



Candidate's Examination Number.....

THE UNITED REPUBLIC OF TANZANIA
NATIONAL EXAMINATIONS COUNCIL
FORM TWO NATIONAL ASSESSMENT

080

ELECTRICAL ENGINEERING

Time: 2:30 Hours

Tuesday, 22nd November 2016 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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SECTION A

ELECTRICAL ENGINEERING SCIENCE (50 Marks)

Answer all questions in this section.

1. For each of the following items (i) – (x), choose the correct answer and write its letter in the box provided.
- (i) What is the equivalent capacitance of $6 \mu F$ and $3 \mu F$ capacitors connected in series?
A $2 \mu F$ B $3 \mu F$
C $9 \mu F$ D $18 \mu F$
- (ii) The magnetic material used in permanent magnets is
A iron, B soft steel,
C nickel, D hardened steel.
- (iii) What is the value of temperature coefficient of a semiconductor?
A Zero B Negative
C Positive D Infinite.
- (iv) Which of the following electrical quantities is measured in Amperes?
A Current B Resistance
C Voltage D Impedance.
- (v) The electrons in the last orbit of an atom are called
A free electrons, B bond electrons,
C valence electrons, D thermionic electrons.
- (vi) What will be the current in the circuit when the resistance is doubled and voltage kept constant?
A The current will be halved. B The current will be doubled.
C The current will be the same. D The current will be improved.
- (vii) The purpose of load in an electric circuit is
A to utilize electrical energy. B to increase the circuit current.
C to decrease the circuit current. D to block both a.c and d.c currents.
- (viii) which of the following systems apply only Kirchhoff's current law?
A Closed loops in a network B Electronic circuits.
C Junctions in a network D Open loops in a circuit.

(ix) What is the combined resistance of two equal resistors connected in parallel?

- A Twice the resistance of one resistor
- B Four times of the resistance of one resistor
- C One half of the resistance of one resistor
- D One fourth of the resistance of one resistor .

☐

(x) What is a transformer?

- A It is an a.c machine which converts electrical energy to mechanical energy.
- B It is an a.c machine which converts mechanical energy into electrical energy.
- C It is a machine which converts one level of voltage to another level.
- D It is a machine which converts d.c power to a.c power.

☐

✓ 2. (a) What is the SI unit of the following quantities?

- (i) Current
- (ii) Power
- (iii) Energy
- (iv) Charge
- (v) Resistance

(b) If a current of 4 A flows through a conductor of resistance $2\ \Omega$:

(i) What is the potential difference across the conductor?

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(ii) Calculate the heat dissipated in the conductor.

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- (iii) Study the circuit given in Figure 1 and calculate the power dissipated in each resistor.

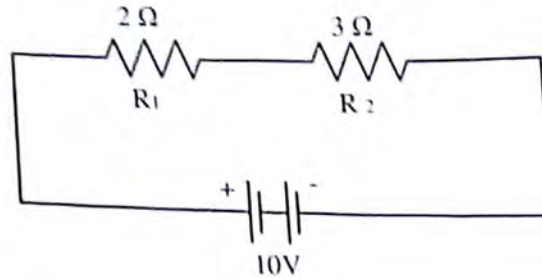


Figure 1

- (c) When two equal resistors are connected in series across a 200 V supply, the power dissipated is 40 W. Calculate;

(i) the resistance of each resistor.

(ii) the current from the supply.

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✓ (d) If a 12 V lamp is operated from a 240 V a.c mains step-down transformer:

(i) What will be the turns ratio of the transformer windings?

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✓ (iii) How many turns are on the primary winding if the secondary winding has 80 turns?

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✓ (iii) What is the current in the primary coil if the current through the lamp is 2 A?

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(e) Give five types of capacitors according to the dielectric used.

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SECTION B

ELECTRICAL INSTALLATION (50 Marks)

Answer all questions in this section.

3. (a) Define the following terms:
- (i) Fuse element
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 - (ii) Fuse
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 - (iii) Insulator
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 - (iv) One-way switch.
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- (b) Give standard sizes of the following cables commonly used in electrical works:
- (i) Cables used for lighting circuits
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 - (ii) Cables for electric circuits
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 - (iii) Cables for ring circuits
.....
 - (iv) Cables for radial circuits.
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4. (a) Give the names of the insulators suitable for
(i) Carker wiring circuit cable.

(ii) Electric iron wiring circuit cable.

(iii) Lighting circuit cable.

(iv) Ring circuit cable.

- (b) Mention four advantages of metal conduits.

5. (a) List three possible electric faults that can occur in electrical circuits.

- (b) Give the meaning of the following terms:

(i) Electrical power.

(ii) Ampere.

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(iii) Electrical energy.

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(c) A piece of resistance wire 100 m long and of cross-sectional area 0.1 mm^2 , at a temperature of 10°C passes a current of 5 A when connected to a d.c supply at 230 V. Calculate the resistivity of the wire.

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ELECTRONICS, RADIO REPAIR AND TV SERVICING (50 Marks)

Answer all questions in this section.

6. (a) Name two groups of electronic components, and for each group give one example.

(i)
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(ii)
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(b) Write two types of fixed resistors.

(i)
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(ii).....

(c) Tabulate the values of colours used in resistors for colour coding.

| Colour | Value |
|--------|-------|
| Red | |
| Green | |
| Blue | |
| Black | |
| Violet | |
| White | |
| Brown | |
| Orange | |
| Yellow | |
| Gray | |

7. (a) (i) Define the term "Semiconductor material".

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(ii) Mention two common semiconductor materials.

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(iii) Name two kinds of extrinsic semiconductors.

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(b) (i) Mention three leads of a bipolar junction transistor.

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(b)

- (i) If a collector current (I_C) is 30 mA and that of Emitter (I_E) is 35mA. Calculate the base current (I_B).

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- (ii) The current in a collector terminal (I_C) is 19 mA and the emitter current (I_E) is 20 mA. What is the current amplification factor (α)?

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8.

- (a) (i) What is soldering?

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- (ii) Which tool is used to remove molten solder from the PCB?

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- (iii) Give two materials used to make an alloy of a solder wire.

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- (b) Draw electronic symbols for;
 (i) Fixed capacitor,

- (ii) Variable resistor,

- (c) Study Figure 2 carefully and answer the questions that follow.

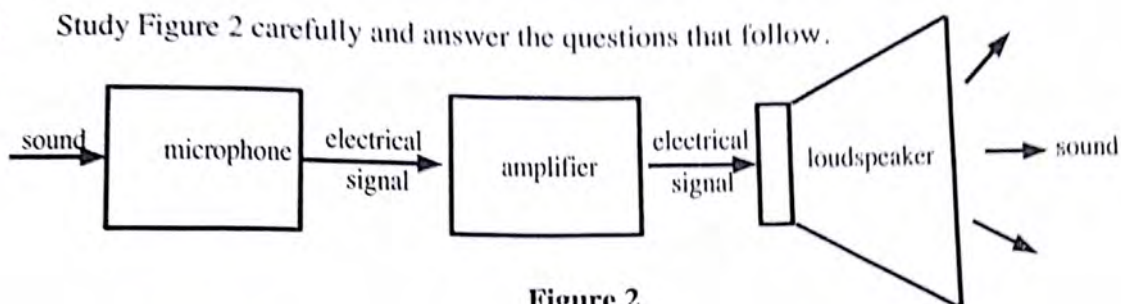


Figure 2

- (i) What is the function of the following parts of the block diagram given in Figure 2?

Microphone.

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Amplifier.

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Loudspeaker.

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(ii) Name two transducers found in Figure 2.

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