Seat No. : _____

AP-119

April-2022

M.B.A., Sem.-VIII

Quantitative Techniques for Management – II

Time : 2 Hours] **[Max. Marks : 50**

Note :

(1) Non - Programmable scientific calculator can be used.
(2) Statistical tables and graphs will be providing on request.
(3) There are **two** sections.
(4) From Section - 1 attempt any **three** questions.
(5) From Section - 2 attempt any **eight** questions.

SECTION – I
(Attempt any three question)

1. Solve following : **14**

(A) Explain different costs associated with Inventory Management.

(B) A dealer supplies you the following information with regard to a product dealt in by him :

Annual Demand = 5000 units
Buying Cost = ₹ 250
Inventory Carrying Cost = ₹ 30 % per year
Price = ₹ 100 per unit

The dealer is considering the possibility of allowing some back orders to occur for the products. He has estimated that the annual cost of back-ordering the product will be ₹ 10 per unit.

(i) What would be the optimum number of the product he should buy in one lot ?
(ii) What quantity of the product should he allow to be back-ordered ?
(iii) How much additional cost will he have to incur on inventory if he does not permiting back - ordering ?

2. Solve following : **14**

(A) We have five jobs, each of which must go through the two machines A and B in the order A - B. Processing times in hours are given in the table below :

Job	**1**	**2**	**3**	**4**	**5**
Machine A	5	1	9	3	10
Machine B	2	6	7	8	4

Determine an optimal sequence for the five jobs that will minimize the total elapsed time. Also find out idle time of every machine.

(B) Crown Auto is trying to decide about the size of the plant to be built in Gujarat. Three alternatives of annual capacity, viz, (i) 10000 units, (ii) 20000 units and (iii) 30000 units are under consideration. Demand for the product is not known with certainty but the management has estimated the probabilities for 5 different levels of demand. The profit for each size of plant at different levels of demand is as follows :

Level of Demand	Probability	Profits (₹ in Lakhs) Build plant with capacity of 1		
		10000 units	20000 units	30000 units
Very High	0.15	– 4	–6	– 8
Light	0.30	1	0	– 2
Moderate	0.25	1	7	5
Low	0.20	1	7	11
Very Low	0.10	1	7	11

What plant capacity would you suggest to the management ? Also draw the decision - tree ?

3. Solve following : **14**

(A) In a super market the average arrival rate of customers is 5 every 30 minutes. The average time it takes to list and calculate the customer's purchases at the cash deck is 4.5 minutes and this time is exponentially distributed.

(i) How long will the customer expect to wait for service at the cash desk ?

(ii) What is the probability that the cashier's working ?

(B) A dentist schedules all his patients for 30 - minute's appointments. Some of the patients take more than 30 minutes some less, depending on the type of dental work to be done. The following summary shows the various categories of work, their probabilities and time actually needed to complete the work :

Category of Service	**Time Required (in Minutes)**	**Probability of Category**
Filling	45	0.40
Crown	60	0.15
Cleaning	15	0.15
Extraction	45	0.10
Check up	15	0.20

Simulate the dentist's clinic for four hours and determine the average waiting time for the patients as well as the idleness of the doctor. Assume that all the patients show up at the clinic at exactly their scheduled arrival time starting at 8:00 a.m. Use the following random numbers for handling the above problem:

40, 82, 11, 34, 25, 66, 17, 79.

4. Solve following : **14**

(A) The cost of a new machine is ₹ 5000. The maintenance cost of n^{th} year is given by $C_n = 500\ (n - 1)$; n = 1, 2, ... Suppose that the discount rate per year is 0.5. After how many years it will be economical to replace the machine by a new one ?

(B) Suppose there are two market products of brands A and B respectively. Let each of these two brands have exactly 50% of the total market in same period and let the market be of a fixed size. The transition matrix is given below :

	To A	To B
From A	0.9	0.1
From B	0.5	0.5

If the initial market share breakdown is 50% for each brand, then determine their market shares in the steady - state.

5. Solve following : **14**

(A) Ten workers were given on-the-job training with a view to shorten their assembly time for a certain mechanism. The results of the time (in minutes) and motion studies before and after the training programme are given below :

Worker	1	2	3	4	5	6	7	8	9	10
Before	61	62	55	62	59	74	62	57	64	62
After	59	63	52	54	59	70	67	65	59	71

Is there evidence that the training programme has shortened the average assembly time ?

(B) Samples have been taken from two branches of chain of stores. The samples relate to the daily turnover of both the branches. Is there any difference in turnover between the two branches ?

Branch 1	23500	25500	35500	19500	24400	24000	23600	25900	26000
Branch 2	24000	19800	22000	21500	24500				

Section - II

Attempt any Eight Questions : **[8]**

6. Answer the following :

(1) SIRO stand for

(a) Service In Random Order (b) Service In Random Organization

(c) Service In Run Order (d) Service In Running Organization

(2) Algorithm for solving sequencing problem is known as

(a) Johnson and Johnson algorithm (b) Johnson's algorithm

(c) Gantt's algorithm (d) Sequential algorithm

(3) The total cost of a piece of equipment over a given period of n years would equal

(a) Purchase Price × maintenance cost for n years + value of the asset after n years

(b) Purchase Price × maintenance cost for n years – value of the asset after n years

(c) Purchase Price + maintenance cost for n years + value of the asset after n years

(d) Purchase Price + maintenance cost for n years – value of the asset after n years

(4) When the time value of money is considered, the present value factors serve as

(a) random variables (b) weights

(c) costs (d) scrap value

(5) From the following distribution,

Week :	1	2	3	4	5
Probability of failure:	0.10	0.15	0.30	0.25	0.20

It can be said that for a group of 1000 bulbs, the number of bulbs expected to fail in the first week and second week are

(a) 100; 135 (b) 100; 250 (c) 100; 160 (d) 100;115

(6) A state *i* is said to be transient

(a) if there is a way to leave it, there is a way to return also

(b) if there is a way to leave it but it never returns to it

(c) if state *j* is reachable from state *i*, then *i* is reachable from *j*

(d) if transition begins in state *i* and ends in state *j*

(7) In a Markov Chain with three states, 1, 2 and 3, with given transition probability matrix, P, the probability that the system, presently in state 3, shall be in state 1, three periods from now, would be given by element

(a) 3, 1 of the Matrix P^3 (b) 3, 1 of the Matrix P

(c) 1, 3 of the Matrix P (d) 1, 3 of the Matrix P^3

(8) Which of the following is not a variable cost ?

(a) Ordering Cost (b) Holding Cost (c) Shortage Cost (d) Purchase Cost

(9) Which of the following cannot solve by Johnson's rule ?

(a) Processing n jobs through 2 machines

(b) Processing n jobs through 3 machines

(c) Processing n jobs through k machines

(d) Processing 2 jobs through k machines

(10) Which of the following Non Parametric test is used for comparing means among more than two samples

(a) Wilcoxon matched pair sign rank test

(b) Kruskal-Wallis Test

(c) Mann Whitney U test

(d) Kolmogorov Smirnov Test