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SB-1374

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

March / April – 2011

Quantitative Methods - II

Time : **3** Hours] [Total Marks : **70**

Instructions :

(1)

નીચે દર્શાવેલ ☛ નિશાનીવાળી વિગતો ઉત્તરવહી પર અવશ્ય લખવી.
Fillup strictly the details of ☛ signs on your answer book.

Name of the Examination :

☛ **S. Y. B. B. A. (Sem. 3)**

Name of the Subject :

☛ **Quantitative Methods - 2**

☛ Subject Code No. : **1 3 7 4** ☛ Section No. (1, 2,.....) : **Nil**

Seat No. :

Student's Signature

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

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

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

1 Answer the following questions : **14**

(i) In a binomial distribution with n=5, p(x=2) = 0.2048 and p(x=3) = 0.0512 find value of p.

(ii) The probable error of the correlation co-efficient of 16 pairs of values is 0.085. Find the value of the correlation coefficient.

(iii) A sample of size 16 from a normal population gave $\bar{x}$ = 48.5 and $\sum(x_i - \bar{x})^2 = 240$ Test the hypothesis $H_0 : \sigma^2 = 25$.

(iv) If the monthly trend equation is y = 50 + 6x then find annual trend equation.

(v) The values of mean and standard deviation of a production process are 0.0523 and 0.0032 cm. respectively. If 4 units are taken in each sample during the inspection of 10 samples, find the control limits of $\bar{X}$-chart.

(vi) 100 observations of a sample gave the mean and s.d. as 30 and 30 respectively. Test the hypothesis that the mean of the population may be atleast 31.2.

(vii) Define Mathematical Expectation.

2 (a) Give properties of Binomial Distribution. **2**

(b) A group consists of 7 men and some women. The probability of selecting 2 women from them is 1/15. Find the number of women in the group. **4**

(c) There are two defective pencils in a pack of dozen pencils. If three pencils are taken at random, find the probabilities that (i) at the most one pencil is defective (ii) two pencils are defective. **4**

(d) 5 per cent of the observations of a normal distribution are less than 12 and 40 per cent are less than 36. Find mean and S.D. of the distribution. **4**

OR

2 (a) Define probability mass function. **2**

(b) There are 2 white and 4 black balls in a box. A person takes 3 balls at random from the box. If he receives Rs. 10 for each white ball and receives Rs. 5 for each black ball, find the expected value of the amount received by him. **2**

(c) In the manufacturing of cotter pins it is known that 5% of the pins are defective. The pins are sold in boxes of 100 and it is guaranteed that not more than 4 pins will be defective in a box. What is the probability that a box will meet this guarantee. **4**

(d) The distribution of marks of the students in a class is normal with mean 20 and S.D. 5. The number of students getting more than 25 marks is 50. Estimate the number of students of that class. **4**

3 (a) State merits and limitations of Karl Pearson's coefficient of correlation. **2**

(b) In the following data the proportion of water (x) and yield (y) are shown. From this, find r by product moment method. **4**

Proportion of water (x)	12	18	24	30	36	42	48
Yield (y)	51	57	62	70	80	86	84

(c) The equations of two regression lines are $16x - 4y + 160 = 0$ and $15x - 2y - 95 = 0$. The standard deviation of y is 12. Find mean of x and y, regression coefficients and S.D. of x. **4**

(d) The observations of the population are 10, 14, 20, 36. Take all possible samples of size 2 with replacement from the population and verify the following results : **4**

(i) $E(\bar{y}) = \bar{y}$ (ii) $V(\bar{y}) = \sigma^2/n$.

OR

3 (a) Give properties of regression coefficients. **2**

(b) The ranks in Statistics and Accountancy of 10 students are given in brackets. Find the rank correlation coefficient. **4**

(8,3) (1,5) (6,2) (3,9) (2,10) (5,1) (4,6) (10,4) (9,7) (7,8)

(c) Find the regression equations between x and y and estimate y for x=50. **4**

Height (x)	48	49	50	51	52	53	54	55	56
Weight (y)	98	100	88	102	95	125	120	110	125

(d) For studying some characteristic of a population observations of the population are 5,9,11,19. Taking all possible samples of size 2 without replacement from this population verify the following results : **4**

(i) $E(\bar{y}) = \bar{y}$ (ii) $V(\bar{y}) = \left(\frac{N-n}{N}\right)\frac{S^2}{n}$

(iii) $E(s^2) = S^2$.

4 (a) Define Critical Region. **2**

(b) A group of 10 students selected at random were treated to find out how many digits they could repeat from memory after hearing them once. They were given practice for a ten days period and were then tested. Data is given below. Is the difference between the performances of 10 students at the two tests significant ? **4**

Students	1	2	3	4	5	6	7	8	9	10
Test – I	6	5	4	7	8	6	7	5	8	8
Test – II	7	7	6	8	9	6	9	7	8	10

(c) Two random samples are taken from two Normal Population. From the following data test the hypothesis that "variances of both the populations are same." **4**

Sample I	22	28	35	25	25	
Sample II	42	38	30	35	28	37

(d) Sample of respondents classified by social class and political thinking and is tabulated as given below. Test whether the political thinking is associated with social class :

Political Thinking	***Social Class***		
	Poor	***Medium***	***Elite***
Socialist	24	66	10
Communist	34	24	16
Capitalist	40	38	40

OR

4 (a) Define degrees of freedom. **2**

(b) The marketing Research Department by ABC company used a national telephone survey of 4750 housewives and found that 238 purchased extra spicy brand. A similar study made 2 years ago showed the perception of housewives who said that they purchased the brand was 4 per cent should the company conclude that there is an increased interest in the extra-spicy ? **4**

(c) ABC Gym. conducting a weight reduction programme, claims that participant in their programme achieve a weight reduction of at least 5 kgs after for weeks of the programme. A sample of 10 such participant was selected for ran enquiry. On the basis of this sample evidence can the claim of ABC Gym. on weight reduction be sustained ? **4**

Before	86	92	100	93	88	80	88	92	95	106
After	77	84	92	87	80	74	80	85	95	96

(d) To see the analytical capability of students of XYZ city common test in Mathematics was conducted to a number of boys taken at random from the fifth class of each of the four schools in a city. The results are given below. Is there any significant in the means performance of schools ? **4**

Schools

A	*B*	*C*	*D*
8	12	18	13
10	11	12	9
12	9	16	12
8	14	6	16
7	4	8	15

5 (a) Explain payoff matrix. 4

(b) Estimate the sale for the year 2009 from the following data by fitting straight line : 5

Year	2002	2003	2004	2005	2006	2007	2008
Sale	120	128	130	135	145	151	157

(c) R. Food Company puts mango juice into cans advertised as containing 100 ml juice. The weights of juice drained from can immediately after filling for 12 samples are taken by a random. Each of the samples included 4 cans. The samples are shown below. The weights given below are in excess of 100 ml. Construct mean chart and Range chart to control the weights of mango juice for the filling cans. 5

Samples	*Weight of each can*			
1	15	12	13	20
2	10	8	8	14
3	12	17	11	12
4	8	15	17	10
5	18	13	15	4
6	20	16	14	20
7	15	19	23	17
8	13	23	14	16
9	9	8	18	5
10	6	10	14	20
11	5	12	20	15
12	3	15	18	18

5 (a) Explain Decision Tree. 4

(b) For data-given below compute a second degree parabolic trend. Also estimate the population for 2011 : 5

Year	1911	1921	1931	1941	1951	1961	1971	1981	1991	2001
Population	238	253	256	279	320	366	440	560	670	860

(c) Construct P-chart for the following data and comment. **5**

Pr*oductionOrder*	1	2	3	4	5	6	7	8	9	10
No.of defectives	23	15	17	15	41	0	25	31	29	0
Lot Size	200	200	200	200	200	200	200	200	200	200