

ST CLEMENTS UNIVERSITY, HIGHER EDUCATION SCHOOL
NIUE

BACHELOR OF APPLIED ENGINEERING (ELECTRICAL)
BAE 401 ADVANCED ENGINEERING MATHEMATICS

QUESTION (1)

FINAL TEST (100 MARKS)

$z_1 = 1 - 2i$, $z_2 = 3 + 2i$ FIND $z_1 z_2$ AND $\frac{z_1}{z_2}$

(10 MARKS)

QUESTION (2)

FIND A LAURENT EXPANSION OF $\frac{z}{z^2 + z - 2}$

ABOUT $z = 0$ WHICH IS VALID FOR $z = \frac{3}{2}$

(10 MARKS)

QUESTION (3)

FIND VELOCITY AND ACCELERATION VECTOR

FOR $\vec{R} = \hat{i} e^t \cos t + \hat{j} e^t \sin t$

(10 MARKS)

QUESTION (4)

$$2x + y - 3z = 1$$

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

$$5x + 2y - 6z = 6$$

FIND x, y, z BY VECTOR METHOD

(10 MARKS)

QUESTION (5)

FIND DIRECTIONAL DERIVATIVE BY USING GRADIENT

METHOD (1) $\nabla f = \hat{i} \frac{\partial f}{\partial x} + \hat{j} \frac{\partial f}{\partial y} + \hat{k} \frac{\partial f}{\partial z}$

QUESTION (6)

$y' + 2y \tanh x = 0$ FIND GENERAL SOLUTION

(10 MARKS)

QUESTION (7)

THERE ARE 12 PARKING PLACES IN A LINE ON A PARKING SPACE TO A GIVEN TIME. 4 OF THE PLACES ARE FREE. FIND THE PROBABILITY THAT THESE 4 PLACES ARE SUCCESSIVE IN TIME

(10 MARKS)

QUESTION (8)

| ESTIMATED SOURCE | MEAN | STANDARD DEVIATION |
|------------------|------|--------------------|
| SALES MANAGER | 110 | 10 |
| MARKET SURVEY | 70 | 7 |

FIND COMBINED ESTIMATE & COMBINED STANDARD DEVIATION

(10 MARKS)

QUESTION (9)

EVALUATE $\oint_C \frac{z^2 - e^{x^2}}{z^2 (z^2 - 1) (z + 3)} dz$ WHERE

C IS THE JORDAN CURVE $|z| = 2$ MAPPED COUNTER CLOCKWISE

(10 MARKS)

QUESTION (10)

$u(x) = x^2$ FIND THE FIRST ORDER FORWARD OF F.D APPROXIMATION TO $u_x(3)$ USING STEP SIZE $h = 0.1$

(10 MARKS)