Reg No.:_____   Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
SIXTH SEMESTER B.TECH DEGREE EXAMINATION(S), DECEMBER 2019

Course Code: ME372
Course Name: Operations Research

Max. Marks: 100   Duration: 3 Hours

PART A
Answer any three full questions, each carries 10marks.   Marks

1 a) Vitamins A and C are found in two different foods F1 and F2. One unit of food   (5)
       F1 contains 2 units of vitamin A and 5 units of vitamin C. One unit of food F2
       contains 4 units of vitamin A and 2 units of vitamin C. One unit of food F1 and
       F2 costs of Rs. 30 and Rs.25 respectively. The minimum daily requirement of
       vitamin A and C is 40 and 50 units respectively. Find out the optimal mixture of
       food F1 and F2 at the minimum cost which meets the daily minimum
       requirement of vitamins A and C. Formulate as an LPP model.

   b) Solve using graphical method.   (5)

       Maximize : $Z = 4x_1 + 3x_2$

       Subject to: $3x_1 + 4x_2 \leq 24$

       $8x_1 + 6x_2 \leq 48$

       $x_1 \leq 5$

       $x_2 \leq 6$

       $x_1, x_2 \geq 0$

2 a) Use Two phase Simplex method.   (10)

       Maximize : $Z = 2x_1 + 3x_2 + 4x_3$

       Subject to: $3x_1 + x_2 + 6x_3 \leq 600$

       $2x_1 + 4x_2 + 2x_3 \geq 480$

       $2x_1 + 3x_2 + 3x_3 = 540$

       $x_1, x_2 \geq 0$

3 a) Least cost method is superior to North –West corner method in obtaining the   (3)
       starting solution why?

   b) Find the initial feasible solution for the transportation model using VAM method.   (7)

		Warehouse			Capacity
Factory	W1	W2	W3	W4	
F1	21	16	25	13	11
F2	17	18	14	23	13
F3	32	27	18	41	19

Requirement   6   10   12   15

4   Five different machines can do any of the five required jobs with different profits   (10) resulting from each assignment is given in the table: Find out maximum profit possible through optimal assignment.

	Machines				
Jobs	M1	M2	M3	M4	M5
J1	30	37	40	28	40
J2	40	24	27	21	36
J3	40	36	33	30	35
J4	25	38	40	36	36
J5	29	62	41	34	39

PART B
Answer any three full questions, each carries 10 marks.

5   Construct the network for the project whose activities are given below: (10)

Activity   :   1-2   1-3   1-4   2-5   3-6   3-7   4-6   5-8   6-9   7-8   8-9
Duration (months) :   2   2   1   4   8   5   3   1   5   4   3

Find critical path and project duration.

6   There are five jobs, each which is to be processed through the machines A and B   (10) in the order A, B. Process time in hours are given below.

Job	1	2	3	4	5
Machine A	3	8	5	7	4
Machine B	4	10	6	5	8

Determine the optimum sequence for the five jobs and the minimum elapsed time. Also find the idle time of machine A and B.

7   A self service store employs one cashier at its counter. An average of nine   (10) customers arrives every 5 minutes while the cashier can serve 10 customers in 5

minutes. Assuming Poisson distribution for arrival rate and exponential distribution for service rate, find

      a) Average no. of customers in the system

      b) Average no. of customers in the queue

      c) Average time a customer spends in the system

   d)   Average time a customer spends in the queue

8   a)   Write down any three assumptions of the basic inventory model.   (3)

     b)   Discuss various elements of the queuing system.   (7)

PART C
Answer any four full questions, each carries 10 marks.

9   Discuss the difference between decision making under risk and uncertainty. List   (10)
three methods each coming under these categories.

10   Reduce the following game by dominance method and find the game value: (10)

Player B

		I	II	III	IV	V
Player A	I	2	4	3	8	4
	II	5	6	3	7	8
	III	6	7	9	8	7
	IV	4	2	8	4	3

11   Solve the game by graphical method   (10)

	Player Y				
Player X	6	3	-1	0	-3
	3	2	-4	2	-1

12   Explain the following terms :(i) Two person zero-sum game (ii) Principle of   (10)
dominance (iii) Pure strategy in game theory (iv) Value of the game

13   What are the advantages and disadvantages of simulation models?   (10)

14   Explain Monte - Carlo method of simulation with a suitable example.   (10)

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