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(d) Expected Value of Perfect Information (EVPI)
(6×3=18)

(1200)

[This question paper contains 8 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 1032

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Unique Paper Code : 2922103601

Name of the Paper : Operations Research

Name of the Course : B.A. (H) Business
Economics

Semester : VI

Duration : 3 Hours

Maximum Marks : 90

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt any 5 questions out of the total 6 given.
3. All questions carry equal marks (18 each).

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1. Solve the following using simplex method Minimize:

$$Z = 5X_1 + 3X_2$$

Subject to :

$$2X_1 + X_2 \geq 10$$

$$X_1 + 3X_2 \geq 12$$

$$X_1 + X_2 \geq 8$$

$$X_1, X_2 \geq 0$$

(18)

2. The supply of each plant or factory, the demand of each warehouse and per unit transportation cost are shown in the following table :

FACTORY	WAREHOUSE				CAPACITY (SUPPLY)
	W1	W2	W3	W4	
F1	21	16	25	13	11

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Strategy	A1(0.3)	A2(0.5)	A3(0.2)
P1	100	50	20
P2	80	60	30
P3	40	70	90

- (a) Calculate EMV for each strategy

- (b) Calculate EOL

- (c) Find EVPI and

- (d) Select the best strategy

(5,4,4,5)

6. Short Notes (Write on any 3)

- (a) Saddle Point

- (b) Characteristics of Operations Research

- (c) Maximin and Minimax Principles

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(b) A company has two brands A and B. The transition probabilities are :

- 80% of A customers stay with A, 20% switch to B
- 60% of B customers stay with B, 40% switch to A

(i) Form the transition matrix

(ii) If initially 70% customers use A, find the distribution after 2 periods. (10,8)

5. Explain the concepts of Expected Monetary value (EMV), Expected Opportunity Loss (EOL) and Expected Value of Perfect Information (EVPI) in decision- making under risk. Given the following pay off table and probabilities :

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F2	17	18	14	23	13
F3	32	27	18	41	19
REQUIREMENT (DEMAND)	6	10	12	15	43

Find the optimal solution using (i) North West Corner Method and (ii) Vogel's Approximation Method (VAM) and check its optimality using MODI (Modified Distribution Method) (9,9)

3. Based on the following activities :

Activity	Predecessor	Duration (days)
A	—	3
B	A	4
C	A	2
D	B	5

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E	C	6
F	B, C	4
G	D, F	3
H	E	5
I	G, H	4
J	I	2

(a) Draw the network diagram.

(b) Determine ES, EF, LS, and LF for each activity.

(c) Identify the critical path and project duration.

(d) Calculate Total Float, Free Float, and Independent Float.
(4,5,4,5)

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4. (a) Consider the integer programming problem:

$$\text{Maximize : } Z = 2X_1 + X_2$$

The problem has been solved till the below table:

Basis	X1	X2	S1	S2	RHS
X1	1	0	0.5	0	2.5
X2	0	1	0.5	1	1.5
Z	0	0	1	0	6.5

where X_1 and X_2 are integers.

(i) Check whether the solution is optimal and integer feasible or not. Give appropriate explanation for the same.

(ii) If not, determine the final solution using Gomory cut method.

P.T.O.