F.Y.B.SC. SEM – I (CBCS - 2016 COURSE) : SUMMER - 2018

SUBJECT : STATISTICS : DISCRETE PROBABILITY & PROBABILITY DISTRIBUTIONS - I

Day : **Wednesday** Time : **11.00 A.M. TO 02.00 PM**

Date : **25/04/2018** **S-2018-0627** Max. Marks : 60

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: **[06]**

i) If $X \rightarrow H(10, 6, 3)$, then the mean of X is:
a) 18 **b)** 1.8 **c)** 3 **d)** None of these

ii) If $X \rightarrow B(n, p)$ with $E(X) = 6$ and $Var(X) = 4.2$, then p is:
a) 0.7 **b)** 0.3 **c)** 0.5 **d)** 0.6

iii) If $E(X) = 5$, then $E\left(\frac{X+7}{2}\right)$ is:
a) 7 **b)** 3.5 **c)** 6 **d)** 2.5

iv) For the following probability distribution, mode of X is :

X	–2	–1	0	1
P(x)	0.3	0.2	0.4	0.1

a) – 2 **b)** – 1 **c)** 1 **d)** 0

v) If A and B are independent events with $P(A) = 0.6$ $P(B) = 0.75$, then $P(A' \cap B')$ is:
a) 0.5 **b)** 0.1 **c)** 0.45 **d)** None of these

vi) If $B \subset A$, then $P(A \mid B)$ is:
a) 0.8 **b)** 0.3 **c)** 1 **d)** None of these

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

i) If A′ and B′ are independents, then A and B are independent.

ii) $P(\phi) = 0$ is one of the axiom of probability theory.

iii) The events Ω and ϕ are mutually exclusive.

iv) A function $X: \Omega \rightarrow R$ is called as a random variable.

v) Variance of a random variable is never negative.

vi) If $\gamma_1 < 0$, the distribution is mesokurtic.

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

a) Define independence events. If A and B are independent events defined on sample space Ω, then show that A′ and B are independent.

b) A card is drawn from an ordinary pack of 52 playing cards. What is the probability that it is a king given that it is face card?

P.T.O.

c) The p.m.f. of X is given by

$$P(X=x)=\frac{x-2}{6},\ x=3,4,5$$
$$=\ 0\ ,\ \text{otherwise}$$

Find E(7X + 5).

d) Consider two events A and B such that

$$P(A)=\frac{1}{4},\ P(B|A)=\frac{1}{2},\ P(A|B)=\frac{1}{4}.$$

Does A and B are mutually exclusive events?

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

a) State the axioms of probability.

b) A family consist of 3 children. Write the sample space and the following events: **i)** eldest is a boy **ii)** youngest is a girl.

c) A discrete random variable X has the following probability distribution.

X	– 4	– 2	0	2	4	6
P(X = x)	$\frac{1}{10}$	k	$\frac{2}{10}$	3k	$\frac{3}{10}$	2k

Find k and mode of X.

d) Let X ~ B(n = 10, p). If E(X) = 8. Find $E\left(\frac{X}{10}\right)$ and the value of p.

e) Give three practical application of hypergeometric distribution.

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

a) Define binomial distribution. State any three real life examples for it.

b) Let X taking values 1, 2, 3----n with equal probabilities. Find mean and variance of X.

c) A discrete random variable (r.v.) X has the following probability distribution.

X	–2	0	2	4	6
P(X = x)	0.1	0.2	0.3	0.25	0.15

Find : **i)** $P(X > 2)$ **ii)** $P(-2 \le X \le 4)$ **iii)** $P(X > 0 \mid X < 4)$

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

a) Define cumulative distribution function (c.d.f) of a discrete r.v. State its important properties.

b) The first three moments about the value '3' for a certain probability distribution are 1, 16 and – 40 respectively. Find:

i) Mean, variance and third central moment of the distribution.

ii) Compute γ_1 and interpret it.

c) Let X → B(n = 10, p = 0.7). Find : **i)** $P(X > 2)$ **ii)** mode of X.

* * * *