APRIL 2025 **52506/141E2B/127E2B/126E2B/125E2B/120E2B/225E4B/220E4B/226E4B/227E4B/241E4B**

Time : Three hours Maximum : 75 marks

PART A — ($10 \times 2 = 20$ marks)

Answer any TEN questions.

1. Define sample space with example.

2. What is the chance of getting a king in a draw from a pack of 52 cards?

3. Define equally likely events.

4. Write mean and variance of binomial distribution.

5. Define cumulative distribution function.

6. Write the p.d.f of normal distribution.

7. Define continuous random variable.

8. Define exponential distribution.

9. Define type-I error and type-II error.

10. What do you mean by testing of hypothesis?

11. Define null and alternative hypothesis.

12. Give any two uses of chi-square distribution.

PART B — ($5 \times 5 = 25$ marks)

Answer any FIVE questions.

13. State and prove addition theorem of probability.

14. A bag contains 7 red, 12 white and 4 green balls. What is the probability that

    (a) 3 balls drawn are all white and

    (b) 3 balls drawn are one each colour?

15. Derive MGF of binomial distribution.

16. Derive the mean and variance of Poisson distribution.

17. Write the conditions for the application of chi-square test.

18. Explain working procedure for testing single mean.

19. Given a sample mean of 83, a sample standard deviation of 12.5 and a sample size of 22, test the hypothesis that the value of the population mean is 70 against the alternative that it is more than 70.

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

20. A discrete random variable has the following distribution

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

Find the value of a, $P(X > 3)$ and distribution function of X.

21. If X is a random variable following binomial distribution with mean 2.4 and variance 1.44, find $P(X < 5)$.

22. A bank manager has learnt that the length of time the customer have to wait for being attended to by the teller is normally distributed with mean time of 5 minutes and standard deviation of 0.8 minutes. Find the probability that a customer has to wait

(a) For less than 6 minutes

(b) For more than 3.5 minutes and

(c) Between 3.4 and 6.2 minutes.

23. State and prove additive property of chi-square distribution.

24. A completely randomized design with 10 plots 3 treatments gave the following results :

A	5	7	3	1
B	4	4	7	
C	3	5	1	

Analyze the results for treatment effects.
