

GUJARAT TECHNOLOGICAL UNIVERSITY**M.E Sem-III Regular Examination January 2011****Subject code: 731402 Subject Name: Operation Research in Construction****Date: 10 /01 /2011****Time: 02.30 pm – 05.00 pm****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1 (a)** State whether following statements are true /false with due justifications. **06**
1. Expected payoff and expected regret criteria would both lead to identical decisions in a given case.
 2. If the value of the game is negative value, it implies that the game is favoring player B.
 3. Efficiency index is the ratio of expected value of sample information to expected value of perfect information.
- (b)** Discuss the role & scope of quantitative methods for scientific decision making in large construction projects. **08**
- Q.2 (a)** Define an OR model giving examples. State their properties, advantages and limitations. **08**
- (b)** Distinguish between following with all respects: **06**
1. Analogue and iconic models,
 2. Deterministic and stochastic models.
- OR**
- (b)** Answer following questions in brief: **06**
1. Explain decision making under risk.
 2. Differentiate between opportunity loss and expected value of perfect information.
 3. Explain the posterior analysis of decision making.
- Q.3 (a)** Describe maximin and minimax principle of game theory. **07**
- (b)** There are three production lines on which the products could be processed. The rates of production in units per day and the total available capacity days are given in following table. The cost of using the line is Rs. 600, Rs. 500 and Rs. 400 per day respectively. **07**

Production line	Products			Maximum line capacity(days)
	P1	P2	P3	
1	150	100	400	20
2	200	100	400	20
3	160	80	600	18
Total	2000	3000	6000	--

Formulate as a linier programming problem to minimize the cost of operation.

OR

- Q.3 (a)** Obtain the solution to the following LP problem using simplex method. **10**
- Maximize: $Z = x_1 + 3x_2$,
 Subject to $x_1 + 2x_2 \leq 9$,
 $x_1 + 4x_2 \leq 1$,
 $x_1, x_2 \geq 0$.

- (b) Formulate the LP problem only, to determine production schedule to get maximum profit. Refer data given in table below. **04**

Products	Production in tones of		Total
	X	Y	
Minimum production	2 tones	3 tones	9 tones
Machining Hours	20 Hrs/ton	50 Hrs/ton	360 Hours
Profit	80 Rs/ton	120 Rs/ton	

- Q.4 (a)** Calculate and tabulate expected monetary value and conclude which of the course of action can be chosen as the best using following payoffs of three acts A1,A2, A3 and three events E1, E2,E3 **07**

State of nature	Probability	Nature of demand		
		A1	A2	A3
E1	0.1	25	-10	-125
E2	0.7	400	440	400
E3	0.2	650	740	750

- (b) Construction manager is considering drilling a well at project site. In past, only 70% of wells drilled were successful at 20m depth in that area. Moreover on finding no water at 20m some persons in that area drilled it further up to 25m but only 20% struck water at that level. The prevailing cost of drilling is Rs.500/m. The manager estimated that in case he does not get water in his own well, he will have to pay Rs.15000 to buy water from outside for the same period of getting water from the well. The following decisions are considered. **07**

1. Do not drill any well
2. Drill up to 20m.
3. If no water is available at 20m, drill further up to 25m.

Determine construction manager's strategy using decision tree approach.

OR

- Q.4 (a)** Justify following statements giving brief reasons: **05**

1. Decision making is an integral part of process of management.
2. Quantification of a real-time problem represents sound decision making.

- (b) Outline the steps involved in the simplex algorithm for solving LP maximization problem. **05**

- (c) Define the following and state their significance w. r. to simplex method: **04**

- (i) Key column, (ii) Key row, (iii) Degeneracy and
- (iv) Multiple optima.

- Q.5 (a)** Define the transportation problem and give its mathematical model. **07**

- (b) Solve following transportation problem to the maximum iterations possible. **07**

Source	Destination				Supply
	1	2	3	4	
1	15	18	22	16	30
2	15	19	20	14	40
3	13	16	23	17	50
Demand	20	20	25	35	100

OR

- Q.5 (a)** Explain **07**

1. Utility function.
2. Utility measure.
3. Utility curve.

- (b) For the following payoff matrix, find the value of the game and strategies for the player A and player B. 07

Player A		Player B		
		1	2	3
	1	3	-1	4
	2	6	7	-2
