

LOCATION: SWANSEA

LLEOLIAD: ABERTAWE

LEVEL 4

LEFEL 4

EXAMINATION PERIOD
JULY 2022

CYFNOD ARHOLIADAU
GORFFENNAF 2022

MODULE CODE: ACDA4003& ACDA4008
Mathematics

TIME: 2 HOURS

ANSWER ALL QUESTIONS

SHOW ALL YOUR WORKINGS WHEN ANSWERING QUESTIONS

Equipment or materials required –Approved Calculators; Tables of Derivatives and Integrals of Common Functions; Formula Sheet

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ANSWER ALL QUESTIONS

WHEN ANSWERING QUESTIONS SHOW ALL YOUR WORKINGS

Q1)

- a. Solve the following equation for x:

$$\frac{x+8}{6} - \frac{x+3}{4} = \frac{3x+1}{4}$$

[5 Marks]

- b. Solve the pair of simultaneous equations for x:

$$\begin{aligned} 2x + 3y &= 3 \\ 5x - 3y &= 18 \end{aligned}$$

[4 Marks]

- c. Solve the following equation for x:

$$2x^2 + 4x - 6 = 0$$

[5 Marks]

Q2)

a. Given $\mathbf{A} = \begin{bmatrix} 1 & 2 & 3 \\ 3 & 1 & 0 \\ 4 & 1 & 2 \end{bmatrix}$ and $\mathbf{B} = \begin{bmatrix} 1 & 2 & 1 \\ -1 & -3 & -1 \\ 1 & 4 & 1 \end{bmatrix}$

find:

i) $\mathbf{AB}$

[5 Marks]

ii) $\mathbf{A-B}$

[3 Marks]

iii) $\mathbf{A+B}$

[3 Marks]

iv) $\mathbf{A}^T$

[3 Marks]

b. Given $\mathbf{A} = \begin{bmatrix} 2 & 3 & -1 \\ 2 & 5 & -2 \\ -1 & 2 & 1 \end{bmatrix}$, find the determinant of $\mathbf{A}$.

[5 Marks]

- c. Using any method to find x, y and z in the following set of simultaneous equations.

$$\begin{aligned} 2x + 3y - 1z &= 3 \\ 2x + 5y - 2z &= -3 \\ -1x + 2y + 1z &= 6 \end{aligned}$$

[5 Marks]

(Please turn over page)

Q3)

- a. For the two vectors: $\overrightarrow{OP} = 2 + 6\mathbf{j}$ and $\overrightarrow{OR} = -6 + 8\mathbf{j}$, find:
- Find $|\overrightarrow{OP}|$ [3 Marks]
 - Find an expression for $\overrightarrow{PR}$ [5 Marks]
- b. For the two vectors: $\underline{a} = 1\underline{i} - 4\underline{j} + 3\underline{k}$ and $\underline{b} = 5\underline{i} - 2\underline{j} + 3\underline{k}$ find:
- $\underline{a} \times \underline{b}$ [5 Marks]
 - $\underline{a} \cdot \underline{b}$ [5 Marks]
- c. For the two complex numbers: $z = -1 + 2i$ and $w = 2 + 4i$ find:
- $2z + w$ [5 Marks]
 - zw [5 Marks]
 - $\frac{z}{w}$ [7 Marks]

Q4)

- a. Find the derivatives of the following functions with respect to x:
- $3x^2$ [5 Marks]
 - $x^3 + \cos 5x$ [5 Marks]
 - xe^{3x} [5 Marks]
- b. Integrate the following functions with respect to x:
- $4x^3$ [5 Marks]
 - $e^{2x} + \cos 5x$ [7 Marks]

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