

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY**MBA - SEMESTER-II • EXAMINATION – SUMMER 2013****Subject Code: 820007****Date: 27-05-2013****Subject Name: Research Methodology and Operation Research****Time: 10:30am – 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 (a) Explain with a diagram the different sequences of a research Process. **07**

(b) A Bank is attempting to determine where its assets should be invested during the current year. At present Rs.10 crore is available for investment in the bonds, home loans, car loans and personal loans. The Annual rate of returns on each type of investment is as follows

Bonds 7%, Home Loans 9%, Car Loans 11% and Personal Loans 12%

To ensure that the bank's portfolio is not risky, the bank's investment manager has placed the following three restrictions on the bank's portfolio:

1. The amount invested in personal loan cannot exceed the amount invested in bonds.
2. The Amount invested in home loans cannot exceed the amount invested in car loans.
3. No more than 25% of the total amount invested may be in personal loans.

Formulate the above problem as the LPP

Q.2 (a) Solve the following LPP by graphical solution **07**

$$Z_{\max} = 20X_1 + 28X_2$$

Subject to constraints,

$$4X_1 + 4X_2 \leq 75 \quad \dots (i)$$

$$2X_1 + X_2 \leq 100 \quad \dots (ii)$$

$$3X_1 + 2X_2 \leq 50 \quad \dots (iii)$$

$$\text{Where } X_1, X_2 \geq 0$$

(b) Discuss in detail steps in sampling designing process **07****OR****(b)** Write Differences between Parametric V/S Non-parametric tests **07****Q.3 (a)** What are the classification of measurement scaling in research **07****(b)** Write Ten differences between Quantitative Vs Qualitative research **07****OR****Q.3 (a)** Solve the following transportation problem **07**

Destination				
Source	1	2	3	Supply
1	3	5	7	10
2	11	8	9	8
3	13	3	9	5
Demand	5	9	11	

- (b) What do we mean by 'Duality'? Write some important features of 'Primal and Dual problem. Write the dual of the following problem. Maximize $10Y_1 + 8Y_2 - 6Y_3$ STC $3Y_1 + Y_2 - 2Y_3 \leq 10$, $-2Y_1 + 3Y_2 - Y_3 \leq 12$, $Y_1, Y_2, Y_3 \geq 0$ 07

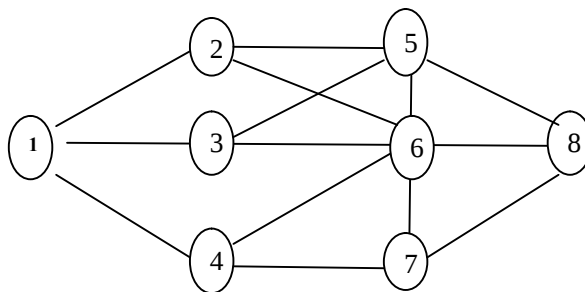
- Q.4 (a) What are the various preparation steps of the data preparation process? 07
 (b) Define Null hypothesis, Alternative Hypothesis. Write down the process of hypothesis testing. 07

OR

- Q.4 (a) Solve the accompanying cost table for the new optimal assignment of workers to projects. Why did this solution occur? 07

WORKER	PROJECT		
	1	2	3
Adams	11	14	6
Brown	8	10	11
Cooper	9	12	7
Davis	10	13	8

- Q.4 (b) A truck must travel from node 1 to node 8. As shown in figure, A variety of routes are available. Table shows the distance between two nodes of the arc. Use Dijkstra's algorithm to find the route from node 1 to node 8 that uses the minimum distance.



S. No	Arc	Distance		S. No	Arc	Distance
1	1-2	35		8	4-6	60
2	1-3	90		9	4-7	115
3	1-4	75		10	5-6	90
4	2-5	170		11	5-8	35
5	2-6	85		12	6-7	95
6	3-5	110		13	6-8	125
7	3-6	55		14	7-8	60

- Q.5 (a) Explain the Internal and External Sources of Secondary data. 07
 (b) Explain with examples about Nominal, Ordinal, Interval and Ratio level data. 07

OR

- Q.5 (a)** The campaign manager for a politician who is running for reelection to a political office is planning the campaign. Four ways to advertise have been selected: TV ads, radio ads, billboards, and newspaper ads. The cost of these are \$900 each TV ad, \$500 for each radio ad, \$ 600 for a billboard for one month, and \$ 180 for each newspaper ad. The audience reached by each type of advertising has been estimated to be 40000 for each TV ad, 32000 for each radio ad, 34000 for each billboard, and 17000 for each newspaper ad. The total monthly advertising budget is \$16000. The following goals have been established and ranked: **07**
1. The number of people reached should be at least 1500000
 2. The total monthly advertising budget should not be exceeded.
 3. Together, the number of ads on either TV or radio should be at least 6.
 4. No more than 10 ads of any one type of advertising should be used.
- Formulate this as a goal programming problem.

- (b)** Grey construction would like to determine the least expensive way of connecting houses it is building with cable TV. It has identified 11 possible branches or routes that could be used to connect the houses. The cost in hundreds of dollars and the branches are summarized in the following table. What is the least expensive way to run cable to the houses? **07**

BRANCH	START NODE	END NODE	COST (\$100)
Branch 1	1	2	5
Branch 2	1	3	6
Branch 3	1	4	6
Branch 4	1	5	5
Branch 5	2	6	7
Branch 6	3	7	5
Branch 7	4	7	7
Branch 8	5	8	4
Branch 9	6	7	1
Branch 10	7	9	6
Branch 11	8	9	2
