

**2017**

Time : 3 hours

Full Marks : 100

Candidates are required to give their answers in  
their own words as far as practicable.

The figures in the margin indicate full marks.

Answer any **five** questions.

1. Write notes on any **two** of the following :

10×2 = 20

- Mathematical formulation of assignment problem.
- Explain Independent zero in context of Hungarian method of assignment.
- Balanced assignment problem.

2. (a) Explain unbalanced assignment problem. 5



- (b) A company has 4 machines on which 3 jobs are done. Each job can be assigned to one and only machine. The cost of each job on each machine is given in the following table :

	M1	M2	M3	M4
J1	18	24	28	32
J2	8	13	17	19
J3	10	15	19	22

What should be the jobs assignment for the minimum cost ? 15

3. Explain the following terms with example :  
5×4 = 20

- (a) Pure strategy
- (b) Mixed strategy
- (c) Minimax criterion
- (d) Saddle point

4. Solve the following problems : 10×2 = 20

- (a) The pay-off matrix of a game is given below.  
Find the solution of game to A and B.

	Player B			
	I	II	III	IV
Player A	I	-2	0	3
	II	3	2	1
	III	-4	-3	0
	IV	5	3	-4

- (b) Solve the game whose pay-off matrix is given below :

	Player B		
	I	II	III
Player A	I	-2	5
	II	-4	-6
	III	-4	10

5. Write notes on the following : 20

- (a) Explain the concept of Dominance to reduce the size of the game.
- (b) Explain Arithmetic Method for 2 × 2 games in context of mixed strategy games.

6. Solve the following problems : 10×2 = 20

- (a) There are only three industries in an economy and you have to estimate the



output of each industry the with given input coefficient matrix and the final demand as follows (the coefficient matrix is value terms):

$$A = \begin{pmatrix} 0.3 & 0.5 & 0.2 \\ 0.2 & 0.4 & 0.5 \\ 0.1 & 0.3 & 0.1 \end{pmatrix} \text{ and } F = \begin{pmatrix} 100 \\ 40 \\ 50 \end{pmatrix} \text{ (Million Rs.)}$$

(b) The following inter-industry transactions table was constructed for an economy for the year 2017.

Industry	1	2	Final consumption	Total
1	500	1,600	400	2,500
2	1,750	1,600	4,650	8,000
Labour	250	4,800	—	5050
Total	2,500	8,000	5050	15,550

Construct technology coefficient matrix showing direct requirements. Does it satisfy Hawkins-Simon conditions ?

7. What do you understand by input - output analysis ? Also discuss the limitations of input-output analysis. 20

8. (a) Five jobs (J1, J2, J3, J4 and J5) are done on five different machines (M1, M2, M3, M4 and M5). Any machine can process any job with the resulting profit (in Rs.) represented in the following table : 10

	10				
	M1	M2	M3	M4	M5
J1	32	38	40	28	40
J2	40	24	28	21	36
J3	41	27	33	30	37
J4	22	38	41	36	36
J5	29	33	40	35	39

Note : Explain every step

(b) Explain unbalanced transportation problem. 10

9. Explain the following : 10×2 = 20

(a) Closed and Open Input-Output Model

(b) Dynamic Input-Output Model

