Progressive Education Society's
Modern College of Arts, Science & Commerce Ganeshkhind, Pune – 16
(Autonomous)
End Semester Examination: Jan.2023
Faculty: Science and Technology

Program: B. Sc.Gen03 **Semester: I** **SET: A**
Program (Specific): General B. Sc. **Course Type: CC**
Class: F. Y.B. Sc. (General) **Max .Marks: 35**
Name of the Course: Discrete Probability & Probability Distribution
Course Code: 22-ST-112 **Time: 2Hr**
Paper: II

Instructions to the candidate:

1) ***There are 4 sections in the question paper. Write each section on separate page.***
2) ***All Sections are compulsory.***
3) ***Figures to the right indicate full marks.***
4) ***Draw a well labelled diagram wherever necessary***
5) ***Use of statistical tables and scientific calculator are allowed.***

SECTION: A

Q1) Choose the correct alternative in each of the following: **[1 x 5]**

1) A sample space is ……..
   a) A set of data space in which a sample experiment can be performed to resolve a particular problem.
   b) The set of all possible outcomes of a random experiment.
   c) A space from which a sample for study may be drawn.
   d) The set of all possible outcomes that belong to a particular sample.

2) If A and B are independent events with P (A) = 0.4 ,P (B) = 0.5 , then P (A' ∩ B) is
   a) 0.03 b) 0.3 c) 0.9 d) 0.1

3) Which of the following is not a discrete random variable?
   a) Number of students present in the class.
   b) Number of persons possessing O-ve' blood group in a blood donation camp.
   c) Number of girls born to a couple until they get boy.
   d) Weight of new born baby.

4) If random variable X follows binomial distribution with parameters n and p , then ……
   a) mean < variance b) mean > variance
   c) mean = variance d) mean ≠ variance

5) If X is a discrete random variable with E (X) = 4 then ……..
   a) $E(X^2) = 16$ b) $E(X^2) \leq 16$
   c) $E(X^2) \leq 16$ d) $E(X^2) \geq 16$

Q2) Attempt any four from the following: **[1 x 4]**

1) For the following p. m. f, P (x), what is the value of mode of X?
   P (x) = kx; x= 1, 2, 3, 4, 5.
2) Define equally likely outcomes.
3) Give real life example of Binomial distribution.
4) State degenerate distribution.
5) Find E (Constant).
6) State probability mass function of discrete uniform distribution.

SECTION: B

Q3) Attempt any four from the following: **[2 x 4]**

1) If A and B are two independent events with P(A)=0.7, P(B)=0.8 then
   Find i) P (A∩B) ii) P (A | B).

2) The probability distribution of a discrete random variable X follows

X	0	2	4
P(X)	0.35	0.4	0.25

Calculate c. d. f of X and hence find median.

3) If X follows Bernoulli distribution with parameter p. Write p. m. f of X and state its mean.

4) A random variable X has following discrete uniform distribution.
   If P (x) = $\frac{1}{20}$; x = 1, 2…20 .Find E (X) and median.

5) State the relationship between binomial and hyper-geometric distribution.

6) If X~ H (N=200, M=150, n=5) then calculate E(X), P (X=0).

SECTION: C

Q4) Attempt any four from the following: **[2 x 4]**

1) If $X \sim B(n_1, p)$, $Y \sim B(n_2, p)$ and X & Y are independent ,then state the distribution of X+Y with its parameter.

2) For the following probability distribution of X is given below:

X	0	1	2	3	4
P(X = x)	k	3k	4k	5k	2k

Find i) k

ii) P (X ≥ 1)

3) State p.m.f. of hyper geometric distribution with parameters (N , M , n).

4) Explain each of the following term
   a) Disjoint events.
   b) Mutually exhaustive events

5) X ~ B (8, 0.5), Find mode of X.

6) Give real life situation where hyper-geometric distribution is applicable.

SECTION: D

Q5) Attempt any two from the following: **[5 x 2]**

1) Obtained variance of r. v. of X having following p. m. f.

x	0	1	2	3	4	5
P (x)	0.05	0.15	0.2	0.5	0.09	0.01

2) State the recurrence relation of B (n, p) , If for certain B (10, p) $\frac{P(x=1)}{P(x=0)} = \frac{2}{3}$ then find
   i) p ii) Mean ii) Variance

3) State and prove addition theorem of probability.

4) Bag I contains 6 blue and 4 red balls. Bag II contains 2 blue and 8 red balls.
   i) A bag is chosen at random and a ball is drawn randomly from it. It turns out to be blue. Find the probability that bag I was chosen.
   ii) A bag is chosen at random and 2 balls are drawn randomly from it. It turns out to be blue. Find the probability that bag II was chosen.

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