B.N. Bandodkar College of Science, Thane

S.Y. B.Sc. First Term end Examination Oct 2011

Statistics Paper I

Duration 2 hrs Max Marks-60

N.B. 1) All Questions are compulsory.
2) Figures to right indicate marks.
3) Use of calculators is allowed.

Q.1) a) Show that sum of i.i.d Bernoulli variates is a binomial variate. 3

b) Attempt any **THREE**

1) With usual notations, If $K_X(t) = m(e^t - 1)$, obtain its first four moments hence β_1 and β_2 . 4

2) State and prove additive property of Poisson variates. 4

3) Define hyper geometric variate. Write down its probability mass function, obtain its mean. 4

4) If a random variable X follows uniform distribution over the range (-1,1) . Obtain p.d.f of i) $Y=2X+3$ ii) $U= X^2$ 4

5) If bivariate p.m.f. is given by 4

$$P(X,Y)= K(X+Y) \qquad X,Y =1,2,3$$

Obtain the value of K . Also obtain marginal densities of X and Y.

Write down the expression for conditional p.m.f of X given Y=y.

Q2) a) Define Moment Generating Function. (m.g.f.) State and prove its properties. 7

b) Attempt any **ONE**

1) Define moments and cumulants. Obtain the relations between first four central moments and cumulants 8

2) Verify whether following functions are m.g.f. If so obtain mean in each case. 8

i. $M_x(t)= 2/(1-t)$

ii. $M_x(t)= (3-2e^t)^{-1}$

iii. $M_x(t)= 4t/(5-t)$

iv. $M_x(t) = (e^t - e^{-t})/2t$

Q 3) a) Obtain p.m.f. of truncated binomial distribution truncated at zero. Find its mean and variance. 7

b) Attempt any **ONE**

1) If a random variable X follows Poisson distribution with parameter m, with usual notations show that 8

$$\mu_{r+1} = m\,(d\mu_r / dm + r\,\mu_{r-1})$$

hence evaluate $\beta 1$, $\beta 2$

2) If a random variables X& Y are two independent geometric variates with parameter p then show that $P[X=Y] = p/(1+q)$ 8

Q.4) a) Define correlation coefficient. State its properties and prove any one. 7

b) Attempt any **ONE**

1) Find the value of 'a' so that U and V are uncorrelated. U= Xsina +Ycosa and V=Xcosa +Ysina 8

2) If f(X,Y) is a bivariate p.d.f. Obtain the value of K . Also obtain marginal densities of X and Y. Write down the expression for conditional p.d.f of X given Y=y. check whether X and Y are independent. 8

$$f(x,y) = Kxye^{-(x+y)} \qquad x,\ y > 0$$
$$= 0 \qquad \text{o.w.}$$

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