International Islamic University Chittagong

Department of Business Administration

MBA Mid-Term Examination

Trimester: Autumn-2019

Course Title: Quantitative Business Analysis

Course Code: QTM-5403

Time: 2.00 hours | Marks: 30

[Answer any **three** of the following questions]

1. $3+3+4=10$

(a) Discuss the role of qualitative & quantitative analysis in decision making.

(b) Define model. Mention the characteristics of a good model.

(c) Discuss the phases of decision-making process through QBA.

2. $2+2+6=10$

(a) Explain briefly, why simplex method is superiority to all other methods of solving LP problem.

(b) Give highlight on sensitivity analysis.

(c) The mathematical model and the final simplex tableau for a linear programming product mix problem are given below:

Maximize, $Z = 2x_1 + 5x_2 + 8x_3 + 0s_1 + 0s_2 + 0s_3$

Subject to,

$6x_1 + 8x_2 + 4x_3 \le 96$ [Department-I]

$2x_1 + x_2 + 2x_3 \le 40$ [Department-II]

$5x_1 + 3x_2 + 2x_3 \le 60$ [Department-III]

$x_1, x_2, x_3 \ge 0$

Final Simplex Tableau:

		C_j	2	5	8	0	0	0
C_B	Basis	Solution	x_1	x_2	x_3	s_1	s_2	s_3
5	x_2	$\frac{8}{3}$	$\frac{1}{3}$	1	0	$\frac{1}{6}$	$-\frac{1}{3}$	0
8	x_3	$\frac{56}{3}$	$\frac{5}{6}$	0	1	$-\frac{1}{12}$	$\frac{2}{3}$	0
0	s_3	$\frac{44}{3}$	$\frac{7}{3}$	0	0	$-\frac{1}{3}$	$-\frac{1}{3}$	1
	Z_j	$\frac{488}{3}$	$\frac{25}{3}$	5	8	$\frac{1}{6}$	$\frac{11}{3}$	0
	$C_j - Z_j$		$-\frac{19}{3}$	0	0	$-\frac{1}{6}$	$-\frac{11}{3}$	0

Requirements:

(i) Is this solution feasible? If yes, why? If no, why not?

(ii) Find the 'range of optimality' of the decision variable x_2.

(iii) Find the 'range of feasibility' of Department I.

(iv) Which of these departments is being used to full capacity when producing according to this solution?

3. $3 + 2 + 5 = 10$

(a) Discuss about the multiple objectives decision-making criteria.

(b) Write down the application areas of Goal Programming.

(c) The ABC paint Company specializes in manufacturing two types of outdoor paints, a water-base and an enamel paint. The production of each 100 gallons of the water-base paint requires 10 hours of labor while each 100 gallons of enamel paint requires 15 hours of labor. 40 hours of labor are available weekly. Additional help is not available and overtime will not be employed. Both paints provide a profit of Tk.1.00 per gallon. The owner of the ABC paint Company has established the following goals:

Goal 1: Avoid overtime operations.
Goal 2: Achieve a weekly profit of Tk.1000.
Goal 3: produce at least 700 gallons of enamel paint per week.

Solve the problem graphically.

4. $2 + 2 + 6 = 10$

(a) Define Simulation. Why system simulation technique is superior to Monte-Carlo technique?

(b) Mention the application areas of simulation technique.

(c) The investment corporation of Bangladesh wants to study the investment project based on three factors: market demand in units, profit per unit and the investment required. These factors are felt to be independent of each other. In analyzing a new consumer product, the corporation estimates the following probability distribution:

Annual demand		Profit per unit		Investment required	
Units	Probability	Tk.	Probability	Tk.	Probability
20,000	0.05	1.00	0.10	15,00,000	0.20
25,000	0.10	3.00	0.20	20,00,000	0.50
30,000	0.20	5.00	0.40	25,00,000	0.30
35,000	0.30	7.00	0.20		
40,000	0.20	9.00	0.10		
45,000	0.10				
50,000	0.05				

Consider the following random number:

For demand	: 28	57	60	17	64	20	27	58	61	30
For profit / unit	: 19	07	90	02	57	28	29	83	58	41
For investment	: 17	67	16	71	43	68	47	24	19	97

Using simulation process, repeat the trial 10 times, compute the return on investment for each trial taking these three factors into account approximately, select the most likely return.

....The End....