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TOPICALLY ARRANGED

Updated With December 2025 Past Paper with Answers

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PART A:

PAST PAPERS QUESTIONS

TOPIC 1

MATHEMATICAL TECHNIQUES

QUESTION 1

December 2025 Question One C

The total revenue function of producing product A is linear in nature.
The following data shows the number of units of product A sold and the corresponding sales revenue in thousands of shillings:

Sales Revenue (Sh."000")	24	37.5
Number of units sold, Q	50	80

The total cost (TC) function is given as TC = 170Q + 5700 (in thousands in shillings.)

Required:

(i) Formulate the revenue function. (5 marks)
(ii) Determine the break-even quantity of producing product A. (4 marks)
(iii) Determine the total profit when the number of units sold is 250 units. (2 marks)

QUESTION 2

December 2025 Question Two A

Boramax Ltd. has won a tender to supply 500 doors, 900 windows and 1,500 metallic cabinets to a housing agency. The management of Boramax Ltd. decided that 300 doors, 400 windows and 700 metallic cabinets could be supplied by supplier A and the balance of the order could be filled from supplier B.
The following details were provided by the suppliers:

1. Production of each door requires 2 hours in welding department, 7 hours in the painting department and 5 hours in the drying department.
2. Production of windows requires 3 hours in the welding department, 5 hours in the painting department and 9 hours in the drying department.
3. Production of metallic cabinet requires 3 hours in the welding department, 5 hours in the painting department and 5 hours in the drying department.
4. The cost per hour in the welding, painting and drying department is Sh.30, Sh,70 and Sh.110 respectively.

Required:

Using the matrix algebra, calculate:

(i) The total number of hours required at each department. (6 marks)

PART B:

SUGGESTED ANSWERS AND SOLUTIONS

TOPIC 1

MATHEMATICAL TECHNIQUES

QUESTION 1

December 2025 Question One C

(i) **Revenue function.**

Total revenue (TR) = a + bQ

When:

TR = 24 (Sh. 000) = 24000

Q = 50

24000 = a + 50b …..i

37500 = a + 80b……ii

- 13500 = - 30b

b = 450

24000 = a + 50(450)

a = 24000 – 22500

= 1500

Hence,

TR = 1500 + 450Q

(ii) **Break-even quantity of producing product A.**

TC = 170Q + 5700

TR = 1500 + 450Q

At break-even point (B.E.P)

TC = TR

170Q + 5700 = 1500 + 450Q

- 280Q = - 4200
- Q = 15 units

(iii) **Total profit (TP) when the number of units sold is 250 units.**

TP = (TR) – (TC)

$[1500 + 450\ (250)] - [170(250) + 5700]$

= Sh. 65, 800

QUESTION 2

December 2025 Question Two A

Boramax Ltd.

(i) **The total number of hours required at each department.**

Let:

D = doors

W = windows

M = metallic cabinets

X = welding department

Z = drying department

Matrix of quantity supplied by each supplier:

Space A = $\begin{pmatrix} D & W & M \\ 300 & 400 & 700 \end{pmatrix}$

Space B = $\begin{pmatrix} D & W & M \\ 200 & 500 & 800 \end{pmatrix}$

Hence, matrix of quantity supplied by A&B = $\begin{matrix} & D & W & M \\ A & 300 & 400 & 700 \\ B & 200 & 500 & 800 \end{matrix}$

Matrix of hours per item in each department:

$$\begin{matrix} & X & Y & Z \\ D & 2 & 7 & 5 \\ W & 3 & 5 & 9 \\ M & 3 & 5 & 5 \end{matrix}$$

Total hours = No of items x hours per item

$$\begin{matrix} & D & W & M \\ A & 300 & 400 & 700 \\ B & 200 & 500 & 800 \end{matrix} \times \begin{matrix} & X & Y & Z \\ D & 2 & 7 & 5 \\ W & 3 & 5 & 9 \\ M & 3 & 5 & 5 \end{matrix}$$

$$\begin{matrix} & X & Y & Z \\ A & 3900 & 7600 & 8600 \\ B & 4300 & 7900 & 9500 \end{matrix}$$

Hence, the total number of hours required at each department

Department		Total hours required
X	3900 + 4300	8200
Y	7600 + 7900	15500
Z	8600 + 9500	18100

(ii) **Calculate the total cost incurred by each supplier.**

Total hours × Cost per hour

$$\begin{matrix} & X & Y & Z \\ A \\ B \end{matrix}\begin{pmatrix} 3900 & 7600 & 8600 \\ 4300 & 7900 & 9500 \end{pmatrix} \times \begin{matrix} X \\ Y \\ Z \end{matrix}\begin{pmatrix} 30 \\ 70 \\ 110 \end{pmatrix}$$

$$\begin{matrix} A \\ B \end{matrix}\begin{pmatrix} 1595000 \\ 1727000 \end{pmatrix}$$

Hence,

Supplier	Total cost
	Sh.
A	1,595,000
B	1,727,000

(iii) **The total cost incurred by Boramax Ltd. to supply the order.**

= 1,595,000 + 1,727,000

Sh. 3,322,000

QUESTION 3

December 2025 Question Three B

Profit midpoint

Sh.000	x	f	cf	fx	fx^2
15 - 19	17	8	8	136	2312
20 – 24	22	10	18	220	4840
25 – 29	27	14	32	378	10,206
30 – 34	32	21	53	672	21,504
35 – 39	37	11	64	407	15,059
40 – 44	42	8	72	336	14,112
45 – 49	47	4	76	188	8,836
		76		2,337	76,868

(i) **Arithmetic mean profit.**

$\bar{x} = \frac{\sum fx}{\sum f} = \frac{2,337}{76} = 30.75$ (Sh.000)

(ii) **Modal profit.**

$M_0 = L + \left[\frac{f_m - f_0}{(f_m - f_0) + (f_m - f_1)}\right] \times C$

Modal class = 30 – 34

L = 29.5

f_m = 21

f_0 = 14

f_1 = 11

c = 5

$M_0 = 29.5 + \left[\frac{21-14}{(21-14)+(21-11)}\right] \times 5$

= 31.56 (Sh. 000) Approx.

(iii) **Median profit (M_d)**

$M_d = L + \left[\frac{\frac{n}{2} - cf_0}{f_m}\right] \times C$

Median = Value of $\left(\frac{76}{2}\right)^{th}$ item

Is value 38th item

Median class = 30 – 34

L = 29.5

f_m = 21

cf_0 = 32

c = 5

Median = $29.5 + \left[\frac{\frac{76}{2} - 32}{21}\right] \times 5$

30.93 (Sh.000) Approx.

(iv) **Standard deviation of the data.**

$SD = \sqrt{\frac{\Sigma fx^2}{\Sigma f} - \left(\frac{\Sigma fx}{\Sigma f}\right)^2}$

$= \sqrt{\frac{76869}{76} - \left(\frac{2337}{76}\right)^2}$

= 8.12 (Sh. 000) Approx.

(v) **Coefficient of variation of the data.**

$CV = \frac{SD}{\bar{x}} \times 100\%$

$= \frac{8.12}{30.75} \times 100\% = 26\%$ Approx.

QUESTION 4

December 2025 Question Four B

The integral of the function.