Total No. of Questions :6] **SEAT No. :**

P4019 **[Total No. of Pages : 4**

[5070]-104
M.B.A.
104:STATISTICAL AND QUANTITATIVE METHODS
(2008 Pattern) (Semester-I)

Time : 3 Hours] ***[Max. Marks :70***

Instructions to the candidates:

1) ***Solve any two questions from section I and any Two questions from section II.***
2) ***Use of electronic calculator and statistical tables are allowed.***
3) ***Graph paper will be supplied on request.***
4) ***Figures to the right indicate marks.***

SECTION-I

Q1) a) The following table gives the frequency distribution of the weights of 100 articles in a consignment:

Weight (in gm)	200-240	150-290	300-340	350-390	400-440	450-490	500-540	550-590	600-640
No. of articles	4	5	12	23	31	10	8	5	2

Draw the 'histogram' and ' more than o give' curve for it and estimate the median and mode from the graphs. **[6]**

b) Find the Karl Pearson's correlation coefficient between the age and playing habit from the following student record:

Age (in years)	15	16	17	18	19	20
No. of students	250	200	150	120	100	80
Regular players	200	150	90	48	30	12

Also calculate the probable error and point out if the coefficient of correlation is significant. **[6]**

c) In a sample of 500 children, 200 came from higher income group and rest from the lower income group. The number of intelligent children in these groups respectively were 25 and 100. Calculate the coefficient of association between intelligence and economic status and comment on the result. **[6]**

P.T.O.

Q2) a) The table below gives the employee strength in the companies located in a small IT park. Find the mean number of employees in a company and its standard deviation. Also, estimate the coefficient of variation for the data.

Employee Strength	00-10	10-20	20-30	30-40	40-50	50-60	60-70
No. of companies	10	15	25	25	10	10	5

[6]

b) Find out the two regression lines for the following data about the usage of fertilizer (in quintals) and the productivity (in metric tons)

	Arithmetic mean	Std. Deviation
Fertilizer used	35.6	10.5
productivity	84.8	8.5

Correlation coefficient, r =0.62

Estimate the productivity if the amount of fertilizer used is 30 quintals.How much standard error can you expect in these estimates? **[6]**

c) A company has two plants to manufacture scooters which are then trasported to the central distribution centre. Plant I manufactures 80 percent of the scooters and plant II manufactures 20 percent. At plant I, 85 out of 100 scooters are rated standard quality or better. At plant II, only 65 out of 100 scooters are rated standard quality or better.

i) What is the probability that a scooter selected at random at the distribution centre is of standard quality or better?

ii) What is the probability that a scooter selected at random at the distribution centre come from plant I, if it is known that the scooter is of standard quality or better? **[6]**

Q3) a) A machine produces an average of 20% defective bolts. A batch is accepted if a sample of 5 bolts taken from that batch contains no defectives and is rejected if the sample contains 3 or more defectives. In other cases, a second sample is taken for inspection. What is the probability that a second sample is required? **[6]**

b) In a trivariate distribution, $\sigma_1 = 2$, $\sigma_2 = \sigma_3 = 3$, $r_{12}=0.7$, $r_{23} = r_{31} = 0.5$. Find the coefficients: $r_{23.1}$, $R_{2.13}$ and $b_{12.3}$. **[6]**

c) Write a note on: **[6]**

Measures of Dispersion

OR

Association of Attributes.

SECTION-II

Q4) a) A company has three factories which supply their products to four warehouses. Monthly capacity of the factories are 120,200 and 180 units respectively. Monthly requirements of the warehouses are 100,140,110 and 150 respectively.Unit shipping costs are as follows:

Factories	Warehouses			
	P	Q	R	S
A	15	–	30	20
B	–	24	12	15
C	15	15	–	20

Shipments from A to Q, B to P and C to R are not possible due to certain unavoidable reasons. Find the optimum distribution program to minimise the total shipping cost. Give alternate solutions if any. **[9]**

b) Patients arrive at a clinic according to Poisson distribution at the rate of 8 patients per hour. The examination time per patient is exponential with mean of 5 minutes.

i) What is the probability that a new arriving patient does not have to wait?

ii) What is the average number of patients waiting to get themselves examined?

iii) What is the average time spent by a patient in the clinic?

iv) What is the average number of waiting patients in a non-empty queue? **[8]**

Q5) a) A newspaper vendor has to decide how many copies of a particular magazine he should buy for the comming month. Each magazine costs him Rs. 5. Which he sells for Rs10. At the end of the month the unsold magazines are thrown away. The demand distribution of the magazines is as follows.

No. of copies demanded : 10 11 12

Probability : $\frac{1}{3}$ $\frac{1}{3}$ $\frac{1}{3}$

Construct a pay off-table. Use maximin and Hurwitz criteria (with α=0.6) to decide the number of copies he should stock. Which number of copies will maximise the expected pay off. **[9]**

b) Adepartment head has an assignment consisting of three tasks to be performed with four subordinates. The subordinates differ in efficiency. The estimates of time in hours each subordinate would take to perform the tasks is given below in the matrix. How should he allocate the tasks to each subordinate so as to minimise the total labour cost at an estimated rate of Rs. 10 per man hours required to complete the tasks. What is the total labour cost? Also state which subordinate will remain idle. **[8]**

	Tasks		
Subordinates	X	Y	Z
A	10	21	16
B	14	28	7
C	36	27	16
D	19	31	21

Q6) a) The pay-off table for a zero sum game between A and B is shown below, where A is playing to maximise his pay off. Solve the game for the optimal strategies of the two players and for the value of the game.

		Player B			
		B_1	B_2	B_3	B_4
Player A	A_1	150	–18	78	90
	A_2	6	102	54	70
	A_3	130	–30	78	80

[9]

b) A market-survey is made on three brands of break-fast foods. Dawn, Sky and Zing. Every month a customer purchases a new package, he may buy the same brand or switch to another. The following estimates of the shifts (in percentage) are obtained.

		Next Brand		
		Dawn	Sky	Zing
Persent Brand	Dawn	70	20	10
	Sky	30	50	20
	Zing	30	30	40

[8]

At this time it is estimated that 30% of customers buy Dawn, 20% buy Sky and 50% buy Zing.

i) Construct first and second step transition matrix.

ii) What will be the distribution of the customers one and two months later?

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