Semester: I

Progressive Education Society's
Modern College of Arts, Science & Commerce Ganeshkhind, Pune – 16
(Autonomous)
End Semester Examination: Jan.2022
Faculty: Science and Technology

Program: BscComp05 **SET: B**
Program (Specific): BSc (Computer Science) **Course Type: CC**
Class: F.Y.B.Sc.Comp Sci.
Max.Marks: 35
Name of the Course: Mathematical Statistics
Course Code: 22-CSST-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 calculators are allowed.***

SECTION: A

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

1. If $A \subset B$, where two events A and B defined on sample space S then A B =
   a) A b) B c) A^c d) B^c

2. If X is a random variable then Var (aX-b) =
   a) aVar(X) b) Var(X)+b c) aVar(X)+b d) a^2Var(X)

3. Occurrence of at least one of the event out of two events A and B defined on sample space S is given as
   a) A B b) A B^c c) $(A\ B)^c$ d) AUB

4. If X ~ B(10,p) and E(X) = 5 then value of p is
   a) 0.5 b) 0.05 c) 0.13 d) 0.25

5. If S is sample space then P(S) is
   a) 1 b) 0.5 c) 0.25 d) 0

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

1. Define Finite sample space.
2. In how many ways a committee can choose 6 members from 13 members for a meeting?
3. Define Mutually exhaustive events
4. If P (A) = 0.4 then find P (A^c).
5. Explain the term "Event"
6. Define the term "Relative complementation of A given B".

SECTION: B

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

1. For the following probability distribution of X

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

Find
i) The value of k
ii) P ($X \geq 1$)

2. If A and B are two events defined on sample space S such that P(B) = $\frac{1}{4}$ and P (A|B) = $\frac{1}{2}$ then find P ((A B)^c).
3. Define variance of a discrete random variable. Also state any one property of variance.
4. State Baye's theorem.
5. Discuss Non-deterministic experiment with an example.
6. Write any two real life situations where
   i) Poisson distribution is applicable.
   ii) Binomial distribution is applicable.

SECTION: C

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

1. State additive property of Binomial distribution.
2. A company consists of 2 managers and 1 team leader. Write the set for the following events that it consists
   i)At least one manager.
   ii) First is a team leader.

3. State multiplication theorem.
4. The discrete r.v. X has following probability distribution

X	-1	0	1	2	3
P(x)	0.15	0.20	0.30	0.25	0.10

i) Mode of X.
ii) $P(X \leq 1 \mid X \leq 3)$

5. Write axioms of probability.
6. Let A and B be two independent events defined on Ω such that P (A) = 1/3, P (B) = 1/4.
   Find $P(A' \quad B)$, $P(A|B)$.

SECTION: D

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

1. Following is the Probability mass function of a discrete r.v X:

X	4	5	6	7	8
P(X= x)	0.15	0.20	0.30	0.25	0.10

Find i) $P(4 < X < 7)$

ii) $E(2X)$

iii) $E(2X+3)$

2. A random variable X has following discrete uniform distribution.

$$P(X) = \frac{1}{20} \; ; \; x = 1, 2 \ldots 20.$$

Find E (X) and Var (X)

3. Define distribution function of a discrete random variable X and state its four properties.
4. If D_1 and D_2 form partition of a sample space $P(D_1)= 0.2$, $P(D_2)= 0.8$ and $P(A|D_1) = 0.2$, $P(A|D_2) = 0.3$ then find $P(D_1|A)$ and $P(D_2|A)$

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