TEVETA

DIPLOMA IN ELECTRICAL ENGINEERING

LEVEL 6 YEAR II EXAMINATIONS

FINAL INTEGRATED SUMMATIVE EXAMINATIONS

SITTING: APRIL/MAY 2026

SUBJECT: POWER SYSTEMS

TIME: THREE (3) HOURS

TOTAL MARKS: 100

PASS MARK: 50

INSTRUCTIONS TO CANDIDATE

1. Write your examination number and national registration card numbers on the answer booklet provided. Ensure to append your signature in the space provided on the answer booklet.
2. Write your answer SCRIPT SERIAL NUMBER on the examination register provided and entry slip.
3. There are EIGHT (8) questions in this paper. Question one (1) is compulsory
4. Answer any other four (4) questions from the remaining seven (7)
5. Each question carries 20 marks.
6. Cell phones and programmable calculators are not allowed in the examination room.
7. No candidate is allowed to leave the examination room within the first hour and the last thirty (30) minutes before the end of the examination.

DO NOT TURN THIS PAPER UNTIL YOU ARE TOLD TO DO SO.

QUESTION 1

a) Explain the importance of the Electricity Act of 2019 in Zambia **(3 marks)**

b) State four (4) functions of the Energy Regulation Board (ERB) of Zambia **(4 marks)**

c) Explain the significance of a name-plate on Electrical Equipment **(5 marks)**

d) Describe information which single line construction diagrams convey for proper installation of substation equipment **(8 marks)**

Total: 20 marks

QUESTION 2

a) State four (4) types of circuit breakers used in Power System Networks **(4 marks)**

b) Explain two (2) functions of mineral oil in circuit breakers **(4 marks)**

c) Describe the isolation procedure for a substation circuit breaker prior to commencement of maintenance on the breaker **(6 marks)**

d) Explain the suitability of non-oil based circuit breakers at operating voltages which are above 66kV. **(6 marks)**

Total: 20 marks

QUESTION 3

a) State three (3) functions of reactors installed in Power System Networks. **(3 marks)**

b) Contrast Circuit breakers from Isolators. **(4 marks)**

c) With the aid of a well labelled layout diagram explain the operation of a duplicate bus bar system **(7 marks)**

d) Explain the appropriate site conditions for use of metal clad switch gear. **(6 marks)**

Total: 20 marks

QUESTION 4

a) State four (4) preparatory tasks which are carried out prior to commencement of maintenance activities on Power Systems Networks equipment(s). **(4 marks)**

b) Describe the typical maintenance activities on a Low Voltage Township Distribution transformer including appropriate test results. **(10 marks)**

c) Explain the benefit of vegetation management activities (trimming of trees along system conductors) to overall maintenance of distribution lines. **(6 marks)**

Total: 20 marks

QUESTION 5

a) State four (4) merits of Hydro-Electric Power Plant over Nuclear Power Plant **(4 marks)**

b) Explain the function of following components of Hydro-Electric Power Plant:

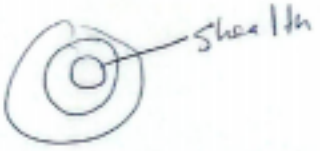
(i) Dam Reservoir **(2 marks)**

(ii) Forebay **(2 marks)**

(iii) Surge Tank **(2 marks)**

(i) Spillway **(2 marks)**

(ii) Penstock **(2 marks)**



c) Describe three (3) factors which are critical for the construction of a Hydro Electric Power Plant **(6 marks)**

Total: 20 marks

QUESTION 6

a) State four (4) main considerations in selecting a site for a wind generators **(4 marks)**

b) With the aid of a well labelled diagram, describe the working principle of wind energy conversion system (WECS) **(8 marks)**

c) Explain the classification of wind energy conversion systems **(4 marks)**

d) State two (2) merits and two (2) de-merits of wind energy conversion system **(4 marks)**

Total: 20 marks

QUESTION 7

a) State two (2) advantages of underground cables. **(2 marks)**

b) Explain the concept of loss angle as it relates to underground cables **(4 marks)**

c) Explain the effects of voids in underground cables **(4 marks)**

d) Describe the tests which are carried out on an underground cable before it is installed in a medium voltage feeder circuit **(10 marks)**

Total: 20 marks

QUESTION 8

a) Define power systems stability study. **(2 marks)**

b) State four (4) classes of faults that occur in Power System Networks. **(8 marks)**

c) Explain the following Network Structures:

(i) Ring Circuits **(5 marks)**

(ii) Mesh Circuits **(5 marks)**

Total: 20 marks

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