



MACHAKOS UNIVERSITY

University Examinations 2016/2017

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

THIRD YEAR FIRST SEMESTER DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

EED 306: ELECTROMAGNETICS

DATE: 27/7/2017

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. Magnetic fields
 - ii. Electromagnetic induction
 - iii. Electro motive force
 - iv. Transverse wave
 - v. Longitudinal wave(10 marks)
- b) State and explain any FOUR properties 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 50cm side placed parallel and 2mm apart. The space between the plates is filled with dielectric having a relative permittivity of 5 a potential drop of 500v is maintained between the plates.

Calculate:

- i) Area of capacitor
 - ii) Charge
 - iii) Electric flux density
 - iv) Potential gradient
 - v) Capacitance (16 marks)
3. a) Define the following terms giving two examples of each quantity.
- i) Scalar quantity
 - ii) Vector quantity
 - iii) Vector field
 - iv) Scalar field (8 marks)

- b) Given vector

$$A = 6\vec{j} + 9\vec{L}$$

$$B = 9\vec{j} + 10\vec{L}$$

Find;

- i. $\vec{A} \times \vec{B}$
- ii. $\vec{A} + \vec{B}$
- iii. $A \cdot B$ (12 marks)

4. 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

$$P = 2\vec{a}_x - \vec{a}_y + \vec{a}_z$$

$$Q = 5\vec{a}_x - 2\vec{a}_z$$

$$R = \vec{a}_x - \vec{a}_y$$

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)

5. 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)