

LOCATION: SWANSEA

LLEOLIAD: ABERTAWE

LEVEL 4

LEFEL 4

**EXAMINATION PERIOD
MAY 2022**

**MODULE CODE: ACMA4006
ENGINEERING MATHEMATICS (TEST 1 RESIT)**

TIME: 1 ½ HOURS

ANSWER ALL QUESTIONS

Equipment or materials required –

Calculators allowed

Formula booklet provided

Show all workings

Total marks: 86

IMPORTANT INSTRUCTIONS FOR ONLINE EXAMINATIONS:

- *You will need to submit a digital photograph or scan of each page of workings*
- *Please submit these to Moodle (underneath where you accessed the exam paper)*
- *Put the time, date, module code and your student number at the top of each page*
- *Number each page 'x of y'*
- *If you have any issues, email richard.sutton@uwtsd.ac.uk*

QUESTION ONE

a) Solve the following equations, using the appropriate method, for x :

(i) $\frac{(x+1)}{5} + \frac{(x-5)}{3} = \frac{x}{5}$

(ii) $2 \ln(x + 5) = \ln(x + 1) + \ln(x + 7)$

(iii) $4^{x+5} = 2 \times 3^x$

(11 marks)

QUESTION TWO

a) Solve the following quadratic equation by using the quadratic formula:

$$8x^2 = -3x + 16$$

(5 marks)

b) Solve the following quadratic equations **by using the factorisation method**:

(i) $x^2 + 7x + 10 = 0$

(ii) $x^2 - 9x + 14 = 0$

(iii) $x^2 - 100 = 0$

(iv) $x^2 + 11x = -10$

(12 marks)

QUESTION THREE

a) Solve the following trigonometric equations for $0^\circ \leq x \leq 360^\circ$:

(i) $\cos x = 0.32$

(ii) $-9 \sin x = 7$

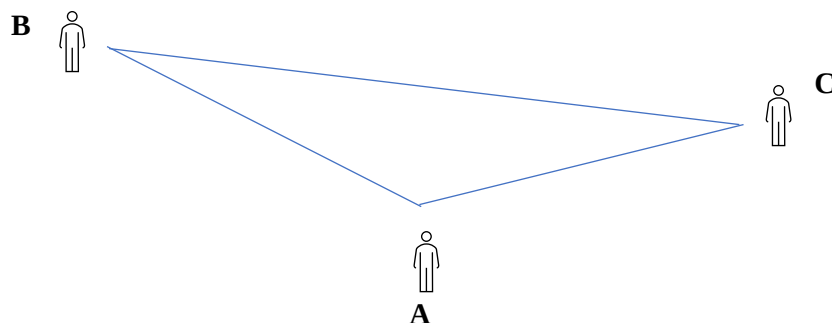
(iii) $\tan^2 x - 9 \tan x + 20 = 0$

(12 marks)

QUESTION FOUR

The following people are testing some distance measuring apparatus. If the angle at point A is 65° , the angle at point B is 39° and the distance between person A and C is 37 metres, calculate:

- (i) The angle at C
- (ii) The distance between person A and person B
- (iii) The distance between person B and person C



Triangle not drawn to scale.

(6 marks)

QUESTION FIVE

a) Find the first derivative of the following functions:

(i) $y = 7x^2 - 10x + e^x$

(ii) $y = (x - 3)^2$

(iii) $y = \sqrt[3]{x} - \frac{2}{x^7}$

(iv) $y = \sin 5x + \cos 3x - \tan 4x$

(v) $y = x^3 \sin x$

(vi) $y = \frac{\sin 3x}{e^{2x}}$

(vii) $y = (x^4 - 4x + 3)^4$

(22 marks)

b) Find the four second order partial derivatives of the following:

$$z = x^7 - 4x^3y^4 + y^3$$

(6 marks)

TOTAL MARKS: 74