

Seat No.: _____

GUJARAT TECHNOLOGICAL UNIVERSITY
MBA – SEMESTER III– EXAMINATION – WINTER 2019**Subject Code: 4539271****Date: 03/12/2019****Subject Name: Operational Research****Time: 10:30AM to 01:30PM****Total Marks: 70****Instructions:**

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

Q.1 Explain the following 14

- (a) Saddle Point
- (b) Monte Carlo Simulation
- (c) Shadow Price (Simplex Multiplier)
- (d) Optimal Solution
- (e) Queuing system
- (f) Big M method
- (g) equilibrium of steady – state

Q.2 (a) State the different types of models used in OR. Explain briefly the general methods for solving these OR models. 07**(b) What is meant by a mathematical model of a real situation? Discuss the importance of models in the solution of OR problems. 07****OR****(b) 'Linear programming has no real-life applications'; Do you agree with this statement? Discuss. 07****Q.3 (a) Discuss the role of sensitivity analysis in linear programming. Under what circumstances is it needed, and under what conditions do you think it is not necessary? 07****(b) Suppose you are being interviewed by the manager of a commercial firm for a job in the research department which deals with the application of quantitative techniques. Explain the scope and purpose of quantitative techniques and its usefulness to the firm. Give some examples of the application of quantitative techniques in the industry. 07****OR****Q.3 (a) What so you understand by Markov chains? In what areas of management can it be applied successfully? 07****(b) What is a queuing theory problem? Describe the advantages of queuing theory to a business executive with view to persuading him to make use of the same in management. 07****Q.4 (a) What is a game in game theory? What are the properties of a game? Explain the 'best strategy' on the basis of minimax criterion of optimality. 07****(b) Define simulation. Why is simulation used? Give one application area when this technique is used in practice. 07****OR****Q.4 (a) State a transportation problem in general terms and explain the problem of degeneracy. How does one overcome it? 07**

- (b) What is the principle of duality? What is the significance of dual variables in a LP model? Explain its advantages. **07**

Q.5

CASE STUDY:

A manufacturer of jeans is interested in developing an advertising campaign that will reach four different age groups. Advertising campaigns can be conducted through TV, radio and magazines. The following table gives the estimated cost in paise per exposure for each age group according to the medium employed. In addition, maximum exposure levels possible in each of the media, namely TV, radio and magazines are 40, 30, and 20 million, respectively. Also the minimum desired exposure within each age group, namely 13 - 18, 19 - 25, 26 - 35, 36 and older are 30, 25, 15 and 10 millions. The objective is to minimize the cost of attaining the minimum exposure level in each age group.

Media	Age Groups			
	13-18	19-25	26-35	36 and older
TV	12	7	10	10
Radio	10	9	12	10
Magazine	14	12	9	12

- (a) Formulate the above as a transpiration problem and find the feasible solution using Vogel's Approximation Method. **07**
- (b) Find optimal solution of above problem. **07**

OR

- Q.5** (a) Formulate the above as a transpiration problem and find the feasible solution using Least Cost Method. **07**
- (b) Solve this problem if the policy is to provide at least 4 million exposures through TV in the 13 - 18 age group and at least 8 million exposures through TV in the age group 19-25. **07**
