R13

Code No: 812AK

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
MCA II Semester Examinations, October / November - 2020
OPERATIONS RESEARCH

Time: 2 Hours   Max. Marks: 60

Answer any five questions
All questions carry equal marks
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1. Solve the following LPP problem by two-phase method
    $Max = 2x_1 + 3x_2 + 5x_3$, Subject to
    $3x_1 + 10x_2 + 5x_3 \leq 15$
    $33x_1 - 10x_2 + 9x_3 \leq 33$
    $x_1 + 2x_2 + 3x_3 \geq 4$, $x_1, x_2, x_3 \geq 0$ [12]

2. Solve the following transportation problem with initial basic feasible solution by North-West corner method. Find the optimal solution.   [12]

Demand \ Factory	S_1	S_2	S_3	S_4	Supply
A	7	10	12	10	40
B	9	12	10	10	30
C	12	9	14	12	20
Requirement	25	15	30	10	

3.a) State the traveling salesman problem.
  b) Solve the following traveling salesman problem
      $c_{12}=4$, $c_{13}=7$, $c_{23}=6$, $c_{24}=3$ and $c_{34}=7$ where $c_{ij}=c_{ji}$ [12]

4. Six jobs are to be processed on three machines A, B, C with the order of processing jobs as CBA

Job	U	V	W	X	Y	Z
Proc,time on machine A	12	10	9	14	7	9
Proc,time on machine B	7	6	6	5	4	4
Proc,time on machine C	6	5	6	4	2	4

The suggested sequence is Y-W-Z-V-U-X. Find out the elapsed time for the sequence suggested. Is it optimal? If it is not optimal, then find out the optimal sequence and the minimum total elapsed time associated with it. Also find the idle time on each machine.   [12]

5. Assume that present value of one rupee to be spent in a year's time is Rs.0.90 and C=Rs.3000 capital equipment and the running costs are given in the table below.

Year	1	2	3	4	5	6	7
Running cost (Rs.)	500	600	800	1000	1300	1600	2000

When should the machine be replaced?   [12]

6. Find the shortest route from city A to city J along arcs joining various cities lying between A & I. Distances between cities are given as follows: [12]

	B	C	D
A	2	4	3

	E	F	G
B	7	4	6
C	3	2	4
D	4	1	5

	H	I
E	1	4
F	6	3
G	3	3

	J
H	3
I	4

7. If a product is to be manufactured within the company, the details are as follows:
Annual demand rate, r=36000 units
Production rate, k=72000 units
Setup cost, C_0=Rs. 250 per setup
Carrying cost, C_c= Rs.25/unit/year.
Find the   a) EOQ and   b) Cycle time. Derive relevant expressions and use. [12]

8. In a railway yard goods train arrive at a rate of 30 trains/day. Assuming that the inter-arrival time follows an exponential distribution and service time distribution is also exponential with an average 36 minutes. Calculate the following:
a) The average number of trains in the queue.
b) The average waiting of a train in the system.
c) The probability that the number of trains in the system exceeds 10. [12]

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