Candidate's Examination Number.....

THE UUNUTED REPBLIC OF TANZANIA
NATIONAL EXAMINATIONS COUNCIL
FORM TWO SECONDARY EDUCATION EXAMINATION

080

ELECTRICAL ENGINEERING

Time: 2:30 Hours **Tuesday, 24th November 2015 a.m.**

Instructions

1. This paper consists of sections A and B.
2. Answer **all** questions in section A. In section B answer **all** questions in the area of your specialization.
3. **All** answers must be written in the spaces **provided**.
4. **All** writing must be in blue or black ink **except** drawings which must be in pencil.
5. **All** communication devices and calculators are **not** allowed in the examination room.
6. Write your **Examination number** at the top right corner of every page.

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

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Candidate's Examination Number.....

SECTION A (50 Marks)

Answer **all** questions in this section.

ELECTRICAL ENGINEERING SCIENCE

1. For each of the following items (i) – (x), choose the correct answer and write its corresponding latter in the box provided.

(i) Coulomb is the measure of

A potential difference

B electron flow

C quantity of charge stored

D electric current.

(ii) In an electromagnet the polarity of the magnet will depend upon the

A magnitude of current

B number of turns in the coil

C direction of the current flow

D core material used.

(iii) Resistance of a piece of wire depends on one of the following factors:

A Cross-sectional area

B Turns ratio

C Life span of the wire

D Colour coding of the material.

(iv) Cells are connected in parallel in order to

A increase the voltage available

B reduce cost of wire

C increase the current available

D reduce the time required to fully charge them after use.

(v) Which of the following generating stations has the minimum running cost?

A Hydro-electric station

B Nuclear power station

C Thermal power station

D Diesel power plant.

(vi) The Q-factor of a coil is given by

A its power-factor cos φ

B ratio of maximum energy stored and energy dissipated per cycle

C reciprocal of its power-factor

D ratio of R/Z.

(vii) The combined resistance of two equal resistors connected in parallel is equal to

A one half the resistance of one resistor

B twice the resistance of one resistor

C four times the resistance of one resistor

D one fourth the resistance of one resistor.

(viii) If the number of valence electrons of an atom is four, the substance is usually

A a conductor

B an insulator

C a semiconductor

D an alloy.

(ix) Two electric bulbs rated for the same voltage have powers of 200 W and 100 W. if their resistances are R_1 and R_2 respectively, then,

A $R_1 = 2R_2$

B $R_2 = 4R_1$

C $R_2 = 2R_1$

D $R_1 = 4R_2$.

(x) The basic requirement for inducing e.m.f in a coil is that;

A magnetic flux should link the coil

B there should be change in magnetic flux linking the coil

C coil should form a closed loop

D magnetic core should provide maximum flux

2. (a) Define the following:

(i) Voltage

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(ii) Current

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(iii) Resistance

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(iv) One ampere

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(b) (i) State Ohms Law

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(ii) What is the maximum voltage that can be applied across a 100 Ω, 10W resistor in order to keep within the resistor's power rating?

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(iii) Read carefully the circuit in Figure 1, and then calculate the resistance between A and B, and the total current flowing in the circuit.

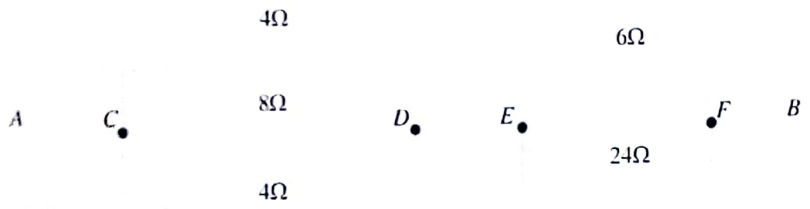

Figure 1

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(c) State the application of the following tools as used in electrical works:

(i) Long nose plier

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(ii) Side cutter

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(iii) Bench vice

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(iv) Files

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(v) Desoldering pump.

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(d) State laws of magnetic force.

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(e) Define the following terms as used in electromagnetism:

(i) Self inductance of a coil

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(ii) Mutual inductance of a coil.

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(e) Draw electrical symbols for the following components:

(i) Air-cored inductor

(ii) Iron cored inductor.

SECTION B (50 Marks)

Answer **all** questions in the area of your specialization.

ELECTRICAL INSTALLATION

3. (a) (i) Define three categories of materials mainly used in electricity.

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(ii) What is the major function of insulation?

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(iii) Mention two ways of mechanically cable protection used in installation works.

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(b) What is the function of each of the following accessories?

(i) Lamp holders.

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(ii) Plugs and socket-outlets.

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(c) Briefly explain how you can perform the basic test of the installation to earth.

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(d) State any six points that should be considered in selecting the wiring system for a particular installation.

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(e) Name two common methods of wiring.

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4. (a) Define "Cell" as applied in chemical effects of electrical current.

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(b) Mention two common types of cells.

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(c) Give three advantages of using Laclanhe' cell "dry" type.

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(d) A Laclanche' wet cell, with e.m.f 1.5 V, and internal resistance 1 Ω, supplies current to a single-stroke electric bell of resistance 5 Ω. Calculate the steady current in the circuit and the potentials difference of the cell.

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5. (a) Define the following earth terms:

(i) Earth electrode.

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(ii) Earthing lead.

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(b) (i) Why are charcoal and salt used during the installation of earth electrode?

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(ii) State two factors that have to be considered in determining the size of a fuse wire in installation.

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(iii) State two kinds of protection that offered by a fuse.

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ELECTRONICS, RADIO REPAIR AND TV SERVICING

6. (a) (i) Apart from the stated value, what are the three necessary factors to be considered when choosing a resistor?

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(ii) A resistance of 8000 Ω is required to be reduced to 5000 by adding a resistance in parallel. What value should the added resistance have?

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(b) Draw symbols for the following electronic components:

(i) Fixed resistor

(ii) Variable capacitor

(iii) Semiconductor diode

(iv) Dust cored transformer

(v) Iron cored inductor

7. (a) Define the following terms used in semiconductor theory.

(i) Intrinsic semiconductor

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(ii) Doping

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(iii) Reverse bias

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(iv) Free electron

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(v) Ionization

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(b) (i) What is rectification?

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(ii) Mention the component that is mainly used for rectification and give a reason for your answer.

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8. (a) Which component is mainly used for signal amplification in a radio receiver?

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(b) Draw a transistor symbols for:

(i) NPN

(ii) PNP.

(c) (i) Draw a symbol for a zener diode and give one major application of it in electronic power supplies.

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(ii) Draw a well labeled characteristic curve of a zener diode.