Register Number :

Name of the Candidate :

1 2 5 8

B.Sc. DEGREE EXAMINATION, 2011

(**MATHEMATICS**)

(THIRD YEAR)

(**PART - III - A - MAIN**)

(PAPER - IX)

760. MATHEMATICAL STATISTICS

(Including Lateral Entry)

May]   [Time : 3 Hours

Maximum : 100 Marks

Answer any FIVE questions.
Statistical tables can be used.
All questions carry equal marks.

$(5 \times 20 = 100)$

1. (a) State and prove Baye's theorem.

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(b) A box contains 6 red, 4 white and 5 black balls. A person draws 4 balls from the box at random. Find the probability that among the balls drawn there is atleast one ball of each colour.

2. (a) State and prove multiplication theorem on expectation.

(b) Let X be a continuous random variable with p.d.f given by:

$$f(x) = \begin{cases} kx & , 0 \le x < 1 \\ k & , 1 \le x < 2 \\ -kx + 3k & , 2 \le x < 3 \\ 0 & , \text{else where} \end{cases}$$

(i) determine the constant k.

(ii) Determine $F(x)$, the c.d.f

and (iii) If x_1, x_2 and x_3 are the three independent observations from x, what is the probability that exactly one of these three numbers is larger than 1.5?

(b) Find the missing term given:

$$u_0 = 580$$

$$u_1 = 556$$

$$u_2 = 520$$

$$u_4 = 385,$$

using Lagranges formula.

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(b) The correlation co-efficient between X and Y is 0·8.

If σ_x = 2·5, σ_y = 3·5, $\bar{x}$ = 65 and

$\bar{y}$ = 67,

find the equations of the two regression lines. Also, find the value of y when $x = 70$.

5. (a) Find the moment generating function of Binomial distribution.

(b) In a Poisson frequency distribution, frequency corresponding to 3 success is

$\frac{3}{2}$ times frequency corresponding to 4 success. Find the mean and standard deviation of the distribution.

6. (a) Define the Rectangular distribution and find the moment generating function of it.

(b) Define $\Gamma-$ distribution and find the moment generating function of it.

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7. (a) Explain the following terms:

(i) Type – I error,

(ii) Type – II error,

(iii) Critical region

and (iv) Confidence limits.

(b) The average hourly wage of a sample of 150 workers in a plant 'A' was 2·56 with a standard deviation of ₹ 1·08. The average hourly wage of a sample of 200 workers in plant 'B' was ₹ 2·87 with a standard deviation of ₹ 1·28. Can an applicant safely assume that the hourly wages paid by plant 'B' are higher than those paid by plant 'A'?

8. (a) State and prove Neyman Pearson lemma.

(b) Two random samples gave the following results:

$$n_1 = 9, \ \bar{x_1} = 68, \ \Sigma(x_i - \bar{x_1})^2 = 36$$

$$n_2 = 10, \ \bar{x_2} = 69, \ \Sigma(x_i - \bar{x_2})^2 = 42$$

Test whether the samples have come from the same population.

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9. Calculate Fisher's ideal index number from the following data and show that it satisfies time reversal test and factor reversal test:

Commodity	1995		1996	
	Price	Quantity	Price ₹	Quantity
A	10	49	12	50
B	12	25	15	20
C	18	10	20	12
D	20	5	40	2

10. (a) From the following information, estimate the production in the year 2002.

Year	2000	2001	2002	2003	2004	2005
Production	39	85	-	151	264	388

3. (a) Calculate the co-efficient of correlation between X and Y the following:

X	1	3	4	5	7	8	10
Y	2	6	8	10	14	16	20

(b) Fit a second degree parabola to the given data:

X	0	1	2	3	4
Y	1·0	1·8	1·3	2·5	6·3

4. (a) Two judges in a beauty competition rank the 10 competitors as given below:

X	35	56	50	65	44	38
Y	50	35	70	25	35	58

44	50	15	26
75	60	55	35

Calculate the rank correlation co-efficient between X and Y.

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