Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

MBA. Sem-II Remedial Examination December 2010

Subject code: 820007

Subject Name: Research Methodology and operations Research

Date: 24 /12 /2010 **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)** Find the graphical solution of the following problem. **07**

Find x and y so as to Minimize Z = X + Y subject to the following constraints;
$5X + 10Y \leq 50$, $X + Y \geq 1$, $Y \leq 4$, X , $Y \geq 0$. Observe the solution and comment on it.

Write the dual of this problem.

(b) State and explain the following important features of 'Explanatory Data Analysis' **07**
(1) Frequency table and Histogram (2) Stem and Leaf displays (3) Boxplots

Q.2 **(a)** Explain salient features of 'Goal Programming'. **07**

Construct a goal programming problem using the following facts. Show the deviational variables in the constraints.

Resource type	Product 1	Product 2	Available Resource
Labor hours	2	4	600
Material 1	4	5	1000
Material 2	5	4	1200
Profit per Unit	Rs. 20	Rs. 32	

It is known that production of one unit of product 1, would maintain 0.3 person and one unit of production of product 2 would maintain 0.75 person. The manager has set up two goals (1) profit of Rs. 5400 and (2) A total staff of 108 persons.

(b) Identify the differences between Parametric and non-Parametric tests. in the context of **07**
χ^2 test , comment on 'Goodness of fit is identified by badness of fit'. It is hypothesized by a researcher that the three cities A , B ,and C have selling potential of a product in the ratio 2:3:4. The sales manager of the company gave the actual sales figures 380 , 640, and 780 in the respective cities .What test do you suggest? Perform basic steps towards the solution and find the calculated value. (There is no need of searching for 'Table value'.)

OR

(b) What is a research? State each aspect of a good research and write distinct features or characteristics of that aspect. **07**

Q.3 **(a)** Define hypothesis in research terminology. What is a null hypothesis? Give important features on each of the followings. **07**
(1) Descriptive Hypothesis (2) Relational Hypothesis (3) Co relational Hypothesis, and (4) Explanatory Hypothesis. Explain type-I and type –II errors.

(b) It was claimed that persons crossing certain age group may not like to change their reading habits. The study of 22 randomly selected persons divided in two equal groups, the total numbers of books or magazines they read during a span of one year are as follows. **07**

	Group A	Group B
Average books read	1500	1300
Standard Deviation	225	251

Do the two groups means differ from each other? (Use 0.05 % level of significance)

OR

Q.3 **(a)** Briefly discuss the two important features –(1) Accuracy and (2) Precision of a good sample. Discuss Cluster Sampling and Double Sampling. **07**

(b) Find a simple (linear) regression using the following data and also graph the relation you obtain. **07**

X	Y
12	2000
16	3000
20	4000
24	5000

Q.4 **(a)** Describe the complete procedure of finding graphical solution of a linear programming problem. What do you understand by 'convex region'? Discuss one special case in the graphical solution of such problem. **07**

(b) What do we mean by 'Duality'? Write some important features of 'Primal & Dual' problem. **07**

Write the dual of the following problem.

Maximize $10\ Y_1 + 8\ Y_2 - 6\ Y_3$ subject to the following constraints.

$3\ Y_1 + Y_2 - 2\ Y_3 \leq 10$, $-2Y_1 + 3\ Y_2 - Y_3 \geq 12$, Y_1, Y_2 , $Y_3 \geq 0$

OR

Q.4 **(a)** Write the dual of the following problem. Graph both the Primal and its Dual. **07**

Maximize $Z = 5X + 7Y$, Subject to $X + Y \leq 4$, $3X + 8Y \leq 26$, $10\ X + 7Y \leq 35$

$X , Y \geq 0$

(b) Find an initial basic feasible solution to the following transportation problem. Is it an optimal one ? **07**

TO / FROM	D1	D2	D3	D4	AVAILABLE UNITS
O1	5	4	2	1	130
O2	2	3	7	5	100
O3	5	4	5	6	30
DEMAND	40	50	70	100	

Q.5 **(a)** Solve the following assignment problem. (Assign one machine to one worker so that total time in hours is minimized.) **07**

Time Matrix

Machine / Man	M1	M2	M3	M4	M5
A	3	2	7	4	8
B	5	4	3	8	5
C	3	7	9	1	2
D	4	2	6	5	7
E	2	8	4	6	6

(b) Explain the basic concepts of Sensitivity Analysis. What are the different factors affecting the given solutions and how do we resolve them? Give a brief comment on each of them. **07**

OR

Q.5 **(a)** What is a travelling salesman's problem? **07**

Stating an upper bound of the solution, solve the problem.

You are required to design a complete route for a salesman who begins from the city 'A' and he is required to return to the same city 'A'. The distances in miles between the cities are given as follows.

TO / FROM	A	B	C	D	E	F
A	---	25	18	35	50	39
B	21	---	28	16	30	13
C	22	28	----	14	16	20
D	35	12	14	-----	12	12
E	50	30	16	12	-----	8
F	39	15	20	12	7	-----

(b) What is Simulation? Describe Monte Carlo Simulation. Explain applications of simulation in business environment. **07**

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