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

2006/10/20 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. Cellular phones are **not** allowed in the examination room.
4. Electronic calculators are **not** allowed in the examination room.
5. Write your **Examination Number** on every page of your answer booklet(s).

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) Which one of the following methods is used to improve the low power factor in a large installation?

A Changing one of the phases
B Installing a new motor
C Installing a synchronous motor
D Connecting a number of resistors in series with loads
E Connecting a number of resistors parallel with a loads.

(ii) Fuse is a protective device fitted in an electrical installation in order to

A decorate an electrical circuit
B maintain continuity
C measure insulation resistance
D protect Installation against excess current
E protect electrical short-circuit.

(iii) The open circuit test in a transformer is used to determine ..... losses.

A variable
B copper
C mechanical
D iron
E energy

(iv) Which one of the following arrangements represent a supply sequence of residential houses as recommended by TANESCO? Service line

A cut out, ELCB, main switch, Kwh-meter
B cut out, Kwh-meter, ELCB, main switch
C ELCB, cut out, Kwh meter, main switch
D Kwh meter, cut out, ELCB, main switch
E ELCB, Kwh-meter, cut out, main switch.

(v) Earthing in electrical installation means

A connection of load to transformer
B missing of one phase to motor supply
C connection of installation to general mass of the earth
D connection of installation to gravitational force
E connection of wires to the ground.

(vi) When measuring voltage across the bulb/light, the voltmeter should be connected

A in parallel with bulb/light
B inseries with bulb/light
C horizontal to the bulb/light
D immediately after the bulb
E perpendicular to bulb/light

(vii) Why do we carry a polarity test in a new installation?
A To check if insulation resistance is durable
B To check if all switches, circuit breakers and fuses are connected to a live wire
C To check if the earthing system is effectively earthed
D To ensure that there is no open circuit
E To check if the new installation is stable.

(viii) What is a synchronous speed?
A motor speed
B speed of a revolving magnetic field
C rotor speed
D stator speed
E motor and rotor speed.

(ix) What is a first Aid?
A First Aid box with medicine
B First Aid Kit
C Temporary measure or service given to a victim of an accident before sent to a skilled person
D Permanent treatment given to a victim of an electrical accident
E Aid given to injured people.

(x) Express 1Kwh into mega joules:-
A 3.6 MJ
B 3.6 KJ
C 3.6 MJ
D 3600 MJ
E 360J

SECTION B (30 marks)

Answer **all** questions in this section.

2. Mention **three (3)** different types of D.C motors.

3. What is the size of a power factor in a pure capacitive circuit?

4. Name **three (3)** methods of reducing stroboscopic effect.

5. Distinguish the following electrical accessories:
(a) junction box.
(b) joint box.

6. Outline **two (2)** losses available in a transformer.

7. How can you reverse the direction of a rotation of a three phase induction motor?

8. What is cable size and current rate of a lighting circuit?

9. A fuse rated at 20 A has a fusing factor of 1.5. Calculate the current required to blow the fuse.

10. Outline **two (2)** types of instrument transformer and application of each one.

11. Calculate the supply voltage of a heater element rated 2.5 Kw and absorbs a current of 10.5 A.

SECTION C (60 marks)

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

12. A moving coil meter has a resistance of 5 Ω and a full scale deflection of 25 miliampea. Calculate the:
    (a) resistance required to enable the meter to be used as a voltmeter to measure up to 20 V.
    (b) resistance required to enable the meter to be used as an ammeter to measure up to 5A.

13. A 500 V shunt generator has full load current of 100 A and stray losses of 1.5 Kw. Armature and field resistances are 0.3 Ω and 250 Ω. Calculate:
    (a) Field current.
    (b) Armature current.
    (c) Total power losses.
    (d) Input and output power.

14. An electric kettle is required to heat 160 litres of water from 10° C to the boiling point in 5 minutes. The supply voltage being 230 volts and the efficiency of the kettle is 78 percent. Taking the specific heat capacity of water as 4187J/kgk, calculate the:
    (a) energy used.
    (b) resistance of heating element.
    (c) rate of an element in the nearest KW.

15. (a) What is an ideal transformer?
    (b) 75KVA Transformer has a stepdown ratio of 12:1 with 2400 primary turns and a primary voltage of 3.3 KV. Calculate:
        (i) volts per turn
        (ii) secondary voltage
        (iii) secondary turns
        (iv) the primary and secondary currents.

16. A room, 12 m by 7.5 m, is to be illuminated to an average intensity of 240 lux. The lamp efficiency is 30 lumen per watt and the coefficiency of utilization of the room is 0.6 and maintenance factor is 0.8. Calculate the:
    (a) total lumen
    (b) total power required.
    (c) the number of lamps if each lamp is rated at 100 W.