



MACHAKOS UNIVERSITY

University Examinations 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

SUPPLEMENTARY EXAMINATION

EPC 213: ELECTRICAL MAINTENANCE AND FAULT DIAGNOSIS

DATE: 30/8/2017

TIME: 8:30 – 10:30 AM

INSTRUCTIONS

Attempt 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 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

- (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

- (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

- (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

- (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)