253405

Seat No._____

Second Year B. B. A. Examination

April / May – 2003

Business Statistics

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

Instructions : (1) Figures to the **right** indicate marks of that question.

(2) Use of **simple** calculator only is allowed.

(3) Graph papers will be **supplied** on request.

(4) Necessary statistical values are given at the end of **Q.5**.

1 (a) It is 1 : 4 against *Chaterjee* solving a problem and it is 3 : 2 in favour of *Banerjee* solving the same problem. **4**

(i) What is the probability that problem will be solved ?

(ii) If it is known that problem is solved, what is the probability that it is solved by *Banerjee* ?

(b) In an army battalion 60% of soldiers are known to be married and remaining unmarried. If there are 500 rows each containing 5 soldiers, find out expected number of rows containing : **5**

(i) All unmarried soldiers

(ii) At least one married soldier.

(c) The average number of units produced by a factory per day is 355 with a standard deviation of 50. The factory makes a profit of Rs.1.50 per unit. Determine the percentage of days when its total profit per day is **5**

(i) between Rs.457.50 and Rs.645

(ii) Greater than Rs.682.50

(Assume the distribution to be normal)

OR

1 (a) If a defective machine is installed, it costs Rs.15000 to repair the damage resulting to machine. It costs Rs.600 to test a machine before installation. Is it more profitable to install machine without testing if it is known that 5% of all the machines produced are defective ? Justify your answer. **4**

(b) The number of telephone calls at the telebanking department of a bank follows Poisson distribution at an average rate of 4 calls per 5 minutes. The operator leaves for a 5 minutes tea-break. Find the probability that : **5**

(i) at the most two calls go unanswered

(ii) three calls go unanswered.

(c) (i) Give the mathematical form of normal probability distribution. **3**

(ii) Find the mean and standard deviation from the following normal distribution function : **2**

$$f(x) = \sqrt{\left(\frac{2}{\pi}\right)} \cdot e^{-2(x-3)^2}$$

2 (a) (i) If it is known that two regression lines are perpendicular to each other, what will be the value of correlation coefficient γ ? Also find equations of both regression lines for such value of γ ? **3**

(ii) Is it possible to have $\gamma = 1 - \frac{580}{500}$? **2**

(b) It is known that both the regression lines pass through the point (2, 3). Further it is given that coefficient of determination is 0.0576, $b_{yx} = -0.4$ and variance of $y = 9$ **5**

(i) Estimate x when $y = 10$

(ii) Variance of x.

(c) $\gamma_{12} = 0.30 \quad \gamma_{23} = 0.45 \quad \gamma_{13} = 0.50$. **4**

Obtain

(i) $\gamma_{32.1}$

(ii) $R_{1.32}$

OR

2 (a) (i) If two regression lines coincide each other and $b_{xy} = -0.75$, find γ and b_{yx}. **2**

(ii) If probable error of γ based on 36 observations is 0.027 find γ and coefficient of determination. **2**

(b) **6**

Advt. Exp (y) (Rs. in '000)	**Sales Revenue *X* (Rs. in Lakhs)**			
	1-3	**3-5**	**5-7**	**7-9**
70–80	2	–	2	–
80–90	3	2	1	–
90–100	–	1	1	3

(i) Obtain Regression line of Sales Revenue on Advertisement Expenditure.

(ii) Estimate Sales Revenue when Advertisement Expenditure is Rs.1,20,000.

(c) $\gamma_{23} = \gamma_{12} = 0.35 \quad \gamma_{13} = 0.40$

$S_1 = 3 \qquad 3S_2 = 4S_3 = 12$

Obtain multiple regression line of X_2 on X_1 and X_3.

3 (a) The *Decora Paints Ltd.* is into the dealing of the paint which is used for automobiles. Annual demand for such paints is 50,000 litres and the paint cost Rs.20 per litre. Annual carrying costs are 15% of the value of paint held. Each order costs Rs.80. **4**

Determine :

(i) How much paint should be ordered each time ?

(ii) How often should the paint be ordered ?

(iii) Time between two consecutive orders

(Assume 1 year = 360 days)

(iv) Total annual inventory cost of this policy.

(b) (i) Name the probability distribution that are used in costruction of R-chart and p-chart. **2**

(ii) Draw an appropriate control chart and state your conclusions from the following data : **4**

Day	1	2	3	4	5	6	7	8	9	10
No.of customer complaints	4	3	0	2	8	1	3	5	2	2

(c) For a single sampling plan (500, 10, 2) obtain : **4**
(i) Producer's risk when AQL = 1%
(ii) AOQ and ATI when p' = 2%

OR

3 (a) Explain following terms : **4**
(i) Consumer's Risk
(ii) *O.C.*Curve
(iii) Acceptance Sampling
(iv) AOQ.

(b) 10 samples each of size 6 are drawn from a production process. Draw $\overline{X}$ and R chart and state your conclusions : **6**

Sample No.	1	2	3	4	5	6	7	8	9	10
$\overline{X}$	10.1	12.3	10.0	11.2	12.4	10.8	10.0	12.1	12.0	11.5
R	2.4	2.8	2.0	1.9	2.0	2.3	2.5	2.0	2.4	2.6

(c) A manufacturing company uses an EOQ approach in planning its production for dolls. Following information is available. Annual demand is 60,000 dolls. Cost of each doll is Rs.20. Set up (ordering) costs are Rs.4000 per set up and inventory carrying cost per month is 2% of inventory value. When in production, dolls can be produced at the rate of 400 dolls per day and the company works for 300 days in a year. Determine : **4**

(i) Economic lot size

(ii) Total annual inventory cost

(iii) Optimum no. of production runs

(iv) Optimum manufacturing time in days.

4 (a) Out of a cosignment of 10,000 tennis balls, 400 were selected at random and after examining them 20 were found defective. **4**

(i) Construct 99% confidence interval for the proportion of defective balls.

(ii) How many defective balls can you expect in the consignment at 99% level of confidence ?

(b) Two batches of the same product are tested for their average life. Assuming that the lives of the product follow normal distribution, test the hypothesis that average life is same for both the batches at 5% level of significance. You are given following information : **4**

Batch	Sample Size	Average life (in hrs)	Standard Deviation
I	12	1050	68
II	10	980	74

(c) You are given the following data relating to number of prepaid cards sold by four salesmen in three months : **6**

Month	Salesman			
	X	Y	Z	W
April	50	40	48	39
May	46	48	50	45
June	39	44	40	39

Construct two-way *ANOVA* table for the above data. Clearly mention hypothesis as well as your conclusions. (Take $\alpha = 5\%$)

OR

4 (a) A population with 800 units is divided into three strata of size 200, 500 and 100 respectively. The variances of these strata are 25, 4 and 9 respectively. If 25% sample is to be taken under optimum allocation, find $V(\bar{y}_{st})_{optm}$. **4**

(b) An ice-cream parlour wants to estimate aveage no. of cups sold each day. A random sample of 36 days showed standard deviation of 53 cups per day. How large a sample should be taken to be 95% confident that the sample mean is within 5 cups of population mean ? **4**

(c) A survey was conducted regarding the popularity of the serial "Kahani Ghar Ghar Ki" amongst the wives and husbands of Ahmedabad. In a sample of 120 wives, 80 liked the serial while in a sample of 100 husbands, 35 disliked the serial. Test the hypothesis that "Kahani Ghar Ghar Ki" is more popular amongst the wives than the husbands of Ahmedabad. (Take $\alpha = 5\%$) **6**

5 (a) What is Time Series ? Explain various components of Time-Series in brief **4**

(b) Fit a parabolic trend equation to the following data. Also estimate production for the year 2004 :

Year	1999	2000	2001	2002	2003
Production (Rs. in Lakhs)	38	42	36	44	46

(c) From the following data obtain index number using family budget method : **4**

Commodity	**Index**	**Weight**
A	110	15
B	125	20
C	228	5
D	165	42
E	190	18

OR

5 (a) Estimate Trend for the following data using three yearly moving average method : **6**

Year	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Sales	40	48	62	59	45	57	65	68	62	58

(b) A particular consumer price index number consists of five groups of items namely food, clothing, fuel, house rent and miscellaneous. Between 1995 to 2000; the index rose from 180 to 225. Over the same period of time the price index numbers of various groups changed as follows : **8**

Food from 198 to 252; Clothing from 185 to 205; Fuel from 175 to 195; House Rent remain unchanged at 150, Miscellaneous from 138 to 212.
If it is given that weights of clothing, house rent and fuel are equal, determine the weights of individual group of items.

STATISTICAL VALUES

Area under *SNC* between

$Z = 0$	to	$Z = 1.0$	=	0.3413
$Z = 0$	to	$Z = 1.5$	=	0.4332
$Z = 0$	to	$Z = 2.0$	=	0.4772
$Z = 0$	to	$Z = 2.05$	=	0.4798
$Z = 0$	to	$Z = 5.80$	=	0.4998
$Z = 0$	to	$Z = 6.55$	=	0.4999

$e^{-0.1} = 0.9048$	$e^{-4} = 0.01832$
$e^{-0.2} = 0.8187$	$e^{-5} = 0.006738$
$e^{-0.4} = 0.6703$	$e^{-8} = 0.00300$
$e^{-0.8} = 0.4493$	$e^{-10} = 0.000045$

For $n = 10$ $A_2 = 0.31$ $D_3 = 0.22$ $D_4 = 1.78$
$n = 6$ $A_2 = 0.48$ $D_3 = 0$ $D_4 = 2.01$

$t_{9,0.05} = 2.262$

$t_{11,0.05} = 2.201$

$t_{20,0.05} = 2.086$

$t_{21,\,0.05} = 2.080$

$t_{22,\,0.05} = 2.074$

$F_{(2,6)}^{0.05} = 5.14$ $\qquad$ $F_{(2,7)}^{0.05} = 4.74$

$F_{(3,\,6)}^{0.05} = 4.76$ $\qquad$ $F_{(3,\,7)}^{0.05} = 4.35$

$F(6,\,2)^{0.05} = 19.33$ $\qquad$ $F_{(7,\,2)}^{0.05} = 19.34$

$F_{(6,\,3)}^{0.05} = 8.94$ $\qquad$ $F_{(7,\,3)}^{0.05} = 8.90$
