

Enrollment No: _____

Exam Seat No: _____

C.U.SHAH UNIVERSITY

Summer Examination-2020

Subject Name : Operation Research

Subject Code : 5CS03WOR1

Branch: M.Sc.I.T. (WebTech)

Semester :3

Date : 29/02/2020

Time : 02:30 To 05:30

Marks 70

Instructions:

- (1) Use of Programmable calculator and any other electronic instrument is prohibited.
 - (2) Instructions written on main answer book are strictly to be obeyed.
 - (3) Draw neat diagrams and figures (if necessary) at right places.
 - (4) Assume suitable data if needed.
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SECTION – I

Q-1 Attempt the Following questions (7)

- a. Define : OR
- b. What is constraint?
- c. LCM stands for _____
- d. Which are the two graphical methods?
- e. What is the limitation of graphical method?
- f. What is feasible region?
- g. What is decision variable?

Q-2 Attempt all questions (5)

- a. Explain features of Operation Research. (5)
- b. Explain special cases in Linear Programming. (5)
- c. Explain types of transportation problem with example. (4)

OR

Q-2 Attempt all questions (5)

- a. Use the graphical method to solve an LP Problem : (5)
 $MAX (Z) = 15X_1 + 10X_2$
Subject to the constraints,
 $4X_1 + 6X_2 \leq 360, 3X_1 + 0X_2 \leq 180, 0X_1 + 5X_2 \leq 200, X_1 \geq 0, X_2 \geq 0$
- b. Determine an initial basic solution to the following transportation problem using NWCM method. (5)



	D1	D2	D3	D4	SUPPLY
S1	3	1	7	5	300
S2	2	6	5	9	400
S3	8	3	3	2	500
DEMAND	250	350	400	200	1200

- c. A firm is engaged in producing two products A and B. Each unit of product A requires 2 kg of raw material and 4 labour hours for processing, whereas each unit of B requires 3 kg of raw materials and 3 labour hours for the same type. Every week, the firm has an availability of 60 kg raw material and 96 labour hours. One unit of product A sold yields Rs. 40 and one unit of product B sold gives Rs.35 as profit. Formulate this as an Linear Programming problem. (4)

Q-3 Attempt all questions

- a. Explain difference between transportation problem and assignment problem. (7)
b. Explain general mathematical model of LPP. (7)

OR

Q-3 Attempt all questions

- a. Explain applications of linear programming. (7)
b. Use the simplex method to solve the following LP problem. (7)

$$\text{MAX } Z = 6X_1 + 8X_2$$

Subject to the constraints,

$$5X_1 + 10X_2 \leq 60, \quad 4X_1 + 4X_2 \leq 40, \quad X_1 \geq 0, X_2 \geq 0$$

SECTION – II

Q-4 Attempt the Following questions

- a. What is slack variable? (7)
b. What is rim condition?
c. Which are the methods of finding initial solution in transportation problem?
d. Which are the conditions for applying assignment problem on given cost matrix?
e. What is row reduction?
f. If there are n workers and n jobs, there will be ___ solutions.
g. What is critical path?

Q-5 Attempt all questions

- a. Determine an initial basic solution to the following transportation problem using LCM method. (5)



	D1	D2	D3	D4	SUPPLY
S1	19	30	50	10	7
S2	70	30	40	60	9
S3	40	8	70	20	18
DEMAND	5	8	7	14	34

- b. Explain PERT and CPM. (5)
- c. Draw a network diagram for the following activities (4)

Activity	Predecessor Activity
A	-
B	A
C	A
D	B
E	B,C
F	E
G	D,F
H	G

OR

Q-5 Attempt all questions

- a. Explain phases of Project management. (5)
- b. Determine an initial basic solution to the following transportation problem using vogel's approximation method. (5)

	D1	D2	D3	SUPPLY
S1	4	8	8	76
S2	16	24	16	82
S3	8	16	21	77
DEMAND	72	102	41	

- c. Define: slack variable, surplus variable, artificial variable. (4)

Q-6 Attempt all questions

- a. A department head has four sub ordinates and four tasks to be perform. The sub Coordinate differs in efficiency. The task differs in their manner. The effective matrix is given below. How should the task to be allocated to minimize the total man hours. (7)



Sub coordinates	1	2	3	4
Tasks				
1	8	26	17	11
2	13	28	4	26
3	38	19	18	15
4	19	26	24	10

- b. Explain Critical Path Analysis. (7)

OR

Q-6

Attempt all Questions

- a. Solve the following effective matrix using Travelling sales man problem. (7)

-	A	B	C	D	E
A	-	375	600	150	190
B	375	-	300	350	175
C	600	300	-	350	500
D	160	350	350	-	300
E	190	175	500	300	-

- b. From the following table draw network diagram, calculate EST, EFT, LST, LFT, Total float, Free float. (7)

Activity	Predecessor	Duration
A	-	4
B	A	6
C	A	7
D	B	8
E	C	10
F	D,E	9
G	F	5

