

Seat No.: \_\_\_\_\_

Enrolment No. \_\_\_\_\_

**GUJARAT TECHNOLOGICAL UNIVERSITY****M.B.A.- SEMESTER – II • EXAMINATION – WINTER 2012****Subject code: 820007****Date: 05-01-2013****Subject Name: Research Methodology and Operations Research****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 is Research? Explain the importance of research in decision making in business management. **07**
- (b) How qualitative approach differs from quantitative approach in business research? **07**

- Q.2** (a) What is sampling? What precautions are required to take decisions for the best sample size out of the universe? **07**
- (b) What is measurement and scaling? What steps are required for reliability and validity of scales? **07**

**OR**

- (b) Compare advantages of experiment method along with survey and observation method. **07**
- Q.3** (a) Explain in Detail the steps of hypothesis testing. What is the virtue Of this procedure? **07**
- (b) Use the following contingency table and appropriate test to determine whether social class is independent of number of children in a family. Let  $\alpha = .05$  **07**

		Social Class			
		Lower	Middle	Upper	
Number of Children	0	7	18	6	31
	1	9	38	23	70
	2 or 3	34	97	58	189
	>3	47	31	30	108
		97	184	117	398

**OR**

- Q.3** (a) Distinguish between the following: **07**
- I. Parametric tests and nonparametric tests
  - II. Null hypothesis and alternative hypothesis.
  - III. One-tailed tests and two-tailed tests.
- (b) You conduct a survey of a sample of 25 members of this year's graduating students and find that the average GPA is 3.2. The standard deviation of the sample is 0.4. Over the last 10 years, the average GPA has been 3.0. Is the GPA of this year's students significantly different from the long-run average? At what alpha level would it be significant? **07**

- Q.4** An exporter of ready-made garments makes two types of shirts: X and Y. He makes a profit of Rs 10 and Rs 40 per shirts on X and Y, respectively. He has two tailors, A and B, at his disposal to stitch these shirts. Tailors A and B can devote **14**

at the most 7 hours and 15 hours per day, respectively. Both these shirts are to be stitched by both the tailors. Tailor A and Tailor B spend 2 hours and 5 hours, respectively, in stitching an X shirt and 4 hour and 3 hours, respectively, in stitching a Y shirt. How many shirts of both types should be stitched in order to maximize daily profits? (A non-integer solution for this problem will not be accepted.)

OR

**Q. 4 (a)** Obtain graphically the solution to the following LP problem: **07**

Maximize  $Z = x_1 + 3x_2$

Subject to

$$x_1 + 2x_2 \leq 9$$

$$x_1 + 4x_2 \leq 11$$

$$x_1 - x_2 \geq 2$$

$$x_1, x_2 \geq 0$$

**(b)** Write Dual of following problem **07**

Maximize  $Z = 3x_1 + 5x_2 + 7x_3$

Subject to

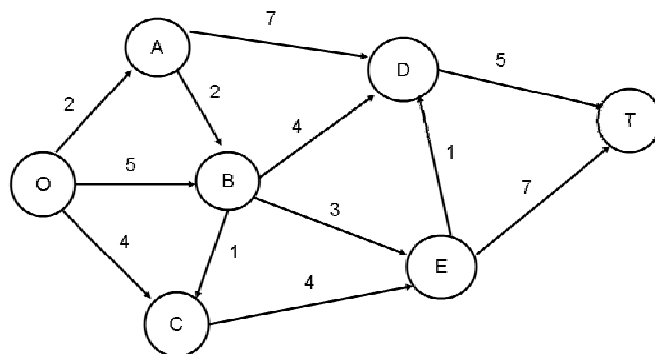
$$2x_1 + 4x_2 + 3x_3 \leq 40$$

$$-4x_1 + 5x_2 - 3x_3 \geq 25$$

$$x_1 + 2x_2 + 5x_3 = 15$$

$$x_1, x_2 \geq 0, x_3: \text{unrestricted in sign}$$

**Q.5** SEERVADA PARK has recently been set aside for a limited amount of sightseeing and backpack hiking. Cars are not allowed into the park, but there is a narrow, winding road system for trams and for jeeps driven by the park rangers. This road system is shown in following figure, where location O is the entrance into the park; other letters designate the locations of ranger stations. The numbers give the distances of these winding roads in miles. **14**



The park contain a scenic wonder at station T. A small number of trams are used to transport sightseers from the park entrance to station T and back. The park management currently faces two problems.

- I. One is to determine which route from the park entrance to station T has the smallest total distance for operation of the trams.
- II. A second problem is that telephone lines must be installed under the roads to establish telephone communication among all the stations (including the park entrance). Because the installation is both expensive and destructive to the natural environment, lines will be installed under just enough roads to provide some connection between every pair of stations. The question is where the lines should be laid to accomplish this with a minimum total number of miles of line installed.

Using network techniques, determine the solution of the above problem.

**OR**

- Q.5 (a)** A cement company has three factories which manufacture cement which is then transported to four distribution centers. The quantity of monthly production of each factory, the demand of each distribution centre and the associated transportation cost per quintal are given as follows: **07**

		Distribution Centers				Monthly Production (In quintals)
		W	X	Y	Z	
Factories	A	10	8	5	4	7000
	B	7	9	15	8	8000
	C	6	10	14	8	10,000
Monthly Demand (in quintals)		6000	6000	8000	5000	

If the company wants at least 5,000 quintals of cement are transported from factory C to distribution centre Y, Suggest the optimal transportation schedule.

- (b)** A company plans to assign 5 salesmen to 5 districts in which it operates. Estimates of sales revenue in thousands of rupees for each salesman in different districts are given in the following table. In your opinion, what should be the placement of the salesmen if the objective is to maximize the expected sales revenue? **07**

Salesman	District				
	D1	D2	D3	D4	D5
S1	40	46	48	36	48
S2	48	32	36	29	44
S3	49	35	41	38	45
S4	30	46	49	44	44
S5	37	41	48	43	47

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