## 2020

## **COMPUTER SCIENCE — GENERAL**

Paper: DSE-A-2

(Operation Research)

Full Marks: 50

The figures in the margin indicate full marks.

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

Day 3

Answer question no. 1 and any four questions from the rest.

1. Answer any five questions:

 $2 \times 5$ 

- (a) Mention any two limitations of Operation Research.
- (b) What do you understand by Degenerate solution?
- (c) Write statement of weak duality theorem.
- (d) When is a game called a fair game?
- (e) Define primal problem.
- (f) What is an assignment problem?
- (g) What is a balanced transportation problem?
- (h) State the limitations of graphical method.
- 2. (a) Using North-West corner rule obtain an initial basic feasible solution to the following transportation problem:

	$D_1$	$D_2$	$D_3$	$D_4$	Supply
$O_1$	1	2	3	4	6
$O_2$	4	3	2	0	8
Ο <sub>3</sub>	0	2	2	1	10
Demand	4	6	8	6	

## T(5th Sm.)-Computer Sc.-G/DSE-A-2/CBCS/Day-3

(b) Using matrix minima method obtain an initial basic feasible solution to the following transportation problem:

(2)

	$D_1$	_	-	•	Available	
$O_1$	7	9	3	2	16	
$O_2$	4	4	3	5	14	
$O_3$	_ 6	4	5	8 _	20	
Require units	11	9	22	8		5+5

3. (a) Solve the following assignment problem:

- (b) Describe a method of drawing minimum number of lines in the context of assignment problem.

  Name the method.

  5+(4+1)
- 4. (a) What is a game theory? What are the properties of a game?
  - (b) Solve the following  $2 \times 3$  game:

Player B

Player A 
$$\begin{bmatrix} 1 & 3 & 11 \\ 8 & 5 & 2 \end{bmatrix}$$
(2+3)+5

5. (a) Solve the following problem using graphical solution method.

$$Maximize Z = 3x_1 + 2x_2$$

Subject to the constraints:

$$\begin{array}{cccc} -2x_1 + x_2 & \leq & 1 \\ x_1 & \leq & 2 \\ x_1 + x_2 & \geq & 0. \end{array}$$

(b) Use the simplex method to solve the L.P.P.

$$Maximize Z = 3x_1 + 2x_2$$

Subject to the constraints:

$$x_1 + x_2 \le 4$$
  
 $x_1 - x_2 \le 2$   
 $x_1, x_2 \ge 0$ . 5+5

5+5

6. (a) Obtain the dual problem of the following L.P.P.

Maximize 
$$f(x) = 2x_1 + 5x_2 + 6x_3$$

Subject to the constraints:

$$5x_1 + 6x_2 - x_3 \leq 3$$

$$-2x_1 + x_2 + 4x_3 \leq 4$$

$$x_1 - 5x_2 + 3x_3 \leq 1$$

$$-3x_1 - 3x_2 + 7x_3 \leq 6$$

$$x_1, x_2, x_3 \geq 0$$

(b) Use duality to solve the following L.P.P.

Minimize 
$$Z = 15x_1 + 10x_2$$

Subject to the constraints:

$$3x_1 + 5x_2 \ge 5$$
  
 $5x_1 + 2x_2 \ge 3$   
 $x_1, x_2 \ge 0$ .

- 7. (a) What is unbalanced transportation problem? How do you start in this case?
  - (b) Solve the following transportation problem:

X	10	5	8	175
Y	12	7	6	1
Warehouse	250	100	150	
Demand				

- **8.** (a) Show that the optimal solution of an assignment problem is unchanged if we add or subtract the same constant to the entries of any row or column of the cost matrix.
  - (b) How do you interpret an assignment problem as an Linear Programming model? 5+5

C Plant Supply

9 200