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		

F2 - 27

PM-RALG- 2015

Scanned by CamScanner

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 $\cos \varphi$

    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

....

....

....

(ii)   Current

....

....

....

(iii)   Resistance

....

....

....

(iv)   One ampere

....

....

....

(b)   (i)   State Ohms Law

....

....

....

(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?

....

....

....

....

....

(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

....

....

....

....

....

....

....

....

....

....

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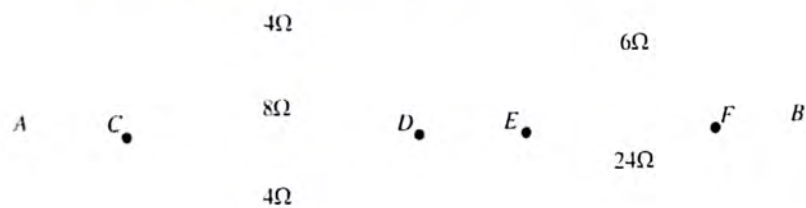
(c)   State the application of the following tools as used in electrical works:

   (i)   Long nose plier

   ....
   ....

   (ii)   Side cutter

   ....
   ....

   (iii) Bench vice

   ....
   ....

   (iv)   Files

   ....
   ....

   (v)   Desoldering pump.

   ....
   ....

(d)   State laws of magnetic force.

   ....
   ....
   ....
   ....
   ....
   ....

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

   (i)   Self inductance of a coil

   ....
   ....
   ....

(ii) Mutual inductance of a coil.

....
....
....
....

(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.

....
....
....
....
....
....
....
....

(ii)   What is the major function of insulation?

....
....
....
....

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

....
....
....

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

(i)   Lamp holders.

....
....
....
....

(ii)   Plugs and socket-outlets.

....
....
....
....

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

....
....
....
....
....
....

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

....
....
....
....
....
....

(e) Name two common methods of wiring.

....
....
....

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

....
....
....

(b) Mention two common types of cells.

....
....
....

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

....
....
....
....

Scanned by CamScanner

(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.

....

....

....

....

....

....

....

5. (a) Define the following earth terms:

(i) Earth electrode.

....

....

....

....

....

(ii) Earthing lead.

....

....

....

....

....

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

....

....

....

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

....

....

....

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

....

....

....

....

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?

....

....

....

....

(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?

....

....

....

....

....

....

....

....

Page 11 of 14

(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

    ....
    ....
    ....

    (ii)   Doping

    ....
    ....
    ....

(iii)   Reverse bias

....

....

....

(iv)   Free electron

....

....

....

(v)   Ionization

....

....

....

(b)   (i)   What is rectification?

....

....

....

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

....

....

....

....

....

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

....

....

(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.

....
....
....

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