



MACHAKOS UNIVERSITY

University Examinations for 2020/2021 Academic Year

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

SECOND YEAR SECOND TERM EXAMINATION FOR

CERTIFICATE IN ELECTRICAL AND ELECTRONICS ENGINEERING

1601/205 - ELECTRICAL MAINTENANCE AND FAULT DIAGNOSIS

DATE: 7/6/2021

TIME: 8.30-10.30 AM

INSTRUCTIONS

Attempt all questions

QUESTION ONE

- a) Explain two causes of excessive sparking at the brushes of a DC motor and state the remedies. (6 marks)
- b) Describe with aid of a diagram the Hopkinson test for determining the efficiency of a DC machine. (8 marks)
- c) A DC machine was dismantled during annual maintenance and the following observed:
- Dirt, oil and grease on the service
 - Some parts had rusted
 - Worn out ball bearings
- Outline for each, one remedy to be done. (6 marks)

QUESTION TWO

- a) State four faults that may occur in a DC machine (4 marks)
- b) With the aid of a diagram, explain how a short circuit fault is located on the armature of a DC motor. (6 marks)
- c) Explain how each of the following may cause faults in dc generators and state in each case the remedies:
- Base not mounted correctly
 - Vents are clogged with dust. (6 marks)
- d) State four possible faults that may cause a three-phase ac machine fail to start (4 marks)

QUESTION THREE

- a) Outline three maintenance checks carried out for the following AC motor faults.
- i. Fuses blow or overload trip operates when any attempt is made to start the motor
 - ii. Three phase motor hums but does not start
 - iii. Single phase motor hums but does not start (9 marks)
- b) i Name three instruments used in fault finding in AC machines
- ii Outline the visual inspections carried out on an AC motor during maintenance (6 marks)
- c) Describe the following tests conducted on an electric machine
- i. Continuity test on a starter of the motor
 - ii. Insulation resistance test performed on the motor (5 marks)

QUESTION FOUR

- a) Outline **five** maintenance and service procedure when repairing a faulty AC machine. (5 marks)
- b) State **four** functional test carried out on a three-phase induction motor after repair. (4 marks)
- c) With the aid of a diagram explain the insulation resistance to earth test on the winding of a three- phase machine (8 marks)
- d) Outline three objectives of corrective maintenance in industry. (3 marks)

QUESTION FIVE

- a) Name any two-test done to the motor after repair and assembling. (2 marks)
- b) Table 2 shows possible symptoms in DC machines. Complete the table to indicate two possible causes and their respective remedies. (6 marks)

Table 1

S no	Fault	Possible cause	Remedy
1.	Motor fails to start		
2.	On load, excessive current is observed and armature coils heat up		
3.	On load, motor sparks		

- c) Describe the tests and checks performed on a single-phase AC motor that hums and fails to start. (6 marks)
- d) A single phase 240V,50Hz capacitor start capacitor run induction motor hums but does not rotate. Explain three checks or tests to find the possible causes. (6 marks)