing Search Trees, Stochastic Search, AO* Search Implementation, Minimax Search, Alpha-Beta Pruning Basic Knowledge Representation and Reasoning: Propositional Logic, First-Order Logic, Forward Chaining and Backward Chaining, Introduction to Probabilistic Reasoning, Bayes Theorem

UNIT - III:

Machine-Learning: Introduction. Machine Learning Systems, Forms of Learning: Supervised and Unsupervised Learning, reinforcement – theory of learning – feasibility of learning – Data Preparation– training versus testing and split.

UNIT - IV:

Supervised Learning: Regression: Linear Regression, multi linear regression, Polynomial Regression, logistic regression, Non-linear Regression, Model evaluation methods. **Classification:** – support vector machines (SVM), Naïve Bayes classification

UNIT - V:

Unsupervised learning

Nearest neighbor models – K-means – clustering around medoids – silhouettes – hierarchical clustering – k-d trees, Clustering trees – learning ordered rule lists – learning unordered rule . **Reinforcement learning**- Example: Getting Lost -State and Action Spaces

TEXT BOOKS:

- 1. Russell, S. and Norvig, P, Artificial Intelligence: A Modern Approach, Third Edition, Prentice Hall, 2010.
- 2. MACHINE LEARNING An Algorithmic Perspective 2nd Edition, Stephen Marsland, 2015, by Taylor

& Francis Group, LLC

3. Introduction to Machine Learning , The Wikipedia Guide

REFERENCES:

- 1. Artificial Intelligence, Elaine Rich, Kevin Knight, Shivasankar B. Nair, The McGraw Hill publications, Third Edition, 2009. 2. George F. Luger,
- 2. Artificial Intelligence: Structures and Strategies for Complex Problem Solving, Pearson Education, 6th ed., 2009.
- 3. Introduction to Machine Learning, Second Edition, Ethem Alpaydın, the MIT Press, Cambridge, Massachusetts, London, England.
- 4. Machine Learning , Tom M. Mitchell, McGraw-Hill Science, ISBN: 0070428077
- 5. Understanding Machine Learning: From Theory to Algorithms, c 2014 by ShaiShalev-Shwartz and Shai Ben-David, Published 2014 by Cambridge University Press.

COURSE OUTCOMES:

- 1. Understand the informed and uninformed problem types and apply search strategies to solve them.
- 2. Apply difficult real life problems in a state space representation so as to solve those using AI techniques like searching and game playing.
- 3. Apply machine learning techniques in the design of computer systems
- 4. To differentiate between various categories of ML algorithms
- 5. Design and make modifications to existing machine learning algorithms to suit an

Open Elective -II

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MALLA REDDY COLLEGE OF ENGINEERING ANDTECHNOLOGY III Year B. TECH – II- SEM ANE L/T/

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(R22A6753) BIG DATA ARCHITECTURE (Open Elective –II)

COURSE OBJECTIVES

- 1. To introduce the terminology, technology and its applications
- 2. To introduce the concept of Analytics and Visualization
- 3. To demonstrate the Big Data Architecture and its components, tools
- 4. To introduce Apache Spark
- 5. To introduce Technology Landscape using NoSQL

UNIT I

Big Data Introduction: Classification of Digital Data, Structured and Unstructured Data, Introduction to Big Data: Characteristics – Evolution – Definition - Challenges with Big Data - Other Characteristics of Data, Why Big Data - Traditional Business Intelligence versus Big Data, Importance of Big Data.

UNIT II

Big Data Architecture Introduction: Big Data Architecture- Definition, Why Big Data Architecture. Evolution of Big Data Architecture, Market Trends, Big Data Architecture and Its Sources, Big Data Architecture Use Cases.

UNIT-III

Big Data architecture components: Data ingestion, Data storage, Data Computing, Data Analysis, Data Visualization. Understanding the Lambda architecture, HBase, Spark Libraries, Spark Streaming.

UNIT IV

Introducing Apache Spark : Introduction to Spark, Spark Architecture and its components, Features of Spark, Spark vs Hadoop, Challenges of Spark.

UNIT V

Introduction to Technology Landscape

NoSQL, Comparison of SQL and NoSQL, Hadoop -RDBMS Versus Hadoop - Distributed Computing Challenges – Hadoop Overview - Hadoop Distributed File System - Processing Data with Hadoop - Managing Resources and Applications with Hadoop YARN - Interacting with Hadoop Ecosystem

TEXT BOOKS:

- 1. Tom White Hadoop: The Definitive Guide Third Edit on, O'reily Media, 2012.
- 2. Seema Acharya, Subhasini Chellappan, "Big Data Analytics" Wiley 2015.

REFERENCE BOOKS:

- 1. Michael Berthold, David J. Hand, "Intelligent Data Analysis, Springer, 2007.
- 2. Jay Liebowitz, Big Data and Business Analytics Auerbach Publications, CRC press (2013)
- 3. Tom Punkett, Mark Hornick, Using R to Unbck the Value of Big Data: Big Data Analytics with Oracle R Enterprise and Oracle R Connector for Hadoop, McGraw-Hill/Osborne Media (2013), Oracle press.

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- 4. Glen J. Myat, Making Sense of Data , John Wiley & Sons, 2007
- 5. Pete Warden, Big Data Gbssary, O'Reily, 2011.
- 6. Michael Mineli, Michele Chambers, Ambiga Dhiraj, "Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses", Wiley Publications, 2013.
- 7. ArvindSathi, BigDataAnalytics: Disruptive Technologies for Changing the Game , MC Press, 2012
- 8. Paul Zikopoulos ,Dirk DeRoos , Krishnan Parasuraman , Thomas Deutsch , James Giles , David Corigan , "Harness the Power of Big Data The IBM Big Data Platform ", Tata McGraw Hill Publications

COURSE OUTCOMES:

Upon successful completion of the course, the student is able to

- 1. Identify Big Data and its Business Implications.
- 2. Categorize and summarize Big Data and its importance.
- 3. Acquire fundamental enabling techniques and scalable algorithms like Hadoop, Map Reducein big data analytics
- 4. Compare various file systems and use an appropriate file system for storing different types of data.
- 5. Connect to web data sources for data gathering, Integrate data sources with Hadoop components to process streaming data.

MALLA REDDY COLLEGE OF ENGINEERING ANDTECHNOLOGY III Year B. TECH – II- SEM ANE L/T/

L/T/P/C 3/-/-/3

(R22A0352) DESIGN THINKING (Open Elective –II)

COURSE OBJECTIVES:

- 1. Understand the conceptual development techniques to find solution for a critical design issue.
- 2. Understand Principles to translate the conceptual ideas to engineering design.
- 3. Understand Principles of Design for Manufacturing and Assembly.
- 4. To know about the design for assembly principles
- 5. To know about the design for environment and design for recycling

UNIT-I

Introduction: Innovations in Design, Engineering Design Process, Prescriptive and integrative models of design, Design Review and societal considerations.

Identification of Customer Need: Evaluating Customer requirements and survey on customer needs, Conversion of customer needs into technical Specifications, Information sources.

UNIT-II

Theory of Inventive Problem solving (TRIZ), Creativity and Problem solving, Functional Decomposition of the problem for innovative concept development, Introduction to Axiomatic Design, Concept evaluation and decision making.

UNIT-III

Design for Manufacturing: Technical estimating, design of experiments, design for manufacturability, statistical process control, Introduction to FMEA (failure modes and effects analysis), and Case study of design for manufacturing: Manufacturing System Design Based on Axiomatic Design: Case of Assembly Line

UNIT-IV

Design for Assembly: Assembly Principles, Process, Worksheet, Assumptions. Case study of design for Assembly: Manufacturing System Design Based on Axiomatic Design: Case of Assembly Line

UNIT-V

Design for Environment: Design for recycling; Design for disassembly, Design for energy Efficiency, Design for remanufacture, Design for disposability, Hazardous material minimization. Case study of design for Environment.

TEXT BOOKS:

- 1. Nigel Cross, Engineering Design Methods, John Wiley, 2009.
- 2. George E. Dieter, Engineering Design, McGraw-Hill, 2009.
- 3. Genrich Altshuller, The Innovation Algorithm, Technical Innovation Centre, 2011.

REFERENCE BOOKS

- 1. The Art of Innovation, by Tom Kelley.
- 2. Design Thinking, by Nigel Cross.
- 3. The Design of Business: by Roger Martin.

COURSE OUTCOMES:

- 1. The importance of design in innovation.
- 2. Design tools and processes can generate innovative new ideas.
- 3. Design and design thinking to innovative in areas such as engineering, software development and business operations.
- 4. Strengthen students' individual and collaborative capabilities to identify customer needs, create sound concept hypotheses, collect appropriate data, and develop a prototype that allows for meaningful feedback in a real-world environment.
- 5. To describe the various case studies for design for environment.

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(R22A2152) NANO TECHNOLOGY (Open Elective-II)

Course objectives

- 1. To provide a comprehensive overview of synthesis and characterization of nano particles, Nano composites and hierarchical materials with Nano scale features.
- 2. To provide the engineering students with necessary back ground for understanding various nano material's characterization techniques
- 3. To develop an understanding of the basis of the choice of material for device applications
- 4. To give an insight into complete systems where nano technology can be used to improve our everyday life

UNIT I: Introduction to Nanomaterials

Nanotechnology, Frontier of future-an overview, Length Scales, Variation of physical properties from bulk to thin films to nano materials, Confinement of electron in 0D, 1D, 2D and 3D systems, Synthesis of Nano materials: Bottom – Up approach: Chemical Routes for Synthesis of nano materials - Sol-gel, Precipitation, Solution Combustion synthesis, Hydro thermal, Top – Down approach – Ball milling technique, Sputtering, Laser Ablation.

UNIT II: Characterization of Nanomaterials

Basic principles and instrumentations of Electron Microscopy –Transmission Electron Microscope, ScanningElectron Microscope, Scanning Probes- Scanning Tunneling microscope, Atomic Force Microscope –different imaging modes, comparison of SEM and TEM, AFM and STM, AFM and SEM.

UNIT III: Carbon Based Materials

Introduction, Synthesis, Properties (electrical, Electronic and Mechanical), and Applications of Graphene, SWCNT, MWCNT, Fullerenes and other Carbon Materials: Carbon nano composites, nano fibers, nano discs, nano diamonds.

UNIT IV: Nano technology in Energy storage and conversion

Solar cells: First generation, Second generation and third generation solar cells: Construction and working of Dye sensitized and Quantum dot sensitized solar cells.

Batteries: Nano technology in Lithium ion battery - working, Requirements of anodic and cathodic materials.

Fuel Cells: Introduction, construction, working of fuel cells and nanotechnology in hydrogen storage and proton exchange membranes

UNIT V: Applications of Nano technology

Nano tech Applications and Recent Breakthroughs: Introduction, Significant Impact of Nano technology and Nanomaterial, Electronic Applications (Nano electronics), Computing Applications (Nano computers), ChemicalApplications (Nano chemistry), Optical Applications (Nano photonics).

TextBooks

1. Nano Materials – A.K.Bandyopadhyay/NewAgePublishers

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- 2. Nanocrystals: Synthesis, Properties and Applications C.N.R. Rao, P. John Thomas and G. U. Kulkarni, SpringerSeriesinMaterialsScience
- 3. NanoEssentials-T.Pradeep/TMH

References

- 1. Introduction to Nanotechnology, C.P.Poole and F.J.Owens, Wiley, 2003
- 2. Understanding Nanotechnology, Scientific American 2002
- 3. Nanotechnology, M. Ratner and D.Ratner, Prentice Hall 2003

Outcomes:

- 1. Demonstrate the synthesis of nano particles by various techniques.
- 2. Explain working of basic instruments used in characterization of nano particles.
- 3. Discuss the application of nanotechnology to mechanical and civil domains
- 4. Classify the nano materials based on the dimensions.
- 5. Assess the suitability of nano materials for various device applications.

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MALLA REDDY COLLEGE OF ENGINEERING ANDTECHNOLOGY III Year B. TECH – II- SEM ANE L/T/

L/T/P/C 3/-/-/3

(R22A6251) CYBER GOVERNANCE (Open Elective –II)

Course Objectives:

- 1. To learn Principles of Cyber Security.
- 2. To learn various types of attacks and the precautions.
- 3. To gain the knowledge of security and governance measurements
- 4. To learn the analyticals and various security compliance in Cyber Security throughgovernance.
- 5. To gain the knowledge of various countries Cyber Security Principles and Governance.

UNIT - I:

Principles of cyber-security governance, Assessment of cyber security maturity, Theories of governance – introduction, Governance – definitions and typologies, Tools, methods and processes,

UNIT - II:

Vulnerability management, Threat management, Endpoint management, Intrusion detection and prevention (IDPS), Security incident management, Security operations center (SOC) and related concepts.

UNIT - III:

Measurement of governance: Metrics – concepts, Application security metrics, Network security metrics, Security incident metrics, Vulnerability metrics, Service level objectives / agreement (SLO / SLA), NIST metrics

UNIT - IV:

Basics of security analytics, Threat intelligence and governance, Data driven security governance, Impact of cognitive security on security governance, Industry specific security compliance

UNIT - V:

Cyber security governance India and Other countries, NIST mandates for compliance, Security reporting basics, CISO – role and organization structure

TEXT BOOKS:

- 1. Hayden, Lance. IT Security Metrics: A Practical Framework for Measuring Security & Protecting Data. McGraw-Hill Education Group, 2010.
- 2. Jacobs, Jay, and Bob Rudis. Data-driven security: analysis, visualization and dashboards. John Wiley & Sons, 2014
- 3. Collins, Michael. Network Security Through Data Analysis: From Data to Action. "O'Reilly Media, Inc.", 2017.
- 4. Jaquith, Andrew. Security metrics: replacing fear, uncertainty, and doubt. PearsonEducation, 2007.

REFERENCE BOOKS:

1. Cybersecurity, Critical Infrastructure. "Framework for Improving Critical Infrastructure Cybersecurity." Framework 1 (2014): 11.

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Course Outcomes:

- 1. Students will be able to understand the basis of cyber-security.
- 2. Students will be able to know various governance principles
- 3. Students will learn about various types of attacks and threats in Security
- 4. Students will gain the knowledge of other countries standards, methods in governance.

PROFESSIONAL ELECTIVE-II

MALLA REDDY COLLEGE OF ENGINEERING ANDTECHNOLOGY III Year B. TECH – II- SEM ANE L/T,

L/T/P/C 3/-/3/3

(R22A2134) AIRFRAME STRUCTURAL DESIGN (Professional Elective –II)

Objectives:

- 1. To know about detailed structural components present inaircraft
- 2. To acquire the knowledge about the design parameters how why and wherethey will be used in manufacturing
- 3. To gain the knowledge of different joints and fastener design in airplane
- 4. Students can acquire the knowledge about the loading conditions done on thestructure
- 5. Toknow about different failure modes and failure measures inaircraft structure

UNIT I INTRODUCTION

Principal structural components of aircraft. Design requirements- structural integrity, stiffness, service life. Baseline aerodynamic configuration, Air loads, external loading, weight, operating conditions, conformity to government regulations.

Unit II FASTENERS AND STRUCTURALJOINTS

Fasteners and fittings- role, significance, general design considerations, Fastener systems, types, fastener information, dimensions, materials, allowable strength- tensile, shear, bending. Rivets, bolts and screws, nuts-detail design consideration. Joints – splices, eccentric, gusset, welded, brazed, bonded- types, methods of joining.

UNIT III DESIGN OF WING AND TAIL STRUCTURES

The wing- role- summary of wing loads, structural components- wing box, leading and trailing edges. Wing layout- location of spars, ailerons and flaps, rib spacing and direction, root rib bulkhead, span wise stiffeners, wing covers- skin-stringer panels, integrally stiffened panels, access holes, attachment of leading edge and trailing edge panels Spars- general rules of spar design. Ribs and bulkheads- rib spacing and arrangement .Wing root joints, carry through structure. Leading and trailing edge assembly- control surfaces, flaps- structure. Tail unit- horizontal, vertical tail, elevator, rudder-configuration.

UNIT IV DESIGN OFFUSELAGE AND LANDING GEAR

Function of fuselage- loading, general requirements. Principal structural components –skin and stringers, frame and floor beam, pressure bulkheads, wing & fuselage intersection- layout. Landing gear- purpose, types, general arrangement, loads- design considerations- ground handling, take-off, landing, braking, pavement loading, support structure. stowage and retraction, gear lock- kinematic design Shock absorbers- function, types, Wheels and brakes.

UNIT V FATIGUELIFE, FAIL SAFE-SAFE LIFE DESIGN

Catastrophic effects of fatigue failure- examples- modes of failure- design criteria- fatigue stress, fatigue performance, fatigue life. Fatigue design philosophy- fail-safe, safe life, Aircraft materials.

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Text Books:

- NIU.M.C. Airframe Structural Design, second edition, Hongkong Conmlit Press, 1988, ISBN: 962-7128-09-0
- 2. NIU.M.C. Airframe Stress Analysis And Sizing, second edition, Hongkong Conmlit Press, 1987, ISBN: 962-7128-08-2

- 1. The student will be able to describe overall flight loads acting an aircraft with safe life and fail safe conditions.
- 2. Different types of fasteners and joints on aeronautical field.
- 3. Define complete knowledge about wing and tail section functions and design criteria.
- 4. Students will be attained complete knowledge about fuselage and landing gear functions and structural components
- 5. Students will be acquainted knowledge about aircraft materials and different failure theories.

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L/T/P/C 3/-/3/3

(R22A2135) MECHANISMS AND MACHINE DESIGN (Professional Elective –II)

Objectives:

- 1. The subject gives in depth knowledge on general mechanisms and mechanical design of which aircraft systems are important component.
- 2. To understand how to draw velocity and acceleration diagrams forvarious mechanisms
- 3. To impart the effect of motion in a vehicle when it is moving in air , on water and on road
- 4. To design different types of cam profiles
- 5. To understand and design the gear for various gear trains

UNIT – I

Mechanisms: Elements of links: Classification, Types of kinematic pairs: Lower and higher pairs, closed and open pairs. Constrained motion. Kinematic chain, inversions of mechanisms: inversion of quadratic cycle. Chain – single and double slider crank chains.

UNIT – II

Kinematic Analysis and Design of Mechanisms:

Kinematic analysis: Velocity and acceleration. Motion of link in machine determination of velocity and acceleration diagrams – graphical method. Application of relative velocity method for four bar chain. Analysis of slider crank chain for displacement, velocity and acceleration of sliding-Acceleration diagram for a given mechanism, Klein's construction, Coriolis acceleration, Determination of Coriolis component of acceleration.

Instantaneous centre of rotation, centrode and axode – relative motion between two bodies - Three centres in line theorem – Graphical determination of instantaneous centre, diagrams for simple mechanisms and determination of angular velocity of points and links.

UNIT – III

Gyroscope – Processional Motion: The gyroscope – free and restrained – working principle - the free gyro, rate gyro, integrating gyro as motion measuring instruments. Effect of precession on the stability of vehicles – motorbikes, automobiles, airplanes and ships, Static and dynamic forces generated due to in precession in rotating mechanisms.

UNIT-IV

CAMS and Followers: Cams and followers – definition, uses – types – terminology. Types of follower motion – uniform velocity, simple harmonic motion and uniform acceleration. Maximum velocity and acceleration during outward and return strokes.

UNIT – V

Gears and Gear Trains: Introduction to gears – types, law of gearing. Tooth profiles – specifications, classification – helical, bevel and worm gears, simple and reverted gear train, epicyclic gear trains – velocity ratio ortrain value.

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Belts & Ropes: Types of belts, Velocity Ratio of belt drive, Slip of belt, Creep of belt, Length of open belt drive, length of cross belt drive, Power transmitted, Angle of contact, Centrifugal tension, Condition for transmission of maximum power, V-belt drives, Rope drives, Ratio of driving tensions for rope drives.

Text Books:

- 1. The Theory of machines Thomas Beven., Third Edition– Pearson Publishers.
- 2. Theory of machines and Mechaisms Third Edition John J. Uicker, Jr. Gordon R. Pennock, Josph E. Shigley, Oxford Publisher.
- 3. Theory of Machines J.K. Gupta and R.S. Khurmi- S Chand Publications

Reference Books:

- 1. Mechanism and Machine Theory J. S Rao, R.V.D Dukkipati, New age Publishers.
- 2. Theory of Machines, III rd Edition Sadhu Singh, Pearson Publishers.

- 1. Application of principles in the formation of mechanisms and their kinematics.
- 2. Able to understand the effect of friction in different machine elements.
- 3. Can analyze the forces and toques acting on simple mechanical systems
- 4. To apply different cam profiles for different types of motion
- 5. To design ear trains for transmission of power.

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L/T/P/C 3/-/3/3

(R22A2136) WIND TUNNEL TECHNIQUES (Professional Elective –II)

Objectives:

- 1. Identify the importance of wind tunnel and types.
- 2. Students learn about Low Speed windtunnel performance and various components
- 3. Students gain knowledge about measurement and correction methods involved in wind tunnel
- 4. Gain knowledge of Measurement and their importance in Aerodynamics
- 5. Recognizevarious flow visualization techniques.

UNIT- I AERODYNAMIC EXPERIMENTS- HISTORY, MODEL TESTNG Forms of aerodynamic

experiments- Model testing- wind tunnel- principles-scaling laws, scale parameters-significance. low speed wind tunnels - types, description. High speed tunnels- transonic, supersonic, hypersonic, shock tubes, special tunnels- low turbulence, high Re, environmental, automobile- function, distinctive features, application. Major wind tunnel facilities- description, details.

UNIT-IILOWSPEED WIND TUNNELS-CONSTRUCTION, COMPONENTS, PERFORMANCE LOW

speed wind tunnel- principal components- working section, diffuser, corners, turning vanes, fan, strengtheners, honeycombs, screens, contraction cone, fan, motor- function, description, design requirements, constraints, construction, performance- loss coefficients. Wind tunnel performance-flow quality, power losses.

UNIT- III WIND TUNNEL CORRECTIONS & LOAD MEASUREMENTS Wind tunnel corrections. Sources of inaccuracies- buoyancy, solid blockage, wake blockage, streamline curvature causes, estimation, correction. Total correction on airspeed, dynamic pressure, zero lift drag. wind tunnel balances Load measurements-wind tunnel balances, types, description, application.

UNIT- IV FLOW MEASUREMENTS- INSTRUMENTATION Steady and unsteady pressure measurements and various types of pressure probes and transducers, errors in pressure measurements; measurement of temperature using thermocouples, resistance thermometers, temperature sensitive paints and liquid crystals; measurement of airspeed, flow direction, boundary layer profile using Pitot static tubes, 5 hole probes, total head rake-function, working principle, types, details of design and construction, use. Hot Wire Anemometry, Laser Doppler Anemometry, Particle Image Velocimetry-working principles, description of equipment, experimental setup, settings, calibration, measurement, data processing, applications.

UNIT- V FLOW VISUALISATION TECHNIQUES Flow visualization- need, types- tufts, china clay, oil film, smoke- working principle, description, setting up, operation, observation, recording, interpretation of imagery, relative merits, applications. High speed flows- optical methods of shadowgraph, Schlieren, interferometry.

TEXT BOOKS

- 1. Low Speed Wind Tunnel Testing, Barlow, J.B., Rae, W.H., Pope, A., Wiley 1999.
- 2. High Speed Wind Tunnel Testing, Pope, A. and Goin, K.L., Wiley, 1965.
- 3. Yang, W.J., Handbook of Flow Visualization, 2nd edition, Taylor and Francis, 2001.

- 1. Able to correlate various wind based on applications.
- 2. Students gainknowledge of Low Speed wind tunnel.
- 3. Acquire knowledge of various measurement techniques involved in windtunnel
- 4. Gain knowledge of various components of wind tunnel
- 5. Recognizevarious flow visualization techniques.

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L/T/P/C 3/-/3/3

(R22A2137) SPACECRAFT STRUCTURES (Professional Elective –II)

Objectives:

- 1. To understand the basic concepts of Space Structures.
- 2. To study different types of space Structures.
- 3. To understand Design process & methods.
- 4. To study Different types of Shell Structures.
- 5. To know about Test verification & Test Plan.

UNIT 1: INTRODUCTION TO SPACE STRUCTURES

Next Generation Science Standards, Common Core State Standards for Mathematics, Background-SpaceLaunch System Spacecraft Structures

UNIT II DESIGN PROCESS

Design criteria, Design specification, Design, Design control, Design & amp; Development.

UNIT III DESIGN & AMP; SAFETY FACTORS

Terminology, Flight Limit Load, Design Limit Load, Ultimate Load, Buckling ,Yield ,Proof Load, Allowable stress, Material Strength, A-value (A basis),10 B-value (B basis) ,S-Value (S-basis), Qualification Loads, Flight Acceptance Loads, Margin of Safety,15 Fail-Safe , Safe-life , Factors of Safety for Spacecraft

UNIT IV SHELL STRUCTURES

Introduction to Shells, Spherical shells, Barrel Shells, Hyperbolic shells

UNIT V TEST VERIFICATION

Tests, Goal of the tests, Test Plan, Test Procedure, Model philosophy, Static Test, Sine-burst testdwell test, Mechanical Vibration/Acoustic Tests ,Sine Vibration Test ,Random Vibration Acoustic Vibration Test

Text Book References

- 1. Spacecraft Structures--- Jacob Job Wijker .
- 2. Design and Analysis of Space Craft Structures—The Mermo Legacy

Reference Books:

1. Aeronautical information Circular

- Student will have good knowledge of space structures.
- Student can do hand calculations.
- Students can understand safety factors of different materials.
- Student can understand shell structures and its failures.
- Student will be in a position to test various vibrational test procedures

MALLA REDDY COLLEGE OF ENGINEERING ANDTECHNOLOGY

III Year B. TECH – II- SEM ANE

R22

(R22A2189) AIRCRAFT COMPUTATIONAL STRUCTURES LAB

Objectives:

- 1. To obtain an understanding of the fundamental theory of the FEA method;
- 2. To understand the use of the basic finite elements for structural applications using truss, beam, frame, and plane elements;
- 3. To gain knowledge about element and mesh selection for a particular structural problem
- 4. To know the different material influence and their limitation when a particular structure is loading
- 5. To understand the application and use of the FE method for Aerospace problems.

LIST OF EXPERIMENTS:-

- 1. Introduction to computational structural analysis in ANSYS
- 2. Computational Analysis of Truss Structure.
- 3. Static Analysis of Cantilever Beam.
- 4. Modal Analysis of Cantilever Beam
- 5. Computational analysis of spar beam
- 6. Computational Analysis of Rectangular Stiffened Panel.
- 7. Stress analysis of Thick and thin Walled Closed Section Panel.
- 8. Computational Analysis of Tapered Wing Structure.
- 9. Computational Analysis of Fuselage Structure
- 10. Computational Analysis of Landing Gear.
- 11. Computational analysis of beam using metal and ceramic based composite
- 12. Computational analysis of fiber reinforced composite plate.

Note: Total 10 experiments are to be conducted.

Equipment Needed:

- 1. Computers: Core 2 duo processor with 1 GB RAM
- 2. Softwares: Ansys or NASTRAN or equivalent

Reference Books:

- 1. Aircraft STRUCTURES for Engineering Students 4th Edition by THG MEGHSON
- 2. Finite Element Simulations with ANSYS by Huei-Huang Lee

- 1. The ability to create models for trusses, frames, plate structures, machine parts, and components using ANSYS general-purpose software;
- 2. Students gains knowledge about plate under compression
- 3. To develop a basic understanding of the limitations of the FE method and understand the possible error sources in its use.
- 4. Major aircraft components analysis design and element selection will be attained
- 5. Influence of different material on structures

MALLA REDDY COLLEGE OF ENGINEERING ANDTECHNOLOGY III Year B. TECH – II- SEM ANE L/T/P/C

-/-/2/1

(R22A0580) Artificial Intelligence and Machine Learning Lab

LAB OBJECTIVES:

- 1. Familiarity with the Prolog programming environment.
- 2. To introduce students to the basic concepts and techniques of Machine Learning.
- 3. To implement classification and clustering methods.
- 4. To become familiar with Dimensionality reduction Techniques.
- 5. Learning basic concepts of Prolog through illustrative examples and small exercises &Understanding list data structure in Prolog.

STUDY OF PROLOG; WRITE THE FOLLOWING PROGRAMS USING PROLOG/PYTHON

- Week-1. Write a program to implement all set operations (Union, Intersection, Complement etc)
- Week-2. Implementation of DFS for water jug problem using PROLOG
- Week-3. Implementation of BFS for tic-tac-toe problem using PROLOG
- Week-4. Solve 8-puzzle problem using best first search
- Week-5. Write a program to solve 8 queens problem
- Week-6. Implementation of Hill-climbing to solve 8- Puzzle Problem

MACHINE LEARNING

WEEK-1

Data Extraction, Wrangling

- 1. Loading different types of dataset in Python
- 2. Arranging the data

WEEK-2

Data Visualization

- 1. Handling missing values
- 2. Plotting the graphs

WEEK-3

Supervised Learning

Implementation of Linear Regression

WEEK-4

Implementation of K-nearest Neighbor

WEEK-5

Unsupervised Learning Implementing K-means Clustering

WEEK-6

Unsupervised Learning Implementing Hierarchical Clustering

LAB OUTCOMES:

- 1. Apply various AI search algorithms (uninformed, informed, heuristic, constraint satisfaction,)
- 2. Understand the fundamentals of knowledge representation, inference using AI tools..
- 3. Solve the problems using various machine learning techniques
- 4. Design application using machine learning techniques

MALLA REDDY COLLEGE OF ENGINEERING ANDTECHNOLOGY III Year B. TECH – II- SEM ANE L/T/P/C -/-/4/2 -/-/4/2

(R22A2190) APPLICATION DEVELOPMENT-II

List of Experiments

- 1. Installation of Xcode studio.
- 2. Development Of Hello aero mrcet Application
- 3. Create an application that takes the name from a textbox and shows hello message along with thename entered in textbox, when the user clicks the OK button
- 4. Finding stationary objects with precision
- 5. Adjusting the Brightness and Contrast of an Image
- 6. Implementing proximity-based interactions between a phone and watch
- 7. Create an ios application using Fragments
- 8. Design an android application Using Radio buttons
- 9. Design an android application for menu.
- 10. Create a user registration application that stores the user details in a database table.

MALLA REDDY COLLEGE OF ENGINEERING ANDTECHNOLOGY III Year B. TECH – II- SEM ANE L/T/P/C

2/-/-/1

(R22A0085) PROFESSIONAL DEVELOPMENT SKILL -II

OBJECTIVES:

- 1. To strengthen the students with the professional skill set.
- 2. To make the students recognize the role of technical English in their academic and professional fields.
- 3. To improve language proficiency and to develop the required professional ethics.
- 4. To equip students, organize, comprehend, write, and present, short and long forms of any technical work within the broad framework of the Scientific Method.
- 5. To facilitate communication about projects and ideas throughout the industry and also to the non-technical people.

UNIT-I:

- Inter-personal & Intra-Personal Communication
- Sub Skill of Reading: Skimming
- Writing: Resume Writing: Functional, Chronological, Targeted
- Innovative Leadership and Design Thinking

UNIT-2:

- Group Discussion: Factual, Opinion-Based, Abstract
- Sub Skill of Reading: Scanning
- Writing: Cover Letter
- Trust and Collaboration

UNIT-3:

- Debate
- Sub Skill of Reading: Intensive Reading
- Writing: Report Writing: Research Report, Analytical and Projects
- Managing Personal Finance

UNIT-4:

- Interview skills
- Sub Skill of Reading: Extensive reading
- Writing: Précis Writing
- Leadership and Managerial Skills

UNIT-5:

- Mock Interviews
- Reading: Cloze-Test
- Writing: Mini Projects
- Entrepreneurial Skills

OUTCOMES:

Students will be able to

- 1. Understand information which assists in completion of the assigned job tasks more successfully
- 2. Market them with the rich professional skills that they acquire
- 3. Adhere to ethical norms of scientific communication
- 4. Strengthen their individual and collaborative work strategies
- 5. Successfully market them and sell themselves to the employer of their choice.

REFERENCE BOOKS:

- 1. Curriculum and Guide line for Life Skills, By UGC, August 2023
- 2. David F. Beer and David McMurrey, Guide to writing as an Engineer, John Willey. New York, 2004
- 3. Diane Hacker, Pocket Style Manual, Bedford Publication, New York, 2003. (ISBN 0312406843)
- 4. Shiv Khera, You Can Win, Macmillan Books, New York, 2003.
- 5. Raman Sharma, Technical Communications, Oxford Publication, London, 2004.
- 6. Meenakshi Raman, Prakash Singh, Business communication, Oxford Publication, New Delhi 2012.
- 7. Dale Jung k, Applied Writing for Technicians, McGraw Hill, New York, 2004. (ISBN: 07828357-4)
- 8. Sharma, R. and Mohan, K. Business Correspondence and Report Writing, TMH New Delhi 2002.
- 9. Xebec, Presentation Book, TMH New Delhi, 2000. (ISBN 0402213)

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY IV Year B.TECH–I-SEM ANE

L/T/P/C 4/-/-/4

(R22A2116) AIRCRAFT SYSTEMS AND INSTRUMENTATION

OBJECTIVE:

- To impart knowledge of the hydraulic and pneumatic systems components and types of instruments and its operation including navigational instruments to the students
- Develop a solid foundation in aircraft instrumentation, including power activation systems, flight control systems, auto pilot and flyby wire systems
- To gain solid undertaking on engine systems, fuel systems, lubricating systems and ignition systems.
- To impart knowledge on Air conditioning and pressurization systems

UNIT I AIRCRAFTSYSTEMS

Hydraulic systems – Study of typical systems – components – Hydraulic systems controllers – Modesofoperation–Pneumaticsystems–Workingprinciples–TypicalPneumaticPowersystem Brake system – Components, Landing Gear Systems – Classification – Shock absorbers – Retractive mechanism.

UNIT II AIRPLANE CONTROL SYSTEMS

Conventional Systems – Power assisted and fully powered flight controls – Power actuated systems– Engine control systems–Push pull rod system–operating principles–Modern control systems–Digital fly by wire systems–Autopilot system, Active Control Technology.

UNIT III ENGINE SYSTEMS

Piston and Jet Engines- Fuel systems – Components - Multi-engine fuel systems, lubricating systems – Starting and Ignition systems.

UNIT IV AIR CONDITIONING AND PRESSURIZING SYSTEM

Basic Air Cycle systems – Vapour Cycle Systems, Boot-strap air cycle system – Evaporative vapour cycle systems – Evaporation air cycle systems – Oxygen systems – Fire extinguishing system and smoke detection system, Deicing and anti – icing system.

UNIT V AIRCRAFT INSTRUMENTS

Flight Instruments and Navigation Instruments – Accelerometers, Air speed Indicators – Mach Meters – Altimeters - Gyroscopic Instruments– Principles and operation – Study of various types of engine instruments–Tachometers–Temperature and Pressure gauges.

TEXTBOOKS

- 1. Mekinley, J.L.andR.D. Bent, Aircraft Power Plants, McGrawHill1993.
- 2. Pallet, E.H.J.Aircraft Instruments & Principles, Pitman & Co 1993.

REFERENCES

- 1. Handbooks of Airframe and Power plant Mechanics, US dept. of Transportation, Federal, Aviation Administration, the English Book Store, New Delhi, 1995.
- 2. McKinley, J.L. and BentR.D. Aircraft Maintenance & Repair, McGrawHill, 1993.
- 3. Teager, S, "Aircraft Gas Turbine technology, McGrawHill1997.

OUTCOMES: Students can able to

- Compare the features of various flight control systems.
- Describe the principle and working of different aircraft systems.
- Analyze the performance of various aircraft engine systems.
- Acquire and interpret data from various aircraft instruments.
- Identify the various cockpit controls.

MALLA REDDY COLLEGE OF ENGINEERING ANDTECHNOLOGY IV Year B. TECH – I- SEM ANE L/T/

L/T/P/C 3/-/-/3

(R22A2117) FLIGHT VEHICLE DESIGN

Course objectives

- 1. The goal is to obtain the knowledge in understanding the principles, concepts and facts of the design process.
- 2. The goal of the objective is to use the principles to demonstrate the preparation of geometric sizing of an airplane.
- 3. After the learning of course, students will be able to optimize the design requirements through various inputs such as materials and size.
- 4. The objective is to make student realize the performance of aircraft depending on the type of the engine.
- 5. At the end of the session, the objective is to enable students to realize the stability and control of aircraft based on the design characteristics.

UNIT I

Design process overview, airfoil

Overview of aircraft design, Phases of aircraft design. Aircraft conceptual design process, Sizing from conceptual sketch, Empty weight & fuel fraction estimation, Mission profiles, Mission segment weight fractions. L/D estimation. Take-off weight estimation. Airfoil and geometry selection, Airfoil design, Design lift coefficient, Stall, Airfoil thickness ratio, Airfoil considerations.

UNIT II

Geometry selection, thrust to weight ratio, wing loading

Wing geometry (aspect ratio, wing sweep, tapper ratio and wing vertical location, wing tip shapes. Tail geometry and arrangements. Thrust to weight ratio & Wing loading- statistical estimation, thrust matching. Wing loading (for take-off, instantaneous/sustained turn rate, loiterer endurance, cruise range).

UNIT III

Initializing & configuration layout

Sizing with fixed engine and with rubber engine. Refined sizing equations/ methods. Geometry sizing of fuselage, Wing, Tail, Control surfaces. Development of configuration lay out from conceptual sketch. The inboard profile drawing, Wetted area, Volume distribution and fuel volume plots, Lofting- definition, significance and methods, flat wrap lofting. Special consideration in configuration lay out. Isobar tailoring Sears-Haack volume distribution, structural load paths.

UNIT IV

Crew station, passengers &payload, landing gear &subsystems, structures, weight & balance Fuselage design- crew station, passenger compartment, cargo provisions, weapons carriage, gun installation, Landing gear arrangements, guidelines for lay out. Shock absorbers – types, sizing, stroke determination, gear load factors. Gear retraction geometry. Aircraft subsystems, significance to configuration lay out. Airworthiness requirements - loads, safety margins, material properties, methods of estimation- construction, operation, maintenance, training- procedures, Aircraft materials- mechanical properties- design data- allowable, allowable bases. Failure theory. Flight loads- atmospheric, maneuver- construction of flight envelope. Wing loads, Empennage loads, Fuselage loads.

UNIT V

Performance and constraint analysis refined sizing & trade studies

The aircraft operating envelope. Take off analysis, Balanced field length Landing analysis. Fighter performance measures of merit. Effects of wind on aircraft performance. Initial technical report of baseline design analysis and evaluation. Refined baseline design and report of specifications. Elements of life cycle cost, cost estimating method, RDT&E and production costs, operation and maintenance costs, fuel and oil costs, crew salaries Refined conceptual sizing methods. Sizing matrix plot and carpet plot. Trade studies - design trades, requirement trades, growth sensitivities. Measures of merit Determination of final baseline design configuration, preparation of type specification report

TEXT BOOK:

1. Raymer, D.P., Aircraft Design: A Conceptual Approach, 3rd edition., AIAA Education series, AIAA, 1999,ISBN: 1-56347-281-0

REFERENCE BOOK:

1. Howe, D., Aircraft Conceptual Design Synthesis, Professional Engineering Publishing, London, 2000, ISBN:1-86058-301-6

- 1. Define the design process overview followed during the design of the aircraft.
- 2. Demonstrate initial sizing and layout preparation and handwork for geometric sizing.
- 3. Discuss material properties, geometry, size and systems requirement to construct flight envelope.
- 4. Understand performance and trade studies which allows distinguishing type of engine and design to be adopted.
- 5. Interpret importance of design on stability and control of the aircraft.

MALLAREDDYCOLLEGEOFENGINEERINGANDTECHNOLOGY

IV Year B.TECH–I-SEM ANE

L/T/P/C 3/-/-/3

(R22A2118)AVIONICS

Objectives:

- 1. To introduce the students with functioning and principle of operation of various avionics systems including sensors installed on modern passenger and fighter aircraft.
- 2. Identify various display systems used in aircraft
- 3. Identify and know the functioning of various attitude determination and airdata equipment's used in aircraft
- 4. To introduce various navigation and landing equipments used
- 5. Knowledge of surveillance and flight systems functioning

UNITI: INTRODUCTION TO AVIONICS

Importance and role of Avionics in modern aircraft-systems which interface directly with pilot- aircraft state sensor systems, outside world sensor systems, task automation systems. The avionics equipment and system requirement- environmental, weight, reliability. Standardization and specification of avionics equipment and systems- ARINC and MIL specification. Electrical and optical data bus systems. Integrated modular avionics architectures.

UNITII:DISPLAY&MAN-MACHINEINTERACTIONANDCOMMUNICATIONSYSTEM

Introduction to displays-head-up displays (HUD)-basic principles, Helmet mounted displays, Head tracking systems. Head down displays-Civil cockpit, Military cockpit, Solid state stand by display systems, Data fusion in displays-Intelligent display systems. Introduction to voice and data communication systems- HF, VHF, UHF and Satellite communications, Flight data recorders.

UNITIII:INERTIALSENSORS, ATTITUDEDERIVATIONANDAIRDATASYSTEMS

Basic principles of gyroscope and accelerometers. Introduction to optical gyroscope- ring laser gyrosprinciples. Stable platform system-strap down systems- error in inertial systems and corrections. Air data Information and its use, derivation of Air Data Laws and relationship- altitude-static pressure relationship, variation of ground pressure, Speed of sound, Mach Number, CAS, TAS, Pressure error. Air data sensors and computing

UNITIV:NAVIGATION(INSANDGPS)ANDLANDINGSYSTEM

Principles of Navigation, Types of Navigation systems-. Inertial Navigation System-Initial alignment and Gyro compassing, Strap down INS computing. Landing System- localizer and glide-slope-marker systems. Categories of ILS. Global navigation satellite systems-GPS- description and basic principles. Integration of GPS and INS, Differential GPS.

UNITV:SURVEILLANCEANDAUTOFLIGHTSYSTEMS

Traffic alert and collision avoidance systems (TCAS)-Enhanced ground proximity warning system. Weather radar. Autopilots-Basic principle, height control, heading control, ILS coupled auto pilot control, satellite landing system, speed control and auto throttle. Flight management systems- principles-flight planning-navigation and Guidance, performance prediction and flightpath optimization.

TEXTBOOKS

- 1. Collinson, R.P.G., Introduction to Avionics Systems, second edition, Springer, 2003, ISBN 978-81-8489-795-1
- Moir,I.andSeabridge,A.,CivilAvionicsSystems,AIAAeducationSeries,AIAA,2002,ISBN 1- 56347589-8

REFERENCEBOOKS

1. Kayton, M., & Fried, W.R, Avionics Navigation Systems, Wiley, 1997, ISBN 0-471-54795-6Z

- 1. The student would gain understanding of the basic principles of avionics system.
- 2. Correlate different displays and communicating ranges their operation and importance
- 3. Understand the air data computation and attitude determination
- 4. Understand landing and navigation equipment components and functioning
- 5. Identify the surveillance and auto flight systems operation and their importance

PROFESSIONAL ELECTIVE-III

Malla Reddy College of Engineering and Technology

www.mrcet.ac.in

MALLA REDDY COLLEGE OF ENGINEERING ANDTECHNOLOGY

IV Year B. TECH – I- SEM ANE

L/T/P/C 3/-/-/3

(R22A2138) SATELLITE TECHNOLOGY (Professional Elective-III)

COURSE OBJECTIVES:

- 1. To introduce basic aspects of satellite subsystems and their functions, peculiarities of space environment and types of satellite orbits to students.
- 2. To impart knowledge to students on orbit determination and maneuvers and ground station network requirements.
- 3. To make students familiarize with satellite mechanical and structural configurations and satellite thermal control systems.
- 4. To acquaint students with satellite control requirements and type of control maneuvers and sensors needed for control.
- 5. To impart knowledge to students on satellite power electronics telemetry and telecomm and systems.

UNIT I INTRODUCTION TO SATELLITE SYSTEMS

Common satellite applications and missions – Typical spacecraft orbits – Definitions of spin the three axis stabilization-Space environment – Launch vehicles – Satellite system and their functions (structure, thermal, mechanisms, power, propulsion, guidance and control, bus electronics).

UNIT II ORBITAL MECHANICS

Fundamental of flight dynamics – Time and coordinate systems – Orbit determination and prediction — Orbital maneuvers — GPS systems and application for satellite/orbit determination –Ground station network requirements.

UNIT III SATELLITE STRUCTURES & THERMAL CONTROL

Satellite mechanical and structural configuration: Satellite configuration choices, launch loads, separation induced loads, deployment requirements – Design and analysis of satellite structures — Structural materials and fabrication — The need of thermal control: externally induced thermal environment – Internally induced thermal environment - Heat transfer mechanism: internal to the spacecraft and external heat load variations — Thermal control systems: active and passive methods.

UNIT IV SPACECRAFT CONTROL

Control requirements: attitude control and station keeping functions, type of control maneuvers – Stabilization schemes: spin stabilization, gravity gradient methods, 3 axis stabilization — Commonly used control systems: mass expulsion systems, momentum exchange systems, gyro and magnetic torque - Sensors star and sun sensors, earth sensor, magnetometers and inertial sensors.

UNIT V POWER SYSTEM AND BUS ELECTRONICS

Solar panels: Silicon and Ga-As cells, power generation capacity, efficiency – Space battery systems – battery types, characteristics and efficiency parameters — Power electronics. Telemetry and telecommand systems: Tm & TC functions, generally employed communication bands (UHF/VHF, S, L, Ku, Ka etc), their characteristics and applications- Coding Systems — Onboard computer- Ground checkout Systems..

TEXT BOOKS:

- 1. Analysis and Design of Flight Vehicle Structures, Tri-State off set company, USA, 1980.
- 2. Francis J. Hale , 'Introduction Space Flight', Prentice Hall, 1994
- 3. Rilay, FF, 'Space Systems Engineering, McGraw Hill, 1982
- 4. Space Vehicle Design, Michael D. Griffin and James R. French, AIAA Education Series, 1991.
- 5. Vertregt.M, 'Principles of Astronautics'., Elsevier Publishing Company, 1985.

REFERENCES:

- 1. Craft Lewis H. Abraham Structural Design of Missiles & Space, McGraw Hill, 1992.
- 2. Hughes, P.C. Spacecraft Altitude Dynamics, Wilsey, 1986.
- 3. Richard.F, FilipowskyEugen I Muehllorf Space Communications Systems, , Prentice Hall, 1995.
- 4. Spacecraft Thermal Control, Hand Book, Aerospace Press, 2002.

COURSE OUTCOMES: Upon completion of this course, Students will be able to

- **CO1:** Explain the concepts of Orbits and their mechanics.
- **CO2:** Explain the concepts of structural design, analyzing techniques and various types of loads in satellite structural subsystem.
- **CO3:** Acquire knowledge on the importance of thermal control subsystem and its design studies.
- **CO4:** Explain the concepts of satellite sensors and actuators that needed for Attitude control subsystem development.
- **CO5:** Acquire the knowledge of satellite attitude as well as orbital dynamics in order to design the satellite control subsystem.

MALLA REDDY COLLEGE OF ENGINEERING ANDTECHNOLOGY

IV Year B. TECH – I- SEM ANE

L/T/P/C 3/-/-/3

(R22A2139) AIRLINE AND AIRPORT MANAGEMENT (Professional Elective-III)

Objectives:

To understand and acquire a sound understanding on basic management aspect of airport and airlines system such as airports layout, air traffic control, landing procedure, scheduling, flight planning and other economic and commercial activities.

UNIT I

AIRPORTS AND AIRPORT SYSTEMS

Introduction-Airport Management on an international level- Rules that govern airport management-Organization and administration Airport ownership and organization, responsibilities of Airport manager. Components of an airport-The airfield-Navigation aids (NAVAIDS) located on airfields-Air traffic Control and surveillance facilities located on the airfield.

UNIT II

AIRPORT OPERATIONS MANAGEMENT: Airspace and air traffic management, Airport operations management under FAR Part 139, Airport terminals and ground access, Airport security and Administration -Security at commercial service airports-Security at general aviation airports.

UNIT III

AIRPORT ADMINISTRATION AND FINANCIAL MANAGEMENT , CAPACITY AND DELAY

concept of Airport planning and financial accounting-Revenue strategies at commercial airports-Pricing of airport facilities and services, , The future of airport management.

Defining capacity-Factors affecting capacity and delay-estimating capacity-Simulation Models- Defining delay-Estimating delay-Analytical estimates of delay.

UNIT IV

INTRODUCTION то AIRLINE PLANNING: Structure of AirlineIndustry (Domestic & International)-Growth and Regulation-Deregulation-Major and National Carriers-Regional Carriers-Economic characteristics of the Airlines Airline Planning Process-Airline Terminology and Measures: airline demand, airline supply, average load factor, unit revenue, Airline Planning Decisions

UNIT-V

FLEET PLANNING AND ROUTE EVALUATION: Factors in Fleet Planning-Hub-and-Spoke System-Technical Aspects-Fleet Rationalization-Fleet Commonality-Long Range Aircraft-Noise Restrictions-Factors in Design and Development-Fleet Planning Process; Route Evaluation in Hub Networks-Route profitability estimation issues-Demand Driven Dispatch.

Text Books

- 1. Airport Planning and Management 6/E 0006 Edition by Young Seth, Mc GRAW Hills.
- 2. Airport Management by Ravindran P.C.K, Asian Law House.
- 3. Air Transportation: A Management Perspective (Fifth Edition) by Alexander T.Wells and John G.Wensveen, Brooks Cole, 2003

REFERENCE BOOKS

- 1. Airport Systems: Planning, Design and Management by Rechard De Neufville Tata Mc Graw Hills.
- 2. Airline Marketing and Management by Stephen Shaw, Ashgate Publishing, 2004
- 3. Airline Management, by Peter P BelobabaMIT Open Courseware Lecture Notes, 2006

- 1. The student can get an broad overview and functioning of the airline industry. It focuses on the underlying marketing, financial, operational and competitive factors that influence airline viability.
- 2. The student can investigate how the sensitivity of airline profitability impacts airline management decisions and analyze the principles of airline economics, costs and pricing.
- 3. The student and assess the individual characteristics of low-cost carriers and business only airlines.

MALLA REDDY COLLEGE OF ENGINEERING ANDTECHNOLOGY

IV Year B. TECH – I- SEM ANE

L/T/P/C 3/-/-/3

(R22A2140) CIVIL AVIATION RULES AND REGULATIONS (Professional Elective-III)

Objectives:

- Civil aircraft rules
- Regulations pertaining to DGCA.
- Various Log Books maintained by civil operators. •
- Knowledge about various certificates pertaining to flight operations
- Modifications and approvals for different types of Organizations

UNIT I: AIRCRAFT RULES AND CATEGORIES OF AME LICENCE

Knowledge of Aircraft Rules as far as they relate to airworthiness and safety of aircraft. Knowledge of Privileges and responsibilities of the various categories of AME License and approved persons.

UNIT II: CIVIL AIRWORTHINESS REQUIREMENT

Knowledge of "Civil Airworthiness Requirements", "Aero nautical Information Circulars (relating to airworthiness)", "Advisory Circulars" and AME Notices issued by DGCA. Knowledge of various mandatory documents like Certificate of Registration, Certificate of Airworthiness, Flight Manual, Export Certificate of Airworthiness. Method of identifying approved material on Aircraft.

UNIT III: LOG BOOKS AND STORES.

Knowledge of various documents/ certificates issued to establish airworthiness of Aircraft parts. Various logbooks required to be maintained for Aircraft. Method of maintaining the logbook. Procedure for making entries in logbooks; Journey logbook, Technical logbook etc. Use of schedules, its certification, preservation, Stores, Bonded and Quarantine stores, storage of various aeronautical products including rubber goods, various fluids.

UNIT IV: CERTIFICATE OF FLIGHT

Knowledge of various terms such as Certificate of Flight Release, Certificate of Maintenance, Approved Certificates. Condition under which Aircraft is required to be test flown; Certificate to be issued by AME for test flight. Circumstances under which C of A is suspended. Ferry Flight, MEL, CDL. Minimum equipments, instruments required for various types of operation.

UNIT V: AIRCRAFT MODIICATIONS AND TYPE APPROVAL

Modification, concession, Airworthiness Directive, Service Bulletins. Approval of Organization. Documents required to be carried on board. Issue of Type Approval. Registration markings. Human performance and limitations relevant to the duties of an aircraft maintenance engineer, license holder.

Text books:

- 1. Aircraft Act, 1934
- 2. Aircraft Rules
- 3. DGCA CAR Section 1 and Section 2

Reference Books:

1. Aeronautical information Circular

Outcomes:

- Student will have good knowledge of Civil Aircraft rules.
- Student can write civil AME license.
- Student will have knowledge of importance and maintenance of different types log books.
- Studentwillbefamiliarwithproceduresforoperationandcertificationofcivilaircraft.
- Student will have knowledge of approvals from various organizations required to run an aircraft

R22

MALLAREDDYCOLLEGEOFENGINEERINGANDTECHNOLOGY

IV Year B.TECH–I-SEM ANE

L/T/P/C 3/-/-/3

(R22A2141)SPACECRAFT SYSTEM ENGINEERING (Professional Elective-III)

Course Objectives

- 1. To provide a comprehensive understanding of the fundamental principles and practices in spacecraft system engineering.
- 2. To develop the ability to analyze, design, and evaluate various spacecrafts systems and subsystems.
- 3. To enhance knowledge of the integration, testing, and operational aspects of spacecraft.
- 4. To familiarize students with the latest trends, challenges, and advancements in spacecraft technologies.
- 5. To equip students with the skills needed to participate in spacecraft design projects and contribute to the aerospace industry.

Chapter1:IntroductiontoSpacecraftSystems

Overview of Spacecraft Systems -Definition and Classification of Spacecraft, Historical Background and Evolution, Key Missions and Their Impact; **Space Environment** - Space Environment Characteristics, Effects on Spacecraft (Radiation, Microgravity, Debris), Spacecraft Shielding and Protection Mechanisms; **Space Mission Design and Planning** - Mission Objectives and Requirements, Concept of Operations (ConOps), Mission Phases and Milestones

Chapter2:Spacecraft Subsystems

Structural Subsystems - Spacecraft Structures and Materials, Load Analysis and Stress Management, Thermal Protection and Control; **Power Subsystems** - Power Generation (Solar Panels, RTGs), Power Storage (Batteries, Capacitors), Power Distribution and Management; **Attitude Determination and Control Subsystems (ADCS)** – Attitude Sensors (Gyroscopes, Star Trackers), Actuators (Reaction Wheels, Thrusters), Control Algorithms and Stability Analysis

Chapter3:Propulsion and Communication Systems

Propulsion Systems - Chemical Propulsion (Solid, Liquid), Electric Propulsion (Ion, Hall Effect), Propulsion System Design and Integration; **Communication Systems** - RF Communication Basics, Antennas and Transponders, Data Transmission and Processing; **Onboard Data Handling** - Data Collection and Storage, Onboard Computers and Software, Telemetry and Command Systems

Chapter4: Spacecraft Integration and Testing

System Integration -Subsystem IntegrationProcesses,MechanicalandElectricalInterfaces,Integration Challenges and Solutions; **Testing and Verification** - Environmental Testing (Vibration, Thermal Vacuum); Functional Testing (Subsystem and System Level) - Simulation and Validation Techniques; **Launch and Deployment** - Launch Vehicles and Integration, Launch Site Operations and Procedures, Deployment Mechanisms and Early Operations

Chapter5: Spacecraft Operations and End-of-Life

Spacecraft Operations - Mission Operations Center and Control, In-orbit Operations and Maintenance, Anomaly Detection and Resolution; End-of-Life Considerations - Deorbiting and Disposal Strategies, **Space Debris Mitigation, Post-Mission Analysis and Lessons Learned;** Future Trends and Emerging Technologies - Advances in Miniaturization (CubeSats, SmallSats), Autonomous andAI-based Systems, Spacecraft for New Space Exploration Missions

TEXTBOOKS:

- 1. James R. Wertz, Wiley Larson, "Space Mission Analysis and Design", 3rd Ed., Springer Netherlands, 1999.
- 2. PeterFortescue, GrahamSwinerd, JohnStark, "SpacecraftSystemsEngineering", 4thEd., Willey, 2011.
- 3. VincentL.Piscane, "FundamentalsofSpaceSystems", OxfordUniversityPress, 2ndEd., 2005.

REFERENCES:

- 1. JamesR.Wertz, "Spacecraft Attitude DeterminationandControl", Springer, 1978.
- 2. Kaplan, M.H., "ModernSpacecraftDynamicsandControl", WileyIndiaPvtLtd, 2011.

3. MaralG., andVousquetM., "SatelliteCommunicationsSystems:Systems, Techniques, and Technology", 5thEd., 2010.

 MarkleyF.Landis,CrassidisJohnL., "FundamentalsofSpacecraftAttitude DeterminationandControl", Springer, 2014.

5. RogerR.Bate,DonaldD.Mueller,andJerryE.White, "FundamentalsofAstrodynamics", Dover Publications, Inc., New York,1971.

OUTCOMES:

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

- 1. Analyze the issues in the spacecraft structures.
- 2. Understand the functions of spacecraft power systems.
- 3. Detect the error and correcting the spacecraft computer systems.
- 4. Learn system engineering by designing, building, and testing a small satellite in laboratory.
- 5. Understand the selection process of the launch systems.

PROFESSIONAL ELECTIVE-IV

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MALLAREDDYCOLLEGEOFENGINEERINGANDTECHNOLOGY

IV Year B.TECH–I-SEM ANE

L/T/P/C 3/-/3/3

(R22A2142) AIRCRAFT MAINTENANCE ENGINEERING (Professional Elective-IV)

Objectives:

- 1. To introduce the knowledge of the maintenance and repair procedures followed for overhaul of aero engines.
- 2. To impart th standards of FAA for documentation.
- 3. To impart over all technical service of aircraft
- 4. To introduce in Hanger maintenance and responsibilities of various cadres aero officers.
- 5. Students can know quality of maintenance with respect to FAA

UNIT–I

NECESAITY&DEVELOPMENTOFMAINTENANCE PROGRAMS

Definition of maintenance, role of the engineer, role of the mechanic, two types of maintenance, reliability, establishing a maintenance program. Goals and objectives of maintenance. Maintenance steering group(MSG) Approach, process – Oriented maintenance, task- oriented maintenance, current MSG process – MSG – 3, maintenance program documents.

UNIT–II

AVIATION CERTIFICATION REQUIREMENTS AND DOCUMENTATION FOR MAINTENANCE &ENGINEERING

Aircraft certification, delivery inspection, operator certification, certification of personnel, aviation industry interaction; types of documentation. Manufacturer's documentation, regulatory documentation. Airline generated documentation. ATA document standards. Objectives of a maintenance program, outline of aviation maintenance program, summary of FAA requirements, additional maintenance program requirements; organization of maintenance and engineering, organizationstructure,M&Eorganizationchart,generalgroupings,manageriallevelfunctions-technical services, aircraft maintenance, overhaul shops, material.

UNIT-III

TECHNICALSERVICES

Engineering: makeup of engineering, mechanics and engineers, engineering department functions, engineering order preparation; production planning & control – forecasting, production planning, production control, Organization of PP&C; technical publications- functions of technical publications, airline libraries, control of publications,; Technical Training- organization, training for aviation maintenance, airframe manufacturer`s training courses,

UNIT-IV

MAINTENANCEANDMATERIALSUPPORT

Line maintenance(on – aircraft), functions that control maintenance, MCC responsibilities, general line maintenance operations, aircraft logbook, ramp and terminal operations, maintenance crew requirement, morning meeting; Hangar Maintenance (on-aircraft)- organization of hangar maintenance, problem areas in hangar maintenance, maintenance support shops, ground support equipment, typical C – check: Shop data collection; Material support –organization and function of

material. Material directorate, M&E support functions

UNIT-V

OVERSIGHTFUNCTIONS, ART & SCIENCEOFTROUBLESHOOTING

Quality Assurance, quality audits, ISO 9000 quality standard, technical records, Quality control- quality control organization, FAA and JAA QC inspector qualifications. Basic inspection policies,; Reliability – definition and types of reliability, elements of a reliability program, Maintenance safety – safety regulations, maintenance safety program, general safety rules, accident and injury reporting. Human factors in maintenance, Trouble shooting, knowledge of malfunctions, Basic concepts of trouble shooting.

Textbooks:

- 1. Kinnison, H.A, Aviation Maintenance Manageent, McGraw–Hill–2004.
- Mc Kinley, J.L.Bent, R.D., Maintenance and Repair of Aerospace Vehicles, Northrop Institute of Technology, Mc Graw Hill, 1967.

Reference Books:

- 1. Friend, C.H., Aircraftmaintenance Management. Longman, 1992.
- 2. Kroes, M., Watkins. W., and Delp. F. Aircraft Maintenance and Repair, Tata McGraw-Hill. 2010

- 1. Ability to maintain and repair the aero engines.
- 2. Ability to prepare aircraft maintenance manuals.
- 3. Ability to know the standards of quality, FAA
- 4. Ability to perform technical service of aircraft
- 5. Students should come across Hanger responsibilities

MALLA REDDY COLLEGE OF ENGINEERING ANDTECHNOLOGY

IV Year B. TECH – I- SEM ANE

L/T/P/C 3/-/3/3

R22

(R22A2143) HEAT TRANSFER (Professional Elective-IV)

*Note: Heat and Mass Transfer data books are permitted

Objectives: The objective of this subject is to

- Provide knowledge about Heat transfer through conduction, convection and radiation.
- Learn different modes of Heat Transfer.
- Understand and apply the dimensional analysis.
- Develop the empirical relations for fluid flow heat transfer.

UNIT-I

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

UNIT-II

Unsteady state Heat Transfer conduction: I-D Transient heat conduction- Lumped system analysis, and solutions by use of Heisler charts.

UNIT-III

Convection: Dimensional analysis- Continuity, momentum and energy equations - Boundary layer theory concept- Free, and Forced convection- Approximate solution of the boundary layer equations - Laminar and turbulent heat transfer correlation- Application of dimensional analysis to free and forced convection problems- Dimensionless numbers and Empirical correlations.

UNIT-IV

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

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

UNIT- V

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

TEXT BOOKS:

- 1. Heat Transfer, by J.P.Holman, Int.Student edition, McGraw Hill Book Company.
- 2. Fundamentals of Heat and Mass Transfer- Sachdeva, New Age Publications

R22

REFERENCE BOOKS:

- 1. Heat Transfer by S.P.Sukhatme.
- 2. Heat transfer by Yunus A Cengel.
- 3. Heat transfer by Arora and Domakundwar, Dhanpat Rai & sons, New Delhi

OUTCOMES: At the end of this course, student will be able to

- Understand how heat and energy is transferred between the elements of a system for different configurations.
- Solve problems involving one or more modes of heat transfer.
- Student gets the exposure to different modes of Heat Transfer.
- Design the extended surfaces like fins for better heat transfer
- Understand radiation mode of heat transfer

MALLA REDDY COLLEGE OF ENGINEERING ANDTECHNOLOGY

IV Year B. TECH – I- SEM ANE

L/T/P/C 3/-/3/3

(R22A2144) ROCKETRY AND SPACE MECHANICS (Professional Elective-IV)

COURSE OBJECTIVES:

- 1. This course presents the fundamental aspects of rocket motion along with detailedestimation of rocket trajectories.
- 2. This course also imparts knowledge on optimization of multistage rockets.
- 3. This course provides the basics of space mechanics required for an aeronautical student
- 4. This course helps students to provide with the basics of orbit transfer of satellites.
- 5. This course will help students to gain knowledge on various control methods of rockets.

UNIT I ORBITAL MECHANICS

Description of solar system – Kepler's Laws of planetary motion – Newton's Law of Universal gravitation – Two body and Three-body problems – Jacobi's Integral, Librations points – Estimation of orbital and escape velocities.

UNIT II SATELLITE DYNAMICS

Geosynchronous and geostationary satellites- factors determining life time of satellites – satellite perturbations – orbit transfer and examples –Hohmann orbits – calculation of orbit parameters– Determination of satellite rectangular coordinates from orbital elements- satellite epiphermis.

UNIT III ROCKET MOTION

Principle of operation of rocket motor – thrust equation – one dimensional and two dimensional rocket motions in free space and homogeneous gravitational fields – Description of vertical, inclined and gravity turn trajectories– determinations of range and altitude – simple approximations to burnout velocity.

UNIT IV ROCKET AERODYNAMICS

Description of various loads experienced by a rocket passing through atmosphere – drag estimation – wave drag, skin friction drag, form drag and base pressure drag – Boat-tailing in missiles – performance at various altitudes – rocket stability – rocket dispersion – launching problems.

UNIT V STAGING AND CONTROL OF ROCKET VEHICLES

Need for multi staging of rocket vehicles – multistage vehicle optimization – stage separation dynamics and separation techniques- aerodynamic and jet control methods of rocket vehicles – SITVC.

TEXT BOOKS:

- 1. Cornelisse, JW, "Rocket Propulsion and Space Dynamics", J.W. Freeman & Co., Ltd., London, 1982.
- 2. Parker, ER, "Materials for Missiles and Spacecraft", McGraw-Hill Book Co., Inc., 1982.
- 3. Suresh. B N & Sivan. K, "Integrated Design for Space Transportation System", SpringerIndia, 2016.

REFERENCES

- 1. Sutton,GP, Biblarz,O, "Rocket Propulsion Elements", John Wiley & Sons Inc., New York, 9th Edition, 2017.
- 2. Van de Kamp, "Elements of Astromechanics", Pitman Publishing Co., Ltd., London, 1980.

COURSE OUTCOMES:

Upon completion of this course, students will be able

- **CO1:** To knowledge on the fundamental laws of orbital mechanics with particular emphasis on interplanetary trajectories.
- **CO2:** To calculate orbital parameters and perform conceptual trajectory designs for geocentricor interplanetary missions.
- **CO3:** To familiarize themselves with trajectory calculations for planar motion of rockets.
- CO4: To determine forces and moments acting on airframe of a missile.
- **CO5:** To acquire knowledge on the need for staging and stage separation dynamics of rocketvehicles.

IV Year B. TECH – I- SEM ANE

L/T/P/C 3/-/3/3

(R22A2145) ASTRODYNAMICS (Professional Elective-IV)

Objectives:

The course should enable the students to:

- Study the basic governing equation for space trajectory.
- Learn about the staging of the launchers.
- Study the launching and controlling the spacecraft.
- Study about the sensors and its applications.
- Learn about the re-entry of space vehicle.

UNIT-I ASTRODYNAMICS

Gravitational Field, Keplerian Trajectories, Orbital transfer, the problem of time, Perturbations, special orbits.

UNIT-II LAUNCH SYSTEM

Propulsion system, optimal staging, Launcher parameter statistics based on existing engines, stage separation systems,

UNIT-III OPTIMAL LAUNCHER TRAJECTORIES

Phases of the launcher trajectory, Analytical formulas for gravity turn trajectories, Fast evaluation of launcher performance, Q-guidance.

UNIT-IV SENSORS

Digital sun sensor, Analog sun sensor, Earth sensor, Star tracker sensor, Magnetometers.

UNIT-V RE-ENTRY VEHICLE

Steep Ballistic Reentry, Ballistic Orbital Reentry, Skip Reentry, Aero-braking - Lifting Body Reentry.

Text Books:

- Fung Y.C. an introduction to the Theory of Aeroelasticity John Wiley and Sons, New York, 1985.
- **2.** Bisphlinghoft R. C. Ashlay. H and Halfmam. R Aero-elasticity Addition Werley Publishing Company.
- **3.** Scnlan R.H. and Rosenbaum. R Introduction to the study of Aircraft Vibrations and Flutter McGraw Company New York 1981.

Reference Books:

1: "Orbital Mechanics for engineering students", By Howard D. Curtis, Elsevier Aerospace Engineeringseries.

Outcomes:

The student should be able to:

- Understand the governing equation and its implementation.
- Able to obtain the trajectory of spacecraft.

- Understand the purpose of assembling the staging and their separation.
- Understand the sensors and its uses.
- Able to get the path of re-enter of spacecraft.

IV Year B. TECH – I- SEM ANE

L/T/P/C -/-/2/1

(R22A2191) FLIGHT VEHICLE DESIGN LAB

Objectives:

- 1. To learn conceptual aircraft design of a typical civil transport and fighter aircraft.
- 2. Generate coding to evaluate Engine sizing and Wing design.
- 3. Generate codes for airfoil, vertical and horizontal tail contour sketch
- 4. Perform 3D Modeling of Aircraft
- 5. Demonstrate various systems used in aircraft

LIST OF EXPERIMENTS:

- 1. Weight estimation (Fixed engine) of the fighter and transport aircraft.
- 2. Weight estimation (Rubber engine) of the fighter and transport aircraft.
- 3. Estimating Wing Loading of transport and fighter aircraft.
- 4. Wing design and estimation of aerodynamic (lift and Drag) and stability parameters to meet the system requirement.
- 5. Design of Horizontal and vertical tail and control surfaces to meet system requirements.
- 6. Design of Crew and passenger cabin for the hypothetical aircraft identified in experiment no one.
- 7. 3D modeling of Aircraft.
- 8. Estimation of Nozzle characteristics
- 9. Demonstration of Hydraulic Test Rig.
- 10. Demonstration of Pneumatic Test Rig.
- 11. Demonstration of Control surface Test Rig.

Note: Minimum 10 experiments should be conducted.

Software Required: CATIA or Equivalent software & Microsoft Excel, MATLAB/SIMULINK Programming or Equivalent software

TEXTBOOKS:

- 1. AIRCRAFTDESIGN: A Conceptual Approach AIAA Book ISBN:0-930403-51-7 by Daniel PRaymer
- 2. MATLA/SIMULINK Users' Guide.

- 1. Student will be able to develop preliminary design of a given aircraft (transport and fighter aircraft)to meet given performance requirements.
- 2. Able to use various software tools in design & analysis of aircraft.
- 3. Correlate fixed and rubber engine
- 4. Understand the functioning of aircraft systems
- 5. Analyze design parameters

IV Year B. TECH – II- SEM ANE

L/T/P/C 3/-/-/4

(R22A0337) INNOVATION, START-UP AND ENTREPRENEURSHIP

COURSE OBJECTIVES:

- 1. To understand the concept of innovation, new product development
- 2. To know the startup opportunities and startup equation
- 3. To understand new venture creation opportunities, its resources, and Requirements
- 4. To understand the Entrepreneurial Mindset and new trends in entrepreneurship
- 5. To understand the strategic perspectives in entrepreneurship

UNIT-I

Innovation Management: Concept of Innovation- Levels of Innovation- Incremental Vs Radical Innovation-Inbound and Outbound Ideation- Open and Other Innovative Ideation Methods-Theories of outsourcing New Product Development: Transaction Cost, Resource Based, Resource Dependence, Knowledge Based Theories.

UNIT-II

Startup opportunities: The New Industrial Revolution – The Big Idea- Generate Ideas with Brainstorming Business Startup - Ideation- Venture Choices - The Rise of The startup Economy -The Six Forces of Change- The Startup Equation

UNIT-III

Startup Capital Requirements and Legal Environment: Identifying Startup capital Resource Requirements - estimating Startup cash requirements - Develop financial assumptions- Constructing a Process Map - Positioning the venture in the value chain - Launch strategy to reduce risks- Startup financing metrics – **Business plan**-The Legal Environment- Approval for New Ventures- Taxes or duties payable for new ventures.

UNIT-IV

Understanding Entrepreneurial Mindset- The revolution impact of entrepreneurship- The evolution of entrepreneurship - Functions of Entrepreneurs – types of entrepreneurs - Approaches to entrepreneurship- Process approach- Role of entrepreneurship in economic development- Twenty first century trends in entrepreneurship.

UNIT-V

Strategic perspectives in entrepreneurship - Strategic planning - Strategic actions strategic positioning- Business stabilization - Building the adaptive firms - Understanding the growth stage – Internal growth strategies and external growth strategies, Unique managerial concern of growing ventures. Initiatives by the Government of India to promote entrepreneurship, Social and women entrepreneurship.

REFERENCEBOOKS

- Kathleen R Allen, Launching New Ventures, An Entrepreneurial Approach, Cengage Learning, 2016 Anjan Raichaudhuri, Managing New Ventures Concepts and Cases, Prentice Hall International, 2010.
- 2. Innovation Management, C.S.G. Krishnamacharyulu, R. Lalitha, Himalaya Publishing House, 2010.

- 3. S. R. Bhowmik & M. Bhowmik, Entrepreneurship, New Age International, 2007.
- 4. Stuart Read, Effectual Entrepreneurship, Routledge, 2013
- 5. Rajeev Roy, Entrepreneurship, 2e, Oxford publications, 2012.
- 6. Nandan .H, Fundamentals of Entrepreneurship, PHI, 2013

COURSE OUTCOMES:

Students will be able to understand the concept of innovation and new product development; startup opportunities and startup equation; new venture creation opportunities, its resources, and Requirements; the Entrepreneurial Mindset and new trends in entrepreneurship; strategic perspectives in entrepreneurship.

PROFESSIONAL ELECTIVE-V

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R22

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY IV Year B. TECH–II-SEM ANE

(R22A2146) AIRCRAFT COMPOSITE MATERIALS (Professional Elective-V)

OBJECTIVES:

- 1. To study the types of mechanical behavior of materials for aircraft applications.
- 2. To make the student understand the analysis of composite laminates under different loading Conditions and different environmental conditions.
- 3. To impart the knowledge in usage of composite materials in aircraft component design.
- 4. To impart the knowledge and design concepts of Hybrid Composites for the Selection criteria for Aerospace Materials
- 5. Able to know Application and Testing of composite material for aircraft components

UNIT-IMECHANICALBEHAVIOUROFENGINEERINGMATERIALS

Linear and non linear elastic properties – Yielding, strain hardening, fracture, Bauschinger's effect – Notch effect testing and flaw detection of materials and components – creep and fatigue – Comparative study of metals, ceramics, plastics and composites.

UNIT-IIHEATTREATMENTOFMETALSANDALLOYS

Light Metal Alloys: Aluminum and its alloys, high strength and high corrosion alloys. Titanium and its alloys: applications, Classification of steels alloys, effect of alloying elements, magnesium alloys and their properties, maraging steels: properties and applications.

High Strength and Heat Resistant Alloys: Classification of heat resistant materials, iron, nickel and cobalt based alloys, refractory materials, silica based ceramics, properties of inconel, monel, nimonic and super alloys; application of heat resistant alloy in aerospace vehicles. Heat treatment of steel and its alloys. Case hardening, initial residual stresses and stress alleviation procedures, corrosion prevention and protective treatments.

UNIT-IIIINTRODUCTIONTOCOMPOSITEMATERIALS

Introduction, polymer matrix composites, metal matrix composites, ceramic matrix composites, carbon-carbon composites, fiber, reinforced composites and nature-made composites and applications.

Reinforcements: Fibers Glass, Silica, Kevlar, carbon, boron, silicon carbide, and born carbide, fibres. Particulate composites, Polymer composites, Thermoplastics, Thermosetting

UNIT-IV Hybrid Composites

Basic design concepts of sandwich construction - Materials used for sandwich construction. Failure modes of sandwich panels. Basic design of composite structure, Smart materials, Functionally Graded Materials (FGM)

Selection criteria for Aerospace Materials: Properties of flight vehicle materials, importance of strength/ weight ratio of materials for aerospace vehicles structures, importance of temperature variations, factors affecting the selection of material for different parts of airplanes.

UNIT-V Application and Testing

Classification of Aircraft Materials used for Aircraft Components-Application of Composite Materials-Super Alloys (Ni & Mg Alloys), Indigenes Alloys (Ti6AL4V, Si-Al-Cu). Emerging Trends in Aerospace Materials (Shape memory alloys). Latest techniques in testing and Flaw Detection of Material and Components by mechanical and NDT checks.

TextBooks

- 1. G.F.Titterton, Aircraft Materials and Processes, 5/e, Sterling Book House, 1998.
- 2. D. Agarwal,L.J.BroutmanandK.Chandrasekhara,AnalysisandPerformanceofFibre Composites,Wiley, 3rd edition, 2015
- 3. VijayK.Varadan,K.J.Vinoy,S.Gopalakrishnan,SmartMaterialSystems andMEMS:Designand Development Methodologies,Wiley

References

- 1. Martin, J.W., "EngineeringMaterials, Theirpropertiesand Applications", Wykedham Publications (London) Ltd., 1987.
- 2. G.E.Dieter, Mechanical Metallurgy, 1/e, McGraw Hill, 1976.
- 3. NonlinearApproachesinEngineeringApplications

- 1. Understanding the mechanical properties of the materials.
- 2. Understanding heat treatment processes
- 3. Exposure to high temperature materials for space applications
- 4. Understanding the mechanics of composite materials
- 5. Knowledge gained in manufacture of composites

IV Year B. TECH – II- SEM ANE

L/T/P/C 3/-/-/3

(R22A2147) AIR TRANSPORTATION SYSTEM (OPEN ELECTIVE – V)

Objectives:

- The subject will introduce the air transportation systems in detail.
- To study the basic governing bodies of ATS, its laws and regulations
- To understand the Airspace sectors, setting up Airport, Airlines and economic considerations involved in it

UNIT-I

Aviation industry & its regulatory authorities: Introduction, history of aviation-evolution, development, growth, challenges. Air transportation industry-economic impact- types and causes. The breadth of regulation- ICAO, IATA, national authorities (DGCA, FAA). Safety regulations-risk assessment-human factors and safety, security regulations, environmental regulations.

UNIT-II

Airspace: Airspace and air traffic management, Categories of airspace-separation minima, airspace sectors-capacity, demand and delay. Evolution of air traffic control system-procedural ATC system, procedural ATC with radar assistance, first generation 'automated' ATC system, current generation radar and computer-based ATC systems. ICAO future air-navigation system.

UNIT-III

Aircraft: Costs-project cash-flow, aircraft price. Compatibility with the operational infrastructure. Direct and indirect operating costs. Balancing efficiency and effectiveness-payload-range, fuel efficiency, technical contribution to performance, operating speed and altitude, aircraft field length performance. Effectiveness-wake-vortices, cabin dimensions, flight deck.

UNIT- IV

Airlines: Setting up an airline-modern airline objectives. Structure of Airline Industry (Domestic & International) Route selection and development, annual utilization and aircraft size, seating arrangements. Aircraft- buy or lease. Revenue generation and yield management. Airline scheduling, Factors in Fleet Planning-Hub-and-Spoke System.

UNIT-V

ENVIRONMENTAL CONTROL

Noise, Characteristics, Evaluation of Noise in the Vicinity of Airports, Aircraft Noise Measurement, ShortTerm Measurement, Long-term Noise Monitoring, Prediction of Air Transport Noise, Airport Noise Mitigation and Noise Abatement Procedures, Control of Gaseous Emissions, Bird Control, Bird Strike Statistics.

Text Books:

- 1. Hirst, M., The Air Transport System, Wood head Publishing Ltd, Cambridge, England, 2008.
- 2. Antonin Kazda, Robert E Caves, Airport design and operation, Second edition, Elseiver, 2007.

Reference Books:

- 1. Wensven, J.G., AirTransportion: A Management Perspective, Ashgate, 2007.
- 2. Belobaba, P., Odoni, A. and Barnhart, C., Global Airline Industry, Wiley, 2009.
- 3. M.Bazargan, M., Airline operations and Scheduling Ashgate, 2004.
- 4. Nolan, M.s., Fundamentals of Air Traffic Control, fourthedn., Thomson Learning, 2004.
- 5. Wells, A. and young, S., Airport Planning and Management, fifth edn., McGraw-Hill, 1986.

- The operational structure of the Airport, its establishing, working strategies in detail
- The economic and the business outcomes of the operations of ATS The student with acquire operational knowledge of air transport system

IV Year B. TECH – II- SEM ANE

L/T/P/C 3/-/-/3

(R22A2148) AERO-ELASTICITY (PROFESSIONAL ELECTIVE-V)

Course Objectives:

- 1. Understanding Aeroelastic Phenomena: Develop a comprehensive understanding of aeroelasticity, including the interaction between aerodynamic forces and structural dynamics in aerospace vehicles.
- 2. **Analytical Skills**: Acquire analytical skills to model and analyze aeroelastic behavior in aircraft structures, including flutter, divergence, and control effectiveness.
- 3. **Design Considerations**: Explore design considerations for aeroelasticity, including structural stiffness, damping, and control surface effectiveness, to ensure safe and stable flight.
- 4. **Gust Response Analysis**: Learn techniques to analyze the response of aircraft structures to atmospheric disturbances, such as gusts and turbulence, and mitigate their effects on flight stability.
- 5. **Control Strategies**: Investigate passive and active control strategies to mitigate aeroelastic instabilities and enhance aircraft performance and safety.

Chapter 1: Introduction to Aeroelasticity

Overview of Aeroelasticity, Historical Perspective, Importance in Aircraft Design and Performance, Classification of Aeroelastic Phenomena

Chapter 2: Structural Dynamics Fundamentals

Review of Structural Dynamics Principles, Equations of Motion for Structural Systems, Modal Analysis and Mode Shapes, Eigenvalue Problems in Structural Dynamics

Chapter 3: Aerodynamics Fundamentals

Basics of Aerodynamics, Potential Flow Theory, Thin Airfoil Theory, Panel Methods for Aerodynamic Analysis

Chapter 4: Static and Dynamic Aeroelasticity

Introduction to Static and Dynamic Aeroelasticity, Oscillatory Motion of Aircraft Structures, Rigid Body Dynamics and Flexibility Effects, Modal Representation of Aeroelastic Systems, Flutter Phenomena and Analysis Techniques

Chapter 5: Aeroelastic Control and Advanced Topics

Introduction to Aeroelastic Control, Passive and Active Control Techniques, Structural Damping and Stability Augmentation, Aeroelastic Control Surfaces and Systems, Control Laws and Implementation Strategies, Nonlinear Aeroelasticity, Aeroelastic Tailoring and Optimization, Aeroelasticity of Composite Structures, Aeroelasticity in Unmanned Aerial Vehicles (UAVs)

Textbooks:

1. "Aircraft Aeroelasticity and Loads" by Jan R. Wright and Jonathan Edward Cooper. Published by Wiley.

2. "Aeroelasticity" by Raymond L. Bisplinghoff, Holt Ashley, and Robert L. Halfman. Published by Dover Publications.

References:

- 1. "Aeroelasticity of Plates and Shells" by René Cottereau and Alain Frémont. Published by Springer.
- 2. "Nonlinear Aeroelasticity" by Grigorios Dimitriadis. Published by Springer

Course Outcomes:

- 1. **Comprehensive Understanding**: Demonstrate a thorough understanding of aeroelastic phenomena and their implications for aircraft design, performance, and safety.
- 2. **Analytical Proficiency**: Apply analytical methods to model and analyze aeroelastic behavior, including flutter, divergence, and control effectiveness, in aerospace structures.
- 3. **Design Competence**: Design aircraft structures with appropriate stiffness, damping, and control surface characteristics to mitigate aeroelastic instabilities and ensure safe and stable flight.
- 4. **Gust Response Analysis**: Analyze the response of aircraft structures to atmospheric disturbances and develop strategies to mitigate their effects on flight stability and passenger comfort.
- 5. **Control Implementation**: Implement passive and active control strategies to mitigate aeroelastic instabilities and improve aircraft performance and safety.

IV Year B. TECH – II- SEM ANE

L/T/P/C 3/-/-/3

(R22A2149) SPACE MISSION (PROFESSIONAL ELECTIVE-V)

Objectives:

- 1. students will understand the advanced concepts of manned space missions
- 2. And to provide the necessary mathematical knowledge that are needed in understanding their significance and operation.
- 3. The students will have an exposure on various topics such as missile space stations, space vs earth environment, life support systems, mission logistics and planning
- 4. And will be able to deploy these skills effectively in the understanding of manned space missions.
- 5. The students will have an exposure on various topics Command, Control, and Communications Architecture.

UNIT I INTRODUCTION

The physics of space - Current missions: space station, Moon missionand Mars missions - Engineering challenges on Manned vs. unmanned missions - Scientific and technological gains from space programs - Salient features of Apollo and Space station missions – space shuttle mission.

UNIT II SPACE VS EARTH ENVIRONMENT

Atmosphere: Structure and Composition - Atmosphere: Air Pressure, Temperature, and Density - Atmosphere: Meteoroid, Orbital Debris & Radiation Protection - Human Factors of Crewed Spaceflight, Safety of Crewed Spaceflight - Magnetosphere - Radiation Environment: Galactic Cosmic Radiation (GCR), Solar Particle Events (SPE) - Radiation and the Human Body – Impact of microgravity and g forces on humans – space adaptation syndrome.

UNIT III LIFE SUPPORT SYSTEMS AND COUNTERMEASURES

Life Support Systems and Space Survival Overview - Environment Controlled Life Support Systems (ECLSS) - Human / Machine Interaction - Human Factors in Control Design - Crew Accommodations.

UNIT IV MISSION LOGISTICS AND PLANNING

Group Dynamics: Ground Communication and Support - Space Resources and Mission Planning - Space Mission Design: Rockets and Launch Vehicles - Orbital Selection and Astrodynamics, Entry, Descent, Landing, and Ascent, Designing and Sizing Space elements, Transfer, Entry, Landing, and Ascent Vehicles, Designing, Sizing, and Integrating a Surface Base, Planetary Surface Vehicles.

UNIT V ALLIED TOPICS

Spacecraft Subsystems: Space Operations - Space Architecture, Attitude Determination and Control - Designing Power Systems - Extravehicular Activity (EVA) Systems - Space Robotics - Mission Operations for Crewed Spaceflight - Command, Control, and Communications Architecture.

TEXT BOOKS

- 1. Larson, W. J. and Pranke, L. K., Human Spaceflight: Mission Analysis and Design, McGraw-Hill HigherEducation, Washington, DC, 1999.
- 2. McNamara, Bernard. 2000. Into the Final Frontier: The Human Exploration of Space. (Brooks Cole Publishing.).
- 3. Connors, M.M., Harrison, A.A., and Akins, F.R. 2005. Living Aloft: Human Requirements for ExtendedSpaceflight, University Press of the Pacific, Honolulu, Hawaii: ISBN: 1-4102-1983-6.
- 4. Eckart, P. 1996. Space flight Life Support and Bio spherics.

- 1. understand the advanced concepts of manned space missions
- 2. Understand and apply the knowledge of mathematical significance
- 3. Understand an exposure on various space techniques
- 4. Understand skills effectively in mission logistics and planning
- 5. Understand and operate Command, Control, and Communications Architecture of space

PROFESSIONAL ELECTIVE-VI

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IV Year B.TECH–II-SEM ANE

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(R22A2150) FLIGHT SCHEDULING OPERATIONS (Professional Elective-VI)

Objectives:

- Analyze the intricate nature of airline operations, emphasizing the need for optimization to enhance efficiency and profitability.
- Define airline networks and their components, including nodes (airports) and edges (routes), and understand their implications in routing and scheduling.
- Formulate mathematical models using decision variables, objective functions, and constraints to optimize route planning and scheduling.
- Will analyze how the scheduling is done for flights
- Will know about crew duties and passengers boarding procedures

UNITI:

AIRLINE NETWORK AND AIRCRAFT ROUTING

Complexity of airline planning, operations and dispatch- need for optimization- Networks- definitions, network flow models shortest path problem, minimum cost flow problem maximum flow problem, multi-commodity problem. Integer programming models-set covering/partitioning problems, traveling salesman problem- mathematical formulation- decision variables, objective function, constraints. Goal of aircraft routing- maintenance requirements, other constraints Routing cycles, route generators Mathematical models of routing- decision variables, objective functions, alternatives, constraints- flight coverage and aircraft available Example problems and solutions

UNITII

FLIGHT AND FLEET SCHEDULING

Significance of flight scheduling. The route system of the airlines- point-to-point flights, hub and spoke flights Schedule construction- operational feasibility, economic viability Route development and flight scheduling process- load factor and frequency Case study. Purpose of fleet assignment. Fleet types, fleet diversity, fleet availability- performance measures Formulation of the fleet assignment problem-decision variables, objective function, constraints, solution Scenario analysis, fleet assignment models.

UNITIII

CREW AND MANPOWER SCHEDULING

Crew scheduling process- significance Development of crew pairing- pairing generators- mathematical formulation of crew pairing problem- methods of solution. Crew rostering- rostering practices .The crew rostering problem-formulation, solutions. Man power scheduling- modeling, formulation of the problem, solutions.

UNITIV

GATE ASSIGNMENT AND AIRCRAFT BOARDING STRATEGY

Gate assignment- significance- the problem- levels of handling-passenger flow, distance matrixmathematical formulation, solution Common strategies for aircraft boarding process, mathematical model, interferences, model description, aisle interferences.

UNITV

AIRLINE IRREGULAR OPERATION, DISRUPTION OF SCHEDULE AND RECOVERY COMUTATIONAL COMPLEXITY-CASE STUDIES

The problem statement, the time band approximation model formulation of the problem the scenarios-solution. Complexity theory, heuristic procedures Case studies of airline operation and scheduling study through simulation modeling- use of available software.

Textbooks:

1. Bazargan, M., 'AirlineOperationsandScheduling' 2ndedn., AshgatePublishingltd, 2010

- Students can schedule different operations done by airport authorities.
- Students can schedule different operations done by airlines authorities.
- They will be getting acknowledged about the functioning of airports
- Analyze airline networks using network flow models to solve practical routing problems.
- Evaluate routing strategies based on maintenance requirements, operational constraints, and economic factors.

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(R22A2151) HELICOPTER ENGNEERING (PROFESSIONAL Elective-VI)

Objectives:

- 1. To understand the basic difference between aircraft and helicopter
- 2. To know the helicopter 's configuration and their limitation
- 3. To know the aerodynamic characteristics on rotor system during different mode of flight condition
- 4. To know how the helicopter movement is achieved and what are the controls associated with
- 5. Basic stability of helicopter and how it is differ from airplane

UNIT I INTRODUCTION

Historical Development of Helicopters, Helicopter Configuration, Control Requirements, Types of Rotor Systems, Basic Power Requirements.

UNIT II INTRODUCTION TO HOVERING THEORY

Momentum Theory, Blade Element Theory, Combined Blade Element and Momentum theories for non-uniform inflow calculation, Ideal Rotor vs. Optimum Rotor.

UNIT III VERTICAL FLIGHT

Various flow states of Rotor, Autorotation in Vertical Descent, Ground Flight.

UNIT IV FORWARD FLIGHT

Momentum Theory, Variable Inflow Models, Blade Element Theory, Rotor Reference Planes, HubLoads, Power variation with forward speed, Rotor Blade flapping Motion: Simple Model.

UNIT V HELICOPTER TRIM AND STABILITY

Equilibrium condition of helicopter, Trim analysis, Basics of helicopter stability.

Text Books:

- 1. Gessow.A and Meyers G.C. Aerodynamics of Helicopter, Macmillan& co., N.Y. 1987
- 2. Johnson W Helicopter theory, Princeton University pres 1980
- 3. MccormickB.W. Aerodynamics, Aeronautics& Flight mechanics , John Wiley , 1995
- 4. Gupta. L Helicopter Engineering, Himalayan Books 1996
- 5. BramwellA.R.S Helicopter Dynamics Edward Arnold Publications London 1976
- 6. Stepniewski W.ZRotary Rotary wing Aerodynamics Vol 1 & 2 Dover publications 1984

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- 1. The student will be able to identify the key differences between Aircraft and Helicopter
- 2. To analyze the basic concepts, theories regarding hover Student gains knowledge about how the flow varies during climb and descent.
- 3. Student attains the complexity of forward flight condition
- 4. Stability of helicopter and trim requirement
- 5. Various equilibrium conditions

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(R22A2153) ANALYSIS OF COMPOSITE STURCTURE (Professional Elective-VI)

Objectives

- 1. Defines about the various composite types and functions
- 2. Failure the properties of composite materials
- 3. Identify various analysis methods of composite materials and laminates
- 4. Outlines various buckling analysis used in composite material
- 5. Introduce various theories based on composite material

UNIT-I

Properties of Constituent Materials and Composite Laminates: Introduction to laminated composite plates, Mechanical Properties of constituent materials such as Matrix and Filaments of different types. Netting analysis of composite materials, determination of properties of laminates with fibers and matrices.

UNIT-II

Stress-Strain relations of Isotropic, Orthotropic and Anisotropic materials, transformation of material properties for arbitrary orientation of fibers.

UNIT-III

Methods of Analysis: Mechanics of materials approach to determine Young's modulus, Shear Modulus and Poisson's ratio, brief mention of elasticity approach and Macro mechanics of laminates Anisotropic elasticity, stress –strain relations in material coordinates - Transformation of geometric axes, strength concepts, Biaxial strength theories, Maximum stress and Maximum strain.

UNIT-IV

Analysis of laminated plates: Classical plate theory, Classical lamination theory – Special cases of single layer, symmetric, anti-symmetric & asymmetric composites with cross ply, angle ply layup. Deflection analysis of laminated plates, Analysis laminated beam and plates.

UNIT-V

Shear deformation theories for composite laminated beams, plates-first, second and third order theories, nth Order theory.

Buckling analysis of laminated composite plates with different orientation of fibers, Tsai-wucriteria and Tsai– Hill Criteria.

Text Books

- 1. Agarwal B. D., Broutman. L. J., *Analysis and performance of fiber composites,* John wiley and sons-New York, 1980.
- 2. Lubin. G, *Hand Book on Advanced Plastics and Fiber Glass*, Von. Nostr and, Reinhold Co. New York, 1989.

REFERENCES

- 1. Gupta L., Advanced composite Materials, Himalayan Books, New Delhi, 1998.
- 2. Jones, R. M., *Mechanicsof Composite Materials*, McGrawHill, Kogakusha, ltd. Tokyo.
- 3. Reddy J.N., Mechanics of Composite Materials.

- 1. The students will be able to select appropriate composite materials and analyzes for different elastic properties by using various methods.
- 2. Gain knowledge of materials used in manufacturing of composite materials
- 3. Gain knowledge of performance parameters of composite materials
- 4. Knowledge of various properties of composite materials
- 5. Gain knowledge of various theories

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(R22A2154) SPACE EXPLORATION TECHNOLOGY

(Professional Elective-VI)

Course Objectives:

- 1. **Understand Space Exploration History:** Explore the historical development to space exploration, including key milestones, missions, and technological advancements.
- 2. **Comprehend Spacecraft Design Principles:** Gain comprehensive understanding of spacecraft design principles, including structural design, thermal control, power generation, communication systems, and navigation.
- 3. **Familiarize with Rocket Propulsion Systems:** Learn about different types of rocket propulsion systems, their principles of operation, and design considerations, including chemical, electric, and nuclear propulsion.
- 4. **Explore Planetary Exploration Missions:** Examine robotic and human missions to planets, moons, and asteroids, including mission objectives, spacecraft design, landing, and surface exploration techniques.
- 5. **Study Emerging Space Technologies:** Explore emerging space technologies, including space tourism, space habitats, advanced propulsion concepts, and their potential impact on future space exploration.

Chapter1: Introduction to Space Exploration

- Overview of Space Exploration History
- Motivations for Space Exploration
- Evolution of Space Exploration Technology
- Space Agencies and International Collaboration
- Current Challenges and Future Prospects

Chapter2: Rocket Propulsion Systems

- Fundamentals of Rocket Propulsion
- Types of Rocket Engines (Chemical, Electric, Nuclear)
- Propellant Types and Characteristics
- Rocket Engine Components and Design Considerations
- Thrust Control and Propulsion Efficiency

Chapter3: Spacecraft Design and Systems

- Overview of Spacecraft Design Principles
- Structural Design and Materials Selection
- Thermal Control Systems
- Power Generation and Storage
- Communication and Data Handling Systems
- Navigation and Guidance Systems

Chapter4: Planetary Exploration Missions

- Overview of Planetary Exploration
- Robotic Missions to Planets, Moons, and Asteroids

- Landers, Rovers, and Orbital Probes
- Sample Return Missions and Analysis
- Challenges of Planetary Surface Exploration

Chapter5: Space Technology and Future Trends

- Emerging Technologies in Space Exploration
- Human Space flight and Space Tourism
- Space Elevators and Advanced Propulsion Concepts
- Space Colonization and Habitat Design
- Ethical and Legal Considerations in Space Exploration

Textbooks:

- 1. "Space Mission Analysis and Design" byJamesR.WertzandWileyJ.Larson.Publishedby Microcosm Press.
- 2. "Spacecraft Systems Engineering" by Peter Fortescue, Graham Swinerd, and John Stark. Published by John Wiley & Sons.
- 3. **"RocketPropulsionElements"**byGeorgeP.SuttonandOscarBiblarz.PublishedbyWiley.

References:

- 1. "IntroductiontoSpaceSystems:DesignandSynthesis" by MiguelR. Aguirre. Published by Springer.
- 2. **"Fundamentals of Astrodynamics"** by Roger R.Bate, Donald D.Mueller, and Jerry E.White. Published by Dover Publications.

Course Outcomes:

- 1. **Comprehensive Understanding:** Demonstrate a comprehensive understanding of space exploration history, spacecraft design principles, rocket propulsion systems, and emerging space technologies.
- 2. **Proficiency in Spacecraft Design:** Apply spacecraft design principles to develop conceptual designs for space missions, considering structural, thermal, and power, communication, and navigation requirements.
- 3. **Knowledge of Rocket Propulsion Systems:** Analyze the principles of operation, performance characteristics, and design considerations of different types of rocket propulsion systems.
- 4. **Appreciation of Planetary Exploration Missions:** Evaluate the objectives, challenges, and achievements of past and current planetary exploration missions, including robotic and human exploration efforts.
- 5. Awareness of Emerging Space Technologies: Assess the potential impact of emerging space technologies, such as space tourism, space habitats, and advanced propulsion concepts, on future space exploration endeavors.
