

# International Islamic University Chittagong

Department of Business Administration

## Mid-Term Examination

Trimester: Summer 2022

Program: MBA

Course Code: MATH-4101

Course Title: Business Mathematics

Time: 2 hours

[Answer any three (3) questions]

Full Marks: 30

(3+3+4)

1. (a) What is an equation? Mention the characteristics of equation. Compare equation with function.
- (b) The price of two pens and five bags is Tk.68,000. If the price of a bag exceeds that of a pen by Tk.800, find the price of each.
- (c) Deluxe Tire Company finds that to produce each additional tire it costs \$21.50. The fixed costs of the plant operation amount to \$126,000 per month. The tires are sold for \$58 each.
- Find the revenue and cost functions for the operation.
  - How many tires must be produced and sold in order for Deluxe to break even in a month?
  - How many tires must be produced and sold in order for Deluxe to earn a profit of \$40,000 in a month?

(2+4+4)

- 2.(a) Why matrix algebra is so important in business? Discuss: a) Singular matrix, and b) Cofactor matrix.

- (b) A factory produces two types of drinking water: slalom water ski and trick water ski. To produce a slalom water ski, it requires 5 labor-hours in the assembly department and 3 labor-hour in the finishing department. To produce a trick water ski, it requires 3.5 labor-hours in the assembly department and 1.5 labor-hours in the finishing department. Assembly personnel receive \$15 per hour and finishing personnel receive \$12 per hour. Calculate the total labor cost by matrix.

- (c) A manufacturer produces three products A, B, C that he sells in the market. Annual sales volumes are indicated as follows:

Market	Products		
	A	B	C
I	8000	10000	15000
II	10000	2000	20000

- (i) If unit sale prices of A, B and C are \$2.25, \$1.50 and \$1.25 respectively, find the total revenue in each market with the help of matrices.
- (ii) If the unit costs of the above three products are \$1.60, \$1.20 and \$0.90 respectively, find the gross profit with the help of matrices.

(2+3+5)

- 3.(a) What is quadrant? Discuss different types of slope.
- (b) Find the equation of the straight line passing through the point (-3, 1) and perpendicular to the line  $5x-2y+7=0$ .
- (c) A company finds that when the temperature is  $12^{\circ}\text{C}$  it uses 100 litres of heating oil per day. When the temperature is  $5^{\circ}\text{C}$ , it uses 170 litres of heating oil per day.
- Write down the coordinates of the above problem.
  - Find the equation (assumed to be linear) for oil usage in terms of temperature.
  - Find the amount of oil that would be used at  $9^{\circ}\text{C}$ .

(2+8)

4. (a) Discriminate between open model and closed model in input-output analysis.

(b) An economy is based on three sectors: Agriculture, Transport & Energy. Production of a dollar's worth of agriculture requires an input of \$0.20 from agriculture sector, \$0.20 from Transport & \$0.20 from energy sector. Production of a dollar's worth of Transport sector requires an input of \$0.40 from agriculture, \$0.20 from transport & \$0.30 from energy sector. And finally production of a dollar's worth of energy requires an input of \$0.30 from each sector.

(i) Construct the relevant input coefficient matrix.

(ii) Find the output level of each sector that is needed to satisfy a final demand of \$20 billion from agriculture \$10 billion from transport & \$12 billion from energy.

(iii) Find the total primary input requirements.

..... **The End**.....