

BACHELOR OF TECHNOLOGY (CBCS) (2021-COURSE)
B. Tech. Sem - IV Computer Science & Business Systems : WINTER : 2023
SUBJECT : OPERATIONS RESEARCH

Day : Thursday
Date : 23-11-2023

W-24159-2023

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 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 various applications of operations Research techniques. (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 $Z = 2x_1 + 5x_2$
Subject to $x_1 + 4x_2 \leq 24$
 $3x_1 + x_2 \leq 21$
 $x_1 + x_2 \leq 9$
 $x_1, x_2 \geq 0$

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	10
	F ₄	5	7	7	8	6	10
Required		30	30	15	20	5	

OR

Q.3 A machine tool company decides to make four subassemblies through four contractors each contraction is to receive only one subassembly. The cost of each subassembly is determined by the bids submitted by each contractor and is shown in table below in hundreds of rupees. (10)

		Contractor			
		1	2	3	4
Subassemblies	1	15	13	14	17
	2	11	12	15	13
	3	13	12	10	11
	4	15	17	14	16

Assign the different subassemblies to contractors so as to minimize the total cost.

P. T. O.

- 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 Consider the following table summarizing the details of the project. (10)

Activity	Predecessors	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	A,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

- i) Construct the project network. (10)
 ii) Find the expected duration and variance of each activity.
 iii) Find critical path and expected project completion time.

- 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 A company has demand of 11000 units/ year for an item and it can produce 2000 such items per month. The cost of one setup is Rs. 350 and the holding cost/ unit/ month is Rs. 0.25. Find the optimum lot size and the total cost per year assuming the cost of 1 unit as Rs. 5. Also find the maximum inventory manufacturing time and total time. (10)

- Q.6 Explain in detail the various elements of Queuing system and operating characteristics of a Queuing system. (10)

OR

- Q.6 Explain in detail the phases of the simulation process along with its advantages and disadvantages. (10)

* * * *