

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.
- Answer all questions in sections A and B and three (3) questions from section C.
- 3.- Calculators are not allowed in the examination room.
- 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 6 printed pages.

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SECTION A (10 Marks)

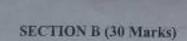
Answer all questions in this section.

- For each of items (i) (x) choose the correct answer from among the given alternatives and write its letter beside the item number.
 - The function of protective relay in a circuit breaker is to (i)
 - react on each stray voltage
 - close the contacts when actuating quantity reaches a certain B predetermined value,
 - limit arcing current during the operation of the circuit breaker
 - provide additional safety in the operation of the circuit breaker D
 - neutralize the effect of transient. E
 - Which portion of the transmission system does the fault occurs most (ii) frequently?
 - Transformer A
 - Overhead lines B
 - Alternators C
 - Underground cables D
 - Switch gears. E
 - Which of the following category of consumers can provide highest load factor?
 - A domestic consumer A
 - A steel melting unit using arc furnace B
 - A cold storage plant C
 - A continuous process plant D
 - An air compressor running continuously. E
 - 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?
 - Voltage will decrease when inductor is connected but will A increase when capacitor is connected.
 - Voltage will increase when inductor is connected but will В decrease when capacitor is connected.
 - Voltage will decrease when either inductor or capacitor is connected.
 - Voltage will increase when either inductor or capacitor is D
 - Voltage will remain constant either inductor or capacitor is E connected.

- How much energy can be taken from a power supply?
 - As much as the consumers demand
 - Maximum demand B
 - Base load and peak load C
 - A maximum of the installed capacity of generation D
 - kWh generated in a year.
- One of main reasons for conducting continuity tests on ring final circuit (vi) conductors is to
 - identify the opposite legs of the ring
 - ensure that the CPC is not continuous B
 - ensure that interconnections in the ring do not exist C
 - take a resistance measurement D
 - ensure that CPC is continuous E
- Identify factors which decide the type of wiring system. (vii)
 - Flexibility, appearance, number of points, type of conductors
 - Type of building, flexibility, appearance, durability, cost, safety B
 - Type of room, type of supply, size of fuse, cost earthing C conditions, installation conditions
 - Current rating, fusing factor, availability of accessories, cost, D safety, durability
 - Type of building, installation condition, atmospheric conditions. E
- (viii) One can control a single bulb or a group of bulbs from two different positions by use of
 - two single- pole switches
 - one two- way switch and one single- pole switch B
 - two one- way switches and an intermediate switch C
 - two two- way switches D
 - one intermediate switch. E
- The purpose of interpoles in a de machine is to (ix)
 - aid reactance voltage of the commutating coils
 - oppose reactance voltage of the commutating coils B
 - aid armature reaction ampere turns C
 - oppose armature reaction ampere turns D
 - aid in reversal of current in the commutating coils.
- Power factor of a.c series motor can be improved by
 - increasing the magnitude of inductances of field and armature winding
 - equalizing the armature resistance to armature reactance B
 - decreasing the number of turns on armature winding C
 - increasing armature resistance to armature reactance
 - decreasing the magnitude of reactance and armature winding D

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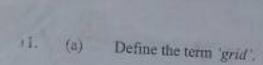


Answer all questions in this section.

- Define the following terms as used in electrical installation work.
 - (a) Earthing
 - (b) Direct contact
 - (c) Fault current
 - (d) Protective relays
 - (e) Enclosed.
- 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?
- Explain briefly the five (5) main features of good protective devices.
- List six (6) parts of a d.c generator.
- 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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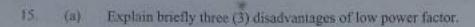


(b) Describe four (4) requirements which should be fulfilled for a system to be considered as a good system.

SECTION C (60 Marks)

Answer three (3) questions from this section.

- 12. With the help of a diagram explain clearly how the ranges of a dc (a) ammeter and a dc voltmeter can be extended.
 - A permanent magnet moving coil instrument gives a full scale (b) 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,
- Define the following terms as used in armature windings. 13. (a)
 - (i) Conductor
 - (11) Turn
 - (iii) Coil
 - (iv) Winding
 - A series generator of total resistance 0.5 Ω is running at 1000 r.p.m and (b) 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.
- List three (3) methods of starting fluorescent lamps. 14. (a)
 - With the help of a well labeled circuit diagram, explain the working (b) principle of a low pressure mercury vapour lamp (fluorescent lamp).
 - Draw a circuit of domestic consumer's control unit and state the cable (0) sizes you would use for each circuit.



- (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.
- (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/m². 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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