VCD 26/10/23 SYB.Sc (MS) SEM-III Probability Distribution Paper-I HRS- 3 MARKS-100

Note: (i) All questions are compulsory.

(ii) Use of Calculator is allowed.

(iii)Figures on right indicates maximum marks.

Q.1) Answer the following questions

a) Correct the following if necessary: **(10M)**

i. Binomial distribution is continue.

ii. The mean of binomial distribution depends on n only.

iii. For Poisson distribution discrete distribution

iv. Hypergeometric distribution has two parameters.

v. Coefficient of correlation lies between -1 to 0.

b) Answer in One sentence: **(10M)**

i. Define Characteristic Function of r.v.y.

ii. State p.m.f of poisson distribution.

iii. State p.d.f of normal distribution.

iv. Define covariance between two random variables.

v. State property of correlation coefficient.

Q.2) Attempt any TWO **(20M)**

a) Define C.G.F and Write properties of it also prove any one peoperty.

b) i) If a r.v.X follows binomial distribution with parameter (n,p) obtain expression for its M.G.F hence Evaluate its mean and variance.

c) A r.v.X has a P.m.f

$$P(X=x) = \frac{x}{15} \qquad x = 1, 2, 3, 4, 5$$
$$= 0 \qquad \text{o.w}$$

i) Obtain M.G.F hence find mean and variance

ii) Write M.G.F of Y= 2X+3

Q.3) Attempt any TWO **(20M)**

a) State the P.m.f of Negative Binomial distribution and hence Obtain its mean and Variance.

b) i) Obtain the P.m.f of Truncated Poisson distribution truncated at 0

ii) Define Geometric Distribution State its M.G.F and C.G.F

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c) State the P.m.f of Poisson distribution, Obtain its mean and variance using the M.G.F.

Q.4) Attempt any TWO **(20M)**

a) Define joint probability mass function and cumulative distribution function of bivariate discrete r.v's X and Y. State all properties of cumulative distribution function.

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

$$f(x,y) = 8xy \qquad 0 < x < y < 1$$
$$= 0 \qquad \text{o.w}$$

Find i) $E(X / Y)$ ii) $E(Y / X)$

d) What is Jacobian Transformation?
If a random variable X follows uniform distribution over the range (0, 1).
Obtain p.d.f of i) $Y = X^2$ ii) $Y = -2\log X$

Q.5) Attempt any TWO **(20M)**

a) i) Prove that for large n binomial distribution tends to Poisson distribution.
ii) Write down the properties of covariance.

b) Write down the properties of covariance. Evaluate $V(aX+bY)$

c) i) Describe Correlation Coefficient, State its Properties.
ii) Obtain the m.g.f of binomial distribution.