

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

II B.Tech II Semester Supplementary Examinations, November 2025**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

BCLL	CO(s)	Marks
L2	CO-I	[14M]

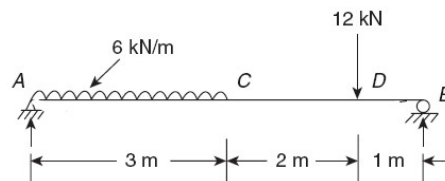
- 1 Draw and label the stress-strain diagram for structural steel and explain the salient points?

OR

- 2 *A* Explain the thermal stresses in compound bars. L2 CO-I [7M]
B Show that the stress developed due to load applied suddenly is double the stress developed in the body due to the same load applied gradually. L4 CO-I [7M]

SECTION-II

- 3 Determine support reactions and bending moments at *C*, *D*. L3 CO-II [14M]



OR

- 4 *A* What are the different types of loads acting on a beam? Differentiate between a point load and a uniformly distributed load. L4 CO-II [7M]
B A cantilever beam of length 2 m carries a point load of 1 kN at its free end, and another load of 2 kN at a distance of 1 m from the free end. Draw shear force and bending moment diagram for the cantilever. L3 CO-II [7M]

SECTION-III

- 5 Derive the bending equation $\frac{M}{I} = \frac{\sigma}{y} = \frac{E}{R}$ L3 CO-III [14M]

OR

- 6 *A* Show that for a rectangular section the maximum shear stress is 1.5 times the average stress. L4 CO-III [7M]
B A wooden beam of rectangular section 15 cm × 30 cm is simply supported over a length of 4 m. It carries a udl of 4 kN/m throughout its length. What is the maximum shear stress developed in the beam section? L3 CO-III [7M]

SECTION-IV

- 7 *A* Find the expression for the slope of a cantilever of length *L* which carries a uniformly distributed load over a length *a* from the fixed end by double integration method. L3 CO-IV [7M]

	B	A cantilever of length 3 m is carrying a point load of 50 kN at a distance of 2 m from the fixed end. If $I = 10^8 \text{ mm}^4$ and $E = 2 \times 10^5 \text{ N/mm}^2$, find slope at the free end.	L3	CO-IV	[7M]
		OR			
8	A	Derive an expression for the slope of a cantilever of length L, carrying a point load w at a distance L_1 from the fixed end by double integration method.	L4	CO-IV	[7M]
	B	An I section steel girder with $I_{xx} = 2,502 \times 10^4 \text{ mm}^4$ is used as a beam for a span length of 4 m. The beam carries a udl of 4 kN/m throughout its length. Determine the maximum deflection in the beam.	L3	CO-IV	[7M]
		SECTION-V			
9	A	What is the significance of polar moment of inertia in the analysis of torsion in circular shafts? How is it calculated for solid circular shaft of diameter d and for a hollow circular shaft with external diameter d_1 and internal diameter d_2 ?	L4	CO-V	[7M]
	B	A circular shaft of diameter 60 mm is subjected to a torque of 1000 Nm. Calculate the shear strain and the angle of twist if the shaft is 1 m long. The shear modulus $G = 85 \times 10^9 \text{ N/m}^2$.	L3	CO-V	[7M]
		OR			
10	A	Derive the expressions for circumferential and longitudinal stress when thin cylindrical shell subjected to internal pressure.	L4	CO-V	[7M]
	B	A cylindrical thin drum 80 cm in diameter and 3m long has a shell thickness of 1 cm. if the drum is subjected to an internal pressure of 2.5 N/mm^2 , determine change in diameter and change in length. Take $E = 2 \times 10^5 \text{ N/mm}^2$ Poisson's ratio = 0.25.	L3	CO-V	[7M]

Code No: R20A0309

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

II B.Tech II Semester Supplementary Examinations, November 2025**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.

SECTION-I

- | | | | BCLL | CO(s) | Marks |
|---|----------|---|-------------|--------------|--------------|
| 1 | <i>A</i> | Discuss the working of Rankine cycle with reheating with help of necessary schematic and property diagrams. | L2 | CO-I | [7M] |
| | <i>B</i> | Consider a steam power plant operating on the simple ideal Rankine cycle. The steam enters the turbine at 2.5 MPa and 300°C and is condensed in the condenser at a pressure of 75 kPa, Determine the thermal efficiency of the cycle. | L4 | CO-I | [7M] |

OR

- | | | | | | |
|---|----------|--|-----------|-------------|-------------|
| 2 | <i>A</i> | Differentiate between boiler mountings and accessories. List out the components under separately under mountings and accessories | L2 | CO-I | [7M] |
| | <i>B</i> | Illustrate the working of Lamont boiler with a suitable schematic sketch. | L2 | CO-I | [7M] |

SECTION-II

- | | | | | | |
|---|----------|---|-----------|--------------|-------------|
| 3 | <i>A</i> | Discuss the working of different types of steam nozzles with a suitable schematic sketch. | L2 | CO-II | [7M] |
| | <i>B</i> | Steam expands isentropically from 8 bar and 250°C to 1.5 bar in a convergent-divergent nozzle. The steam flow rate is 0.75 kg/s. Determine the velocity of steam at the exit of the nozzle. | L4 | CO-II | [7M] |

OR

- | | | | | | |
|---|----------|--|-----------|--------------|--------------|
| 4 | <i>A</i> | Discuss the different components of a steam condensing plant with a suitable schematic sketch. | L2 | CO-II | [10M] |
| | <i>B</i> | Enlist the differences between surface and jet condensers. | L2 | CO-II | [4M] |

SECTION-III

- | | | | | | |
|---|----------|--|-----------|---------------|-------------|
| 5 | <i>A</i> | Classify the steam turbine and also write examples for each classification. | L2 | CO-III | [7M] |
| | <i>B</i> | Discuss the working of single stage impulse turbine with a suitable schematic diagram. | L2 | CO-III | [7M] |

OR

- | | | | | | |
|---|----------|---|-----------|---------------|-------------|
| 6 | <i>A</i> | Illustrate the working of Parson's reaction turbine with a suitable sketch. | L4 | CO-III | [7M] |
| | <i>B</i> | Discuss the working of pressure-velocity compounding with a neat sketch. | L5 | CO-III | [7M] |

SECTION-IV

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|-------------------------|----------|---|-----------|--------------|-------------|
| 7 | <i>A</i> | Describe the working of a simple open cycle gas turbine plant. | L2 | CO-IV | [7M] |
| | <i>B</i> | A simple closed cycle gas turbine plant receives air at 1 bar and 15°C, and compresses it to 5 bar and then heats it to 800°C in the heating chamber. The hot air expands in a turbine back to 1 bar. Calculate the power developed per kg of air supplied per second. Take C_p for air as 1 kJ/kg-k. | L4 | CO-IV | [7M] |
| OR | | | | | |
| 8 | <i>A</i> | How does the regeneration effect the performance of a simple gas turbine cycle? Explain. | L2 | CO-IV | [7M] |
| | <i>B</i> | A closed cycle gas turbine unit operating with maximum and minimum temperatures of 700°C and 15°C has pressure ratio of 8:1. Calculate the ideal cycle efficiency and work ratio. | L4 | CO-IV | [7M] |
| <u>SECTION-V</u> | | | | | |
| 9 | <i>A</i> | Derive the expression for thrust produced by a jet engine. What factors influence the amount of thrust generated? | L3 | CO-V | [7M] |
| | <i>B</i> | Explain the working principle of a rocket engine based on Newton's third law of motion. How does it differ from air-breathing engines? | L2 | CO-V | [7M] |
| OR | | | | | |
| 10 | <i>A</i> | Describe different methods of thrust augmentation in turbojet engines. | L2 | CO-V | [7M] |
| | <i>B</i> | Define specific impulse. Explain its significance in evaluating rocket performance | L2 | CO-V | [7M] |

Code No: R20A0311

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
II B.Tech II Semester Supplementary Examinations, November 2025
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.

		<u>SECTION-I</u>	BCLL	CO(s)	Marks
1	<i>A</i>	Explain the principles of object oriented programming	L2	CO-I	[7M]
	<i>B</i>	Explain method overloading and method overriding with examples	L2	CO-I	[7M]
		OR			
2	<i>A</i>	Explain hierarchical inheritance with example	L2	CO-I	[7M]
	<i>B</i>	Define polymorphism. Explain compile-time and run-time polymorphism with examples.	L2	CO-I	[7M]
		<u>SECTION-II</u>			
3	<i>A</i>	Differentiate between Linear and Non-Linear Data Structures with suitable examples	L2	CO-II	[7M]
	<i>B</i>	Explain String Manipulation in Python. Discuss string slicing with examples.	L2	CO-II	[7M]
		OR			
4	<i>A</i>	Explain Lists and Tuples in Python. What are the key differences between them	L2	CO-II	[7M]
	<i>B</i>	Explain Dictionary in Python. How is it different from other data structures?	L2	CO-II	[7M]
		<u>SECTION-III</u>			
5	<i>A</i>	Summarize the Linear Search algorithm and its working with an example in Python.	L3	CO-III	[7M]
	<i>B</i>	Differentiate between Bubble Sort and Insertion Sort based on their working principles and efficiency.	L4	CO-III	[7M]
		OR			
6	<i>A</i>	Explain the basic operations on arrays (insertion, deletion, traversal, searching, and updating) with examples.	L2	CO-III	[7M]
	<i>B</i>	Assess the advantages and disadvantages of using Merge Sort over Quick Sort in different scenarios.	L5	CO-III	[7M]
		<u>SECTION-IV</u>			
7	<i>A</i>	Define a Stack and explain its properties with an example.	L1	CO-IV	[7M]
	<i>B</i>	Implement a Queue using a Linked List in Python and demonstrate its operations.	L4	CO-IV	[7M]
		OR			
8	<i>A</i>	Explain how Queue operations (Enqueue, Dequeue, Front,	L2	CO-IV	[7M]

		Rear) work with an example in Python.			
	B	Explain the implementation of a Singly Linked List in Python with an example.	L2	CO-IV	[7M]
		<u>SECTION-V</u>			
9	A	Explain the differences between Weighted and Unweighted Graphs with examples.	L2	CO-V	[7M]
	B	Summarize the steps of Breadth-First Search (BFS) with an example..	L2	CO-V	[7M]
		OR			
10	A	Differentiate between Adjacency Matrix vs. Adjacency List in terms of space and time complexity.	L4	CO-V	[7M]
	B	Analyze the differences between Binary Trees and Binary Search Trees (BSTs).	L4	CO-V	[7M]

Code No: R20A0551

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

II B.Tech II Semester Supplementary Examinations, November 2025**Introduction to DBMS****(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

			BCLL	CO(s)	Marks
1	A	Demonstrate the different types of database users and the role of a DBA.	L2	CO-I	[7M]
	B	Define the characteristics of a DBMS.	L1	CO-I	[7M]

OR

2	A	What are DBMS languages? Explain their types with examples.	L1	CO-I	[7M]
	B	Apply the evolution and history of database systems.	L3	CO-I	[7M]

SECTION-II

3	A	Define the goals of an ER diagram and its importance in database design.	L1	CO-II	[7M]
	B	explain the tabular representation of various ER schemas.	L2	CO-II	[7M]

OR

4	A	What are keys in a database? Explain their uses.	L1	CO-II	[7M]
	B	Analyze entity sets and relationship sets with suitable examples.	L4	CO-II	[7M]

SECTION-III

5	A	Compare the various aggregate functions in SQL with suitable examples.	L2	CO-III	[7M]
	B	Recall how NULL values are handled in SQL queries.	L1	CO-III	[7M]

OR

6	A	Discuss the concept and implementation of triggers in SQL.	L1	CO-III	[7M]
	B	What are views in SQL? Explain their importance with an example.	L3	CO-III	[7M]

SECTION-IV

7	A	Define minimal cover and explain its significance.	L1	CO-IV	[7M]
	B	Distinguish 1NF, 2NF, 3NF, and BCNF with suitable examples.	L4	CO-IV	[7M]

OR

8	A	Explain the process of normalization with an example.	L1	CO-IV	[7M]
	B	Contrast the properties of a good decomposition in database normalization?	L2	CO-IV	[7M]

SECTION-V

9	A	Define the different types of locks used in concurrency	L1	CO-V	[7M]
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		control.			
	B	Explain concurrency control using timestamps.	L2	CO-V	[7M]
		OR			
10	A	What is transaction recovery? Explain different recovery techniques.	L1	CO-V	[7M]
	B	Outline validation-based concurrency control techniques.	L2	CO-V	[7M]

Code No: R20A0024

R20**MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY****(Autonomous Institution – UGC, Govt. of India)****II B.Tech II Semester Supplementary Examinations, November 2025****Probability and Statistics****(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

BCLL	CO(s)	Marks
L3	CO-I	[7M]

- 1 A Apply probability, Let X be a random variable of sum of two numbers in throwing two fair dice. Find the probability distribution of X, mean and variance.
- B Apply probability and find expectation of number tosses require when a coin is tossed until head appears or five tails occurs.

OR

- 2 Apply probability, A random variable X has the following probability distribution

X	0	1	2	3	4	5	6	7
P(X)	0	K	2K	2K	3K	K ²	2K ²	7K ² +K

Determine i) k ii) Mean iii) Variance.

SECTION-II

- 3 A Apply probability, In **256** sets of **12** tosses of a coin ,in how many cases one can expect **8** Heads and **4** Tails.
- B Apply probability, In a normal distribution **7%** of the items are under 35 and **89%** of the items are under 63. Find mean and variance of the distribution.

OR

- 4 Make use of Binomial distribution, Fit a Binomial distribution for the following data.

x	0	1	2	3	4	5
f	2	14	20	34	22	8

SECTION-III

- 5 Apply coefficient correlation, A sample of **12** fathers and their elder sons gave the following data about their elder sons. Calculate the rank correlation coefficient.

Fathers	65	63	67	64	68	62	70	66	68	67	69
Sons	68	66	68	65	69	66	68	65	71	67	68

OR

- 6 A Apply coefficient correlation, The equations of two regression lines are **7x - 16y + 9 = 0** and **5y - 4x - 3 = 0**. Find the coefficient of correlation and the means of **x** & **y**.
- B Make use of regression, If **$\sigma_x = \sigma_y = \sigma$** and the angle between the

regression lines is $\tan^{-1}(4/3)$ Find r .

SECTION-IV

- 7 Apply Sampling distribution, A population consist 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 **L3 CO-IV [14M]**
- a) The mean of the population
b) The standard deviation of the population
c) The mean of the sampling distribution of means and
d) The standard deviation of the sampling distribution of means

OR

- 8 A Apply Sampling distribution, The mean height of students in a college is 155cms and standard deviation is 15 . What is the probability that the mean height of 36 students is less than 157 cms. **L3 CO-IV [7M]**
- B Apply Normal distribution, A normal population has a mean of 0.1 and standard deviation of 2.1 . Find the probability that mean of a sample of size 900 will be negative . **L3 CO-IV [7M]**

SECTION-V

- 9 Make use of sampling, A random sample of size 16 values from a normal population showed a mean of 53 and sum of squares of deviations from the mean equals to 150 . Can this sample be regarded as taken from the population having 56 as mean ? Obtain 95% confidence limits of the mean of the population.? **L3 CO-V [14M]**

OR

- 10 Make use of Poisson distribution to the following data and test for its goodness of fit at 5% los **L3 CO-V [14M]**

x	0	1	2	3	4
f	419	352	154	56	19
