



MACHAKOS UNIVERSITY

University Examinations for 2016/2017

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

SECOND YEAR SECOND SEMESTER EXAMINATION FOR CERTIFICATE IN

ELECTRICAL AND ELECTRONICS ENGINEERING

EPC 213: ELECTRICAL MAINTENANCE AND FAULT DIAGNOSIS

DATE: 5/6/2017

TIME: 2:00 – 4:00 PM

INSTRUCTIONS

Answer question ONE and any other TWO questions

QUESTION ONE (COMPULSORY) (30 MARKS)

- (a) Define the term discharge lamp (2 marks)
- (b) State any FOUR properties of carbon that make it suitable for machine brushes. (4 marks)
- (c) State any FOUR advantages of planned preventive maintenance. (4 marks)
- (d) Differentiate between the following types of maintenance: -
 - i) Running and predictive
 - ii) Total preventive maintenance and Servicing (4 marks)
- (e) With the aid of a labeled diagram, explain the operation of thermal type fluorescent lamp. (5 marks)
- (f) Explain temperature rise as applied to transformers (2 marks)

- (g) With aid of a circuit diagram and wave forms, describe the lead - lag method used for minimizing stroboscopic effect in fluorescent lamps. (6 marks)
- (h) A twin cable of length 1000 metres has developed a low resistance earth on one core. A fall of potential test is taken from both ends, P and Q. The readings taken at P are $V_1 = 15V$, and $I_1 = 3A$. The readings at Q are $V_2 = 30V$, and $I_2 = 3A$. Find the position of the fault. (3 marks)

QUESTION TWO (20 MARKS)

- (a) Describe the following faults common in underground cables.
(i) Open circuit
(ii) Earth leakage fault (4 marks)
- (b) With aid of a well labeled circuit diagram, describe the Murray loop test method used to locate the position of earth fault in underground cables. (8 marks)
- (c) Find the location of an earth fault in a cable of length 260m. The measured resistance of the faulty conductor is $0.3803\Omega/m$. And the null point is at resistance of 68Ω against the constant resistance of 23Ω . (8 marks)

QUESTION THREE (20 MARKS)

- (a) State FOUR defects caused by Armature reaction. (2 marks)
- (b) Explain with aid of well labeled diagrams describe the following methods used to minimize armature reaction in DC machines.
I. Inter poles
II. Compensating winding (12 marks)
- (c) Differentiate between the following terms with reference to dc machines.
(i) Back emf
(ii) Eddy currents (2 marks)
- (d) Explain the possible causes of the following symptoms in dc machine.
(i) Brush sparking at commutator
(ii) Dc generator fails to build up its voltage (4 marks)

QUESTION FOUR (20 MARKS)

- (a) State any TWO transformer test performed for preventive maintenance (2 marks)
- (b) With aid of a labeled diagram, describe the following test carried out on transformer oil.
 - (i) Crackle test
 - (ii) Sight test (6 marks)
- (c) Outline the causes of the following faults in transformers
 - (i) Leakage fault
 - (ii) Over heating of oil in the transformer (6 marks)
- (d) Outline FOUR precautions to be taken during the drying of transformers (6 marks)

QUESTION FIVE (20 MARKS)

- (a) State THREE methods used to dry electric motors. (3 marks)
- (b) Outline the procedure for aligning motor with the driven load (4 marks)
- (c)
 - (i) State THREE causes of single phasing of three phase induction motors (3 marks)
 - (ii) Explain the effect of low voltage to the performance of an induction motor. (3 marks)
- (d) With the aid of a well labeled diagram, describe the following tests conducted in a AC motor.
 - (i) Continuity and short circuit test on running winding
 - (ii) Earth test on running winding (7 marks)