



MACHAKOS UNIVERSITY COLLEGE

(A Constituent College of Kenyatta University)
University Examinations for 2015/2016

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

FIRST SEMESTER EXAMINATION FOR DIPLOMA IN ELECTRICAL AND
ELECTRONICS ENGINEERING

EED 306: ELECTROMAGNETICS

DATE: 9/8/2016

TIME: 2:00 – 4:00 pm

INSTRUCTIONS TO CANDIDATES:

Answer question ONE and any other TWO

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 giving two examples of each quantity.
 - i) Scalar quantity
 - ii) Vector quantity
- b) Given vector

$$A=4\vec{J}+2\vec{L}$$

$$\mathbf{B} = 5\vec{j} + 9\vec{L}$$

Find;

- i. $\vec{A} \cdot \vec{B}$
- ii. $\vec{A} \times \vec{B}$
- iii. $\vec{A} + \vec{B}$

3. a) Given vectors $\vec{E} = 3\vec{a}_x + 5\vec{a}_y + 7\vec{a}_z$
 $\vec{F} = 7\vec{a}_x + 4\vec{a}_y + 9\vec{a}_z$

Determine

- i) $|\vec{E} + \vec{F}|$
 - ii) Component of $\vec{E}$ along $\vec{a}_z$
 - iii) A unit vector parallel to $2\vec{E} + \vec{F}$ (10 marks)
- b) Three fields are given by
- $$\mathbf{P} = 2\vec{a}_x - \vec{a}_y + \vec{a}_z$$
- $$\mathbf{Q} = 5\vec{a}_x - 2\vec{a}_z$$
- $$\mathbf{R} = \vec{a}_x - \vec{a}_y$$

Determine

- i. $\vec{Q} \cdot \vec{R} \times \vec{P}$
 - ii. A unit vector perpendicular to both $\vec{Q}$ and $\vec{R}$
 - iii. The component of $\vec{P}$ along $\vec{Q}$ (10 marks)
4. 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)
5. a) Define the following terms
- Capacitor
 - 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)