RC-1724

Second Year B.B.A. (Sem. III) Examination

April / May – 2010

Quantitative Methods : Paper-II

Time :   Hours]   [Total Marks : **70**

Instructions :

(1)

(2) **All** questions carry **equal** marks.

(3) The figures to the **right** indicate marks.

(4) Graph papers and statistical tables will be provided on request.

1   Answer the following questions :   **14**

   (i)   Prove the correlation coefficient is a geometric mean of regression coefficients.

   (ii) Define Null and Alternative Hypothesis.

   (iii) The coefficient of correlation between two variants X and Y is 0.6. Their covariance is 18. The variance of x is 25. Find the variance of Y.

   (iv) If b_{xy} = 0.4 and variance of y is 4 times than variance of x then find the coefficient of correlation.

   (v)   A box contain 4 defective and 6 good electronic calculators. Two calculators are drawn out one by one without replacement then what is the probability that the two calculators drawn are good?

(vi) Given annual trend of production function of a company Y = 36 + 0.12x with origin 2008. Convert the equation to a monthly trend equation and shift the origin to July 2009.

(vii) In $\overline{X}$-chart, UCL = 40.6, $\overline{X}$ =30.6 then find the value of LCL.

2 (a) Distinguish between Mutually Exclusive Events and Independent Events. **2**

(b) What is the probability that over a two day period **4** the number of requests would either 11 or 12 if at a motor garage the records of service requests with their probabilities are as given below?

Daily Demand	Probability
5	0.25
6	0.65
7	0.10

(c) The probability that a bulb will fail before 100 hours **4** is 0.2. Bulbs fail independently. If 15 bulbs are tested for life lengths, what is the probability that the number of failures before 100 hours does not exceed 3 ?

(d) Time taken by a construction company to construct **4** a flyover is a normal variate with mean 400 labour days and standard deviation of 100 labour days. If the company promises to construct the flyover in 450 days or less and agrees to pay a penalty of Rs. 10,000/- for each labour day spent in excess of 450, what is the probability that

   (i) if the company pays a penalty of at least Rs. 2,00,000

   (ii) the company takes at most 500 days to complete the flyovers.

OR

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2 (a) State the important characteristic of normal   **2**
distribution.

(b) A random variable x has the following probability   **4**
function. Find the value of k and also find mean and
variance.

x	-2	-1	0	1	2	3
$P(x_i)$	0.1	k	0.2	$2k$	0.3	k

(c) East-West Airlines has the policy of employing only   **4**
Indian women whose height is between 62 inches and
69 inches. If the height of Indian women is
approximately normally distributed with a mean of
64 inches and a standard deviation of 3 inches, out of
the 1000 applications received find the number of
applicants that would be

(i)   too tall

(ii) too short

(iii) of acceptable height.

(d) The following table shows the distribution of number   **4**
of faulty units produced in a single shift in a factory.
The data is for 400 shifts.

No. of faults	0	1	2	3	4
No. of shifts	138	161	69	27	5

Find expected frequencies using poisson distribution.

3 (a) State the merits and demerits of Spearman's rank   **2**
correlation.

(b) With the following data in 6 cities calculate   **4**
coeffcient of correlation by Pearson's method between
the density of population and death rate.

Cities	Area in sq. miles	Population in '000	No. of death
A	300	60	600
B	360	180	2880
C	200	80	1120
D	120	84	1680
E	240	144	2448
F	160	48	624

(c) Percentage of Marks of 10 students in MBA and BBA **4** examination are as follows. Under similar conditions how much a student securing 76 marks in BBA may expect in MBA ?

MBA	65	58	40	67	72	48	54	76	54	66
BBA	70	75	62	45	78	60	40	64	45	61

(d) The following data based on **500** students are given **4** for marks in statistics and Busines administration at a certain examination.

	Statistics	Business Administration (BA)
Mean marks	72	60
Standard deviation	16	12
Sum of products of deviation from mean	61,440	

Find

(i) coefficient of correlation

(ii) two regression coefficient

(iii) marks in BA of the candidate who obtained 75 marks in statistics.

OR

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3   (a)   What is the difference between correlation and   **2**
regression?

(b)   Find the rank correlation coefficient from the   **4**
following marks awarded by the examiners in Statistics
to 11 students.

Roll No.	1	2	3	4	5	6	7	8	9	10	11
Marks awarded by examiner A	24	29	19	14	30	19	27	30	20	28	11
Marks awarded by examiner B	37	35	16	26	23	27	19	20	16	11	21
Marks awarded by examiner C	30	28	20	25	25	30	20	24	22	29	15

(c)   For 50 students of a class the regression equation of   **4**
marks in statistics (x) on the marks in Research
Methodology (y) is 3y–5x+180=0. The mean marks of
Research Methodology is 44 and variance of marks in
statistics is 9/16th of the variance of marks in Research
Methodology. Find the mean marks of statistics and the
coefficient between marks in two subjects.

(d)   In order to find the correlation between two variables   **4**
x and y from 12 paris of observations, the following
calculations were made.

$$\sum x = 30, \ \sum x^2 = 670, \ \sum y = 5, \ \sum y^2 = 285, \ \sum xy = 344$$

On subsequent verification it was discovered that the
pair (x=11, y=4) was copied wrongly, the correct values
being (x=10, y=14). After making necessary correlation,

Find

(a)   The two regression coefficients

(b)   The two regression equations

(c)   The correlation coefficient.

4   (a)   State the meaning and objectives of sampling.   **2**

      (b)   A production manager claims that only 4% of the   **4** goods produced are defective. In a random sample of a batch of 600 units 36 units are found to be defective. Test the claim of production manager at 5% level of significance.

      (c)   A group of 5 patients treated with medicine x weight   **4** 42, 39, 48, 60, 41 kg. A second group of 5 patients treated with medicine B weight 38, 42, 48, 67, 40 kg. Do the two medicines differ significantly with regard to their effect in decreasing weight?

      (d)   In an infantile paralysis 500 persons contracted the   **4** disease. 300 received no serum treatment and of these 75 became paralysed. Of those who did receive serum treatment 65 became paralysed. Was the serum treatment effective ?

OR

4   (a)   Define level of significance and degrees of freedom.   **2**

      (b)   The following table gives the yield on 15 fields under   **4** three varieties of seeds A, B, C. Test at 5% level of significance.

A	19000	19200	19600	18200	19000
B	18600	19600	18400	20000	18000
C	20000	20600	19400	20600	21400

      (c)   A study was conducted to test the effects of growth   **4** hormone on the rate of growth of 10 children. Growth rates were measured before and after the subjects were given growth hormone three times a week for an year. Based on the data given below, does the sample show a significance difference in the growth rate.

Subject	1	2	3	4	5	6	7	8	9	10
Before treatment	3.4	3.6	4.8	3.4	4.8	5.8	4.2	5.7	4.1	4.3
After treatment	4.5	5.2	6.5	5.2	7.4	8.9	8.4	8.5	7.5	8.2

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(d) A sample analysis of examination results of 500 students was made. It was found that 220 students had failed, 170 had secured a third class, 90 were placed in second class and 20 got a first class. Are these figures commensurate with the general examination result which is in the ratio of 4:3:2:1 for the various categories respectively ? **4**

5 (a) Write a note on maximin and MinMin criteria. **4**

(b) Fit a second degree parabola for the following data. **5**

Year	2000	2001	2002	2003	2004
Production	8	12	15	7	8

(c) The data given below gives the number of defects observed in an inspection of 15 FM radios. **5**

Draw a suitable control charts and state your conclusion.

No. of defects : 2, 5, 1, 0, 2, 0, 6, 7, 6, 3, 2, 0, 0, 1, 1

OR

5 (a) Explain expected monetary value. **4**

(b) The units of the population are 21, 21, 23, 24, 25 take the sample of size 2 WOR from the above population and check the following results. **5**

(i) $E(\bar{y}) = \bar{y}$

(ii) $E(s^2) = S^2$

(iii) $V(\bar{y}) = \left(\dfrac{N-n}{n}\right) S^2$

(c) Following data relate to sales of Tulsian Ltd. Fit   **5** a straight line trend by the method of least squares and tabulate the trend values. Estimate the likely sales for the year 2006.

Year	2000	2001	2002	2003	2004	2005
Sales	10	20	30	56	40	60

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