XW-104

April-2013

Five Year MBA Integrated (K.S.)

IV MBA

Quantitative Techniques for Management-II

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

1. Answer any **two** :   **7 + 7 = 14**
   (a) What is a business research ? With the help of example explain its utility.
   (b) Explain the criterion to identify a good research design. What is the need of research design.
   (c) Explain different attitude scales.

2. Answer any **two** :   **7 + 7 = 14**
   (a) A job shop has a capacity of 50 hours normal time production and 20 hours of overtime production every week. The jobs have to be processed on three machines A, B and C in the same order. The shop floor supervisor has been using First in First out method and taking the jobs for manufacturing in the serial order. A new job has been received by the organisation which is very profitable, but supervisor is of the opinion that there is no surplus capacity available. The new job would take seven, two and six hours on A, B, C respectively processing time of other jobs in hours are given below. Do you support supervisors observation. Justify your answer.

Job → Machines ↓	J_1	J_2	J_2	J_4	J_5	J_6	J_7
A	9	10	8	6	9	10	5
B	2	2	1	3	3	2	4
C	8	7	6	6	4	1	5

   (b) A stockist of a perishable commodity, wants to determine the quantity of the commodity he should stock to meet the demand. He prefers to sell the commodity in a multiple of five. From his past experience he knows minimum demand is 10 units and maximum is 50 units. When he analysis the past record of 200 days he finds the following demand pattern :

Number of commodity required	:	10	15	20	25	30	35	40	45	50
Number of days demand occur	:	4	6	15	25	60	40	25	15	10

   The cost of 5 commodity put together is ₹ 400, which he can sell for ₹ 500. Any unsold commodity lot is a net loss.
   (i) What action should the stockist take to maximize his profit.
   (ii) Determine EVIP, EPPI.

(c) For each of the following functions, determine whether the function is convex, concave or neither :

(i) $f(x) = 3x_1x_2 - x_1^2 - x_2^2$

(ii) $f(x) = 5x_1 + 10x_1^2 + 6x_2 + 2x_2^2 - 8x_1x_2$

(iii) $f(x) = x_1x_2$

3. (a) What is the general structure of queuing system ? Define different operating characteristics of queuing system. **7**

(b) A retailer takes orders through telephone. Only one line is available and if the line is busy, the next caller is put on hold. No callers on hold hang up over a long wait. On an average there are 15 calls per hours and on an average 3 minutes are required to service a customer. Arrival is poisson and service is exponentially distributed. An employee who takes order is paid ₹ 400 per hour and maintenance charge is ₹ 15 per hour for the telephone line. The company estimates that a minute a customer kept on hold costs company ₹ 20 for customer dissatisfaction and loss of future business. **7**

Estimate :

(i) The proportion of time that the line will be busy

(ii) The average time a customer will be on hold.

(iii) The average number of customers on line.

(iv) The total hourly cost of service and waiting.

<div align="center">OR</div>

(b) A bookstore wishes to carry a particular book in stock-demand is probabilistic and replenishment of stock takes 2 days (i.e. if order is placed on March 1, it will be delivered at the end of the day on March 3). The probabilities of demand are as follows :

Demand daily	0	1	2	3	4
Probability	0.05	0.10	0.30	0.45	0.10

Each time an order is placed, the store incurs an ordering cost ₹ 120 per order. The store also incurs a holding cost of ₹ 3 per book per day. The inventory holding cost is calculated on the basis of the stock at the end of each day. The manager of the bookstore wishes to compare two options for his inventory decision :

(i) Order five books when the inventory at the beginning of the day plus orders outstanding is less than eight books.

(ii) Order eight books when the inventory at the beginning of the day plus orders outstanding is less than eight books.

Currently (beginning of the 1st day) the store has a stock of eight books and six books ordered two days ago and the books are expected to arrive next day. Using Monte Carlo simulation for 10 days recommend which option the manager should choose.

The two digit random numbers are : 89, 34, 78, 63, 61, 81, 39, 16, 13, 73

4. Attempt any **two** :   7 + 7 = **14**

(a) The yearly repair cost of two machines A and B in rupees when time value of money is neglected are given below :

Year	1	2	3	4	5
Machine A	1800	1200	1400	1600	1800
Machine B	2800	2000	1400	1100	600

Find the cost pattern if the time value of money is 10% per year and hence find which machine is more economical.

(b) A computer contains 10,000 registors. When any registor fails, it is replaces. The cost of replacing a registor individually is ₹ 1. If all the registors are replaced at the same time, the cost per registor would be reduced to 35 paise. The percentage surviving at the end of the month t is given below :

Month	0	1	2	3	4	5	6
Percentage surviving	100	97	90	70	30	15	0

What is the optimum replacement plan ?

(c) Calculate the steady state probabilities from the information given below, presuming that the system is in state 1 at the beginning :

To → From ↓	A (State 1)	B (State 2)	C (State 3)
A (State 1)	.8	.2	.00
B (State 2)	.2	0.0	0.8
C (State 3)	.2	.2	.6

5. Attempt any **two** :   7 + 7 = **14**

(a) The data shown represent two random sample gathered from two populations. Is there sufficient evidence in the data to determine whether the values of population 1 are significantly larger than the values of population 2. Use Mann Whitney's u-test and $\alpha = 0.01$.

Sample 1	224	256	231	222	248	283	241	217	240	255	216		
Sample 2	203	218	229	230	211	230	209	223	219	236	227	208	214

(b) A firm has divided its marketing area into three zones. The firm has been collecting data regarding the sales and salesmen in each area over a number of years. The information is given below. For the next year the firm has only nine salesmen and the problem is to allocate these salesmen to the three zones so that the total sales is maximized. Solve the problem.

Number of Salesmen	Profit in zone		
	I	II	III
0	30	35	42
1	45	45	54
2	60	52	60
3	70	64	70
4	79	72	82
5	90	82	95
6	98	93	102
7	105	98	110
8	100	100	110
9	90	100	110

(c) A local bank wants to know about the type of people who use their ATM in a market area. Shop owners and local people of that area are classified as type A and type B are the shoppers. Following data shows the user of ATM by different types (A & B) on Friday evening. Test this sequence for randomness at the 0.05 level of significance.

BBBAAABAAAAABBBBABAAAABBAABBBBABBBBAAAAAABBB

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