F.Y.B.SC. SEM – I (CBCS - 2016 COURSE) : WINTER - 2017

SUBJECT : STATISTICS : DISCRETE PROBABILITY & PROBABILITY DISTRIBUTIONS - I

Day : **Tuesday**
Date : **07/11/2017**

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

W-2017-0549

N.B.:

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

Q.1 A) Choose the correct alternative for the following: **[06]**

i) A coin is tossed three times in succession and the outcomes are noted. The number of sample points in the sample space is :
a) 6 **b)** 8 **c)** 3 **d)** 9

ii) The probability that a person shall not die is ___________.
a) 0 **b)** 1 **c)** 0.5 **d)** 0.3

iii) If $P(A \cap B) = 0$, then the two events A and B are:
a) Mutually exclusive **c)** Dependent events
b) Independent events **d)** Exhaustive events

iv) If A and B are independent events with P(A) = 0.4 and P(B) = 0.5, then $P(A' \cap B)$ is:
a) 0.03 **b)** 0.09 **c)** 0.1 **d)** 0.3

v) If E(Y) = 3 and $Y = \frac{X-2}{5}$, then E(X) is:
a) $\frac{1}{5}$ **b)** $\frac{17}{5}$ **c)** $\frac{5}{17}$ **d)** 17

vi) If $X \rightarrow B\left(10, \frac{1}{2}\right)$ then, mean of X is:
a) 10 **b)** 5 **c)** 2 **d)** 20

B) State the following statements are true or false: **[06]**

i) The first raw moment of a variable is always zero.

ii) Mode of binomial distribution is unique.

iii) If A and B are independent, then A′ and B are independence.

iv) An elementary event is an event containing only one element.

v) If $\gamma_2 = 0$, the distribution is mesokurtic.

vi) $P(\Omega) = 1$ is one of the axiom of probability theory.

Q.2 Attempt **ANY THREE** of the following: **[12]**

a) Write down the sample space for the following random experiments:
i) A coin is tossed three times.
ii) Counting number of defectives in a lot of 10 items.

b) With usual notation prove that:
$$P(B \cup C) = P(B) + P(C) - P(B \cap C)$$

P.T.O.

c) If X is a r.v. with p.m.f. :

$P(x) = kx \quad ; \quad x = 1, 2, 3$

$\quad = 0 \quad ; \quad$ otherwise

Find k and E(2X + 10).

d) If A and B are independent events with P(A) = 0.5 and P(B) = 0.4.
Find : **i)** $P(A \cup B)$ **ii)** $P(A' \cap B')$ **iii)** $P(A' \cap B)$

Q.3 Attempt **ANY FOUR** of the following: **[12]**

a) Define cumulant generating function (C.G.F) of r.v. X. State uses of it.

b) Let X be a r.v. with p.m.f. as below:

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

Find mode and median of X.

c) A random variable X follows Bernoulli distribution with $\mu_3 = 0$. What is the value of p?

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

e) State the properties of M.G.F.

Q.4 Attempt **ANY TWO** of the following: **[12]**

a) A r.v. X has the following discrete uniform distribution. If

$P(X = x) = \frac{1}{n+1}; \quad x = 0, 1, 2, \ldots n$

$\quad = 0 \quad ; \quad$ otherwise.

Find E(X) and Var (X).

b) Let X be a discrete r.v. with probability distribution:

X	0	1	2	3	4
P(X = x)	k	4k	6k	3k	2k

i) Find the value of k **ii)** $P(X \geq 2)$ **iii)** $P(1 \leq X \leq 4)$

c) State and prove the recurrence relation for binomial probabilities. Also, state its use.

Q.5 Attempt **ANY TWO** of the following: **[12]**

a) The first three central moments of distribution are 0, 50 and 90. Compute coefficient of skewness and interpret the value. Also write down μ_2 and μ_3 in terms of raw moments.

b) For a discrete r.v. X, E(X) = 10 and Var (X) = 25. Find the positive value of a and b such that Y = (aX – b) has zero mean and unit variance.

c) State and prove Baye's theorem.

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