Candidate's Examination No. .....

THE UNITED REPUBLIC OF TANZANIA
MINISTRY OF EDUCATION AND VOCATIONAL TRAINING
FORM TWO SECONDARY EDUCATION EXAMINATION, 2011

0084 **ELECTRICAL ENGINEERING**

TIME: 2½ HOURS

INSTRUCTIONS

1. This paper consists of sections A and B.
2. Attempt **ALL** questions in section A. In section B answer **ALL** questions from the area of your specialisation.
3. **ALL** answers should be written in the spaces provided.
4. **ALL** writing must be in blue or black ink **EXCEPT** drawings which must be in pencil.
5. Write your examination number at the top right corner of every page.
6. Cellphones and calculators are not allowed in the examination room.

FOR EXAMINER'S USE ONLY		
QUESTION NUMBER	SCORE	INITIALS OF EXAMINER
1		
2		
3		
4		
5		
6		
7		
8		
TOTAL		

This paper consists of 11 printed pages.

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SECTION A

ENGINEERING SCIENCE (40 MARKS)

1. Choose the correct answer and write its corresponding letter in the box provided.

(i) Electromagnetism is applied in:
A. all non-magnetic circuits
B. domestic wiring systems
C. electric bells and transformers
D. electric lamps and conveyer belts.

(ii) The unit of power is:
A. coulombs
B. horse - power
C. joule
D. newton.

(iii) Goggles, safety belts and fire extinguishers are considered as:
A. circuit insulators
B. first aid tools
C. protective devices
D. semi-conductor materials.

(iv) In electrical works, a folding ruler is used for measuring:
A. folded distances
B. height from the ground floor to the roof
C. short distances
D. undetermined angles.

(v) The movement of electrons in a conductor is caused by:
A. a resistance in a conductor
B. an e.m.f
C. an inductance
D. equal potentials between the terminals.

(vi) Two resistors each having a resistance of 5Ω are connected in series. The equivalent resistance of the circuit is:
A. 0.4Ω
B. 5.0Ω
C. 10.0Ω
D. 40.0Ω

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(vii) A capacitance of 2μF charged to a potential difference of 150V is connected in parallel with an uncharged capacitor of 4μF. What is the voltage existing in the combination?

A. 25V
B. 50V
C. 75V
D. 100V

(viii) The function of a rectifier is to:

A. change heat energy into electrical energy
B. change peak voltage into r.m.s value
C. convert a.c voltage into d.c voltage
D. generate magnetic field.

(ix) One of the indications of a full charged cell is:

A. changes of colour of the plates
B. high and constant specific gravity
C. low specific gravity
D. whitish deposit on plates.

(x) Ohm's law does not apply to:

A. a.c circuits
B. conductors
C. d.c circuits
D. semi-conductors.

2. (a) (i) List three ways of heat transfer.

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(ii) Calculate the quantity of heat needed to raise the temperature of 20kg of water from 30°C to 33°C. Assume specific heat capacity of water is 4200J/kgK

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(b) (i) What is a transformer?

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3. (a)

(ii) A transformer is required to step down 1320V to 240V at 50 Hz. If the transformer needs to have 1.5V per turn, calculate the number of turns on both primary and secondary windings.

(c) Define the following terms:

(i) Cable.....

(ii) Conductor.....

(iii) Insulator.....

(d) A PVC twin copper cable 50m long has a total voltage drop of 8V when it is carrying a current of 40A. Calculate the cross sectional area of the cable, given that the resistivity of copper is 1.7 μΩcm

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SECTION B

ELECTRICAL INSTALLATION (60 MARKS)

3. (a) List two materials used to produce wires for high – voltage transmission lines.

(i) .....

(ii) .....

(b) Mention two advantages of using clad-steel wires and high towers for high-voltage transmission lines.

(i) .....

(ii) .....

(c) What is a fuse?

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(d) Write three types of fuse.

(i) .....

(ii) .....

(iii) .....

(e) Briefly describe three applications of heating effects of an electric current.

(i) .....

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(ii) .....

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(iii) .....

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(f) Calculate the resistivity of aluminium wire if a length of 100 m aluminium conductor with a cross sectional area of 4 mm^2 has a measured resistance of 0.7 Ω

4. (a) Draw a symbol for each of the following electrical accessories

(i) Emergency lighting

(ii) Lamp feed from variable voltage supply

(iii) Two way two gang

(b) (i) Explain the term "Earth resistance".

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(ii) What is the function of the Earth Leakage Circuit Breaker (ELCB)?

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(c) (i) Design a lighting circuit of two lamps connected in series, with rates of 60 W and 100 W

(ii) An electric heater is rated 240 V, 3 kW. Calculate the power output if the supply falls by 10%

(d) (i) What is "First Aid"?

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(ii) Draw a well labeled diagram of a carbon dioxide fire extinguisher.

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5. (a) Briefly explain the applications of a dimmer switch.

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(b) The specific resistance of platinum is 10.3 μΩcm. Calculate the length of a conductor made from platinum if its diameter is 0.548 mm. Assume resistance of a platinum is 4 Ω

(c) (i) Define the term "Ampere".

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(ii) Briefly explain how electric power is obtained.

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(d) Draw a simple diagram to indicate six 13 A socket outlets connected using a ring-wiring method.

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ELECTRONICS, RADIO REPAIR AND TELEVISION SERVICING

(60 MARKS)

6. (a) Sketch a neat symbol for each of the following:

(i) Generator

(iii) Fuse

(ii) Single pole switch

(iv) Voltmeter

(b) What is the importance of rectification?

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(c) Why are resistors used in electronic circuits?

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(d) A moving coil instrument of resistance 5Ω gives a full scale deflection with 0.015A. Calculate the resistance of a resistor connected in parallel to allow the instrument to read up to 2A

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7. (a) What is electric field intensity?

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(b) Briefly explain the factors that affect the capacitance of a capacitor.

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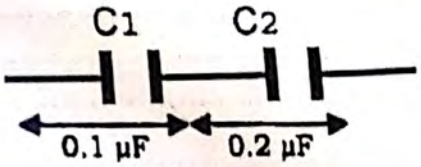
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(c) Write down the recommended electric solder.

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(d) In the figure below, calculate the voltage across C_1



8. (a) Write the colour code for the following resistances:

(i) 60 kΩ .....

(ii) 40 Ω .....

(iii) 25 kΩ .....

(iv) 72 kΩ .....

(v) 120 Ω .....

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(b) What is a tunnel diode?

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(c) What is meant by "impedance in a transformer"?

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(d) Write down the importance of impedance in a transformer.

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