B. N. BANDODKAR COLLEGE OF SCIENCE, THANE – 400 601.

FIRST TERM EXAMINATION, OCT. 2010.

S.Y. B. Sc.

Time : 2Hrs

Subject : Statistics - I **Marks : 60**

N. B. : 1. All questions are compulsory.

2. Figures to the right indicate full marks.

Q.1 a) With usual notation, if $K_r = 1$ for all values of r, obtain an expression for its moment generating function. [3]

b) Solve ANY THREE :

1. State and prove additive property of binomial variates. [4]
2. For the geometric distribution, obtain the value of mode. [4]
3. If X_T is truncated binomial distribution truncated at n, obtain p.m.f. of X_T. [4]
4. The joint p.m.f. of (X, Y) is
   $f(x, y) = k\,xy$ $x = 0, 1, 2, 3$
   $y = 0, 1, 2, 3$
   Obtain the value of k. Are X and Y independent ? [4]
5. If the random X – follows the p.d.f
   $f(x) = 2x$ $0 < x < 1$
   Obtain p.d.f. of $Y = 3X + 2$
   [4]

Q.2 a) Obtain the relationship between first your central moments and cumulants. [7]

b) Solve ANY TWO :

1) If $X_1, X_2 \ldots\ldots X_n$ is an random sample from a given distribution having m.g.f. $M_X(t)$. Show that

$$M_x(t) = [\,M_x(t/n)\,]^n$$ [4]

2) If the p.m.f. of r.v. X is given by

$f(x) = ab^x \qquad x = 0, 1, 2, \ldots\ldots\ldots$

Find its m.g.f. [4]

3) If r^{th} cumulant of a random variable x is given by $K_r = (r-1)!$

Find the expression for m.g.f. [4]

4) Define characteristic function. State its properties. [4]

Q.3 a) Let the random variable X follows poisson distribution with parameter λ. With usual notation prove that.

$$\mu_{r+1} = \lambda \left[\frac{d\mu_r}{d\lambda} + r\mu_{r-1}\right]$$

Hence find β_1 and β_2. [7]

b) Solve ANY ONE :

1) Define negative binomial variate with parameter (k, p). Obtain its mean and variance . [8]

2) Obtain limiting distribution of hypergeometric variate. [8]

Q.4 a) With usual notation show that

1) $E(E(X/Y) = E(X)$

2) $E(V(X/Y) + V(E(X/Y) = V(X)$ [7]

b) **Solve ANY ONE :**

1) The joint p.d.f. of (X, Y) is given by

$f(x, y) = K \times e^{-x(1+y)} \qquad x, y, \geq 0$

Find K. Also obtain marginal density of X. [8]

2) If the conditional density of x given by is given by

$$f(x/y) = \frac{k^x}{y^2} \qquad 0 < x < y, 0 < y < 1$$

and marginal density of Y as

$f_y(y) = cy^4 \qquad 0 < y < 1$

Find joint density of (X, Y) [8]

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