BACHELOR OF TECHNOLOGY (CBCS) (2021-COURSE)
B. Tech. Sem - IV Computer Science & Business Systems : WINTER: 2025
SUBJECT: OPERATIONS RESEARCH

Day : Friday
Date : 05/12/2025

W-24159-2025

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

N.B.

1) All questions are **COMPULSORY**.
2) Figures to the **RIGHT** indicate **FULL** marks.
3) Assume suitable data **WHEREVER** necessary.
4) Draw neat labeled diagrams **WHEREVER** necessary.

Q.1 Explain in detail the different phases in operation research **(10)**

OR

Q.1 State and explain the different mathematical models used in operation research. **(10)**

Q.2 Solve the following linear Programming problem using graphical method **(10)**

Maximize $Z = 100\,x_1 + 60x_2$

subjected to $5x_1 + 10x_2 \leq 50$

$8x_1 + 2x_2 \geq 16$

$3x_1 - 2x_2 \geq 6$

$x_1, x_2 \geq 0$

OR

Q.2 Solve the following Linear programing problem using simplex method **(10)**

Minimize $Z = 2x_1 - 3x_2 + 6x_3$

subjected to $3x_1 - x_2 + 2x_3 \leq 7$

$2x_1 + 4x_2 \geq -12$

$-4x_1 + 3x_2 + 8x_3 \leq 10$

$x_1, x_2, x_3 \geq 0$

Q.3 Find the initial feasible solution for the following problem using Vogel's approximate method **(10)**

		Destination				
		A	**B**	**C**	**D**	**Supply**
Source	1	3	1	7	4	300
	2	2	6	5	9	400
	3	8	3	3	2	500
Demand		250	350	400	200	

OR

Q.3 Solve the following Assignment problem using Hungarian method **(10)**

		Machines				
		I	**II**	**III**	**IV**	**V**
Jobs	**1**	10	5	9	18	11
	2	13	9	6	12	14
	3	3	2	4	4	5
	4	18	9	12	17	15
	5	11	6	14	19	10

P.T.O.

Q.4 Explain in detail the phases involved in Project Management. Also explain with neat sketch the Gantt Chart. (10)

OR

Q.4 Solve the following Network Analysis problem. (10)

		Time Durations		
Activity	Predecessor	Optimistic	Pessimistic	Most Likely
A	-	5	6	7
B	-	1	3	5
C	-	1	4	7
D	A	1	2	3
E	B	1	2	9
F	C	1	5	9
G	C	2	2	8
H	E,F	4	4	10
I	D	2	5	8
J	H,G	2	2	8

a. Construct the project network.
b. Find the expected duration and variance for each activity
c. Find the critical path and expected project duration.

Q.5 An Automobile company has to supply 14000 units of a product per year to the customers. The demand is fixed and known. The shortage cost is assumed to be infinite. The inventory holding cost is Rs.0.30 per unit per month and the ordering cost per order is Rs.450.Determine the optimal lot size, the optimal scheduling period and the minimum total variable cost (10)

OR

Q.5 Explain in detail with neat sketch the Economic order Quantity model with instantaneous replenishment model. (10)

Q.6 Explain in detail with neat sketch the major constituents of a Queuing System. (10)

OR

Q.6 What is meant by simulation? Explain in detail the steps involved in simulation process. (10)

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