BACHELOR OF TECHNOLOGY (CBCS) (2021-COURSE)

Computer Science & Business Systems

B. Tech. Sem - IV :SUMMER : 2023

SUBJECT : OPERATIONS RESEARCH

Day : Wednesday

Time : 10:00 AM-01:00 PM

Date : 31-05-2023

S-24159-2023

Max. Marks : 60

N.B.:

1) All questions are **COMPULSORY**.
2) Figures to the right indicate **FULL** marks.
3) Use of non-programmable **CALCULATOR** is allowed.

Q.1 State and explain the various characteristics of Operation Research. **(10)**

OR

Q.1 Explain in detail the different types of mathematical models used in operation research. **(10)**

Q.2 Solve the following Linear Programming (LP) by using graphical method. **(10)**

Maximize $Z = 40x_1 + 100x_2$

Subjected to $12x_1 + 6x_2 \leq 3000$

$4x_1 + 10x_2 \leq 2000$

$2x_1 + 3x_2 \leq 900$

$x_1, x_2 \geq 0$

OR

Q.2 Use Simplex method to solve the following problem. **(10)**

Maximize $Z = 4x_1 + 3x_2 + 6x_3$

Subject to $2x_1 + 3x_2 + 2x_3 \leq 440$

$4x_1 + 3x_3 \leq 470$

$2x_1 + 5x_2 \leq 430$

$x_1, x_2, x_3 \geq 0$

Q.3 Find the optimum solution is the following transportation problem in which the cells contain the transportation cost in rupees. **(10)**

Warehouse		W_1	W_2	W_3	W_4	W_5	Availability
Factories	F_1	7	6	4	5	9	40
	F_2	8	5	6	7	8	30
	F_3	6	8	9	6	5	20
	F_4	5	7	7	8	6	10
Required		30	30	15	20	5	

OR

Q.3 What is MODI method? Describe the method stepwise. **(10)**

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Q.4 A project schedule has the following characteristics. **(10)**

Activity	Time (weeks)	Activity	Time (weeks)
1-2	4	5-6	4
1-3	1	5-7	8
2-4	1	6-8	1
3-4	1	7-8	2
3-5	6	8-10	5
4-9	5	9-10	7

Construct the network diagram. Calculate the EST and LFT for each event. Find the critical path.

OR

Q.4 Draw a network to represent the project and find the minimum time of completion of the project when time, in days, of each task is as follows: **(10)**

Task	Precedence	duration (days)
A	-	8
B	-	10
C	-	8
D	A	10
E	A	16
F	B,D	17
G	C	18
H	C	14
I	F,G	9

Also identify the critical path. **(10)**

Q.5 Explain in detail with neat sketch the inventory model with demand rate uniform, Replenishment rate infinite and shortages are allowed.

OR

Q.5 Discuss in detail with neat sketch the Economic Order Quantity when stock replenishment is non-instantaneous along with assumptions. **(10)**

Q.6 Explain in detail the various element of Queuning system and operating characteristics of a Queuing system. **(10)**

OR

Q.6 The bakery keeps a record of sales of the number of cake of a certain type information relating to 200 days sales is **(10)**

Demand (no. of cakes)	5	6	7	8	9	10	11	12	**Total**
No. of days	4	10	16	50	62	38	12	8	**200**

The random number given are
61, 74, 24, 03, 39, 16, 84, 92, 52, 07.
Determine the demand for first 10 days.

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