THE UNITED REPUBLIC OF TANZANIA
NATIONAL EXAMINATIONS COUNCIL
CERTIFICATE OF SECONDARY EDUCATION EXAMINATION

081 **ELECTRICAL INSTALLATION**
(For both School and Private Candidates)

Time: 3 Hours **Tuesday, 19th October 2010 a.m.**

Instructions

1. This paper consists of sections A, B and C.
2. Answer **all** questions in sections A and B and **three (3)** questions from section C.
3. Calculators are **not** allowed in the examination room.
4. Cellular phones are **not** allowed in the examination room.
5. Write your **Examination Number** on every page of your answer booklet(s).

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This paper consists of 6 printed pages.

SECTION A (10 Marks)

Answer **all** questions in this section.

1. For each of items (i) – (x) choose the correct answer from among the given alternatives and write its letter beside the item number.

(i) The function of protective relay in a circuit breaker is to
- A react on each stray voltage
- B close the contacts when actuating quantity reaches a certain predetermined value.
- C limit arcing current during the operation of the circuit breaker
- D provide additional safety in the operation of the circuit breaker
- E neutralize the effect of transient.

(ii) Which portion of the transmission system does the fault occurs most frequently?
- A Transformer
- B Overhead lines
- C Alternators
- D Underground cables
- E Switch gears.

(iii) Which of the following category of consumers can provide highest load factor?
- A A domestic consumer
- B A steel melting unit using arc furnace
- C A cold storage plant
- D A continuous process plant
- E An air compressor running continuously.

(iv) A transformer with a fixed primary voltage is feeding a unity power factor load on the secondary side. How will the secondary terminal voltage behave when either inductor or capacitor is connected in parallel to the load?
- A Voltage will decrease when inductor is connected but will increase when capacitor is connected.
- B Voltage will increase when inductor is connected but will decrease when capacitor is connected.
- C Voltage will decrease when either inductor or capacitor is connected.
- D Voltage will increase when either inductor or capacitor is connected.
- E Voltage will remain constant either inductor or capacitor is connected.

(v) How much energy can be taken from a power supply?
- A As much as the consumers demand
- B Maximum demand
- C Base load and peak load
- D A maximum of the installed capacity of generation
- E kWh generated in a year.

(vi) One of main reasons for conducting continuity tests on ring final circuit conductors is to
- A identify the opposite legs of the ring
- B ensure that the CPC is not continuous
- C ensure that interconnections in the ring do not exist
- D take a resistance measurement
- E ensure that CPC is continuous

(vii) Identify factors which decide the type of wiring system.
- A Flexibility, appearance, number of points, type of conductors
- B Type of building, flexibility, appearance, durability, cost, safety
- C Type of room, type of supply, size of fuse, cost earthing conditions, installation conditions
- D Current rating, fusing factor, availability of accessories, cost, safety, durability
- E Type of building, installation condition, atmospheric conditions.

(viii) One can control a single bulb or a group of bulbs from two different positions by use of
- A two single- pole switches
- B one two- way switch and one single- pole switch
- C two one- way switches and an intermediate switch
- D two two- way switches
- E one intermediate switch.

(ix) The purpose of interpoles in a dc machine is to
- A aid reactance voltage of the commutating coils
- B oppose reactance voltage of the commutating coils
- C aid armature reaction ampere turns
- D oppose armature reaction ampere turns
- E aid in reversal of current in the commutating coils.

(x) Power factor of a.c series motor can be improved by
- A increasing the magnitude of inductances of field and armature winding
- B equalizing the armature resistance to armature reactance
- C decreasing the number of turns on armature winding
- D increasing armature resistance to armature reactance
- E decreasing the magnitude of reactance and armature winding.

SECTION B (30 Marks)

Answer **all** questions in this section.

2. Define the following terms as used in electrical installation work.
   (a) Earthing
   (b) Direct contact
   (c) Fault current
   (d) Protective relays
   (e) Enclosed.

3. Draw a neat circuit diagram of two lamps controlled by two - way switches together with two intermediate switches (type I and type II).

4. What are the uses of the following tools?
   (a) Revolving punch pliers
   (b) End cutting nippers
   (c) Pipe wrench
   (d) Crimping pliers.

5. (a) Why is it necessary to measure earth resistance?
   (b) Mention three (3) tests required to be performed on any installation before putting it into service?

6. Explain briefly the five (5) main features of good protective devices.

7. List six (6) parts of a d.c generator.

8. Explain briefly six (6) advantages of electric heating compared to other type of heating.

9. A consumer has the following connected loads:
   10 lamps of 60 W each and 2 heaters of 1000 W each. His maximum demand is 1500 W. On the average, he uses 8 lamps for 5 hours a day and each heater for 3 hours a day. Find his total load, monthly energy consumption and load factor.

10. (a) What is an ideal transformer?
    (b) Mention two (2) types of losses that may occur in a transformer.

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11. (a) Define the term *'grid'*.

(b) Describe four (4) requirements which should be fulfilled for a system to be considered as a good system.

SECTION C (60 Marks)

Answer **three (3)** questions from this section.

12. (a) With the help of a diagram explain clearly how the ranges of a dc ammeter and a dc voltmeter can be extended.

(b) A permanent magnet moving coil instrument gives a full scale deflection at 100 mV and 20 mA. Explain how the instrument can be used as

(i) an ammeter of 0-100 A range.

(ii) voltmeter of 0- 200 V range.

13. (a) Define the following terms as used in armature windings.

(i) Conductor

(ii) Turn

(iii) Coil

(iv) Winding

(b) A series generator of total resistance 0.5 Ω is running at 1000 r.p.m and is delivering 5 kW at a terminal voltage of 100 V. If the speed is raised to 1500 r.p.m and the load is adjusted to 8 kW; find the new current and terminal voltage. Assume that the magnetization curve is a straight line.

14. (a) List three (3) methods of starting fluorescent lamps.

(b) With the help of a well labeled circuit diagram, explain the working principle of a low pressure mercury vapour lamp (fluorescent lamp).

(c) Draw a circuit of domestic consumer's control unit and state the cable sizes you would use for each circuit.

15 (a) Explain briefly three (3) disadvantages of low power factor.

(b) The cost of electrical power to a consumer is Shs 1,300/= per month per kVA of maximum demand plus Shs. 13/= per unit. A consumer's maximum demand is 450 kW at 0.72 power factor lagging and his monthly consumption is 60,000 kWh.

(i) Calculate the overall cost per unit.

(ii) Give one (1) method by which the consumer could reduce the cost of his power while taking the same number of units.

16. (a) Mention three (3) factors which determine a well designed lighting scheme.

(b) A hall 30 m long and 12 m wide is to be illuminated, and the illumination required is 50 lm/m^2. Calculate the number of lamps required in each unit. The output of different types of lamp is given below. Take depreciation factor of 1.3 and utilization factor of 0.5.

Watts:	100	200	300	500	1000
Lumens:	1615	3650	4700	9950	21500

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