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.
- 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).

This paper consists of 5 printed pages.

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SECTION A (10 marks) Answer all questions in this section.

- 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 4KVA
 - C 5KVA

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- 7 KVA 3 VA
- To reduce stroboscopic effects, discharge lamps may be connected
 - on one phase of a three phase supply
 - on all three phases of a 3 phase supply
 - without capacitor power factor improvement C
 - with special filters D
 - with a bank of capacitors.
- (viii) For a completed electrical installation, the minimum insulation resistance test reading allowed is
 - 0.5 M \Q A

(B)

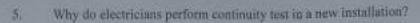
- 1.0 M Ω B
- C 100 M Ω
- Infinity D
- 2.5 M Ω
- One of the main reasons for using a ringmain to feed a large distribution system is
 - supply reliability
 - spare stand by switch gear B
 - consumer growth factor C
 - D less maintenance
 - higher voltage supply.
- The resistance of a conductor increases when (x)
 - its length decreases
 - B its area decreases
 - both area and length increases C
 - its area increases D
 - diameter increases.

SECTION B (30 marks)

Answer all questions in this section

- What is the cable size and current rate for a circuit used for a radial circuit of the socket outlet?
- What is the purpose of performing insulation resistance test in a new installation?
- Find the synchronous speed of a 4 pole 3-phase motor operating at 380 V/50 Hz.

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- Mention three (3) methods of starting a 3-phase squirrel cage induction motor.
 - What are the recommended heights by I.E.E. regulations for the light switch and switch socket from the floor? (Write the height in certimetres).
 - 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.

 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) Annature current.
- (c) Electromotive force generated.
- (d) Mechanical power input.
- (e) Electrical power output.
- (f) The generator efficiency.
- (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?

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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:

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- (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.