APRIL 2026 **52506/125E2B/141E2B/ 120E2B/127E2B/126E2B/ 220E4B/241E4B/226E4B/ 227E4B/225E4B**

Time : Three hours Maximum : 75 marks

PART A — (10 × 2 = 20 marks)

Answer any TEN questions.

1. Define a random experiment with an example.

2. Define mutually exclusive events. Give an example.

3. State the axioms of probability.

4. State Bayes theorem.

5. Define probability mass function with an example.

6. Define binomial distribution. Write its mean and variance.

7. What is the difference between PDF and CDF?

8. Mention any two properties of Normal distribution.

9. Write the standard normal variate transformation.

10. State any two applications of student's t-distribution.

11. Write two applications of chi-square test.

12. Define type I type II errors.

PART B — (5 × 5 = 25 marks)

Answer any FIVE questions.

13. Let 5 men out of 100 and 25 women out of 1000 are colour blind. A colour blind person is chosen at random. What is the probability of being male? (Assume that males and females are in equal proportion).

14. A coin is tossed 6 times. Find the probability of getting exactly 3 heads using binomial distribution.

15. Define distribution function. State its properties.

16. Derive the mean and variance of Poisson distribution.

17. Define exponential distribution. Find its mean and variance.

18. Write a note on :

(a) Sampling distribution

(b) Standard error

19. What its ANOVA? State its assumptions.

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

20. For 'n' events $A_1, A_2, A_3, \ldots, A_n$, prove that $P\left(\bigcap_{i=1}^{n} A_i\right) \geq \sum_{i=1}^{n} P(A_i) - (n-1)$.

21. 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	$2k^2$	$7k^2 + k$

(a) Find 'k'

(b) Evaluate $P(X < 6)$, $P(X \geq 6)$ and $P(0 < X < 5)$

(c) If $P(X \leq k) > \frac{1}{2}$, find the minimum value of k.

(d) Determine the distribution on X.

22. Show that in normal distribution mean = median.

23. Derive student t-distribution.

24. Out of 8000 graduates in a town 800 are females, out of 1600 graduates employees 120 are females. Use χ^2–test to determine if any distinction is made in appointment on the basis of sex.

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