

B.Sc. (Part-I) (Semester-II) (CBCS (NEP2020)) Examination, March 2024**Balasaheb Desai College, Patan****STATISTICS****Sub. Code: 90228****Discrete Probability distributions (Paper – IV)****Day and Date: Monday 01/04/2024****Time : 02:30 p.m. to 04:30 p.m.****Total Marks: 40****Period: 2 Hours****Total Pages: 02****Instructions :** i) All questions are compulsory .

ii) Figures to the right indicate full marks.

1. Choose the correct alternative: (08)

- 1 If r. v. X has one point distribution assuming value k then mean of X is ...
 - a) zero
 - b) one
 - c) k
 - d) none of these
- 2 The $P(X = x) = \frac{1}{5}$, $x = 21, 25, 30, 38, 40$ is example of p. m. f. of ...
 - a) One point distribution
 - b) Two-point distribution
 - c) Bernoulli distribution
 - d) Discrete uniform distribution
- 3 Which of the following distribution has **not** satisfy the additive property?
 - a) Poisson distribution
 - b) Geometric distribution
 - c) Negative binomial distribution
 - d) all of these
- 4 If $X \sim \text{NBD}(k, p)$ then mean of X is ..
 - a) kq/p
 - b) pq
 - c) kp/q
 - d) kp
- 5 Let (X, Y) be the bivariate discrete r. v. then variables X and Y are independent if...
 - a) $p(x, y) = p(x)/p(y)$
 - b) $p(x, y) = p(x) \cdot p(y)$
 - c) $p(x, y) = p(x) + p(y)$
 - d) none of these
- 6 If $F(x, y)$ be the joint cumulative distribution function(c.d.f.) of X and Y then it lies in the interval...
 - a) $[-1, 0]$
 - b) $[-\infty, \infty]$
 - c) $[-1, 1]$
 - d) $[0, 1]$
- 7 If X and Y are two independent variables then $E(XY) = \dots$
 - a) $E(X) + E(Y)$
 - b) $E(X) \cdot E(Y)$
 - c) $E(X) - E(Y)$
 - d) $E(X + Y)$
- 8 If $P_x(s)$ and $P_y(s)$ be p.g.f.'s of independent r.v.'s X and Y respectively. Then p.g.f. of a r.v. $X + Y$ is...
 - a) $P_x(s) + P_y(s)$
 - b) $P_x(s) - P_y(s)$
 - c) $P_x(s) \cdot P_y(s)$
 - d) $P_x(s)/P_y(s)$

2. Attempt any Two of the following**(16)**

- 1 Define Binomial distribution find its p.g.f, mean and variance
- 2 Define Poisson distribution find its p.g.f, mean and variance
- 3 The joint probability distribution (X, Y) is

X\Y	0	1	2	3
0	C	2c	3c	4c
1	2c	4c	6c	8c
2	3c	6c	9c	12c

- Find
- i) c
 - ii) $P(X+Y \leq 2)$
 - iii) $P(X=Y)$
 - iv) marginal probability distribution of X

3. Attempt any Four of the following**(16)**

- 1 Find recurrence relation of probabilities for Binomial distribution
- 2 State and prove lack of memory property of Geometric distribution
- 3 For a bivariate discrete random variable (X, Y) define:
 - i) marginal p.m.f. of X and Y
 - ii) conditional distribution of X given Y
- 4 For a bivariate discrete random variable (X, Y), Show that $E(X+Y) = E(X) + E(Y)$
- 5 For a bivariate discrete random variable (X, Y), Show that $V(aX+bY) = a^2V(X) + b^2V(Y) + 2ab \text{Cov}(X, Y)$
- 6 The joint p.m.f. of bivariate r.v. (X, Y) is

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

Find $E(XY)$

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