

MASTER OF BUSINESS ADMINISTRATION (C.B.C.S.) (2016 COURSE)
M.B.A. Sem - III :SUMMER- 2022
SUBJECT : OPERATIONS RESEARCH

Day : Friday
 Date : 10/6/2022

S-15412-2022

Time : 10:00 AM-01:00 PM
 Max. Marks : 60

N.B.:

- 1) Answer ANY THREE questions from Section I. Each question carries 10 Marks
- 2) Answer ANY TWO questions from Section II. Each question carries 15 Marks.
- 3) Answers to Both the sections to be written in **SAME** answer books
- 4) Draw a labeled diagram WHEREVER necessary
- 5) Graph Papers will be provided if necessary.
- 6) Use of Non-Programmable scientific calculators is allowed.

SECTION - I

Q.1) Answer the following: (10 Marks X 1 = 10 Marks)

Differentiate between transportation problem and assignment problem.

Q.2) Answer the following: (10 Marks X 1 = 10 Marks)

Apply graphical method to solve the following LPP

$$\text{Maximise } Z = 5x_1 + 2x_2$$

Subject to, $2x_1 + 3x_2 \leq 150$

$$3x_1 \leq 150$$

$$5x_2 \leq 200$$

$$x_1, x_2 \geq 0$$

Q.3) Answer the following: (10 Marks X 1 = 10 Marks)

Draw the network for the data given below and compute: Critical path, Earliest and latest times for each activity, Total slack for each activity

Activity	A	B	C	D	E	F	G	H	I
Predecessor	--	--	--	A	B	C	D, E	B	H, F
Estimated time (weeks)	3	5	4	2	3	9	8	7	9

Q.4) Answer the following: (10 Marks X 1 = 10 Marks)

The Champ Toy store keeps stock of a popular brand of Toy. Weekly demand based on past experience indicates the following pattern

Weekly Demand	0	1	2	3	4	5
Probability	0.01	0.15	0.20	0.50	0.12	0.02

Consider the following sequence of random numbers:-

48, 68, 09, 51, 56, 70, 15, 34, 68, 19, 22, 90, 30, 41, 50. Using this sequence, simulate the demand for the next 15 weeks. Find out the stock situation, if the owner of the bakery decides to buy 30 toys every week. Also estimate the weekly average demand for the cakes on the basis of simulated data.

Q.5) Write short notes on the following: Attempt ANY TWO (5 Marks X 2 = 10 Marks)

- a) History of operations research
- b) Applications of Assignment Problems
- c) Time estimates in PERT

SECTION - II

Q.6) Answer the following: (15 Marks X 1 = 15 Marks)

A product is produced at four factories A, B, C and D and transported to four stores P, Q, R and S respectively. The transportation table is as follows:

Factory	Stores				Availability
	P	Q	R	S	
A	4	6	8	13	50
B	13	11	10	8	70
C	14	4	10	13	30
D	9	11	13	8	50
Requirement	25	35	105	20	

Determine the optimum transportation schedule so that the transportation cost is minimum. Is there any alternate solution? If yes, determine it.

Q.7) Answer the following: (15 Marks X 1 = 15 Marks)

The coach of a swimming team needs to assign swimmers to a 200-yard relay team (four swimmers, each swims 50 yards of one of the four strokes). Since most of the best swimmers are very fast in more than one stroke, it is not clear which swimmer should be assigned to each of the four strokes. The fastest swimmers and their best times (in seconds) they have achieved in each of the strokes (for 50 yards) are as follows

Swimmers	Backstroke	Breaststroke	Butterfly	Freestyle
Arnav	377	434	333	292
Anant	329	331	285	264
Bikas	338	422	389	296
Gautam	337	347	304	285
Aditya	354	418	336	311

How should the swimmers be assigned to make the fastest relay team?

Q.8) Answer the following: (15 Marks X 1 = 15 Marks)

Three time estimates (in months) of all activities of a project are as given below:

Activity	1-2	2-3	2-4	3-4	4-5	5-6
t_o	0.8	3.7	6.2	2.1	0.8	0.9
t_m	1.0	5.6	6.6	2.7	3.4	3.4
t_p	1.2	9.9	15.4	6.1	3.6	2.7

t_o : optimistic time, t_m = most likely time, t_p = pessimistic time

- Find the expected duration and variance of each activity.
- Determine the critical path, expected project length and expected variance of project length.
