

Course Code: 23CSE1T01

BONAM VENKATA CHALAMAYYA INSTITUTE OF TECHNOLOGY &  
SCIENCE (AUTONOMOUS)

I - M. Tech I-Semester Supplementary Examinations (BR23), Feb - 2026

MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE  
(COMPUTER SCIENCE & ENGINEERING)

Time: 3 hours

Max. Marks: 75

Answer any Five Questions One Question for One UNIT.  
ALL the Question Carry Equal Marks.  
Statistical Tables are to be provided.

UNIT-I

Marks CO BL  
CO1 3

- 1.a) The probability distribution of a random variable X is given by  
Determine

10M

$x$	0	1	2	3	4	5	6	7	8
$p(x)$	$a$	$3a$	$5a$	$7a$	$9a$	$11a$	$13a$	$15a$	$17a$

(i)a

(ii) $P(X < 3)$ ,  $P(X \geq 3)$  and  $P(0 < X < 5)$

(iii) Find the distribution function  $F(x)$ .

- b) A manufacturer of external hard drives claims that only 10% of his drives require repairs within the warranty of 12 months. If 5 of 20 of his drives required repairs within the first year, does this tend to support or refute the claim.

5M

CO1 2

OR

- 2.a) A discrete random variable X has the mean 6 and the variance 2, if it is assumed that the distribution is binomial then find the probability that  $5 \leq X \leq 7$ .

8M

CO1 3

- b) Two dice are thrown. Let X assign to each point  $(a, b)$  in S is the maximum of the numbers i.e.  $X = \max(a, b)$ . Find the probability distribution. Also find the mean and variance of the distribution.

7M

CO1 2

UNIT-II

Marks CO BL  
CO2 3

3. A population consists of 5 members 2,3,6,8,11. Consider all possible samples of size 2, which can drawn with replacement from that population. Find

(i) Mean of the population.

(ii) Standard deviation of the population.

(iii) The mean of the sampling distribution of means.

(iv) Variance of the sampling distribution of means

(v) Standard deviation of the sampling distribution of means, verify the results.

15M

OR

- 4.a) In a random sample of 1000 persons from town-A 400 are found to be consumers of wheat in a sample of 800 from town-B 350 are found to be consumers of wheat. Find confidence interval at 99%. 7M 2
- b) Find the maximum error of 400 industrial accidents, when it was found that 231 were due to unsafe working conditions. 8M 2

**UNIT-III**

**Marks CO BL**

- 5.a) The life time of electric bulbs for a random sample of 10 from a large consignment gave the following data. Life time 1200 hrs., 4600, 3900, 4100, 5200, 3800, 3900, 4300, 4400, 5600. Can we accept the hypothesis that the average life time of bulbs is 4000 hrs. 8M CO3 4
- b) Producer of 'Gutkha' claims that the Nicotine content in his 'Gutkha' on the average is 1.83 milli grams. Can this claim accepted if a random sample of 8 'Gutkha' of this type have the Nicotine contains of 2, 1.7, 2.1, 1.9, 2.2, 2.1, 2, 1.6 milli grams.? Use a 0.05 L.O.S. 7M CO3 4

**OR**

6. The nicotine contents in milligrams in two samples of tobacco were found to be as follows: CO3 4

Sample-A	24	27	27	30	26	
Sample-B	28	21	22	25	28	26

15M

Can it be said that the two samples have come from the same normal population?

**UNIT-IV**

**Marks CO BL**

- 7.a) Show that the set of all strings S is a monoid under the operation +, concatenation of strings. Is S a group w.r.t the above operation? Justify your answer. 7M CO4 4
- b) Q is the set of rational numbers,  $\circ$  is a binary operation defined on Q such that  $a \circ b = a - b + ab$  for  $a, b \in Q$ . Then  $(Q, \circ)$  is not a semi group. 8M CO4 4

**OR**

8. a) Explain in brief about fermats theorem? 5M CO4 2  
 b) Explain in brief about Division theorem? 5M  
 c) Explain in brief about GCD with example? 5M

**UNIT-V**

**Marks CO BL**

- 9.a) How many edges are there in a complete graph? Explain 8M CO5 2  
 b) Draw a connected graph that becomes disconnected when any edge is removed from it. 7M CO5 2

**OR**

- 10.a) Use Euler's theorem to find a number between 0 and 9 such that a is congruent to 7 1000 (mod 10) 8M CO5 3  
 b) Draw a graph that has a Hamiltonian path but does not have a Hamiltonian circuit. 7M CO5 2

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