

F.Y.B.Sc. SEM – I (CBCS 2018 COURSE) : WINTER - 2018
SUBJECT: STATISTICS: DISCRETE PROBABILITY AND PROBABILITY
DISTRIBUTIONS-I

Day: Saturday
Date: 20/10/2018

W-2018-0673

Time: 11.00 A.M TO 02.00 PM
Max. Marks: 60

N.B:

- 1) All questions are **COMPULSORY**.
- 2) Figures to the right indicate **FULL** marks.
- 3) Use of algorithmic tables, statistical table and pocket **CALCULATOR** is allowed.

Q.1 Attempt **ANY TWO** of the following: **(12)**

- a) State and prove Baye's theorem.
- b) Let A and B be any two events defined on a sample space Ω , such that
 $P(A) = \frac{1}{3}, P(B) = \frac{1}{4}, P(A \cap B) = \frac{1}{6}$,
 Find: i) $P(A \cup B)$ ii) $P(A')$
 iii) $P(A' \cap B)$ iv) $P(A' \cap B')$
- c) Write down the sample space and state its type for the following random experiments.
 - i) A coin is tossed three times.
 - ii) Counting number of defectives in a lot of 6 items.

Q.2 Attempt **ANY TWO** of the following: **(12)**

- a) Define cumulative distribution function and state its properties.
- b) A discrete random variable X has the p.m.f given by

X	2	4	6	8	10
P(x)	$\frac{1}{12}$	$\frac{1}{6}$	$\frac{1}{4}$	$\frac{1}{3}$	$\frac{1}{6}$

- Find i) mode ii) median iii) $P(4 \leq X \leq 8)$.
- c) Given the following probability distribution of a discrete random variable X.

X	0	1	2	3
P(X = x)	0.1	0.3	0.4	0.2

Find E (X) and Var (X). Also find E (2X +5).

Q.3 Attempt **ANY TWO** of the following: **(12)**

- a) State the probability mass function of Binomial distribution with parameters n and p. Obtain its mean and variance.
- b) Obtain mean and variance of discrete uniform distribution with parameter 'n'.
- c) Let a discrete random variable X assumes values 0, 1,2, 3 and 4 such that
 $P(X=0) = P(X=1), P(X=3) = P(X=4)$,
 $P(X > 2) = P(X < 2) = P(X = 2)$.
 Find probability distribution of X. Also find E(X).

P.T.O.

Q.4 Attempt **ANY THREE** of the following: **(12)**

a) A husband and wife appear for two vacancies in the same post. The probability of husband's selection is $\frac{1}{7}$ and that of wife's selection is $\frac{1}{5}$. What is probability that

- i) Both of them will be selected?
- ii) Only one of them will be selected?

b) Verify whether the following can be looked upon as p.m.f. for the given values of X.

i) $P(x) = \frac{1}{4}; \quad x=0,1,2,3,4.$

ii) $P(x) = \frac{x^2}{30}; \quad x=0,1,2,3,4.$

c) Explain the following terms with illustration:

- i) Mutually exclusive events
- ii) Complement of an event.

d) The mean and variance of marks in statistics (X) are 60 and 25 respectively. Find the mean and variance of

i) $Y = \frac{X-40}{10}$ ii) $Z = \frac{X-50}{20}$

Q.5 Attempt **ANY FOUR** of the following: **(12)**

a) Give three real life situations where the Bernoulli distribution can be used.

b) If $X \rightarrow H(10,6,3)$ then find mean and variance of X.

c) A family consist of 3 children. Write the sample space and the following events.

- i) Eldest is a boy
- ii) Youngest is a girls

d) If A and B are independent events with $P(A)=0.4$ and $P(B)=0.25$, then find $P(A' \cap B)$ and $P(A \cap B')$.

e) For two events defined on sample space Ω , define conditional probabilities $P(A|B)$ and $P(B|A)$.

f) The first two moments about the value 3 for a certain probability distribution are 1 and 16 respectively. Find the mean and variance of the distribution.

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