2021

COMPUTER SCIENCE — HONOURS

Paper : DSE-B-1

(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.*

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

1. Answer *any five* questions :   2×5

   (a) What do you understand by decision alternatives?

   (b) What do you mean by non-negativity constraint? Give examples.

   (c) What is the objective of judgemental phase in O.R.?

   (d) State briefly the different phases of O.R.

   (e) What do you mean by feasible solution?

   (f) Explain the rules to determine a Saddle Point.

   (g) What is triangular inequality?

   (h) State four characteristics of O.R.

   (i) Define slack and surplus variable.

2. (a) Find the initial basic feasible solution of the following transportation by least cost method.

	I	II	III	IV	Supply
A	10	30	20	13	5
B	22	9	7	16	10
C	4	32	5	29	15
Demand	5	5	10	10	

   (b) What do you mean by Static and Dynamic model?   8+2

Please Turn Over

3. (a) What is the unbalanced assignment problem? How is it solved by the Hungarian method?

(b) State and explain the different steps of Iso-Profit or Iso-Cost graphical model. 7+3

4. (a) Consider the following LP with two variables :

Maximize $Z : = 2x_1 + 3x_2$

Subject to $-$ $\left.\begin{array}{l} 2x_1 + x_2 \le 4 \\ x_1 + 2x_2 \le 5 \\ x_1, x_2 \ge 0 \end{array}\right\}$ Solve it graphically

(b) What is de-generacy in transportation problem? 8+2

5. (a) Define primal and dual solution with example.

(b) Write the steps of the formulation of Dual problem. (2+2)+6

6. (a) Consider the following LP :

Maximize : $Z = 2x_1 + 4x_2 + 4x_3 - 3x_4$

Subject to $x_1 + x_2 + x_3 = 4$

$x_1 + 4x_2 + x_4 = 8$

$x_1, x_2 \ x_3, x_4 \ge 0.$

(b) What do you understand by Zero Sum Game? 8+2

7. Write short notes on *any two* : 5×2

(a) Assignment Problem

(b) North-West Corner Method

(c) Critical Path Method.

8. (a) Construct the PERT network for the following profit schedule.

Activity	Name	Time (days)	Activity	Name	Time (days)
1 – 2	A	4	5 – 6	G	4
1 – 3	B	1	5 – 7	H	8
2 – 4	C	1	6 – 8	I	1
3 – 4	D	1	7 – 8	J	2
3 – 5	E	6	8 – 10	K	5
4 – 9	F	5	9 – 10	L	7

(b) What do you mean by objective function? 8+2