MASTER OF TECHNOLOGY
In
MACHINE DESIGN

ACADEMIC REGULATIONS, COURSE COVERAGE SUMMARY
&
QUESTION BANK

Department of Mechanical Engineering

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)

Sponsored by CMR Educational Society

(Affiliated to JNTUH, Hyderabad, Approved by AICTE - Accredited by NAAC – 'A' Grade - ISO 9001:2015 Certified)
Maisammaguda, Dhulapally, Kompally, Secunderabad – 500100, Telangana State, India.
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MASTER OF TECHNOLOGY
MACHINE DESIGN

DEPARTMENT OF
MECHANICAL ENGINEERING

ACADEMIC REGULATIONS
COURSE STRUCTURE AND SYLLABUS
(Batches admitted from the academic year 2019 - 2021)

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

PRELIMINARY DEFINITIONS AND NOMENCLATURES

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

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

*"Commission" means University Grants Commission.

*"AICTE" means All India Council for Technical Education.

*"University" means Jawaharlal Nehru Technological University, Hyderabad.

*"College" means Malla Reddy College of Engineering & Technology, Secunderabad unless indicated otherwise by the context.

*"Program" means:

Master of Technology (M.Tech) degree program

PG Degree Program: M.Tech

*"Branch" means specialization in a program like M.Tech degree program in Mechanical Engineering , M.Tech degree program in Aeronautical Engineering etc.

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

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

FOREWORD

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

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

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

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

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

PRINCIPAL

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
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VISION

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

MISSION

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

QUALITY POLICY

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

For more information: www.mrcet.ac.in

ACADEMIC REGULATIONS R-18 FOR M. TECH. (REGULAR) DEGREE COURSE

Academic Regulations of R-18 are applicable for the students of M. Tech. (Regular) Course from the Academic Year 2018-19 and onwards. The M.Tech Degree of Malla Reddy College of Engineering & Technology (MRCET), Secunderabad shall be conferred on candidates who are admitted to the program and who fulfill all the requirements for the award of the Degree.

1.0 ELIGIBILITY FOR ADMISSIONS

Admission to the above program shall be made subject to eligibility, qualification and specialization as prescribed by the University from time to time.

Admissions shall be made on the basis of merit/rank obtained by the candidates at the qualifying Entrance Test conducted by the University (or) State Government (or) on the basis of any other order of merit as approved by the University, subject to norms as laid down by the State Govt. from time to time.

2.0 AWARD OF M. TECH. DEGREE

2.1. A student shall be declared eligible for the award of the M. Tech. Degree, if he pursues a course of study in not less than two and not more than four academic years.
2.2. A student, who fails to fulfill all the academic requirements for the award of the degree within four academic years from the year of his admission, shall forfeit his seat in M. Tech. course.
2.3. The student shall register for all 88 credits and secure all the 88 credits.
2.4. The minimum instruction days in each semester are 90.

3.0 A. COURSE OF STUDY

The following specializations are offered at present for the M. Tech. course of study.

1. Aerospace Engineering
2. Computer Science and Engineering
3. Machine Design
4. System and Signal Processing
5. VLSI and Embedded Systems
6. Thermal Engineering

and any other course as approved by the MRCET from time to time.

3.0 B. Departments offering M. Tech. Programmes with specializations are noted below:

Aeronautical Engineering	Aerospace Engineering
Computer Science Engineering	Computer Science Engineering
Electronics & Communication Engineering	System & Signal Processing
Electronics & Communication Engineering	VLSI and Embedded Systems
Mechanical Engineering	Machine Design
Mechanical Engineering	Thermal Engineering

4.0 ATTENDANCE

The programs are offered on a unit basis with each subject being considered a unit.

4.1 A student shall be eligible to write University examinations if he acquires a minimum of 75% of attendance in aggregate of all the subjects.

4.2 Condonation of shortage of attendance in aggregate up to 10% (65% and above and below 75%) in each semester shall be granted by the College Academic Committee.

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

4.4 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 shall stand cancelled.

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

4.6 A student shall not be promoted to the next semester unless he satisfies the attendance requirement of the present semester, as applicable. They may seek readmission into that semester when offered next. If any candidate fulfills the attendance requirement in the present semester, he shall not be eligible for readmission into the same class.

4.7 In order to qualify for the award of the M. Tech. Degree, the candidate shall complete all the academic requirements of the subjects, as per the course structure.

4.8 A student shall not be promoted to the next semester unless he satisfies the minimum academic requirements of the previous semester.

5.0 EVALUATION

The performance of the candidate in each semester shall be evaluated subject-wise, with a maximum of 100 marks for theory and 100 marks for practicals, on the basis of Internal Evaluation and End Semester Examination.

For the theory subjects 70 marks shall be awarded based on the performance in the End Semester Examination and 30 marks shall be awarded based on the Internal Examination Evaluation. The internal evaluation consists of two mid-term examinations each covering descriptive paper 24 marks which consists of six questions and answers any four questions, each carrying 6 marks a total duration of 2 hours. Average of the two mid-term examinations shall be taken as the final marks secured by each candidate. Six (6) marks are allocated for Assignments (as specified by the subject teacher concerned). The total marks secured by the student in mid-term examination and assignment are evaluated for 30 marks.

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

5.1 The end semesters examination will be conducted for 70 marks with 5 questions consisting of two questions each (a) and (b), out of which the student has to answer either (a) or (b), not both and each question carries 14 marks.

5.2 For practical subjects, 70 marks shall be awarded based on the performance in the

End Semester Examinations and 30 marks shall be awarded based on the day-to-day performance as Internal Marks.

5.3 There shall be two seminar presentations during I year I semester and II semester respectively. For seminar, a student under the supervision of a faculty member, shall collect the literature on a topic and critically review the literature and submit it to the department in a report form and shall make an oral presentation before the Departmental Academic Committee consisting of Head of the Department, Supervisor and two other senior faculty members of the department. For each Seminar there will be only internal evaluation of 50 marks. A candidate has to secure a minimum of 50% of marks to be declared successful.

5.4 A candidate shall be deemed to have secured the minimum academic requirement in a subject if he secures a minimum of 40% of marks in the End semester Examination and a minimum aggregate of 50% of the total marks in the End Semester Examination and Internal Examination taken together.

5.5 In case the candidate does not secure the minimum academic requirement in any subject (as specified in 5.4) he has to reappear for the End semester Examination in that subject.

5.6 A candidate shall be given one chance to re-register for each subject provided the internal marks secured by a candidate are less than 50% and so has failed in the end examination. In such a case, the candidate must re-register for the subject(s) and secure the required minimum attendance. The candidate's attendance in the re-registered subject(s) shall be calculated separately to decide upon his eligibility for writing the end examination in those subject(s). In the event of the student taking another chance, his internal marks and end examination marks obtained in the previous attempt stand cancelled.

5.7 In case the candidate secures less than the required attendance in any subject, he shall not be permitted to write the End Examination in that subject. He shall re-register the subject when next offered.

5.8 Laboratory examination for M. Tech. courses must be conducted with two Examiners, one of them being the Laboratory Class Teacher and the second examiner shall be another Laboratory Teacher.

6.0 EVALUATION OF PROJECT/DISSERTATION WORK

Every candidate shall be required to submit a thesis or dissertation on a topic approved by the Project Review Committee.

6.1 A Project Review Committee (PRC) shall be constituted with Principal as Chairperson, Heads of all the Departments offering the M. Tech. programs and two other senior faculty members.

6.2 Registration of Project Work: A candidate is permitted to register for the project work after satisfying the attendance requirement of all the subjects, both theory and practical.

6.3 After satisfying 6.2, a candidate has to submit, in consultation with his project supervisor, the title, objective and plan of action of his project work to the Departmental Academic Committee for approval. Only after obtaining the approval of the Departmental Academic Committee can the student initiate the Project work.

6.4 If a candidate wishes to change his supervisor or topic of the project, he can

do so with the approval of the Departmental Academic Committee. However, the Departmental Academic Committee shall examine whether or not the change of topic/supervisor leads to a major change of his initial plans of project proposal. If yes, his date of registration for the project work starts from the date of change of Supervisor or topic as the case may be.

6.5 A candidate shall submit his status report in a bound-form in two stages at least with a gap of 3 months between them.

6.6 The work on the project shall be initiated at the beginning of the II year and the duration of the project is two semesters. A candidate is permitted to submit Project Thesis only after successful completion of theory and practical course with the approval of PRC not earlier than 40 weeks from the date of registration of the project work. For the approval of PRC the candidate shall submit the draft copy of thesis to the Principal through Head of the Department and make an oral presentation before the PRC.

6.7 Three copies of the Project Thesis certified by the supervisor shall be submitted to the College/School/Institute.

6.8 The thesis shall be adjudicated by one examiner selected by the University. For this, the Principal of the College shall submit a panel of 5 examiners, eminent in that field, with the help of the guide concerned and head of the department.

6.9 If the report of the examiner is not favorable, the candidate shall revise and resubmit the Thesis, in the time frame as decided by the PRC. If the report of the examiner is unfavorable again, the thesis shall be summarily rejected.

6.10 If the report of the examiner is favorable, Viva-Voce examination shall be conducted by a board consisting of the Supervisor, Head of the Department and the examiner who adjudicated the Thesis. The Board shall jointly report the candidate's work as one of the following:

A. Excellent
B. Good
C. Satisfactory
D. Unsatisfactory

The Head of the Department shall coordinate and make arrangements for the conduct of Viva- Voce examination.

If the report of the Viva-Voce is unsatisfactory, the candidate shall retake the Viva-Voce examination only after three months. If he fails to get a satisfactory report at the second Viva- Voce examination, he will not be eligible for the award of the degree.

7.0 AWARD OF DEGREE AND CLASS

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

Letter Grades and Grade Points:

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

Grades	Points	Marks secured (%)
O (Outstanding)	10	≥ 85
A+(Excellent)	9	80 – 84
A(Very Good)	8	75 – 79
B+(Good)	7	70 – 74
B(Above Average)	6	65 – 69
C(Average)	5	60 – 64
P(Pass)	4	50 – 59
F(Fail)	0	<50
Ab(Absent)	0	-

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

Computation of SGPA and CGPA

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

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

SGPA (S_i) = $\Sigma(C_i \times G_i) / \Sigma C_i$

where C_i is the number of credits of the i^{th} course and G_i is the grade point scored by the student in the i^{th} 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 = $\Sigma(C_i \times S_i) / \Sigma C_i$

where S_i is the SGPA of the i^{th} semester and C_i is the total number of credits in that semester.

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

8.0 WITHHOLDING OF RESULTS

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

9.0 TRANSITORY REGULATIONS

9.1 Discontinued, detained, or failed candidates are eligible for admission

to two earlier or equivalent subjects at a time as and when offered.

10. GENERAL

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

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

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

10.4 The College may change or amend the academic regulations or syllabi at any time and the changes or amendments made shall be applicable to all the students with effect from the dates notified by the Academic Council of the College/Affiliating University.

MALPRACTICES RULES

DISCIPLINARY ACTION FOR / IMPROPER CONDUCT IN EXAMINATIONS

S.No	Nature of Malpractices/Improper conduct	Punishment
	If the candidate:	
1. (a)	Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the subject of the examination)	Expulsion from the examination hall and cancellation of the performance in that subject only.
(b)	Gives assistance or guidance or receives it from any other candidate orally or by any other body language methods or communicates through cell phones with any candidate or persons in or outside the exam hall in respect of any matter.	Expulsion from the examination hall and cancellation of the performance in that subject only of all the candidates involved. In case of an outsider, he will be handed over to the police and a case is registered against him.
2.	Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the candidate is appearing.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the subjects of that Semester. 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. 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 othe 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. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
5.	Using objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.	Cancellation of the performance in that subject.
6.	Refuses to obey the orders of the Chief Superintendent/Assistant Superintendent / any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the officer-in charge or any person on duty in or outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the officer-	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that subject and all other subjects the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester. The candidates also are debarred and

	incharge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the College campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is registered against them.
7.	Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester. 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. 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. 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.
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 examinations.
12.	If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to the Academic Council of the College (or) affiliating University for further action towards suitable punishment.	

Malpractices identified by squad or special invigilators will entail punishment to the candidates as per the above guidelines..

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF MECHANICAL ENGINEERING

M.TECH. (MACHINE DESIGN)

I Year I Semester (3 Subjects+2 Electives +2 Open Elective + 1 Lab)

S.No.	SUBJECT CODE	SUBJECT	L	T/P/D	C	Max Marks	
						Int.	Ext.
1	R18D1501	Advanced Mechanical Engineering Design	3	-	3	30	70
2	R18D1502	Advanced Mechanics of Solids	3	-	3	30	70
3	R18D1503	Fatigue, Creep & Fracture Mechanics	3	-	3	30	70
4		**PROGRAM ELECTIVE-I**	3	-	3	30	70
	R18D1504	Advanced Finite Element Analysis					
	R18D1505	Analysis Gear Engineering					
	R18D1506	Theory of Elasticity & Plasticity					
5		**PROGRAM ELECTIVE-II**	3	-	3	30	70
	R18D1507	Advanced Mechanics of Composite Materials					
	R18D1508	Advanced Computer Aided Design					
	R18D1509	Applied Tribology					
6		**OPEN ELECTIVE –I**	3	-	3	30	70
7	R18D1581	Kinematics and Dynamics Lab	-	3	2	30	70
8		**Audit Course I**	2	-	-	50	-
	R18DHS55	Disaster Management					
		Total	**20**	**3**	**20**	**260**	**490**

OPEN ELECTIVE I			
Subject Code	**Subject Name**	**Subject Code**	**Subject Name**
R18DME51	Non-Conventional Energy Sources	R18DCS51	Scripting Languages
R18DME52	Industrial Safety	R18DAE51	Mathematical Modeling Techniques
R18DME53	Operations Research	R18DEC51	Embedded Systems Programming
R18DHS51	Business Analytics		

I Year II Semester (3 Subjects+2 Electives+1 Open Elective+ 1 Lab)

S.No.	SUBJECT CODE	SUBJECT	L	T/P/D	C	Max Marks	
						Int.	Ext.
1	R18D1510	Advanced Mechanics of Machinery	3	-	3	30	70
2	R18D1511	Design Synthesis	3	-	3	30	70
3	R18D1512	Experimental Stress Analysis	3	-	3	30	70
4	 R18D1513 R18D1514 R18D1515	**PROGRAM ELECTIVE – III** Industrial Robotics Design Of Hydraulic And Pneumatic System Mechatronics	3	-	3	30	70
5	 R18D1516 R18D1517 R18D1518	**PROGRAM ELECTIVE- IV** Computer Integrated Manufacturing Concurrent Engineering Mechanical Vibrations	3	-	3	30	70
6		**OPEN ELECTIVE- II**	3	-	3	30	70
7	R18D1582	Computer Aided testing, Analysis and Modeling Lab	-	3	2	30	70
8	 R18DHS56	**Audit Course II** English for Research Paper Writing	2	-	-	50	
Total			**20**	**3**	**20**	**260**	**490**

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

OPEN ELECTIVE II			
Subject Code	Subject Name	Subject Code	Subject Name
R18DME54	Composite Materials	R18DCS52	Information Security
R18DME55	Waste to Energy	R18DAE52	Unmanned Aerial Vehicles
R18DME56	Industrial Management	R18DEC52	Research Methodology
R18DHS52	Cost Management of Engineering Projects		

II Year I Semester

S.No.	Subject Code	SUBJECT	L	T/P/D	C	Max Marks	
						Int.	Ext.
1	R18D1583	Seminar-I	-	-	2	50	-
2	R18D1591	Mini Project	-	-	4	100	-
3	R18D1592	Project Review I	-	-	8	100	-
Total			**-**	**-**	**14**	**250**	**-**

II Year II Semester

S.No.	Subject Code	SUBJECT	L	T/P/D	C	Max Marks	
						Int.	Ext.
1	R18D1584	Seminar-II	-	-	2	50	-
2	R18D1593	Project Review - II	-	-	8	100	-
3	R18D1594	Project Viva-Voce	-	-	8	-	100
Total			**-**	**-**	**18**	**150**	**100**

SEMESTER-I
SYLLABUS

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

M .Tech I Year – I Sem(Machine Design)

L	T/P/D	C
3	0	3

(R18D1501) ADVANCED MECHANICAL ENGINEERING DESIGN

Course Objectives:

- Understanding the motion of the component and the basic geometry of the mechanisms.
- Understanding the process and methods of design of machines and elements.
- The kinematics of machines deals with the motion of members of the mechanisms which includes the determination of velocities and acceleration of the machine members.
- Abilities of developing equations pertaining to the design of machines.
- Ability to design new machines or modify existing machine according to the need.

UNIT-I

Design Philosophy: Design process, Problem formation, Introduction to product design, various design models-Shigley model, Asimov model and Norton model, Need analysis, Strength considerations -standardization. Creativity, Creative techniques, Material selections, Notches and stress concentration, design for safety and Reliability.

UNIT-II

Product Design: Product strategies, value, planning and specification, concept generation, concept selection, concept testing.

Design for manufacturing: Forging design, Casting design, Design process for non metallic parts, Plastics, Rubber, Ceramic, Wood and Glass parts like. Material selection in machine design.

UNIT-III

Failure Theories: Static failure theories, Distortion energy theory, Maximum shear stress theory, Coulomb-Mohr's theory, Modified Mohr's theory, Fracture mechanics theory, Fatigue mechanisms, Fatigue failure models, Design for fatigue strength and life, creep: Types of stress variation, design for fluctuating stresses, design for limited cycles, multiple stress cycles, Fatigue failure theories ,cumulative fatigue damage, thermal fatigue and shock, harmful and beneficial residual stresses, Yielding and transformation.

UNIT-IV

Surface Failures: Surface geometry, mating surfaces, oil film and their effects, design values and procedures, adhesive wear, abrasive wear, corrosion wear, surface fatigue, different contacts, dynamic contact stresses, surface fatigue failures, surface fatigue strength.

UNIT-V

Economic Factors Influencing Design: Economic analysis, Break-even analysis, Human engineering considerations, Ergonomics, Design of controls, Design of displays. Value engineering, Material and process selection in value engineering, Modern approaches in design.

TEXT BOOKS:

1 Machine Design An Integrated Approach / Robert L. Norton / Prentice-Hall New . Jersey, USA.
2 Engineering Design / George E Dieter / McGraw Hill /2008
3 Mechanical Engineering Design / J.E. Shigley and L.D. Mitchell / McGraw Hill . International Book Company, New Delhi.

REFERENCE BOOKS:

1 Fundamentals of machine elements/ Hamrock, Schmid and Jacobian/ 2nd edition . /McGraw-Hill International edition.
2 Product design and development / Karl T. Ulrich and Steven D. Eppinger / 3rd . edition/ Tata McGraw Hill.
3 Product Design and Manufacturing /A.K. Chitale and R.C. Gupta / Prentice Hall

Course Outcomes:

After Completion of this course students will be able to

- Apply the knowledge of Mathematics, Science and Engineering for designing machine part. Propose the Engineering solutions for global progress, productivity and economic development. List the materials and variety of mechanical components available/used to produce every day goods and services.
- Identify and solve the engineering challenges regarding the human needs in daily life about machines and systems. List the processes and methods of design of machines and elements. Develop equations and relations pertaining to the design of machines Develop fundamental knowledge of the Standards used in the design of machine elements. List different materials and state their properties
- Design component, machine, workstation and systems etc. for safe working by minimizing accidents and other health hazards. List and define functionality of various parts used in Automobiles, working principles and their design which include brakes, Gears, Clutches, and Springs etc.
- Design new machines or modify the existing machines according to the need, also use the techniques, skills and modern engineering tools for engineering practice. Communicate effectively through written and oral skills.
- Knowledge of different materials and their properties for designing the components of machine elements.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

M.Tech I Year – I Sem (Machine Design)

L	T/P/D	C
3	0	3

(R18D1502) ADVANCED MECHANICS OF SOLIDS

Course Objectives:

- To understand the strain/displacement and Hooke's law relationships.
- To solve torsion problems in bars and thin walled members.
- To solve for stresses and deflections of beams under unsymmetrical loading.
- To impart concepts of stress and strain analyses in a solid.
- To study the methodologies in theory of elasticity at a basic level.

UNIT-I

Shear Centre: Bending axis and shear center-shear center for axi-symmetric and un symmetrical sections.

Unsymmetrical Bending: Bending stresses in Beams subjected to Nonsymmetrical bending Deflection of straight beams due to nonsymmetrical bending.

UNIT-II

Curved Beam Theory: Winkler Bach formula for circumferential stress – Limitations – Correction factors – Radial stress in curved beams – closed ring subjected to concentrated and uniform lads- stresses in chain links.

UNIT- III

Torsion: Torsion of a cylindrical bar of Circular cross Section, Saint-Venant's semi-inverse methods, Linear elastic solution Prandtl elastic membrane (Soap-Film) Analogy, Narrow rectangular cross Section , Hallow thin wall torsion members, Multiply connected Cross section, Thin wall torsion members with restrained ends

Axi-Symmetric Problems: Rotating Discs – Flat discs, Discs of uniform thickness, Discs of Uniform Strength, Rotating Cylinders.

UNIT-IV

Theory of Plates: Introduction, Stress resultants in a flat plate Kinematics Strain-Displacement relations for plates Equilibrium equations for small displacement theory of flat plates Stress – Strain, – Temperature relation for Isotropic plates, Strain energy of a plate, Boundary conditions for plate Solution of rectangular plate problem, Solution of circular plate problem.

Beams on Elastic Foundation: General theory, Infinite Beam subjected to concentrated load, boundary conditions, Infinite beam subjected to a distributed lad segment, Semi-infinite beam with concentrated load near its end, Short Beams.

UNIT-V

Contact Stresses: Introduction, problem of determining contact stresses, Assumptions on which a solution for contact stresses is based, Expressions for principal stresses, Methods of computing contact stresses, Deflection of bodies in point contact; Stresses for two bodies in contact over narrow rectangular area (Line contact), Loads normal to area; Stresses for two bodies in line contact. Normal and Tangent to contact area.

TEXT BOOKS:

1. Advanced Mechanics of materials/Seely and Smith/ John Willey
2. Advanced Mechanics of materials / Boresi & Sidebottom/wiely international
3. Advanced strength of materials / Den Hortog J.P./Torrent

REFERENCE BOOKS:

1. Strength of materials / Sadhu singh/ Khanna Publishers
2. Mechanics of Materials / Beer & Jhonson / McGraw Hill
3. Theory of Plates & Shells / Timoshenko/ McGraw Hill/ 2nd Edition

Course Outcomes:

After Completion of this course students will be able to

- Understand and analyze stresses and strains at a point.
- Analyze and determine beams under unsymmetrical loading.
- Apply shear center of thin wall beams, torsion & ax symmetric problems
- Design straight beams, curved and asymmetrical bending of beams.
- Apply energy methods in structural mechanics problems.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

M .Tech I Year – I Sem(Machine Design)

L	T/P/D	C
3	0	3

(R18D1503) FATIGUE, CREEP AND FRACTURE MECHANICS

Course Objectives:

- Provide an understanding of the mechanics and micro-mechanisms of elastic and plastic deformation, creep, fracture, and fatigue failure, as applied to metals, ceramics, composites, thin film and biological materials.
- Provide a thorough introduction to the principles of fracture mechanics.
- Provide practical examples of the application of fracture mechanics to design and life prediction methods and reporting. Provide a basis for the use of fractography as a diagnostic tool for structural failures.
- To provide an understanding of fundamental principles and assumptions, and to give a basis for analysis and evaluation of structures from a fracture mechanics point of view.
- Also students will be explored to fatigue, creep deformation, creep-fatigue interactions.

UNIT-I

Introduction: Fracture behaviour of metals and alloys. The ductile/brittle transition temperatures for notched and un-notched components, Ductile rupture as a failure mechanism Fracture at elevated temperature.

Definitions of types of fracture and failure, Introduction to stress intensity factor and strain energy release rate, Equivalence of energy approach and stress intensity approach.

Basic Stress Analysis and Mechanical Properties: Elasticity, General 3-D relations, Plane stress and plane strain, Mohr's circle-principal stresses, Yield in materials, Tresca and Von Mises criteria, Ideal and actual strength of materials. Typical stress/strain curves for different classes of materials.

UNIT-II

Stress Intensity Factor and its use in Fracture Mechanics: Early concepts of stress concentrators and flaws, Ingles solution to stress round an elliptical hole-implications of results. Stress intensity factor for a crack. Westergaard's solution for crack tip stresses. Stresses and displacement in Cartesian and polar coordinates, Linear Elastic Fracture Mechanics. Typical values of fracture toughness, Different modes of crack opening. Superposition of crack tip stress fields, Direction of crack growth under mixed mode loadings.

Crack tip plasticity, Early estimates of plastics zone, Irwin plastic zone correction and Dugdale approach, Plastic zone shape in three dimensions and shape under plane stress and plane strain conditions, Allowable plasticity for LEFM to apply, the thickness criterion Experimental methods for measuring Kic.

UNIT-III

Elastic/Plastic Fracture Mechanics: Elastic/plastic fracture mechanics: The crack opening displacement and J-integral approaches, R-curve analysis Testing procedures, Measurement of these parameters, RAD, Fail sage and safe life design approaches, Practical applications. Advanced to pics in EOFM.

UNIT-IV

Fatigue: Importance of fatigue in engineering, Low cycle fatigue, Coffin-Manson law, Cyclic work hardening and softening. Micro structural models of crack initiation. Stage I, II and III crack growth.

Analysis of Fatigue: The empirical laws of fatigue failure. High cycle-low strain fatigue, Basquin's law, Goodman, Soderberg and Gerber mean stress corrections, Miner's law of damage summation. Low cycle fatigue, Crack growth and application of fracture mechanics to fatigue, Paris-Ergodan law, Threshold stress intensity range. Crack closure and its theories Cycle counting methods, Developments in using rain-flow counting methods to recreate fatigue standard spectra. Standard spectra suitable for different applications.

UNIT-V

Fatigue Of Welded Structures: Factors affecting the fatigue lives of welded joints, the codes and standards available to the designer, the use of fracture mechanics to supplement design rules. Practical examples.

Creep: Phenomenology, Creep curves, Creep properties, Multi-axial creep, Creep-fatigue interaction, Creep integrals.

TEXT BOOKS:

1. Mechanical Metallurgy / Dieter / McGraw Hill
2. Fracture Mechanics: Fundamental and Applications /Anderson T.L & Boca Raton/ . CRC Press, Florida, 1998.
3. Deformation and Fracture mechanics of Engineering Materials / Richard W Hertz . /Wiley

REFERENCE BOOKS:

1. Plasticity for structural Engineers / W.F. Chen and D.J,. Ha,
2. Engineering Fracture Mechanics/ D.R.J. Owen and A.J. Fawkes /Pincridge press, . Swansea, U.K.
3. Fracture and fatigue control in structures/ S.T. Rolfe and J.M. Barsom/ Printice Hall, Englewood cliffs, N.J..

Course Outcomes:

- The Student will be able to use simple continuum mechanics and elasticity to determine the stresses, strains, and displacements in a loaded structure. Able to do mathematical modeling of the elements of plastic deformation, with respect to continuum and microscopic mechanisms.
- The Student will be able to use creep data to predict the life of structures at elevated temperatures and the understanding of mechanisms of creep deformation and fracture.
- The Student will be able to quantitatively estimate failure criteria for both elastically and plastically deforming structures, in the design of life prediction strategies, and for fracture control plans, with examples from automotive, aerospace, medical, and other industries.

- After completion of this course students will acquire the knowledge for applying fracture mechanics theory
- To calculate stress areas and the”energy release rate” around crack tips and crack growth due to fatigue

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

M .Tech I Year – I Sem (Machine Design)

L	T/P/D	C
3	0	3

(R18D1504) ADVANCED FINITE ELEMENT ANALYSIS (PROGRAM ELECTIVE–I)

Course Objectives:

- Apply vector mechanics as a tool for problem solving.
- Understand the need in Design for the Finite Element Method.
- Understanding of mechanical engineering design concepts to use the Finite Element Method software correctly and efficiently.
- Analyze a physical problem, develop experimental procedures for accurately investigating the problem, and effectively perform and document findings.
- Understand forces associated with different parts of a machine

UNIT-I

Introduction to FEM, basic concepts, historical back ground, applications of FEM, general description, comparison of FEM with other methods, variational approach, Glerkin's Methods. Coordinates, basic element shapes, interpolation function, Virtual energy principle, Rayleigh – Ritz method, properties of stiffness matrix, treatment of boundary conditions, solution of system of equations, shape functions and characteristics, Basic equations of elasticity, strain- displacement relations.

UNIT-II

1-D Structural Problems: Axial bar element – stiffness matrix, load vector, temperature effects, Quadratic shape functions and problems. ANALYSIS OF TRUSSES : Plane Trusses and Space Truss elements and problems ANALYSIS OF BEAMS : EFA Hermite shape functions – stiffness matrix – Load vector – Problems.

UNIT-III

2-D Problems: CST, LST, force terms, Stiffness matrix and load vectors, boundary conditions, Isoparametric elements – quadrilateral element, shape functions – Numerical Integration. Finite element modelling of Axi-symmetric solids subjected to Axi-symmetric loading with triangular elements. 3-D PROBLEMS: Tetrahedran element – Jacobian matrix – Stiffness matrix.

UNIT-IV

Scalar Field Problems: 1-D Heat conduction-Slabs – fins - 2-D heat conduction problems – Introduction to Torsional problems.

UNIT-V

Dynamic Considerations: Dynamic equations – consistent mass matrix – Eigen Values, Eigen vector, natural frequencies – mode shapes – modal analysis.

TEXT BOOKS:

1. The Finite Element Methods in Engineering / SS Rao / Pergamon.
2. Finite Element Methods: Basic Concepts and applications, Alavala, PHI
3. Introduction to Finite Elements in Engineering, Chandrupatla, Ashok and Belegundu, Prentice – Hall

REFERENCE BOOKS:

1. Finite Element Method – Zienkiewicz / Mc Graw Hill
2. Introduction to Fininte element analysis- S.Md.Jalaludeen,Anuradha Publications, print-2012
3. A First Course in the Finite Element Method/Daryl L Logan/Cengage Learning/5th . Edition

Course Outcomes:

After Completion of this course students will be able to solve

- Numerical methods involved in Finite Element Theory.
- Definition of truss, beam, membrane, plate, and continuum elements. Formulation of planar one dimensional (truss and beam) elements having linear, quadratic, and cubic shape functions.
- Global, local, and natural coordinates. Formulation of planar, plane stress two-dimensional elements (rectangular and quadratic quadrilateral elements).
- Formulation of 3-dimensional elements (four node tetrahedral and eight-node brick elements).
- Direct formulation and basic energy and weighted residual formulation of finite elements. Procedures for performing and verifying FEA using commercial FEA software.

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

M .Tech I Year – I Sem (Machine Design)

L	T/P/D	C
3	0	3

(R18D1505) ANALYSIS GEAR ENGINEERING
(Design Data Book Permitted)
(PROGRAM ELECTIVE–I)

Course Objectives:

- To develop an ability to design a system, component, or process to meet desired needs with in realistic constraints.
- To develop an ability to identify, formulate, and solve engineering problems.
- To develop an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.
- Impart design skills to the students to apply these skills for the problems in real life industrial applications.
- Develop an holistic design approach to find out pragmatic solutions to realistic domestic and industrial problems.

UNIT–I

Introduction: Principles of gear tooth action, Generation of Cycloid and Involute gears, Involutometry, gear manufacturing process and Inspection, gear tooth failure modes, stresses, selection of right king of gears.

Spur Gears: Tooth loads, Principles of Geometry, Design considerations and methodology, Complete design of spur gear teeth considering Lewis beam strength, Buckingham's dynamic load and wear load. Design of gear shaft and bearings.

UNIT–II

Helical Gears: Tooth loads, Principles of Geometry, Design considerations and methodology, Complete design of helical gear teeth considering Lewis beam strength, Buckingham's dynamic load and wear load. Design of gear shaft and bearings.

Gear Failures: Analysis of gear tooth failures, Nomenclature of gear tooth wear and failure, tooth breakage, pitting, scoring, wear, overloading, gear-casing problems, lubrication failures.

UNIT–III

Worm Gears: Tooth loads, Principles of Geometry, Design considerations and methodology, Complete design of worm gear teeth considering Lewis beam strength, Buckingham's dynamic load and wear load. Heat dissipation consideration. Design of gear shaft and bearings.

UNIT–IV

Bevel Gears: Tooth loads, Principles of Geometry, Design considerations and methodology, Complete design of bevel gear teeth considering Lewis beam strength, Buckingham's dynamic load and wear load. Design of gear shaft and bearings.

UNIT–V

Gear Trains: Simple, compound and epicyclic gear trains, Ray diagrams, Design of a gearbox of an automobile, Design of gear trains from the propeller shafts of airplanes for auxiliary systems.

Optimal Gear Design: Optimization of gear design parameters. Weight minimization, Constrains in gear train design-space, interference, strength, dynamic considerations, rigidity etc. Compact design of gear trains, multi objective optimization of gear trains. Application of Traditional and non-traditional optimization techniques.

TEXT BOOKS:

1. Machine Design/ Maleev and Hartman/ C.B.S Publishers, India.
2. Gear engineering/ Henry E.Merrit / Wheeler publishing, Allahabad. 1992.
3. Practical Gear design/ Darle W.Dudley/ McGraw-Hill book company.

REFERENCE BOOKS:

1. Analytical mechanics of gears/ Earle Buckingham/ Dover publications, New York, . 1949.
2. Hand book of gear design/ G.M.Maitha / Tata McGraw Hill publishing company Ltd, . New Delhi, 1994.
3. Machine Design / Shaum series / McGraw Hill.

Course Outcomes:

After Completion of this course students will get

- Ability to select appropriate materials for a design, considering manufacturability, availability, cost, performance, suitability for the conditions, potential failure modes, environmental impact, and other considerations.
- Ability to evaluate the importance of an engineering decision, select an appropriate decision making process, and implement that process to make a defensible engineering decision.
- Ability to model, analyze, design, and realize a mechanical system that meets a particular need.
- To understand and apply principles of gear design to spur gears and industrial spur gear boxes.
- To become proficient in Design of Helical and Bevel Gear.

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

M .Tech I Year – I Sem (Machine Design)

L	T/P/D	C
3	0	3

(R18D1506) THEORY OF ELASTICITY AND PLASTICITY (PROGRAM ELECTIVE–I)

Course Objectives:

- To understand the theory of stress, strain and plasticity and enlighten the advances in plasticity and plastic strain analysis.
- To obtain the stress strain relation within the elastic body and find the principle stress and strain for a different types of elastic body.
- To known yield criteria for ductile metal.
- To understand the plastic stress-strain relations and learn Upper and lower bound theorems and corollaries.
- To understand the concepts of plasticity, yield criteria, plastic flow etc.,

UNIT-I

Elasticity: Two dimensional stress analysis - Plane stress - Plane strain - Equations of compatibility - Stress function - Boundary conditions.

Problem in Rectangular Coordinates - Solution by polynomials - Saint Venent's principles - Determination of displacement - Simple beam problems.

Problems in Polar Coordinates - General equations in polar coordinates - Stress distribution symmetrical about axis - Strain components in polar coordinates - Simple and symmetric problems.

UNIT-II

Analysis of Stress and Strain in Three Dimensions: Principle stresses - Homogeneous deformations - Strain spherical and deviatoric stress - Hydrostatic strain.

General Theorems: Differential equations of equilibrium and compatibility - Displacement - Uniqueness of solution - Reciprocal theorem.

UNIT-III

Bending of Prismatic Bars: Stress function - Bending of cantilever beam - Beam of rectangular cross-section - Beams of circular cross-section.

UNIT-IV

Plasticity: Plastic deformation of metals - Structure of metals - Deformation - Creep stress relaxation of deformation - Strain rate condition of constant maximum shear stress - Condition of constant strain energy - Approximate equation of plasticity.

UNIT-V

Methods of Solving Practical Problems: The characteristic method - Engineering method - Compression of metal under press - Theoretical and experimental data drawing.

TEXT BOOKS:

1. Theory of Elasticity/Timoshenko S.P. and Goodier J.N./Koakusha Publishers
2. An Engineering Theory of Plasticity/E.P. Unksov/Butterworths
3. Applied Elasticity/W.T. Wang/TMH

REFERENCE BOOKS:

1. Theory of Plasticity for Engineers/Hoffman and Sacks/TMH
2. Theory of Elasticity and Plasticity/Sadhu Singh/ Khanna Publishers
3. Theory of Elasticity and Plasticity/Harold Malcolm Westergaard/Harvard University . Press

Course Outcomes:

After Completion of this course students will be able to

- Understand the stress and strain tensor field.
- Understand the contact stresses analysis problem in bearing.
- Understand advanced concepts of plasticity and plastic deformation analysis
- Students can demonstrate Idealized stress-strain diagrams for different material models
- Demonstrate experimental verification of the Prandtl-Reuss equation.

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

M .Tech I Year – I Sem (Machine Design)

L	T/P/D	C
3	0	3

(R18D1507) ADVANCED MECHANICS OF COMPOSITE MATERIALS (PROGRAM ELECTIVE–II)

Course Objectives:

- To develop an understanding of the linear elastic analysis of composite materials.
- To understanding will include concepts such as anisotropic material behavior and the analysis of laminated plates.
- The students will undertake a design project involving application of fiber reinforced laminates.
- Explain the behavior of constituents in the composite materials.
- Enlighten the students in different types of reinforcement.

UNIT–I

Basic Concepts and Characteristics: Geometric and Physical definitions, natural and man-made composites, Aerospace and structural applications, types and classification of composites.

Reinforcements: Fibres – Glass, Silica, Kevlar, carbon, boron, silicon carbide, and born carbide fibres. Particulate composites, Polymer composites, Thermoplastics, Thermostats, Metal matrixand ceramic composites.

UNIT–II

Micromechanics: Unidirectional composites, constituent materials and properties, elastic properties of a lamina, properties of typical composite materials, laminate characteristics and configurations. Characterization of composite properties.

Manufacturing Methods: Autoclave, tape production, moulding methods, filament winding, manlayup, pultrusion, RTM.

UNIT–III

Coordinate Transformation: Hooke's law for different types of materials, Hooke's law for two dimensional unidirectional lamina, Transformation of stress and strain, Numerical examples of stress strain transformation, Graphic interpretation of stress – strain relations. Off –axis, stiffness modulus, off – axis compliance.

Elastic Behavior of Unidirectional Composites: Elastic constants of lamina, relation ship between engineering constants and reduced stiffness and compliances, analysis of laminated composites, constitutive relations.

UNIT–IV

Strength of Unidirectional Lamina: Micro mechanics of failure, Failure mechanisms, strength of an orthotropic lamina, strength of a lamina under tension and shear maximum stress and strain criteria, application to design. The failure envelope, first ply failure, free-edge effects. Micros mechanical predictions of elastic constants.

UNIT–V

Analysis of Laminated Composite Plates:

Introduction thin plate theory, specially orthotropic plate, cross and angle ply laminated plates, problems using thin plate theory.

TEXT BOOKS:

1. Mechanics of Composite Materials/ R. M. Jones/ Mc Graw Hill Company, New . York,1975.
2. Engineering Mechanics of Composite Materials by Isaac and M Daniel, Oxford . University Press,1994.
3. Analysis and performance of fibre Composites/ B. D. Agarwal and L. J. Broutman/ . Wiley Interscience, New York, 1980.

REFERENCE BOOKS:

1. Mechanics of Composite Materials/ Second Edition (Mechanical Engineering)/ Autar K.Kaw Publisher: CRC
2. Analysis of Laminated Composite Structures/ L. R. Calcote/ Van Nostrand Rainfold, NewYork, 1969.
3. Advanced Mechanics of Composite Materials/ Vasiliev &Morozov/Elsevier/Second . Edition

Course Outcomes:

- An ability to identify the properties of fiber and matrix materials used in commercial composites, as well as some common manufacturing techniques.
- An ability to predict the elastic properties of both long and short fiber composites based on the constituent properties.
- An ability to rotate stress, strain and stiffness tensors using ideas from matrix algebra.
- A basic understanding of linear elasticity with emphasis on the difference between isotropic and anisotropic material behavior.
- An ability to analyze a laminated plate in bending, including finding laminate properties from lamina properties and find residual stresses from curing and moisture.

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

M .Tech I Year – I Sem (Machine Design)

L	T/P/D	C
3	0	3

(R18D1508) ADVANCED COMPUTER AIDED DESIGN (PROGRAM ELECTIVE–II)

Course Objectives:

- Model the 3-D geometric information of machine components including assemblies, and automatically generate 2-D production drawings.
- Understand the basic analytical fundamentals that are used to create and manipulate geometric models in a computer program.
- Improve visualization ability of machine components and assemblies before their actual fabrication through modeling, animation, shading, rendering, lighting and coloring. Model complex shapes including freeform curves and surfaces.
- Integrate the CAD system and the CAM system by using the CAD system for modeling design Information and converting the CAD model into a CAM model for modeling the manufacturing Information.
- Use full-scale CAD/CAM software systems designed for geometric modeling of machine Components and automatic generation of manufacturing information.

UNIT-I

Principles of Computer Graphics : Introduction, graphic primitives, point plotting, lines, Bresenham's circle algorithm, ellipse, transformation in graphics, coordinate systems, view port,2D and 3D transformation, hidden surface removal, reflection, shading and generation of characters.

UNIT-II

Cad Tools: Definition of CAD Tools, Types of system, CAD/CAM system evaluation criteria, brief treatment of input and output devices. Graphics standard, functional areas ofCAD, Modeling and viewing, software documentation, efficient use of CAD software.

Geometric Modelling: Types of mathematical representation of curves, wire frame models wire frame entities parametric representation of synthetic curves her mite cubic splines Beziercurves B-splines rational curves.

UNIT-III

Surface Modeling: Mathematical: representation surfaces, Surface model, Surface entities surface representation, Parametric representation of surfaces, plane surface, rule surface, surface of revolution, Tabulated Cylinder.

UNIT-IV

Parametric Representation of Synthetic Surfaces: Hermite Bicubic surface, **Bezier** surface, **B-** Spline surface, COONs surface, Blending surface Sculptured surface, Surface manipulation — Displaying, Segmentation, Trimming, Intersection, Transformations (both 2D and 3D).

UNIT-V

Geometricmodelling-3D: Solid modeling, Solid Representation, Boundary Representation (13-rep), Constructive Solid Geometry (CSG).**CAD/CAM.**

Exchange : Evaluation of data - exchange format, IGES data representations and structure, STEP Architecture, implementation, ACIS & DXF. Design Applications: Mechanical tolerances, Mass property calculations, Finite Element Modeling and Analysis and Mechanical Assembly.

Collaborative Engineering: Collaborative Design, Principles, Approaches, Tools, Design Systems.

TEXT BOOKS:

1. Mastering CAD/CAM / Ibrhim Zeid / Mc Graw Hill International.
2. CAD/CAM Principles and Applications/ P.N.Rao/TMH/3rd Edition
3. CAD/CAM /Groover M.P./ Pearson education

REFERENCE BOOKS:

1. CAD/CAM Concepts and Applications/ Alavala/ PHI
2. CAD / CAM / CIM, Radhakrishnan and Subramanian/ New Age
3. Principles of Computer Aided Design and Manufacturing/ Farid Amirouche/ Pearson

Course Outcomes:

After Completion of this course students will be able to

- Understand the concepts of wireframe, surface and solid modeling and part modeling and part data exchange standards (VDA, IGES, and STEP).
- Develop knowledge in 2D-Transformations, 3D Transformations and the Assembly Modeling, Assembly tree, and Assembly Methods.
- The Students become experts on Visualization and computer animation Techniques.
- Identify and interpret information provided in technical drawings, schematics, or mask sets.
- Analyze relationships between design elements for parametric modeling.

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

M .Tech I Year – I Sem (Machine Design)

L	T/P/D	C
3	0	3

(R18D1509) APPLIED TRIBOLOGY
(PROGRAM ELECTIVE-II)

Course Objectives:

- Understanding the principles for selecting compatible materials for minimizing friction and wear in machinery and the principles of bearing selection and bearing arrangement in machines.
- Learn the computations required for selecting and designing bearings in machines and the fundamental principles of lubrication for reduction of friction and Wear.
- Understanding the fundamental principles of high contact stresses (Hertz stresses), Fatigue-failure and Elasto hydrodynamic (EHD) lubrication in rolling bearings and gears.
- Describe the viscosity and laws of fluid flow with reference to lubrication.
- Illustrate the behavior of tribological components subjected to different working conditions and describe different tribological measures

UNIT-I

Historical Background - Viscosity - Viscometry - Effect of temperature on viscosity - Effect of pressure in viscosity - Other physical properties of mineral oils - The generalized Reynolds equation - Flow and shear stress - The energy equation - The equation of state - Mechanism of pressure development.

UNIT-II

Circumferential Flow - Oil flow through a bearing having a circumferential oil groove - Heat generation and lubricant temperature - Heat balance and effective temperature - Bearing design: Practical considerations - Design of journal bearings - Parallel surface bearing - Step bearing - Some situations under squeeze film lubrication - The mechanism of hydrodynamic instability - Stiffness and damping coefficients - Stability.

UNIT-III

Elasto Hydrodynamic Lubrication: Theoretical consideration - Grubin type solution - Accurate solution - Point contact - Dimensionless parameters - Film thickness equations - Different regimes in EHL contact - Deep-groove radial bearings - Angular contact bearings - Thrust ball bearings - Geometry - Kinematics - Stress and deformations - Load capacity.

UNIT-IV

Surface Topography - Surface characterization - Apparent and real area of contact - Derivation of average Reynolds equation for partially lubricated surface - Effect of surface roughness on journal bearings

UNIT-V

Laws of Friction - Friction theories - Surface contaminants - Frictional heating - Effect of sliding speed on friction - Classification of wear - Mechanisms of wear - Quantitative laws of wear - Wear resistance materials.

TEXT BOOKS:

1. Rowe WW& O' Dionoghue,‖Hydrostatic and Hybrid bearing design — Butterworths . & Co.Publishers Ltd,1983.
2. Collacott R.A,‖ Mechanical Fault diagnosis and condition monitoring‖, Chapman and Hall, London 1977.
3. Bernard J.Hamrock, — Fundamentals of fluid film lubricant‖, Mc Graw-Hill Co.,1994.

REFERENCE BOOKS:

1. Neale MJ, (Editor) — Tribology hand Book‖Neumann Butterworths, 1975.
2. Connor and Boyd JJO (Editors) — Standard hand book of lubrication engineers — . ASLE,Mc
3. Introduction to Tribology of Bearings by Majumdar, B.C

Course Outcomes:

- Students will demonstrate basic understanding of friction, lubrication and wear processes and familiar with mathematical tools used to analyze tribological processes.
- Students will become familiar with common anti-friction and anti-wear components and the lubricants used therein.
- Students will be able to describe the detailed operation of selected anti-friction or anti wear components.
- The student can identify different areas of Industrial Tribology.
- Can find the applications of all the areas in day to day life.

OPEN ELECTIVE-I

MALLAREDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

M.Tech I Year – I Sem (Machine Design)

L	T/P/D	C
3	0	3

(R18DME51) NON CONVENTIONAL ENERGY SOURCES (OPEN ELECTIVE-I)

Course Objectives:

- To explain the concept of various forms of renewable energy.
- To outline division aspects and utilization of renewable energy sources for both domestics and industrial applications.
- This course envisages the new and renewable source of energy, available in nature.
- To expose the students on sources of energy crisis and the alternates available.
- Also stress up on the application of non-conventional energy technologies.

UNIT-I

Introduction: Energy Scenario, Survey of energy resources. Classification and need for conventional energy resources.

Solar Energy: The Sun-sun-Earth relationship, Basic matter to waste heat energy circuit, Solar Radiation, Attention, Radiation measuring instruments.

Solar Energy Applications: Solar water heating. Space heating, Active and passive heating, Energy storage, Selective surface, Solar stills and ponds, solar refrigeration, Photovoltaic generation.

UNIT -II

Geothermal Energy: Structure of earth, Geothermal Regions, Hot springs. Hot Rocks, Hot Aquifers. Analytical methods to estimate thermal potential. Harnessing techniques, Electricity generating systems.

UNIT-III

Direct Energy Conversion: Nuclear Fusion, Fusion reaction, P-P cycle, Carbon cycle, Deuterium cycle, Condition for controlled fusion, Fuel cells and photovoltaic, Thermionic and Thermoelectric generation and MHD generator.

Hydrogen Gas as Fuel: Production methods, Properties, I.C. Engines applications, Utilization strategy, Performances.

UNIT-IV

Bioenergy: Biomass energy sources. Plant productivity, Biomass wastes, aerobic and anaerobic bioconversion processes, Raw material and properties of bio-gas, Bio-gas plant technology and status, the energetic and economics of biomass systems, Biomass gasification

UNIT-V

Wind Energy: Wind, Beaufort number, Characteristics, Wind energy conversion systems, Types, Betz model. Interference factor. Power coefficient, Torque coefficient and Thrust coefficient, Lift machines and Drag machines. Matching Electricity generation.

Energy from Oceans: Tidal energy, Tides, Diurnal and semi-diurnal nature, Power from tides, Wave Energy, Waves, Theoretical energy available. Calculation of period and phase velocity of waves, Wave power systems, submerged devices. Ocean thermal Energy, Principles, Heat

exchangers, Pumping requirements, Practical considerations.

TEXTBOOKS:

1. Non-conventional Energy Sources / GD Rai/Khanna publications.
2. Non-Conventional Energy Sources and Utilisation (Energy Engineering)/ R K Rajput / S.Chand.
3. Renewable Energy Sources /Twidell & Weir/Taylor and Francis/ 2nd special Indian edition .

REFERENCE BOOKS:

3. Renewable Energy Resources- Basic Principles and Applications/ G.N.Tiwari and M.K.Ghosal/ Narosa Publications.
4. Renewable Energy Resources/ John Twidell & Tony Weir/Taylor & Francis/2nd edition.
5. Non Conventional Energy / K.Mittal/ Wheeler.

Course Outcomes:

- Students get expertise in analyzing the environmental sources.
- Cost economics of using renewable energy sources compared to fossil fuel.
  Students get exposure on direct energy conversion systems.
- Understand the different non conventional sources and the power generation techniques to generate electrical.
- Design a prescribed engineering sub-system.
- Recognize the need and ability to engage in lifelong learning for further developments in this field.

MALLAREDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

M.Tech I Year – I Sem (Machine Design)

L	T/P/D	C
3	0	3

(R18DME52) INDUSTRIAL SAFETY
(OPEN ELECTIVE –I)

Course Objectives:

- To explain the concept of various industrial safety methods.
- To outline division aspects measurements of safety performance .
- To know about Industrial safety programs and toxicology, Industrial laws , regulations and source models.
- To understand about fire and explosion, preventive methods, relief and its sizing methods.
- To analyse industrial hazards and its risk assessment.

UNIT-I :
Importance of Safety, health and environment. Health safety and environmental policy, fundamentals of safety, classification of accidents, Managements responsibility, objectives of safety management, National safety council, Employees state insurance act 1948, approaches to prevent accidents, principles of safety management, safety organization, safety auditing, maintenance of safety, measurements of safety performance, industrial noise and noise control, Industrial Psychology, Industrial accidents and prevention. Introduction to OSHAS 18001 AND OSHA.

UNIT II:
Process safety management (P.S.M) as per OSHA, legal aspects of safety, safety with respect to plant and machinery, the explosive act 1884, Petroleum act 1934, personal protective equipment, classification of hazards, protection of respiratory system, work permit system, hazards in refineries and process plants, safety in process plants, pollution in some typical process industry.

UNIT III:
Safe working practices, housekeeping, safe working environment, safety device and tools, precaution in use of ladders, safety instruction during crane operation, safety instruction for welding, burning and cutting and gas welding equipment, electrical safety, case studies, safety in use of electricity, electric shock phenomena, Occurrence of electric shock, medical analysis of electric shock and its effect, safety procedures in electric plants, installation of Earthing system,

UNIT IV:
Safety in hazardous area, hazard in industrial zones, classification of industrial Enclosures for gases and vapors. Mechanical, Chemical, Environmental and Radiation hazards, Machine guards and safety devices, slings, load limits, lifting tackles and lifting equipment,

hydrostatic test, Chemical hazards, industrial toxicology, toxic chemicals and its harmful effects on humans, factors influencing the effect of toxic materials, Units of concentration, control measure, environmental hazards, devices for measuring radiation, safety analysis and risk analysis, risk management, First aid, Safety measures to avoid occupational diseases.

UNIT V

Factories act – 1948 Stuatutory authorities – inspecting staff, health, safety, provisions relating to hazardous processes,welfare, working hours, employment of young persons – special provisions – penalties and procedures- Indian Boiler Act 1923, static and mobile pressure vessel rules (SMPV), motor vehicle rules, mines act 1952, workman compensation act, rules – electricity act and rules

Text books :

1. Industrial safety management By: L.M. Deshmukh Publishers: Tata Megraw Hill ,New Delhi Year: 2006 Edition: First
2. The Factories Act 1948, Madras Book Agency, Chennai, 2000

References:

1. Industrial safety health and environment Management system By: R.K. Jain & Sunil S. Rao Publishers: Khanna Publishers Year: 2008 Edition: Second
2..The Indian boilers act 1923, Commercial Law Publishers (India) Pvt.Ltd., Allahabad.
3.. ”Accident prevention manual for industrial operations”, N.S.C.,Chicago, 1982.
4. Industrial Safety and Environment by Amit Gupta
5.“Safety in Industry” N.V. Krishnan JaicoPublishery House, 1996.

Course Outcome:

By the end of the course the students will be able to.

- Analyze the effect of release of toxic substances.
- Understand the industrial laws, regulations and source models.
- Apply the methods of prevention of fire and explosions.
- Understand the relief and its sizing methods.
- Understand the methods of hazard identification and preventive measures.

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

M.Tech I Year – I Sem (Machine Design)

L	T/P/D	C
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(R18DME53)OPERATIONS RESEARCH
(OPEN ELECTIVE –I)

Course Objectives:

- To familiarize the students with the use of practice oriented mathematical applications for optimization functions in an organization.
- To familiarize the students with various tools of optimization, probability, statistics and simulation,
- To applicable in particular scenarios in industry for better management of various resources.
- Analyze any real life system with limited constraints and depict it in a model form.
- Convert the problem into a mathematical model.

UNIT–I

Introduction : Development – Definition– Characteristics and Phases – Types of models – operation Research models– applications.

Allocation : Linear Programming Problem Formulation – Graphical solution – Simplex method –Artificial variables techniques -Two–phase method, Big-M method.

UNIT–II

Transportation Problem – Formulation – Optimal solution, unbalanced transportation problem –Degeneracy.Assignment problem – Formulation – Optimal solution - Variants of Assignment Problem-Traveling Salesman problem.

Sequencing – Introduction – Flow **–**Shop sequencing – n jobs through two machines – n jobs through three machines – Job shop sequencing – two jobs through 'm' machines.

UNIT–III

Replacement: Introduction – Replacement of items that deteriorate with time – when money value is not counted and counted – Replacement of items that fail completely, group replacement.

Theory of Games: Introduction – Minimax (maximin) – Criterion and optimal strategy – Solution of games with saddle points – Rectangular games without saddle points – 2 X 2 games – dominance principle – m X 2 & 2 X n games -graphical method.

UNIT–IV

Waiting Lines: Introduction – Single Channel – Poisson arrivals – exponential service times – with infinite population and finite population models– Multichannel – Poisson arrivals – exponential service times with infinite population single channel Poisson arrivals.

Inventory: Introduction – Single item – Deterministic models – Purchase inventory models with one price break and multiple price breaks – shortages are not allowed – Stochastic models – demand may be discrete variable or continuous variable – Instantaneous production. Instantaneous demand and continuous demand and no set up cost.

UNIT–V

Dynamic Programming: Introduction – Bellman's Principle of optimality – Applications of dynamic programming- capital budgeting problem – shortest path problem – linear programming problem.

Simulation: Definition – Types of simulation models – phases of simulation– applications of simulation – Inventory and Queuing problems – Advantages and Disadvantages – Simulation Languages.

TEXT BOOKS :

1. Operations Research / S.D.Sharma-Kedarnath
2. Introduction to O.R/Hiller &Libermann (TMH).
3. Introduction to O.R /Taha/PHI

REFERENCE BOOKS:

1. Operations Research /A.M.Natarajan,P.Balasubramani,A. Tamilarasi/Pearson . Education.
2. Operations Research / R.Pannerselvam,PHI Publications.
3. Operation Research /J.K.Sharma/MacMilan.

Course Outcomes:

- Student will be able to Illustrate the need to optimally utilize the resources in various types of industries.
- Apply and analyze mathematical optimization functions to various applications.
- Demonstrate cost effective strategies in various applications in industry.
- Identify and develop operational research models from the verbal description of the real system.
- Understand the mathematical tools that are needed to solve optimization problems.

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

M.Tech I Year – I Sem (Machine Design)

L	T/P/D	C
3	0	3

(R18DHS51) BUSINESS ANALYTICS
(OPEN ELECTIVE –I)

Course Objective:

- To understand the importance of ever-increasing volume, variety and velocity of data in organization and application of data analytical tools for decision making.
- Students will demonstrate ethical reasoning skills, understand social, civic, and professional responsibilities and aspire to add value to society.
- Students will effectively communicate using business specific terminology in written and verbal form.
- Students will utilize interpersonal and leadership skills to be highly effective business managers and leaders.
- Students will have a strategic understanding of business analytics.

Unit-I: Introduction to Business Analytics: Importance, Scope, Evolution, Classification, and Application; Data Structure-Visualization of Data, Data Architecture, Measurement Scale; Decision Models-Classification, Structure of Decision Models; Data Structure and Data View-Understanding of data, exploring data using pivot tables.

Unit-II: Descriptive Analytics: Descriptive Statistical Measures–Population and samples, Measures of location, Measures of Dispersion, Measures of variability, measures of Association. Probability distribution and Data Modeling – Discrete Probability distribution, Continuous Probability distribution, Random sampling from Probability Distribution, Data Modeling and Distribution fitting.

Unit-III: Predictive Analytics: Karl Pearson Correlation Techniques -Multiple Correlation-Spearman's Rank correlation-Simple and Multiple regression-Regression by the method of least squares –Building good regression models –Regression with categorical independent variables --Linear Discriminant Analysis-One way and Two Way ANOVA

Unit-IV: Data Mining: Scope of Data Mining, Data Exploration and Reduction, Unsupervised learning –cluster analysis, Association rules, Supervised learning-Partition Data, Classification Accuracy, prediction Accuracy, k-nearest neighbors, Classification and regression trees, Logistics Regression.

Unit-V: Simulation: Random Number Generation, Monte Carlo Simulation, What if Analysis, Verification and Validation, Advantages and Disadvantages of Simulation, Risk Analysis, Decision Tree Analysis.

References:

- James Evans, Business Analytics, 2e, Pearson.

- Camm, Cochran, Fry, Ohlmann, Anderson, Sweeney, Williams Essential of Business Analytics, Cengage Learning.
- Thomas Eri, Wajid Khattack & Paul Buhler: Big Data Fundamentals, Concepts, drivers and Techniques by Prentice Hall of India, New Delhi.
- Akil Maheswari: Big Data, Upskill ahead by Tata McGraw Hill, New Delhi.
- Seema Acharya & Subhashini Chellappan: Big Data and Analytics, Wiley Publications, New Delhi.
- S. Christian Albright, Wayne L. Winston: Business Analytics: Data Analysis & Decision Making, Cengage Learning

Course Outcome:

- Students will be able to understand Importance of Analytics.
- Students will be able to understand Understanding the analytical tools.
- Students will be able to understand Application of Analytical tools to solve business problems.
- Students will demonstrate the ability to use technical skills in predicative and prescriptive modeling to support business decision-making.
- Analyze and evaluate appropriate business strategies, practices, and theories that inform and guide organizations to ensure sustainability.

MALLAREDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

M.Tech I Year – I Sem (Machine Design)

L	T/P/D	C
3	0	3

(R18DCS51) SCRIPTING LANGUAGES
(OPEN ELECTIVE – I)

Course Objectives:

- Motivation for and applications of scripting.
- Difference between scripting languages and non- scripting languages.
- Types of scripting languages.
- Scripting languages such as PERL, PHP,TCL/TK, python and BASH.
- Creation of programs in the Linux environment.

UNIT I

Introduction to PERL and Scripting Scripts and Programs, Origin of Scripting , Scripting Today, Characteristics of Scripting Languages, Web Scripting, and the universe of Scripting Languages. PERL- Names and Values, Variables, Scalar Expressions, Control Structures, arrays, list, hashes, strings, pattern and regular expressions, subroutines, advance perl - finer points of looping, pack and unpack, filesystem, eval, data structures, packages, modules, objects, interfacing to the operating system, Creating Internet ware applications, Dirty Hands Internet Programming, security Issues.

UNIT II

PHP Basics- Features, Embedding PHP Code in your Web pages, Outputting the data to the browser, Datatypes, Variables, Constants, expressions, string interpolation, control structures, Function, Creating a Function, Function Libraries, Arrays, strings and Regular Expressions.

UNIT III

Advanced PHP Programming Php and Web Forms, Files, PHP Authentication and Methodologies -Hard Coded, File Based, Database Based, IP Based, Login Administration, Uploading Files with PHP, Sending Email using PHP, PHP Encryption Functions, the Mcrypt package, Building Web sites for the World – Translating Websites- Updating Web sites Scripts, Creating the Localization Repository, Translating Files, text, Generate Binary Files, Set the desired language within your scripts, Localizing Dates, Numbers and Times.

UNIT IV

TCL Structure, syntax, Variables and Data in TCL, Control Flow, Data Structures, input/output, procedures, strings, patterns, files, Advance TCL- eval, source, exec and up level commands, Name spaces, trapping errors, event driven programs, making applications internet aware, Nuts and Bolts Internet Programming, Security Issues, C Interface. Tk- Visual Tool Kits, Fundamental Concepts of Tk, Tk by example, Events and Binding , Perl-Tk.

UNIT V

Python Introduction to Python language, python-syntax, statements, functions, Built-in-functions and Methods, Modules in python, Exception Handling, Integrated Web

Applications in Python – Building Small, Efficient Python Web Systems, Web Application Framework.

TEXT BOOKS:

1. The World of Scripting Languages, David Barron, Wiley Publications.
2. Python Web Programming, Steve Holden and David Beazley, New Riders Publications.
3. Beginning PHP and MySQL, 3rd Edition, Jason Gilmore, Apress Publications (Dreamtech)

REFERENCE BOOKS:

1. Open Source Web Development with LAMP using Linux, Apache, MySQL, Perl and PHP, J.Lee and B.Ware (Addison Wesley) Pearson Education.
2. Programming Python, M.Lutz, SPD.
3. PHP 6 Fast and Easy Web Development, Julie Meloni and Matt Telles, Cengage Learning Publications.
4. PHP 5.1,I.Bayross and S.Shah, The X Team, SPD.
5. Core Python Programming, Chun, Pearson Education.
6. Guide to Programming with Python, M.Dawson, Cengage Learning.
7. Perl by Example, E.Quigley, Pearson Education.
8. Programming Perl, Larry Wall, T.Christiansen and J.Orwant, O'Reilly, SPD.
9. Tcl and the Tk Tool kit, Ousterhout, Pearson Education.
10. PHP and MySQL by Example, E.Quigley, Prentice Hall(Pearson).
11. Perl Power, J.P.Flynt, Cengage Learning.
12. PHP Programming solutions, V.Vaswani, TMH.

Course Outcomes:

- Ability to create and run scripts using PERL/TCl/Python/PHP in IC design flow.
- Be familiar with design issues of object-oriented and functional languages.
- Be familiar with language abstraction constructs of classes, interfaces, packages, and procedures.
- Be familiar with using functional languages.
- Ability to use Linux environment and write programs for automation of scripts in VLSI tool design flow.

MALLAREDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

M.Tech I Year – I Sem (Machine Design)

L	T/P/D	C
3	0	3

(R18DAE51) MATHEMATICAL MODELING TECHNIQUES (OPEN ELECTIVE-I)

Course Objectives

- The objective is to emphasize the importance of mathematical modeling of diverse engineering problems.
- Specifically aerospace problems will be discoursed to understand the need for numerical techniques
- To introduce optimization techniques into numerical problems to reduce problem data.
- Identify a problem and choose an appropriate mathematical model.
- Solve the problem using the appropriate technology if necessary.

UNIT-I: **INTRODUCTION TO MODELING AND SINGULAR PERTURBATION METHODS**

Definition of a model, Procedure of modeling: problem identification, model formulation, reduction, analysis, Computation, model validation, Choosing the model, Singular Perturbations: Elementary boundary layer theory, Matched asymptotic expansions, Inner layers, nonlinear oscillations

UNIT-II: **VARIATIONAL PRINCIPLES AND RANDOM SYSTEMS**

Variational calculus: Euler's equation, Integrals and missing variables, Constraints and Lagrange multipliers, Variational problems: Optics-Fermat's principle, Analytical mechanics: Hamilton's principle, Symmetry: Noether's theorem, Rigid body motion, Random systems: Random variables, Stochastic processes, Monte Carlo method

UNIT-III: **FINITE DIFFERENCES: ORDINARY AND PARTIAL DIFFERENTIAL EQUATIONS**

ODE: Numerical approximations, Runge-Kutta methods, Beyond Runge-Kutta, PDE: Hyperbolic equations-waves, Parabolic equations-diffusion, Elliptic equations-boundary values

CELLULAR AUTOMATA AND LATTICE GASES

Lattice gases and fluids, Cellular automata and computing

UNIT- IV: **FUNCTION FITTING AND TRANSFORMS**

Function fitting: Model estimation, Least squares, Linear least squares: Singular value decomposition, Non-linear least squares: Levenberg-Marquardt method, Estimation, Fisher information, and Cramer-Rao inequality, Transforms:Orthogonal transforms, Fourier transforms, Wavelets, Principal components

FUNCTION FITTING ARCHITECTURES

Polynomials: Pade approximants, Splines, Orthogonal functions, Radial basis functions, Over-fitting, Neural networks: Back propagation, Regularization

UNIT-V: **OPTIMIZATION AND SEARCH**
Multidimensional search, Local minima, Simulated annealing, Genetic algorithms
FILTERING AND STATE ESTIMATION

Matched filters, Wiener filters, Kalman filters, Non-linearity and entrainment, Hidden Markov models

TEXT BOOK

1. *The Nature of Mathematical Modeling*, Neil Gershenfeld, Cambridge University Press, 2006, ISBN 0-521-57095-6

REFERENCE BOOKS

2. *Mathematical Models in the Applied Sciences*, A. C. Fowler, Cambridge University Press, 1997, ISBN 0-521-46140-5

3. *A First Course in Mathematical Modeling*, F. R. Giordano, M.D. Weir and W.P. Fox, 2003, Thomson, Brooks/Cole Publishers

Applied Numerical Modeling for Engineers, Donald De Cogan, Anne De Cogan, Oxford University Press, 1997

Course Outcomes

- Student will be able to predict and develop a numerical framework to a problem of physical interest.
- Student will be able to choose different techniques to solve various problems of diverse engineering, more especially to aeronautics and aerospace.
- Student will also enable to choose better optimized solutions using different optimization techniques.
- Students will develop understanding of various mathematical concepts and modeling techniques required for successful application of mathematics.
- Student will be able to model data using the language and techniques of mathematics.

MALLAREDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

M.Tech I Year – I Sem (Machine Design)

L	T/P/D	C
3	0	3

(R18DEC51) EMBEDDED SYSTEMS PROGRAMMING (OPEN ELECTIVE –I)

Course Objectives:

- To have knowledge about the basic programming of an embedded system.
- To provide in-depth knowledge about embedded processor, its hardware and software.
- To explain real time operating systems, inter-task communication and an embedded software development tool.
- To acquire knowledge about embedded processors and their applications.
- Test a real application of Embedded system on Board

Unit 1 - Embedded OS (Linux) Internals

Linux internals: Process Management, File Management, Memory Management, I/O Management. Overview of POSIX APIs, Threads – Creation, Cancellation, POSIX Threads Inter Process Communication - Semaphore, Pipes, FIFO, Shared Memory

Kernel: Structure, Kernel Module Programming Schedulers and types of scheduling.

Interfacing: Serial, Parallel Interrupt Handling Linux Device Drivers: Character, USB, Block & Network

Unit 2 – Open source RTOS

Basics of RTOS: Real-time concepts, Hard Real time and Soft Real-time, Differences between General Purpose OS & RTOS, Basic architecture of an RTOS, Scheduling Systems, Inter-process communication, Performance Matric in scheduling models, Interrupt management in RTOS environment, Memory management, File systems, I/O Systems, Advantage and disadvantage of RTOS.

Unit 3 – Open Source RTOS Issues

POSIX standards, RTOS Issues - Selecting a Real Time Operating System, RTOS comparative study. Converting a normal Linux kernel to real time kernel, Xenomai basics.

Overview of Open source RTOS for Embedded systems (Free RTOS/ Chibios-RT) and application development.

Unit 4 – VxWorks / Free RTOS

VxWorks/ Free RTOS Scheduling and Task Management - Realtime scheduling, Task Creation, Intertask Communication, Pipes, Semaphore, Message Queue, Signals, Sockets, Interrupts I/O Systems - General Architecture, Device Driver Studies, Driver Module explanation, Implementation of Device Driver for a peripheral

Unit 5 – Case study

Cross compilers, debugging Techniques, Creation of binaries & porting stages for Embedded Development board (Beagle Bone Black, Rpi or similar), Porting an Embedded OS/ RTOS to a target board ().Testing a real time application on the board

TEXT BOOKS:

1. Essential Linux Device Drivers, Venkateswaran Sreekrishnan
2. Writing Linux Device Drivers: A Guide with Exercises, J. Cooperstein
3. Real Time Concepts for Embedded Systems – Qing Li, Elsevier

REFERENCES:

1. Embedded Systems Architecture Programming and Design: Raj Kamal, Tata McGraw Hill
2. Embedded/Real Time Systems Concepts, Design and Programming Black Book, Prasad, KVK
3. Software Design for Real-Time Systems: Cooling, J E Proceedings of 17the IEEE Real-Time Systems Symposium December 4-6, 1996 Washington, DC: IEEE Computer Society
4. Real-time Systems – Jane Liu, PH 2000
5. Real-Time Systems Design and Analysis : An Engineer's Handbook: Laplante, Phillip A
6. Structured Development for Real - Time Systems V1 : Introduction and Tools: Ward, Paul T & Mellor, Stephen J
7. Structured Development for Real - Time Systems V2 : Essential Modeling Techniques: Ward, Paul T & Mellor, Stephen J
8. Structured Development for Real - Time Systems V3 : Implementation Modeling Techniques: Ward, Paul T & Mellor, Stephen J
9. Monitoring and Debugging of Distributed Real-Time Systems: TSAI, Jeffrey J P & Yang, J H
10. Embedded Software Primer: Simon, David E.
11. Embedded Systems Architecture Programming and Design: Raj Kamal, Tata McGraw Hill

Course Outcomes:

- Ability to understand the internal architecture and interfacing of different peripheral devices with Microcontrollers.
- Ability to port an Embedded OS/ RTOS to a target board.
- Foster ability to understand the design concept of embedded systems.
- Ability to integrate hardware and software for embedded applications systems.
- Foster ability to understand the design concept of embedded systems.

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

M.Tech I Year – I Sem (Machine Design)

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(R18D1581) KINEMATICS AND DYNAMICS LABORATORY

Course Objectives:

- To equip students with understanding of the fundamental principles and techniques for Identify different types of dynamic systems and classify them by their governing equations.
- To develop a model of a mechanical system using a free body diagram.
- To develop equations of motion for translational and rotational mechanical systems.
- To develop an understanding of how property data is generated and reported.
- To create a bridge between theoretical knowledge and application.

LIST OF EXPERIMENTS:

1. Determination of damped natural frequency of vibration of the vibrating system with different viscous oils.
2. Determination of steady state amplitude of a forced vibratory system.
3. Static balancing using steel balls.
4. Determination of the magnitude and orientation of the balancing mass in dynamic balancing.
5. Field balancing of the thin rotors using vibration pickups.
6. Determination of the magnitude of gyroscopic couple, angular velocity of precession and representation of vectors.
7. Determination of natural frequency of given structure using FFT analyzer.
8. Diagnosis of a machine using FFT analyzer.
9. Study of un damped natural frequencies
10. Study of frequencies with various springs arranged in series and parallel

(A Minimum of 10 experiments are to be conducted)

Course Outcomes:

As an outcome of completing this course, students will be able to:

- Plan, conduct, analyze and evaluate experiments.
- Compare analytical and theoretical results.
- Understand static and dynamic balance.
- Understand forward and inverse kinematics of open-loop mechanisms.
- Communicate test results through presentation (graphical or oral).

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

M.Tech I Year – I Sem (Machine Design)

L	T/P/D	C
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(R18DHS55) Disaster Management
(Audit Course I)

Course objective:

- Develop an understanding of why and how the modern disaster manager is involved with pre-disaster and post-disaster activities.
- Understand the four work objectives of the disaster manager.
- They Know the key personnel or specialists related to disaster management and associate them with the types of disasters and phases in which they are useful.
- To increase the knowledge and understanding of the disaster phenomenon, its different contextual aspects, impacts and public health consequences.
- To ensure skills and ability to design, implement and evaluate research on disasters.

Unit-I: **Introduction to Disaster Management:** Definition, Nature, Types and Magnitude. Factors and Significance; Difference between Hazard and Disaster; Natural and Manmade Disasters

Unit-II: Consequences of Disasters and Hazards: Economic Damage, Loss of Human and Animal Life, Destruction of Ecosystem. Pre-Disaster Management- Early Warning and Prediction Systems: Role of IT, RS, GIS, GPS and ICS

Unit-III: **Global Perspective (Natural Disasters):** History of Disasters And Types of Hazards: Earthquakes, Volcanisms, Cyclones, Tsunamis, Floods, Droughts And Famines, Landslides & Avalanches.

Unit-IV: Global Perspective (Man-Made Disasters): Study of Environmental Impacts Induced By Human Activity, Nuclear Reactor Meltdown, Industrial Accidents, Oil Slicks and Spills, Outbreaks of Disease and Epidemics, War and Conflicts.

Unit-V: Disaster Management and Planning: Post Disaster Management Planning: Management of Essential Supplies and Temporary Shelter Relief, Evacuation & other Logistic Management, Site Management, Medical Trauma and Stress Management, Integrated Developmental Planning For Disaster Management

Reference Books:

- Bryant Edwards (2005): Natural Hazards, Cambridge University Press, U.K.
- Carter, W. Nick, 1991: Disaster Management, Asian Development Bank, Manila.
- Central Water Commission, 1987, Flood Atlas of India, CWC, New Delhi.
- Central Water Commission, 1989, Manual of Flood Forecasting, New Delhi.
- Government of India, 1997, Vulnerability Atlas of India, New Delhi.

- Sahni, Pardeep Et.Al. (Eds.) 2002, Disaster Mitigation Experiences and Reflections. Prentice Hall Of India, New Delhi.

Course Outcomes:

- Students will be able to affirm the usefulness of integrating management principles in disaster mitigation work.
- Students can distinguish between the different approaches needed to manage pre-during and post- disaster periods.
- Understanding foundations of hazards, disasters and associated natural/social phenomena.
- Familiarity with disaster management theory (cycle, phases).
- Capacity to manage the Public Health aspects of the disasters.

SEMESTER-II
SYLLABUS

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

M.Tech I Year – II Sem (Machine Design)

L	T/P/D	C
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(R18D1510) ADVANCED MECHANICS OF MACHINERY

Course Objectives

- Understand the basic principles and concepts of Mechanical Design.
- To study the physics that governs behavior of various mechanisms.
- Examine the suitability of mechanical devices/products for specific applications.
- Understand the various quantitative and qualitative approaches to synthesis and modeling of compliant mechanisms.
- To understand the synthesis and path generation of four bar mechanism.

UNIT–I

Advanced Kinematics of Plane Motion- I: Introduction to plane motion. The Inflection circle, Euler – Savary Equation, Analytical and graphical determination of di , Bobillier's Construction , Collineation axis , Hartmann's Construction ,Inflection circle for the relative motion of two moving planes, Application of the Inflection circle to kinematic analysis.

UNIT-II

Advanced Kinematics of Plane Motion - II: Polode curvature, Hall's Equation, Polode curvature in the four bar mechanism, coupler motion, relative motion of the output and input links, Determination of the output angular acceleration and its Rate of change, Freudenstein's collineation –axis theorem, Carter –Hall circle, The circling – point curve for the Coupler of afour bar mechanism.

UNIT-III

Introduction to Synthesis-Graphical Methods - I: The Four bar linkage ,Guiding a body through Two distinct positions, Guiding a body through Three distinct positions, The Roto center triangle , Guiding a body through Four distinct positions, Burmester's curve.

UNIT-IV

Introduction to Synthesis-Graphical Methods - II: Function generation- General discussion, Function generation: Relative – Roto center method, Overlay's method, Function generation- Velocity – pole method, Path generation: Hrones's and Nelson's motion Atlas, Roberts's theorem.

UNIT–V

Introduction to Synthesis - Analytical Methods: function generation: Freudenstien's equation, Precision point approximation, Precision – derivative approximation, Path Generation: Synthesis of Four-bar Mechanisms for specified instantaneous condition, Method of components, Synthesis of Four-bar Mechanisms for prescribed extreme values of the angular velocity of driven link, Method of components.

TEXT BOOKS:

1. Kinematics and Dynamics of plane mechanisms/ Jeremy Hirschhorn/McGraw-. Hill,1962.
2. Theory of Machines and Mechanisms/ J.E Shigley and J.J . Uicker Jr./ McGraw-Hill, . 1995
3. Theory of Mechanisms and Machines/ Amitabh Ghosh and Ashok Kumar Mallik/

E.W.P.Publishers.

REFERENCE BOOKS:

1. Kinematics and Linkage Design/ Allen S.Hall Jr./ PHI,1964.
2. Kinematics and Dynamics of Machinery/Charles E Wilson/Pearson/3rd Edition
3. Mechanics of Machines by Viswanatha Ramamurti

Course Outcomes

- Understand the metrics that are used to determine/set desired performance.
- Understand the physics that govern the behavior of compliant mechanisms.
- Identify the practical issues that are important to address during integration and implementation.
- Able to understand function and path generation of mechanisms.
- Students are able to understand the graphical and analytical methods for four bar mechanism.

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

M.Tech I Year – II Sem (Machine Design)

L	T/P/D	C
3	0	3

(R18D1511) DESIGN SYNTHESIS

Course Objective:

- To study the set of tools and methods for product design and development.
- To understand the tolerance and surface finish Confidence to create a new product.
- The role of multiple functions in creating a new product (e.g. marketing, finance, industrial design, engineering, production).
- Ability to coordinate multiple, interdisciplinary tasks in order to achieve a common objective.
- To study the design optimization in the new product development.

UNIT-I

Design process and methodologies of systematic design conceptual design variants and evaluation Standardization and its exploitation in design.

UNIT–II

Tolerance from process and function, interchangeability and selective assembly, selection of fits for different design situations, surface finish. Load transmission, load equalization light weigh and rigid constructions.

UNIT–III

Design of case, forged sheet metal parts and welded constructions Machine considerations.

UNIT–IV

Design for assembly and dismantling Modular constructions erection, operation inspection and maintenance considerations, Ergonomics Design of accuracy Location pins and registers, Machining in assembly, adjustment, Backlash and Clearance adjustment.

UNIT–V

Problems formulation for design optimization Example illustration the various principles available design variants for some of the common basic functional requirements.

TEXT BOOKS:

1. Engineering Design a systematic approach/ G. Phal W. Beitz/ Springer /3rd Edition
2. Engineering Design a material and processing approach/ George Dieter/ McGraw . Hi8ll international book company 1983
3. Engineering Design Synthesis: Understanding, Approaches and Tools edited by . Amaresh Chakrabarti.

REFERENCE BOOKS:

1. Mechanical Design Theory Methodology/ Manjula B. Waldron and Kenneth J. Waldron/Springer Verlag New York 1996.
2. Design Synthesis: Integrated Product and Manufacturing System Design Graeme Arthur Britton, Seppo Torvinen.
3. Formal Engineering Design Synthesis By Erik K. Antonsson, California Institute of . Technology & Jonathan Cagan , Carnegie Mellon University, Pennsylvania.

Course Outcomes:

Students are able to understand a product design are,

- Know how to communicate product design ideas and concepts.
- Able to develop product design proposals
- Able to realize outcomes to a design brief.
- Understand design principles and ergonomic accuracies for product development.
- Able form design optimization for various functional requirements.

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

M.Tech I Year – II Sem (Machine Design)

L	T/P/D	C
3	0	3

(R18D1512) EXPERIMENTAL STRESS ANALYSIS

Course Objectives:

- To study the relation between the mechanics theory and experimental stress analysis.
- To establish the fundamental concepts and new experimental techniques.
- To use the experimental techniques on the practical problems.
- To make a fine presentation related to the experimental techniques.
- To study conceptual techniques of 3D photo elasticity and birefringent coatings.

UNIT-I

Introduction: Theory of Elasticity, Plane stress and plane strain conditions, compatibility conditions, three-dimensional stress strain relations.

Strain Measurement Methods: various types of strain gauges, electrical resistance strain gauges, semiconductor strain gauge circuits.

UNIT-II

Recording Instruments: Introduction, static recording and data logging, dynamic recording at very low frequencies, dynamic recording at intermediate frequencies, dynamic recording at high frequencies, dynamic recording at very high frequencies, telemetry systems.

UNIT-III

Brittle Coatings: Introduction, coating stresses, failure theories, brittle coating crack patterns, crack detection, ceramic based brittle coatings, resin based brittle coatings, test procedures for brittle coatings analysis, analysis of brittle coating data.

Moire Methods: Introduction, mechanism of formation of Moire fringes, the geometrical approach to moiré-fringe analysis, the displacement field approach to Moire-fringe analysis, out of plane displacement measurements, out of plane slope measurements, sharpening and multiplication of moiré-fringes, experimental procedure and techniques.

UNIT-IV

Photo Elasticity: Photo elasticity, polariscope, plane and circularly polarized light, bright and dark filed setup, photo elasticity materials,, Isochromatic fringes – Isoclinics.

UNIT-V

Three Dimensional Photo Elasticity: Introduction, locking in model deformation, materials for three dimensional photo elasticity, machining cementing and slicing three dimensional models, slicing the model and interpretation of the resulting fringe patterns, effective stresses, shear-difference method in three dimensions, scattered-light method

Birefringent Coating: Introduction, coating stress and stains, coating sensitivity, coating materials, application of coatings, effective of coating thickness, fringe-order determinations in coatings, stress separation methods.

TEXT BOOKS:

1. Theory of elasticity / Timoshenko and Goodier Jr.
2. Experimental Stress analysis/ Dally and Riley, Mc Graw-Hill
3. Experimental Stress Analysis by James W. Dally, William Franklin Riley

REFERENCE BOOKS:

1. A treatise on Mathematical theory of elasticity / LOVE A.H./ Dover Publications
2. Photo Elasticity / Frocht/ Wiley / 3rd Edition
3. Experimental Stress Analysis: Principles and Methods By G. S. Holister

Course Outcomes:

After Completion of this course students will be able to,

- Apply basic science systematization thought excavation, the evaluation, the diagnosis project question, and plans and carries out ability of the special study and the solution.
- Have independent research, collection the data, standard problem take into analytical the identification and acquire conclusion.
- Able to use mathematical engineering realm is related analysis and design software, explanation data with independently solves the ability of problem.
- Able to understand the methods of photo elasticity.
- Ability to use 3D photo elasticity methods and birefringent coating for different materials.

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

M.Tech I Year – II Sem (Machine Design)

L	T/P/D	C
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(R18D1513) INDUSTRIAL ROBOTICS
(PROGRAM ELECTIVE – III)

Course Objectives:

- To develop the student's knowledge in various robot structures and their workspace.
- To develop student's skills in perform kinematics analysis of robot systems.
- To provide the student with some knowledge and analysis skills associated with Trajectory planning.
- To provide the student with some knowledge and skills associated with robot controls
- To know the industrial applications of robots.

UNIT-I

Introduction: Automation and Robotics, Robot anatomy, robot configuration, motions joint notation work volume, robot drive system, control system and dynamic performance, precision of movement.

Control System and Components: basic concept and modais controllers control systematic analysis, robot activation and feedback components. Positions sensors, velocity sensors, actuators sensors, power transmission system.

UNIT-II

Motion Analysis and Control: Manipulator kinematics, position representation forward transformation, homogeneous transformation, manipulator path control, robot dynamics, configuration of robot controller.

UNIT-III

End Effectors: Grippers-types, operation, mechanism, force analysis, tools as end effectors consideration in gripper selection and design. SENSORS: Desirable features, tactile, proximity and range sensors, uses sensors in robotics.

Machine Vision: Functions, Sensing and Digitizing-imaging, Devices, Lighting techniques, Analog to digital single conversion, image storage, Image processing and Analysis-image data reduction, Segmentation feature extraction. Object recognition, training the vision system, Robotics application.

UNIT-IV

Robot Programming: Lead through programming, Robot programming as a path in space ,Motion interpolation, WAIT, SINONAL AND DELAY commands, Branching capabilities and Limitations.

Robot Languages: Textual robot Languages, Generation, Robot language structures, Elements in function.

UNIT-V

Robot Cell desgin and control: Robot cell layouts-Robot centered cell, In-line robot cell, Considerations in work design, Work and control, Inter locks, Error detect ion, Work wheel controller.

Robot Application: Material transfer, Machine loading/unloading. Processing operation, Assembly and Inspection, Feature Application.

TEXT BOOKS:

1. Industrial Robotics / Groover M P /Pearson Edu.
2. ntroduction to Robotic Mechanics and Control / J J Craig/ Pearson / 3rd edition.
3. Robotics / Fu K S/ McGraw Hill.

REFERENCE BOOKS:

1. Robotic Engineering / Richard D. Klafter, Prentice Hall
2. Robot Analysis and Intelligence / Asada and Slotine / Wiley Inter-Science.
3. Robot Dynamics & Control – Mark W. Spong and M. Vidyasagar / John Wiley & Sons (ASIA) Pte Ltd.

Course Outcomes:

After Completion of this course students will be able to

- Classify robots based on joints and arm configurations.
- Design and applications of specific End Effectors for robots.
- Compute forward and inverse kinematics of robots and determine trajectory plan.
- Program robot to perform typical tasks including Pick and Place, Stacking and Welding.
- Design and select of robots for Industrial applications.

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

M .Tech I Year – II Sem (Machine Design)

L	T/P/D	C
3	0	3

(R18D1514) DESIGN OF HYDRAULIC AND PNEUMATIC SYSTEMS (PROGRAM ELECTIVE – III)

Course Objective:

- To again the knowledge hydraulic power generators and selection and specifications of pumps
- Impart students on the science, use and application of hydraulics and pneumatics as fluid power in Industry.
- Also to impart knowledge on the methodology of basic and advanced design of pneumatics and hydraulics systems.
- To understand pneumatic systems and circuits
- To know about Electrical control of pneumatic and Hydraulic circuits.

UNIT I OIL HYDRAULIC SYSTEMS AND HYDRAULIC ACTUATORS

Hydraulic Power Generators – Selection and specification of pumps, pump characteristics. Linear and Rotary Actuators – selection, specification and characteristics, Hydrostatic drives, types, selection.

UNIT II CONTROL AND REGULATION ELEMENTS

Pressure - direction and flow control valves - relief valves, non-return and safety valves - actuation systems, Proportional Electro hydraulic servo valves.

UNIT III HYDRAULIC CIRCUITS

Reciprocation, quick return, sequencing, synchronizing circuits - accumulator circuits - industrial circuits - press circuits - hydraulic milling machine - grinding, planning, copying, - forklift, earth mover circuits design methodology- design and selection of components - safety and emergency mandrels – Cascade method.

UNIT IV PNEUMATIC SYSTEMS AND CIRCUITS

Pneumatic fundamentals - control elements, position and pressure sensing, Pneumatic equipments- selection of components - design calculations - logic circuits - switching circuits - fringe conditions modules and these integration - sequential circuits - cascade methods - mapping methods - step counter method - compound circuit design - combination circuit design- Karnaugh - Veitch map.

UNIT V ELECTROMAGNETIC & ELECTRONIC CONTROL OF HYDRAULIC & PNEUMATIC CIRCUIT

Electrical control of pneumatic circuits – use of relays, counters, timers, ladder diagrams, use of microprocessor in circuit design – use of PLC in hydraulic and pneumatic circuits – Fault finding– application -fault finding - hydro pneumatic circuits - use of microprocessors for sequencing - PLC, Low cost automation - Robotic circuits.

REFERENCES:

1. Antony Espossito, “Fluid Power with Applications”, Prentice Hall, 1980.

2. Dudleyt, A. Pease and John J. Pippenger, “Basic fluid power”, Prentice Hall, 1987.

3. Andrew Parr, “Hydraulic and Pneumatics” (HB), Jaico Publishing House, 1999.

4. Bolton. W., “Pneumatic and Hydraulic Systems “, Butterworth –Heinemann, 1997.

5. K.Shanmuga Sundaram, “Hydraulic and Pneumatic Controls: Understanding made Easy" S.Chand & Co Book publishers, New Delhi, 2006 (Reprint 2009)

Course Outcome:

- Hydraulic power generators and selection and specifications of pumps and know about actuators.
- Use and application of hydraulics and pneumatics as fluid power in Industries.
- Also to impart knowledge on the methodology of basic and advanced design of pneumatics and hydraulics systems.
- To understand pneumatic systems and circuits
- To again knowledge about Electrical control of pneumatic and Hydraulic circuits.

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

M .Tech I Year – II Sem (Machine Design)

L	T/P/D	C
3	0	3

(R18D1515) MECHATRONICS
(PROGRAM ELECTIVE – III)

Course Objectives:

- Have a strong foundation in science and focus in mechanical, electronics, control, software, and computer engineering, and a solid command of the newest technologies
- Be able to design, analyze, and test "intelligent" products and processes that incorporate Appropriate computing tools sensors, and actuators
- Be able to demonstrate professional interaction and communicate effectively with team Members Be able to work efficiently in multidisciplinary teams
- Be prepared for a variety of engineering careers, graduate studies, and continuing education
- Practice professional and ethical responsibility, and, be aware of the impact of their designs on human-kind and the environment.

UNIT-I

Mechatronics systems, elements, levels of Mechatronics system, Mechatronics design process, system, measurement systems, control systems, microprocessor-based controllers, advantages and disadvantages of Mechatronics systems. Sensors and transducers, types, displacement, position, proximity, velocity, motion, force, acceleration, torque, fluid pressure, liquid flow, liquid level, temperature and light sensors.

UNIT-II

Solid state electronic devices, PN junction diode, BJT, FET, DIA and TRIAC. Analog signal conditioning, amplifiers, filtering. Introduction to MEMS & typical applications.

UNIT-III

Hydraulic and pneumatic actuating systems, Fluid systems, Hydraulic and pneumatic systems components, control valves, electro-pneumatic, hydro-pneumatic, electro-hydraulic servo systems: Mechanical actuating systems and electrical actuating systems.

UNIT-IV

Digital electronics and systems, digital logic control, micro processors and micro controllers, programming, process controllers, programmable logic controllers, PLCs versus computers, application of PLCs for control.

UNIT-V

System and interfacing and data acquisition, DAQS, SCADA, A to D and D to A conversions; Dynamic models and analogies, System response. Design of Mechatronics systems & future trends.

TEXT BOOKS:

1. MECHATRONICS Integrated Mechanical Electronics Systems/KP Ramachandran & GK Vijaya Raghavan/WILEY India Edition/2008

2. Mechatronics Electronics Control Systems in Mechanical and Electrical Engineering by W Bolton, Pearson Education Press, 3rd edition, 2005.
3. Mechatronics Source Book by Newton C Braga, Thomson Publications, Chennai.

REFERENCE BOOKS:

1. Mechatronics – N. Shanmugam / Anuradha Agencies Publishers.
2. Mechatronics System Design / Devdas shetty/Richard/Thomson.
3. Mechatronics/M.D.Singh/J.G.Joshi/PHI.

Course Outcomes:

Mechatronics engineering graduates will be able to:

- Employ the knowledge of mathematics, science, and engineering. Design and conduct experiments to evaluate the performance of a Mechatronics system or component with respect to specifications, as well as to analyze and interpret data.
- Design Mechatronics component, system or process to meet desired needs
- Define and solve engineering problems. Use the techniques, skills, and modern Mechatronics engineering tools necessary for engineering practice.
- Communicate technical matters effectively in oral, written, and graphical form
- Identify and evaluate ethical ramifications and professional responsibilities in a variety of situations.

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

M .Tech I Year – II Sem (Machine Design)

L	T/P/D	C
3	-	3

(R18D1516) COMPUTER INTEGRATED MANUFACTURING
(PROGRAM ELECTIVE – IV)

Course objectives:

The students will learn to:

- Explain basic concepts of CIM systems and Develop machining programs for CNC equipment
- Develop PLC-based control systems for manufacturing cells
- Design CIM systems to fulfill certain requirements
- Identify and solve problems in the operations of CIM systems
- Enhance performance of manufacturing systems by applying different CIM concepts and tools

UNIT-I

Introduction: Scope of computer integrated manufacturing, Product cycle, Production automation.

Group technology: Role of group technology in CAD/CAM integration, Methods for developing part families, Classification and coding, Examples of coding systems, Facility design using group technology, Economics of group technology.

UNIT-II

Computer Aided Process Planning: Approaches to process planning - Manual, Variant, Generative approach, Process planning systems - CAPP, DCLASS, CMPP, Criteria for selecting a CAPP system, Part feature recognition, Artificial intelligence in process planning.

UNIT-III

Integrative Manufacturing Planning And Control: Role of integrative manufacturing in CAD/CAM integration, Over view of production control - Forecasting, Master production schedule, Capacity planning, M.R.P., Order release, Shop-floor control, Quality assurance, Planning and control systems, Cellular manufacturing, JIT manufacturing philosophy.

UNIT-IV

Computer Aided Quality Control: Terminology in quality control, Contact inspection methods,

Noncontact inspection methods, Computer aided testing, Integration of CAQC with AD/CAM.

UNIT-V

Computer Integrated Manufacturing Systems: Types of manufacturing systems, Machine tools and related equipment, Material handling systems, Computer control systems, FMS.

TEXT BOOKS:

1. CAD/CAM Principles and Applications by P.N. Rao, Tata McGraw Hill .Publishing. Company Ltd.
2. CAD/CAM Computer Aided Design and Manufacturing by Mikell P. Groover . and Emory W. Zimmer, Jr.
3. Computer Integrated Design and Manufacturing by David D. Bedworth, . Mark R. . Henderson, Philip M. Wolfe.

REFERENCE BOOKS:

1 Automation, Production Systems and Computer Integrated Manufacturing .by Mikell P. Groover, Prentice Hall of India Pvt. Ltd.

2 Principles of Computer Integrated Manufacturing by Vajapayee, Prentice . Hall of India Pvt. Ltd.

3 Computer Integrated Manufacturing By A. Alavudeen, N. Venkateshwaran.

Course Outcomes:

This course primarily contributes to Mechanical Engineering program outcomes:

- An ability to apply knowledge of mathematics, science, and engineering
- An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
- An ability to identify, formulate, and solve engineering problems
- knowledge of contemporary issues
- an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

M .Tech I Year – II Sem (Machine Design)

L	T/P/D	C
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(R18D1517) CONCURRENT ENGINEERING
(PROGRAM ELECTIVE - IV)

Course objectives:

- To familiarize with the basics of concurrent engineering
- The tools and methodologies available in concurrent engineering
- Various approaches to concurrent engineering
- The other related aspects of concurrent engineering
- Critically analyses alternative spacecraft design configuration and option concurrent engineering identify information requirements and sources for spacecraft design and evaluation CE

UNIT-I

Introduction: Background and challenges faced by modern production environment, sequential engineering process, Concurrent engineering definition and requirement, meaning of concurrent objectives of CE, benefits of CE, Life cycle design of products, life cycle costs. Support for CE: Classes of support for CE activity, CE organizational, structure CE, team composition and duties, Computer based Support, CE Implementation Process.

UNIT-II

Design Product for Customer: Industrial Design, Quality Function Deployment, house of quality, Translation process of quality function deployment (QFD). Modeling of Concurrent Engineering Design: Compatibility approach, Compatibility index, implementation of the Compatibility model, integrating the compatibility Concerns.

UNIT-III

Design for Manufacture (DFM): Introduction, role of DFM in CE, DFM methods, e.g. value engineering, DFM guidelines, design for assembly, creative design methods, product family themes, design axioms, Taguchi design methods, Computer based approach to DFM. Evaluation of manufacturability and assimilability.

UNIT-IV

Quality by Design : Quality engineering & methodology for robust product design,Parameter and Tolerance design, Quality loss function and signal to noise ratio for designing the quality, experimental approach.

UNIT-V

Design for X-ability: Design for reliability, life cycle serviceability design, design for maintainability, design for economics, and decomposition in concurrent design, concurrent design case studies.

TEXT BOOKS:

1. Concurrent Engineering- Kusiak - John Wiley & Sons
2. Concurrent Engineering- Menon - Chapman & Hall
3. Concurrent Engineering Fundamentals; Integrated Product Development, VO1. I and II, Biren Prasad, Prentice Hall, New Jersey

REFERENCE BOOKS:

1. Concurrent Engineering /Johan R Hartley/productivity press.
2. Concurrent Engineering; concepts, Implementation and practice/chanan&Menon/ Chapman Hall
3. Concurrent Engineering by Susan Carlson Skalak

Course Outcomes:

- The graduates shall have the ability to understand the importance of product design in leveraging both manufacturing cost and product lifecycle cost.
- The graduates shall have the ability to plan and implement a product development program.
- The graduates shall have the ability to determine customer needs and define product specifications that meet professional ethical standards.
- The graduates shall have the ability to define product architecture and design products for maximum economic impact.
- The graduates shall have the ability to design and conduct experiments to ensure that the product design is robust and compatible with the capability of the manufacturing process.

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

M.Tech I Year – II Sem (Machine Design)

L	T/P/D	C
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(R18D1518) MECHANICAL VIBRATIONS
(PROGRAM ELECTIVE – IV)

Course Objectives:

- To know about damped and undamped free vibrations
- Students will be able to learn how to deal with the phenomena of vibrations by transforming the physical model into a mathematical model.
- Getting the response of a physical model
- Solving the mathematical model, analyzing the response and bring its physical concept.
- To know about the numerical methods

UNIT-I

Single Degree of Freedom Systems : Undamped and damped free vibrations; forced vibrations coulomb damping, Response to excitation, rotating unbalance and support excitation, vibration isolation and transmissibility- Response to Non Periodic Excitations: unit impulse, unit step and unit Ramp functions; response to arbitrary excitations, The Convolution Integral, shock spectrum, System response by the Laplace Transformation method.

UNIT-II

Two Degree Freedom Systems: Principal modes- undamped and damped free and forced vibrations, undamped vibration absorbers.

UNIT-III

Multi Degree Freedom Systems: Matrix formulation, stiffness and flexibility influence coefficients, Eigen value problem; normal modes and their properties, Free and forced vibration by Modal analysis, Method of matrix inversion, Torsional vibrations of multi- rotor systems and geared systems, Discrete- Time systems.

Vibration Measuring Instruments: Vibrometers, velocity meters & accelerometers.

UNIT-IV

Frequency Domain Vibration Analysis: Over view, machine-train monitoringparameters-Data base development-vibration data acquisition-trending analysis-failure- nodeanalysis-signature analysis-root cause analysis.

UNIT-V

Numerical Methods: Raleigh’s stodola's, Matrix iteration, Rayleigh- Ritz Method and Holzer's methods.

TEXT BOOKS:

1. Mechanical Vibrations/Groover/Nem Chand and Bros
2. Elements of Vibration Analysis by Meirovitch, TMH, 2001
3. Mechanical Vibrations/Schaum Series/ McGraw Hill

REFERENCE BOOKS:

1. Mechanical Vibrations / SS Rao/ Pearson/ 2009, Ed 4,
2. Mechanical Vibrations/Debabrata Nag/Wiley
3. Vibration problems in Engineering / S.P. Timoshenko.

Course Outcomes:

After Completion of this course students will be able to

- Understand the causes and effects of vibration in mechanical systems and their Classification.
- Solve vibration problems that contain multiple degrees of freedom and obtain design parameters.
- Learn how the vibration measuring instrument works and how to apply the proper instrument for a particular application.
- Analyze a system with infinite degrees of freedom and also be able to find infinite natural frequencies corresponding to infinite principle modes of the systems.
- Apply various numerical methods to solve determinants of higher order when one deals with multi-degree freedom systems

OPEN ELECTIVE-II

MALLAREDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

M.Tech I Year – II Sem (Machine Design)	**L**	**T/P/D**	**C**
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(R18DME54) COMPOSITE MATERIALS
(OPEN ELECTIVE-II)

Course Objectives:

- To be familiar with classification and characteristics of composite material and their applications.
- To gain the knowledge about manufacturing methods of composites.
- To know the testing methods related to composite materials.
- To know the Advantages and disadvantages of Composite Materials.
- To again knowledge about Typical bond strengths and test procedures.

UNIT-I

Introduction: Definitions, Composites, Reinforcements and matrices, Types of reinforcements, Types of matrices, Types of composites, Carbon Fibre composites, Properties of composites in comparison with standard materials, Applications of metal, ceramic and polymer matrix composites.

UNIT-II

Manufacturing methods: Hand and spray lay - up, injection molding, resin injection, filament winding, pultrusion, centrifugal casting and prepregs. Fibre/Matrix Interface, mechanical. Measurement of interface strength.

UNIT-III

Mechanical Properties -Stiffness and Strength: Geometrical aspects – volume and weight fraction. Unidirectional continuous fibre, discontinuous fibers, Short fiber systems, woven reinforcements –Mechanical Testing: Determination of stiffness and strengths of unidirectional composites; tension, compression, flexure and shear.

UNIT-IV

Laminates: Plate Stiffness and Compliance, Assumptions, Strains, Stress Resultants, Plate Stiffness and Compliance, Computation of Stresses, Types of Laminates -, Symmetric Laminates, Anti-symmetric Laminate, Balanced Laminate, Quasi-isotropic Laminates, Cross-ply Laminate, Angle-ply Laminate. Orthotropic Laminate, Laminate Moduli, Hygrothermal Stresses.

UNIT-V

Joining Methods and Failure Theories : Joining –Advantages and disadvantages of adhesive and mechanically fastened joints. Typical bond strengths and test procedures.

TEXT BOOKS:

1. K.K. Chawla, (1998), Composite Materials, Springer-Verlag, New York
2. B.T. Astrom, (1997), Manufacturing of Polymer Composites, Chapman & Hall

3. Composite materials by J.N.Reddy

REFERENCE BOOKS:

1. Stuart M Lee, J. Ian Gray, Miltz, (1989), Reference Book for Composites Technology, CRC press
2. Frank L Matthews and R D Rawlings, (2006), Composite Materials: Engineering and Science, Taylor and Francis.
3. D. Hull and T.W. Clyne, (1996), Introduction to Composite Materials, Cambridge University Press
4. Analysis and Performance of Fiber Composites by Bhagwan D. Agarwal
5. Mechanics of Composite Materials by Autar K. Kaw

Course Outcomes:

- To provide knowledge on characteristics of composites
- To get knowledge on manufacturing and testing methods and mechanical behavior of composites.
- Determination of stiffness and strengths of unidirectional composites; tension, compression, flexure and shear
- To get the exposure of different materials.
- To understand about Joining Methods and Failure Theories

MALLAREDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

M.Tech I Year – II Sem (Machine Design)

L	T/P/D	C
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(R18DME55) WASTE TO ENERGY
(OPEN ELECTIVE-II)

Prerequisite: Renewable Energy Sources, Physics, Environmental Studies

Course Objectives:

- To classify solid waste sources
- To identify methods of solid waste disposal
- To study various energy generation methods
- To analyse biogas production methods and recycling of e-waste
- To know about Government regulations on e-waste management – International experience.

UNIT- I :Solid Waste Sources Solid Waste Sources, types, composition, Properties, Global warming, Municipal Solid Waste: Physical, chemical and biological properties , Waste Collection and, Transfer stations, Waste minimization and recycling of municipal waste, Segregation of waste, Size Reduction , Managing Waste. Status of technologies for generation of Energy from Waste Treatment and Disposal Aerobic composting, incineration, Furnace type and design, Medical waste /Pharmaceutical waste treatment Technologies, incineration, Environmental impacts, Measures to mitigate environmental effects due to incineration .

UNIT – II :Land Fill method of Solid waste disposal Land fill classification, Types, methods and Sitting consideration, Layout and preliminary design of landfills: Composition, characteristics, generation, Movement and control of landfill leach ate and gases, Environmental monitoring system for land fill gases.

UNIT – III :Energy Generation from Waste Bio-chemical Conversion: Sources of energy generation, anaerobic digestion of sewage and municipal wastes, direct combustion of MSW-refuse derived solid fuel, Industrial waste, agro residues, Anaerobic Digestion.

UNIT – IV :Biogas production, Land fill gas generation and utilization, Thermo-chemical conversion: Sources of energy generation, Gasification of waste using Gasifiers, Briquetting, Utilization and advantages of briquetting, Environmental benefits of Bio-chemical and Thermo- chemical conversion.

UNIT – V :E-waste: e-waste in the global context – Growth of Electrical and Electronics Industry in India – Environmental concerns and health hazards – Recycling e-waste: a thriving economy of the unorganized sector – Global trade in hazardous waste – impact of hazardous e-waste in India. Management of e-waste: e-waste legislation, Government

regulations on e-waste management – International experience – need for stringent health safeguards and environmental protection laws of India.

TEXT BOOKS:

1. Nicholas P. Cheremisinoff. Handbook of Solid Waste Management and Waste Minimization Technologies. An Imprint of Elsevier, New Delhi (2003).
2. P. Aarne Vesilind, William A. Worrell and Debra R. Reinhart. Solid Waste Engineering. Thomson Asia Pte Ltd. Singapore (2002)
3. M. Dutta , B. P. Parida, B. K. Guha and T. R. Surkrishnan. Industrial Solid Waste Management and Landfilling practice. Narosa Publishing House, New Delhi (1999).
4. "E-waste in India: Research unit, Rajya Sabha Secretariat, New Delhi, June 2011"
5. Amalendu Bagchi. Design, construction and Monitoring of Landfills. John Wiley and Sons. New York. (1994)
6. M. L. Davis and D. A. Cornwell. Introduction to environmental engineering. Mc Graw Hill International Edition, Singapore (2008)
7. C. S. Rao. Environmental Pollution Control Engineering. Wiley Eastern Ltd. New Delhi (1995)
8. S. K. Agarwal. Industrial Environment Assessment and Strategy. APH Publishing Corporation. New Delhi (!996)
9. Sofer, Samir S. (ed.), Zaborsky, R. (ed.), "Biomass Conversion Processes for Energy and Fuels", New York, Plenum Press, 1981
10. Hagerty, D.Joseph; Pavoni, Joseph L; Heer, John E., "Solid Waste Management", New York, Van Nostrand, 1973
11. George Tchobanoglous, Hilary Theisen and Samuel Vigil Prsl: Tchobanoglous, George Theisen, Hillary Vigil, Samuel, "Integrated Solid Waste management: Engineering Principles and Management issues", New York, McGraw Hill, 1993.

REFERENCES:

- C Parker and T Roberts (Ed), Energy from Waste – An Evaluation of Conversion Technologies, Elsevier Applied Science, London, 1985
- KL Shah, Basics of Solid and Hazardous Waste Management Technology, Prentice Hall, 2000 3. M Datta, Waste Disposal in Engineered Landfills, Narosa Publishing House, 1997
- G Rich et.al, Hazardous Waste Management Technology, Podvan Publishers, 1987
- AD Bhide, BB Sundaresan, Solid Waste Management in Developing Countries, INSDOC, New Delhi,1983 FUEL CELL AND

Google books:

1. e-waste Management: From waste to Resource Klaus Hieronymi, Ramzy Kahnat, Eric williams Tech. & Engg.-2013(Publisher: Earthscan 2013).
2. What is the impact of E-waste: Tamara Thompson
3. E-waste poses a Health Hazard: Sairudeen Pattazhy

Weblinks :

- www.unep.org
- www.routledge.com
- www.amazon.com
- www.bookdepository.com
- www.ecoactiv.com

Course Outcomes: Upon the completion of the subject, the student will be able to

- Understand technologies for generation of energy from solid waste
- Compare methods of solid waste disposal
- Identify sources of energy from bio-chemical conversion
- Analyze methods for management of e-waste
- Understand the Global trade in hazardous waste – impact of hazardous e-waste in India.

MALLAREDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

M.Tech I Year – II Sem (Machine Design)

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(R18DME56) INDUSTRIAL MANAGEMENT
(OPEN ELECTIVE-II)

Course Objectives:

- Concepts of Management and Organization - Functions
- The student able to understand and make decisions relating to issues
- To understand about Organizational structure, production operations and marketing
- The student learns about Human resource Management, product management and strategy.
- To know about Inspection and quality control, types of inspections

UNIT- I

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

UNIT –II

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

UNIT –III

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

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

UNIT –IV

Materials Management-Objectives, Inventory - functions, types, associated costs, inventory classification techniques-ABC and VED analysis. Inventory Control Systems-Continuous review system-periodical review system. Stores Management and Stores Records. Purchase management, duties of purchase of manager,associated forms.Introduction to PERT / CPM : Project management, network modeling-probabilistic model, various types of activity times

estimation-programme evaluation review techniques- Critical Path-probability of completing the project, deterministic model, critical path method (CPM)-critical path calculation-crashing of simple of networks.

UNIT –V

Inspection and quality control, types of inspections - Statistical Quality Control-techniques-variables and attributes-assignable and non assignable causes- variable control charts, and R charts, attributes control charts, p charts and c charts. Acceptance sampling plan- single sampling and double sampling plans-OC curves. Introduction to TQM-Quality Circles, ISO 9000 series procedures. Introduction to Human Resource Management, Functions of HRM, Job Evaluation, different types of evaluation methods. Job description, Merit Rating.-difference with job evaluation, different methods of merit ratings, wage incentives, different types of wage incentive schemes. Marketing, marketing vs selling, marketing mix, product life cycle.

TEXT BOOKS:

1. Amrine, Manufacturing Organization and Management, Pearson, 2nd Edition, 2004.
2. Industrial Engineering and Management O.P. Khanna Dhanpat Rai.
3. A.R.Aryasri, Management Science , Tata McGraw-Hill, 2002.

REFERENCE BOOKS:

1. Panner Selvam, Production and Operations Management, PHI, 2004.
2. Dr. C. Nadha Muni Reddy and Dr. K. Vijaya Kumar Reddy, Reliability Engineering & Quality Engineering, Galgotia Publications, Pvt., Limited.
3. Phillip Kotler, Marketing Management, Pearson, 2004.

Course Outcomes:

- Plan an organizational structure for a given context in the organization carry out
- Production operations through Work study and carry out production operations through Work study.
- Understand the markets, customers and competition better and price the given
- Products appropriately and ensure quality for a given product or service
- Plan and control the HR function better and plan schedule Control projects through PERT and CPM, evolve a strategy for a business or service organization.

MALLAREDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

M.Tech I Year – II Sem (Machine Design)

L	T/P/D	C
3	0	3

(R18DHS52) COST MANAGEMENT OF ENGINEERING PROJECTS (OPEN ELECTIVE – II)

Course Objective:

- Project Cost management is concerned with the process of planning and controlling the budget of a project or business.
- The Cost Management course addresses activities such as planning, estimating, budgeting, financing, funding, managing, and controlling costs so that the project can be completed within the approved budget.
- To make them understand the concepts of Project Management for planning to execution of projects.
- To make them understand the feasibility analysis in Project Management and network analysis tools for cost and time estimation.
- To enable them to comprehend the fundamentals of Contract Administration, Costing and Budgeting.Make them capable to analyze, apply and appreciate contemporary project management tools and methodologies in Indian context.

Unit-I: Introduction to Project Cost Management: Concept of project cost management - objectives and scope- Elements of project costs: functional classification and ascertainment of cost (material, labour and overhead costs) –Preparation of a cost sheet for an engineering project

Unit-II: Method of Project Costing: Single Output/ Unit Costing: Activity Based Costing - Job Costing - Batch Costing - Contract Costing - Process/ Operation Costing

Unit-III: Marginal Cost: Marginal Costing – Nature and Scope- Applications - Break even charts and Point, Decision Making (all types with full problems) Differential Cost Analysis, Advantages and Disadvantages of Marginal Costing.

Unit-IV: Project Budgetary Control: Objectives of Project Budgetary control - Functional Project Budgets - Master Budgets - Key Factor Problems on Production Budgets and Flexible Budgets. Standard Costing- Comparison with Budgetary control, analysis of Variances, Simple Problems on Material and Labour variances only.

Unit-V: Project Cost Audit & Reporting to Management: Objectives and advantages of Project Cost Audit – Project Cost Audit report - Management Audit - Objectives and Scope. Reporting to Management – Purpose of reporting- Requisites of a good report, Classifications of Report, Segment reporting

Reference Books

- Project Estimating and Cost Management, Project Management Essential Library, Berrett-Koehler Publishers (October 1, 2001)

- Project Management Accounting,: Budgeting, Tracking, and Reporting Costs and Profitability, Wiley; 2 edition (June 28, 2011) by Kevin R. Callahan, Gary S. Stetz , Lynne M. Brooks
- Cost and Management Accounting 2014, by S.P. Jain & K.L. Narang
- Cost and Management Accounting, New Age International by M.E. Thukaram Rao
- Advanced Cost & Management Accounting – Problems & Solutions, Prentice Hall of India (P) Ltd. by V.K. Saxena & C.D. Vashist
- Studies in Cost Management, Sultan Chand & Sons by S.N. Maheshwari

Course Outcome:

- The student is able to understand the detailed cost concepts, cost structure and elements of costs of manufacturing and service organizations. Understand project characteristics and various stages of a project.
- Understand the conceptual clarity about project organization and feasibility analyses.
- Analyze the learning and understand techniques for Project planning, scheduling and Execution Control.
- Apply the risk management plan and analyse the role of stakeholders. Understand basics of strategic sourcing process & its application.
- Understand the contract management, Project Procurement, Service level Agreements and productivity.

MALLAREDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

M.Tech I Year – II Sem (Machine Design)

L	T/P/D	C
3	0	3

(R18DCS52) INFORMATION SECURITY
(OPEN ELECTIVE – II)

Course Objectives:

- The student is able to understand the detailed cost concepts, cost structure and elements of costs of manufacturing and service organizations. Understand project characteristics and various stages of a project.
- Understand the conceptual clarity about project organization and feasibility analyses.
- Analyze the learning and understand techniques for Project planning, scheduling and Execution Control.
- Apply the risk management plan and analyse the role of stakeholders. Understand basics of strategic sourcing process & its application.
- Understand the contract management, Project Procurement, Service level Agreements and productivity.

UNIT I

A model for Internetwork security, Conventional Encryption Principles & Algorithms (DES, AES, RC4, Blowfish), Block Cipher Modes of Operation, Location of Encryption Devices, Key Distribution.

Public key cryptography principles, public key cryptography algorithms (RSA, Diffie-Hellman, ECC), public Key Distribution.

UNIT II

Approaches of Message Authentication, Secure Hash Functions (SHA-512, MD5) and HMAC, Digital Signatures, Kerberos, X.509 Directory Authentication Service, Email Security: Pretty Good Privacy (PGP)

IP Security: Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations and Key Management.

UNIT III

Web Security: Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Electronic Transaction (SET). Firewalls: Firewall Design principles, Trusted Systems, Intrusion Detection Systems

UNIT IV

Auditing For Security: Introduction, Basic Terms Related to Audits, Security audits, The Need for Security Audits in Organization, Organizational Roles and Responsibilities for Security Audit, Auditors Responsibility In Security Audits, Types Of Security Audits.

UNIT V

Auditing For Security: Approaches to Audits, Technology Based Audits Vulnerability Scanning And Penetration Testing, Resistance to Security Audits, Phase in security audit, Security

audit Engagement Costs and other aspects, Budgeting for security audits, Selecting external Security Consultants, Key Success factors for security audits.

TEXT BOOKS:

1. Cryptography and Network Security by William Stallings, Fourth Edition, Pearson Education 2007.
2. Network Security Essentials (Applications and Standards) by William Stallings Pearson Education, 2008.
3. Cryptography & Network Security by Behrouz A. Forouzan, TMH 2007.
4. Information Systems Security by Nina Godbole, WILEY 2008.

REFERENCE BOOKS:

1. Information Security by Mark Stamp, Wiley – INDIA, 2006.
2. Fundamentals of Computer Security, Springer.
3. Network Security: The complete reference, Robert Bragg, Mark Rhodes, TMH
4. Computer Security Basics by Rick Lehtinen, Deborah Russell & G.T.Gangemi Sr., SPD O'REILLY 2006.
5. Modern Cryptography by Wenbo Mao, Pearson Education 2007.
6. Principles of Information Security, Whitman, Thomson.

Course Outcomes:

- To the enhancements made to lPv4 by IPSec. Understand Intrusions and intrusion detection
- Discuss the fundamental ideas of public-key cryptography.
- Generate and distribute a PGP key pair and use the PGP package to send an encrypted e-mail message.
- To understand about Web security and Firewalls and Ability to identify information system requirements for both of them such as client and server.
- Ability to understand the current legal issues towards information security.

MALLAREDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

M.Tech I Year – II Sem (Machine Design)

L	T/P/D	C
3	0	3

(R18DAE52) UNMANNED AERIAL VEHICLES
(OPEN ELECTIVE – II)

Course Objectives:

- Acquire the knowledge of various disciplines contributing to the design, development and deployment of UAVs
- Explain the design of UAV systems and their configuration
- Develop and deploy the unmanned aircraft systems
- To understand the Development and Future of UAV Systems
- To know about the future applications of unmanned aircraft systems (UAV)

UNIT-I: INTRODUCTION TO UNMANNED AIRCRAFT SYSTEMS

Applications of UAS, categories of UAV systems, roles of unmanned aircraft, composition of UAV system.

UNIT-II: DESIGN OF UAV SYSTEMS-I

Introduction to design and selection of the systems-conceptual phase, preliminary design, detailed design; Aerodynamics and airframe configurations-Lift-induced Drag, Parasitic Drag, Rotary-wing Aerodynamics, Response to Air Turbulence, Airframe Configurations; Medium-range, Tactical Aircraft, Characteristics of Aircraft Types-Long-endurance, Long-range Role Aircraft, Medium-range, Tactical Aircraft, Close-range/Battlefield Aircraft, MUAV Types, MAV and NAV Types, UCAV, Novel Hybrid Aircraft Configurations, Aspects of Airframe Design: Scale Effects, Packaging Density, Aerodynamics, Structures and Mechanisms, Selection of power- plants, Modular Construction, Ancillary Equipment, Design for Stealth: Acoustic Signature, Visual Signature, Thermal Signature, Radio/Radar Signature, Payload Types: Non-dispensable and dispensablepayloads.

UNIT-III: DESIGN OF UAV SYSTEMS-II

Communications-Communication Media, Radio Communication, Mid-air Collision (MAC) Avoidance, Communications Data Rate and Bandwidth Usage, Antenna Type; Control and Stability: HTOL Aircraft, Convertible Rotor Aircraft, Payload Control, Sensors, Autonomy; Navigation: NAVSTAR Global Positioning System (GPS), TACAN, LORAN C, Inertial Navigation, Radio Tracking, Way-point Navigation; Launch and Recovery.

Design for Reliability: Determination of the Required Level of Reliability, Achieving Reliability,
Reliability Data Presentation, Multiplexed Systems, Reliability by Design, Design for Ease of Maintenance; Design for Manufacture and Development

UNIT-IV: THE DEVELOPMENT OF UAV SYSTEMS

System Development and Certification-System Development, Certification, Establishing Reliability; System Ground Testing: UAV Component Testing, UAV Sub- assembly and Sub-system Testing, Testing Complete UAV, Control Station Testing , Catapult Launch System Tests, Documentation; System In- flight Testing: Test Sites, Preparation for In-flight Testing, In- flight Testing, System certification.

UNIT-V: DEPLOYMENT AND FUTURE OF UAV SYSTEMS

Operational trials and full certification; UAV System Deployment- Network-centric Operations (NCO), Teaming with Manned and Other Unmanned System; Naval, arm and air force roles, civilian, paramilitary and commercial roles.

Text Books:

1. Reg Austin, Wiley, “Unmanned Aircraft Systems, UAVS Design and Deployment”, 2nd Edition, 2010.

Reference Books:

1. Richard K. Barnhart, Stephen B. Hottman, Douglas M. Marshall, Eric Shappee, (eds.), “Introduction to Unmanned Aircraft Systems”, CRC Press, 2012.
2. Valavanis, Kimon P., Vachtsevanos, George J. “Handbook of Unmanned Aerial Vehicles” AIAA series, 3rd Edition, 2004.

Course Outcomes:

- The student will be able to understand the design concepts of UAVs
- The student will be able to understand the electronic instrumentation associated with the UAVs
- It is also expected to understand the necessity of drone in various fields
- Gain the complete knowledge system development and UAV system testing
- To know about future of UAVs

MALLAREDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

M.Tech I Year – II Sem (Machine Design)

L	T/P/D	C
3	0	3

(R18DEC52) RESEARCH METHODOLOGY
(OPEN ELECTIVE – II)

Course Objectives

- Demonstrate the ability to choose methods appropriate to research aims and objectives
- Identify appropriate research topics
- Prepare a project proposal (to undertake a project) and organize and conduct research (advanced project) in a more appropriate manner
- Write a research report and thesis and Write a research proposal (grants)
- Understand the limitations of particular research methods and Develop advanced critical thinking skills

UNIT - I

Introduction: Research objective and motivation, Types of research, Research approaches, Significance, Research method vs. methodology, Research process.

UNIT - II

Formulating a research problem: Literature review, Formulation of objectives, Establishing Operational definitions, Identifying variables, constructing hypotheses.

UNIT - III

Research design and Data Collection: Need and Characteristics, Types of research design, Principles of Experimental research design, Method of data collection, Ethical issues in collecting data.

UNIT - IV

Sampling and Analysis of data: Need of Sampling, Sampling distributions, Central limit theorem, Estimation: mean and variance, Selection of sample size Statistics in research, Measures of Central tendency, Dispersion, asymmetry and relationships, Correlation and Regression analysis, Displaying data

UNIT - V

Hypothesis Testing: Procedure, Hypothesis testing for difference in mean, variance limitations, Chi-square test, Analysis of variance (ANOVA), Basic principles and techniques of writing a Research Proposal

Text Books:

1. R. C. Kothari, Research Methodology: Methods and Techniques, 2nd edition, New Age International Publisher, 2009
2. Ranjit Kumar, Research Methodology: A Step-by-Step Guide for Beginners, 2nd Edition, SAGE, 2005

References:

1. Trochim, William M. The Research Methods Knowledge Base, 2nd Edition. Internet WWW page, at URL: <http://www.socialresearchmethods.net/kb/>
2. (Electronic Version): StatSoft, Inc. (2012). Electronic Statistics Textbook. Tulsa, OK: StatSoft. WEB: http://www.statsoft.com/textbook/.(Printed Version): Hill, T. & Lewicki, P. (2007). STATISTICS: Methods and Applications. StatSoft, Tulsa, OK.

Course Outcomes

- Develop understanding on various kinds of research, objectives of doing research, research process, research designs and sampling.
- Construct a coherent research proposal that includes an abstract, introduction, literature review, research questions, ethical considerations, and methodology. Have basic knowledge on qualitative research techniques
- Have adequate knowledge on measurement & scaling techniques as well as the quantitative data analysis
- Have basic awareness of data analysis-and hypothesis testing procedures
- Explain the difference between quantitative, qualitative, and mixed methods research and what types of research questions can be answered with each method

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

M.Tech I Year – II Sem (Machine Design)

L	T/P/D	C
-	3	2

(R18D1582) COMPUTER AIDED TESTING, ANALYSIS AND MODELING LABORATORY

Course Objectives:

- Model the 3-D geometric information of machine components including assemblies, and automatically generate 2-D production drawings, understand the basic analytical fundamentals that are used to create and manipulate geometric models in a computer program.
- Improve visualization ability of machine components and assemblies before their actual fabrication through modeling, animation, shading, rendering, lighting and coloring.
- Model complex shapes including freeform curves and surfaces.
- Analyze the mode of heat transfer in piping system and Make use of CAD software to simulate mechanical systems
- Solve simple problems in Computational Fluid Dynamics (CFD)

TESTING:

1. Preparation and study of the Micro Structure of ferrous metals and alloys.
2. Preparation and study of the Microstructure of nonferrous metals and alloys.
3. Effect of tempering time on the hardness of quenched carbon steels.
4. Effect of tempering temperature on the hardness of a hardened carbon steels.
5. Preparation of metallic specimens by electro polishing.
6. Study of work hardening characteristics of a pure metal.
7. Determination of carbon percentage in the given ferrous specimen.

MODELING:

1. Surface modeling.
2. Solid modeling.
3. Drafting.
4. Assembling.

ANALYSIS OF STRUCTURES USING FEA PACKAGES:

1. Static Analysis.
2. Modal Analysis.
3. Harmonic Analysis.
4. Spectrum Analysis.
5. Buckling Analysis.
6. Analysis of Composites.
7. Fracture mechanics.
8. Transient analysis

Course Outcomes:

After Completion of this course students will be able to

- Understand the concepts of wireframe, surface and solid modeling.
- Understand part modeling and part data exchange standards (VDA, IGES, and STEP).
- Develop knowledge in 2D-Transformations, 3D Transformations.
- Understand the Assembly Modeling, Assembly tree, and Assembly Methods.
- The Students become experts on Visualization and computer animation Techniques

MALLAREDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

M.Tech I Year – II Sem (Machine Design)

L	T/P/D	C
2	-	-

(R18DHS56) ENGLISH FOR RESEARCH PAPER WRITING
(AUDIT COURSE II)

Course Objectives:

- To enable the students to use linguistic structures to form well-organized texts in research contexts.
- To improve the quality of a composition by using appropriate cohesive devices.
- To enhance the mechanics of writing skills using correct grammar and vocabulary.
- To equip learners with the strategies of error – free writing.
- To get complete knowledge to write the research paper.

INTRODUCTION

Writing a research paper is a significant part of any academia. It is a substantial piece of academic writing in which the author does independent investigation into a topic and writes a description of the findings of that study. Research studies are important because these contribute to a scholar's knowledge and also provides solutions to the latest challenges. Writing forces one to think about what he believes and what he wants to communicate. Since good writing skills allow a learner to communicate his message with clarity, an extensive exposure on techniques of writing research paper proves to be an immense value to the students .

SYLLABUS

Unit 1 - Sentence Formation
Word order, Structuring paragraphs, Breaking up long sentences

Unit 2 - Cohesive devices
Types of cohesive devices - Anaphoric reference, Cataphoric reference, Exophoric reference
Tense agreement

Unit 3 – Academic Vocabulary
Hedging, Transitions – Additive, Adversative, Causal, Sequential

Unit 4– Grammar for Research Papers
Active & Passive, Punctuation, Articles

Unit 5 – Academic writing
Removing redundancy, Avoiding ambiguity, Paraphrasing, Sample Abstracts for practice, Sample videos

* Exercises apart from the text book shall also be referred for classroom tasks.

REFERENCE BOOKS:

1. English for Writing Research Papers. Adrian Wallwork, edition II, Springer, 2016.
2. Handbook of Technical Writing. James H. Shelton, McGraw Hill, 1994
3. Writing the Research Paper, a handbook. 8th edition, Anthony C. Winkler, Jo Ray Metherell,
Wadsworth, 2012

Course Outcomes:

Students will be able to:

- Write in a clear, coherent, and direct style appropriate for academic research
- Draft coherent and unified paragraphs with adequate supporting details.
- Develop the strategy to use lexical terms effectively.
- Adopt appropriate syntactic and semantic techniques
- Demonstrate analytical and inference skills. Comprehend and employ the various forms of scholarly composition.

MALLAREDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

M.Tech II Year – I Sem (Machine Design)	**L**	**T/P/D**	**C**
	-	**-**	**2**

(R18D1583) SEMINAR-I

Course Objectives:

- Understand the diverse field in Mechanical Engineering
- Understand the themes of this seminar
- Identify, understand and discuss current
- Understand the history of Mechanical research
- Identifies real-world issues

Course Outcomes:

- Learn and integrate
- Think and Create
- Communicate
- Clarify Purpose and Perspective
- Practice and use multiple thinking strategies to examine real- world issues

MALLAREDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

M.Tech II Year –I Sem (Machine Design)	**L**	**T/P/D**	**C**
	-	**-**	**4**

(R18D1591) MINI PROJECT

Course Objectives:

- To be able to apply some of the techniques/principles you have been taught
- To carry out budget and time planning for the project.
- To inculcate implementation skills by basics of design using an appropriate analysis tool.
- To follow correct simulation practices
- To do effective methodology in the mini project

Course Outcomes:

- Demonstrate a through and systematic understanding of project contents.
- Understand methodologies and professional way of documentation and communication.
- Know the key stages in development of the project.
- Extend or use the idea in mini project.
- Create new ideas with the help of fundamentals of Mechanical Engineering

MALLAREDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

M.Tech II Year –I Sem (Machine Design)	**L**	**T/P/D**	**C**
	-	**-**	**8**

(R18D1592) PROJECT REVIEW-I

Course Objectives:

- To provide an opportunity to work in group on a topic / problem / experimentation.
- To encourage creative thinking process.
- To provide an opportunity to analyze and discuss the results to draw conclusions.
- To acquire and apply fundamental principles of planning and carrying out the work plan project through observations, discussions and decision making process.
- To acquire the knowledge to publishing papers in peer reviewed journals/conference proceedings

Course Outcomes:

- Identify methods and materials to carry out experiments/develop code.
- Reorganize the procedures with a concern for society, environment and ethics.
- Analyze and discuss the results to draw valid conclusions.
- Prepare a report as per recommended format and defend the work.
- Explore the possibility of publishing papers in peer reviewed journals/conference proceedings.

MALLAREDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

M.Tech II Year – II Sem (Machine Design)	**L**	**T/P/D**	**C**
	-	**-**	**2**

(R18D1584) SEMINAR-II

Course Objectives:

- Understand the diverse field in Mechanical Engineering
- Understand the themes of this seminar
- Identify, understand and discuss current
- Understand the history of Mechanical research
- Identifies real-world issues

Course Outcomes:

- Learn and integrate
- Think and Create
- Communicate
- Clarify Purpose and Perspective
- Practice and use multiple thinking strategies to examine real- world issues

MALLAREDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

M.Tech II Year – II Sem (Machine Design)	**L**	**T/P/D**	**C**
	-	**-**	**8**

(R18D1593) PROJECT REVIEW-II

Course Objectives:

- To provide an opportunity to work in group on a topic / problem / experimentation.
- To encourage creative thinking process.
- To provide an opportunity to analyze and discuss the results to draw conclusions.
- To acquire and apply fundamental principles of planning and carrying out the work plan project through observations, discussions and decision making process.
- To acquire the knowledge to publishing papers in peer reviewed journals/conference proceedings

Course Outcomes:

- Identify methods and materials to carry out experiments/develop code.
- Reorganize the procedures with a concern for society, environment and ethics.
- Analyse and discuss the results to draw valid conclusions.
- Prepare a report as per recommended format and defend the work.
- Explore the possibility of publishing papers in peer reviewed journals/conference proceedings.

MALLAREDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

M.Tech II Year – II Sem (Machine Design)	**L**	**T/P/D**	**C**
	-	**-**	**8**

(R18D1594) PROJECT VIVA - VOCE

Course Objectives:

- Student understand the project and should give the clear explanation about the project
- To provide the foundation of good programming skills by discussing key issues to the design of project.
- To be able to apply some of the techniques/principles students have been taught.
- To enable the students to attend placements and be better performers in their future.
- To familiarize with the various techniques.

Course Outcomes:

- Understand the data requirements and collect data relevant to their research.
- Analyze data and interpret results.
- Develop research design for their topic of research.
- Follow the process related activity and testing techniques to work as team member.
- Implement different system calls for various file handling operations.

SEMESTER-I
COURSE COVERAGE SUMMARY

COURSE COVERAGE SUMMARY

SUB:- ADVANCED MECHANICAL ENGINEERING DESIGN

Units	Chapter No's In The Text Book Covered	Author	Text Book Title	Publishers	Edition
Unit-I Design Philosophy	1,2,3.	J. E. Shigley & L. D. Mitchell	Mechanical Engineering Design	Mcgraw – Hill International Book Company	3rd edition
Unit-II Product Design, Design For Manufacturing	1 AND 5,6	R S KHURMI A K CHITALE R C GUPTA	DESIGN OF MACHINE MEMBERS	S.Chand & company LTD	6 th edition
Unit-III (Failure Theories)	5,6 AND 2,3	J. E. Shigley & L. D. Mitchel R S KHURMIl	Mechanical Engineering Design	Mcgraw – Hill International Book Company	4 th edition
Unit-IV Surface Failures	7	Robert L. Norton	Machine Design An Integrated Approach	Prentice Hall New Jersey, Usa.	3 rd edition
Unit-V Economic Factors Influencing Design	11,12&14	A K Chitale & R C Gupta	Production Design And Manufacturing	Prentice Hall	6 th edition

COURSE COVERAGE SUMMARY

SUB:- ADVANCED MECHANICS OF SOLIDS

Units	Chapter No's In Text Book Covered	Author	Text Book Title	Publishers	Edition
Unit-I Shear Centre, Un Symmetric Bending	8 & 14	P B Boresi & Richardo	Advanced Mechanics Of Materials	John Wiley & Sons	6th
Unit-II Curved Beam Theory, Design For Manufacturing	9	P B Boresi & Richardo	Advanced Mechanics Of Materials	John Wiley & Sons	6th
Unit-III Failure Theories	6 & 17	P B Boresi & Richardo	Advanced Mechanics Of Materials	John Wiley & Sons	6th
Unit-IV Surface Failures	10 & 12	P B Boresi & Richardo	Advanced Mechanics Of Materials	John Wiley & Sons	6th
Unit-V Economic Factors Influencing Design	14	P B Boresi & Richardo	Advanced Mechanics Of Materials	John Wiley & Sons	6th

COURSE COVERAGE SUMMARY

SUB: - FATIGUE, CREEP AND FRACTURE MECHANICS

Units	Chapter No's In Text Book Covered	Author	Text Book Title	Publishers	Edition
Unit -I Introduction, Basic Stress Analysis And Mechanical Properties	1	Ted. L. Anderson	Fracture Mechanics: Fundamentals And Applications	Crc Press Florilnda	3rd
Unit -II Stress Intensity Factor And Its	2	Ted. L. Anderson	Fracture Mechanics: Fundamentals And Applications	Crc Press Florilnda	3rd
Unit -III Elastic/Plastic Fracture Mechanics	3, 4 & 5	Ted. L. Anderson	Fracture Mechanics: Fundamentals And Applications	Crc Press Florilnda	3rd
Unit -IV Fatigue, Analysis Of Fatigue	10	Ted. L. Anderson	Fracture Mechanics: Fundamentals And Applications	Crc Press Florilnda	3rd
Unit -V Fatigue Of Welded Structures, Creep	1 to 14	T.R Gurney	Fatigue Of Welded Structures	Crc Press Florilnda	3rd

COURSE COVERAGE SUMMARY

SUB:- ADVANCED FINITE ELEMENT ANALYSIS

Units	Chapter No's In Text Book Covered	Author	Text Book Title	Publishers	Edition
Unit –I Introduction To Fem	1	Singiresu S. Rao	The Finite Element Method In Engineering	Elsevier	5th Edition
Unit –II 1-D Structural Problems Analysis Of Trusses Anlysis Of Beams	1,2,3,4,9	Singiresu S. Rao	The Finite Element Method In Engineering	Elsevier	5th Edition
Unit –III 2-D Problems 3-D Problems	15,16	Singiresu S. Rao	The Finite Element Method In Engineering	Elsevier	5th Edition
Unit –IV Scalar Field Problems	7	Singiresu S. Rao	The Finite Element Method In Engineering	Elsevier	5th Edition
Unit –V Dynamic Problems	12	Singiresu S. Rao	The Finite Element Method In Engineering	Elsevier	5th Edition

COURSE COVERAGE SUMMARY

SUB:-ADVANCED MECHANICS OF COMPOSITE MATERIALS

Units	Chapter No's In Text Book Covered	Author	Text Book Title	Publishers	Edition
Unit-I Basic Concepts And Characteristics, Reinforcements	1	Robert M.Jones	Mechanics Of Composite Material	Mc Graw Hill Company, New .	2nd
Unit-II Micromechanics, Coordinate Transformations	1,2,3	Autar K.Kaw	Mechanics Of Composite Material	Mc Graw Hill Company, New .	2nd
Unit-III Elastic Behavior Of Unidirectional Composites	1to 5	Isaac Daniel	Engineering Mechanics Of Composite Materials	New York Oxford University Press	2nd
Unit-IV Strength Of Unidirectional Lamina	3&4	Robert M.Jones	Mechanics Of Composite Material	Mc Graw Hill Company, New .	2nd
Unit-V Laminated Composite Beams And Plates, Finite Element Analysis	5&6	Robert M.Jones	Mechanics Of Composite Material	Mc Graw Hill Company, New .	2nd

COURSE COVERAGE SUMMARY

SUB:NON CONVENIONAL ENERGY RESOURCES

UNITS	CHAPTER NO'S IN TEXT BOOK COVRED	AUTHOR	TEXT BOOK TITLE	PUBLISHERS	EDITION
Unit-I: Introduction Solar Energy	2,3	John twidell&Tony Weir	Renewable Energy Resources	Taylor&Francis	New
Unit-II: PVT Surface	14	John twidell&Tony Weir	Renewable Energy Resources	Taylor&Francis	New
Unit-III: Combustion	17	G.N.Tiwari & M.K.Ghoshal	Renewable Energy Resources	Narosa publications	New
Unit-IV: Power Cycles	10	John twidell&Tony Weir	Renewable Energy Resources	Taylor&Francis	New
Unit-V: Energy conversion	7&8,11,12 &13	John twidell&Tony Weir	Renewable Energy Resources	Taylor&Francis	New

SEMESTER- II

COURSE COVERAGE SUMMARY

SUB: - ADVANCED MECHANICS OF MACHINERY

Units	Chapter No's In The Text Book Covered	Author	Text Book Title	Publishers	Edition
Unit-I Advanced Kinematics Of Plane Motion	1	Jeremy Hirschhorn	Kinematics And Dynamics Of Plane Mechanisms	Mcgraw-Hill	3rd
Unit-II Advanced Kinematics Of Plane Motion	2,3	Amithab hghosh And Ashok Kumar Mallik	Theory Of Machines & Mechanisms	Mcgraw-Hill	3rd
Unit-III Introduction To Synthesis-Graphical Methods	5,6,7	Amithab hghosh And Ashok Kumar Mallik	Theory Of Mechanisms& Machines	E.W.P Publishers,	3rd
Unit-IV Introduction To Synthesis-Graphical Methods	8	L.Sciacvic co And B.Siciliano	Modeling And Control Of Manipulators	Springer-Verlag	3rd
Unit-V Introduction To Synthesis - Analytical Methods	9	Edward Arnold	Modeling And Control Of Manipulators	Springer-Verlag	3rd

COURSE COVERAGE SUMMARY

SUB:- DESIGN SYNTHESIS

Units	Chapter No's In The Text Book Covered	Author	Text Book Title	Publishers	Edition
Unit-I Design Process And Methodologies	1	P. Kannaiah	Machine Design	Scitech, Chennai	3rd edition
Unit-II Tolerence From Process And Function	9	MAHAJAN	METROLOGY	DHANPAT AND CO	3 rd edition
Unit-III Design Of Casting , Forged ,And Sheet Metal Parts	13	GEORGE E DIETER	ENGINEERING DESIGN	Scitech, Chennai Mcgraw – Hill	4th edition
Unit-IV Design For Assembly And Dismantling	6,7	GRAEME ARTHUR BRITTON	DESIGN SYNTHESIS	CRC Press	6 th edition
Unit-V Problem Formulation For Design Optimization	15	GEORGE E DIETER	ENGINEERING DESIGN	Mcgraw – Hill	4 th edition

COURSE COVERAGE SUMMARY

SUB:- EXPERIMENTAL STRESS ANALYSIS

Units	Chapter No's In Text Book Covered	Author	Text Book Title	Publishers	Edition
Unit-I Introduction	8	Thosheke & Goodier Jr	Theory Of Elasticity	T.M.H	3rd
Unit-I Recording Instruments	6	Thosheke & Goodier Jr	Theory Of Elasticity	T.M.H	3rd
Unit-I Brittle Coatings	5	Thosheke & Goodier Jr	Theory Of Elasticity	T.M.H	3rd
Unit-I Photo Elasticity	14	Thosheke & Goodier Jr	Theory Of Elasticity	T.M.H	3rd
Unit-I Three Dimensional Photo Elasticity	15	Thosheke & Goodier Jr	Theory Of Elasticity	T.M.H	3rd

COURSE COVERAGE SUMMARY

SUB:MECHATRONICS

Units	Chapter No's In Text Book Covered	Author	Text Book Title	Publishers	Edition
Unit-I Mechatronics Systems, Elements, Levels Of Mechatronics System	8	Kp Ramachandran & Gk Vijaya Raghavan	Mechatronics Integrated Mechanical Electronics Systems	Wiley India Edition	2008
Unit-II Solid State Electronic Devices, Pn Junction Diode, Bjt, Fet, Dia And Triac	6	Devdas Shetty	Mechatronics System Design	Richard/Thomson	2008
Unit-III Hydraulic And Pneumatic Actuating Systems, Fluid Systems, Hydraulic And Pneumatic Systems	5	Kp Ramachandran & Gk Vijaya Raghavan	Mechatronics Integrated Mechanical Electronics Systems	Wiley India Edition	2008
Unit-IV Digital Electronics And Systems, Digital Logic Control, Micro Processors And Micro Controllers	14	Kp Ramachandran & Gk Vijaya Raghavan	Mechatronics Integrated Mechanical Electronics Systems	Wiley India Edition	2008
Unit-V System And Interfacing And Data Acquisition, Daqs, Scada, A To D And D To A Conversions	15	Devdas Shetty	Mechatronics System Design	Richard/Thomson	2008

COURSE COVERAGE SUMMARY

SUB:-COMPUTER INTEGRATED MANUFACTURING

Units	Chapter No's In Text Book Covered	Author	Text Book Title	Publishers	Edition
Unit-I Introduction	17,18	P.N.Rao	CAD/CAM Principles and Applications	McGraw Hill Publications	Third
Unit-II Computer Aided Process Planning	16,18	P.N.Rao	CAD/CAM Principles and Applications	McGraw Hill Publications	Third
Unit-III Integrative Manufacturing Planning And Control	19	P.N.Rao	CAD/CAM Principles and Applications	McGraw Hill Publications	Third
Unit-IV Computer Aided Quality Control	23	P.N.Rao	CAD/CAM Principles and Applications	McGraw Hill Publications	Third
Unit-V Computer Integrated Manufacturing Systems	24	P.N.Rao	CAD/CAM Principles and Applications	McGraw Hill Publications	Third

COURSE COVERAGE SUMMARY

SUB: INDUSTRIAL MANAGEMENT

Units	Chapter No's In Text Book Covred	Author	Text Book Title	Publishers	Edition
Unit-I Concepts of Management and Organisation	1&2	Amrine	Manufacturing Organization and Management	Pearson	2nd Edition, 2004.
Unit-II Designing Organisational Structures	3&4	Amrine	Manufacturing Organization and Management	Pearson	2nd Edition, 2004.
Unit-III Plant location, definition, factors affecting the plant location,	5&6	Amrine	Manufacturing Organization and Management	Pearson	2nd Edition, 2004.
Unit-IV Materials Management-Objectives, Inventory - functions, types	7&8	Amrine	Manufacturing Organization and Management	Pearson	2nd Edition, 2004.
Unit-V Inspection and quality control, types of inspections	9	Amrine	Manufacturing Organization and Management	Pearson	2nd Edition, 2004.

SEMESTER- I
PREVIOUS QUESTIONS PAPERS

Code No: R15D1501

R15

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
M.Tech I Year - I Semester supplementary Examinations, Jan/Feb 2018
Advanced Mechanical Engineering Design
(MD)

Roll No										

Time: 3 hours **Max. Marks: 75**

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 15 marks

****

Section-I

Q. No. 1 a) Explain what the objectives of the design are. [5]
b) What is the role of standardization in Design? [5]
c) Explain the problem formation in design process . [5]

OR

Q. No. 2 a) Distinguish between Shigley model and Asimov model in design process. [5]
b) List out various design considerations of a machine element : Bearing. [5]
c) How is creativity established in the process of design? [5]

Section-II

Q. No. 3 a) Elaborate how to list the features and specifications of a new product [7]
b) Explain various strategies for development of new product. [8]

OR

Q. No. 4 a) What do you mean by Design of Manufacturing (DOM) with suitable example.[7]
b) Describe the general principles of design of casted products. [8]

Section-III

Q. No. 5 a) State any four static theories of failures. [8]
b) How do we define fatigue Life? Sketch S-N curve for ductile and brittle materiaL [7]

OR

Q. No.6 a) with reference the stress ratio, classify fluctuating stress. Show them on the diagram. [5]
b) Analyze the Sodeberg and Good man's failure theories of fatigue. [5]
c) State creep phenomenon. [5]

Section-IV

Q. No. 7 a) How do you estimate wear? Describe various types of wear. [7]
b) Write short notes on surface fatigue failures and surface fatigue strength. [8]

OR

Q. No. 8 Develop an expression for dynamic contact stress at contact point of involute teeth of spur gears. [15]

Section-V

Q. No. 9 a) Explain the concepts HMI(Human Machine Interface) in Engineering design. [8]

b) Describe the general steps to be followed in the estimation value of product. [7]

OR

Q. No. 10 a) Focus the selection of process for the value addition of product and elaborate. [7]

b) Demonstrate the role of CAD in Design. [8]

*****

R17

Code No: R17D1501

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
M.Tech I Year - I Semester Regular Examinations, Jan/Feb 2018
Advanced Mechanical Engineering Design
(MD)

Roll No										

Time: 3 hours **Max. Marks: 70**

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 14marks.

* * * * * *

SECTION - I

1. (a) Explain the various phases of the design process with the help of a flow chart. 7M
   (b) Define Creativity. Explain the various creative techniques. 7M

(Or)

2. Explain "Stress Concentration" with special reference to designing of machine elements. How do you propose to reduce the effect of stress concentration? 14M

SECTION – II

3. (a) Discuss the product design for sand castings from the point of view of designing for minimizing the shrinkage defects. 8M
   (b) Explain the design guidelines for non metallic parts. 6M

(Or)

4. (a) Explain the mathematical modeling similitude relations in product design. 8M
   (b) Explain the following terms:
   Product specification; Product planning; Product strategies. 6M

SECTION – III

5. (a) Explain the difference between the criteria of design for limited cycles and design for multiple stress cycles, with suitable examples. 10M
   (b) Differentiate between the harmful and beneficial residual stresses. 4M

(Or)

6. (a) Explain about Yielding and Transformation. 4M
   (b) What are the different fatigue failure models? Explain with suitable examples. 10M

SECTION – IV

7. (a) Distinguish between the design procedures for surface failure due to adhesive

wear and abrasive wear. 8M

(b) Discuss the effect of dynamic contact stresses in surface failures. 6M

(Or)

8. The work cycle of a mechanical component subjected to completely reversed bending stresses consists of the following elements:
   i) ± 350 N/mm^2 for 85% of time,
   ii) ± 400 N/mm^2 for 12% of time, and
   iii) ± 500 N/mm^2 for 3% of time.
   The material of the component is 50C4 (S_{ut} = 660 N/mm^2), and the corrected endurance strength of the component is *280* N/mm^2. Determine the life of the component. 14M

SECTION – V

9. (a) What is the importance of material and process selection in value engineering? Explain. 7M

(b) List and explain the various ergonomical considerations in engineering design. 7M

(Or)

10. (a) Explain the various economic factors influencing the design process. 7M

(b) Differentiate between design of controls and design of displays. 7M

****

Code No: R15D1501

R15

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
M.Tech I Year - I Semester supplementary Examinations, August 2017
Advanced Mechanical Engineering & Design
(MD)

Roll No										

Time: 3 hours **Max. Marks: 75**

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 15 marks.

* * * * * *

SECTION - I

3. (a) Sketch the heart of a design process, and explain its components.
   (b) Distinguish between the Asirnov model and Norton model.

(Or)

4. (a) Explain the need analysis by stating its significance.
   (b) Bring out the differences between design for safety and design for reliability.

SECTION – II

5. (a) What are the important points to be considered while designing with plastics? Explain.
   (b) Write a note on the aesthetic and ergonomic considerations in product design.

(Or)

6. (a) Discuss the different approaches for concept testing of a new product.
   (b) List out the different product strategies to be followed in product design.

SECTION – III

7. (a) Explain the difference between the criteria of design for limited cycles and design for multiple stress cycles, with suitable examples.
   (b) Explain the Fracture Mechanics theory with suitable examples.

(Or)

8. The force acting on a bolt consists of two components – an axial pull of 12 kN, and a transverse shear force of 6 kN. The bolt is made of steel FeE 310 (S_{yt} = 310 N/mm^2), and the factor of safety is 2.5. Determine the diameter of the bolt using the maximum shear stress theory of failure.

SECTION – IV

9. (a) What is Surface Fatigue Strength, and how is it determined? Explain.
   (b) What are the different types of oil films that can exist between two mating surfaces? Discuss their effects on the surface failure.

(Or)

10. (a) Distinguish between adhesive wear, abrasive wear, and corrosion wear by giving suitable examples.
    (b) List the reasons for surface fatigue failures.

SECTION – V

11. (a) Write a note on the material and process selection in value engineering.
    (b) Define Ergonomics. And explain various human engineering considerations with reference to the design process.

(Or)

12. (a) Explain the various economic factors influencing the design process.
    (b) Differentiate between design of controls and design of displays.

****

Code No: R15D1501-151-S

R15

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

M.Tech. I Year - I Semester supplementary Examinations, Aug 2016

Advanced Mechanical Engineering Design

(MD)

Roll No	1	5	N	3						

Time: 3 hours Max. Marks: 75

Note: This question paper Consists of 5 Sections. Answer FIVE Questions, Choosing ONE Question from each SECTION and each Question carries 15 marks.

* * * * * *

SECTION - I

1. a) What are the essential factors for Product design? Explain in detail.
   b) What is creativity in engineering design? What are the techniques to improve creativity in design? Explain.

(Or)

2. (a) Sketch the heart of a design process, and explain its components.
   (b) Distinguish between the Shigley model and Norton model.

SECTION – II

3. a) Discuss the application of modeling in product design.
   b) Bring out the differences between design for safety and design for reliability.

(Or)

4. a) What are the manufacturing considerations in forging design and casing design.
   b) Explain material selection in machine design.

SECTION – III

5. The force acting on a bolt consists of two components – an axial pull of 12 kN, and a transverse shear force of 6 kN. The bolt is made of steel FeE 310 (S_{yt} = 310 N/mm^2), and the factor of safety is 2.5. Determine the diameter of the bolt using any three theories of failure.

(Or)

6. The principal stresses at a point consist of a tensile stress of σ_1 = 200 MPa, a compressive stress of σ_2 = 100 MPa, and σ_3 = 0. Determine the maximum shear stress and factor of safety, if the material has S_y = 500 MPa.

SECTION – IV

7. a) Explain various ways of surface fatigue failures.
   b) Explain dynamic contact stresses with examples.

(Or)

8. a) Distinguish between the design procedures for surface failure due to adhesive wear and abrasive wear.
   b) Discuss the oil film effect on the surface failure of mating surfaces.

SECTION – V

9.a) Explain the various factors to be considered in the design of displays.
   b) Explain Modern approaches in design.

(Or)

10. a) Explain ergonomical considerations in engineering design.
    b) Discuss economic factors influencing design.

Code No: R15D1501

R15

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
M.Tech I Year - I Semester Supplementary Examinations, July/Aug 2018
Advanced Mechanical Engineering Design
(MD)

Roll No										

Time: 3 hours **Max. Marks: 75**

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 15 marks.

****

SECTION-I

Q. No. 1 a) What are sequential steps in the design according to Sheglay. [5M]
b) Name various agencies for standardization in Design? [5M]
c) Standardize power rating of an induction motors from 1kW to 10kW with R5 series [5M]

OR

Q. No. 2 a) Define reliability. State suitable reliability distribution for material selection [5M]
b) List out various design consideration in machine design. [5M]
c) Explain ideas creation sources in the process of design. [5M]

SECTION-II

Q. No. 3 a) Elaborate how to list the features and specifications of a new product. [7M]
b) Explain various stages for development of new product. [8M]

OR

Q. No. 4 a) What do you mean by Design for Manufacturability. What aspects of manufacturing are to be covered in the design stage (DOM). [7M]

b) Describe the general principles of design of forging products. [8M]

SECTION-III

Q. No. 5 a) Deduce appropriate expressions of static theory of distortion energy. [8M]
b) How do we estimate cumulative fatigue damage? Explain it with expressions . [7M]

OR

Q. No.6 a) Classify fluctuating stresses. Show amplitude and stress ratio in each case. [5M]
b) Elaborate failure theories of fatigue. [5M]
c) Give examples for residual stress and thermal fatigue [5M]

SECTION-IV

Q. No. 7 a) Describe adhesive wear and abrasive wear with example. [7M]
b) Write short notes on surface fatigue failures and surface fatigue strength [8M]

OR

Q. No. 8 Explain about (a) surface geometry (b) mating surfaces (c) dynamic contact stress. [5*3=15M]

SECTION-V

Q. No. 9 a) Explain the role of ergonomics in engineering design. [8M]

b) Describe the various types economic analysis adopted in value engineering. [7M]

OR

Q. No. 10 a) What are major concerns in material selection for a product to enhance its value. [7M]

b) Name and demonstrate various modeling softwares in design. [8M]

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Code No: R17D1501

R17

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
M.Tech I Year - I Semester Supplementary Examinations, July/Aug 2018
Advanced Mechanical Engineering Design
(MD)

Roll No										

Time: 3 hours **Max. Marks: 70**

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

* * * * * *

SECTION - I

13. (a) Sketch the heart of a design process, and explain its components. [7M]
(b) Distinguish between the ASimov model and Shigley model. [7M]

(OR)

14. (a) Explain the need analysis by stating its significance. [6M]
(b) Bring out the differences between design for safety and design for reliability. [8M]

SECTION – II

15. (a) What are the important points to be considered while designing with plastics? Explain. [7M]
(b) Write a note on the aesthetic and ergonomic considerations in product design. [7M]

(OR)

16. (a) Discuss the different approaches for concept testing of a new product. [7M]
(b) List out the different product strategies to be followed in product design. [7M]

SECTION – III

5. (a) Explain about static failure theory and distortion energy theory [8M]
(b) Explain the Fracture Mechanics theory with suitable examples. [6M]

(OR)

6. The force acting on a bolt consists of two components – an axial pull of 12 kN, and a transverse shear force of 6 kN. The bolt is made of steel FeE 310 (S_{yt} = 310 N/mm^2), and the factor of safety is 2.5. Determine the diameter of the bolt using the maximum shear stress theory of failure. [14M]

SECTION – IV

7. (a) What is Surface Fatigue Strength, and how is it determined? Explain. [6M]
(b) What are the different types of oil films that can exist between two mating surfaces? Discuss their effects on the surface failure. [8M]

(OR)

8. (a) Distinguish between adhesive wear, abrasive wear, and corrosion wear by giving suitable examples. [10M]
   (b) List the reasons for surface fatigue failures. [4M]

SECTION – V

9. (a) Explain about design of controls and design of display . [7M]
   (b) Define Ergonomics. And explain various human engineering considerations with reference to the design process. [7M]

(OR)

10. (a) Write a short note on Break-even analysis. [7M]
    (b) Mention the significance of modern approaches in design. [7M]

****

Code No: R15D1501 **R15**

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

M.Tech. I Semester Regular/supplementary Examinations, February 2017

Advanced Mechanical Engineering Design

(Machine Design)

Roll No			N	3						

Time: 3 hours **Max. Marks: 75**

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 15 marks.

* * * * * *

SECTION - I

1. (a) Explain the various phases of the design process with the help of a Flow chart.
   (b) Define Creativity. Explain the various creative techniques.

(Or)

2. Explain "Stress Concentration" with special reference to designing of machine elements. How do you propose to reduce the effect of stress concentration?

SECTION – II

3. (a) Discuss the product design for sand castings from the point of view of designing for minimizing the shrinkage defects.
   (b) Explain the design guidelines for non metallic parts.

(Or)

4. (a) Explain the mathematical modeling similitude relations in product design.
   (b) Explain the following terms:
   Product specification; Product planning; Product strategies.

SECTION – III

5. A solid circular shaft made of steel Fe 620 (S_{ut} = 620 N/mm^2 and S_{yt} = 380 N/mm^2) is subjected to an alternating torsional moment which varies from -200 N-m to +400 N-m. The shaft is ground, and the expected reliability is 90%. Neglecting stress concentration, calculate the shaft diameter for infinite life, using the distortion energy theory of failure. The factor of safety may be taken as 2.0

(Or)

6. (a) Differentiate between the harmful and beneficial residual stresses.
   (b) What are the different fatigue failure models? Explain with suitable examples.

SECTION – IV

7. (a) Distinguish between the design procedures for surface failure due to adhesive wear and abrasive wear.
   (b) Discuss the effect of dynamic contact stresses in surface failures.

(Or)

8. The work cycle of a mechanical component subjected to completely reversed bending stresses consists of the following elements:
   i) ± 350 N/mm^2 for 85% of time,
   ii) ± 400 N/mm^2 for 12% of time, and
   iii) ± 500 N/mm^2 for 3% of time.
   The material of the component is 50C4 (S_{ut} = 660 N/mm^2), and the corrected endurance strength of the component is 280 N/mm^2. Determine the life of the component.

SECTION – V

9. (a) What is the importance of material and process selection in value engineering? Explain.
   (b) List and explain the various ergonomical considerations in engineering design.

(Or)

10. (a) Write a short note on Break-even analysis.
    (b) Mention the significance of modern approaches in design.

****

Code No: R15D1502

R15

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
M.Tech I Year - I Semester supplementary Examinations, Jan/Feb 2018
Advanced Mechanics of solids
(MD)

Roll No										

Time: 3 hours **Max. Marks: 75**

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 15 marks

****

1. A) Define shear centre? What is the practical importance of shear centre? 3M

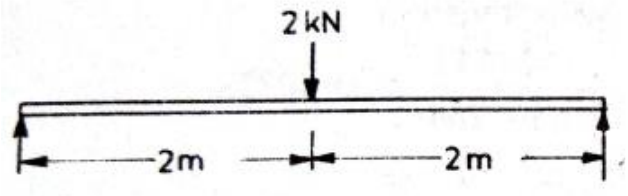
   B) Determine the shear stress distribution in a channel section (Thickness of the flanges t_1 and thickness of the web t_2 height of the web h, width of flanges b) of a cantilever beam subjected to a load F, as shown in fig 1, and locate the shear centre of the section. 12M

Fig.1

OR

2. A) Differentiate between Euler-Bernoulli Beam and Timoshenko beam 3M

   B) A beam is loaded as shown in fig.2; determine the maximum deflection and stresses at B. Take E =210Gpa. 12M



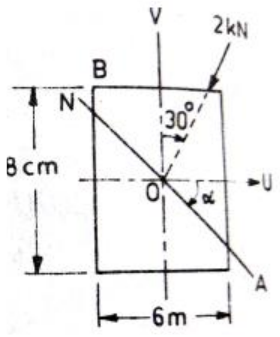


Fig.2

3. A) Show that the position of neutral axis is always below centroidal axis for a curved beam

   3M

   B) An opening ring T-section as shown in fig.3; subjected to a compressive load of 100kN. Determine the stresses at A and B. 12M

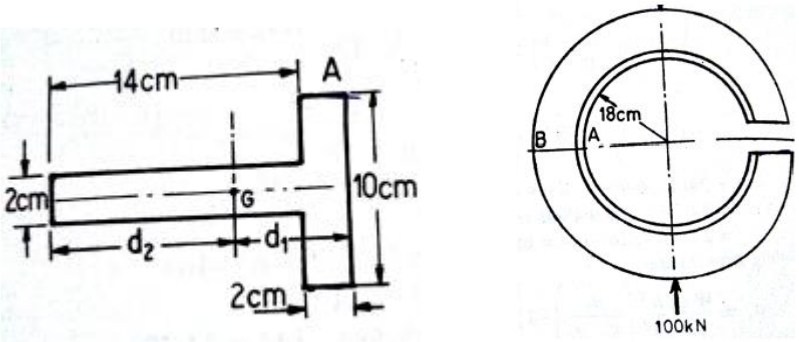


Fig.3

OR

4. A chain link shown in fig.4; is subjected to a pull of 200kN. It is composed of steel 2.5cm diameter and has a mean radius of 3cm. Its semi-circular ends are connected by straight pieces 2.5 cm long. Estimate maximum compressive stress in the link and tensile stresses at the same section. 15M

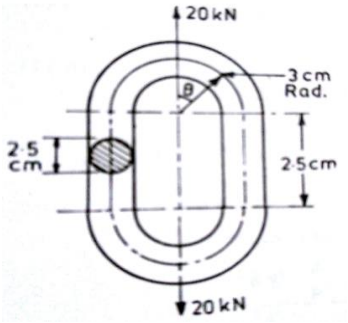


Fig .4

5. A) A thin walled cellular section shown in fig.5, is subjected to a torque of 50N-m, if G= 100Gpa calculate i) Sharing of torques by two cells. ii) Maximum shear stress in each cell, iii) angular twist per unit length. The thickness of all walls is 2mm. 10M

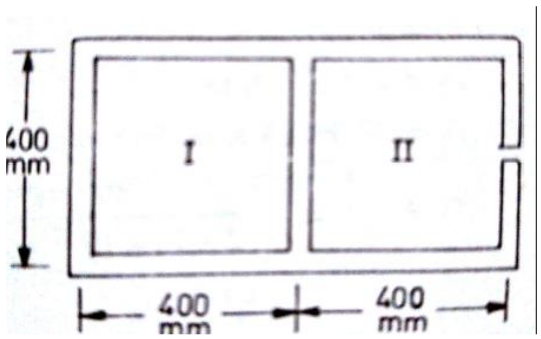


Fig.5

B) Write a short note on soap film analogy for a thin cross section subjected to torsion 5M

OR

6. A) What is meant by disc of uniform strength? Deduce an expression for variation of thickness along radius for a disc of uniform strength? 5M

   B) A disc of 50cm diameter and uniform thickness is rotating at24000rpm. Determine the maximum stresses induced in the disc. If a hole of 10cm diameter is drilled at the centre of the disc find the maximum intensities of radial and hoop stresses induced. Plot the variation of the stresses across the radius. Take ν =0.28 and ρ = 7800kg/m^3. 10M

7. A)Describe the equilibrium equations for a flat rectangular plate with usual notations 10M

   B) A water tank 3.60 m deep and 2.70 m square is to be made of structural steel plate. The sides of the tank are divided into nine panels by two vertical supports (or stiffeners) and two horizontal

supports; that is, each panel is 0.90 m wide and 1.20 m high, and the average head of water on a lower panel is 3.00 m.(fig.6)

i) Determine the required thickness of the plate for the lower panels, using a working stress limit of σ_w = 124.0 MPa.

(b) Calculate the maximum deflection of the panel, (For fixed edges, with b/a = 0.75, Assume, M = 0.040pb^2) 5M

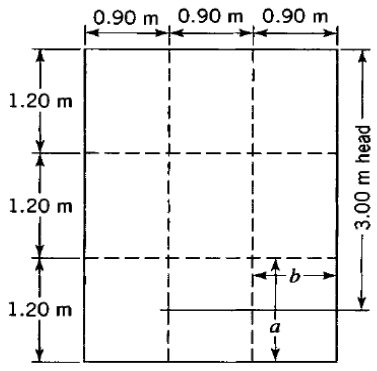


Fig.6.

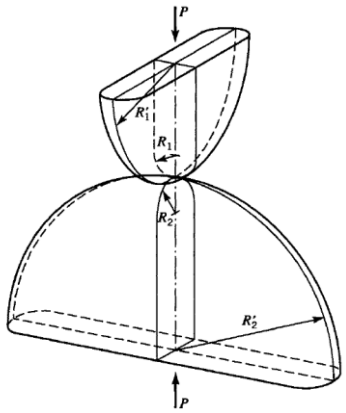


Fig .7

OR

8. A) Determine the maximum bending moment and maximum deflection for a rail subjected to a single wheel load of 125kN. The elastic support for the rail has a spring constant of k=14MN/m^2. The moment of inertia of rail is 3700X10^{-8}m^4, E = 200GN/m^2. Also calculate maximum stress in the rail, assume depth of the rail is 200mm and the distance of the centroidal axis of the cross section of the rail from top surface is 120mm. 5M

B) Deduce an expression for the response of an infinite beam on an elastic foundation subjected to a concentrated lateral load. 10M

9. Two semicircular disks in Figure 7, be made of steel (El = E2 = 200 GPa and $v_1 = v_2 =$ 0.29).The radii of curvature of the two surfaces at the point of contact are R_1, = 60 mm, R'_1; = 130 mm, R_2 = 80 mm, and R'_2; = 200 mm. The angle a between the planes of minimum curvature is a/3 rad. If the load P = 4.50 kN, determine the maximum principal stress, maximum shear stress, and maximum octahedral shear stress in the disks and state the location of the point where each of these stresses occur. Determine the approach 6 for the two disks because of load P. 15M

OR

10. What is the significance of contact stresses? What are the fundamental assumptions made in evaluating the contact stresses? Describe various equations for evaluating principal stress and maximum shear stress? 15M

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Code No: R17D1502

R17

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
M.Tech I Year - I Semester Regular Examinations, Jan/Feb 2018
Advanced Mechanics of Solids
(MD)

Roll No										

Time: 3 hours **Max. Marks: 70**

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 14marks.

****

1. a) Discuss the shear centre for axi-symmetric and unsymmetrical sections. [7M]

   b) Determine the shear centre of the unsymmetrical section shown in Fig.1 Take same thickness throught the cross section. [7M]

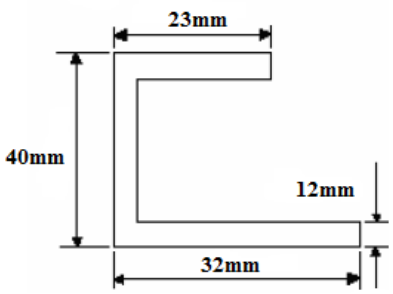

Fig.1

(OR)

2. Explain the phenomenon of finding deflection of straight beams due to non-symmetrical bending. [14M]
3. The frame shown in Fig.2 has a 50 mm square cross section. The load P is located 100 mm from the center of curvature of the curved beam portion of the frame. The radius of curvature of the inner surface of the curved beam is a=30mm. For P=9.50 KN, determine the values for the maximum tensile and compressive stresses in the frame. [14M]

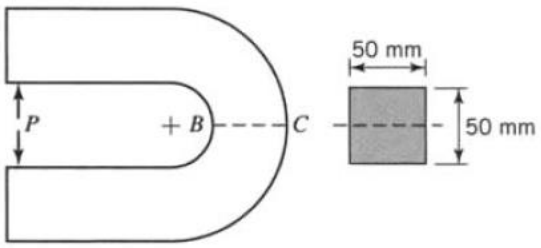

Fig.2

(OR)

4. A chain link is subjected to a pull of 40 KN. It is composed of steel 3.5 cm diameter and has a mean radius of 5 cm. Its semicircular ends are connected by straight pieces 4 cm long. Estimate the maximum compressive stress in the link and tensile stress at the same section. [14M]
5. The nominal dimensions of a steel wide-flange section(W760x220) are shown in Fig.3 The beam is subjected to a twisting moment T=5000N-m.
   a) Determine the maximum shear stress τ_{max} and its location. Ignore the fillets and stress concentrations.
   b) Determine the angle of twist per unit length for the applied twisting moment. [7+7M]

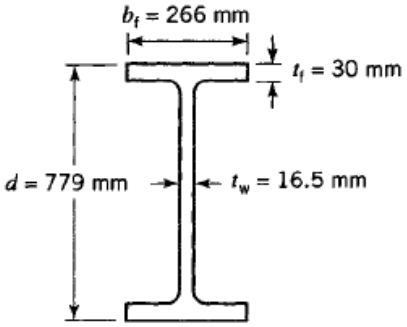

Fig.3

(OR)

6. A circular steel disc of inner radius a=100mm and outer radius b=300 mm is subjected to a constant angular velocity ω rad/sec. The steel has material properties Y=620 MPa, E=200GPa, v=0.29, and ρ=7.85x10^3 kg/m^3. Assume that the disc is in a state of plane stress (σ_{zz}=0) and that yield is governed by the maximum shear-stress criterian. Also, let the disk be traction free at r=a and r=b, and let T=0.
   a) Determine the angular velocity ω_r at which yield in the disk is initiated.
   b) Determine the angular velocity ω_p at which the disk is fully plastic; compare $\omega_{p \text{ and}}$ ω_r.

   [7+7M]
7. A plate made of mild steel (E=200GPa, v=0.29, and Y=315 MPa) has a thickness h=10mm and covers a circular opening having a diameter of 200 mm. The plate is fixed at the edges and is subjected to a uniform pressure *P*.
   a) Determine the magnitude of the yield pressure P_y and deflection ω_{max} at the center of the plate when this pressure is applied.
   b) Determine a working pressure based on a factor of safety SF=2.00 relative to P_y.

   [7+7M]

(OR)

8. A steel I-beam (E=200GPa) has a depth of 102 mm, width of 68 mm, moment of inertia of I_x=2.53x10^6 mm^4, and length of 4m. It is attached to a rubber foundation for which k_0=0.350 N/mm^3. A concentrated load *P=30.0* KN is applied at one end of the beam. Determine the maximum deflection, maximum flexural stress in the beam, and the location of each. [14M]

9. In terms of *P* compute the maximum principal stress, maximum shear stress, and maximum octahedral shear stress in two steel balls (E=200GPa and v=0.29) 200 mm in diameter

pressed together by a force *P.*

[14M]

(OR)

10. A fatigue testing machine rolls together two identical steel disks (E=200GPa and ν=0.29), with radii 40 mm and thickness *h* =20mm. In terms of the applied load *P,* determine σ_{max}, τ_{max}, $\tau_{oct(max)}$, and τ_0.

[14M]

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R15

Code No: R15D1502-151-S

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

M.Tech. I Year - I Semester supplementary Examinations, Aug 2016

Advanced Mechanics of Solids

(MD)

Roll No	1	5	N	3						

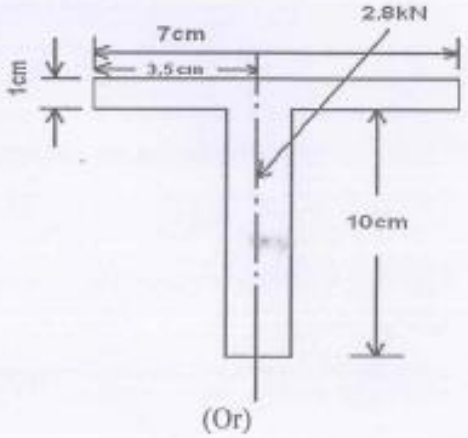
Time: 3 hours **Max. Marks: 75**

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 15 marks.

* * * * * *

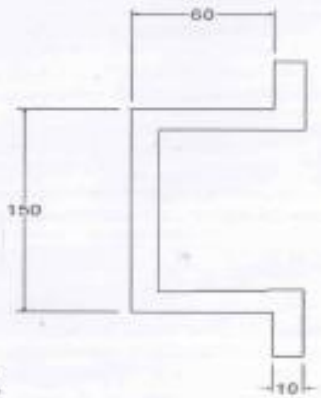
SECTION - I

1. A simply supported beam of length 1.6 m carries a central load of 2.8 KN inclined at 40^0 to the vertical and passing through the centroid of the section a shown in fig.1. Determine: a) maximum tensile stress b) maximum compressive stress and c) deflection due to the load.



(Or)

2. Determine the shear centre of the section shown in figure 2. The thickness of the



Section is 10 mm throughout the cross-section.

Fig. 2.

SECTION – II

3. A chain link is made of 20 mm diameter round with mean radius of circular ends 25mm, length of straight portion being 20 mm. Determine the values of maximum tensile and compressive stresses, when the link is subjected to a pull of 20kN at its ends.

(Or)

4. Find the load carrying capacity of a hook of rectangular cross section 100 x 75 mm. The thickness of hook is 75 mm, the radius of inner fiber is 150 mm while that of outer fibre is 250 mm. The line of action of force passes at a distance of 75 mm from the inner fibres. The allowable stress is 70 N/mm^2.

SECTION – III

5. A shaft of hollow square section of outer side 34mm and inner side 28mm is subjected to twisting such that the maximum shear stress developed of 230N/mm^2. What is the torque acting on the shaft and angular twist if the shaft is 1.0 m long. Take G = $8x10^5$ N/mm^2.

(Or)

6. A thin uniform steel disc of radius 28 cm is rotating about its axis at 3200 r.p.m. Draw the radial and circumferential stress distribution diagram along the radius of the dsc. What are the maximum and minimum values of circumferential and radial stresses. ρ = 0.078 N/cm3, Poisson's ratio = 0.3 and g = 9.81 m/sec^2.

SECTION – IV

7. A plate made of mild steel has a thickness h = 10 mm and covers a circular opening having a diameter of 200 mm. The plate is fixed at the edges and is subjected to a uniform pressure 'p'. i) Determine the magnitude of the yield pressure and deflection at the center of the plate ii) Determine the working pressure based on a factor of safety 2 . For mild steel take E = 200 Gpa, μ = 0.29, Yield stress = 315 GPa.

(Or)

8. A steel I beam (E=200 G Pa) has a depth of 102 mm, width of 68 mm, moment of inertia of $I_x=2.53 \times 10^6$ mm^4, and length of 4 m. It is attached to a rubber foundation for which K_0 = 0.350 N/mm^3. A concentrated load P =30 k N is applied at a location 500 mm from one end of the beam. Determine the maximum deflection, the maximum flexural stress in the beam.

SECTION – V

9. a) Derive expressions for principal stress for contact stresses
b) Briefly explain the methods to compute contact stresses.

(Or)

10. Derive the expression for contact pressure on a single row ball bearing. If the ball diameter is 4 cm, the radius of the groove is 2.5 cm. The diameter of the outer race is 20 cm and the greatest compressive force on one ball is 5 kN. Calculate the contact pressure.

Code No: R15D1502

R15

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
M.Tech I Year - I Semester Supplementary Examinations, July/Aug 2018
Advanced Mechanics of Solids
(MD)

Roll No										

Time: 3 hours **Max. Marks: 75**

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 15 marks.

******

SECTION-I

1. A 90 mm × 60 mm × 10 mm unequal angle is placed with the larger leg vertical as shown in Fig.. It is subjected to a sagging bending moment of 700 N-m on the horizontal axis. Determine the stresses induced at points P_1 and P_2.
[15M]

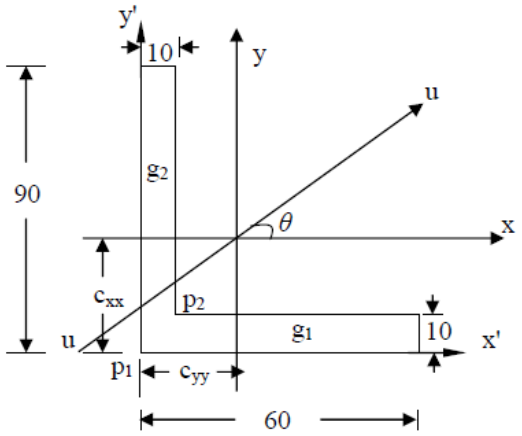


Fig.1

OR

2. An ISWB 200 mm × 140 mm rolled steel beam is freely supported over a span of 2 meters. It is subjected to a bending moment of 1000 kg m at the central section, the oy^1 of the plane of loading being inclined at 20^0 to the principal axis oy. If I_{xx} = 2624.5 cm^4 and I_{xy} = 328.8 cm^4 locate the neutral axis and calculate the maximum bending stress induced in the section. Also calculate the maximum deflection of the joint, assuming the bending moment being due to a load 40 kN uniformly distributed over the span.
[15M]

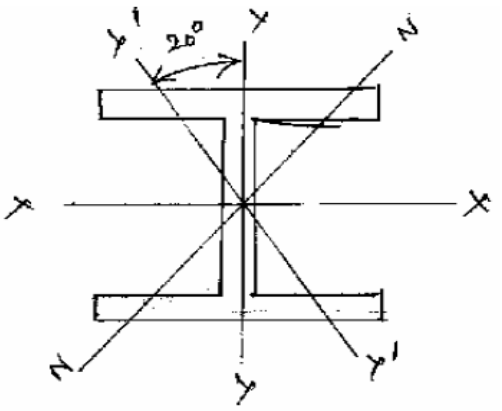


Fig.2

SECTION-II

3. a) What are the limitations in the Winkler Batch Theory. [5M]
   b) Derive the Winkler batch formula for finding circumferential stresses. [5M]
   c) A chain link is made of 20 mm diameter round with mean radius of circular ends 25mm, length of straight portion being 20 mm. Determine the values of maximum tensile and Compressive stresses, when the link is subjected to a pull of 20 kN at its ends.[5M]

OR

4. a) A semicircular girder is fixed at both ends and is subjected to a uniformly distributed load over its entire spa. Determine the expression for moment at mid-span. Also determine the expression for bending moment, shear force and torsional moment at any point in the beam.

5. b) A ring made of 20 mm diameter steel bar carries a pull of 12 kN. Calculate the maximum tensile and compressive stresses in the ring. The mean radius of the ring is 200 mm. [8M]

SECTION-III

6. a) Explain Saint-Venant's semi-inverse method. [7M]
   b) The aluminum (G=27.1GPa) hollow thin walled torsion member has shown dimensions in Fig.3. Its length is 3m. If the member is subjected torque of 11KN-m, determine the maximum shear stress and angle of twist.
   [8M]

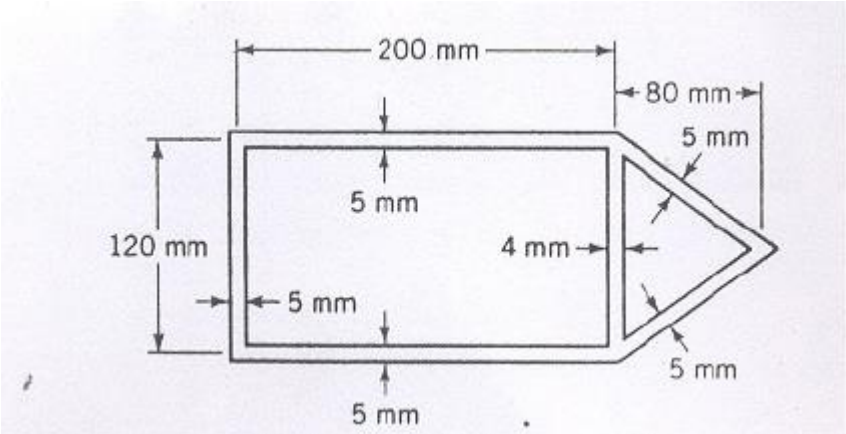


Fig.3

OR

7. a) Derive an expression for the allowable twisting moment for a thin walled tube. Also derive an appropriate expression for strength-weight ratio of such a tube. Take τ_s as an allowable shear stress. [7M]

b) A thin uniform steel disc of radius 28cm is rotating about its axis at 3200 r. p.m. Draw the radial and circumferential stress distribution diagram along the radius of the disc. What are the maximum and minimum values of circumferential and radial stresses? Weight density, ρ = 0.078 ; Poisson's ratio = 0.3; g=9.81. [8M]

SECTION-IV

8. a) Analyze a circular plate freely supported around the edge and having a central hole carrying distributed load. Obtain maximum deflection and moment. [7M]

b) A square structural steel trap door (E = 200 G Pa, υ = 0.29 and γ = 240 M Pa) has a side length of 1.50 m and thickness of 15mm. The plate is simply supported and subjected to a uniform pressure. Determine the yield pressure P_γ and maximum deflection when this pressure is applied. [8M]

OR

9. a) A solid plate of 400mm diameter and 20mm thickness is acted upon by a uniformly distributed load of 1000 kN/m^2. Calculate the central deflection and the values of the maximum stress in the radial and tangential directions when i) The edges are truly supported and ii) The edges firmly clamped. Take E=205 G Pa; and poisson's ratio, υ = 0.3. [7M]

b) An infinitely long steel beam of unit width and 200mm thick is resting on an elastic foundation whose modulus of foundation is 10 N/mm^2. A concentrated load of 8 KN is applied at a point on the beam. Determine the maximum deflection of the beam and the maximum bending stresses. Take E = 2 × 105 N/mm2, υ =0.28. [8M]

SECTION-V

10. a) Explain the significance of calculating contact stresses when two bodies in contact.[7 M]

(b) Explain the procedure to calculate contact stresses when two bodies (sphere and sphere) in contact. [8M]

OR

10. A feed roll consists of two circular cylindrical steel rollers, each 200 mm in diameter and arranged so that their longitudinal axes are parallel. A cylindrical steel shaft (60 mm in diameter) is fed between the rollers in such a manner that its longitudinal axis is perpendicular to that of the rollers. The total load P between the shaft and rollers is 4.5 KN. Determine the values of the maximum principal stress and maximum shear stress in the shaft. [15M]

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Code No: R17D1502

R17

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
M.Tech I Year - I Semester Supplementary Examinations, July/Aug 2018
Advanced Mechanics of Solids
(MD)

Roll No										

Time: 3 hours **Max. Marks: 70**

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

****

SECTION-I

11. a) Differentiate between symmetrical bending and unsymmetrical bending. [7M]

b) Locate the shear centre for the beam cross section shown in Fig.1 The walls of the cross section have constant thickness t=2.50 mm. [7M]

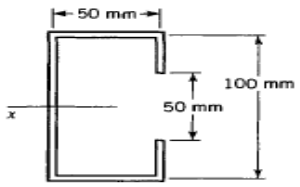

Fig.1

(OR)

12. Locate the shear centre for the beam cross-section shown in **Fig.2** The walls of the cross-section have constant thickness t=2mm. [14M]

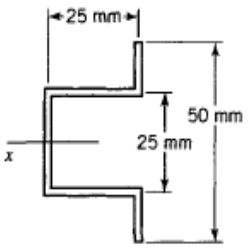

Fig.2

SECTION-II

13. a) Derive Winkler Bach expression for circumferential stress. [7M]

b) A beam fixed on elastic foundation carries a uniformly distributed transverse load throughout its length. Derive the expressions for shear force, bending moment, slope and deflection at any point on the beam. [7M]

(OR)

14. A T-section curved beam has the cross section shown in **Fig.3** The center of curvature lies 40mm from the flange. If the curved beam is subjected to a positive bending moment M_x=2.50 KN-m, determine the stresses at the inner and outer radii. Use Bleich's correction factors. What is the maximum shear stress in the curved beam. [14M]

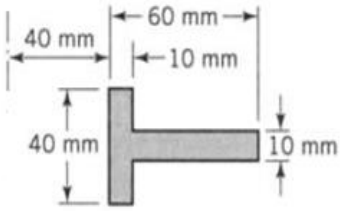

Fig.3

SECTION-III

15. A hollow thin-wall torsion member has two compartments with cross-sectional dimensions as indicated in **Fig.4** The material is an aluminium alloy for which G=26.0 GPa. Determine the torque and unit angle of twist if the maximum shear stress, at locations away from stress concentrations, is 40.0 MPa. [14M]

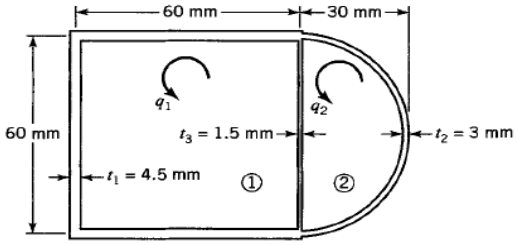

Fig.4

(OR)

16. A hollow circular torsion member has an outside diameter of 22.0 mm and an inside diameter of 18.0mm, with mean diameter D=20.0 mm and t/D=0.10.
    a) Let the shear stress at the mean diameter be τ=70.0MPa. Determine T and θ and compare these values with values obtained using the elasticity theory. G=77.5GPa.
    b) Let a cut be made through the wall thickness along the entire length of the torsion member and let the maximum shear stress in the resulting torsion member be 70.0MPa. Determine T and θ. [7+7M]

SECTION-VI

17. A square structural steel trap door (E=200GPa, v=0.29, and Y=240 MPa) has a side length of 1.50 m and thickness of 15 mm. The plate is simply supported and subjected to a uniform pressure. Determine the yield pressure P_Y and maximumdeflection when this pressure is applied. [14M]

(OR)

18. An infinitely long beam rests on an elastic foundation and is loaded by two equal forces *P* spaced at a distance L. The beam has bending stiffness EI and the foundation has a spring constant *k*. Find the distance L such that the deflection y under one of the forces is the same as the deflection midway between the two forces. [14M]

SECTION-V

19. A hard steel ball (*E*=200GPa and v=0.29) of diameter 50 mm is pressed against a thick aluminium plate (E=72.0 GPa, v=0.33, and Y=450MPa),. Determine the magnitude of load P_Y required to initiate yield in aluminium plate according to the octahedral shear stress criterian of failure. [14M]

(OR)

20. A cylindrical steel roller, with diameter 30 mm, is used as a follower on a steel cam. The surface of the cam at the contact region is cylindrical with radius of curvature 6mm. Under no load, the follower and cam are in line contact over a length of 15mm. For a value σ_{max}=-1000MPa, determine the corresponding applied load *P* (E=200GPa and v=0.29).
Also determine the load *P* that can be applied to the cylinders to cause fatigue failure after 10^9 cycles (β=0). [14M]

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Code No: R15D1503

R15

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
M.Tech I Year - I Semester supplementary Examinations, Jan/Feb 2018
Fatigue, Creep & Fracture Mechanics
(MD)

Roll No										

Time: 3 hours **Max. Marks: 75**

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 15 marks

.

Section-I

Q. No. 1 Explain in detail the Von Mises criterion for predicting the yielding in ductile metals.

15 Marks

OR

Q. No. 2 a) Explain ductile Vs brittle behavior considering stress-strain curve? 10 Marks

b) How fracture stress and crack related to each other. 5 Marks

Section-II

Q. No. 3 a) Write a short notes on Dugdale's modelof plastic zone 7Marks

b) How plastic zone size can be estimated at crack tip. 8 Marks

OR

Q. No. 4 Explain the stress distribution in a plate carrying uni axial load and containing hole of following shape: (i) Circular (ii) elliptical. 15 Marks

Section-III

Q. No. 5 a) What are R curve? Explain in detail. 8 Marks

b) Write about J-controlled fracture? 7 Marks

OR

Q. No.6 a) Explain about CTOD 7 Marks

b) The basic procedure can be used to measure *J* near the onset of ductile crack extension.

8 Marks

Section-IV

Q. No. 7 a) Write a short notes on Fatigue under combined stresses. 8 Marks

b) What is miner's rule of fatigue? 7 Marks

OR

Q. No. 8 a) Write short notes on empirical fatigue crack growth equations. 8 Marks

b) Write about S-N curve (stress vs number of cycles) of ferrous and non ferrous metals.

7marks

Section-V

Q. No. 9 a) Explain Constant load and constant stress creep curve. 10 Marks

b) Write about following creep deformation mechanisms (i) Dislocation Creep (ii) Diffusion Creep.

5Marks

OR

Q. No. 10 a) Explain in detail the factors affecting fatigue strength of welded joints.

7Marks

b) What is Damage accumulation Rule? 8 Marks

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Code No: R17D1503

R17

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
M.Tech I Year - I Semester Regular Examinations, Jan/Feb 2018
Fatigue, Creep & Fracture Mechanics
(MD)

Roll No										

Time: 3 hours **Max. Marks: 70**

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 14marks.

******

Section-I

Q. No. 1 a) Explain in detail the theory of ductile to brittle transition?
8 Marks

b) What are various ways in which a notch increases the tendency for brittle fracture?
6 Marks

OR

Q. No. 2 a) Explain why some materials show a sharp ductile-brittle transition at transient temperature, while others do not.
4Marks

b) Write a short notes on Equivalency of G (Mechanical energy release rate) and K (Stress intensity factor). 10 Marks

Section-II

Q. No. 3 a) Explain stress concentration factor with an example. 6 Marks

b) Explain the effect of specimen thickness on stress and mode of fracture.
8 Marks

OR

Q. No. 4 a) What are different modes of crack opening.
6 Marks

b) A steel plate with a through thickness crack of length 2a = 20mm is subjected to a stress of 400 MPa normal to the crack. If the yield strength of the steel is 1500MPa,what is the plastic zone size and stress intensity factor for the crack. Assume that the plate is infinitely wide.
8 marks

Section-III

Q. No. 5 a) What is the significance of R curves? 6 Marks

b) For which regions of deformation can J- integral be used.
4 Marks

c) How J-integral is related to K (stress intensity factor) 4 Marks

OR

Q. No.6 a) Explain J-Integral Crack growth criterion. 7 Marks

b) What are the possibilities of determining the critical value of J-integral. 7 Marks

Section-IV

Q. No. 7 a) Explain following fatigue stress cycles (i) Reversed (ii) Repeated (iii) Irregular. 7 Marks

b) Explain the effect of mean stress on Fatigue. 7Marks

OR

Q. No. 8 a) Derive Goodman line equation. 6 Marks

b) What is the difference between Goodman and soderberg methods. 8 Marks

Section-V

Q. No. 9 a) Explain the effect of stress on creep curves at constant temperature. 8 Marks

b) Write about the methods of presenting creep data. 6 Marks

OR

Q. No. 10 a) Explain in detail the factors affecting fatigue strength of welded joints. 8 Marks

b) Write about (i) Creep rate (ii) creep strength (iii) Dislocation Glide. 6 Marks

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Code No: R15D1503

R15

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
M.Tech I Year - I Semester supplementary Examinations, August 2017
Fatigue, Creep & Fracture Mechanics
(MD)

Roll No										

Time: 3 hours **Max. Marks: 75**

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 15 marks.

* * * * * *

SECTION-I

1. (a) Explain briefly the ductile/brittle fracture transition temperature for notched and unnotched components
   (b) Define and explain stress intensity factor and strain energy release rate.

OR

2. The load on a bolt consists of an axial pull of 10 kN together with a transverse shear force of 5 kN. Find the diameter of bolt required according to
   i) Maximum shear stress theory
   ii) Maximum distortion energy theory

   Take permissible tensile stress at elastic limit = 100 MPa and Poisson's ratio = 0.3.

SECTION-II

3. What is Westergaard stress function? Explain its applicability for cracked configurations.

OR

4. Explain the Cartesian and polar coordinating system for Mode I and Mode II type of loading.

SECTION-III

5. (a) Explain the reasons for R curve and shape.
   (b) Explain the crack opening displacement approach indetail?

OR

6. What is J- integral? Explain J-integral approach.

SECTION-IV

7. Explain the following:
(a) High cycle fatigue
(b) Fatigue crack closure theories
(c) MINER's law.

OR

8. Explain developments in using rain-flow counting methods to recreate fatigue standard spectra and write its applications.

SECTION-V

9. Write short notes on i)Creep resistant materials ii)Multi axial creep

OR

10. Explain with a neat sketch the creep behavior of a material subject to a constant stress.

R15

Code No: R15D1503-151-S

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

M.Tech. I Year - I Semester supplementary Examinations, Aug 2016

Fatigue, Creep & Fractur Mechanics

(MD)

Roll No	1	5	N	3						

Time: 3 hours **Max. Marks: 75**

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 15 marks.

SECTION - I

1. Explain briefly the ductile/brittle fracture transition temperature for notched and unnotched components

(Or)

2. Explain the construction of mohr's circle of stress in two dimension, extend it to three dimensional state of stress, explain the condition for uniaxial tension and compression, biaxial tension and triaxial tension with neat sketches.

SECTION – II

3. What is Westergaard stress function? Explain its applicability for cracked configurations.

(Or)

4. Explain the Cartesian and polar coordinating system for Mode I and Mode II type of loading.

SECTION – III

5. What is J- integral? Explain J-integral approach.

(Or)

6. Explain fail safe and safe life design approaches related to fracture mechanics.

SECTION – IV

7. What is low cycle fatigue? State coffin-Manson law.

(Or)

8. Discuss the empirical laws of fatigue failure.

SECTION – V

9. Write short notes on i)Creep resistant materials ii)Multi axial creep

(Or)

10. Explain with a neat sketch the creep behavior of a material subject to a constant stress.

Code No: R15D1503

R15

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
M.Tech I Year - I Semester Supplementary Examinations, July/Aug 2018
Fatigue, Creep & Fracture Mechanics
(MD)

Roll No										

Time: 3 hours **Max. Marks: 75**

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 15 marks.

*****

SECTION-I

Q. No. 1. a) Explain stress intensity factor and strain energy release rate. [5M]

b) Explain briefly the ductile/brittle fracture transition temperature for notched and unnotched components? [5 M]

c) What do you mean by Ductile to Brittle Transition Temperature? Explain its importance. [5M]

OR

Q. No. 2 a) Draw engineering stress-strain curves for the following materials and explain its type of fracture. i) Mild steel ii) White cast iron [5M]

b) Explain plane stress and plane strain conditions. [5M]

c) Why actual strength of the material is different from ideal strength? Explain. [5M]

SECTION-II

Q. No. 3 a) Explain stresses and displacement in Cartesian and polar coordinates. [5 M]

b) What is Westergard stress function ? Explain its applicability for cracked configurations? [10M]

OR

Q. No. 4 Write short notes on the following :

(a) Crack-tip triaxiality [5M]

(b) Plastic zone shape [5M]

(c) Allowable plasticity for Linear Elastic Fracture Mechanics. [5M]

SECTION-III

Q. No. 5 a) Explain the reasons for R curve and shape. [7M]

b) What is J-contour integral? Show that J is a path independent.
[8M]

OR

Q. No.6 a) Explain Ratio analysis diagram.
[5M]
b)Explain Fail safe and safe life design approaches.
[10M]

SECTION-IV

Q. No. 7 a) Compare Goodman, Soderberg and Gerber Fatigue design formulae. Show them on
a graph.
[7M]
b) What is low cycle fatigue. State Coffin-Manson law.
[8M]

OR

Q. No. 8 a) Discuss the empirical laws of fatigue failure.
[7M]
b) Discuss the failure mechanisms for metals in the three regions of the fatigue crack growth curve. [8M]

SECTION-V

Q. No. 9 a) Discuss the factors affecting the fatigue life of welded joints.
[5M]
b) What are the Creep properties? Explain Creep-fatigue interaction.
[10M]

OR

Q. No. 10 a) Explain the codes and standards available to the designer.
[5M]
b) Explain with neat sketch the creep behavior of a material subjected to a constant stress.
[10M]

****

Code No: R17D1503

R17

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
M.Tech I Year - I Semester Supplementary Examinations, July/Aug 2018
Fatigue, Creep & Fracture Mechanics
(MD)

Roll No										

Time: 3 hours **Max. Marks: 70**

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

******

SECTION-I

Q. No. 1 a) In what way the temperature affects the fracture
4 Marks
b) Explain Mohr's circle for two dimensional state of stress
10 Marks

OR

Q. No. 2 a) What is the Concept of energy release rate? 7 Marks
b) Explain Tresca criterion of predicting yielding in ductile materials.
7 Marks

SECTION-II

Q. No. 3 a) Explain in detail the following modes of crack propagation with neat sketches (i) opening (ii) sliding (iii) tearing. 7 Marks
b) In what way fracture toughness related to allowable stress and crack size.
7 Marks

OR

Q. No. 4 a) Explain in detail the driving force of a crack and resistance to its propagation.
7 Marks
b) Explain Plain strain fracture toughness measurement using load-displacement curve for compact tension specimen. 7 Marks

SECTION-III

Q. No. 5 a) Explain in detail about R curve for ductile material and brittle material.
10Marks
b) What are the possibilities of determining the critical value of J-integral.
4 Marks

OR

Q. No.6 a) What are the reasons for R curve shape? 7 Marks

b) Define J integral and How J is related to K (Stress intensity factor). 7 Marks

SECTION-IV

Q. No. 7a) Explain in detail about low and high cycle fatigue failures 8 Marks

b) Explain importance of fatigue in Engineering 6 Marks

OR

Q. No. 8 a) A 4340 steel bar is subjected to a fluctuating axial load that varies from a maximum of 330KN tension to a minimum of 110KN compression. The mechanical properties of the steel are: Ultimate stress = 1090 MPa, Yield stress =1010 MPa, Fatigue Limit = 510MPa. Determine the bar diameter to give infinite fatigue life based on a safety factor of 2.5. 10 Mark

b) What is the effect of specimen size on fatigue? 4 Marks

SECTION-V

Q. No. 9 a) Explain strain range partitioning approach for design under creep-Fatigue interaction. 10 Marks

b) Write about (i) Transient creep (ii) Viscous Creep). 4Marks

OR

Q. No. 10 a) What are the methods of improving fatigue performance of welded joints? 8 Marks

b) Write a short notes on influence of residual stress and type of material on fatigue of welded joints. 6 Marks

******

Code No: R15D1503

R15

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

M.Tech. I Semester Regular/supplementary Examinations, February 2017

Fatigue, Creep & Fracture Mechanics

(Machine Design)

Roll No		N	3						

Time: 3 hours **Max. Marks: 75**

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 15 marks.

* * * * * *

SECTION-I

1 (a) Define failure and explain various modes of failure occur in material systems.
(b) What advantage does the fracture mechanics approach afford the engineer in designing components compared to traditional approaches.

OR

2. (a) With the help of a stress – strain diagram, discuss the 'Strain – Hardening' in a poly crystalline material. Enumerate the reasons for strain hardening.
(b) Explain the construction of Mohr's circle in 2D state of stress

SECTION-II

3. (a) Explain various modes of fracture occur in materials? 5M
(b) How the fracture toughness of material can be determined. Explain the influence of various factors on fracture toughness.

OR

4. (a) Describe the three modes of fracture by appropriate sketches

(b)Discuss the Fatigue crack-growth phenomenon through the following relations by Graphs
(i) Instantaneous crack length versus no. of cycles of failure.
(ii) dc/dn versus Stress Internsity Factor range.

SECTION-III

5. What is J- integral? Explain J-integral approach.

OR

6. (a) Explain fail safe and safe life design approaches related to fracture mechanics.
(b)) Determine the energy release rate for a double cantilever beam.

SECTION-IV

7. Write short notes on the following:
(a) Coffin – Marson law.
(b) Three principle ways in which fatigue stresses develop.
(c) good man mean stress corrections

OR

8. (a) What is low cycle fatigue? State and explain coffin-Manson law.
(b) Discuss the empirical laws of fatigue failure.

SECTION-V

9. Write notes on codes and standards for fatigue of welded structures.

OR

10. (a) Discuss on factors affecting the fatigue failure of welded joints.
(b) Discuss on creep-fatigue interactions.

****

Code No: R15D1504

R15

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
M.Tech I Year - I Semester supplementary Examinations, Jan/Feb 2018
Advanced Finite Element Analysis
(MD)

Roll No										

Time: 3 hours **Max. Marks: 75**

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 15 marks

* * * * * *

SECTION - I

1(a) What is the FEM and what are the applications of FEM. Also write the advantages and disadvantages of FEM.. (10M)

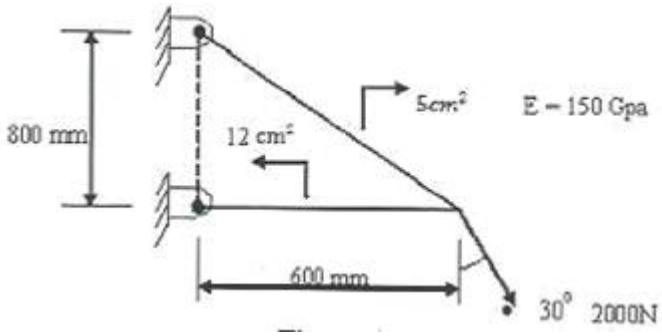
(b) List out the various properties of stiffness matrix. (5M)

(Or)

2 Discuss convergence requirements in finite element formulation. Derive the shape function for 3-noded truss element by Lagrangian interpolating function. (15M)

SECTION – II

3 Calculate the nodal displacement, stresses and support reactions for the truss shown in figure. (15 M)



(Or)

4 (a) Differentiate among Bar element, Truss element and Beam element indicating D.O.F and geometry characteristics for determining stiffness matrix. (10M)

(b) Describe EFA Hermite shape functions. (5M)

SECTION – III

5. (a) Derive the stiffness matrix [K] and the load vector for the two dimensional six nodded triangular element, also determine nodal displacements of triangular element, strain and stress of an element. (10M)

(b) Differentiate between CST and LST with respect to the triangular element. (5M)

(Or)

6. Determine the element equations for the plane stress element shown in Fig.1. The element
has a 20 N/cm^2 load acting perpendicular to side jk and is subjected to a 15ºC temperature
rise. Thickness of the element = 2 cm; E = 6 × 106 N/cm^2 α = 7 × 10–6 cm/cm ºC; μ = 0.25

(15M)

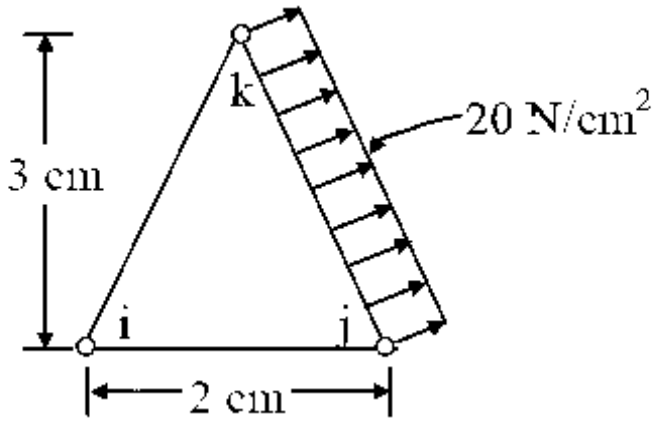


Fig.1

SECTION – IV

7. Consider a brick wall of thickness 0.3 m , k=0.7 W/m K . The inner surface is at 280^0 C and the outer surface is exposed to cold air at -150^0 C. The heat transfer coefficient associated with the outside surface is 40W/m^2 K. Determine the steady state temperature distribution within the wall and also the heat flux through the wall. Use two elements and obtain the solution. (15M)

(Or)

8. For the two dimensional body as shown figure 2, determine the temperature distribution. The left and right ends have constant temperatures of 200^0 C and 100^0 C respectively. Take k=5 W/cm^0 C. The body is insulated along the top and bottom. (15M)

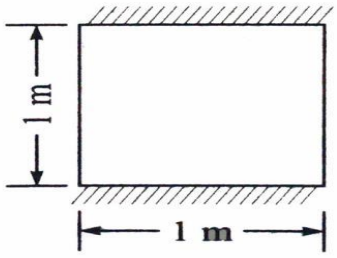


Fig.2

SECTION – V

9. (a) Distinguish between consistent mass matrix and Lumped mass matrix. 5M
(b) Consider axial vibration of the steel bar shown in Fig.3, (i) develop the global stiffness and mass matrices and (ii) determine the natural frequencies and mode

shapes using the characteristic polynomial technique. 10M

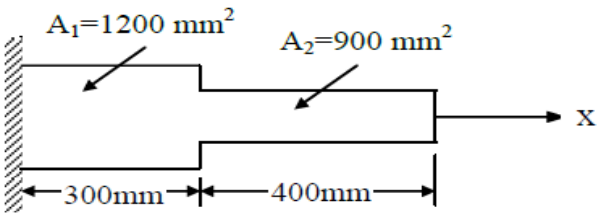


Fig.3

(Or)

10. Evaluate eigen values and eigen vectors for a cantilever beam of length 1 m, supported at the other end. Take E = 200GPa, I = 40 × 10^{-10} m^4, A = 2 × 10^{-4} m^2 and weight density = 7850 kg/m^3. Use one element method. (15M)

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Code No: R15D1504

R15

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
M.Tech I Year - I Semester supplementary Examinations, August 2017
Advanced Finite Element Analysis
(MD)

Roll No										

Time: 3 hours **Max. Marks: 75**

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 15 marks.

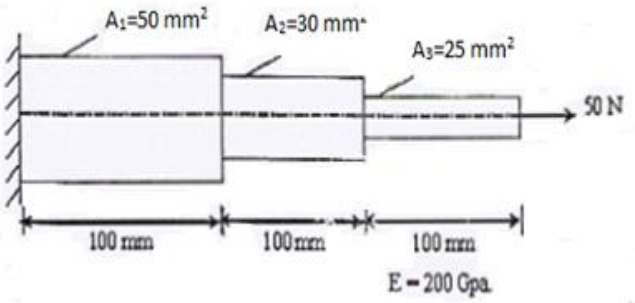
****

SECTION-I

1. a. List the advantages and disadvantages of FEM over other traditional variation methods.
   b. Derive the finite element equation using the potential energy approach.

(OR)

2. a.Use finite element method to calculate displacement and stresses of the bar as shown in figure.1.



b. List and briefly describe the general steps of the finite element method.

SECTION-II

3. a) Differentiate between planar frame element and space frame element.
   b) Calculate the nodal displacement, stresses and support reactions for the truss shown in figure Assume the missed data

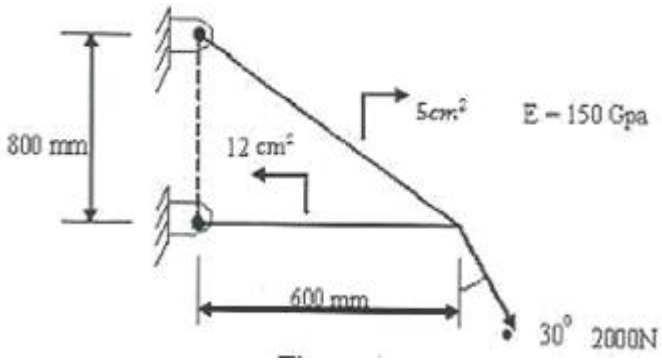


Figure.1

(OR)

4. For a beam and loading shown in Figure.2, determine the slopes at 2 and 3 and the vertical deflection at the mid point of the distributed load.

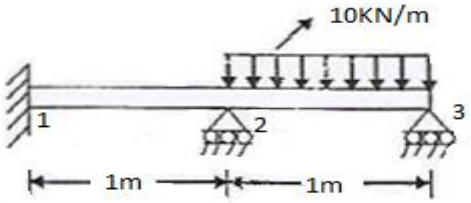


Figure.2

SECTION-III

5. a. Derive the stiffness matrix of an axisymmetric element using potential approach.

b. Compute the finite element equation for the LST element as shown in Figure.3

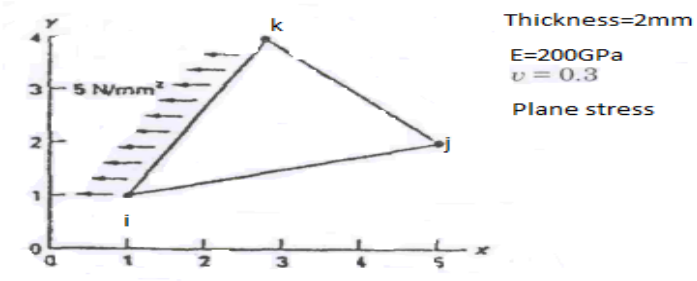


Figure.3

(OR)

6. a. What are the non-zero strain and stress components of axisymmetric element? Explain.

b. The nodal coordinates of the triangular element shown in figure 4 At the interior point P the x coordinate is 3.3 and the shape function at the node 1 is N_1 is 0.3 Determine the shape functions at nodes 2 and 3 and also y coordinate of point P

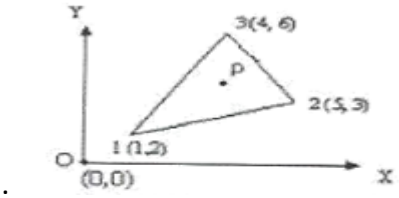


Figure.4

SECTION-IV

7. Derive a finite element equation for one dimensional heat conduction with free end convection.

(OR)

8. Consider a brick wall of thickness 0.3m, k=0.7 W/m K. The inner surface is at 28^0C and the outer

surface is exposed to cold air at -15^0C. The heat transfer coefficient associated with the outside

surface is 40 W/m^2K. Determine the steady state temperature distribution within the wall and also

the heat flux through the wall. Use two elements and obtain the solution.

SECTION-V

9. Consider the axial vibrations of a steel bar shown in Figure.5
   a) Develop global stiffness and mass matrices,
   b) Determine the natural frequencies?

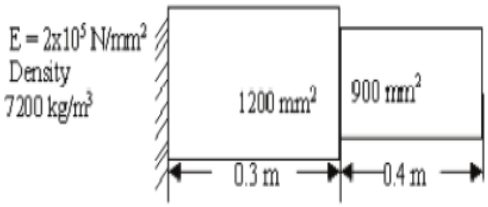


Figure.5

(OR)

10. Derive the equation of motion based on weak form for transverse vibration of a beam.

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R15

Code No: R15D1504-151-S

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

M.Tech. I Year - I Semester supplementary Examinations, Aug 2016

Advanced Finite Element Analysis

(MD)

Roll No	1	5	N	3						

Time: 3 hours Max. Marks: 75

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 15 marks.

* * * * * * *

SECTION - I

1. a)Define the stiffness matrix and describe the characteristics of the stiffness matrix.
   b)What are the advantages and limitations of finite element analysis over other numerical methods?

(Or)

2. a) Explain in detail about Galerkin method with an example.
   b) Explain in detail about Rayleigh- Ritz method.

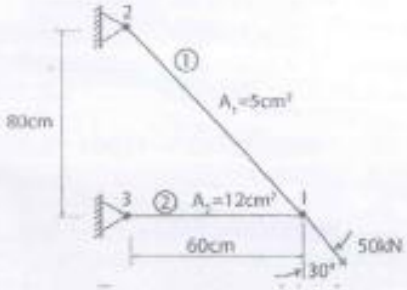
SECTION – II

3. The vertically supported stepped bar is shown in fig. the specific weight is 75kN/m^3. A point load of 100kN acts at the middle node. Determine the stress in each element and the support reaction. Take E = 200GPa.

Fig. 1

(Or)

4. Calculate the stress in element1 of the truss shown in fig. take E = 20×10^6 N/cm^2



SECTION – III

5. Derive Hermite shape function and also discuss its usefulness and limitations. Obtain the genetic form of finite element equations for a beam element.

(Or)

6. Determine the deflection and stresses at the point of load application on a plate by considering two triangular element shown in fig. assume thickness t = 4mm poisson's ratio = 0.25 and E = 210GPa

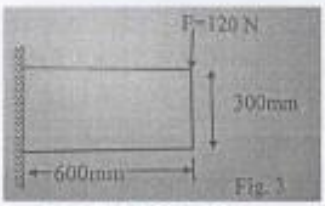


Fig. 3

SECTION – IV

7. Derive the genetic element equations for a One dimensional heat transfer problem.

(Or)

8. Explain the finite element formulation of a stepped circular shafts subjected to torsion.

SECTION – V

9. Explain the following with examples.
   (a) Lumped parameter model
   (b) Consistent mass matrix model.

(Or)

10. Using a single finite element, determine the natural frequencies of vibration of a cantilever beam of length L, assuming constant values of P,E, and A.

Code No: R15D1504

R15

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

M.Tech. I Semester Regular/supplementary Examinations, February 2017

Advanced Finite Element Analysis

(Machine Design)

Roll No			N	3						

Time: 3 hours Max. Marks: 75

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 15 marks.

SECTION-I

1. a. What is the need for developing the overall stiffness matrix of the entire structure in terms of its global coordinate system? Give an example.
   b. What are the Lagrangian interpolation functions? Using the same derive the shape functions for a One-dimensional linear element.

(OR)

2. The differential equation for a phenomenon is given by $\frac{d^2y}{dx^2}+500x^2=0$, $0\le x\le 5$ .The boundary conditions are y(0)=y(5)=0. Find the approximate solution using any classical technique. Start with minimal possible approximate solution.

SECTION-II

3. For the plane trusses supported by the spring at node 1 in Figure-1, determine the nodal displacement and stresses in each element. Let E=210GPa and A=5.0x10^{-4} m^2.

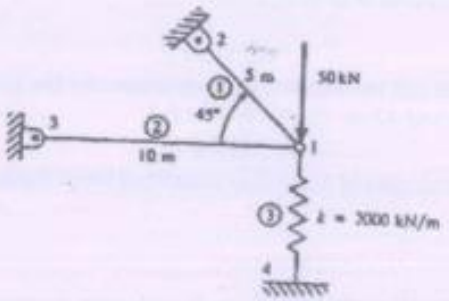


Figure-1

(OR)

4. A concentrated load P=50 KN is applied at the centre of a fixed beam of length 3m, depth 200 mm and width 120 mm. calculate the deflection and slope at the midpoint. Assume E=2x10^5 N/mm^2.

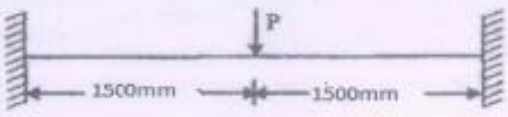


Figure.2

SECTION-III

5. Derive the stiffness matrix for a CST element using potential approach.

(OR)

6. Establish the shape functions and derive the strain displacement matrix for an axisymmetric triangular element.

SECTION-IV

7. A composite wall consists of three materials as shown in Figure.3. The outer temperature is T_0=20^{0}c. convection heat transfer takes place on the inner surface of the wall with T_∞=800^{0}c and h=25W/m^{2}^{0}c. Determine the temperature distribution in the wall.

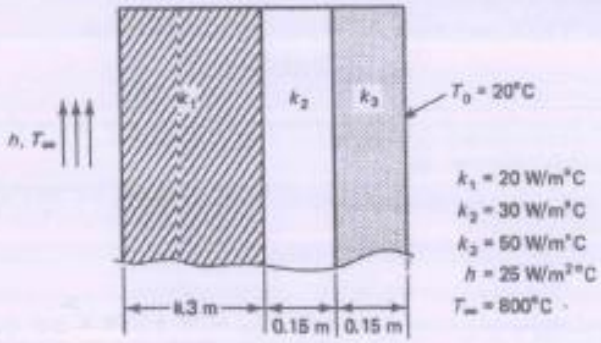


Figure.3

(OR)

8. Heat generated in a large plate (0.8W/m K) at the rate of 4000W/m^3. The plate is of thickness 25cm. The outer surface is exposed to an ambient air with a heat transfer coefficient of 20 W/m^{2}K at 30^{0}c. If the inside surface temperature is 500^{0}c ,calculate the temperature at a distance of 10cm from the inner wall. Assume cross sectional area is 62.5 mm^2.

SECTION-V

9. Find the natural frequencies and corresponding mode shapes for the longitudinal vibrations for a stepped bar having A1=2A and A2=A; I1=I2=I & E1=E2=E.

(OR)

10. Determine all natural frequencies of the simply supported beam shown in Figure.4.Take E=200GPa and density=7840 kg/m^3.

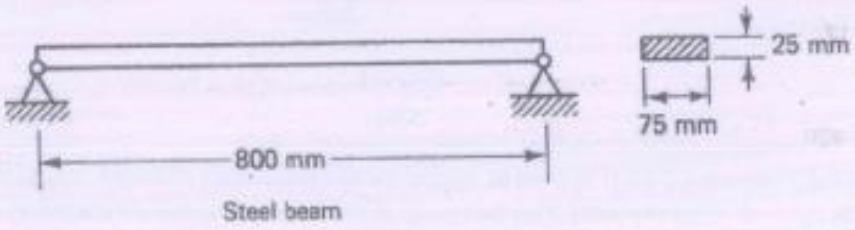


Figure.3

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Code No: R15D1507

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
M.Tech I Year - I Semester supplementary Examinations, Jan/Feb 2018
Advanced Mechanics of Composite Materials
(MD)

R15

Roll No										

Time: 3 hours **Max. Marks: 75**

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 15 marks

*****

SECTION-I

1. a) List out the reasons, why polymers are preferred in making laminated composites.[8M]
   b) What are ceramic composites? Discuss their important properties and applications.[7M]

(OR)

2. a) Write a brief note on engineering applications of composites. [7M]
   b) How do you classify the composites based on the matrix material used? List a few composites with appropriate matrix and reinforcement. [8M]

SECTION-II

3. a) Explain briefly various properties of typical composite materials. [7M]
   b) Explain briefly about autoclave method. [8M]

(OR)

4. Write various manufacturing methods of composites. Explain about RTM method. [15M]

SECTION-III

5. a) Derive the relationship between elastic constants of lamina. [8M]
   b) Find the coefficients of thermal expansion for a 600 angle lamina of glass/epoxy whose longitudinal and transverse coefficients of thermal expansion are 8.6×10^{-6} m/m/^{0}c and 22.1×10^{-6} m/m/^{0}c respectively. [7M]

(OR)

6. a) What is the relationship between the elements of the transformed compliance matrix for a 0 and 90° lamina? [7M]
   b) A uniaxial load is applied to a 10° ply. The linear stress–strain curve along the line of load is related as $\sigma_x = 123\epsilon_x$, where the stress is measured in GPa and strain in m/m. Given $E_1 = 180$ GPa, $E_2 = 10$ GPa and $\upsilon_{12} = 0.25$, find the value of (1) shear modulus, G_{12}; and Young's modulus Ex for a 60° ply. [8M]

SECTION-IV

7. Derive the expressions to E_{11}, E_{22}, υ_{12} and G_{12} in terms of constituent properties using micromechanics principles. [15M]

(OR)

8. a) Explain about Strength of orthotropic lamina [8M]
   b) Explain about strength of a lamina under tension and shear. [7M]

SECTION-V

9. Derive the governing differential equations for a symmetric cross ply laminated plate [15M]

(OR)

10. Explain briefly about cross ply angle ply laminated plates. [15M]

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R17

Code No: R17D1507

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
M.Tech I Year - I Semester Regular Examinations, Jan/Feb 2018
Advanced Mechanics of Composite Materials
(MD)

Roll No										

Time: 3 hours **Max. Marks: 70**

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 14marks.

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Section- I

Q. No. 1 a) Enumerate the classification of composite materials. [10M]
b) What are the advantages of composite materials over conventional materials? [04M]

OR

Q. No. 2 a) Explain about ceramic matrix composites. [10M]
b)Discuss advantages and applications of metal matrix composites [04M]

Section- II

Q. No. 3 a) Explain semi-empirical models for evaluating elastic constants of a lamina [12M]
b) Define Fiber volume fraction and Matrix volume fraction [02M]

OR

Q. No. 4 a) Discuss filament winding process with a neat sketch. [10M]
b) What are the advantages of spay-layup technique? [04M]

Section- III

Q.No. 5 a) Find the relationship between the engineering constants and its compliance matrix for composite material. [10M]
b) Write number of engineering elastic constants for orthotropic and anisotropic Materials. [04M]

OR

Q.No. 6 Find the strains in the 1–2 coordinate system (local axes) in a unidirectional q Boron/epoxy lamina, if the stresses in the 1–2 coordinate system applied to are σ_1= 4 MPa, σ_2 = 2 MPa, and τ_{12} = –3 MPa.
Use the properties of a unidirectional Boron /epoxy lamina
E_1 = 204GPa, E_2 = 18.5 GPa, v_{12} = 0.23, G_{12} = 5.59 GPa [14M]

Section- IV

Q.No. 7 Find the Engineering constants for a 30° angle ply lamina. Use the following properties: E_1=204GPa, E_2=18.5GPa, υ_{12}=0.2, G_{12}=5.359GPa [14M]

OR

Q.No. 8 An off axis lamina with 30^0 fiber angle is subject to bi-axial loading σ_x= -σ_0, σ_y= - σ_0. Using Max. strain theory find σ_0. Use the following properties
E_1=145GPa, E_2=104GPa, G_{12}=6.9GPa, υ_{12}=0.27, F_{ic}=1725MPa, F_{2c}=207MPa. [14M]

Section- V

Q.No. 9 Discuss Classical laminated theory. [14M]

OR

Q.No. 10 Expand the following laminated codes

a) [0/-45/90/60/30] [05M]

b) $[0/-45/90_2/60/0]$ [05M]

c) $[0/-45/60]_s$ [04M]

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Code No: R15D1507

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
M.Tech I Year - I Semester supplementary Examinations, August 2017
Advanced Mechanics of Composite Materials
(MD)

Roll No										

Time: 3 hours **Max. Marks: 75**

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 15 marks.

Assume suitable data wherever necessary.

* * * * * *

SECTION - I

1. (a) Classify Composites based on various criteria.
   (b)What's the difference between a Lamina and a Laminate?

(OR)

2. (a)What are the primary advantages of polymer matrix composites?
   (b)List at least three items made of Composites; identify the Matrix and Reinforcement materials for each.

SECTION – II

3. Derive expressions for the elements [Cij} of the stiffness matrix for a transversely isotropic material directly in terms of the five independent material constants E1, E2, v12, v23, andG12.

(OR)

4. Write short notes on the following with respect to manufacturing of compostes :--
   (i) filament winding (ii) pultrusion

SECTION – III

5. Consider the graphite-reinforced composite material given below:

$$E_1 = 155.0\ \text{GPa}, \qquad E_2 = E_3 = 12.10\ \text{GPa}$$
$$\nu_{23} = 0.458, \qquad \nu_{12} = \nu_{13} = 0.248$$
$$G_{23} = 3.20\ \text{GPa}, \qquad G_{12} = G_{13} = 4.40\ \text{GPa}$$

(a) Determine the reduced compliance and stiffness matrices. (b) Check that the two matrices obtained in (a) are indeed inverses of each other by multiplying them together to get the identity matrix.

(OR)

6. Consider a plane element of size 50mm×50mm made of glass-reinforced polymer composite material whose elastic constants are given below.

$$E_1 = 50.0\ \text{GPa}, \qquad E_2 = E_3 = 15.20\ \text{GPa}$$
$$\nu_{23} = 0.428, \qquad \nu_{12} = \nu_{13} = 0.254$$
$$G_{23} = 3.28\ \text{GPa}, \qquad G_{12} = G_{13} = 4.70\ \text{GPa}$$

The element is subjected to a tensile stress σx = 100MPa in the x-direction. Calculate the strains and the deformed dimensions of the element in the following three cases:
(a) the fibers are aligned along the x-axis.
(b) the fibers are inclined to the x-axis with an orientation angle θ = 45^0.
(c) the fibers are inclined to the x-axis with an orientation angle θ = -45^0.

SECTION – IV

7. Explain the follwwing theories:-
(i) Maximum Stress Theory (ii)Maximum Strain Theory (iii) Tsai-Hill Theory (Deviatoric strain energy theory)

(OR)

8. (a)Distinguish between Failure in Isotropic and Transversely Isotropic Materials.
(b)Brief out First ply failure.

SECTION – V

9. With respect to Laminate Analysis, Explain the following equations with the help of appropriate diagrams. Clearly specify the meaning of each symbol.

$$\begin{Bmatrix} N_x \\ N_y \\ N_{xy} \end{Bmatrix} = \begin{bmatrix} A_{11} & A_{12} & A_{16} \\ A_{12} & A_{22} & A_{26} \\ A_{16} & A_{26} & A_{66} \end{bmatrix} \begin{Bmatrix} \varepsilon_x^0 \\ \varepsilon_y^0 \\ \gamma_{xy}^0 \end{Bmatrix} + \begin{bmatrix} B_{11} & B_{12} & B_{16} \\ B_{12} & B_{22} & B_{26} \\ B_{16} & B_{26} & B_{66} \end{bmatrix} \begin{Bmatrix} \kappa_x^0 \\ \kappa_y^0 \\ \kappa_{XY}^0 \end{Bmatrix}$$

$$\begin{Bmatrix} M_x \\ M_y \\ M_{xy} \end{Bmatrix} = \begin{bmatrix} B_{11} & B_{12} & B_{16} \\ B_{12} & B_{22} & B_{26} \\ B_{16} & B_{26} & B_{66} \end{bmatrix} \begin{Bmatrix} \varepsilon_x^0 \\ \varepsilon_y^0 \\ \gamma_{xy}^0 \end{Bmatrix} + \begin{bmatrix} D_{11} & D_{12} & D_{16} \\ D_{12} & D_{22} & D_{26} \\ D_{16} & D_{26} & D_{66} \end{bmatrix} \begin{Bmatrix} \kappa_x^0 \\ \kappa_y^0 \\ \kappa_{XY}^0 \end{Bmatrix}$$

$$A_{ij} = \sum_{k-1}^{N} \bar{Q}_{ij_k}(z_k - z_{k-1})$$
$$B_{ij} = \frac{1}{2}\sum_{k=1}^{N} \bar{Q}_{ij_k}\left(z_k^2 - z_{k-1}^2\right)$$
$$D_{ij} = \frac{1}{3}\sum_{k=1}^{N} \bar{Q}_{ij_k}\left(z_k^3 - z_{k-1}^3\right)$$

(OR)

10. Consider a graphite-reinforced polymer composite laminate with the elastic constants as given in Question No.5. The laminate has total thickness of 0.600mm and is stacked as a $[+45/0/-30]^T$ laminate. The three layers are of equal thickness. Calculate the [A], [B], and [D] matrices for this laminate.

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Code No: R15D1507-151-S

R15

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

M.Tech. I Year - I Semester supplementary Examinations, Aug 2016

Advanced Mechanics of Composite Materials

(MD)

Roll No	1	5	N	3						

Time: 3 hours **Max. Marks: 75**

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 15 marks.

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SECTION - I

1. Explain the classification of composites and their applications in detail.

(Or)

2. a) Differentiate between thermo sets and thermo plastics.
   b) What are important characteristics of boron carbide fibers? How they are produced.?

SECTION – II

3. What are unidirectional composites? Explain their constituent materials and properties.

(Or)

4. Discuss about the followirg:
   a) Autoclaves b) Filament winding process c) Pultrusion

SECTION – III

5. a) What is off-axis compliance? Explain.
   b) Explain Hooke's law for a two dimensional unidirectional lamina?

(Or)

6. a)Explain about Halpin-T sai Equations.
   b)Explain about transformation of stress in an unidirectional stressed lamina off - axis system.

SECTION – IV

7. State and Explain Tsai-Hill theory of failure of a lamina.

(Or)

8. Derive the stiffness matrix Q for orthotropic lamina

SECTION – V

9. Discuss the bending of anti-symmetric angle-ply laminate and state the assumptions made in classical laminate plate theory?

(Or)

10. For a graphite/epoxy unidirectional laminate, find
    i)Redued stiffness matrix and ii) transformed reduced stiffness matrix for 60° angle lamina.
    $E_1 = 181$ GPa, $E_2 = 10.3$GPa, $\gamma_{12} = 0.28$ and $G_{12} = 7.17$ GPa

Code No: R15D1507

R15

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
M.Tech I Year - I Semester Supplementary Examinations, July/Aug 2018
Advanced Mechanics of Composite Materials
(MD)

Roll No										

Time: 3 hours **Max. Marks: 75**

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 15 marks.

*****

SECTION-I

5. a) Differentiate between thermo sets and thermo plastics. [7M]
   b) What are important characteristics of boron carbide fibers? How they are produced. [8M]

(OR)

6. a) Differentiate between natural and man – made composites. [8M]
   b) What are metal – matrix composites? Discuss their important properties and applications. [7M]

SECTION-II

7. a) What are unidirectional composites? Explain their constituent materials and properties. [8M]
   b) Explain briefly about filament winding method. [7M]

(OR)

8. a) Explain in detail model for predicting transverse properties of unidirectional Composites. [7M]
   b) Explain briefly about pultrusion method. [8M]

SECTION-III

9. a) Discuss about coordinate transformations in composite materials. [8M]
   b) Deduce a relation between on-axis and off-axis stress transformations for a unidirectional lamina. [7M]

(OR)

10. a) What are the assumptions made in lamination theory. [8M]
    b) The engineering elastic constants of a unidirectional graphite epoxy lamina are as follows:
    E_{11}=181 GPa ; E_{22}= E_{33} =10.3 GPa; υ_{12} =0.28 ; G_{12} =4.4 GPa
    Determine the reduced stiffness matrix. [7M]

SECTION-IV

11. a) Derive the expressions to υ_{12}, and G_{12} in terms of constituent properties using micromechanics principles. [8M]
    b) Explain Failure envelop. [7M]

(OR)

12. Discuss the failure mechanisms in fibre reinforced polymer matrix composites and describe a

failure theory which is widely used for testing of polymer composites. [15M]

SECTION-V

13. a) Sate the basic assumptions made in thin plate theory [7M]
    b) Briefly discuss about angle ply laminate. [8M]

(OR)

14. Derive the equilibrium equations for a laminated composite plate subjected to transverse loads. [15M]

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Code No: R17D1507

R17

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
M.Tech I Year - I Semester Supplementary Examinations, July/Aug 2018
Advanced Mechanics of Composite Materials
(MD)

Roll No										

Time: 3 hours **Max. Marks: 70**

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

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SECTION- I

Q. No. 1 a) What is a composite material? [02M]

b) Discuss in detail about particulate composites. [12M]

OR

Q. No. 2 a) What is the function of reinforcing phase in composites? [02M]

b)Discuss about (i) Glass fiber (ii) Carbon fiber (iii) Boron fiber [12M]

SECTION- II

Q. No. 3 a) What is an Uni-diectional lamina? [02M]

b) A hybrid lamina uses glass and graphite fibers in a matrix of epoxy for its construction. The fiber volume fractions of glass and graphite are 40 and 20%, respectively. The specific gravity of glass, graphite, and epoxy is 2.6, 1.8, and 1.2, respectively. Find :

i. Mass fractions ii. Density of the composite [12M]

OR

Q. No. 4 a) Explain about Resin Transfer molding (RTM) with a neat sketch. [10M]

b) What are the advantages of Pultrusion Process? [04M]

SECTION- III

Q.No. 5 The engineering constants for an orthotropic material are found to be E_1=4MPa, E_2=3.1Mpa, v_{12}=0.2, v_{23}=0.4, v_{31}=0.6, G_{12}=6MPa, G_{23}=7MPa, G_{31}=2MPa. Find the Stiffness matrix [C] and the compliance matrix [S] for the above orthotropic material. [14M]

OR

Q.No. 6 Derive the relationship between compliance, stiffness and engineering constants for an Uni-directional lamina. [14M]

SECTION- IV

Q.No. 7 a) Define Tensile strength of the uni-directional lamina.[04M]

b) A thin walled tube is made of carbom/epoxy with fiber direction 45° to its axis. The tube is loaded under combined pressure and torsion producing a normal hoop stress $\sigma_y = \sigma_0$ and a shear stress $\tau_s = 2\sigma_0$. Calculate ultimate value of σ_0 at the failure of the tube according to Tsa-Hill criteria for the following properties.
$F_{1t} = F_{1c} = 10$, $F_{2c} = 20F_6 = 30F_{2t} = 1800$Mpa. [10M]

OR

Q.No. 8 a) List out the failure theories widely used for composite materials. [02M]

b) Discuss in detail about Max.stress failure theory. [12M]

SECTION- V

Q.No. 9 a) What is a cross ply laminate? [02M]

b) Compute all the terms of the [A] matrix for [0/±45] laminate with the following lamina properties.

E_1=145GPa, E_2=10.5GPa, v_{12}=0.28, G_{12}=7.5GPa.[12M]

OR

Q.No10. a) What is a first ply failure? [02M]

b) Find the first ply failure loads for a $[0/90]_s$ Graphite/epoxy laminate. Assume the thickness of each ply is 5mm.

$E_1=181x10^9$ Pa, $E_2=10.3x10^9$ Pa, v_{12}=0.28, $G_{12}=7.12x10^9$. [12M]

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Code No: R15D1507 R15

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

M.Tech. I Semester Regular/supplementary Examinations, February 2017

Advanced Mechanics of Composite Materials

(Machine Design)

Roll No			N	3						

Time: 3 hours **Max. Marks: 75**

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 15 marks.

* * * * * * * * * * * * * * *

SECTION - I

1. (a)Most composites are Pseudo-Isotropic, Orthotropic or Anisotropic; what do these three terms mean?
   (b)What's the difference between a Lamina and a Laminate?

(Or)

2. (a)What are the primary advantages of polymer matrix composites?
   (b)List at least three items made of Composites; identify the Matrix and Reinforcement materials for each.

SECTION – II

3. Suppose the elastic moduli of the component materials of a unidirectional graphite/epoxy composite are known to be as follows:
   E-graphite = 75.0 X 10^6 N/cm^2, E-epoxy = 0.35 X 10^6 N/cm^2
   If the composite material has a fiber volume fraction of 0.65, approximate the following using the Rule of Mixtures:-
   (a) The Composite's Elastic Modulus when it's loaded Parallel to the fibers.
   (b) The Composite's Elastic Modulus when it's loaded Perpendicular to the fibers.

(Or)

4. Elaborate any two manufacturing methods of composites with neat line diagrams and stages.

SECTION – III

5. For an orthotropic material, derive expressions for the elements of the stiffness matrix [C_{ij}] directly in terms of the nine independent material constants.

(Or)

6. Consider a graphite-reinforced polymer composite lamina with the following material properties for the matrix and fibers :-

$$E^m = 4.62\,\text{GPa}, \quad \nu^m = 0.360$$
$$E_1^f = 233\,\text{GPa}, \quad \nu_{12}^f = 0.200$$
$$E_2^f = 23.1\,\text{GPa}, \quad \nu_{23}^f = 0.400$$
$$G_{12}^f = 8.96\,\text{GPa} \quad G_{23}^f = 8.27\,\text{GPa}$$

   Calculate the values of the four elastic constants E1, v12, E2, and G12 for the lamina. Use V f =0 .6.

SECTION – IV

7. Explain various Failure mechanisms and failure criteria in composites.

(Or)

8. Describe Micros mechanical predictions of elastic constants of composites.

SECTION – V

9. Consider a graphite-reinforced polymer composite laminate with the elastic constants as given below.

$$E_1 = 155.0\ \text{GPa}, \quad E_2 = E_3 = 12.10\ \text{GPa}$$
$$\nu_{23} = 0.458, \quad \nu_{12} = \nu_{13} = 0.248$$
$$G_{23} = 3.20\ \text{GPa}, \quad G_{12} = G_{13} = 4.40\ \text{GPa}$$

The laminate has total thickness of 0.500 mm and is stacked as a $[0/90]_S$ laminate. The four layers are of equal thickness. It is deformed so that at a point (x,y) on the reference surface, we have the following strains and curvatures:

$$\varepsilon_x^0 = 400 \times 10^{-6}$$
$$\varepsilon_y^0 = \gamma_{xy}^0 = \kappa_x^0 = \kappa_y^0 = \kappa_{xy}^0 = 0$$

Determine the following:-
(a) the three components of strain at the interface locations. (b) the three components of stress in each layer and (c) the force and moment resultants in the laminate

(Or)

10. Consider a graphite-reinforced polymer composite laminate with the elastic constants as given below. The laminate has total thickness of 900mm and is stacked as a $[\pm 30/0]_S$ laminate. The six layers are of equal thickness. Calculate the [A], [B], and [D] matrices for this laminated plate.

$$E_1 = 155.0\ \text{GPa}, \quad E_2 = E_3 = 12.10\ \text{GPa}$$
$$\nu_{23} = 0.458, \quad \nu_{12} = \nu_{13} = 0.248$$
$$G_{23} = 3.20\ \text{GPa}, \quad G_{12} = G_{13} = 4.40\ \text{GPa}$$

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Code No: R17DME51

R17

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
M.Tech I Year - I Semester Regular Examinations, Jan/Feb 2018
Non Conventional Energy Sources
(MD& TE)

Roll No										

Time: 3 hours **Max. Marks: 70**

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 14marks.

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SECTION – I

1. What are the important performance indices of a solar collector? Based on what features the performance of a solar collector can be evaluated. (14M)

(OR)

2. a) Derive the expression for total radiation on inclined surface. Show that a horizontal surface receives no- ground reflected radiation. (7M)
b) Define solar constant. What is its standard value? (7M)

SECTION – II

3. a) Explain the analysis of energy content and its extraction for a hot dry rock type Geothermal resource. (7M)
b) Explain the difference between a Geothermal power plant and thermal power plant. (7M)

(OR)

4. a) How can geothermal energy be utilized for electricity generation. (7M)
b) What do you mean by dry steam, Wet steam and hot water geothermal systems? (7M)

SECTION – III

5. a) Mention the applications of fuel cells and explain any one application. (7M)
b) Derive an expression for emf, free energy, potential, power output and efficiency of a fuel cell. (7M)

(OR)

6. a) How does a fuel cell generate heat? (7M)
b) How fuel cells is the future option for our energy needs. Justify your answer. (7M)

SECTION – IV

7. a) State various routes of Biomass energy conversion to energy. (7M)
b) Write short notes on Materials for Biogas. (7M)

(OR)

8. What are biomass conversion technologies? Draw a schematic diagram to explain various conversion technologies and products. (14M)

SECTION – V

9. a) Derive an expression for power extracted from wind. Write short notes on Betz criterion. (7M)
   b) Write a technical note on selection of generator for WECS. (7M)

(OR)

10. a) Explain about single basin arrangement in tidal power generation. (7M)
    b) Describe the concepts of converting wave energy in to electrical energy. (7M)

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Code No: R17DME51

R17

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
M.Tech I Year - I Semester Supplementary Examinations, July/Aug 2018
Non Conventional Energy Sources
(MD & TE)

Roll No										

Time: 3 hours **Max. Marks: 70**

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

****

SECTION – I

1 a) Write about the availability energy consumption pattern and growth rate in India.(7M)
b) What are the prospects of renewable energy sources in India? (7M)

(OR)

2 Write short notes on different types of solar energy collectors with neat diagrams. (14M)

SECTION – II

3 Explain with neat sketches, the operation of geothermal power plants. (14M)

(OR)

4 a) Discuss the energy analysis of a hot aquifer type Geothermal resource. (7M)
b) List the various types of Geothermal resources. (7M)

SECTION – III

5 What is fuel cell? Describe the principle of working of H_2-O_2 cell. Give also limitations. (14M)

(OR)

6 Write short notes on
a) Molten carbonate fuel cells (MCFC) (4M)
b) Solid oxide fuel cells (SOFC) (4M)
c) Methanol fuel cells (3M)
d) Phosphoric acid fuel cells (3M)

SECTION – IV

7 a) What are the factors which affect the generation of Biogas? (7M)
b) Explain the production of Biogas. (7M)

(OR)

8 With a neat sketch explain fixed dome type and movable drum type plant. (14M)

SECTION – V

9 Derive the expression for power extracted from wind considering Betz model of a wind turbine. What is the maximum theoretical power that can be extracted and under what condition. (14M)

(OR)

10 a) State the basic principle of tidal energy production and write major components of tidal power plant. (7M)

b) What are the advantages and limitations of wave energy conversion? (7M)

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SEMESTER- II
PREVIOUS QUESTIONS PAPERS

Code No: R15D1513

R15

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
M.Tech I Year - II Semester Regular Examinations, Aug 2017
Advanced Mechanics of Machinery
(MD)

Roll No										

Time: 3 hours **Max. Marks: 75**

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 15 marks.

* * * * * *

SECTION - I

1. What is inflection circle? Explain the analytical procedure to find the inflection circle diameter.

(Or)

2. Explain Hartmann's construction of plane motion.

SECTION – II

3. Explain Polode curvature of a plane motion

(Or)

4. (a) State and explain Freudenstein's Collineation axis theorem. 8M
   (b) Describe Grashof's rule and classify four bar mechanisms. 7M

SECTION – III

5. What is Burmester's Curve? Explain in detail how Burmester's curve will be drawn for a 4 – bar mechanism?

(Or)

6. Explain a method how to design a four bar mechanism by 'Guiding a body through three distant positions.

SECTION – IV

7. Explain the procedure for the function generation with the Overlay method using two parameter and three parameter assumptions.

(Or)

8. Describe the Roberts's theorem with reference to synthesis of mechanisms.

SECTION – V

9. Mechanize the function $y = \log_{10} x$ between the limits $1 < x < 10$ with precision points at x = 1 and x= 10 and precision derivatives at x= 1, 2, 4, 7, and 10.

(Or)

10. Synthesize a 4-bar mechanism for specified instantaneous conditions using method of components.

Code No: R17D1510

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
M.Tech I Year - II Semester Regular Examinations, July/Aug 2018
Advanced Mechanics of Machinery
(MD)

R17

Roll No										

Time: 3 hours **Max. Marks: 70**

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

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Section-I

Q. No. 1. a) State and derive the expression of Euler – Savary equation. [8 Marks]
b) Explain about the collineation axis. [6 marks]

OR

Q. No. 2. Explain Bobillier's theorem and describe the Bobbilier's construction for finding inflection point given the centre of curvature of the tracer point and instant centre. [14 Marks]

Section-II

Q. No. 3. What are polodes? Explain construction of fixed and moving polodes. [14 Marks]

OR

Q. No. 4. Explain the circling point curve for the Coupler of a four bar mechanism. [14 Marks]

Section-III

Q. No. 5. a) Explain the process of guiding a body through two distinct positions of the four bar linkage. [6 Marks]
b) Explain the graphical procedure to design a four-bar mechanism for three-point synthesis. [8 marks]

OR

Q. No.6 a) Explain about the roto center triangle. [6 Marks]
b) Explain the procedure for the construction of Burmester's curve. [8 marks]

Section-IV

Q. No. 7. (a) Explain about function generation. [4 Marks]
(b) Explain Overlay's method used for synthesis of mechanisms. [10 Marks]

OR

Q. No. 8. a) Explain about path generation. [4 Marks]

b) Explain Relative-Roto center method [10 Marks]

Section-V

Q. No. 9. a) Explain the precision point approximation. [6 Marks]

b) Derive Freudenstein's equations dimensional synthesis of four bar mechanism for function generation. [8 Marks]

OR

Q. No. 10. Synthesize the four bar mechanism which will satisfy the following specifications.

$\omega_2 = 1$ rad/sec; $\omega_3 = -2$ rad/sec; $\omega_4 = 3$ rad/sec

$\alpha_2 = 3$ rad/sec^2; $\alpha_3 = 1$ rad/sec^2; $\alpha_4 = 2$ rad/sec^2

Take the distance between the pivoted points as 10 units. [14 Marks]

Code No: R15D1513

R15

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
M.Tech I Year - II Semester supplementary Examinations, Jan/Feb 2018
Advanced Mechanics of Machinery
(MD)

Roll No										

Time: 3 hours **Max. Marks: 75**

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 15 marks

* * * * * *

SECTION - I

1. Derive the Euler – Savary 1st and 2 nd forms of equations. (15M)

(OR)

2. Identify the importance of inflection circle during kinematics study of plane motion. (15M)

SECTION – II

3. Give the expression for the radius of curvature of the fixed polode. Explain the terms involved in the equation. Deduce the Hall's equation from this equation. (15M)

(OR)

4. What is Circling – point curve? Find the radius of curvature for a circling point curve. (15M)

SECTION – III

5. What is Burmester's Curve? Explain in detail how Burmester's curve will be drawn for a 4 – bar mechanism? (15M)

(OR)

6. Explain a method how to design a four bar mechanism by 'Guiding a body through three distinct positions'. (15M)

SECTION – IV

7. Explain the procedure for the function generation with the Overlay's method. (15M)

(OR)

8. Explain the procedure for the path generation with the Robert's theorem in detail. (15M)

SECTION – V

9. Design a four bar mechanism for the following prescribed instantaneous values of angular velocity and angular acceleration of the three moving links. (15M)

Driving Link: $\omega_1 = 10$ rad/sec & $\alpha_1 = 0$ rad/sec^2

Coupling Rod: $\omega_2 = 2$ rad/sec & $\alpha_1 = 15$ rad/sec^2

Driven Link: $\omega_3 = 5$ rad/sec & $\alpha_3 = 10$ rad/sec^2

(OR)

10. Prove the Frudenstein's equation which synthesizes a four bar mechanism with usual terms and standard notation. (15M)

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Code No: R15D1513-152

R15

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous nstitution – UGC, Govt. of India)

M.Tech. I Year - II Semester Regular Examinations, Aug 2016

Advanced Mechanics of Machinery

(MD)

Roll No	1	5	N	3						

Time: 3 hours **Max. Marks: 75**

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 15 marks.

* * * * * *

SECTION - I

1. How do we use the Bobiller theorem to find the inflection circle? Explain the Bobillier construction for locating the conjugate of an arbitrary point.

(Or)

2. Explain Grubler's and Kutzbas criteria's for plain mechanisms with the help of examples.

SECTION – II

3. What is circling point curve? Present a graphical method for obtaining circling point curve for a four bar linkage.

(Or)

4. (a) State and explain Freuderstein's Collineation axis theorem. 8M
   (b) Explain briefly the Carter –Hall circle method. 7M

SECTION – III

5. (a) What is Roto centre triangle? What are the properties of the Roto centre triangle? 8M
   (b) Explain the construction of the Burmester's Curve with a suitable example. 7M

(Or)

6. Derive the Jacobian matrix for the planar Robotic manipulator.

SECTION – IV

7. Explain the procedure for the function generation with the Overlay method using two parameter and three parameter assumptions.

(Or)

8. Describe the Roberts's theorem with reference to synthesis of mechanisms.

SECTION – V

9. Mechanize the function $y = \log_{10} x$ between the limits $1 < x < 10$ with precision points at x = 1 and x= 10 and precision derivatives at x= 1, 2, 4, 7, and 10.

(Or)

10. Synthesize a 4-bar mechanism for specified instantaneous conditions using method of components.

* * * * * * * * * *

Code No: R15D1513

R15

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

M.Tech. I Year - II Semester supplementary Examinations, February 2017

Advanced Mechanics of Machinery

(Machine Design)

Roll No	1	5	N	3						

Time: 3 hours **Max. Marks: 75**

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 15 marks.

* * * * * *

SECTION - I

1. Explain the analytical and graphical procedure to evaluate the diameter of the inflection circle under the following cases.
   (a) When one pair of conjugate points and the corresponding ray angle are given. 8M
   (b) When two pairs of conjugate points on different rays are given. 7M

(Or)

2. Explain the Hartmann's construction to find the inflection circle for a given mechanism.

SECTION – II

3. Give the expression for the radius of curvature of the fixed polode. Explain the terms involved in the equation. Deduce the Hall's equation from this equation.

(Or)

4. Explain the procedure to yield a mechanism with its output having neither precision points nor their derivatives. And also mention the relative advantages and drawbacks of analytical methods over graphical methods while synthesizing mechanisms.

SECTION – III

5. What is Burmester's Curve? Explain in detail how Burmester's curve will be drawn for a 4 – bar mechanism?

(Or)

6. Explain a method how to design a four bar mechanism by 'Guiding a body through three distant positions'.

SECTION – IV

7. Explain the procedure for the Path generation with the Hrones's and Nelson's motion Atlas method.

(Or)

8. Explain the procedure for the function generation with the Velocity – pole method in detail.

SECTION – V

9. Design a four bar mechanism for the following prescribed instantaneous values of angular velocity and angular acceleration of the three moving links.

   Driving Link: $\omega_1 = 10$ rad/sec & $\alpha_1 = 0$ rad/sec^2

   Coupling Rod: $\omega_2 = 2$ rad/sec & $\alpha_1 = 15$ rad/sec^2

   Driven Link: $\omega_3 = 5$ rad/sec & $\alpha_3 = 10$ rad/sec^2

(Or)

10. What is function generation? Explain how to synthesis a 4-bar mechanism using precision point approximation

Code No: R15D1513

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
M.Tech I Year - II Semester Supplementary Examinations, July/Aug 2018
Advanced Mechanics of Machinery
(MD)

Roll No										

Time: 3 hours **Max. Marks: 75**

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 15 marks.

****

SECTION-I

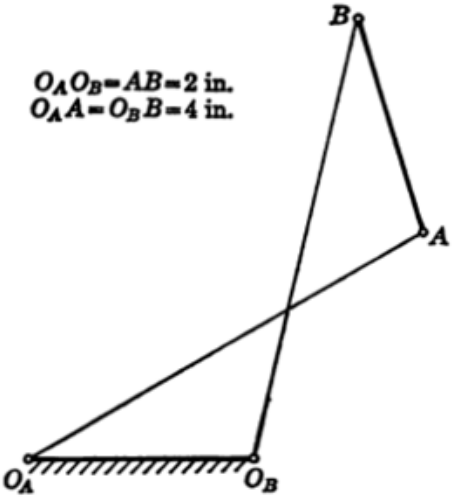
Q. No. 1: With general notations and neat diagram, Derive first and second form of Euler-Savary equation. [15M]

OR

Q. No. 2 : State Bobillier's theorem and explain the construction of inflection circle on a typical four bar mechanism with Bobillier's method [15M]

SECTION-II

Q. No. 3: Develop expression to determine polode curvature associated with the motion of the coupler AB relative to fixed frame 1 for the crossed four bar mechanism shown below: [15M]



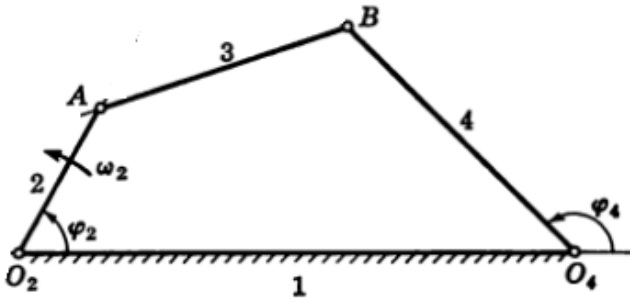
OR

Q. No. 4: For the four bar mechanism shown below, Determine

ω_4, α_4, $d\alpha_4/d\tau$, $\bar{\rho}_2$, and $\bar{\rho}_4$.

Use Bobillier's theorem and Euler- Savary equation. Take O_2O_4=10cm, OA=2.5cm,

AB=4cm and O_4B=6cm. $\phi_2=60^0$.ω_2=2rad/s. [15M]



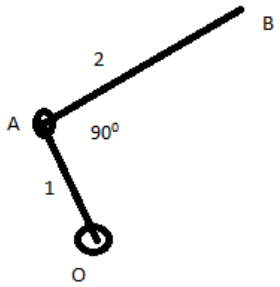
SECTION-III

Q. No. 5 :a)Define Transmission angle in a planar four bar mechanism and Discuss various types of four bar mechanisms with the help of diagrams . Specify application in each case. [8M]

b) Explain Grubler's criteria and Grashof's Rules for planar four bar mechanism. [7M]

OR

Q. No.6 : Explain construction of Burmester's curve for a body defined by AB in four distinct positions ,together with the roto centres. Dimensions are in cm. [15M]



SECTION-IV

Q. No. 7: Design a slider crank mechanism for the generation of the function **$y = \log_{10} x$** with precision points at x=1,2,3 and 4. The independent variable x is to be represented by the horizontal displacement of the slider from right to left, and dependant variable y by a counterclockwise rotation of the crank. [15M]

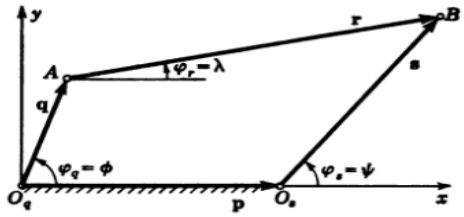
OR

Q. No. 8: Mechanize the function $y=\log_{10}X$,between the limits $1<x<10$, with precision ponts at x =1 and 10 and precision derivatives at x=1,2,4,7, and 10. [15M]

Assume $\Delta\phi = 60°$ $\Delta\psi = -90°$

SECTION-V

Q. No. 9 : Develop Freudenstein's equations for the synthesis of a planar mechanism shown below. [15M]



OR

Q. No. 10 : Design a crank-rocker four bar mechanism for the following condition. p: input driving link

, q: coupler link, and s1 and s2:out put link at two positions. [15M]

$$\omega_q = 10 \text{ rad/sec}, \omega_{s1} = 6 \text{ rad/sec}, \omega_{s2} = -8 \text{ rad/sec}, p = 10 \text{ in.}$$

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Code No: R15D1514

R15

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
M.Tech I Year - II Semester Regular Examinations, Aug 2017
Design Synthesis
(MD)

Roll No										

Time: 3 hours **Max. Marks: 75**

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 15 marks.

* * * * * *

SECTION - I

1. Define design synthesis and distinguish between design synthesis and design analysis.

(Or)

2. Explain and differentiate the following:
   (a) Variant design (b) conceptual design (c) Adaptive design

SECTION – II

3. Discuss the design considerations in lightweight and rigid constructions with suitable examples.

(Or)

4. Discuss the design factors for tolerances from process and functions view point with examples.

SECTION – III

5. Discuss the design steps involved in forged parts with suitable example from automobile parts.

(Or)

6. Explain the design methodology for welded construction with suitable example.

(Or)

SECTION – IV

7. Discuss the need of dismantling. Explain the design considerations involved in dismantling.

(Or)

8. Define product modularity. Explain modular design approach with illustrations.

SECTION – V

9. What is meant by optimal design? Explain the Johnson method of optimum design with an example.

(Or)

10. Discuss the common basic functional requirements.

Code No: R17D1511

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
M.Tech I Year - II Regular Examinations, July/Aug 2018
Design Synthesis
(MD)

R17

Roll No										

Time: 3 hours **Max. Marks: 70**

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

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Section-I

Q. No. 1. Explain the design process for systematic design [14M]

OR

Q. No. 2. Explain the product characteristics required for product design. [14M]

Section-II

Q. No. 3 Explain the significance of interchangeability and selective assembly. 14M]

OR

Q. No. 4 Explain the importance of load equalization light and rigid constructions in design. [14M]

Section-III

Q. No. 5 What are the design considerations for welded constructions. [14M]

OR

Q. No.6 What are the machining considerations in designing a component by an example. [14M]

Section-IV

Q. No. 7 Explain the procedure operation inspection and maintenance consideration in design. [14M]

OR

Q. No. 8 What are the factors to be considered in Ergonomics of design? [14M]

Section-V

Q. No. 9 Explain about problem formulation for design optimization . [14M]

OR

Q. No. 10 Explain the basic functional requirements of conceptual design. [14M]

Code No: R15D1514

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
M.Tech I Year - II Semester supplementary Examinations, Jan/Feb 2018
Design Synthesis
(MD)

R15

Roll No										

Time: 3 hours **Max. Marks: 75**

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 15 marks

* * * * * *

SECTION - I

1. What is standardization and what are its advantages? Give any four examples of the standards used in the design office. (15M)

(Or)

2. Explain design process and methodologies of systematic design with suitable example. (15M)

SECTION – II

3. What is the difference between interchangeability and selective assembly? Where is each one is used? Explain with one example for each? (15M

(Or)

4. Discuss the following in details with suitable examples. (5*3=15M)
   a) Running and sliding fits b) locational fits c) force fits

SECTION – III

5. Explain the machine considerations to improve the design of a component with suitable examples. (15M)

(Or)

6. Explain in details the features to be taken in to account for sheet metal parts design. (15M)

SECTION – IV

7. Explain the ergonomics design of accuracy location pins and registers. (15M)

(Or)

8. Explain the handling and insertion guidelines and other aspects in the assembly with an example. (15M)

SECTION – V

9. Discuss the procedure to formulate problems design optimization with an example. (15M)

(Or)

10. Give examples of the available design variants for some of the common basic functional requirements. (15M)

* * * * * * * * * *

Code No: R15D1514-152

R15

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

M.Tech. I Year - II Semester Regular Examinations, Aug 2016

Design Synthesis

(MD)

Roll No	1	5	N	3						

Time: 3 hours Max. Marks: 75

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 15 marks.

* * * * * *

SECTION - I

1. Explain the evaluation Standardization and its exploitation in design.

(Or)

2. What is meant by design synthesis? How it is useful in product design and development.

SECTION – II

3. Explain the design methodologies for Load transmission, load equalization, lightweight and rigid constructions.

(Or)

4. Explain the importance of tolerance. Discuss the methodology to find it from process and function.

SECTION – III

5. Discuss different aspects to be considered in the design of forging components.

(Or)

6. Explain in details the features to be taken in to account for welded constructions.

SECTION – IV

7. Explain the design for assembly and dismantling.

(Or)

8. Briefly explain the Machining in assembly, adjustment, Backlash and Clearance adjustment.

SECTION – V

9. Discuss the procedure to formulate problems design optimization with an example.

(Or)

10. Give examples of the available design variants for some of the common basic functional requirements.

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Code No: R15D1514

R15

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

M.Tech. I Year - II Semester supplementary Examinations, February 2017

Design Synthesis

(Machine Design)

Roll No	1	5	N	3						

Time: 3 hours **Max. Marks: 75**

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 15 marks.

* * * * * *

SECTION - I

1. Explain the methodologies of systematic design.

(Or)

2. Explain the following:
   (a) Variant design (b) conceptual design

SECTION – II

3. a) Discuss the significance of interchangeability.
   b) Discuss design for uniform strength.

(Or)

4. Discuss the selection of fits for different design situations, surface finish.

SECTION – III

5. Discuss different aspects to be considered in the design of case.

(Or)

6. Explain in details the features to be taken in to account for forged sheet metal parts.

(Or)

SECTION – IV

7. Elaborate the operation inspection and maintenance considerations in design?

(Or)

8. Discuss the steps involved in ergonomics Design of accuracy Location pins and registers.

SECTION – V

9. Illustrate the various principles involved in design optimization.

(Or)

10. Discuss the common basic functional requirements.

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Code No: R15D1514

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
M.Tech I Year - II Semester Supplementary Examinations, July/Aug 2018
Design Synthesis
(MD)

R15

Roll No										

Time: 3 hours **Max. Marks: 75**

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 15 marks.

*****

SECTION-I

Q. No. 1 a) What is the significance of conceptual design? Explain various steps in the conceptual design process. [8M]

b) Explain various current methods followed in the systematic design. [7M]

OR

Q. No. 2 Write short notes on the following: [5*3=15M]

a) variant design b) conceptual design c) standardization

SECTION-II

Q. No. 3 a) Explain the significance of interchangeability. [7M]

b) Explain the need for functional tolerancing quoting with examples. [8M]

OR

Q. No. 4 a) Explain the need for process tolerancing quoting with examples. [7M]

b) Explain procedure for selection of various fits for different design situations quoting with examples. [8M]

SECTION-III

Q. No. 5 a) Explain various factors to be considered in the design of casing quoting with suitable examples. [7M]

b) Explain various aspects to be considered in the design of forging components. [8M]

OR

Q. No.6 a) Explain various aspects to be considered in the design of welded constructions for components. [8M]

b) Explain various design aspects to be considered in machining of components. [7M]

SECTION-IV

Q. No. 7 a) What is meant by group decision making? What is its significance in design? [7M]

b) What are the maintenance considerations in design? [8M]

OR

Q. No. 8 a) What is the procedure for machining in assembly and adjustment in design Methodology. [7M]

b) How are backlash and clearance adjustments can be made in design methodology? Explain. [8M]

SECTION-V

Q. No. 9. How design optimization problem can be formulated? Explain with suitable example for design. [15M]

OR

Q. No. 10. Illustrate various principles for design variants with respect to functional Requirements. [15M]

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Code No: R15D1515

R15

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
M.Tech I Year - II Semester Regular Examinations, Aug 2017
Experimental Stress Analysis
(MD)

Roll No										

Time: 3 hours **Max. Marks: 75**

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 15 marks.

SECTION-I

1.a) Explain briefly about plane stress and plane strain.

b) The principal stresses at a point in a material are 90 N/mm^2 (tension) and 60 N/mm^2 (compression). Find the normal and shear stresses on a plane inclined at 30^0 to the plane of greater principal stress. Find also the position of the plane upon which the stress is wholly a shear and intensity of the shear stress.

(Or)

2. What are the various types of strain gauges. Explain about electrical resistance strain gauge with neat sketch.

SECTION-II

3. a) Explain the working principle of telemetry systems

b) Briefly discuss the advantages and disadvantages of magnetic tape recording system relative to oscillograph recording method

(Or)

4. a) Explain briefly about static recording and dynamic recording at very low frequencies.

b) Briefly describe the difference between direct and frequency modulation recording.

SECTION-III

5.a) Explain the principle of "Brittle coating" method.

b) Discuss in detail the Brittle coating crack trends

(Or)

6.a) Explain briefly the phenomenon of Moire techniques used for the analysis of the stresses.

b) Explain the mechanism of formation of Moire fringes.

SECTION-IV

7.a) Enumerate the properties of an ideal photoelastic material.

b) Define the ‘polarization of light’ and explain the method for production of ‘plane polarized light’.

(Or)

8.a) Explain with neat sketch , circular polariscope (Dark-field).

b) Explain with a neat sketch, the passage of light through crystalline medium.

SECTION-V

9.a) Explain the method of calibration of a photo elastic model material using a beam under pure bending.

b) Discuss the applications of Frozen-stress method.

(Or)

10. Explain the following

(a). coating sensitivity (b). Fringe order determination in coatings

(C) .Effective of coating thickness

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Code No: R17D1512

R17

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
M.Tech I Year - II Regular Examinations, July/Aug 2018
Experimental Stress Analysis
(MD)

Roll No										

Time: 3 hours **Max. Marks: 70**

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

****

SECTION- I

Q. No. 1 a) What do you understand by plane stress and plane strain? Give examples. [7M]
b) Derive stress- strain relation for a three-dimensional body. [7M]

OR

Q. No. 2 a) Write short note on the various types of strain gauges. Give their special advantage and limitations. [7M]
b) A single strain gauge is mounted to measure the axial strain in a simple tensile member. If the recorded strain is 450µcm/cm. What is the axial stress if (a) the member is steel with E_{steel}=2.1X10^6 kg/cm^2, (b) the member is aluminum with E_{al}=0.7X10^6 kg/cm^2. Gauge factor =2. [7M]

SECTION- II

Q. No. 3 a) Discuss the associated instrumentation for measuring (i) static strains (ii) dynamic strains. [7M]
b) Explain how dynamic recording of intermediate frequencies are made. [7M]

OR

Q. No. 4 a) Discuss about telemetry system? [7M]
b) Discuss how dynamic recording of very low frequencies are made. [7M]

SECTION- III

Q.No. 5 a) What are the various crack detection methods? [4M].
b) What are the assumptions made while analyzing brittle coatings? Derive the expressions for coating stresses. [10M]

. **OR**

Q.No. 6 a) What are the two techniques used for moiré fringe analysis? Discuss the displacement approach in detail. [7M]
b) Explain the technique utilized for moiré-fringe sharpening and fringe Multiplication. [7M]

SECTION- IV

Q.No. 7 With the help of neat sketch explain Plane Polariscope with both dark and light field set-up. [14M]

OR

Q.No. 8 a) Discuss the important properties of isoclinics. How isoclinics of various parameters can be obtained? [10M]

b) What is the photoelastic effect [4M]

SECTION- V

Q.No. 9 Write short notes on the following with reference to 3D photo elasticity

a) Locking in model deformation [7M]

b) Slicing 3-D models [7M]

OR

Q.No. 10 a) What are the various methods used for stress separation? Explain the oblique incidence method in detail. [7M]

b) Explain how stresses and strains can be determined by photoelastic coatings. List the various assumptions made. [7M]

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Code No: R15D1515

R15

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
M.Tech I Year - II Semester supplementary Examinations, Jan/Feb 2018
Experimental Stress Analysis
(MD)

Roll No										

Time: 3 hours **Max. Marks: 75**

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 15 marks

****

SECTION-I

1.a) Explain briefly about Mohr's circle.(7M)

b) A point in a strained material is subjected to mutually perpendicular stress of 600 N/mm^2 (tensile) and 400 N/mm^2 (compressive). It is also subjected to a shear stress of 100N/mm^2.Draw Mohr's circle and find principle stresses and maximum shear. (8M)

(OR)

2.a) Derive a general expression for the output voltage of Wheatstone Bridge circuit for different strain gauge combinations. (8M)

b) What is the importance of Temperature compensation in a Strain gauge circuitry and how is it achieved? (7M)

SECTION-II

3. Explain the working of telemetry systems. (15M)

(OR)

4. List out various Data Recording instruments? Discuss what you mean by data loggingand telemetry system. (15M)

SECTION-III

5.a) Explain calibration of Brittle coatings? (8M)

b) List the advntages of brittle coating and discuss the temperature control to minimize errors in a brittle coating tests. (7M)

(OR)

6.a) Explain the geometrical approach to Moire fringe analysis. (7M)

b) Explain briefly about sharpening and multiplication of Moire- fringes (8M)

SECTION-IV

7. Derive the equation for the decomposition of elliptically polarized light wave components.

Hence define plane polarized, circularly polarized and elliptically polarized light. (15M)

(OR)

8.a) What are the important properties of an ideal photoelastic material ? Discuss a few important photoelastic materials. (7M)

b) Explain with a neat sketch the principle of operation of a plane polariscope. (8M)

SECTION-V

9.a) Derive the relation between the stresses, relative retardation, material fringe value and thickness of photoelastic model. (8M)

b) Describe the applications of the frozen stress method. (7M)

(OR)

10.a) Discuss about slicing of three dimensional models. (7M)

b) Explain about stress-separation method. (8M)

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Code No: R15D1515-152

R15

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

M.Tech. I Year - II Semester Regular Examinations, Aug 2016

Experimental Stress Analysis

(MD)

Roll No	1	5	N	3						

Time: 3 hours **Max. Marks: 75**

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 15 marks.

* * * * * *

SECTION - I

1. Derive three dimensional stress- strain relations and then simplify it in two two dimensional.

(Or)

2. Explain briefly major properties of semiconductor strain gauges. Elaborate the sensitivity and linearity of semiconductor strain gauges.

SECTION – II

3. Explain in details about dynamic recording at low and very high frequencies.

(Or)

4. List out various Data Recording instruments? Discuss what you mean by data logging and telemetry system.

SECTION – III

5. What are moiré fringes? Describe the displacement field approach of moiré fringe strain analysis.

(Or)

6. Elaborate ceramic based brittle coatings and resin based brittle coatings and their applications.

SECTION – IV

7. A photo elastic beam 22.5mm high ,6.25mm thick is frely supported at the ends of a span of 7.5cm and loaded by a concentrated force of 50Kg acting at the mid portion of the beam. If the load produces 12 fringes at the most highly stressed pont P of the the bottom edge , calculate the fringe value and its stress optic coefficient in Brewasters. The light used is monochromatic of wave length is 5461A^0.What fringe value would expect on the neutral axis of bending just off the midplane of the model.

(Or)

8. (a) What are basic elements of a Polariscope? Explane working principle of plane polariscope.
   (b) Distinguish between plane and circularly polarized light.

SECTION – V

9. Write short notes on the following with reference to 3Dphoto elasticity:--
   (i) locking in model deformation (ii) slicing three dimensional models

(Or)

10. Explain the birefringence in isotropic solids. Discuss applications of birefringence.

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Code No: R15D1515

R15

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

M.Tech. I Year - II Semester supplementary Examinations, February 2017

Experimental Stress Analysis

(Machine Design)

Roll No	1	5	N	3						

Time: 3 hours **Max. Marks: 75**

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 15 marks.

* * * * * *

SECTION - I

1. Compare and contrast the plane stress and plane strain conditions with the help of neat sketches. Derive Constitutive law in each case.

(Or)

2. Explain the major factors affecting the strain measurements with the electrical strain gauges. Also elaborate wheat stone bridge arrangement for the measurement of strains.

SECTION – II

3. Explain in details about dynamic recording at all frequencies.

(Or)

4. What are main characteristics of Recording instruments? Discuss what do you mean by data logging.

SECTION – III

5. Describe the geometric approach of moiré fringe strain analysis

(Or)

6. What are the assumptions made while analyzing brittle coating? Derive expressions for coating stresses.

SECTION – IV

7. Given a fringe order of 5, a model thickness of 6.25mm , a fringe value 16Kg/cm^2/cm per fringe and an isoclinic parameter of 25^0 defining the angle between Major principal stress and X- axis. Determine the shear stress

(Or)

8. (a)A circular disc is of 75mm diameter and 6mm thick. Determine material fringe value if a load of 200kg produces a fringe order of 6 at the centre of disc.
   (b) Distinguish between plane and circularly polarized light.

SECTION – V

9. Write short notes on the following with reference to 3Dphoto elasticity:--
   (i) Shear-difference method (ii) Frozen-stress method

(Or)

10. List various types of common birefringent materials. Discuss the wave propagation in uniaxial birefringent material.

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Code No: R15D1518

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
M.Tech I Year - II Semester Regular Examinations, Aug 2017
Mechatronics
(MD)

R15

Roll No										

Time: 3 hours **Max. Marks: 75**

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 15 marks.

* * * * * *

SECTION-I

1. (a) Explain microprocessor-based controllers,
   (b) Explain advantages and disadvantages of Mechatronics systems.

(OR)

2. (a) Compare between Sensors and transducers
   (b) Explain displacement, position, proximity, velocity sensors.

SECTION-II

3. (A) Explain DIA and TRIAC semi conductor devices.
   (b) Explain Analog signal conditioning.

(OR)

4. (a) Explain amplifiers and filtering.
   (b) What is MEMS & explain its typical applications.

SECTION-III

5. Explain hydraulic and pneumatic actuating system.

(OR)

6. Compare between Mechanical actuating systems and electrical actuating systems.

SECTION-IV

7. Explain Digital electronics and systems.

(OR)

8. Explain process controllers and programmable logic controllers.

SECTION-V

9. Explain System and interfacing and data acquisition.

(OR)

10. Explain DAQS and SCADA.

****

Code No: R17D1515

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
M.Tech I Year - II Regular Examinations, July/Aug 2018
Mechatronics
(MD)

R17

Roll No										

Time: 3 hours **Max. Marks: 70**

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

****

SECTION – I

1 a) Explain the term mechatronics with suitable examples? [7M]
b) What are the components of mechatronics system? Explain their role. [7M]

(OR)

2 a) Write a brief note on temperature sensors? [7M]
b) Explain the working principle of LVDT? [7M]

SECTION – II

3 a) What is an FET? Compare the functions of three electrodes in an FET? [7M]
b) Write short notes on MEMS and applications of MEMS? [7M]

(OR)

4 What is TRIAC? Sketch the characteristics and describe its operation. [14M]

SECTION – III

5 a) Sketch and explain the working of hydraulic motor? [7M]
b) Give detailed classification of actuators used in mechatronic system. [7M]

(OR)

6 a) Explain with a sketch the construction of a hydraulic cylinder (linear actuator) that is double acting? [7M]
b) List the application features of direction control valves. [7M]

SECTION – IV

7 a) Differentiate between Microprocessor and Micro controller? [7M]
b) Write brief about Digital electronics system? [7M]

(OR)

8 With a neat diagram explain programmable logic controller (PLC).With an example explain ladder logic used in PLC. [14M]

SECTION – V

9 a) Explain data acquisition in mechatronics systems? [7M]
b) Explain digital control system with block diagram? [7M]

(OR)

10 a)Sketch and explain Dynamic models? Describe the system response? [7M]
b) Explain A to D and D to A conversions? [7M]

Code No: R15D1518

R15

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
M.Tech I Year - II Semester supplementary Examinations, Jan/Feb 2018
Mechatronics
(MD)

Roll No										

Time: 3 hours **Max. Marks: 75**

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 15 marks

* * * * * *

SECTION-I

1. Explain various types of Mechatronics systems with their elements. (15M)

(OR)

2. Explain Mechatronics design process and different measurement systems. (15M)

SECTION-II

3. (a) Explain Solid state electronic devices. (7M)
(b)Explain PN junction diode. (8M)

(OR)

4. (a) Explain Bipolar Junction Transistor and its applications. (8M)
(b) Explain Field Effect Transistor and its applications. (7M)

SECTION-III

5. (a) Differentiate between Hydraulic and pneumatic actuating systems. (7M)
(b) Differentiate between components of Hydraulic and pneumatic systems control. (8M)

(OR)

6. (a) Explain electro-pneumatic servo system with neat sketch. (7M)
(b) Explain hydro-pneumatic servo system with neat sketch. (8M)

SECTION-IV

7. Differentiate between micro processors and micro controllers. (15M)

(OR)

8. Compare PLCs versus computers.(15M)

SECTION-V

9. Explain A to D and D to A conversions.(15M)

(OR)

10. Explain Design of Mechatronics systems & future trends.(15M)

****

Code No: R15D1518 **R15**

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

M.Tech. I Year - II Semester supplementary Examinations, February 2017

Mechatronics

(Machine Design)

Roll No	1	5	N	3						

Time: 3 hours **Max. Marks: 75**

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 15 marks.

******

SECTION - I

1. Explain microprocessor based controllers.

(Or)

2. Differentiate between various types of sensors and transducers.

SECTION – II

3. Explain analog signal conditioning.

(Or)

4. Explain MEMS and its applications.

SECTION – III

5. Compare between hydro pneumatic and electro hydraulic servo systems.

(Or)

6. Explain Mechanical actuating systems and electrical actuating systems.

SECTION – IV

7. Explain programmable logic controllers

(Or)

8. Differentiate between programmable logic controllers and computers.

SECTION – V

9. Explain Dynamic models and analogies.

(Or)

10. Explain Design of Mechatronics systems & future trends.

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Code No: R15D1518-152

R15

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

M.Tech. I Year - II Semester Regular Examinations, Aug 2016

Mechatronics

(MD)

Roll No	1	5	N	3						

Time: 3 hours **Max. Marks: 75**

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 15 marks.

* * * * * * *

SECTION - I

1. Explain mechatronics systems and its elements.

(Or)

2. Explain Mechatronics design process

SECTION – II

3. Explain solid state electronic devices

(Or)

4. Explain PN junction diode with neat sketch.

SECTION – III

5. Compare hydraulic and pneumatic systems

(Or)

6. Explain the components of hydraulic and pneumatic systems.

SECTION – IV

7. Explain Digital electronics and systems.

(Or)

8. Differentiate between microprocessors and microcontrollers

SECTION – V

9. Explain system and interfacing and data acquisition.

(Or)

10. Explain A to D conversion.

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Code No: R15D1518

R15

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
M.Tech I Year - II Semester Supplementary Examinations, July/Aug 2018
MECHATRONICS
(MD)

Roll No										

Time: 3 hours **Max. Marks: 75**

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 15 marks.

* * * * * *

SECTION - I

3. (a) Explain mechatronics systems and its elements. [5M]
   (b)) Explain microprocessor-based controllers. [5M]
   (c) Explain advantages and disadvantages of Mechatronics systems. [5M]

OR

4. (a) Explain Mechatronics design process. [6M]
   (b) Compare between Sensors and transducers. [9M]

SECTION – II

5. (a) Explain solid state electronic devices. [5M]
   (b) Explain DIA and TRIAC semi conductor devices. [5M]
   (c) Explain Analog signal conditioning. [5M]

OR

6. (a) Explain PN junction diode with neat sketch. [7M]
   (b) Explain amplifiers and filtering. [8M]

SECTION – III

7. (a) Compare hydraulic and pneumatic systems. [8M]
   (b) Explain electro-hydraulic servo systems. [7M]

OR

8. (a) Explain the components of hydraulic and pneumatic systems. [8M]
   (b) Compare between Mechanical actuating systems and electrical actuating systems. [7M]

SECTION – IV

9. (a) Explain Digital electronics and systems. [8M]
   (b) Explain digital logic control. [7M]

OR

10. (a) Differentiate between microprocessors and microcontrollers. [8M]
    (b) Explain programmable logic controllers. [7M]

SECTION – V

11. (a) Explain system and interfacing and data acquisition. [8M]
    (b) Explain DAQS. [7M]

OR

12. (a) Explain A to D conversion. [8M]
    (b) Explain D to A conversion. [7M]

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Code No: R15D1523

R15

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
M.Tech I Year - II Semester Regular Examinations, Aug 2017
Computer Integrated Manufacturing
(MD)

Roll No										

Time: 3 hours **Max. Marks: 75**

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 15 marks.

****

Section-I

Q. No. 1 a) Explain how CIM can act as an enabling technology for concurrent engineering? 8M

b) Enumerate the role of GT in CAD/CAM integration. 7M

OR

Q. No. 2 a) Define automation. What are the goals of automation in manufacturing industry? 5 M

b) List the benefits & application of Group technology. 10M

Section-II

Q. No. 3 Explain briefly on CMPP. In what ways CMPP is considered very significant. What factors should be considered while selecting the best CAPP system. 15M

OR

Q. No. 4 a) Explain variant computer aided process planning approache in detail. 8M

b) Discuss the advantages and Disadvantages of Variant CAPP. 7M

Section-III

Q. No. 5 What is MRP? Explain the inputs to MRP and various MRP outputs. Also list the various benefits of MRP. 15M

OR

Q. No.6 a) What is cellular manufacturing? 5M

b) Explain in detail about production flow analysis. 5M

c) Explain briefly about the functions of the production planning and control. 5M

Section-IV

Q. No. 7 a) What is the significance of quality control in CIM?
5M
b) Define total quality management and explain its relevance to CIM.
10M

OR

Q. No. 8 a) How does the coordinate measuring machine help in ensuring quality inspection.
10M
b) What is the working principle of computer vision system.
5M

Section-V

Q. No. 9 a) What are the components of FMS?
5M
b) How does FMS classified based on number of machines? Discuss in brief.
10M

OR

Q. No. 10 a) Illustrate the typical automated material handling system with a line sketch.
10M
b) How is NC program management effected in a FMS?

****

Code No: R17D1516

R17

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
M.Tech I Year - II Regular Examinations, July/Aug 2018
Computer Integrated Manufacturing
(MD)

Roll No										

Time: 3 hours **Max. Marks: 70**

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

****

SECTION-I

Q. No. 1 a) Explain the typical product cycle with the without use of computers with the help of net block diagrams. [7M]

b) List the factors that can be considered in selecting a suitable classification and coding system. [7M]

OR

Q. No. 2 a) What is a part family in Group Technology? [4M]

b) Name three parts classification and coding systems commonly used in GT. Explain any one of them in detail with the help of suitable examples. [10M]

SECTION-II

Q. No. 3 a) With a neat sketch, explain retrieval CAPP system. [7M]

b) What are the differences between manual and automated process planning systems. [7M]

OR

Q. No. 4 a) Explain briefly on CMPP. In what ways, CMPP is considered very significant? [7M]

b) What factors should be considered for while selecting the best CAPP system? [7M]

SECTION-III

Q. No. 5 a) What do you mean by MRP? What are the MRP benefits and outputs? [7M]

b) List the various benefits of capacity planning. [7M]

OR

Q. No.6 a) What is MPS? State the significance of it. [7M]

b) Explain the role of Cellular manufacturing in manufacturing planning and control. [7M]

SECTION-IV

Q. No. 7 a) Explain the application and advantages of integration of CAQC with CAD/CAM systems.[7M]

b) Describe any two methods of non contact type of computer aided testing. [7M]

OR

Q. No. 8 a) Explain one non-contact and one non optical inspection method with sketch. [7M]

b) What are the important effects which results from computer aided quality control? [7M]

SECTION-V

Q. No. 9 a) What are the important machine tools in a CIM system? [7M]

b) What are the computer components used in CIM? [7M]

OR

Q. No. 10 a) Discuss the steps needed to analyze a material handling problem. [7M]

b) Describe hardware configuration of CIM with the help of a sketch. [7M]

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Code No: R15D1523

R15

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
M.Tech I Year - II Semester supplementary Examinations, Jan/Feb 2018
Computer Integrated Manufacturing
(MD)

Roll No										

Time: 3 hours **Max. Marks: 75**

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 15 marks

****

Section-I

Q. No. 1 a) With an example, discuss the differences between CAM and CIM. 8M

b) Discuss the hierarchical structure of computerized elements of CIM. 7M

OR

Q. No. 2 a) Define group technology and its importance in CAD/CIM. 5M

b) Define part classification & coding. How is it useful in forming grouping technology layout? 10M

Section-II

Q. No. 3 a) List out the benefits of CAPP. 7M

b) Describe the role of CAPP in CAD/CIM integration. 8M

OR

Q. No. 4 Describe the different elements and functioning of generative approach CAPP. State its advantages and limitations. 15M

Section-III

Q. No. 5 a) Explain about the four classes of users in MRP 10M

b) List the benefits of MRP 5M

OR

Q. No.6 a) Explain briefly about JIT manufacturing philosophy. 5M

b) Define Cellular Manufacturing? 5M

c) Brief about the approaches of process planning. 5M

Section-IV

Q. No. 7 a) Discuss the importance of coordinate measuring machine in ensuring quality in inspection. 10M

b) Write a short notes on computer aided quality control. 5M

OR

Q. No. 8 a) Describe the features of a flexible inspection system. 5M

b) Discuss major non-contact inspection methods. 10M

Section-V

Q. No. 9 a) Define FMS. What arc the Objectives of FMS? 5M

b) Discuss in brief about the FMS layout configurations? 10M

OR

Q. No. 10 a) Discuss the principle of working of automated guided vehicles. 10M

b) What are the basic principles to be considered in automated material handling. 5M

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Code No: R17DME52

R17

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
M.Tech I Year - II Regular Examinations, July/Aug 2018
Industrial Management
(MD & TE)

Roll No										

Time: 3 hours **Max. Marks: 70**

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

*****

SECTION-I

Q. No. 1) Distinguish between management and organization. How for is this distinction justified in your opinion? [14M]

OR

Q. No. 2) Write short notes on the following:
(a) Herzberzs theory of motivation [7M]
(b) Douglas McGregor's theory X and theory Y. [7M]

SECTION-II

Q. No. 3) What problems do you think might arise in working through a virtual corporation to satisfy organizational goals? [14M]

OR

Q. No. 4) What do you understand by line and staff organization? With the help of a neat diagram explain the working of it. [14M]

SECTION-III

Q. No. 5) What are the important factors that influence the selection of a plant location? Illustrate your answer with regard to the location of a power plant in India. [14M]

OR

Q. No. 6) Explain briefly the various types of Production Methods. [14M]

SECTION-IV

Q. No. 7) What is the use of ABC, VED and other classification to departments other than inventory control? What is the use for purchasing, for maintenance and quality control? [14M]

OR

Q. No. 8 (a) What is meant by inventory? What is the need for Inventory Control at different stages of production? [7M]
(b) What are the different costs involved in maintaining Inventory? [7M]

SECTION-V

Q. No. 9) What is Human Resource Management? What are its elements? What is its importance to organizations? Illustrate. [14M]

OR

Q. No. 10)What is acceptance sampling? Illustrate the concepts of single and double sampling. [14M]

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MODEL PAPER 1

SUB: INDUSTRIAL MANAGEMENT

ANSWER THE FOLLOWIENG QUESTIONS, EACH QUESTION CARRIES EQUAL MARKS

1] a. Discuss committee organization, along with merits and demerits.
b. Explain matrix organization. State advantages, disadvantages and applications

[Or]

2] State and explain in detail the five levels in Maslow's need hierarchy.

3] What is the importance of plant location? Discuss in detail various factors affecting the plant location.

[or]

4] What are the types of plant layouts? Discuss any two with their merits and demerits.

5] What is ABC Analysis? Discuss in detail.

[or]

6] Explain the purchase function and its objectives. Write purchase cycle.

7] Draw the network for the following project; it is further given that project completion time is 42 days. Find the find the project duration. Also identify the critical path.

Activity	Description	Duration-days
1-2	Idea generation	7
1-3	Market survey	10
2-4	Prototype making	7
3-5	Advertising campaign	9
4-5	Distribute samples	5
4-6	Commencement of production	5
5-7	Fixing up sales outlet	7
6-7	Manufacture	14

[or]

8 Given the following data, work out the minimum duration of the project and corresponding cost.

Activity	Job	Time		Cost	
A	1-2	10	6	400	600
B	1-3	4	2	100	140
C	2-4	6	4	360	440
D	3-4	8	4	600	900
E	2-5	8	6	840	1100
F	4-6	6	2	200	300
G	5-6	10	8	1200	1400

9] (a) Explain the characteristics of Single Sampling Plain (SSP).
(b) Write a short note on control charts for variables.

[or]

10 Construct $\bar{X}$ and R Charts from the following information and state whether the process is in control. For each of the following $\bar{X}$ has been computed from a sample of 5 units drawn at an interval of half an hour from an ongoing manufacturing

process.

Sample	1	2	3	4	5	6	7	8	9	10
$\bar{X}$	20	34	45	39	26	29	13	34	37	23
R	23	39	14	5	20	17	21	11	40	10

MODEL PAPER 2

SUB: INDUSTRIAL MANAGEMENT

ANSWER THE FOLLOWIENG QUESTIONS, EACH QUESTION CARRIES EQUAL MARKS

1 Explain in detail functions of Management.

2 Or

State and explain in detail the five levels in Maslow's need hierarchy.

3 Define production. How do production is classified? Discuss differences between job production and batch production.

4 Or

Differentiate between product layout and process layout.

5 What are the objectives of inventory control and factors affecting inventory control function?

6 Or

Discuss in brief with a simple format of each

a) Purchase order
b) Invoice
c) Bin Card
d) Material Requisition Note
e) Goods Received/Returned Note

7 The following details relate to a small project with the help of which compute the probability of completion of project within scheduled time. The expected time of each activity is as follows:

Sl. No.	1	2	3	4	5	6	7	8	9
Activity	1-2	1-3	2-4	3-4	4-5	5-6	3-5	5-7	6-7
Activity	6	8	7	12	3	5	7	11	10

8 Or

A manufacturing company is planning to introduce a new product commercially. The list of activities to be carried out with the corresponding duration of time in weeks is listed below.

Activity	description	duration	immediate predecessor
A	initial discussions	3	-
B	product design	11	A
C	market survey	9	A
D	market evaluation	2	C
E	product costing	5	B
F	Sales plan	6	C
G	Product pricing	2	D,E
H	Prototype construction	11	F,G
I	Market information preparation	8	B
J	Prototype testing	9	H,I

Draw the network to represent various activities of the project, determine the minimum duration of the project.

9 For each of the 14 days a number of magnets used in electric relays are inspected and the number of defectives is recorded. The total number of magnets tested is 14,000. The following are the particulars of number of defectives found every day.

Day Number	Number of defectives
1	100

2	50
3	150
4	200
5	150
6	50
7	80
8	120
9	60
10	140
11	50
12	70
13	40
14	140

Or

10 What are the functions of Human Resource Management/Development? Discuss Job evaluation and brief any two types of evaluation methods.

MODEL PAPER 3

SUB: INDUSTRIAL MANAGEMENT

ANSWER THE FOLLOWIENG QUESTIONS, EACH QUESTION CARRIES EQUAL MARKS

1 State and explain Henry Fayol's principles of management. Identify any four principles which you consider as very significant.

Or

2 Explain Mc-Gregor's Theory-X and Theory-Y.

3 What are the objectives and benefits of work study?

Or

4 What is method study? Discuss outline of method study presenting stages involved in method study.

5 What is ABC Analysis? Discuss in detail.

6 Or

Discuss in brief with a simple format of each

f) Purchase order
g) Invoice
h) Bin Card
i) Material Requisition Note
j) Goods Received/Returned Note

7 A small project consists of the following activities with the given time estimates.

	Estimated duration in month		
Project event-successor event	Optimistic time (t_o)	Most likely time (t_m)	Pessimistic time (t_p)
1-2	2	2	14
1-3	2	8	14
1-4	4	4	16
2-5	2	2	2
3-5	4	10	28
4-6	4	10	16
5-6	6	12	30

(a) Draw the network,
(b) Calculate the average expected time for each activity,
(c) Calculate the earliest expected time and latest allowable time for each event, and
(d) Determine the critical path considering project completion time of 36 months.

8 Or

With the help of the following data, draw the net work.
(a) draw the network
(b) Find project duration for the following project and
(c) Identify the critical path.

Activity	1-2	1-3	1-4	2-4	2-5	3-4	3-7	4-6	4-7	5-6	5-7
Time(months)	4	6	12	7	11	7	8	8	13	4	4

9 For each of the 14 days a number of magnets used in electric relays are inspected and the number of defectives is recorded. The total number of magnets tested is 14,000.

The following are the particulars of number of defectives found every day.

Day Number	Number of defectives
1	100
2	50
3	150
4	200
5	150
6	50
7	80
8	120
9	60
10	140
11	50
12	70
13	40
14	140

Or

10 Write a note on

a) Merit rating, and different methods
b) Job Description and Job Evaluation

MODEL PAPER 4

SUB: INDUSTRIAL MANAGEMENT

ANSWER THE FOLLOWIENG QUESTIONS, EACH QUESTION CARRIES EQUAL MARKS

1 Discuss Functional organization and Line and Staff organization structure along with their merits and demerits?

2 Or

What are the principles of organization? Discuss in detail.

3 Write various symbols and their meanings used to record the process of doing job (Process chart).

4 Or

Explain in detail any two types recording techniques used in method study.

5 Write stages involved VED Analysis.

Or

6 What is Total Quality Management? Explain with reference to any standard organization structure.

7 From the activity details given below, determine the optimal project duration and optimal project cost. Indirect cost is Rs. 75 per day.

Activity	Normal		Crash	
	Time (days)	Cost in Rs.	Time(days)	Cost in Rs.
1-2	8	100	6	200
1-3	4	150	2	350
2-4	2	50	1	90
2-5	10	100	5	400
3-4	5	100	1	100
4-5	3	80	1	100

Or

8 Following data relates to a certain project.

Activity	Optimistic time (t_o)	Most likely time (t_m)	Pessimistic time (t_p)
1-2	2	5	14
1-3	3	12	21
2-4	5	14	17
3-4	2	5	8
4-5	1	4	7
3-5	6	15	30

(a) Construct the network, (b) Find the project, (c) Identify the critical path, and (d) Find slack at each event.

9 What is OC Curve? Draw OC curve. Discuss producer's risk and consumer risk with refence to OC Curve.

Or

10 What is product life cycle? Explain various stages involved in product life cycle.

MODEL PAPER 5

SUB: INDUSTRIAL MANAGEMENT

ANSWER THE FOLLOWIENG QUESTIONS , EACH QUESTION CARRIES EQUAL MARKS

1 Discuss Herz Berg's Two factor theory of motivation.

2 Or

Discuss criticism on

a)Taylor's Scientific Management.

b)Fayol's Principles of Management.

3 What is flow process chart? Draw flow process chart for making/manufacturing a screw.

4 Or

A work sampling study on a long cycle operation records the following data:

The total time of study = 5 days

Total Number of observations =1000

Observation of production activity = 725

Manually controlled elements =250

Total acceptable units produced =2500 pieces

Average rating index =120%

Observation of unavoidable delay =100

Calculate the standard time assuming 8 hrs working schedule per day without any overtime.

5 What is benchmarking? What are all the reasons for bench marking? How does a benchmarking play a role in performance of an organisation?

6 Or

What are the benefits of ISO certification to the industry and to the customer? List out ISO 9000 series.

7 Crash the following project network, if overhead charges are Rs.100/day.

Activity	Normal Time	Normal Cost	Crash Time	Crash Cost
1-2	3	350	2	400
2-3	6	1440	4	1620
2-4	9	2160	8	2220
2-5	7	1300	5	1600
3-5	8	500	7	600
4-5	5	1600	3	1770
5-6	8	450	7	750

Or

8 For the following data related to a project, draw the network diagram. Determine the Critical Path and expected project completion time.

Task	A	B	C	D	E	F	G
Duration	10	7	5	3	2	1	14
Precedence	-	-	A	C	D	B,E	E,F

9 Construct $\bar{X}$ and R Charts from the following information and state whether the process is in control. For each of the following $\bar{X}$ has been computed from a sample of 5 units drawn at an interval of half an hour from an ongoing manufacturing process.

Sample	1	2	3	4	5	6	7	8	9	10
$\bar{X}$	20	34	45	39	26	29	13	34	37	23
R	23	39	14	5	20	17	21	11	40	10

Or

10 Discuss the following

a) Total Quality Management
b) Quality Circle

DESIRE

Education is a progressive discovery of our own ignorance. As knowledge is power, a focus must be given in grooming dynamic leaders, not just graduates. Education is transmission of civilization. Our society needs Enthusiasts with passion to transform India into a "Force to reckon with". I believe that the aim of Education is the knowledge not of facts but of values.

Ch. Malla Reddy

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A thought beyond horizons of success
committed for Professional Excellence

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Vision:

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

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

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- To groom the students to become intellectually creative and professionally competitive.

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- Institute has been certified with ISO 9001:2015
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- MoU with Zensar Technologies for the Technology Transfer
- MoU with Tech Mahindra
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- Business Incubation Centre – MSME, Govt. of India
- Global Education and Career Counseling Centre
- Patents award – 4 No's

Principal:
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