

GUJARAT TECHNOLOGICAL UNIVERSITY**M.B.A. Sem-II Examination May 2011****Subject code: 820007****Subject Name: Research Methodology
& Operations Research****Date: 30/05/2011****Time: 10.30 am – 01.30 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 are the different kinds of data collection instruments? State their suitability according to their applications. **07**
- (b)** Explain Focused Group Discussions. **07**

- Q.2 (a)** A firm is engaged in producing two products, A and B. Each unit of product A requires two kg of raw material and four labour hours for processing whereas each unit of product B requires three kg of raw material and three hours of labour, of the same type. Every week, the firm has an availability of 60 kg of raw material and 96 labour hours. One unit of product A sold yields Rs 40 and one unit of product B sold gives Rs 35 as profit. Formulate this problem as linear programming problem and determine how many units of each of the products should be produced per week so that the firm can earn the maximum profit. **07**

- (b)** A market research firm wanted to discover the prime motivations behind inclination towards smoking in females. Devise an appropriate research instrument in form of a questionnaire to obtain relevant insights in this area. **07**

OR

- (b)** Write a Short Note on: Non probability methods of sampling. **07**

- Q.3 (a)** The simplex table for a maximization problem of linear programming is given below. Answer the following questions, giving reasons in brief: **07**
1. Is this solution optimal?
 2. How many units of the two products x_1 & x_2 are being produced according to this solution and what is the total profit?
 3. If S_1 is slack in machine A (in hours/week) and S_2 is slack in machine B (in hours/week), which of these machines is being used to the full capacity, when producing according to this solution?
 4. How much would you be prepared to pay for another hour (per week) of capacity each on machine A and machine B?

Optimal Solution

Basis	x_1	x_2	S_1	S_2	b_i
x_2 5	1	1	1	0	10
S_2 0	1	0	-1	1	3
C_j	4	5	0	0	

- (b)** List the six W's of descriptive research and give an example of each. **07**

OR

- Q.3 (a)** Mr. Contractor is a builder and owner of Ashiana Construction Company. Currently he has three large housing projects in hand. They are located at Andheri, Bandra and Chinchwad. He procures cement from four plants located at Dumdum, Ellora, Feroza and Guna. The basic feasible solution as determined by North West Corner rule is given below: **07**

Projects Plants	A	B	C	Availability
1	2 [50]	7	4	50
2	3 [20]	3 [60]	1	80
3	5	4 [30]	7 [40]	70
4	1	6	2 [140]	140
Demand	70	90	180	340

Mr. Contractor wants to plan movement of cement in such a manner that the optimal minimum transportation cost is reached. Assist him.

- (b)** What is a research problem? How are the research questions related to components of the problem? **07**
- Q.4 (a)** Verify that dual of dual is primal: **07**
 Maximise $Z = 2x_1 - 3x_2$
 subject to
 $x_1 + x_2 \leq 1$
 $2x_1 - 3x_2 \geq 2$
 $2x_1 + x_2 = 2$
 $x_1, x_2 \geq 0$
- (b)** Give suitable examples of usage and application of the following: **07**
1. Chi –square Test
 2. Regression Analysis

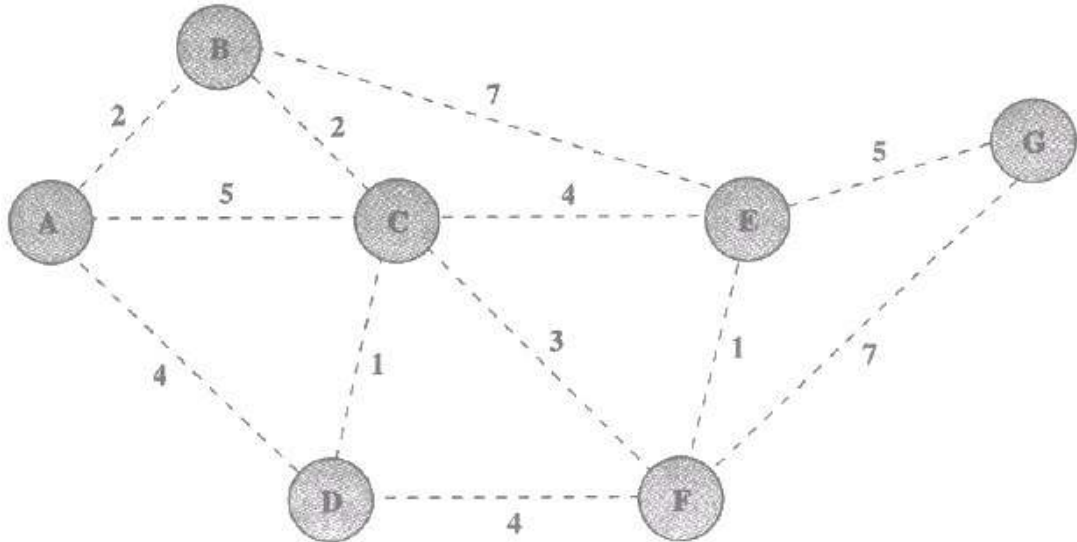
OR

- Q.4 (a)** Fix-It Shop has received three new rush projects to repair: a radio, a toaster oven, and a broken coffee table. Three repair persons, each with different talents and abilities, are available to do the jobs. The Fix-it Shop owner estimates that it will cost in wages to assign each of the workers to each of the three projects. The costs, shown in the table differ because the owner believes that each worker will differ in speed and skill on these quite varied jobs. The owner's objective is to assign the three projects to the workers in a way that will result in lowest total cost to the shop. What is the optimal assignment? **07**

	Project		
Person	1	2	3
Adams	11	14	6
Brown	8	10	11
Cooper	9	12	7

- (b)** Suggest sources of secondary data. **07**

- Q.5 (a)** Management of the Modern Corporation has decided to have a state-of-the-art fiber-optic network installed to provide high-speed communications between its major centers. The nodes in the figure show the geographical layout of the corporation's major centers. The dashed lines are the potential locations of fiber-optic cables. The number next to each dashed line gives the cost of that particular cable chosen for installation. Any pair of centers does not need to have a cable directly connecting them in order to take full advantage of the fiber-optic technology for high-speed communications between these centers. All that is necessary is to have a series of cables that connect the centers. Determine which cables should be installed to minimize the total cost of providing high-speed communications between every pair of centers. **07**



- (b)** Explain the difference between: **07**
1. Type I and Type II error
 2. One tailed and two tailed test

OR

- Q.5 (a)** A firm produces two products P and Q, which yield a contribution margin of Rs 200 and Rs 300 per unit, respectively. The firm has a limited capacity in the two departments where these products need processing. The availability and requirements are given below. Formulate it. **03**

Department	Processing Time (hours)		Daily Availability (hours)
	Product P	Product Q	
I	4	2	45
II	4	4	70

The management of the firm has specified the following goals as per their importance:

1. Produce a product-mix to make a daily profit of at least Rs 4800.
2. Achieve daily sales of at least 15 units of product Q.
3. Achieve daily sales of at least 5 units of product P.

(b) What are the advantages and disadvantages of simulation?

03

(c) Identify the type of scale being used in each of the following questions:

08

1. During which season of the year were you born?

_____ Winter

_____ Spring

_____ Summer

2. Which are your three most preferred eating joints?

Rank them from 1 to 3 according to your preference, with 1 as most preferred

_____ Honest

_____ US Pizza

_____ PizzaHut

_____ Subway

_____ McDonalds

3. How much time do you spend traveling to the institute everyday?

_____ Under 5 minutes

_____ 5-10 minutes

_____ 11-15 minutes

_____ 16 minutes and above

4. How satisfied are you with your current job profile?

_____ Very satisfied

_____ Satisfied

_____ Neither Satisfied nor Dissatisfied

_____ Dissatisfied

_____ Very Dissatisfied
