2021

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.

Answer ***question no.*** **1** in **Section - I** and ***any four*** from **Section - II**.

Section – I

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

(a) What is Slack-variable?

(b) What is Surplus-variable?

(c) What are the conditions of having feasible solutions of set of linear equations?

(d) What do you mean by Basic Feasible Solution of equations?

(e) Define degeneracy in LP-Problems.

(f) Distinguish between separable programming and non-separable programming.

(g) Write short note on Buffer Stock.

(h) What do you mean by Optimal run time of a LPP?

(i) Define unbalanced transportation problem.

(j) State Bellman's Principle of Optimality.

Section – II

2. Find the initial Basic Feasible solution of the following transportation problem by VAM method. 10

Factroy	Warehouses				Available
	W1	W2	W3	W4	
F1	19	30	50	10	7
F2	70	30	40	60	9
F3	40	8	70	20	18
Requirement	5	8	7	14	34

3. A toy manufacturer uses 48,000 rubber wheels per year for its popular dump truck series. The firm makes its own wheels, which it can produce at a rate of 800 per day. The toy trucks are assembled uniformly over the entire year. Carrying cost is 10 per wheel a year. Set up cost for a production run of wheels in 450. The firm operates 240 days per year. 10

Determine each of the following :

(a) Optimal run size

(b) Minimum total annual cost for carrying and set up

(c) Cycle time for the optimal run size

(d) Run time.

4. A manufacturer of toys makes two types of toys, A and B. Processing of these two toys is done on two machines X and Y. The toy A requires two hours on machine X and six hours on machine Y. Toy B requires four hours on machine X and five hours on machine Y. There are sixteen hours of time per day available on machine X and thirty hours on machine Y. The profit obtained on both the toys is the same, i.e., 5 per toy. Formulate this problem as an integer LP problem. 10

5. Solve the following problem by Simplex method. 10

Maximized $Z = 10x_1 - 4x_2$

Subject to :

$$\begin{aligned} 2x_1 - 6x_2 &\leq 0 \\ -x_1 + 2x_2 &\geq -2 \\ -3x_1 - 3x_2 &\geq 24 \\ x_1 , x_2 &\geq 0 \end{aligned}$$

6. Find the optimum strategies for A and B and the value of the game. 10

	B			
A	1	7	2	4
	0	3	7	8
	5	2	6	10

7. Suggest optimum assignment of 4 workers A, B, C and D to 4 jobs I, II, III and IV. The time taken (hours) by different workers in completing the different jobs is given below : 10

Works	JOBS				
		I	II	III	IV
	A	8	10	12	16
	B	11	11	15	8
	C	9	6	5	14
	D	15	14	9	7

8. Write short notes on ***any two*** of the the following : 5×2

(a) Saddle Point in Game Theory

(b) Sensitivity analysis in LP Problems

(c) Non-linear Programming

(d) Branch and Bound Approach.