

BACHELOR OF TECHNOLOGY (CBCS) (2021-COURSE)
B. Tech. Sem - IV CS&BS : WINTER : 2024
SUBJECT: OPERATIONS RESEARCH

Day : Thursday
Date : 28/11/2024

W-24159-2024

Time : 02:30 PM-05:30 PM
Max. Marks : 60

N.B.:

- 1) All questions are **COMPULSORY**.
- 2) Figures to the right indicate **FULL** marks.
- 3) Use non-programmable **CALCULATOR** is allowed.
- 4) Draw neat labeled diagrams **WHEREVER** necessary.
- 5) Assume suitable data, if necessary.

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

OR

Q.1 Explain in detail the mathematical models used in operation research. (10)

Q.2 Solve the following LPP using simplex method (10)

maximize $z = 2x_1 - 3x_2 + 6x_3$

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

$2x_1 + 4x_2 \geq -12$

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

$x_1, x_2 \geq 0$

OR

Q.2 Solve the following using graphical method (10)

maximize $z = 3x_1 + 4x_2$

Subjected to $5x_1 + 4x_2 \leq 200$

$3x_1 + 5x_2 \leq 150$

$5x_1 + 4x_2 \geq 100$

$8x_1 + 4x_2 \geq 80$

$x_1, x_2 \geq 0$

Q.3 Find the initial basic feasible solution to the following transportation problem (10) by using north west corner cell method.

	A	B	C	D	E	Supply
	5	1	8	7	5	15
	3	9	6	7	8	25
	4	2	7	6	5	42
	7	11	10	4	9	35
Demand	30	20	15	10	20	

OR

Q.3 Explain in detail the Hungarian method used to solve the assignment problem. (10)

P.T.O.

Q.4 Explain in detail the procedure to solve the problems by using critical path method. Also explain the total float and free float. (10)

OR

Q.4 Solve the following network analysis problem (10)

Activity	Predecessor	Duration		
		Optimistic	Most likely	Pessimistic
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

- Construct the project network.
- Find the expected duration and variance of each activity.
- Find the critical path and expected project duration.

Q.5 A warehouse has to supply 11000 units of a product per year to his customers. The demand is fixed and known and the shortage cost is assumed to be infinite. The inventory holding cost is 0.25 per unit per month and the ordering cost per order is Rs.300. Determine the optimal lot size, the optimal scheduling period and the total variable yearly cost. (10)

OR

Q.5 A company has a demand of 12000 units/year for an item and it can produce 2000 such units per month. The cost of one set up is Rs.400 and the holding cost/unit/month is Rs.0.15. Find the optimal lot size, total cost per year and the optimal time interval. Assume cost of 1 unit as Rs.4. (10)

Q.6 Explain the detail the elements of queuing 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. Cakes)	5	6	7	8	9	10	11	12	Total
No. of Days	4	10	16	50	62	38	12	8	200

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

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