

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-VI • EXAMINATION – WINTER • 2014****Subject Code: 161601****Date: 05-12-2014****Subject Name: Modeling Simulation and Operation Research****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) What is Operation Research ? Discuss Importance of Operation Research in Information and Technology application building. 07

(b) A company manufactures 3 types of parts which use precious metals platinum and gold. Due to shortage of these precious metals, the government regulates the amount that may be used per day. The relevant data with respect to supply, requirements and profits are summarized in the table as follows : 04

Product	Platinum required unit (gms)	Gold required unit(gms)	Profit/unit (Rs.)
A	2	3	500
B	4	2	600
C	6	4	1200

Daily allotment of platinum and gold are 160gm and 120gm respectively. How should company divide the supply of scarce precious metals? Formulate it as a linear programming problem.

(C) Explain the steps followed to solve LPPs by graphical method. 03

Q.2 (a) Solve this LPP problem graphically. 07

Maximize $Z = X_1 + 3X_2$

Subject to the constraint $X_1 + 2X_2 \leq 9$

$X_1 + 4X_2 \leq 11$

$X_1 - X_2 \leq 2$ and $X_1, X_2 \geq 0$

(b) Use simplex method to solve following LPPs 07

Maximize $Z = 7X_1 + 14X_2$

Subject to $3X_1 + 2X_2 \leq 36$, $X_1 + 4X_2 \leq 10$, $X_1 \geq 0$, $X_2 \geq 0$

OR

(b) Explain the concept and computational steps of the simplex method for solving linear programming problem. How would you identify whether an optimal solution to a problem obtained using simplex algorithm is unique or not ? 07

Q.3 (a) Discuss the Northwest and Least cost method for finding initial basic solution. Give its advantage and disadvantage. 07

(b) Solve the transportation problem and obtain initial feasible solution calculated by Vogel's Approximation Method 07

	D1	D2	D3	D4	D5	Supply
S1	4	2	3	2	6	8
S2	5	4	5	2	1	12
S3	6	5	4	7	7	10
Demand	4	4	6	8	8	

OR

- Q.3 (a) How you deal with the assignment problems where 07
 (a) Some assignment are prohibited ?
 (b) The objective function is of maximization type ?
- (b) ABC company is engaged in manufacturing 5 brands of packed snacks. It 07
 has five manufacturing setups, each capable of manufacturing any of its
 brands one at a time, The costs to make a brand on these setups vary
 according to following table.
- | | S1 | S2 | S3 | S4 | S5 |
|----|----|----|----|----|----|
| B1 | 4 | 6 | 7 | 5 | 11 |
| B2 | 7 | 3 | 6 | 9 | 5 |
| B3 | 8 | 5 | 4 | 6 | 9 |
| B4 | 9 | 12 | 7 | 11 | 10 |
| B5 | 7 | 5 | 9 | 8 | 11 |
- Find the optimum assignment on these setups resulting in the minimum cost?
- Q.4 (a) What is critical path? State the necessary and sufficient condition of 07
 critical path. Can a project have multiple critical path ?
- (b) Consider the following data for the activity of the project: 07
- | Activity | 1-2 | 1-3 | 1-4 | 2-5 | 3-6 | 3-7 | 4-6 | 5-8 | 6-9 | 7-8 | 8-9 |
|----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Duration | 2 | 2 | 1 | 4 | 8 | 5 | 3 | 1 | 5 | 4 | 3 |
- Draw the network find the critical path.
- OR**
- Q.4 (a) Explain following queuing model with example in Information 07
 Technology filed.
- (1) First come first served (2) Last come first served (3) Random pick service
- (b) At a certain petrol pump, customer arrives in a Poisson process with an 07
 average time of five minutes between successive arrivals. The time taken
 at the petrol pump to serve customers follows the exponential distribution
 with an average of two minutes. You are required to obtain the following
 :
- (a) Arrival and service rate
 (b) The utilization parameter
 (c) Expected queue length
 (d) Expected number of customer in the system.
- Q.5 (a) A firm has a machine whose purchase price is Rs.20,000. Its maintenance 07
 cost and resale price at the end of the different years are as given here:
- | Year | 1 | 2 | 3 | 4 | 5 | 6 |
|------------------|-------|-------|-------|-------|------|------|
| Maintenance cost | 1500 | 1700 | 2000 | 2500 | 3500 | 5500 |
| Resale price | 17000 | 15300 | 14000 | 12000 | 8000 | 3000 |
- Obtain the economic life of the machine and the minimum average cost.
- (b) What is simulation? Explain the process of simulation 07
- OR**
- Q.5 (a) Define the simulation model. Distinguish between deterministic and 07
 stochastic simulation mode.
- (b) Explain group replacement policy with suitable example. 07
