



MACHAKOS UNIVERSITY

University Examinations for 2016/2017

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

**THIRD YEAR FIRST SEMESTER EXAMINATION FOR DIPLOMA IN ELECTRICAL
AND ELECTRONICS ENGINEERING**

EED 306: ELECTROMAGNETICS

DATE: 2/6/2017

TIME: 8:30 – 10:30 AM

INSTRUCTIONS

Answer Question One and Any Other Two Questions

1. a) Define the following terms as used in electromagnetic.
 - i) Electromagnetic fields
 - ii) Electromagnetic induction
 - iii) Wave
 - iv) Transverse wave
 - v) Longitudinal wave(10 marks)
- b) State and explain any THREE detectors of electromagnetic waves. (10 marks)
- c) Explain any FOUR characteristics of electromagnetic waves. (10 marks)

SECTION B: ANSWER ANY OTHER TWO QUESTIONS

2. a) Define the following terms
 - i) Capacitor
 - ii) Electric flux density(4 marks)

- b) A capacitor consists of squared two metal plates each 100cm side placed parallel and 3mm apart. The space between the plates is filled with dielectric having a relative permittivity of 4.5 a potential drop of 500v is maintained between the plates.

Calculate:

- i) Charge of capacitor
 - ii) Electric flux density
 - iii) Potential gradient
 - iv) Capacitance (16 marks)
3. a) State and explain Any FIVE differences between Electric and magnetic circuit (10 marks)
- b) State coulomb's law (2 marks)
- c) State and explain the FOUR fundamental forces of nature. (8 marks)
4. a) Define the following terms giving two examples of each quantity.
- i) Scalar quantity
 - ii) Vector quantity (8 marks)
- b) Given vector
- $$\vec{A} = 6\vec{i} + 2\vec{j}$$
- $$\vec{B} = 7\vec{i} + 8\vec{j}$$
- Find;
- i. $(\vec{A} + \vec{B})$
 - ii. $(\vec{A} \times \vec{B})$
 - iii. $|\vec{A} + \vec{B}|$ (12 marks)

5. a) Given vectors $\vec{A} = x + 5y + 7z$
 $\vec{B} = 7x + 4y + 9z$

Determine

- i. $|\vec{A} + \vec{B}|$
- ii. Component of A along z
- iii. A unit vector parallel to $2\vec{A} + \vec{B}$ (10 marks)

- b) Three fields are given by

$$\vec{A} = 2x - y + z$$

$$\vec{Q} = 5x - 2z$$

$$\vec{R} = x - y$$

- i) $\vec{P} \times \vec{Q}$
- ii) A unit vector perpendicular to both $\vec{P}$ and $\vec{Q}$
- iii) The component of P along X (10 marks)