[23] SEAT No._____ No. of Printed Pages : 04

SARDAR PATEL UNIVERSITY

B. Sc. Sem-IV EXAMINATION, 2019

SUBJECT: Operations Research II (US04EMTH06)

Date: 15/04/2019, Monday **Time: 10:00 am to 12:00 noon**

Total Marks: 70

Q-1 **Write the correct option in the answer book.** **[10]**

(1) Activity which is completed before starting new activity is called_____.

(a) dummy (b) predecessor (c) successor (d) none of them

(2) The saddle point in the game is $a_{23}=1$ then the value of game is _____.

(a) 0 (b) 1 (c) 2 (d) 3

(3) What happens when maxmin and minmax values of game are same?

(a) No solution exists (b) saddle point exists (c) solution is mixed (d) none of these

(4) In Job sequencing the time involved in moving jobs from one machine to another is ....

(a) negligible (b) positive number (c) significant (d) none of these

(5) In Job sequencing if smallest time for a job belongs to machine 1 then the job has to place .... of the sequence.

(a) at the end (b) at the beginning (c) at the middle (d) none of these

(6) If number of sources is equal to number of destination in Assignment problem then it is called _____.

(a) unbalanced (b) symmetric (c) unsymmetric (d) balanced

(7) If player A is plays strategy A_4 with probability 1, then he plays the game with _____ strategy.

(a) Pure (b) Mixed (c) Minimal (d) None of these

(8) The optimal solution for A.P. with size n exists if no. of assigned zero is equal to _____.

(a) m+n-1 (b) 2n-1 (c) n (d) m

(9) Dangling is a type of ..... In network scheduling.

(a) event (b) activity (c) error (d) none of these

(10) _____ operation is carried out at a machine.

(a) Two (b) at least one (c) only one (d) none of these

Q:2 **Answer the following in short. (Any Ten)** **[20]**

(1) Define: i. pure strategy ii. Mixed strategy.

(2) State the rules for drawing network diagram.

(3) Write the steps for solving a A.P. by Hungarian method.

(4) What is no passing rule in the sequencing algorithm?

(5) What is an unbalanced assignment problem? How to resolve it?

(6) Write the necessary condition for Johnson's algorithm for n jobs through three machines.

(7) Write a rule to draw minimum number of lines to cover all zeros in AP.

(8) Explain what you mean by sequencing problem.

(9) Explain dominance property in game theory.

(10) What is dummy activity?

(11) Define: i. payoff matrix ii. saddle point

(12) What is total float?

(PTO)

Q -3

(a) Solve the following assignment problem so as to minimize the time (in days) required completing all the task. **[5]**

person	Task				
	1	2	3	4	5
A	6	5	8	11	16
B	1	13	16	1	10
C	16	11	8	8	8
D	9	14	12	10	16

(b) Solve the following assignment problem. **[5]**

	P	Q	R	S	T
A	5	3	4	7	1
B	2	3	7	6	5
C	4	1	5	2	4
D	6	8	1	2	3
E	4	2	5	7	1

Q -3 **OR**

(c) Solve the following assignment problem. **[5]**

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

(d) Find the assignment of salesmen to various districts which will yield maximum profit. **[5]**

Salesman	District			
	1	2	3	4
A	16	10	14	11
B	14	11	15	15
C	15	15	13	12
D	13	12	14	15

Q-4

(a) Solve the following game problem. Determine the optimum strategies for each player and also obtain value of the game. [5]

$$\begin{array}{c} \\ A_1 \\ \end{array} \begin{array}{c} \begin{array}{cc} B_1 & B_2 \end{array} \\ \begin{bmatrix} 0 & 2 \\ -1 & 4 \end{bmatrix} \end{array}$$

(b) Solve the following game problem using dominance criteria. [5]

$$\begin{array}{c} \\ A_1 \\ A_2 \\ A_3 \end{array} \begin{array}{c} \begin{array}{ccc} B_1 & B_2 & B_3 \end{array} \\ \begin{bmatrix} 3 & -2 & 4 \\ -1 & 4 & 2 \\ 2 & 2 & 6 \end{bmatrix} \end{array}$$

Q -4 **OR**

(c) Solve the following game problem using graphical method. [5]

$$\begin{array}{c} \\ \text{PlayerA} \\ \end{array} \begin{array}{c} \begin{array}{cccc} & \text{PlayerB} & & \end{array} \\ \begin{bmatrix} 2 & 1 & 0 & -2 \\ 1 & 0 & 3 & 2 \end{bmatrix} \end{array}$$

(d) Solve the following game problem using dominance criteria. [5]

$$\begin{array}{c} \begin{array}{cccc} B_1 & B_2 & B_3 & B_4 \end{array} \\ \begin{bmatrix} 8 & 15 & -4 & -2 \\ 19 & 15 & 17 & 16 \\ 0 & 20 & 15 & 5 \end{bmatrix} \end{array}$$

Q -5

(a) Five jobs are performed first on machine X and then machine Y. The time taken in hours by each job in each machines is given below: [5]

Job	A	B	C	D	E
Machine X	6	2	10	4	11
Machine Y	3	7	8	9	5

Determine the optimal sequence of the job that minimizes the total elapsed time to complete the job.

(b) There are 5 jobs, each of which must go through the two machines A, B and C in ABC order. Processing times (in hours) are given below. Determine a sequence for 5 jobs that will minimize the elapsed time. [5]

Job i	Processing time		
	A_i	B_i	C_i
1	8	5	4
2	10	6	9
3	6	2	8
4	7	3	6
5	11	4	5

Determine a sequence for 5 jobs that will minimize the elapsed time.

OR

(P.T.O)

Q-5

(c) Following tables shows the machines time (in hours) for 5 jobs to be processed on two different machines: [5]

Job	P	Q	R	S	T
Machine A	3	7	4	5	7
Machine B	6	2	7	3	4

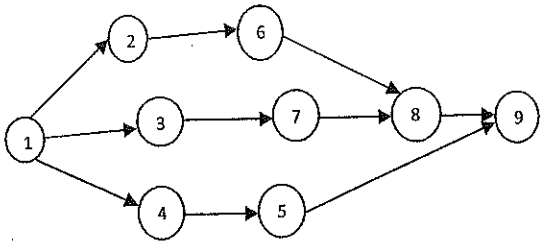
Passing is not allowed. Find the optimal sequence in which jobs should be processed.

(d) Find the sequence that minimizes the total elapsed time required to complete the following task: [5]

Tasks	A	B	C	D	E	F	G
Time on R machine	3	8	7	4	9	8	7
Time on S machine	4	3	2	5	1	4	3
Time on T machine	6	7	5	11	5	6	12

Q -6

(a) For the following network diagram obtain the critical path, total float, independent float and free float values. [5]



(b) Write down the procedure to obtain optimum completion time using Critical Path method. [5]

OR

Q-6 A project has the following time schedule: [5]

(c)

Activity	Time (month)	Activity	Time In month	Activity	Time In month
1-2	2	3-6	8	6-9	5
1-3	2	3-7	5	7-8	4
1-4	1	4-6	3	7-9	3
2-5	4	5-8	1		

Construct PERT network and compute total float for each activity and Find Critical path with its duration.

(d) A small maintenance project consists of the following 12 jobs [5]

Jobs	Duration in days	Jobs	Duration in days	Jobs	Duration in days
1-2	2	3-5	5	6-10	4
2-3	7	4-6	3	7-9	4
2-4	3	5-8	5	8-9	1
3-4	3	6-7	8	9-10	7

Draw the arrow network of the project. Determine the critical path.

—X—