



MURANG'A UNIVERSITY COLLEGE

*A Constituent College of Jomo Kenyatta University of Agriculture and Technology
University Examination 2015/2016*

**YEAR III SUPPLEMENTARY EXAMINATION FOR THE DIPLOMA IN
ELECTRICAL ENGINEERING**

SEE 1301: ENGINEERING MATHEMATICS V

DATE: June 2016

TIME: 2 Hours

Instructions: Attempt question **One** and **Two** other questions

QUESTION ONE (30 Marks)

(a) If $A = \begin{pmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{pmatrix}$ and $B = \begin{pmatrix} 7 & 10 \\ 8 & 11 \\ 9 & 12 \end{pmatrix}$

Find (i) A.B

(ii) B.A

(6 Marks)

(b) Find the determinant of the following matrix

$$A = \begin{pmatrix} 5 & 2 & 1 \\ 0 & 6 & 3 \\ 8 & 4 & 7 \end{pmatrix}$$

(6 marks)

(c) Find the inverse of

$$A = \begin{pmatrix} 1 & 2 & 3 \\ 4 & 1 & 5 \\ 6 & 0 & 2 \end{pmatrix}$$

(10 marks)

(d) Use Cramer's rule to solve the simultaneous equations.

$$4x + y = 14$$

$$6x - 4y = 10$$

(6 marks)

(c) If $A = \begin{pmatrix} 3 & 5 & 4 \\ 4 & -1 & 0 \end{pmatrix}$ and $B = \begin{pmatrix} -1 & 4 & 3 \\ 0 & 2 & 5 \end{pmatrix}$

Find $A + B$

(2 marks)

QUESTION TWO (20 marks)

(a) Determine the Eigen values and Eigen vectors for the Equation

$$A \cdot X = \lambda \cdot X \text{ where } A = \begin{pmatrix} 2 & 0 & 1 \\ -1 & 4 & -1 \\ -1 & 2 & 0 \end{pmatrix} \quad (10 \text{ marks})$$

(b) Solve the following set of equations using Gaussian elimination method.

$$x_1 - 4x_2 - 2x_3 = 21$$

$$2x_1 + x_2 + 2x_3 = 3$$

$$3x_1 + 2x_2 - x_3 = -2 \quad (10 \text{ marks})$$

QUESTION THREE (20 marks)

(a) Use the Laplace transform to solve the following equations

$$f''(x) + 5f'(x) + 6f(x) = 2e^{-x} \text{ where } f'(0) = 0 \text{ \& } f(0) = 0 \quad (10 \text{ marks})$$

(b) Find the inverse Laplace transforms of each of the following

$$(i) F(s) = \frac{3}{s+2} \quad (5 \text{ marks})$$

$$(ii) F(s) = -\frac{3}{4s} \quad (5 \text{ marks})$$

QUESTION 4 (20 marks)

(a) Solve the set of equations using Cramer's rule.

$$x_1 + 2x_2 + x_3 = 3$$

$$3x_2 - 4x_3 = 2$$

$$5x_1 + 3x_2 + 5x_3 = -1 \quad (10 \text{ marks})$$

(b) Find the determinant of the following matrix

$$A = \begin{pmatrix} 1 & 4 & -3 \\ -5 & 2 & 6 \\ -1 & -4 & 2 \end{pmatrix} \quad (5 \text{ marks})$$

(c) Use Cramer's rule to solve the simultaneous equation

$$2x + y = 7$$

$$3x - 4y = 5 \quad (5 \text{ marks})$$

QUESTION 5 (20 Marks)

(a) Find the Eigen values and associated Eigen vectors of the matrix

$$A = \begin{pmatrix} 2 & 4 \\ 6 & 4 \end{pmatrix} \quad (10 \text{ marks})$$

$$(b) \text{ If } A = \begin{pmatrix} 3 & 2 & 5 \\ 6 & 1 & 7 \end{pmatrix} \quad B = \begin{pmatrix} 2 & 3 & 5 \\ 4 & 2 & 6 \end{pmatrix}$$

Find

$$(i) 8A \quad (2 \text{ marks})$$

$$(ii) \lambda A \quad (2 \text{ marks})$$

$$(iii) (A + B) \quad (2 \text{ marks})$$

$$(c) \text{ If } A = \begin{pmatrix} 4 & 7 & 6 \\ 2 & 3 & 1 \end{pmatrix} \quad B = \begin{pmatrix} 3 & 5 \\ 6 & 7 \\ 4 & 2 \end{pmatrix}$$

$$\text{Find } A \cdot B \quad (4 \text{ marks})$$