ELIZADE UNIVERSITY, ILARA-MOKIN, ONDO STATE
FACULTY OF ENGINEERING
DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING

FIRST SEMESTER EXAMINATION, 2017/2018 ACADEMIC SESSION

COURSE TITLE: ENGINEERING MATHEMATICS III

COURSE CODE: GNE 315

EXAMINATION DATE: 27th March 2018

COURSE LECTURER: Dr. O. Akinsanmi

HOD's SIGNATURE

TIME ALLOWED: <u>3 HOURS</u>

INSTRUCTIONS:

1. ANSWER <u>FIVE QUESTIONS ONLY</u>
2. SEVERE PENALTIES APPLY FOR MISCONDUCT, CHEATING, POSSESSION OF UNAUTHORIZED MATERIALS DURING EXAM.
3. YOU ARE **NOT** ALLOWED TO BORROW ANY WRITING MATERIALS DURING THE EXAMINATION.

Question 1

(a) If $A = \begin{pmatrix} 4 & 5 & 6 & 7 \\ 3 & 1 & 9 & 4 \end{pmatrix}$ and $B = \begin{pmatrix} 2 & 8 & 3 & -1 \\ 5 & 2 & -4 & 6 \end{pmatrix}$

   Determine (i) $A + B$ (ii) $A - B$ (iii) $2B$ [3 marks]

(b) Solve the linear equations by Gaussian Elimination Method

$$x_1 + 2x_2 - 3x_3 = 3$$
$$2x_1 - x_2 - x_3 = 11$$
$$3x_1 + 2x_2 + x_3 = -5$$ [9 marks]

Question 2

(a) If $A = \begin{pmatrix} 4 & 3 \\ 2 & 7 \\ 6 & 1 \end{pmatrix}$ and $B = \begin{pmatrix} 5 & 9 & 2 \\ 4 & 0 & 8 \end{pmatrix}$

   Determine (i) $5A$ (ii) $B.A$ (iii) $A.B$ [3 marks]

(b) Solve the linear equations by Cofactor Method

$$x_1 + 2x_2 + x_3 = 4$$
$$3x_1 - 4x_2 - 2x_3 = 2$$
$$5x_1 + 3x_2 + 5x_3 = -1$$

     [9 marks]

Question 3

(a) (i) If $A = \begin{pmatrix} 2 & 6 \\ 5 & 7 \\ 4 & 1 \end{pmatrix}$ and $B = \begin{pmatrix} 3 & 2 \\ 0 & 7 \\ 2 & 3 \end{pmatrix}$ Find A.B   [1 mark]

(ii) If $A = \begin{pmatrix} 4 & 2 & 6 \\ 1 & 8 & 7 \end{pmatrix}$ Find $A.A^T$ [2 marks]

(b) Determine the Eigen values of the matrix

$$A = \begin{pmatrix} 1 & -1 & 0 \\ 1 & 2 & 1 \\ -2 & 1 & -1 \end{pmatrix}$$ [9 marks]

Question 4

(a) Given the point $(1 \quad 6)$, $(3 \quad 2)$ and $(5 \quad -2)$ that lie on a straight line. Determine its equation.   [6 marks]

(b) Sketch the graphs of the following indicating relevant information. Do not plot the graphs in details.

   (i) $y = 2x - 5$ [3 marks]

   (ii) $y = x - x^2$ [3 marks]

Question 5

(a) Solve the equation $y^1 = sin^2x$ [6 marks]

(b) Solve the equation $y^1 = \ln(x^2 + 2)$ [6 marks]

Question 6

(a) Solve the non-homogeneous equation $y^1 + y = sin^2x$ [6 marks]

(b) Solve the homogeneous equation $y^1 = \frac{1-2y-4x}{1+y+2x}$ [6 marks]

Question 7

(a) If $Z = xsiny - ysinx$. Find the total differential dZ [6 marks]

(b) Given that $u = x^2 - y^2$, $v = 2xy$, determine $\frac{\partial(x,y)}{\partial(u,v)}$ [6 marks]