F.Y.B.SC. SEM – II (CBCS - 2016 Course) : WINTER - 2018
SUBJECT : STATISTICS : DISCRETE PROBABILITY & PROBABILITY DISTRIBUTIONS – II

Day : Saturday
Date : 20/10/2018

W-2018-0702

Time : 03.00 P.M. To 06.00 P.M
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)**

1) If Cov (X, Y) = 50, then Cov (10X+10, 5Y+5) is ________.
 a) 50 **b)** 500 **c)** 2500 **d)** 60

2) If X and Y are independent and E(X) =5 and E(Y) =0, then E(XY) is ________.
 a) 5 **b)** 25 **c)** 0 **d)** 1

3) Given the following joint p.m.f of (X, Y), what is the value of K?

X \ Y	1	2
1	K	1/3
2	1/2	0

 a) $\frac{1}{2}$ **b)** $\frac{1}{6}$ **c)** $\frac{1}{3}$ **d)** 0

4) Given Var (X) = 4, Var (Y) =9 and Cov (X,Y) = 0, what is the Var(X + 2Y)?
 a) 13 **b)** 0 **c)** 40 **d)** 20

5) ρ(X, -X) is _____.
 a) 1 **b)** -1 **c)** 0 **d)** 0.5

6) E (X) =2 then E (3X – 5) is ....
 a) 0 **b)** 2
 c) 3 **d)** 1

B) State whether the following statement is true or false. **(06)**

1) Cov(X, X) = Var(X)
2) If (X,Y) is a discrete r.v., then E[Y|X=x] is a function of Y.
3) If $\mu_{11} = 5$, $\mu_{20} = 16$ and $\mu_{02} = 4$ then the value of ρ is 0.625.
4) If X is geometric r.v. taking values 0, 1, 2 ... then its variance is less than mean.
5) Poisson distribution is not symmetric.
6) Cov(3X-10, 10-3Y) = -Cov(X,Y)

P.T.O.

Q.2 Attempt any **THREE** of the following: **(12)**

a) For (X, Y) a bivariate discrete r.v. with $\sigma^2_x = 9$, $\sigma^2_y = 4$ and Cov (X, Y) = -4. Find **i)** Var (X-3Y) **ii)** Cov(2X-3Y).

b) State some real life situations in which geometric distribution can be applied.

c) If X → Poisson(m) such that $P[X = x] = \frac{4}{x} P[X = x-1]$, find the probability mass function of X and variance of X.

d) State the properties of joint distribution function of two dimensional discrete r.v.

Q.3 Attempt any **FOUR** of the following: **(12)**

a) A r.v. (X, Y) has joint pmf as follos:

X \ Y	0	1	2
-2	0.1	0.2	0.3
2	0.1	0.2	0.1

Find marginal distribution of X and Y.

b) Prove that Cov (aX, bY) = ab Cov (X, Y).

c) If X and Y are two independent discrete r.v.s with $\sigma_x = 3$ and Var (2X+3Y) =72. Compute σ_y.

d) If $M_X(t) = e^{2.4(e^t-1)}$ is mgf of r.v. X, then identify the probability distribution of X. Also find E(X).

e) Define geometric probability distribution. State its mean and variance.

Q.4 Attempt any **TWO** of the following: **(12)**

a) Obtain moment generating function (MGF) of Poisson distribution. Hence find the raw and central moments.

b) Define correlation coefficient ρ between two discrete r.v.s. X and Y. Give interpretation of the various values of ρ.

c) The joint p.m.f of (X,Y) is given below:

X \ Y	-1	0	1	2
-1	1/9	1/27	1/27	1/9
1	2/9	0	1/9	1/9
3	0	0	1/9	4/27

Compute **i)** P(X > 0) **ii)** P(X < 0, Y > 0) **iii)** P(X is odd and positive)

Q.5 Attempt any **TWO** of the following: **(12)**

a) The joint p.m.f of X and Y is

X \ Y	1	2	3
0	0.1	0.2	0.3
1	0.1	0.1	0.2

Find **i)** E (X | Y = 2) **ii)** Var (X | Y = 2) **iii)** Are X and Y independent ?

b) If $p(x) = \frac{1}{2^x}$ $x = 1, 2....$ then Find E (X), Var (X) and Mode of X.

c) Suppose X_1 and X_2 and X_3 are three independent discrete r.v.s with means 2, 4 and 5 and variances 4 each.

Find **i)** $E(4X_1 + 3X_2 - X_3)$

ii) $Var(X_1 + X_2 + X_3)$

iii) S.D. $\left(\frac{X_1 + X_2 + X_3}{5}\right)$

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