

Code No: R20A0310

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

R20

(Autonomous Institution – UGC, Govt. of India)

II B.Tech II Semester Regular Examinations, July 2022

Strength of Materials

(ME)

Roll No									
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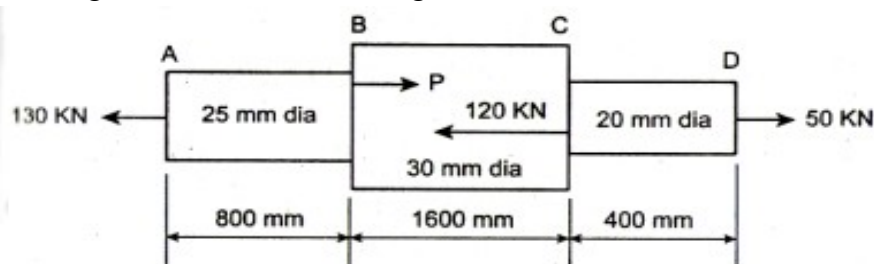
Time: 3 hours

Max. Marks: 70

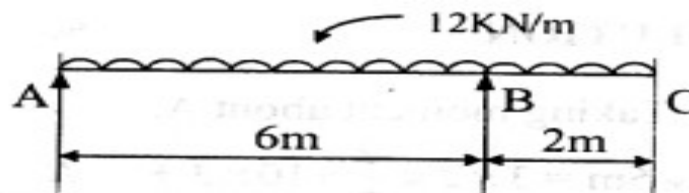
Answer Any Five Questions

All Questions carries equal marks.

- 1 A steel tube of internal diameter 100mm and external diameter 125mm is surrounded by a brass tube of external diameter 150mm. The composite bar is subjected to an axial pull of 10KN. Find the load carried by each tube and the stresses and strains developed in them if $E_s = 200\text{GPa}$ and $E_b = 100\text{GPa}$. [14M]
- 2 Find the value of P and the change in length of each component and the total change in length of the bar shown in figure. Take $E = 2 \times 10^5 \text{N/mm}^2$. [14M]



- 3 A simply supported beam of length 10 m carries the uniformly distributed load 10 kN/m and two point loads 50 kN and 40 kN at 4m apart from a distance of 4 m from the right end. Draw the S.F and B.M diagrams for the beam. Also calculate the maximum bending moment. [14M]
- 4 Draw the shear force and bending moment diagram for the beam loaded as shown in figure. [14M]



- 5 Derive the bending equation from fundamentals $M/I = f/y = E/R$. [14M]
- 6 An I – section beam 350 mm x 150 mm has a web thickness of 10 mm and flange thickness of 20 mm. If the shear force acting on the section is 40 kN, find the [14M]

maximum shear stress developed in I –section. Sketch the shear stress distribution across the section.

- 7 A beam is simply supported as its ends over a span of 10m and carries two concentrated of 100KN and 60KN at a distance of 2m and 5m respectively from the left support. Calculate i) slope at the left support; ii) slope and deflection under the 100KN load. Assume $EI=36 \times 10^4 \text{ KN-m}^2$ [14M]
- 8 a) Derive an expression for circumferential stress and longitudinal stress for a thin cylinder. [7M]
b) A cylinder of internal diameter 3.0 and of thickness 6 cm contains gas. If the tensile stress in the materials is not exceed 70 N/mm^2 , determine the internal pressure of the gas. [7M]

Code No: R20A0308

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

R20

II B.Tech II Semester Regular Examinations, July 2022

Applied Thermodynamics

(ME)

Roll No									
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Time: 3 hours

Max. Marks: 70

Answer Any **Five** Questions
All Questions carries equal marks.

Note: Steam Tables and Mollier chart's are permitted

- 1 In a Rankine cycle the steam at inlet to turbine is saturated at a pressure of 35bar and exhaust pressure is 0.2bar. Determine (i) The pump work (ii) The turbine work (iii) The Rankine efficiency (iv) The condenser heat flow (v) The dryness fraction at the end of expansion. Take a flow rate of 10kg/sec. [14M]
- 2 a) How are the steam boilers classified and explain in detail? [7M]
b) Sketch and describe the working of Babcock and Wilcox water tube boiler. [7M]
- 3 Dry saturated steam at a pressure of 8 bar enters a convergent divergent nozzle and leaves it at a pressure of 1.5 bar. If the flow is isentropic and the corresponding expansion index is 1.135. Find the ratio of cross sectional area at exit and throat for maximum discharge. [14M]
- 4 a) Explain the classification and working principle of a nozzle. [7M]
b) Discuss the merits and demerits of surface condensers over jet condensers [7M]
- 5 a) What is the fundamental difference between the operation of impulse and reaction turbines. [7M]
b) Explain the working of single stage reaction turbine. Sketch the pressure and velocity variations along the axis of the turbine. [7M]
- 6 a) What do you mean by compounding of steam turbine? Discuss various methods of compounding steam turbines? [7M]
b) Deduce an expression for work done per stage in a reaction turbine? [7M]
- 7 a) Explain Regenerative gas turbine cycle with a neat diagram. [7M]
b) What is open cycles gas turbine? Explain Merits and Demerits of it. [7M]
- 8 a) Explain the applications of rockets. [7M]
b) With a neat sketch and T- S diagram, explain the working of a turbojet engine [7M]

(Autonomous Institution – UGC, Govt. of India)

II B.Tech II Semester Regular Examinations, July 2022

Data Structures using Python

(ME)

Roll No										
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Time: 3 hours

Max. Marks: 70

Answer Any Five Questions

All Questions carries equal marks.

- 1 (a). Explain the Principles of object-oriented design. [7M]
(b). Describe the steps in the Python class inheritance that produces a geometric progression. [7M]
- 2 (a). What are some potential efficiency disadvantages of having very shallow inheritance trees, that is, a large set of classes, A, B, C, and so on, such that all of these classes extend a single class, Z? [7M]
(b). Draw a class inheritance diagram for the following set of classes: [7M]
 - Class Goat extends object and adds an instance variable `_tail` and methods `milk()` and `jump()`.
- 3 (a). Explain the various Python Specific Data Structures. [7M]
(b). Explain Comprehensions and its Types with respect to Python. [7M]
- 4 Consider the list `scores = [5, 4, 7, 3, 6, 2, 1]` and write the python code to perform the following operations: [14M]
 - i) Insert an element 9 at the beginning of the list.
 - ii) Insert an element 8 at the index position 3 of the list.
 - iii) Insert an element 7 at the end of the list.
 - iv) Delete all the elements of the list.
 - v) Delete an element at the index position 3.
 - vi) Delete an element at the beginning of the list.
 - vii)
- 5 (a). Given a n array of n numbers. Give an algorithm for finding the element which appears the maximum number of times in the array? [7M]
(b). Given an array of 11 elements. Find three elements in the array such that their sum is equal to given element K? [7M]
- 6 Suppose S is a sequence of n values, each equal to 0 or 1. How long will it take to sort S with the merge-sort algorithm? What about quick-sort? [14M]
- 7 (a). Illustrate Inserting a Node in Doubly Linked List at the Beginning, at the Middle. [7M]
(b). Write a Python program to illustrate stack using the linked list? [7M]
- 8 (a). Explain the Properties of Binary Trees. [7M]
(b). Give an algorithm for finding the number of leaves in the binary tree without using recursion. [7M]

Code No: R20A0551

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

R20

(Autonomous Institution – UGC, Govt. of India)

II B.Tech II Semester Regular Examinations, July 2022

Introduction to DBMS

(EEE, ME, ECE & AE)

Roll No									
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Time: 3 hours

Max. Marks: 70

Answer Any Five Questions
All Questions carries equal marks.

- 1 (a). Discuss about different types of Data models? [7M]
(b). Draw the database architecture and explain in detail about each component. [7M]
- 2 (a). How data inconsistency problems can be avoided in database systems. [2M]
(b). Find whether View exists if the table is dropped from the database? [2M]
(c) Explain three schema architecture for data base management system with neat sketch [10M]
- 3 (a). Differentiate relation schema and relational instance? What are domain constraints [7M]
(b). Explain E-R model with examples. [7M]
- 4 Draw an E-R diagram for a university database, contains information about professors (identified by social security number, or SSN) and courses (identified by courseid). Professors teach courses; For each situation, draw an ER diagram that describes it [14M]
 1. Professors can teach the same course in several semesters, and each offering must be recorded.
 2. Professors can teach the same course in several semesters,
 3. Every professor must teach some course.
 4. Every professor teaches exactly one course (no more, no less).
 5. Every professor teaches exactly one course (no more, no less), and every course must be taught by some professor.
- 5 (a). Explain various types of joins with example. [7M]
(b). Explain the following terms with suitable example: (1) Primary Key (2) Candidate Key (3) Foreign Key [7M]
- 6 Suppose that we have a relation marks(ID, score) and we wish to assign grades to students based on the score as follows: grade F if score < 40, grade C if $40 \leq \text{score} < 60$, grade B if $60 \leq \text{score} < 80$, and grade A if $80 \leq \text{score}$. Write SQL queries to do the following:
 - a. Display the grade for each student, based on the marks relation. [7M]
 - b. Find the number of students with each grade. [7M]

- 7 Explain how functional dependencies can be used to indicate the following:
- i. A one-to-one relationship set exists between entity sets student and instructor. [7M]
 - ii. A many-to-one relationship set exists between entity sets student and instructor. [7M]
- 8 (a). List the ACID properties. Explain the usefulness of each. [7M]
(b). Give an example of a serializable schedule with two transactions such that the order in which the transactions commit is different from the serialization order. [7M]

Code No: R20A0312

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

R20

(Autonomous Institution – UGC, Govt. of India)

II B.Tech II Semester Regular Examinations, July 2022

Manufacturing Processes

(ME)

Roll No										
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Time: 3 hours

Max. Marks: 70

Answer Any **Five** Questions
All Questions carries equal marks.

- 1 List out the defects in casting process. Explain any seven with neat sketch. [14M]
- 2 Explain the principle of Squeeze casting, vacuum mould casting with necessary sketches. [14M]
- 3 a) With the help of a neat sketch explain electron welding process. [7M]
b) What is arc blow? What are the measures to be taken to avoid arc blow? [7M]
- 4 a) Describe the oxy-acetylene gas welding technique and give the applications. [7M]
b) Explain the resistance welding process giving the equipment, parameters controlled and its advantages. [7M]
- 5 a) Explain the changes in structure and properties during cold working, recovery and recrystallization. [7M]
b) Explain why spring back in bending depends on yield stress, elastic modulus, sheet thickness and bend radius. [7M]
- 6 What do you mean by rolling process and explain the different rolling process in detail? [14M]
- 7 a) Write a short notes on i) Wire drawing and ii) Tube drawing. [7M]
b) Explain the various forging operations and list the forging defects. [7M]
- 8 Describe laminated object manufacturing process and its advantages, disadvantages and applications. [14M]

Code No: R20A0024

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

R20

(Autonomous Institution – UGC, Govt. of India)

II B.Tech II Semester Regular Examinations, July 2022

Probability and Statistics

(EEE, ME & AE)

Roll No									
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Time: 3 hours

Max. Marks: 70

Answer Any **Five** Questions
All Questions carries equal marks.

- 1 Let X be a random variable with the following probability distribution [14M]
- | | | | |
|--------|-----|-----|-----|
| x: | -3 | 6 | 9 |
| P(X=x) | 1/6 | 1/2 | 1/3 |
- .Find $E(X)$, $E(X^2)$ and using the laws of expectation, evaluate $E(2X+1)^2$.

- 2 Given that $f(x) = (k/2)x$ is a probability distribution for a random variable X that can take on the values $X = 0, 1, 2, 3$ and 4 i) find k ii) mean and variance of X. [14M]

- 3 Define Poisson distribution with example and show that mean = variance for a Poisson distribution. [14M]

- 4 The mean and variance of binomial distribution are 4 and 1.3333 respectively. Find $P(X \geq 1)$, $P(X = 2)$. [14M]

- 5 Obtain the two regression lines for the following [14M]

X	1	2	3	4	5
Y	10	40	50	20	30

- 6 Calculate the coefficient of correlation for the following data [14M]

X	12	9	8	10	11	13	7
Y	14	8	6	9	11	12	3

- 7 Consider the population: **12, 25, 18, and 23**. Construct a sampling distribution of the sample mean when random samples of size 2 are selected from the population with replacement. [14M]

- 8 Explain t-distribution and point out its uses. Heights of ten members are found to be 63, 63, 66, 67, 68, 69, 70, 70, 71 and 71 inches. For this data discuss suggestion that the mean height of the population is 66 inches. [14M]

Code No: R20A0310

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
 (Autonomous Institution – UGC, Govt. of India)
II B.Tech II Semester Regular/Supplementary Examinations, July 2023
Strength of Materials

(ME)

Roll No									
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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.

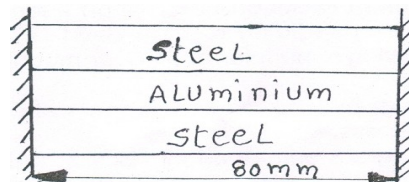
SECTION-I

- | | | |
|----------|---|---------------------------------------|
| 1 | <p>A Draw the stress strain diagram for mild steel and explain?</p> <p>B Derive the relation between young’s modulus and shear modulus.</p> | <p>Marks
[7M]
[7M]</p> |
|----------|---|---------------------------------------|

OR

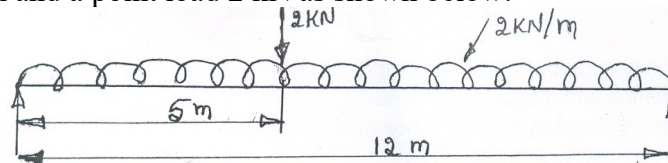
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|----------|--|---------------------|
| 2 | <p>A composite bar of 20mm x 20mm cross section is made up of three flat bars as show in fig. All the bars are rigidly connected at the ends when the temperature is 20⁰c Determine,</p> <p>i)Stresses developed in each bar when the temperature of the composite bar is raised to 60⁰c.</p> <p>ii)The final stresses in each bar when a load of 17.6 KN is applied to the composite bar. Take $E_{al}=80\text{Gpa}, E_s=200\text{ Gpa}$</p> | <p>[14M]</p> |
|----------|--|---------------------|

$\alpha_{al} = 11 \times 10^{-6} / ^\circ c. \alpha_s = 22 \times 10^{-6} / ^\circ c.$



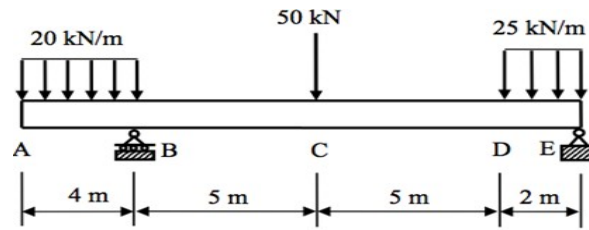
SECTION-II

- | | | |
|----------|---|---------------------|
| 3 | <p>Draw the SF & BM diagrams the simply supported beam carrying UDL of 2kN/m over the entire length and a point load 2 kN as shown below:</p> | <p>[14M]</p> |
|----------|---|---------------------|



OR

- | | | |
|----------|--|------------------------------------|
| 4 | <p>A Draw the shear force and bending moment diagram for a simply supported beam carrying a uniformly distributed load of w k N/m over its entire length.</p> <p>B Draw the shear force and bending moment diagram for the beam shown in Fig. below</p> | <p>[7M]
[7M]</p> |
|----------|--|------------------------------------|

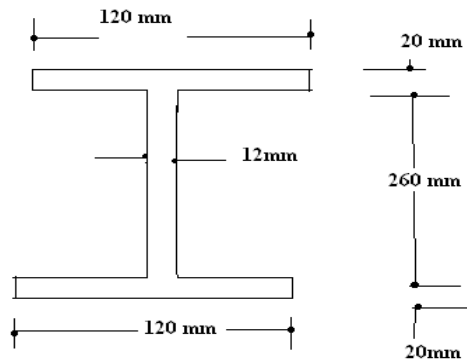


SECTION-III

- 5 *A* State the assumptions in theory of simple bending and derive the bending momentum equation. [10M]
- B* What is meant by section modulus? Find an expression for section modulus of a rectangular section [4M]

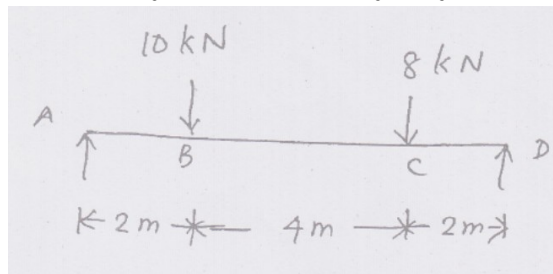
OR

- 6 The cross section as shown in fig below is used as a simply supported beam on a span of 4m. If allowable stress in bending in compression and tension is 100MPa and 165MPa respectively, find the safe UDL the beam can carry. [14M]



SECTION-IV

- 7 Determine the slope at the supports and maximum deflection for the beam shown in Figure 4. Use Macaulay's method. $E=2 \times 10^5 \text{ N/mm}^2$ and $I=20 \times 10^6 \text{ mm}^4$. [14M]



OR

- 8 *A* Derive the slope and deflection equation of a simply supported beam, carrying a point load at its centre. [7M]
- B* A cantilever of length 3m carries a point load of 10kN at 2m from fixed end. If $E=2 \times 10^5 \text{ N/mm}^2$, $I=10^8 \text{ mm}^4$. Find the slope and deflection at the free end using Macaulay's method. [7M]

SECTION-V

- 9 *A* State the assumptions in the shear stress produced in a circular shaft subjected to torsion in detail. [7M]
- B* Explain about longitudinal stress in thin shells and derive expressions for it. [7M]

OR

- 10 A** A shaft transmits 800KW of power at 210 RPM. Determine the actual working stress and the diameter of a shaft twists one degree on a length of 18 diameters and the shear stress is not to exceed 50 MPa. Take $G=81 \text{ G Pa}$. [7M]
- B** Define the terms longitudinal stress and circumferential stress. Also derive the formulae related to them. [7M]

Code No: R20A0309

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
II B.Tech II Semester Regular/Supplementary Examinations, July 2023
Applied Thermodynamics

(ME)

Roll No									
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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.

Note: Steam Tables and Molliar charts are permitted**Marks**

- | | | | Marks |
|---------------------------|----------|--|--------------|
| <u>SECTION-I</u> | | | |
| 1 | A | Show Rankine cycle on P-V and T-S diagram using dry saturated steam and obtain an expression for the Rankine cycle efficiency. | [7M] |
| | B | A power generating plant uses steam as working fluid and operates at boiler pressure of 50 bar, dry saturated and condenser pressure of 0.5 bar. Calculate for these limits i) the cycle efficiency and ii) the work ratio and iii) specific steam consumption for Carnot cycle and Rankine cycle. | [7M] |
| OR | | | |
| 2 | A | Why boiler accessories are installed. Explain the operation of economiser with the help of simple diagram. | [7M] |
| | B | Explain the working of super heater with a neat sketch. | [7M] |
| <u>SECTION-II</u> | | | |
| 3 | | Dry saturated steam at a pressure of 10 bar enters a convergent-divergent nozzle and leaves at a pressure of 1 bar. If the flow is adiabatic and frictionless, determine: (i) The exit velocity of steam (ii) Ratio of cross section at exit and that at throat Assume the index of adiabatic expansion to be 1.135 | [14M] |
| OR | | | |
| 4 | A | What are the effects of air leakage in a condenser | [7M] |
| | B | Classify condensers? Explain each in detail | [7M] |
| <u>SECTION-III</u> | | | |
| 5 | A | Classify steam turbines based on the parameters? Discuss in detail | [7M] |
| | B | Differentiate impulse and reaction turbine? | [7M] |
| OR | | | |
| 6 | | At a stage in a reaction turbine the pressure of steam is 0.34 bar and the dryness 0.95. For a flow rate of 36000 kg/h, the stage develops 950 kW. The turbine runs at 3600 r.p.m and the velocity of flow is 0.72 times the blade velocity. The outlet angle of both stator and rotor blades is 20°. Determine at this stage. Mean rotor diameter (ii) Height of the blades | [14M] |
| <u>SECTION-IV</u> | | | |
| 7 | A | Explain the merits and demerits of closed cycle gas turbine over open cycle gas turbine | [7M] |

- B** Explain open cycle gas turbine with help of neat sketch. [7M]
OR
- 8** **A** Explain Closed cycle gas turbine with the help of neat sketch? [7M]
B Discuss the parameters of performance used in gas turbines? [7M]
- SECTION-V**
- 9** **A** Explain Turbo jet engine with suitable sketch? [7M]
B Discuss the various classifications of Rockets in detail. [7M]
- OR
- 10** **A** Explain the concept of Thrust Augmentation with its Methods [7M]
B Discuss the principles of jet propulsion and mention how they are classified? [7M]
- ***

Pre-Order Traversal: G B Q A C K F P D E R H

In-Order Traversal: Q B K C F A G P E D H R

OR

10

A

Write a short note on:

i) Directed Graphs

[2M]

ii) Undirected Graphs

[2M]

B

Construct the binary tree whose following traversals are given:

[10M]

postorder: FIHEDBJONMKCA

inorder : DFEIHBAJCNOMK

Code No: R20A0551

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

II B.Tech II Semester Regular/Supplementary Examinations, July 2023**Introduction to DBMS****(EEE, ME, ECE & AE)**

Roll No										
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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**Marks**

- 1 **A** Compare and Contrast file Systems with database systems? [7M]
 B Explain different types of database users and write the functions of DBA? [7M]

OR

- 2 **A** Discuss about different types of Data models? [7M]
 B Explain Three schema Architecture of a database [7M]

SECTION-II

- 3 **A** What is Super key? Explain with example [7M]
 B Define view? Explain views with examples? [7M]

OR

- 4 **A** Demonstrate Foreign key constraints with suitable examples [7M]
 B Explain Integrity constraints with examples [7M]

SECTION-III

- 5 **A** Describe various types of outer joins with examples [7M]
 B Explain the set operations of SQL? [7M]

OR

- 6 **A** List and explain the aggregate functions supported by SQL with examples [7M]
 B Demonstrate various types of E-R Diagram Notations. [7M]

SECTION-IV

- 7 **A** Describe the concept of functional dependency and explain computation of closure of F. [7M]

- B** Discuss ACID properties with examples [7M]

OR

- 8 **A** Explain problems caused by Redundancy with examples [7M]
 B i. Define Third normal form and Transitive dependency. [7M]
 ii. Define Second normal form and Partial dependency.

SECTION-V

- 9 **A** Explain conflict serializability with example [7M]
 B Describe Timestamp based locking protocols? [7M]

OR

- 10 **A** Sketch the transaction state and explain in detail. [7M]
 B What is a transaction? Explain desirable properties of transactions. [7M]

Code No: R20A0312

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY**(Autonomous Institution – UGC, Govt. of India)****II B.Tech II Semester Regular/Supplementary Examinations, July 2023****Manufacturing Processes****(ME)**

Roll No									
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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**Marks**

- 1 *A* Explain the steps involved in the design of a casting. Discuss the importance of patterns and allowances in the casting process. **[7M]**
- B* Discuss the principles of gating in casting. Describe the different types of gating systems used and explain their advantages and limitations. **[7M]**

OR

- 2 *A* Describe the solidification process in casting. Discuss the factors affecting solidification and explain the concept of shrinkage defects in castings. **[7M]**
- B* Explain the types and functions of risers in casting. Discuss their importance in reducing casting defects and improving casting quality. **[7M]**

SECTION-II

- 3 Describe the different welding positions used in various welding processes. Explain the significance of each position and the challenges associated with welding in different positions. **[14M]**

OR

- 4 Provide a detailed classification of gas welding, arc welding, forge welding, resistance welding, thermit welding, and plasma welding (air and water). Discuss the working principles, advantages, and limitations of each welding process. **[14M]**

SECTION-III

- 5 *A* Define bulk metal forming and provide examples of commonly used metal forming processes. **[7M]**
- B* Compare and contrast injection molding and blow molding techniques in terms of their working principles and applications. **[7M]**

OR

- 6 *A* Discuss the various forming processes such as bending, coining, and embossing, highlighting their differences and applications. **[7M]**
- B* Explain the concept of strain hardening and its effects on metal deformation. **[7M]**

SECTION-IV

- 7 **A** Describe the water plasma cutting process. Explain the working principles, equipment used, and advantages of water plasma cutting. [7M]
- B** Explain the oxy-acetylene gas cutting process. Discuss the equipment used, the working principles, and the factors affecting the quality of gas cutting. [7M]

OR

- 8 **A** Discuss the operations of blanking, piercing, punching, and trimming in metal forming. Explain the principles and applications of each operation. [7M]
- B** Explain the swaging process in metal forming. Discuss the working principles, applications, and advantages of swaging. [7M]

SECTION-V

- 9 **A** Evaluate the advantages and disadvantages of fused deposition modeling as an additive manufacturing technique. [7M]
- B** Analyze the applications of additive manufacturing in various industries. Assess its impact on product development and customization. [7M]

OR

- 10 **A** Illustrate the process of 3D printing and its role in additive manufacturing. Provide examples of its applications. [7M]
- B** Describe the process of selective laser sintering (SLS) in additive manufacturing. Discuss its working principle, advantages, and limitations. Compare SLS with other additive manufacturing techniques in terms of accuracy and versatility. [7M]

Code No: R20A0024

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

II B.Tech II Semester Regular/Supplementary Examinations, July 2023**Probability and Statistics**

(EEE, ME & AE)

Roll No									
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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**Marks**1 **A** Define Discrete Random Variable and Continuous Random Variable. **[4M]****B** A random variable X has the following distribution **[10M]**

X:	1	2	3	4	8	9
P(x) :	K	3K	5K	7K	9K	11K

Determine i. K ii. Mean iii. $P(x > 3)$

OR

2 **A** The joint probability density function is given by

$$f(x, y) = \begin{cases} 10xy^2, & 0 < x < y < 1 \\ 0, & \text{elsewhere} \end{cases}$$

a) Marginal probability density function of X **[2M]**b) Marginal probability density function of Y **[2M]**c) Conditional probability density function of X given Y **[2M]**d) Conditional probability density function of Y given X **[2M]**

B Given that $f(x) = \frac{kx}{2}$, if $x=1,2,3,4$ is a probability distribution of a random variable X Find K. **[6M]**

SECTION-II3 **A** Derive the mean of a Poisson Distribution. **[6M]****B** Ten coins are thrown simultaneously. Find the probability of getting : **[8M]**

i) At least one head

ii) At most seven heads

OR

4 **A** Write the properties of Normal Distribution **[4M]****B** In a normal distribution, 7% of the items are under 35 and 89% of the items are under 63. Determine the mean and variance of the distribution. **[10M]****SECTION-III**5 **A** Write the properties of correlation coefficient. **[4M]**

B Calculate the coefficient of correlation from the following data [10M]

X	12	9	8	10	11	13	7
Y	14	8	6	9	11	12	3

OR

6 Find the two lines of regression between the two variables [14M]

X:	50	50	55	60	65	65	65	60	60	60
Y:	11	13	14	16	16	15	15	14	13	13

SECTION-IV

7 A Define (i) Null Hypothesis (ii) Alternative Hypothesis. [2M]

B A population consists of five numbers 2,3,6,8,and 11 .Consider all possible samples of size two which can be drawn with replacement from this population ,Find [3M]

i)The mean of the population [3M]

ii)The standard deviation of the population [3M]

iii) The mean of the sampling distribution of means [3M]

iv) Standard deviation of the sampling distribution of means.

OR

8 A Define Sample and population. [2M]

B Sample of 400 men and 600 women were asked whether they would like to have a flyover near their residence. 200 men and 325 women were in favour of the proposal. Test the hypothesis that proportions of men and women in favour of the proposal are same, at 5%level. [12M]

SECTION-V

9 A Write the properties of t-distribution. [4M]

B A random sample of 10 boys had the following I.Q's: 70, 120, 110, 101, 85, 83, 95, 98, 107 and 100. Do these data support the assumption of a population mean I.Q of 100? [10M]

OR

10 A Write the applications of chi-square distribution. [4M]

B Two horses 'A' and 'B' were tested according to the time(in seconds) to run a particular track with the following results: [10M]

Horse 'A'	28	30	32	33	33	29	34
Horse 'B'	29	30	30	24	27	29	

Test whether the two horses have the same running capacity.

Code No: R20A0310

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

R20

(Autonomous Institution – UGC, Govt. of India)

II B.Tech II Semester Supplementary Examinations, December 2022

Strength of Materials

(ME)

Roll No									
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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 and draw stress & strain diagram for mild steel. [7M]
(b) Find the young's modulus of a brass rod of diameter 25 mm and of length 25 mm, which is subjected to a tensile load of 50 kN when the extension of the rod is equal to 0.3 mm. [7M]

OR

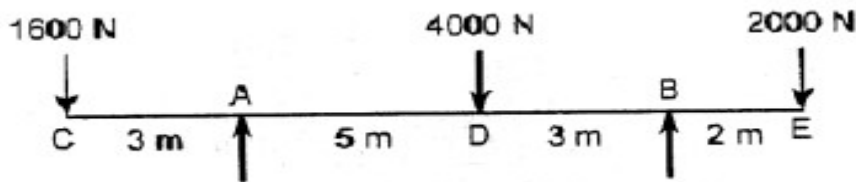
- 2 A cylinder piece of steel 80 mm diameter and 120 mm long is subjected to an axial compression force of 500 kN. Calculate the change in the volume of the piece, if the bulk modulus $1.7 \times 10^5 \text{ N/mm}^2$ and Poisson ratio is 0.3. [14M]

SECTION-II

- 3 A beam 6m long rests on supports 5m apart, the right hand end is overhanging by 1m. The beam carries a UDL of 20KN/m over the entire length of the beam. Draw SFD and BMD indicating the maximum BM and the point of contra flexure. [14M]

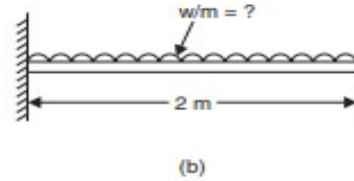
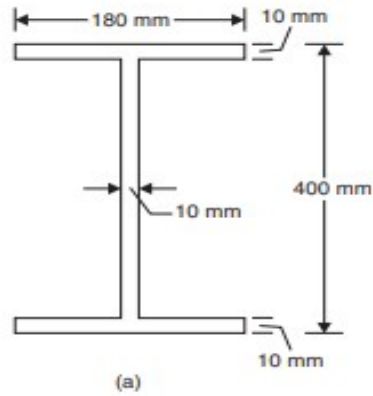
OR

- 4 Draw the shear force and bending moment diagram for the beam shown in figure below. Also determine the point of contra flexure. [14M]



SECTION-III

- 5 The below figure shows the cross-section of a cantilever beam of 2.5 m span. [14M]
Material used is steel for which maximum permissible stress is 150 N/mm^2 . What is the maximum uniformly distributed load this beam can carry?

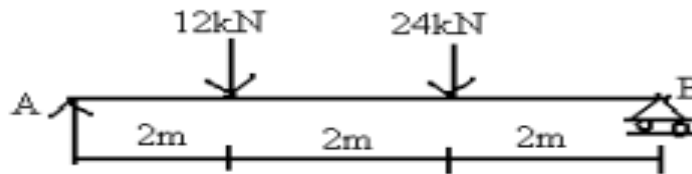


OR

- 6 Obtain the shear stress distribution for a rectangular cross section $230 \times 40 \text{ mm}$ [14M] subjected to a shear force of 40 kN. Calculate the maximum and average shear stress.

SECTION-IV

- 7 Using double integration method, determine the deflection under the loads of the [14M] beam shown in fig.



OR

- 8 A beam AB of length 8 m is simply supported at its ends and carries two point [14M] loads of 50 kN at a distance of 2 m and 5 m respectively from left support A. determine, deflection under each load, maximum deflection occurs. Take $E = 2 \times 10^5 \text{ N/mm}^2$ and $I = 85 \times 10^6 \text{ mm}^4$.

SECTION-V

- 9 Determine the diameter of a solid shaft transmitting 300 kW at 250 rpm. The [14M] maximum shear stress should not exceed 30 N/mm^2 and the twist should not be more than 1° in a shaft length of 2 m. Take $G = 100 \text{ kN/mm}^2$.

OR

- 10 A cylinder shell 90 cm long, 15 cm internal diameter having thickness of metal 8 [14M] mm is fitted with fluid at atmospheric pressure. If an additional 20 cm^3 of fluid is pumped into the cylinder find the (i) Pressure exerted by the fluid on the cylinder. (ii) Hoop stress induced. Take $E = 200 \text{ GPa}$ and Poisson ratio = 0.3.

Code No: R20A0309

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

R20

II B.Tech II Semester Supplementary Examinations, December 2022
Applied Thermodynamics

(ME)

Roll No									
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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.

Note: Steam Tables and Mollier Charts are permitted.

SECTION-I

- 1 A steam power plant is to operate with a boiler pressure of 50 bar and a condenser pressure of 0.07 bar. The steam leaving the boiler is at a temperature of 350°C. Determine the efficiency, specific steam consumption and work ratio of the Rankine cycle. [14M]

OR

- 2 a) Enumerate the differences between fire tube and water tube boilers. [7M]
b) What are the essential features of a good boiler? [7M]

SECTION-II

- 3 A convergent – divergent nozzle is required to discharge 5 kg of steam per second. The nozzle is supplied with steam at 10 bar and 200°C and the discharge takes place against a back pressure of 0.34 bar. Estimate the throat and exit areas. Assume isentropic flow and take the index $n = 1.3$. If the nozzle efficiency is assumed to be 85%, determine the exit area. [14M]

OR

- 4 a) Derive the equation for critical pressure ratio in nozzles [7M]
b) Sketch and Describe the operation of any surface condenser. [7M]

SECTION-III

- 5 The velocity of steam leaving nozzles of an impulse turbine is 900m/s and the nozzle angle is 20°. Blade velocity is 300m/s and blade velocity coefficient is 0.7. Calculate for a mass flow rate of 1kg/Sec and symmetrical blading (i) The blade inlet angle (ii) Driving force on wheel (iii) The axial thrust (iv) Diagram power (v) Diagram efficiency [14M]

OR

- 6 A reaction turbine runs at 3000 rpm and the steam consumption is 20000 kg/hr. The pressure of steam at a certain pair is 2 bar, its dryness fraction is 0.93 and the power developed by the pair is 50 kW. The discharge blade angle is 20° for both the fixed and moving blades and the axial velocity of flow is 0.72 times the blade velocity. Find the drum diameter and the blade height. Take the tip leakage steam as 8%. Neglect blade thickness. [14M]

SECTION-IV

- 7 A gas turbine unit receives air at 100kpa and 300K and compresses it adiabatically to 620kpa with efficiency of the compressor 88%. The fuel has a heating value of 44,180KJ/Kg and the fuel ratio is 0.017kg fuel/kg air. The turbine internal efficiency is 90%. Calculate the compressor work, turbine work and thermal efficiency. [14M]

OR

- 8 a) Explain the working of open cycle gas turbine. [7M]
b) A gas turbine plant receives air at 1 bar and 290K and compresses it to 5 bar. If the temperature of air after compression is 1000K. Find the thermal efficiency of the turbine. Take $\gamma = 1.4$ for air. [7M]

SECTION-V

- 9 a) Explain different thrust augmentation techniques used for air breathing engines. [7M]
b) List out the requirements of an ideal rocket propellant and give the applications of rockets. [7M]

OR

- 10 A turbojet engine flying at a speed of 960 Km/h consumes air at the rate of 54.5 kg/s. Calculate a) Exit Velocity of jet when the enthalpy change for nozzle is 200 KJ/kg and the velocity coefficient is 0.97 b) Fuel flow rate in kg/s when the air-fuel ratio is 75:1 c) Thrust specific fuel consumption d) Propulsive Power e) Propulsive efficiency [14M]

Roll No									
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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 object Oriented concept in Python. [7M]
 (b). Illustrate an Arithmetic Progression Class in Inheritance. [7M]
 OR
- 2 Write a Python class, Flower, that has three instance variables of type str, int, and float, that respectively represent the name of the flower, its number of petals, and its price. Your class must include a constructor method that initializes each variable to an appropriate value, and your class should include methods for setting the value of each type, and retrieving the value of each type. [14M]

SECTION-II

- 3 (a). How do you convert a list into a string and vice-versa? Illustrate with examples. [7M]
 (b). Explain Strings, and slicing with respect to Python. [7M]
 OR
- 4 Read a string from keyboard input. Create a list containing tuples, where each tuple represents a word in the input string and length of that string. Write a Python program sort the words in descending order of their length. [14M]

SECTION-III

- 5 Given a sorted array of n elements, possibly with duplicates. Find the number of occurrences of a number. [14M]
 OR
- 6 Experimentally compare the performance of in-place quick-sort and a version of quick-sort that is not in-place. [14M]

SECTION-IV

- 7 (a). Illustrate Inserting a Node at the Front, End of a Circular Linked List. [7M]
 (b). Write a Python program to illustrate how will you display a linked list from the end? [7M]
 OR
- 8 How do we implement *two* stacks using only one array? Our stack routines should not indicate an exception unless every slot in the array is used. [14M]

SECTION-V

- 9 (a). Describe the numerous Types of Binary Trees. [7M]
 (b). Give an algorithm to check whether the given binary tree is a BST or not. [7M]
 OR
- 10 Given a directed acyclic graph, give an algorithm for finding its depth. [14M]

Code No: R20A0551

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

R20

(Autonomous Institution – UGC, Govt. of India)

II B.Tech II Semester Supplementary Examinations, December 2022

Introduction to DBMS

(EEE, ME, ECE & AE)

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). Describe the functions or responsibilities of database administrators. [7M]
(b). Illustrate the differences between the three levels of data abstraction. [7M]

OR

- 2 (a). One can convert any weak entity set to strong entity set by simply adding appropriate attributes. Answer why, then, do we have weak entity sets? [7M]
(b). Explain how does the data inconsistency problems can be avoided in database systems. [7M]

SECTION-II

- 3 (a). Distinguish strong entity set with weak entity set? Draw an ER diagram to illustrate weak entity set? [7M]
(b). Compare Specialization and Generalization in ER model. Give suitable example for each. [7M]

OR

- 4 (a). Construct an E-R diagram for a car insurance company whose customers own one or more cars each. Each car has associated with it zero to any number of recorded accidents. [7M]
(b). How foreign key can be added to a table after defining the table. Explain with example. [7M]

SECTION-III

- 5 (a). Explain following relational algebra operation: (i) Natural join operation (ii) Selection and projection operation. [7M]
(b). Write SQL Queries for the given Schemas employees (emp-id, first-name, last-name, hire-date, dept-id, salary, job) [7M]
departments (dept-id, dept-name, manager-id, location-id)

i) Display the last names and hire dates of all latest hires in their respective Departments in the location ID 1700.

ii) Write an SQL Query to display all employee names and salary whose salary is Greater than minimum salary of the company and job title starts with 'M'.

OR

- 6 Write the following queries in SQL, using the university schema. [3M]
a. Find the names of all students who have taken at least one Comp. Sci. course; make sure there are no duplicate names in the result.

- b. Find the IDs and names of all students who have not taken any course offering before Spring 2009. [3M]
- c. For each department, find the maximum salary of instructors in that department. You may assume that every department has at least one instructor. [4M]
- d. Find the lowest, across all departments, of the per-department maximum salary computed by the preceding query. [4M]

SECTION-IV

- 7 (a). What is functional dependency? Discuss in detail. [7M]
(b). Explain 1NF, 2NF & 3NF with examples. [7M]

OR

- 8 Explain what is meant by repetition of information and inability to represent information. Explain why each of these properties may indicate a bad relational database design. [14M]

SECTION-V

- 9 (a). Explain why the read-committed isolation level ensures that schedules are cascade-free. [7M]
(b). Explain the ACID properties with suitable examples. [7M]

OR

- 10 (a). Use of multiple-granularity locking may require more or fewer locks than an equivalent system with a single lock granularity. Provide examples of both situations, and compare the relative amount of concurrency allowed. [7M]
(b). Most implementations of database systems use strict two-phase locking. Suggest three reasons for the popularity of this protocol. [7M]

Code No: R20A0312

R20

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

II B.Tech II Semester Supplementary Examinations, December 2022

Manufacturing Processes

(ME)

Roll No									
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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) Why is it important to provide a means of venting gases from the mold cavity? [7M]
b) Why might directional solidification be desirable in the production of a cast product? [7M]

OR

- 2 a) What are the advantages and disadvantages of squeeze casting? [7M]
b) What are the steps involved in Design of Casting [7M]

SECTION-II

- 3 a) What are the kinds of joints that are normally employed for welding processes? [7M]
Give their sketches.
b) Explain submerged arc welding process and its applications [7M]

OR

- 4 a) What are differences between TIG and MIG welding processes? [7M]
b) Write a short note on laser beam welding, detailing the applications. [7M]

SECTION-III

- 5 What is the purpose of hot working and cold working and explain the merits and demerits of hot working and cold working in detail. [14M]

OR

- 6 a) Explain the injection moulding and blow moulding process in detail. [7M]
b) Write the differences between coining and embossing process in detail. [7M]

SECTION-IV

- 7 a) With a neat sketch, explain hydrostatic extrusion. [7M]
b) Discuss smith forging and roll forging [7M]

OR

- 8 a) Explain the Plasma Cutting process and explain its advantages and disadvantages. [7M]
b) Explain Oxy – Acetylene Gas cutting process and explain its advantages and disadvantages. [7M]

SECTION-V

- 9 a) What are the advantages and applications of stereo lithography process. [7M]
b) Briefly explain the need for rapid prototyping. [7M]

OR

- 10 With neat sketch explain the process of selective laser sintering process and its advantages, disadvantages and applications [14M]

Code No: R20A0024

R20

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

II B.Tech II Semester Supplementary Examinations, December 2022

Probability and Statistics

(EEE, ME & AE)

Roll No									
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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. Two unbiased dice are thrown. Find the expected values of the sum of numbers of points on them. [7M]
b. Four coins is tossed until a head appears. What is the expectation of number of tosses required. [7M]

OR

- 2 What is the expectation of the number of failures preceding the first success in an infinite series of independent trials with constant probability P of success in each trial? [14M]

SECTION-II

- 3 Find the mean and variance of the binomial distribution. [14M]
OR
4 If X is a normal variate with mean 30 and standard deviation 5. Find the probabilities that (i) $26 \leq X \leq 40$ ii) $X \geq 45$. [14M]

SECTION-III

- 5 The equations of two regression lines obtained in a correlation analysis are $3x+12y=19$ and $3y+9x=46$ obtain i) Mean values of x and y ii) Correlation coefficient between x. [14M]

OR

- 6 Find the least squares regression line of y on x and x on y. [14M]

X	6	5	8	8	7	6	10	4	9
Y	8	7	7	10	5	8	10	6	8

SECTION-IV

- 7 A company has 500 cables. A test of 40 cables selected at random showed a mean breaking strength of 2400 newtons and a standard deviation of 150 newtons. What are 99% confidence limits for estimating the mean breaking strength of remaining 460 cables. [14M]

OR

- 8 The means of simple sample of 1000 and 2000 are 67.5 and 68 inches respectively. Can the samples be regarded as drawn from the same population of standard deviation 2.5 cm at 0.05 level of significance. [14M]

SECTION-V

- 9 The time taken by workers in performing a job by method I and method II is given [14M]
below:

Method-I	20	16	26	27	23	22	24
Method-II	27	33	42	35	32	34	38

Do the data show that the variances of time distribution from population from which these samples are drawn do not differ significantly?

OR

- 10 Fit a Binomial distribution to the following data and test for goodness of fit [14M]

X	0	1	2	3	4
F	28	62	46	10	4

Code No: R20A0310

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

II B.Tech II Semester Supplementary Examinations, January 2024

Strength of Materials

(ME)

Roll No									
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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

Marks
[14M]

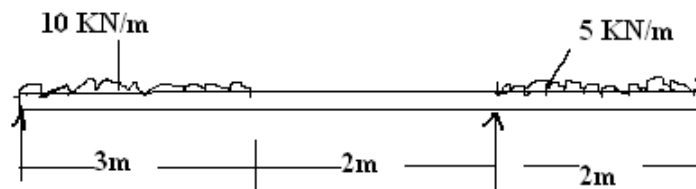
- 1 Three bars made of copper; zinc and aluminium are of equal length and have cross section 500, 700 and 1000mm² respectively. They are rigidly connected at their ends. If this compound member is subjected to a longitudinal pull of 250 k N, estimate the proportional of the load carried on each rod and the induced stresses. Take the value of E for copper = 1.3×10^5 N/mm², for zinc = 1×10^5 N/mm² and for aluminium = 0.8×10^5 N/mm².

OR

- 2 *A* Draw stress - strain curve for a mild steel rod subjected to tension and explain about the salient points on it. **[7M]**
- B* Derive the expression of stress due to impact load. **[7M]**

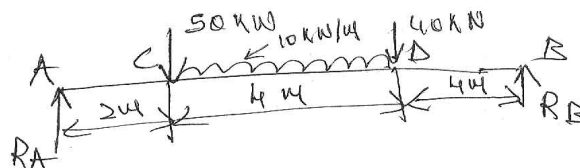
SECTION-II

- 3 Draw the shear force and bending moment diagram for the beam shown in fig below. Find the point of contraflexure. **[14M]**



OR

- 4 *A* Name the different types of beams. Differentiate between a cantilever beam and a simply supported beam. **[7M]**
- B* A simply supported beam of length 10 m, carries the uniformly distributed load and two-point loads as shown in fig: 1. Draw the shear force and bending moment diagrams for the beam. Also calculate the maximum bending moment. **[7M]**



SECTION-III

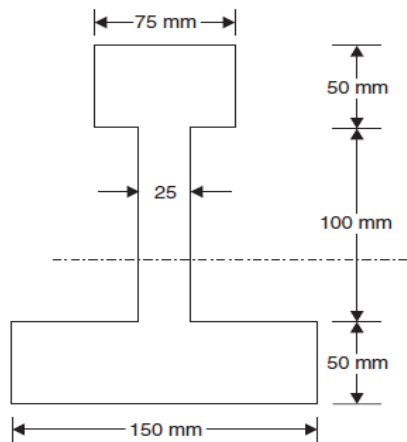
- 5 *A* What is meant by section modulus? Find an expression for section modulus of a rectangular section. **[7M]**

- B** A beam of rectangular section is used as a beam. The beam is subjected to a shear force of F N, at section. Find the maximum shears of in the cross-section of the beam and draw the shear stress distribution diagram for the section. [7M]

OR

- 6 A** Two circular beams where one is solid of diameter D and other is a hollow of outer dia. D_0 and inner dia. D_i , are of the same length, same material and of same weight. Find the ratio of section modulus of these circular beams. [7M]

- B** The cross-section of a cast iron beam is as shown in Fig below. The top flange is in compression and bottom flange is in tension. Permissible stress in tension is 30 N/mm^2 and its value in compression is 90 N/mm^2 . What is the maximum uniformly distributed load the beam can carry over a simply supported span of 5 m? [7M]



SECTION-IV

- 7** Derive the equations for slope and deflection at any point on a beam of length L . The beam is simply supported at Its ends carries a concentrated load of W at a distance 'a' from one of the ends [14M]

OR

- 8** A beam of length 5m and of uniform rectangular section is supported at its ends and carries uniformly distributed load over the entire length. Calculate the depth of the section if the maximum permissible bending stress is 8 N/mm^2 and central deflection is not to exceed 10mm. Take ratio between depth to width as 2. [14M]

SECTION-V

- 9 A** Derive an expression for the shear stress produced in a circular shaft which is subjected to torsion. [7M]

- B** Define the thin cylinder. Name the stresses set up in a thin cylinder subjected to internal fluid pressure and derive the expression for it. [7M]

OR

- 10 A** What are the assumptions made in the theory of torsion? [7M]

- B** A solid circular shaft and hollow circular shafts whose inside diameter is $(3/4)$ of the outside diameter, are of same material, of equal lengths and are required to transmit a given torque. Compare the weights of these two shafts if the maximum shear stresses developed in the two shafts are equal [7M]

Code No: R20A0309

R20

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

II B.Tech II Semester Supplementary Examinations, January 2024

Applied Thermodynamics

(ME)

Roll No									
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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.

Note: Steam tables and Molliar charts are permitted

SECTION-I

Marks

- 1 *A* Describe briefly the Rankine cycle using saturated steam. [7M]
 B Steam is supplied to a Rankine engine at 21 bar with 110⁰ C of superheat. [7M]
 The back pressure is 0.20 bar. Find (1) Rankine efficiency (2) Percentage
 increase in efficiency if the steam has a temperature of 250⁰C before
 entering the cylinder.

OR

- 2 *A* List out the differences between the water tube boilers and fire tube boilers [7M]
 B Explain the working principle of Babcock and Wilcox boiler with the neat [7M]
 sketch.

SECTION-II

- 3 *A* Derive the equation for maximum discharge in nozzles. [7M]
 B Describe with a sketch a low level jet condenser of the counter flow type [7M]

OR

- 4 *A* What are the methods available to obtain maximum vacuum in condensers [7M]
 B What are the elements of a steam condensing plant? Explain [7M]

SECTION-III

- 5 In a single stage impulse turbine the isentropic enthalpy drop of 200 kJ/kg [14M]
 occurs in the nozzle having efficiency of 96% and nozzle angle of 15°. The
 blade velocity co efficiency is 0.96 and ratio of blade speed to steam
 velocity is 0.5. The steam mass flow rate 20 kg/s and velocity of steam
 entering is 50 m/s. determine i) The blade angles at inlet and outlet if the
 steam enters blades smoothly and leaves axially. ii) The blade efficiency
 iii) The power developed in Kw iv) The axial thrust. Solve using velocity
 diagram.

OR

- 6 Define the term Degree of Reaction used in Reaction Turbines. Prove that [14M]
 moving and fixed blades should have the same shape for 50% reaction.

SECTION-IV

- 7 In a gas turbine unit, the gases flow through the turbine is 15 kg/s and the [14M]
 power developed by the turbine is 12000 kW. The enthalpies of gases at
 the inlet and outlet are 1260 kJ/kg and 400 kJ/kg respectively, and the
 velocity of gases at the inlet and outlet are 50 m/s and 110 m/s
 respectively. Calculate: (i) The rate at which heat is rejected to the turbine,
 and (ii) The area of the inlet pipe given that the specific volume of the
 gases at the inlet is 0.45 m³/kg.

OR

- 8 *A* Explain with the help of neat sketch working of open cycle gas turbine. [7M]
 B Discuss Regeneration, Inter cooling and Reheating [7M]

SECTION-V

- 9 *A* Explain Working Principles with schematic diagrams of jet propulsion engine and describe its T-S diagram? [7M]
 B Discuss Thrust, Thrust Power and Propulsion Efficiency? [7M]

OR

- 10 *A* Write the Applications of Rockets? [7M]
 B What do you understand by 'air breathing engines'? how they are classified? [7M]

Code No: R20A0311

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

II B.Tech II Semester Supplementary Examinations, January 2024**Data Structures using Python****(ME)**

Roll No									
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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**Marks**

- 1 **A** Explain polymorphism with class methods in python with an example? **[7M]**
 B Explain about abstract classes in python with an example. **[7M]**

OR

- 2 **A** Explain about class and object in python with an example. **[6M]**
 B Describe various forms of inheritance in python with example. **[8M]**

SECTION-II

- 3 **A** Define Linear Data Structure. Explain any two Linear Data Structures with an example. **[7M]**
 B Write a Python program that counts the number of occurrences of a letter in a string, using dictionaries. **[7M]**

OR

- 4 **A** Define Non-Linear Data Structure. Explain any two Non-Linear Data Structures with an example. **[7M]**
 B Compare between lists, tuples, dictionaries and sets in python. **[7M]**

SECTION-III

- 5 **A** Differentiate between Linear and Binary Search Methods. **[6M]**
 B Write a Python program for Merge Sort. **[8M]**

OR

- 6 **A** Write a Python program to implement the binary search. **[7M]**
 B Sort the following list of elements by using Selection sort 30, 56, 78, 99, 12, 43, 10, 24, 85 **[7M]**

SECTION-IV

- 7 **A** Write a Python function to count the number of nodes in a singly linked list. **[7M]**
 B Define Queue. Explain the operations of queue with an example. **[7M]**

OR

- 8 **A** Explain insert and delete operations in doubly linked list. **[7M]**
 B Write a python program to implement stack using Singly linked list. **[7M]**

SECTION-V

- 9 **A** Write a short note on:
 i) Weighted Graphs **[3M]**
 ii) Unweighted Graphs **[3M]**
 B Insert the following list of elements into the AVL tree:12, 30, 36, 18, 25, **[8M]**

9, 4, 2, 17, 14 , 20, 47. Delete the elements 18, 2 and 30 from the AVL tree.

OR

10 *A* Give any two representations of graph. Demonstrate DFS using suitable example. **[7M]**

B A binary tree has 9 nodes. The inorder and postorder traversal sequences are given below. Give the preorder traversal. **[7M]**

Inorder: D G B A H E C F I

Postoder: G D B H E I F C A

Code No: **R20A0551****MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY****(Autonomous Institution – UGC, Govt. of India)****II B.Tech II Semester Supplementary Examinations, January 2024****Introduction to DBMS****(EEE, ME, ECE & AE)**

Roll No									
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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**Marks**

- | | | | |
|----------|----------|---|-------------|
| 1 | A | Describe the Structure of DBMS? | [7M] |
| | B | Explain the History of Data base Systems? | [7M] |
| | | OR | |
| 2 | A | Explain about Database languages? | [7M] |
| | B | Discuss in detail about database schemas | [7M] |

SECTION-II

- | | | | |
|----------|----------|--|--|
| 3 | A | Explain various types of attributes in ER Model? | [7M] |
| | B | Define the following terms
i) Entity type ii) Entity Set iii) Strong entity sets iv) Weak entity Sets | [7M] |
| | | OR | |
| 4 | A | Illustrate basic features of ER model | [6M] |
| | B | Apply conceptual DB design and draw E-R diagram for the following situations by assuming appropriate Attributes.
i) A Part is supplied by many suppliers at different costs and a supplier supplies many parts.
ii) An employee works in at most one department and a department has many employees
iii) A house has at least and at most one owner and owner has many houses
iv) A Muslim woman marries at most one man and a Muslim man could marry many woman | [2M]
[2M]
[2M]
[2M] |

SECTION-III

- | | | | |
|----------|----------|---|---|
| 5 | A | Discuss about the operators SELECT, UNION and INTERSECT. | [7M] |
| | B | Explain equi-join and non equi- join. | [7M] |
| | | OR | |
| 6 | A | Discuss different types of aggregate operators with examples in SQL? | [8M] |
| | B | a. Discuss correlated nested queries?
b. Write a query to find the names of sailors who have reserved a red boat?
c. Write a query to find the names of sailors who have not reserved a red boat? | [2M]
[2M]
[2M] |

SECTION-IV

- | | | | |
|----------|----------|---|-------------|
| 7 | A | Define normalization? Explain 1NF, 2NF, 3NF Normal forms? | [7M] |
| | B | Define functional dependencies. How are primary keys related to FD's? | [7M] |

OR

- 8 *A* Illustrate redundancy and the problems that it can cause? [7M]
 B Compare and contrast BCNF with 3NF? [7M]

SECTION-V

- 9 *A* Explain about Two Phase Commit protocol? [7M]
 B Explain recoverable schedules with examples? [7M]

OR

- 10 *A* Explain about different types of locks? [7M]
 B Discuss different phases of transaction? [7M]

Code No: **R20A0312****MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY****(Autonomous Institution – UGC, Govt. of India)****II B.Tech II Semester Supplementary Examinations, January 2024****Manufacturing Processes****(ME)**

Roll No									
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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**Marks**

- 1 **A** Describe the materials used for making cores in casting. Differentiate between various types of cores and discuss their advantages and limitations in different casting applications. **[7M]**
- B** Discuss the principles and applications of metal mold casting processes, such as low-pressure casting and high-pressure casting. Compare and contrast these processes, highlighting their advantages and limitations. **[7M]**

OR

- 2 Explain the concept of continuous casting in the manufacturing of metals. Discuss the advantages and limitations of continuous casting compared to other casting methods. **[14M]**

SECTION-II

- 3 **A** Discuss the concept of heat-affected zones (HAZ) in welding. Explain the factors that influence the size and characteristics of the HAZ. **[7M]**
- B** Identify common welding defects and discuss their causes and remedies. Explain how welding defects can affect the strength and integrity of the welded joint. **[7M]**

OR

- 4 Explain the principles and applications of advanced welding processes such as electron beam welding, laser beam welding, friction stir welding, heat flow welding, and ultrasonic welding. **[14M]**

SECTION-III

- 5 **A** Explain the concept of strain hardening in metal forming processes. Discuss its significance and impact on material properties. **[7M]**
- B** Compare and contrast the processes of recovery and recrystallization in metal forming. Describe the factors influencing these processes and their effects on material microstructure. **[7M]**

OR

- 6 **A** Discuss the principles and applications of bending in metal forming. Explain the deformation mechanisms involved and provide examples of industries where bending processes are commonly used. **[7M]**
- B** Describe the working principles of roll mills in metal forming. Differentiate between hot rolling and cold rolling processes, highlighting their advantages and limitations. **[7M]**

SECTION-IV

- 7 **A** Explain the basic extrusion process and its different types. Discuss the equipment used, material considerations, and factors influencing the extrusion process. **[7M]**

B Describe forging operations and their classification. Explain the different forging techniques, such as open die forging, closed die forging, and upset forging. [7M]

OR

8 Discuss the wire drawing and tube drawing processes. Explain the principles, equipment used, and factors influencing the drawing process. [14M]

SECTION-V

9 Classify and categorize the rapid manufacturing processes used in additive manufacturing. Provide a comprehensive overview of the different techniques and their characteristics. [14M]

OR

10 Compare and contrast stereo lithography and powder bed fusion techniques in additive manufacturing. Highlight their key differences and suitability for different applications. [14M]

Code No: R20A0024

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY**(Autonomous Institution – UGC, Govt. of India)****II B.Tech II Semester Supplementary Examinations, January 2024****Probability and Statistics****(EEE, ME & AE)**

Roll No									
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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** Define Continuous Random Variable with example. [2M]
B A Random variable X has the following probability distribution [12M]

X	1	2	3	4	5	6	7	8
P(X)	K	2K	3K	4K	5K	6K	7K	8K

Find the value of (i). K (ii). $P(X \leq 2)$ (iii). $P(2 \leq X \leq 5)$

OR

- 2 **A** Suppose that the error in the reaction temperature in 0°C for a controlled laboratory experiment is a continuous variable X having probability density function [4M]

$$f(x) = \begin{cases} \frac{x^2}{2}, & -1 < x < 2 \\ 0, & \text{else where} \end{cases}$$

Verify that $f(x)$ is a density function.

- B** The joint probability density function is given by [10M]

$$f(x, y) = \begin{cases} 10xy^2, & 0 < x < y < 1 \\ 0, & \text{elsewhere} \end{cases}$$

- a) Marginal probability density function of X
 b) Marginal probability density function of Y
 c) Conditional probability density function of X given Y
 d) Conditional probability density function of Y given X

SECTION-II

- 3 **A** Prove that mean and variance of a poisson distribution are same [7M]
B If 'X' is a normal variate with mean 30 and standard deviation 5. Find the probabilities that [7M]
 (i). $26 \leq X \leq 40$ (ii). $X \geq 45$

OR

- 4 **A** Write the chief characteristics of Normal Distribution. [4M]
B In a normal distribution, 8 % of the items are under 35 and 90 % of the items are under 63. Determine the mean and variance of the distribution. [10M]

SECTION-III

- 5 **A** If $\sigma_x = \sigma_y = \sigma$ and the angle between two regression lines is $\tan^{-1}\left(\frac{4}{3}\right)$. Find 'r' [7M]
B Find the mean values of the variables 'X' and 'Y' and correlation coefficient from the following regression equations. [7M]
 $2Y - X = 50$ and $3Y - 2X = 10$

OR

- 6 *A* Write the properties of correlation coefficient. [4M]
B A random of 5 college students is selected and their marks in mathematics and Statistics are found to be [10M]

Mathematics	85	60	73	40	90
Statistics	93	75	65	50	80

Calculate rank correlation coefficient.

SECTION-IV

- 7 *A* Define Type-I and Type-II errors. [2M]
B A sample of 400 items is taken from a population whose standard deviation is 10. The mean of the sample is 40. Test whether the sample has come from a population with mean 38. Also calculate 90% confidence interval for the population. [12M]

OR

- 8 *A* Explain the procedure for testing of Hypothesis. [7M]
B The means of two large samples of sizes 1000 and 2000 members are 67.5 inches and 68 inches respectively. Can the samples be regarded as drawn from the same population of S.D 2.5 inches. [7M]

SECTION-V

- 9 *A* Write the applications of t-distribution. [4M]
B In a sample 500, from a village in Telanagana 280 is found to be rice eaters and rest of them wheat eaters. Can we assume that both articles are equally popular? [10M]

OR

- 10 *A* Write the properties of Chi-Square ? [7M]
B The measurements of the output of two units have the following results. Assuming that both samples have been obtained from the normal populations at 10% significant level, test whether the two populations have the same variance. [7M]

Unit-A	14.1	10.1	14.7	13.7	14.0
Unit-B	14.0	14.5	13.7	12.7	14.1
