A   Reg. No. : ☐☐☐☐☐☐☐☐☐☐☐☐

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. The range of probability of an event is   CO6- U

    (a) $0 \leq P(E) \leq 1$ (b) $0 \leq P(E) \leq 2$ (c) $1 \leq P(E) \leq 2$ (d) None of these

2. If A and B are mutually exclusive events, then P(A or B) is   CO6 -U

    (a) P(A).P(B)   (b) P(A) – P(B)   (c) P(A) + P(B)   (d) None of these

3. A random variable X is uniformly distributed between 3 and 11. Find the   CO2 - App
    mean of X.

    (a) 12   (b) 9   (c) 7   (d) 8

4. Which of the following discrete distributions follow memory less property: CO6 -U

    (a) Geometric   (b) Gamma   (c) Normal   (d) None of these

5. The joint probability density function is f(x, y) = k, 0 < x < 2, 0 < y < 1.   CO3 - App
    Estimate K =
    (a) 4   (b) 1   (c) ½   (d) 2

6. Var (2X + 3) = _____   CO3 - App

    (a) 4Var (X) + 9Var (Y)   (b) 4Var (X)   (c) 9Var (Y)   (d) 0

7. The range of 16, 18, 18, 16, 18, 20, 17, 19, 16, 24.   CO4 -App

    (a) 12   (b) 8   (c) 9   (d) 10

8. If the mean of first n natural numbers is 5n / 9, then n = ?   CO4 -App

   (a) 7   (b) 9   (c) 6   (d) 10

9. The degrees of freedom for chi square tests to fitting a binomial distribution   CO6 – U

   (a) n – 1   (b) n – 2   (c) n – 3   (d) n – 4

10. F – test is used to test for equality of _____   CO6 - U

   (a) Mean   (b) Variance   (c) Both (a) & (b)   (d) None of these

PART – B (5 x 2= 10Marks)

11. Find the mean for the discrete RV X with probability distribution   CO1 - App

x	-2	-1	0	1
P(X)	0.2	3k	0.2	0.3

12. Calculate the MGF of the RV X whose PDF   CO2 – App

$$P(X = x) = \frac{1}{2^x}, \quad x = 0,1,2,3............$$

13. If Correlation coefficient $\gamma = 0.4, \sigma_x = 5, \sigma_y = 2$, find the regression CO3 – App
    coefficient of y on x.

14. Two series A and B with equal means have standard deviations 9 and 10   CO4 – App
    respectively, which series is more consistent

15. A standard sample of 200 tins of coconut oil gave an average weight of 4.95   CO5 – App
    kg with a standard deviation of 0.21 kg. Do we accept that the net weight is 5
    kg per tin at 5% level of significance?

PART – C (5 x 16= 80Marks)

16. (a)   (i) A RV X has the following distribution   CO1 – App   (8)

X	0	1	2	3	4	5	6	7
P(X)	0	k	2k	2k	3k	k^2	$2k^2$	$7k^2+k$

   (i) Find the value of 'k'
   (ii) Find $P(X < 6)$, $P[1.5 < X < 4.5 / X > 2]$

   (ii) The cumulative distribution function of a random variable X   CO1 – App   (8)
   is $F(x) = 1 - (1 + x)e^{-x}, x > 0$. Find the probability density function

   of X, mean and variance.

<div align="center">Or</div>

(b) (i) A R.V X has the PDF $f(x) = \begin{cases} \dfrac{1}{3} e^{-\frac{x}{3}} & , x \geq 0 \\ 0 & , x < 0 \end{cases}$ CO1 – App   (8)

Find

(i) $P[X > 3]$

(ii) mean and variance.

(ii) For the following density function   CO1 – App   (8)

$f(x) = a e^{|-x|}, -\infty < x < \infty$

    (i)   Find the value of 'a'

    (ii)   Find mean and variance

17. (a) (i) Explain the M.G.F of Geometric distribution and hence find   CO2 –App   (8)
mean and variance.

(ii) The mileage which car owners get with a certain kind of   CO2 –App   (8)
radial tire is a random variable having an exponential distribution
with mean 80,000 km. Derive the probabilities that one of these
tires will last (i) at least 30,000 km and (ii) at most 40,000 km

Or

(b) (i) A random variable X has a uniform distribution over (-4, 4)   CO2 –App   (8)
compute

(i) P(X < 2) (ii) P(|X| < 3) and (iii) P(X > 1).

(ii) Explain the M.G.F of Binomial distribution and hence find   CO2 –App   (8)
mean and variance.

18. (a) (i) The two dimensional RV (X,Y) has the density function   CO3 –App   (8)

       $f(x,y) = \dfrac{x + 2y}{27}$ x = 0, 1, 2; y = 0, 1, 2.

    Find (i) The Marginal distribution function of X and Y

        (ii) Find the Conditional distribution of Y for X = 1

(ii) Obtain the Correlation coefficient for the following data   CO3 –App   (8)

X	12	15	17	18	23	16	25	27
Y	110	120	124	130	136	122	140	143

Or

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(b) (i) The joint probability mass function of (X,Y) is given by $P(x,y) = k(2x+3y)$, x = 0, 1, 2; y = 1, 2, 3. Find marginal distribution function and conditional distribution. CO3 –App (8)

(ii) The joint pdf $f(x,y) = \begin{cases} \dfrac{8xy}{9}, & 0 \le x \le y \le 2 \\ 0 & otherwise \end{cases}$. CO3 –App (8)

Find

$(i) f_X(x)$

$(ii) f_Y(y)$

(iii) conditional density function of X given Y.

19. (a) (i) Compute the Median of the following table: CO4 –App (8)

Marks	0 – 6	6-12	12-18	18-24	24-30	30-36
No. of students	12	17	20	25	14	6

(ii) Calculate the arithmetic mean of the following table: CO4 –App (8)

Marks	0 – 10	10 – 20	20 -30	30 -40	40- 50	50 -60
No. of students	23	25	22	20	33	25

Or

(b) (i) Find the value of x , when mode is 67 CO4 –App (8)

Marks	40-50	50-60	60-70	70-80	80-90
No. of students	5	X	15	12	7

(ii) Compute the Variance of the following data: CO4 –App (8)

Marks	0 -5	5 - 10	10 -15	15 - 20	20 - 25	25 - 30
No. of students	5	12	21	22	13	10

20. (a) (i) Two random samples gave the following results: CO5 –App (8)

Samples	Size	Sample Mean	Sum of the squares of deviation from the mean
1	10	15	90
2	12	14	108

Examine whether the samples come from the same normal population

(ii) Sandal powder is packed into packets by a machine. A CO5 –App (8)
random sample of 12 packets is drawn and their weights are
found to be (in kg) 0.49, 0.48, 0.47, 0.48, 0.49, 0.50, 0.51, 0.49,
0.48, 0.50, 0.51 and 0.48. Test if the average weight of the
packing can be taken as 0.5 kg

Or

(b) (i) Two researchers adopted different sampling techniques while CO5 –App (8)
investigating the same group of students to find the number of
students falling into different intelligence level. The results are as
follows

Research	Below Average	Average	Above Average	Excellent
X	86	60	44	10
Y	40	33	25	2

(ii) Two independent samples of sizes 9 and 7 from a normal CO5 –App (8)
population had the following values of the variables.

Sample I	18	13	12	15	12	14	16	14	15
Sample II	16	19	13	16	18	13	15	--	--

Do the estimates of the population variance differ significally at
5% level?

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