

GUJARAT TECHNOLOGICAL UNIVERSITY**MBA. Evening Sem-III Regular Examination January 2011****Subject code: 820007****Subject Name: Research Methodology and Operations Research****Date: 07 /01 /2011****Time: 10.30 am – 01.00 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) Explain descriptive studies and causal studies. **07**
(b) How do secondary data differ from primary data? What factors should one examine when judging the validity and appropriateness of secondary data? **07**
- Q.2** (a) Do you agree or disagree with the following statements? If not then explain. **07**
(i) Validity is more critical to measurement than reliability.
(ii) Semantic differential scales are often used to describe a respondent to specify a degree of agreement or disagreement with a variety of statements related to the attitude or object.
(iii) A major distributor of office equipment is considering a new sales presentation program for its sales persons. The largest sales territory is selected, the new program is implemented, and the effect on sales is measured. This design is pre-experimental design in which one-shot case study done.
- (b) Explain what a ratio scale is. What are its superiorities over other scales of measurement? **07**

OR

- (b) Describe briefly the sampling design process. **07**
- Q.3** (a) Define and explain coding rules. **07**
(b) Discuss the type of statistical tests that apply in each of the following situations: **07**
(i) Ordinally scaled data in which there are two related samples being compared.
(ii) Nominally scaled data when the two samples are related, such as with pre-test and post-test situation.

OR

- Q.3** (a) Distinguish between the following: **07**
1. Type I error and Type II error. 2. Null hypothesis and alternative hypothesis.
(b) Describe the research report components. **07**
- Q.4** (a) The Harrison Electric Company, located in Chicago's Old Town area, produces two products popular with home renovators: old fashioned chandeliers and ceiling fans. Both the chandeliers and fans require a two-step production process involving wiring and assembly. It takes about 2 hours to wire each chandelier and 3 hours to wire a ceiling fan. Final assembly of chandeliers and fans requires 6 and 5 hours, respectively. The production capability is such that only 12 hours of wiring time and 30 hours of assembly time are available. If each chandelier produced net the firm \$7 and each fan \$6. Harrison's management wants to achieve several goals, arranged in order of their importance to the company. **07**
Goal 1: To produce profit of 30 \$ if possible during the production period.
Goal 2: To fully utilize the available wiring department hours.
Goal 3: To avoid overtime in the assembly department.
Goal 4: To meet a contract requirement to produce at least seven ceiling fans.
Formulate and solve the problem as a goal programming model.

- (b) In relation to the LP problem, explain the implications of the following assumptions of the model: 07

- (i) Linearity of the objective function and constraints,
(ii) Divisibility (iii) Certainty.

OR

- Q.4 (a)** Write differences between the linear programming and goal programming. 07

- (b) JOBCO produces two products on two machines. A unit of product 1 requires 2 hours on machine 1 and 1 hour on machine 2. For product 2, a unit requires 1 hour on machine 1 and 3 hours on machine 2. The revenues per unit of products 1 and 2 are \$30 and \$20, respectively. The total daily processing time available for each machine is 8 hours. 07

- (i) Use the graphical method of linear programming problem to determine the number of units that of product 1 and product 2 that maximizes of revenue.
(ii) Determine the dual prices for the machine 1 and the feasibility range of it.
(iii) Suppose that the unit revenue of product 2 is changed to \$40. Will the current optimum solution remain the same? If not then determine new optimum solution.

- Q.5 (a)** What is simulation? What are the advantages and limitations of simulation? 07

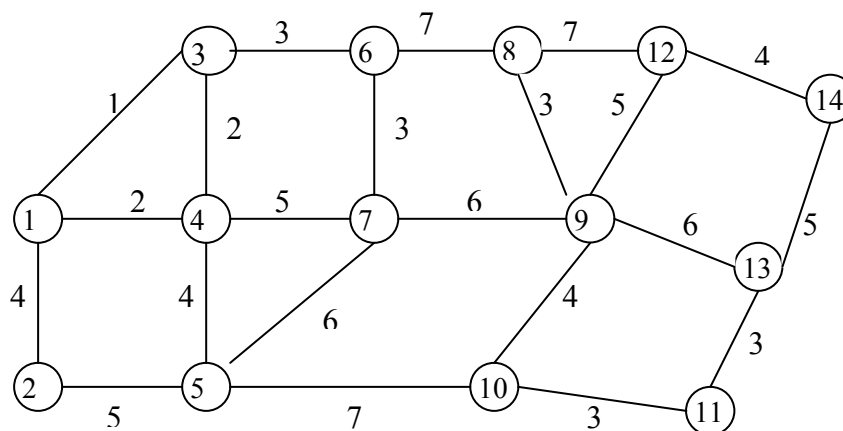
- (b) A company has three factories A, B and C which supply goods to four dealers D_1 , D_2 , D_3 and D_4 . The production capacities of these factories are 1000, 700 and 900 units per month, respectively. The requirements from the dealers are 900, 800, 500 and 400 units per month, respectively. The per unit return (excluding transportation costs) are Rs. 8, Rs. 7 and Rs. 9 at the three factories respectively. The following table gives the unit transportation cost from the factories to the dealers. Determine the optimum solution to maximize the profit. 07

	D_1	D_2	D_3	D_4
A	2	2	2	4
B	3	5	3	2
C	4	3	2	1

OR

- Q.5 (a)** What is a transshipment problem? Explain how it can be formulated and solved as a transportation problem. 07

- (b) AMB Construction is in the process of installing power lines to a large housing development. AMB Construction wants to minimize the total length of wire used, which will minimize his costs. The housing development is shown as a network in following figure. 07



Each house has been numbered, and the distances between houses are given in hundreds of feet. What do you recommend?
