

ELC – Electrical Technology

T004

Monday, 26/11/2018

08:30 – 11:30 AM

WORKFORCE DEVELOPMENT AUTHORITY



P.O. BOX 2707 Kigali, Rwanda Tel: (+250) 255113365

**ADVANCED LEVEL NATIONAL EXAMINATIONS, 2018,
TECHNICAL AND PROFESSIONAL STUDIES**

EXAM TITLE: ELECTRICAL TECHNOLOGY

OPTION: Electricity (ELC)

DURATION: 3 hours

INSTRUCTIONS:

The paper is composed of **the following sections:**

Section I: Seventeen (17) compulsory questions. 55 marks

Section II: Attempt any three (3) out of five questions. 30 marks

Section III: Attempt any one (1) out of three questions. 15 marks

Note:

Every candidate is required to carefully comply with the above instructions. Penalty measures will be applied on their strict consideration

Section I. Seventeen (17) Compulsory questions**55 marks**

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- 01.** When does electric shock occur? And what can practically be done to prevent it? **(3 marks)**
- 02.** Choose and write in full words the correct answer:
A d.c. shunt motor is found suitable to drive fans because they require:
(a) small torque at start up
(b) large torque at high speeds
(c) practically constant voltage **(2 marks)**
- 03.** What is an “isolator”? **(2 marks)**
- 04.** What is the criterion followed in classifying direct current motors? **(1 mark)**
- 05.** What is the importance of a current transformer? **(2 marks)**
- 06.** Define the following terms:
a) Earthing **(2 marks)**
b) Bonding conductor **(2 marks)**
c) Extraneous conductive parts **(2 marks)**
- 07.** Give the main parts of an electric cable. What is the main role of each part? **(3 marks)**
- 08.** What is the purpose of an electric motor starter? **(3 marks)**
- 09.** What can be done to reduce the Eddy currents losses in a transformer? **(2 marks)**
- 10.** Explain why an induction motor can never run at synchronous speed? **(5 marks)**
- 11.** What is an electric motor? **(2 marks)**
- 12.** Draw a table linking the types of fires and the possible extinguishers used to fight against them. **(4 marks)**
- 13.** Explain the difference between “step up transformer” and “step down transformer”. **(3 marks)**

14. Calculate the synchronous speed of a four-pole machine connected to a 50 Hz mains supply. **(3 marks)**
15. Explain briefly the working principle of a relay. **(5 marks)**
16. How does auto-transformer starting of motor work? What is its main disadvantage? **(4 marks)**
17. Explain briefly the Forward – Reverse operation of motors. **(5 marks)**

Section II. Choose and answer any three (3) questions. 30 marks

18. a) Explain all the losses occurring in a transformer and their origins.
b) A 100 kVA power transformer feeds a load operating at a power factor of 0.8. Find the efficiency of the transformer if the combined iron and copper loss at this load is 1 kW. **(10 marks)**
19. A discharge lamp is suspended from a ceiling 4 m above a bench. The illuminance on the bench below the lamp was 300 lx. Find:
(a) the luminous intensity of the lamp
(b) the distance along the bench where the illuminance falls to 153.6 lx. **(10 marks)**
20. Describe briefly how a three-phase supply produces a rotating force or torque in an induction motor. **(10 marks)**
21. Describe how the following protections are provided in an electrical installation:
a) protection against electric shock,
b) protection against over current. **(10 marks)**
22. Why is power factor improvement necessary for motor circuits? **(10 marks)**

Section III. Choose and answer any one (1) question.

15 marks

23. Describe the two types of three- phase induction motor rotor.

(15 marks)

24. a) Describe the Star-Delta starting of motor, and

b) Draw to show the power circuit for this star-delta starting of a three-phase induction motor.

(15 marks)

25. a) What are the criteria for selecting motor controllers?

b) Give and explain ten types of information that are found on a motor nameplate.

(15 marks)