

SARDAR PATEL UNIVERSITY  
 B.Sc. (SEMESTER - IV) EXAMINATION-2016  
 Monday, April 18, 2016  
 10.30 a.m. to 12.30 p.m.  
 US04EMTH06(Operation Research-II)

Maximum Marks: 70

Q.1 Choose the correct option in the following questions, mention the correct option in the answerbook. [10]

- (1) The ..... method used to obtain optimal solution for Assignment problem.  
 (a) Graphical (b) Hungarian (c) MODI (d) Simplex
- (2) The optimal solution for A.P. with size  $n$  exist if number of assigned zero is equal to.....  
 (a)  $m + n - 1$  (b)  $2n - 1$  (c)  $n$  (d)  $m$
- (3) In Assignment Problem the value of decision variable  $x_{ij}$  is.....  
 (a) no restriction (b) one or two (c) one or zero (d) none of these
- (4) If player A plays strategy  $A_1$  with probability 1, then he plays the game with .....strategy.  
 (a) pure (b) mixed (c) optimal (d) none of them
- (5) The saddle point in the game is  $a_{32}$  then player  $B$ 's pure strategy is.....  
 (a) one (b) two (c) three (d) none of these
- (6) What happens when maximin and minimax values of the game are same?  
 (a) No solution exists (b) Solution is mixed  
 (c) Saddle point exists (d) None of these
- (7) In sequencing if smallest time for a job belongs to machine-I then that job has to placed..... of the sequence.  
 (a) a the middle (b) at the starting (c) at the end (d) none of these
- (8) In sequencing the time involved in moving jobs from one machine to another is.....  
 (a) negligible (b) positive number (c) significant (d) none of these
- (9) Activity which does not require any resources or time is called.....activity.  
 (a) predecessor (b) successor (c) dummy (d) none of these
- (10) .....event represents beginning of more than one activities.  
 (a) burst (b) merge (c) merge (d) none of these

Q.2 Attempt any Ten:

[20]

- (1) What is an assignment problem?
- (2) What is an unbalanced assignment problem? How to resolve it?

	P	Q	R
A	5	2	4
B	3	9	11
C	9	6	1

(3) Solve the assignment problem:

(4) Define: (i) Pure strategy (ii) Mixed strategy

(5) Explain the method to obtain saddle point of a game if it exists.

(6) Find optimum strategy and value of the game for

		Player B	
		$B_1$	$B_2$
Player A	$A_1$	0	2
	$A_2$	-1	4

(7) Explain what you mean by a sequencing problem.

(8) Give the optimum job sequence for the following sequencing problem

No. of jobs	1	2	3	4
Machine I	4	8	3	6
Machine II	6	3	7	2

(9) Define: (i) Total Elapsed time (ii) Idle time on a Machine.

(10) Define (i) Predecessor Activity (ii) Successor activity

(11) Define two types of events used in network analysis.

(12) Explain the error of Dangling in network diagram representation.

**Q.3**

	P	Q	R	S
A	22	30	21	15
B	18	33	9	31
C	44	25	24	21
D	23	30	28	14

(a) Solve the assignment problem:

[04]

(b) Solve the following assignment problem:

[06]

	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

**OR**

**Q.3**

(c) Write rule to draw minimum number of line.

[03]

(d) Solve the following assignment problem:

[07]

	A	B	C	D	E
I	2	9	2	7	1
II	6	8	7	6	1
III	4	6	5	3	1
IV	4	2	7	3	1
V	5	3	9	5	1

**Q.4**

(a) Find the range of values of  $p$  and  $q$  which will render the entry (2, 2) a saddle point for the following game: [04]

		Player B		
		$B_1$	$B_2$	$B_3$
Player A	$A_1$	2	4	5
	$A_2$	10	7	$q$
	$A_3$	4	$p$	6

(b) Solve the following game using the principle of dominance:

[06]

		Player B		
		$B_1$	$B_2$	$B_3$
Player A	$A_1$	8	5	8
	$A_2$	8	6	5
	$A_3$	7	4	5
	$A_4$	6	5	6

**OR**

Q.4

(d) Solve the following game using the principle of dominance:

[04]

		Player B			
		B <sub>1</sub>	B <sub>2</sub>	B <sub>3</sub>	B <sub>4</sub>
Player A	A <sub>1</sub>	-5	3	1	20
	A <sub>2</sub>	5	5	4	6
	A <sub>3</sub>	-4	2	0	-5

(d) Solve the following game using graphical method

[06]

		Player B			
		I	II	III	IV
Player A	I	2	2	3	-1
	II	4	3	2	6

Q.5

(a) Give Johnson's algorithm for determining the optimal sequence for processing  $n$  jobs through two machines. [04]

(b) Find the sequence by Johnson's method that minimizes the total elapsed time and idle time for machine A and machine B required to complete the following jobs: [06]

No. of jobs	1	2	3	4	5	6
Machine A	4	8	3	6	7	5
Machine B	6	3	7	2	8	4

OR

Q.5

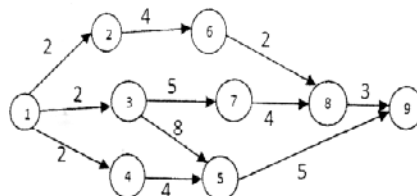
(c) Find the sequence by Johnson's method that minimizes the total elapsed time and idle time for machine A and machine B required to complete the following jobs: [04]

No. of jobs	1	2	3	4	5
Time on Machine A	5	1	9	3	10
Time on Machine B	2	6	7	8	4

(d) Find the sequence that minimizes the total elapsed time required to complete the following tasks: [06]

Tasks	A	B	C	D	E	F	G
Time on machine I	3	8	7	4	9	8	7
Time on machine II	4	3	2	5	1	4	3
Time on machine III	6	7	5	11	5	6	12

Q.6 For the following network diagram obtain the critical path, total float, independent float and free float. [10]



OR

Q.6 A project has the following time schedule:

[10]

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.

— X — X —  
— X —