Sardar Patel University
B.Sc. Semester-IV Examination
Tuesday, 17th April, 2018
Time:- (10:00 A.M. to 12:00 P.M.)   US04ESTA01   M.Marks:70
(Operation Research- II)

Note:- (i) Simple/ Scientific calculator is allowed. (ii) Graph paper will provided on request.

Q.1.   Multiple Choice Questions:-   [10]

(1)   The method used for solving an assignment problem is _____.
   a) Hungarian   b) reduced   c) MODI   d) none of
   method   matrix method   method   these.

(2)   An assignment problem _____.
   a) will always   b) has all   c) always has   d) always has
   have an integer   supplies and   the demand   the demand
   solution.   demands equal   greater than the   lesser than the
                     to 0.   supply.   supply.

(3)   While solving an assignment problem, an activity is assigned to a resource through a square with zero opportunity cost because the objective is to_____.
   a) minimize   b) reduce the   c) reduce the   d) none of
   total cost of   cost of   cost of   these.
   assignment   assignment to   assignment to
                     zero   one

(4)   When the sum of gains of one player is equal to the sum of losses to another player in a game, the situation is known as_____.
   a) biased game   b) zero-sum   c) fair game   d) none of
                     game   these.

(5)   Game models are classified by the_____.
   a) number of   b) sum of all   c) number of   d) All of above.
   players   payoffs   strategies

(6)   The pure strategies exist when the game have_____.
   a) saddle point   b) payoff   c) mixed   d) none of
                                                              these.

(7)   A1 is _____ to A2.   Company B

Company A	I	II	III	IV
I	7	6	5	2
II	4	4	4	1
III	1	8	1	0

   a) superior   b) inferior   c) equal   d) none of
                                                              these.

(8)   In the graphical method for solving 2xn game, the highest point on this lowest boundary gives the _____Point.
   a) minimum   b) minimax   c) maximin   d) none of
                                                              these.

(9)   The term commonly used for activity slack time is _____.

a) Total float.   b) Free float.   c) Independent float.   d) All of the above.

(10) The slack for an activity is equal to
a) LF-LS.   b) EF-ES   c) LS-ES.   d) None of these

Q.2. **Short Type Questions:- (Attempt Any Ten)** [20]
(1) What is an Assignment problem? State its mathematical form
(2) How do you revise opportunity matrix in an Assignment problem?
(3) What is an optimal criterion in the assignment problem?
(4) What are the characteristics of Game theory?
(5) State the four properties of a competitive situation in Game theory.
(6) State the rules for detecting a saddle point.
(7) State the rules for Dominance property.
(8) What is the principle of Dominance?
(9) What are Inferior and Superior strategies?
(10) Define terms: Activity, Event, Merge Event, Burst Event.
(11) State Rules for Network Diagram.
(12) What is the critical path?

Q.3. (a) A project work consists of four major jobs for which an equal number of [05] contractors have submitted tenders. The tender amount quoted (in lakh rupees) is given in the matrix.

Job

Contractor	A	B	C	D
1	10	24	30	15
2	16	22	28	12
3	12	20	32	10
4	9	26	34	16

Find the assignment which minimizes the total cost of the project, when each contractor has to be assigned at least one job.

(b) A departmental head has four subordinates, and four tasks to be [05] performed. The subordinates differ in efficiency, and the tasks differ in their instincts difficulty. His estimate, of the time each man would take to perform each task, is given in the matrix below:

Man-hours

Tasks	E	F	G	H
A	18	26	17	11
B	13	28	14	26
C	38	19	18	15
D	19	26	24	10

How should the tasks be allocated, one to a man, so as to minimize the total man-hours?

OR

Q.3. (a) Allot five lathes to five operators (one for each) so as to maximize total [05] expected profit per week. Allocate the tasks to Operators for output in Lathe .

Weekly output in Lathe

Operators	1	2	3	4	5
P	20	22	27	32	36
Q	19	23	29	34	40
R	23	28	35	39	34
S	21	24	31	37	42
T	24	28	31	36	41

(b) State and discuss the methods for solving an assignment problem. [05]

Q.4. (a) For which range of 'X' the game with the following pay-off matrix is [04] strictly determinable? State the results which you used.

B

A	B1	B2	B3
A1	X	6	2
A2	-1	X	-7
A3	-2	4	X

(b) Explain about Pure strategies and Mixed Strategies. [06]

OR

Q.4. (a) For the following payoff matrix for firm A, [06]
(i) Determine the optimal strategies for both firms and the value of the game.

Firm B

Firm A	-3	-2	-3
	2	0	2
	5	-2	-4

(ii) Determine the optimal strategies for both firms and the value of the game if it exists.

Firm B

Firm A	5	2	3
	6	4	2
	5	2	4

(b) Explain Minimax and Maximin criterion. [04]

Q.5. (a) Obtain the optimal strategies for any zero-sum two person game where [05] optimal strategies are not pure strategies and for which the player A's payoff matrix is

Player B

$$\text{PlayerA} \begin{array}{c} x1 \\ x2 \end{array} \begin{array}{cc} y1 & y2 \\ \begin{bmatrix} v11 & v12 \\ v21 & v22 \end{bmatrix} \end{array}$$

(b) How will you solve 2xn game graphically? [05]

OR

Q.5. (a) Solve the following (4 X2) game graphically. [05]

Player A\ Player B	I	II
I	4	6
II	4	5
III	5	4
IV	-4	8

Obtain the optimal strategies and value of game.

(b) Use the relation of dominance to solve the rectangular game whose [05] payoff matrix to A is given below:

Player   B

Player A	I	II	III	IV
I	1	3	2	2
II	7	-5	1	2
III	4	-1	2	2
IV	3	-2	2	2

Q.6. A project has the following time Schedule, .   [10]
Construct a PERT network and compute
   1. Critical Path and its duration.
   2. Calculate Total float ,free and independent available.

Activity	1-2	1-3	1-4	2-5	3-6	3-7	4-7
Time in Weeks	2	2	2	4	5	8	4
Activity	5-8	6-8	7-9	8-9	9-10		
Time in Weeks	3	4	5	3	4		

OR

Q.6. Explain the Forward and Backward method for calculating in Network Diagram.   [10]

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