

Goa Vidyaprasarak Mandal's
GOPAL GOVIND POY RAITURCAR COLLEGE OF COMMERCE AND
ECONOMICS, PONDA-GOA
B.C.A (SEMESTER-V) EXAMINATION, JULY 2021
NON-COMPUTER SCIENCE (Elective – I)
OPERATIONS RESEARCH

Duration: 2 Hours

Max. Marks: 25

Q 1) Answer ANY 5 of the following questions.

(5×2=10 Marks)

- (i) Explain the dominance rule in game theory
(ii) Obtain dual of the following linear programming problem.

$$\text{Max } z = 2x + 5y + 6z$$

Subject to,

$$5x + 6y - z \leq 3$$

$$-2x + y + 4z \leq 4$$

$$x - 5y + 3z \leq 1$$

$$x, y, z \geq 0$$

- (iii) Explain the Bellman's Principle of Optimality in Dynamic programming.
(iv) Briefly explain the transportation problem. Write the necessary and sufficient condition for the existence of feasible solution to it.
(v) Define queuing system.
(vi) State the different replacement policies.
(vii) Define inventory problem.
(viii) Solve the following transportation problem by least cost method.

3	1	7	4
2	6	5	9
8	3	3	2

Q 2) Answer ANY 4 of the following questions.

(4×5=20 Marks)

- (i) Solve the following LPP using Big M method

$$\text{Min } Z = 60x + 80y$$

Subject to,

$$20x + 30y \geq 900$$

$$40x + 30y \geq 1200$$

$$x, y \geq 0$$

- (ii) Use the Vogel's Approximation method to find the initial basic feasible solution. Also find the optimum solution.

	D	E	F	G	H	
A	5	8	6	6	3	800
B	4	7	7	6	5	500
C	8	4	6	6	4	900
	400	400	500	400	800	

contd....2/-

- (iii) Find the sequence for the following jobs that will minimize the total elapsed time for the completion of all jobs. Each job is processed in the same order CAB. Entries are given for the processing time in hours in the table. Find the idle time for all machines and entire system and also find the total elapsed time of the system.

Jobs→ Machines	1	2	3	4	5	6	7	8
A	4	6	7	4	5	3	6	2
B	8	10	7	8	11	8	9	13
C	5	6	2	3	4	9	15	11

- (iv) XYZ machine tools seeks your expert opinion for the optimal replacement period of a machine used by them. The data relevant for decision making is given as
- (a) Capital cost of the machine is ₹ 10,000.
 - (b) Operating cost is ₹ 500 in the first 4 years and then it increases by 300 each year.
 - (c) Interest rate for the firm is 10% p.a.
- (v) A travelling salesman has planned to visit 4 cities. He would like to start from a particular city visit each city only once and return to the starting city. The traveling cost in rupees is given in the table below. Find the least cost route.

	A	B	C	D
A	0	25	75	45
B	35	0	150	25
C	35	40	0	15
D	65	75	130	0

- (vi) The demand of an item is uniform at a rate of 25 units per month. The fixed cost is ₹ 30 each time a production is made. The production cost is ₹ 2 per item and inventory carrying cost is 50 paise per unit per month. If the shortage cost is ₹ 3 per item per month, determine how often to make a production run and of what size?