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 *Monday morning 29/10/2007*

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).

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SECTION A (10 marks)

Answer **all** questions in this section.

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

(i) The ratio of minimum breaking current over current rating is called
- A diversity factor
- B fusing factor
- C load factor
- D growth factor
- E power factor.

(ii) A tong tester is an instrument used to measure
- A frequency
- B vibration
- C power
- D current
- E voltage.

(iii) The effect of an A.C. motor starter winding having an open circuit fault is called
- A armature reaction
- B single phasing
- C split phasing
- D hunting
- E short circuiting.

(iv) A single phase motor designed to work on both A.C. or D.C. is called
- A series universal motor
- B shaded pole motor
- C split phase
- D capacitor start capacitor run
- E shunt motor.

(v) The battery/cell fitted in a multimeter is used only when measuring
- A currents
- B voltages
- C power
- D resistance
- E inductances.

(vi) The KVA input of a motor rating 4 KW and 3 KVAR is
- A 3 KVA
- B 4 KVA
- C 5 KVA

D 7 KVA
E 3 VA.

(vii) To reduce stroboscopic effects, discharge lamps may be connected
A on one phase of a three phase supply
B on all three phases of a 3 phase supply
C without capacitor power factor improvement
D with special filters
E with a bank of capacitors.

(viii) For a completed electrical installation, the minimum insulation resistance test reading allowed is
A 0.5 M Ω
B 1.0 M Ω
C 100 M Ω
D Infinity
E 2.5 M Ω.

(ix) One of the main reasons for using a ringmain to feed a large distribution system is
A supply reliability
B spare stand by switch gear
C consumer growth factor
D less maintenance
E higher voltage supply.

(x) The resistance of a conductor increases when
A its length decreases
B its area decreases
C both area and length increases
D its area increases
E diameter increases.

SECTION B (30 marks)

Answer **all** questions in this section

2. What is the cable size and current rate for a circuit used for a radial circuit of the socket outlet?

3. What is the purpose of performing insulation resistance test in a new installation?

4. Find the synchronous speed of a 4 pole 3-phase motor operating at 380 V/50 Hz.

5. Why do electricians perform continuity test in a new installation?

6. Mention **three (3)** methods of starting a 3-phase squirrel cage induction motor.

7. What are the recommended heights by I.E.E. regulations for the light switch and switch socket from the floor? (Write the height in centimetres).

8. What are the space factors of the following wiring systems?
   (i) Trunking.
   (ii) Conduit.
   (iii) Ducting.

9. What is the effect of connecting a light switch in a neutral wire?

10. How can you extend the range of an ammeter so as to measure high current?

11. Outline **three (3)** types of D.C. motors.

SECTION C (60 marks)

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

12. A shunt generator supplies 100 A at a terminal voltage of 200 volts. The prime mover is developing 32 H.P. The shunt field resistance is 50 ohms, armature resistant is 0.1 ohms.
    Find:
    (a) Field current.
    (b) Armature current.
    (c) Electromotive force generated.
    (d) Mechanical power input.
    (e) Electrical power output.
    (f) The generator efficiency.

13. (a) Mention **two (2)** types of losses available in a transformer, and the type of tests used to determine them.

    (b) In a 50 KVA transformer with iron losses of 500 W and full load copper losses of 800 W, determine at unit power factor the:
    (i) power input.
    (ii) efficiency.

    (c) If the power factor is changed into 0.8 lagging, what shall be the:
    (i) Input power?
    (ii) Efficiency?

14. A room 12 m by 7.5 m wide is to be lighted to an average intensity of 240 lux. The lamps to be used have an output of 30 lumens per watt and the co-efficient of utilization of the room is 0.6.

If one lamp is rated 30 W, calculate the:

(i) total lumen.
(ii) total power.
(iii) number of lamps.

15. A shunt motor takes 6 amperes on no load and runs at 750 rev/min. The resistance of shunt field is 110 ohms and of armature 0.25 ohms. When loaded, it takes a current of 52 amperes.

Calculate the:

(i) Field current.
(ii) Armature current at no load and at load.
(iii) Back e.m.f. both at load and at no load.
(iv) Speed when loaded.

16. Each phase of a 3-phase delta connected generator supplies a full load current of 100 A at a voltage of 240 V and at a power factor of 0.6 lagging. Find the:

(i) Apparent power.
(ii) Line current.
(iii) Line voltage.
(iv) Real power.
(v) Reactive power.