



MACHAKOS UNIVERSITY

University Examinations for 2016/2017

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

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

EPC 116: ELECTRICAL PRINCIPLES II

DATE: 6/6/2017

TIME: 8:30 – 10:30 AM

INSTRUCTIONS

Answer Question One and Any Other Two Questions

1.
 - (a)
 - (i) State Faraday's induction laws
 - (ii) A copper conductor 20 cm long is carrying current of 15 A. If the conductor is placed in a magnetic field with density 0.5 T. Calculate the force on the conductor. (6 marks)
 - (b) State four characteristics of lines of magnetic flux. (4 marks)
 - (c) Describe the Left-hand rule for determination of force experienced on a current-carrying conductor in a magnetic field. (4 marks)
 - (d) With the aid of a diagram explain the operation of a single-phase transformer. (7 marks)
 - (e) A 200KVA, 11000V/400V, 50hz single phase transformer has 80 turns on the secondary. Calculate the;
 - (i) value of primary and secondary current
 - (ii) number of primary turns (9 marks)

2. (a) A coil of 300 turns is wound uniformly over a wooden ring having a mean circumference of 400mm and a uniform cross-sectional area of 800 mm^2 . If the current through the coil is 5 A and permeability of free space is $4\pi \times 10^{-7} \text{ H/m}$. Calculate the;
- (i) magnetic field strength
 - (ii) flux density
 - (iii) total flux (10 marks)
- (b) A conductor 220 mm long is carrying current of 50 A. The force on the conductor is 3N. Calculate the magnetic flux density. (6 marks)
3. (a) With an aid of a diagram describe the B-H curve (9 marks)
- (b) Distinguish between diamagnetic and paramagnetic with respect to magnetism and for each case state a material example. (8 marks)
- (c) Explain the term fringing with respect to magnetism (3 marks)
4. (a) (i) With the aid of constructional diagrams, describe the following types of transformers
- I. Core
 - II. Shell (8 marks)
- (ii) State four areas of application of transformers (4 marks)
- (b) Explain why transformer cores are laminated. (2 marks)
- (c) An ideal transformer has a voltage ratio of 1:7, if the secondary voltage is 2800V and the primary current is 21A, calculate the;
- (i) primary winding voltage
 - (ii) secondary winding current (6 marks)
5. (a) A coil of 600 turns is wound uniformly over a wooden ring having a mean circumference of 400mm and a uniform cross-sectional area of 900 mm^2 . If the current through the coil is 5 A and permeability of free space is $4\pi \times 10^{-7} \text{ H/m}$. Calculate the;
- (i) magnetic field strength
 - (ii) flux density
 - (iii) total flux (10 marks)
- (b) Describe an experiment to illustrate existence of flux lines in a bar magnet. (6 marks)
- (c) State four applications magnetics. (4 marks)