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(FOR THE CANDIDATES ADMITTED DURING THE ACADEMIC YEAR 2023 ONLY)

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REG.NO. :

N.G.M.COLLEGE (AUTONOMOUS) : POLLACHI

END-OF-SEMESTER EXAMINATIONS : NOVEMBER-2023

COURSE NAME: B.Sc.-MATHEMATICS **MAXIMUM MARKS: 75**

SEMESTER: I **TIME : 3 HOURS**

PART - III
MATHEMATICAL STATISTICS

SECTION – A (10 X 1 = 10 MARKS)

ANSWER THE FOLLOWING QUESTIONS.
MULTIPLE CHOICE QUESTIONS. **(K1)**

1. The value of a and b so that the following is probability mass function

X	0	1	2
P(X=x);	3a	3b	4b

With mean 1.1 , is ……

a) (0.2,0.2) b) (0.1,0.1) c) (0.1,0.2) d) (0.2,01)

2. Mean of a random variable X is given by___________.

a) E(X) b) $E(X^2)$ c) $E(X^2) – (E(X))^2$ d) $(E(X))^2$

3. For a Poisson distribution, parameter λ is having a value of 7. What is the variance for the distribution?

a) 2.64 b) 2.78 c) 7 d) 14

4. The shape of the Normal Curve is ___________.

a) Bell Shaped b) Flat c) Circular d) Spiked

5. The mean of exponential distribution is given as ___________

a) 1/λ b) λ c) λ^2 d) $1/\lambda^2$

ANSWER THE FOLLOWING IN ONE (OR) TWO SENTENCES. **(K2)**

6. Derive managerial Density function.
7. If X_1 **and** X_2 are independent random variable then prove that $P(X = x, Y = y) = P(X = x).P(Y = y)$
8. What do you mean by poisson distribution.
9. What is normal distribution?
10. What is Gamma distribution?

SECTION – B (5 X 5 = 25 MARKS)

ANSWER EITHER (a) OR (b) IN EACH OF THE FOLLOWING QUESTIONS. **(K3)**

11. a) For the frequency distribution

$$F(x)\,dx = \frac{2x}{9}\,dx,\ 0 \le x \le 3$$

Find the mean and the standard deviation.

(CONTD…….2)

(OR)

b) Show that for the rectangular distribution :
dF=dx, 0≤x≤1, $\mu_1^{'}$ (about origin)=1/2,variance=1/12 and mean deviation about mean =1/4.

12.a) i) Find the expectation of the number on a die when thrown
ii) Two unbiased dice are thrown. Find the expected values of the sum of numbers of points on them

(OR)

b) Three urns contain respectively 3 green and 2 white balls, 5 green balls and 6 white balls and 2 green and 4 white balls. One ball is drawn from each urn. Find the expected number of white balls drawn out.

13. a) if X and Y are independent poission variates such that
P(X=1)=P(X=2)
aua P(X=2)=P(Y=3)
Find the variance of X-2Y

(OR)

b) If X and Y are independent poission variates with means λ_1 and λ_2 respectively , find the probability of (i) X+Y=k (ii) X=Y

14.a) Derive the moments of Normal distribution.

(OR)

b) Derive mean deviation from the mean for normal distribution.

15.a) Derive Cumulate Generating function of Gamma Distribution.

(OR)

b) Derive Beta distribution of second kind.

SECTION – C (5 X 8 = 40 MARKS)

ANSWER EITHER (a) OR (b) IN EACH OF THE FOLLOWING QUESTIONS. (K4 (Or) K5)

16. a) In a continuous distribution whose relative frequency density is given by F(x)=y_o.x(2-x),0≤x≤2, Find mean, variance, β_1 ,and β_2 and hence show that the distribution is svm metrical. Also (i) find mean deviation, about mean and (ii)show that this distribution μ_{2n+1}=0,(iii) find the mode ,harmonic mean and median **.**

(OR)

b) A random variable X has the following probability function Values

X,x :	0	1	2	3	4	5	6	7
p(x) :	0	k	2k	2k	3k	k^2	$2k^2$	$7k^2$+k

Find k, (ii) Evaluation P(X<6),P(X≥6), and P(0<X<5),(iii) If P(X≤k > $\frac{1}{2}$) ,find that minimum value of k and (v)Determine the distribution function of X

(CONTD…….3)

17. a) Two random variable X and Y have the following joint probability density function:
$F(x,y)=2-x-y; 0\le x\le 1, 0\le y\le 1 = 0$, otherwise
Find
(i) Marginal probability density function of X and Y
(i) Conditional density functions
(ii) Var (X) and Var (Y)
(iii) Co-variance between X and Y

(OR)

b) If X is a random variable and 'a' is constant, then
(i) $E[a\Psi(X)] = a\,E[\Psi(X)]$
(ii) $E[\Psi(X)+a] = E[\Psi(X)]+a$, where $\Psi(X)$ is any function of X

18. a) Fit a Poission distribution to the following data which gives the number of doddens in a samples of clover seeds .

No.of oddens : (x)	0	1	2	3	4	5	6	7	8
Observed frequency : (y)	56	156	132	92	37	22	4	0	1

(OR)

b) If X and Y are independent poission variates such that
$P(X=1)=P(X=2)$
$P(Y=2)=P(Y=3)$

Find the variance of X-2Y

19. a) Explain the characteristics function of the poisson distribution and its cumulates of the poisson Distribution .

(OR)

b) For certain normal distribution , the first moment about 10 is 40 the fourth moments about 50 is 48. What is the arithmetic mean and standard deviation of the distribution?

20. a) Derive moment generating function of exponential Distribution.

(OR)

b) (a) Derive the constants of Beta Distribution of first kind.

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ETHICAL PAPER