129933

120801

Reg. No. | | | | | | | | | |

I Semester M.C.A. Degree Examination, April/May - 2026

COMPUTER SCIENCE

Computational Mathematics and Statistics

(CBCS Scheme 2025)

Time : 3 Hours **Maximum Marks : 70**

Instructions to Candidates:

1. ***Answer any Five questions from Part - A.***
2. ***Answer any Four questions from Part - B.***

PART - A

Answer any Five of the following questions. Each question carries 6 marks.(5×6=30)

1. a) Explain Logical equivalence between two propositions with example.

b) Construct the truth table for : $(p \rightarrow q) \wedge (p \vee q)$. **(3+3)**

2. a) Explain predicates and quantifiers with examples.

b) If $A = \{3,4\}, B = \{2,4\}, C = \{4,5\}$.

Then Verify : A × (B - C) = (A × B) - (A × C) **(3+3)**

3. a) State the Pigeonhole Principle and give one application.

b) In how many ways can the letters of the word 'PERMUTATIONS' be arranged such that all the vowels are together? **(3+3)**

4. a) Evaluate : ${}^{7}P_{3}$ and ${}^{7}C_{3}$.

b) A committee of 7 has to be formed from 8 boys and 4 girls. In how many ways can this be done when the committee consist of atleast 3 girls? **(3+3)**

5. a) A die is thrown once. Find the probability of getting number divisible by 2 or divisible by 3.

b) Define Conditional Probability. If P(A) = 0.5, P(B) = 0.4 and $P(A \cap B) = 0.2$, *find* $P(A/B)$. **(3+3)**

[P.T.O.

6. 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	$2k^2$	$7k^2+k$

a) Determine k

b) Find Mean of X **(6)**

7. A population consists of the Five numbers 2, 3, 6, 8,11. Consider all possible samples of size two which can be drawn with replacement from this population

Find:

a) The mean of the population

b) The standard deviation of the population.

c) The mean of the sampling distribution of means. **(6)**

8. a) Find the arithmetic mean of the numbers

5, 3, 6, 5, 4, 5, 2, 8, 6, 5, 4, 8, 3, 4,5, 4, 8, 2, 5,4

b) Explain Maximum Likelihood Estimation (MLE) **(3+3)**

PART - B

Answer any Four of the following questions. Each question carries 10 marks.

(4×10=40)

9. a) Check the validity of the argument:

$p \rightarrow qv \sim r$

$q \rightarrow p \wedge r$

$\therefore p \rightarrow r$

b) Prove that: $(A \cap B)' = A' \cup B'$ using the element method. **(5+5)**

10. a) If f: $R \rightarrow R$, is defined by f(x) = 5x-7, Show that f is one-one and onto function.

b) In a group of 80 students, 42 learn Java and 60 learn Python. Each student learns atleast one of the two programming languages. Find how many students learn both Java and Python? **(5+5)**

11. a) State and prove the Binomial theorem.

b) Find the middle term in the expansion $\left(\frac{x}{3}+9y\right)^{10}$ **(5+5)**

12. a) Explain the various approaches to probability with suitable examples.

b) A card is drawn from a pack of well shuffled cards. Find the probability of drawing

i) A red card

ii) A spade

iii) A king

iv) A queen or a jack. **(5+5)**

13. a) Distinguish between Independent and dependent events with examples.

b) Three machines A, B and C manufacture 30%, 50% and 20% of the total production respectively. The percentage of defective items produced by A, B and C are 3, 6 and 2 respectively. If an item is chosen at random and is found to be defective, find the probability of it being a product of C. **(5+5)**

14. a) Explain the different types of sampling methods with suitable examples.

b) A random sample of 50 mathematics grades, selected from a total of 200 grades, has a mean of 75 and a standard deviation of 10. Find the 95% confidence limits for the mean of all 200 grades. **(5+5)**
