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KA-3557

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

October / November – 2012

Quantitative Methods - III

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) (CBCS)

Name of the Subject :

☛ QUANTITATIVE METHODS-3

☛ Subject Code No. : 3 5 5 7 ☛ Section No. (1, 2,.....) : Nil

Seat No. :

Student's Signature

(2) Use of simple calculator is allowed.

(3) Statistical tables will be provided on request.

(4) Indicate your options clearly.

1 Answer the following questions : **10**

(a) For 10 pairs of observations $\sum d^2 = 200$, then find the value of coefficient of correlation.

(b) In a random sample of size 28, $b_{xy} = -1.5$ and $S_y^2 / S_x^2 = 0.25$ find b_{yx}.

(c) The following forecasting equation has been derived by a least squares method; $y = 10.27 + 1.65x$

(Base year; 1997, x = year,, y = tonnes/yr)

Rewrite the equation by shifting the origin to 2002.

(d) If A and B are mutually exclusive and exhaustive events and if $2P(A) = P(B) = K$ then find the value of K.

(e) The mean of a normal distribution is 900 and 16% of the total values are greater than 1000, then obtain the value of S.D.

2 (a) Compute Karl Pearson's coefficient of correlation in the following series relating to cost of living and wages. Also calculate probable error : **6**

Wages (Rs.) :	100	101	103	102	100	99	97	98	96	95
Cost of living :	98	99	99	97	95	92	95	94	90	91

(b) The coefficient of rank correlation of the marks obtained by 10 students in two particular subjects was found to be 0.5. It was later discovered that the difference in ranks in two subjects obtained by one of the students was wrongly taken as 3 instead of 7. What should be the correct value of coefficient of rank correlation ? **6**

OR

2 (a) In order to find the correlation coefficient between two variables X and Y from 12 pairs of observations, the following calculations we mode : **6**

$$\sum X = 30, \sum Y = 5, \sum X^2 = 670, \sum Y^2 = 285, \sum XY = 334$$

On subsequent verification it was found that the pair $(X = 11, Y = 4)$ was copied wrongly, the correct value being $(X = 10, Y = 14)$. Find the correct value of correlation coefficient.

(b) The following data relate to the marks obtained by 10 students of a class in statistics and costing : **6**

Marks in Statistics :	30	38	28	27	28	23	30	33	28	35
Marks in Costing :	29	27	22	29	20	29	18	21	27	22

Obtain the rank correlation coefficient.

3 (a) From the data given below find the two regression equations also obtain the most likely marks in Statistics when marks in Economics are 30 : **6**

Marks in Economics :	25	28	35	32	31	36	29	38	34	32
Marks in Statistics :	43	46	49	41	36	32	31	30	33	39

(b) The equations of regression lines are **6**

$2x - 5y + 40 = 0$ and $10x - 9y = 120$.

Obtain $\bar{x}, \bar{y}$ and 'r' also find estimate of x when y = 40 and estimate of y when x = 60.

OR

3 (a) Following is the distribution of students according to their height and weight : **6**

Height (y) (in inches)	Weight (in lbs) (x)			
	90-100	100-110	110-120	120-130
50-55	4	7	5	2
55-60	6	10	7	4
60-65	6	12	10	7
65-70	3	8	6	3

Obtain two lines of regression and estimate the weight of student whose height is 58" and the height of student whose weight is 115 lbs.

(b) Regression of Savings (S) of a family on income (Y) may be expressed as $S = a + \frac{y}{m}$ where a and m are constants. In a random sample of 100 families, the variance of savings is one-quarter of the variance of incomes and the correlation coefficient is found to be 0.4. Obtain the value of m. **6**

4 (a) Following data are regarding production volume (in '000 tonnes) for a product. Use these data to compute a 3-year moving average for all available years. Also determine short term error : **6**

Year :	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Production (in '000 tonnes)	21	22	23	25	24	22	25	26	27	26

(b) A company that specializes in the production of petrol filters has recorded the following production (in '000 units) over last 7 years : **6**

Years :	1995	1996	1997	1998	1999	2000	2001
Production :	42	49	62	75	92	122	158

Develop a second-degree parabolic equation that best describes these data. Estimate the production for year 2005.

OR

4 (a) Assume a four year cycle and calculate trend by the method of moving average from the following data relating to the production of tea in India. Also calculate short term error : **6**

Year :	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
Production : (million lbs)	464	515	518	467	502	540	557	571	586	612

(b) Fit a straight line trend by the method of least squares to the following data. Assuming that the same rate of change continues, what would be the predicted earning (Rs. in lakh) for the year 2004 ? **6**

Year :	1995	1996	1997	1998	1999	2000	2001	2002
Earning :	38	40	65	72	69	60	87	95

5 (a) From a computer tally based on employer records, the personnel manager of a large manufacturing firm find that 15 percent of the firm's employees are supervisors and 25 percent of the firm's employees are college graduates. He also discovers that 5 percent are both supervisors and college graduates. Suppose an employee is selected at random from the firm's personnel records. What is the probability of : **6**

(i) Selecting a person who is both a college graduate and a supervisor ?

(ii) Selecting a person who is neither a supervisor nor a college graduate ?

(b) A person tosses three coins simultaneously. 6
He gets Rs. 8 if three heads appear, Rs. 4 if two heads appear and Rs. 2 if one head appears. What penalty should be charged if no head appears in order that game is fair ?

OR

5 (a) The data for the promotion and academic qualification of a company is given below : 6

	Academic qualification		
Promotional Status	MBA (A)	Non-MBA ( )	Total
Promoted (B)	0.14	0.26	0.40
Non-promoted ( )	0.21	0.39	0.60
Total	0.35	0.65	1.00

(i) Calculate the conditional probability of promotion after an MBA has been identified

(ii) Calculate the conditional probability that if is an MBA when a promoted employee has been chosen.

(iii) Find the probability that a promoted employee was an MBA.

(b) The probability distribution of a random variable x is as follows : 6

x_i :	–2	–1	0	1	2
$p(x_i)$:	0.15	0.30	0.30	0.15	0.10

Find $E(x+1)^2$ and $V(3x+1)$.

6 (a) A brokerage survey reports that 30 percent of individual investors have used a discount broker i.e. one which does not charge the full commission. In a random sample of 9 individuals, what is the probability that : 6

(i) Exactly two of the sampled individuals have used a discount broker ?

(ii) At least three of them have used a discount broker.

(b) The income of a group of 10,000 persons was found to be normally distributed with mean Rs. 1750 p.m. and standard deviation Rs. 50. Show that of this group 95% had income exceeding Rs. 1668 and only 5% had income exceeding Rs. 1832 what was the lowest income among richest 100 ? **6**

OR

6 (a) A manufacturer who produces medicine bottles, finds that 0.1 percent of the bottles are defective. The bottles are packed in boxes containing 500 bottles. A drug manufacturer buys 100 boxes from the producer of bottles. Using Poisson distribution, find how many boxes will contain : **6**

(i) No defectives

(ii) At least two defectives.

(b) In an examination 15% of the candidates got first class (60% marks or above) while 40% fails (securing below 40%). Assuming the marks to be normally distributed, find mean and standard deviation of marks. **6**
