

BONAM VENKATA CHALAMAYYA INSTITUTE OF TECHNOLOGY & SCIENCE
(AUTONOMOUS)

I–M. Tech I-Semester Regular Examinations (BR25), Feb - 2026

Mathematical Foundations of Computer Science (CSE)

Time: 3 hours

Max. Marks: 60

*Answer any Five Questions One Question from One UNIT
ALL the Questions Carry Equal Marks*

- | | Marks | CO | BL |
|---|-------|-----|----|
| UNIT-I | | | |
| 1.a) Define conditional probability.
A box contains 4 green and 6 white balls another box contains 7 green and 8 white balls. Two balls are transferred from box 1 to box 2 and then a ball is drawn from box 2. What is the probability that it is white? | 4M | CO1 | L1 |
| b) In a certain college 25% of boys and 100% of girls are studying mathematics. The girls constitute 60% of the student body. | | | |
| i) what is the probability the mathematics is being studied | | CO1 | L3 |
| ii) if a student is selected at random and is found to be studying mathematics, find the probability that the student is a girl? | 8M | | |
| iii) a boy? | | | |

OR

2. A Random Variable X has the following probability function

x	0	1	2	3	4	5	6	7
p(x)	0	K	2K	2K	3K	K ²	2K ²	7K ² +K

- (i) Determine K (ii) Evaluate $P(X < 6)$ (iii) if $P(X \leq K) > 1/2$, find the minimum value of K (iv) determine the distribution function of X (v) Mean (vi) Variance

12M CO1 L4

- | | Marks | CO | BL |
|--|-------|-----|----|
| UNIT-II | | | |
| 3. A population consists of five numbers 2,3,6,8,11. consider all possible samples of size two which can be drawn with replacement from this population find i) mean of the population ii) the mean of the sampling distribution of the mean iii) the standard deviation of the sampling distribution of the mean iv) the standard deviation of the population | 12M | CO2 | L3 |

OR

- | | | | |
|---|----|-----|----|
| 4.a) The mean and Standard deviation of population are 11,795 and 14,054 respectively if $n = 50$,. Construct 95% confidence interval for the mean. ($Z_{Tab} = 1.96$) | 6M | CO2 | L2 |
| b) Explain the characteristics of Unbiased Estimator | 6M | CO2 | L2 |

UNIT-III

- 5.a Explain briefly the following (i) Type I error (ii) Type II error (iii) Critical region
- b A random sample of 400 men and 600 women in a locality were asked whether they would like to have a bus stop near their residence. 200 men and 325 women are in favour of the proposal test for the significant difference between two proportions at 5% level. $(Z_{Tab} = 1.96)$

Marks	CO	BL
6M	CO3	L2
6M	CO3	L2

OR

6. From the following data, find whether there is any significant liking in the habit of taking soft drinks among the categories of employees. Apply chi-square test. $(\chi^2_{Tab} = 9.488)$

	Employees		
Soft drinks	Clerks	Teachers	Officers
Pepsi	10	25	65
Thumps up	15	30	65
Fanta	50	60	30

12M CO3 L4

UNIT-IV

- 7.a) If a, b are any two elements of a group (G, .) which commute, Show that a^{-1} and b commute, b^{-1} and a commute, a^{-1} and b^{-1} are commute.
- b) (i) Use the Euclidean algorithm to find the GCD (45 and 126)
- (ii) Find the number of divisors and sum of the divisors for 3625

Marks	CO	BL
6M	CO4	L2
6M	CO4	L2

OR

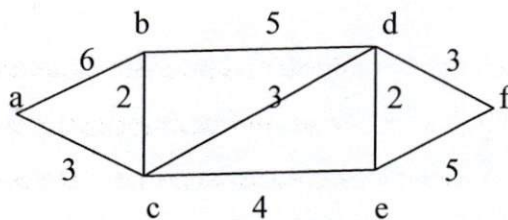
- 8.a) Define Semi-Group, Monoid and properties of Group?
- b) P.T. $Z_{11} = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$ is an abelian group with respect to multiplication modulo 11.

6M	CO4	L2
6M	CO4	L2

UNIT-V

- 9.a) Explain the following with examples i) Adjacency Matrix, ii) Incidence Matrix iii) Isomorphism of Graphs
- b) Use Kruskal's Algorithm to find a minimum spanning Tree for the given weighted graph.

Marks	CO	BL
6M	CO5	L2



6M CO5 L3

- 10.a) Explain the following i) Planar graphs ii) Euler Graph iii) Hamiltonian graph
- b) Explain and illustrate BFS and DFS with examples.

6M	CO5	L2
6M	CO5	L3
