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 **Friday November 12, 2004 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. Electronic 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).

This paper consists of 5 printed pages.

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) A victim of an electrical shock may be given first aid by ---------- method(s):

A Faraday's and Lenz's
B Holger Nielsen's and mouth to mouth
C Kiss of life and Faraday's
D Lenz's and Holger Nielsen's
E Push up.

(ii) A flexible cord is a flexible cable in which the cross-sectional area of each conductor does not exceed --------- mm^2.

A 1
B 1.5
C 2.5
D 4
E 6

(iii) The purpose of a chart circuit found inside the distribution board is to provide information about the

A circuit route and type of wiring systems
B type of circuit protective device and earthing facility
C name of circuit and its protective device
D electrical contractor's name
E current rating.

(iv) A double-wound transformer has 240 volts in primary side which consists of 2400 turns with 120 V in secondary. What is the transformer ratio?

A 2 : 1
B 1 : 2
C 2 : 3
D 1 : 10
E 1 : 20.

(v) Which one of the following power stations generates electrical power by waterfalls?

A Fuel
B Hydroelectric
C Steam
D Neuclear
E Coal fired

(vi) The purpose of adding salt and charcoal around the earth electrode in a dry land is to

A decrease the conductivity of earthing
B increase earth impedance
C decrease earth impedance
D make use of salt and charcoal to earn money
E increase resistivity.

(vii) The stationary part of an induction motor is called

A rotor
B starter
C commutator
D squirrel cage
E winding.

(viii) The ratio of minimum breaking current to current rating is known as

A fusing factor
B diversity factor
C load factor
D growth factor
E single factor.

(ix) For a new and completed electrical installation, its minimum insulation resistance allowed, must not be less than

A 0.5 M Ω
B 100 M Ω
C infinity
D 1 M Ω
E 1.5 M Ω.

(x) In a room where fluorescent lamps are installed near a rotating machine, the machine might appear to be stationary. This is due to

A a poor circuit power factor
B a mixed lamp colouring
C stroboscopic effect
D unbalanced circuit
E skin effect.

SECTION B (30 marks)

Answer **all** questions in this section.

2. Distinguish between the following switch gears:
   (a) Switch fuse.
   (b) Fused switch.
3. State **two (2)** tests performed in a transformer in order to determine its losses.
4. How many switches and which type must be used to control lights from two different positions?
5. How can you reverse the direction of a rotation of a D.C. series motor?
6. State **three (3)** ways of transferring heat energy.
7. State **two (2)** types of starters commonly used by the discharge lamps.
8. Outline **three (3)** methods of improving a low power factor in a factory.
9. Outline **two (2)** types of instrument transformers.
10. Calculate the synchronous speed of a copole motor if the supply frequency is 50 Hz.
11. The resistance of a conductor is determined by various factors including nature of its material (resistivity). What are the other factors?

SECTION C (60 marks)

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

12. A 240 V electric furnace is used to raise the temperature of a 3.6 kg of brass from 16 °C to annealing temperature of 593 °C in a time of 25 minutes at an overall efficiency of 78 percent. The specific heat capacity of brass may be taken as 377 J/kg K. Calculate the:
    (a) Energy used.
    (b) Input power of furnace.
    (c) Resistance of heating element.
    (d) Supply current.
13. A small workshop 6 m × 4 m is to be illuminated by 110 lux. The lamp efficiency is 40 lumen per watt. The coefficient of utilization is 0.5 and maintenance factor is 0.7. Calculate the:
    (a) Total lumen.
    (b) Total power required.
    (c) Number of lamps if each lamp is rated at 60 W.

14. A 40 kVA 3300/240V, 50 Hz single phase transformer has 660 turns on primary winding. Determine the:

(a) Transformer ratio.

(b) Secondary turns.

(c) Secondary and primary currents.

15. A six pole 3 phase alternator driven at 1000 rev per minute supplies power to an 8 pole 3 phase induction motor. Calculate the:

(a) Synchronous speed.

(b) Rotor speed if the slip is 3 percent.

(c) Rotor frequency.

16. An 8–pole d.c. shunt generator with 778 wave connected armature conductors, runs at 500 r.p.m. while supplying a load of 12.5 Ω at terminal voltage of 250 V. The armature and field resistance are 0.24 Ω and 250 Ω. Calculate the:

(a) Field current.

(b) Load current.

(c) Armature current.

(d) Generated e.m.f.

(e) Flux per pole.