(FOR THE CANDIDATES ADMITTED DURING THE ACADEMIC YEAR 2022 ONLY)

22UMS1A1

REG.NO. :

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

END-OF-SEMESTER EXAMINATIONS: DECEMBER- 2022

COURSE NAME: B.Sc.- MATHEMATICS (Aided) **MAXIMUM MARKS: 50**

SEMESTER: I **TIME : 3 HOURS**

PART - III

MATHEMATICAL STATISTICS -I

SECTION-A **(10 X01 = 10 MARKS)**

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

1. E (45) = ______________.
   a) 0 b) 1 c) 45 d) ∞
2. If f (x,y) where $x,y \geq 0$ is a pdf, then $\int_0^\infty \int_0^\infty f(x,y)\,dx\,dy = ?$
   a) -1 b) 0 c)1 d) ∞
3. If X is a random variable, then V(Ax+b) = ___________.
   a) aV(X) b) $a^3V(X)$ c) abV(X) d) $a^2V(X)$
4. $|\emptyset(t)| \leq 1$
   a) $\emptyset(1)$ b) $\emptyset(2)$ c) $\emptyset(0)$ $d)$ $\emptyset(-1)$
5. Mean of Binominal distribution is______________.
   a) np b) npq c) n^2p d) n^3q

ANSWER THE FOLLOWING QUESTIONS IN ONE OR TWO SENTENCES. **K2**

6. Find the Mode of the Poison distribution.
7. Derive the Mean deviation about mean for Rectangular distribution.
8. Prove that for Normal distribution Mean = Median.
9. Write the Moment Generating Function of Rectangular distribution.
10. Write the definition of Exponential distribution.

SECTION-B **(5 X 3 = 15 MARKS)**

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

11. a) A box contains ‘a’ white balls and ‘b’ black balls. ‘c’ balls are drawn at random. Find The Expected value of the number of white balls drawn.

(OR)

b) State and prove the Multiplication theorem.

12. a) Let the random variable X have the distribution :
P(X=0) = P(X=2) = p; P(X=1)= 1-2p, for $0 \leq p \leq \frac{1}{2}$
What value of p gives maximum value for Var(x)?

(CONTD…..2)

(OR)

b) An Urn contains 7 white and 3 red balls. Two balls drawn together at random from this urn. Compute the probability that neither of them is white. Find the probability of getting one white and one red ball. Hence compute the expected number of white balls drawn?

13.a) Ten coins are thrown simultaneously. Find the probability of getting atleast seven heads.

(OR)

b) In a binomial distribution consisting of 5 independent trials, probabilities of 1 and 2 successes are 0.4096 and 0.2048 respectively. Find the parameter ‘p’ of the distribution

14. a) Obtain the equation of the normal curve that may be fitted to the following data:

Class :	60-65	65-70	70-75	75-80	80-85	85-90	90-95	95-100
Frequency:	3	21	150	335	325	135	26	4

Also obtain the expected normal frequencies.

(OR)

b) If X has a uniform distribution in [0, 1], find the distribution (p.d.f) of -2log X. Identify the distribution also.

15. a) State and prove the Additive property of Gamma distribution.

(OR)

b) If $X \sim N(\mu, \sigma^2)$, obtain the p.d.f. of: $U = \frac{1}{2}(\frac{X-\mu}{\sigma})^2$

SECTION-C (5 X 5 =25 MARKS)

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

16. a) In a four tosses of a coin, let X be the number of heads. Tabulate the 16 possible Outcomes with the corresponding values of X. By simple counting, derive the Probability distribution of X and hence calculate the expected value of X.

(OR)

b) Write short notes on conditional distribution function and conditional probability density function.

17. a) In a sequence of Bernoulli trials, let X be the length of the run of either successes or Failures Starting with the first trial. Find E(X) and V(X).

(OR)

b) State and prove some properties of Cumulants.

18.a) The following data due to Weldon shows the results of throwing 12 fair dice 4096 times. A throw of 4,5 or 6 being called success.

Success	Frequency	Success	Frequency
0	-	7	847
1	7	8	536
2	60	9	257
3	198	10	71
4	430	11	11
5	731	12	-
6	948		

Fit a binomial distribution and find the expected frequencies.

ETHICAL PAPER

(CONTD……3)

(OR)

18.b) Find the moments of Poisson distribution.

19.a) If X is a random variable with a continuous distribution function f, then prove that F(X) has a Uniform distribution [0,1].

(OR)

b) Find the moments of Normal distribution.

20.a) Find the Cumulant generating function of Gamma function.

(OR)

b) The Joint pdf of X and Y is $f(x,y) = \begin{cases} e^{-(x+y)}, x > 0, y > 0 \\ 0 \; otherwise, \end{cases}$

Check whether X and Y are independent or not?

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