



MACHAKOS UNIVERSITY

University Examinations 2017/2018

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF ELECTRICAL AND ELECTRONIC ENGINEERING

FIRST YEAR SECOND SEMESTER EXAMINATION CERTIFICATE IN
ELECTRICAL ENGINEERING

EPC 116: ELECTRICAL ENGINEERING PRINCIPLES II

DATE: 15/12/2017

TIME: 2.00-4.00 PM

INSTRUCTIONS

Attempt Question One And Any Other Two Questions

1.
 - (a) State four characteristics of magnetic flux lines. (4 marks)
 - (b) Describe an experiment to confirm existence of imaginary magnetic flux lines in a magnetic bar. (4 marks)
 - (c) A copper conductor 30 cm long carrying a current of 10 amps placed in a magnetic field experience a force of 2 Newtons. Determine the flux density of the field. (4 marks)
 - (d) With the aid of diagram explain the operation of a single-phase transformer. (8 marks)
 - (e) A 400KVA, 22000/750V, 50 HZ single-phase transformer has 75 turns on the secondary winding. Calculate the :
 - i) number of primary turns
 - ii) values of primary and secondary currents. (10 marks)
2.
 - (a) Distinguish between ferro magnetic and diamagnetic materials with respect to

- magnetism and for each case state a material type. (6 marks)
- (b) With the aid of a labeled diagram explain the B-H curve. (12 marks)
- (c) Explain the term coercive force with respect to electromagnetism. (2 marks)
3. (a) A coil of 400 turns is wound uniformly over a wooden ring having a mean circumference of 30 cm and uniform cross-sectional area of 900mm square. If the current through the coil is 7 A and permeability of free space is $4\pi \times 10^{-7}$. Calculate the :
- magnetic field strength
 - flux density
 - Total flux. (11 marks)
- (b) A magnetic flux of 500 microWebers passing through a coil 1500 turns is reversed in 0.1 seconds. Calculate the average value of emf induced in the coil. (5 marks)
- (c) A conductor 150mm long is carrying current of 60 amperes. If the force on the conductor is 3 N calculate the density of the field. (4 marks)
4. (a) Explain why transformer cores are laminated. (3 marks)
- (b) With the aid of constructional diagrams, describe the following types of transformers.
- shell
 - core. (10 marks)
- (c) An ideal transformer has a voltage ratio of 1:8 ,if the secondary voltage is 3200 V and the primary current is 18 A, calculate the :
- Primary winding voltage
 - Secondary winding voltage. (7 marks)
5. (a) State four areas of applications of transformers. (4 marks)
- (b) With an aid of a describe a rule for determination of direction of magnetic flux in a coil carrying current. (9 marks)
- (c) State Lenz's law. (3 marks)
- (d) State two Faraday's laws of induction (4 marks)