Candidate's No .....

THE UNITED REPUBLIC OF TANZANIA
MINISTRY OF EDUCATION AND CULTURE
FORM TWO SECONDARY EDUCATION EXAMINATIONS, 2003

0084 ELECTRICAL ENGINEERING

TIME: 2½ HOURS

INSTRUCTIONS

1. This paper consists of sections A, B and C. Section A is compulsory. You are required to answer all questions in this section.
2. Section B and C are optional. You are required to select either section B or C and answer all questions in the section you have selected.
3. Remember to attach this question paper to answer sheets at the end of the examination.
4. Cell phones are not allowed in the examination room.

FOR EXAMINERS' USE ONLY		
QUESTION NUMBER	SCORE	INITIALS OF EXAMINER
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
TOTAL		

This paper consists of 06 printed pages

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SECTION A (50 MARKS)

ELECTRICAL ENGINEERING SCIENCE

Choose the most correct answer and write its letter in the space provided

1 (i) Crystals of certain materials produce electricity when subjected to

A. Light
B. Magnetism
C. Heat
D. Pressure ✓

(ii) Matter retains its chemical properties when broken down into

A. Electrons
B. Molecules
C. Ions
D. Atoms ✓

(iii) The capacity of a cell or battery is measured in

A. Ampere – hours
B. Litres
C. Volts ✓
D. Watts

(iv) Electromagnetism is the study of

A. Behaviour of a conductor in magnetic field ✓
B. Magnetic field set up by a conductor
C. Magnetic field set up by a current carrying conductor
D. Interaction of two electromagnetic fields

(v) The movement of electrons through a conductor in one direction is caused by

A. Equal potentials
B. Inductance
C. A resistance
D. An e.m.f. ✓

(vi) The two main defects of a primary cell are

A. Polarization and sulphation
B. Local action and polarization ✓
C. Buckling and polarization
D. Sulphation and buckling

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SECTION A (50 MARKS)

ELECTRICAL ENGINEERING SCIENCE

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1. (i) Crystals of certain materials produce electricity when subjected to:

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(vii) In a step down transformer, the number of turns in the secondary as compared to the primary turns would be:
A. Fewer ✓
B. The same
C. Greater
D. One turn less

(viii) The value of capacitance depends upon:
A. The product of charge and voltage
B. The product of charge and current
C. Charge divided by voltage. ✓
D. Voltage divided by charge

(ix) The unit of electrical energy as commercially used is:
A. Kilowatt – hour ✓
B. Kilo Watt
C. Kilo Volt
D. Kilo Amperes

(x) When the temperature of an electric conductor is increased, its resistance will:
A. Remain the same
B. Decrease
C. Increase ✓
D. None of the above

Questions 2(a) – (e) are short answer questions. Fill in the blanks with the correct answers for each question

2. (a) When measuring electric current and voltage passing across the load respectively, the ammeter and voltmeter should be connected Series, Parallel the circuit load respectively

(b) The two major losses in the transformer are
(i) Cu loss (Copper loss)
(ii) Fe loss (Iron loss)

(c) Electromagnetism is the study of magnetic field set up by the passage of electric current through a system of conductor.

(d) State Ohm's Law in words and by using formula
The current flowing in a circuit is directly proportional to the voltage and inversely proportional to the resistance provided that the temperature constant.
Mathematical $I \propto \frac{V}{R}$ $\propto$ = Constant
$I = \frac{V}{R}$
$V = IR$

$\frac{20 \times 10}{10}$
2

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(e) In an Analogy instrument, "damping" means

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Questions 3(a) – (e) involve calculations. You are required to show clearly all the steps that lead you to the final answer for each question. Use answer sheets provided

3. (a) The resistance of the relays coil used in a cold room test was 20 ohms at 0°C. What would be its resistance when operating at a mean temperature of 20°C, the temperature coefficient of resistance of the coil winding is 0.0043/°C.

(b) A carbon resistor has a resistance of 100 ohms at 30°C and 98.95 ohms at 70°C. Determine the average temperature coefficient of resistance of carbon over this temperature range.

(c) A P.V.C. 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 and the power lost in the cable when this current is flowing.

(d) Write down the various ranges of voltage which are defined in the electricity supply act of the following.

(i) Extra – low voltage
(ii) Medium voltage
(iii) Low voltage
(iv) High voltage
(v) Extra high voltage

(e) What will be the power dissipated in the resistor if a current of 15 mA flows in a resistor of 20 kilo ohms?

SECTION B (50 MARKS)
ELECTRICAL INSTALLATION

Answer all questions in the answer sheets provide.

4. (a) Write three measures which should be taken in the case of an electric fire?

(b) (i) What is the maximum permissible voltage drop in installation as recommended by the I.E.E. Regulations.

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

(c) Write the components which are used to make a simple circuit and draw the simple circuit.

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5. (a) Draw symbols for the following electrical accessories.

(i) socket outlet
(ii) lighting outlet
(iii) earth.

(b) (i) What is a fuse?

(ii) Write three types of fuses?

(c) What is the resistance of an electric lamp filament if it draws a current of 0.6A from a 240 V supply?

6. (a) The seriousness of electric shock will depend on

(i) .....
(ii) .....
(iii) .....
(iv) .....

(b) Write the long form of the following abbreviations of cables:

(i) MICS
(ii) S.W.A
(iii) P.V.C.
(iv) T.R.S
(v) M.I.A.S

(c) Explain the uses of running couples

SECTION C (50 MARKS)

ELECTRONICS, RADIO REPAIR AND TELEVISION SERVICING

Answer all questions in this section on separate sheets of paper provided.

7. (a) In n-type semiconductor, name

(i) the majority charge carriers
(ii) the minority charge carriers.

(b) Name a doping agent used to obtain a

(i) P-type semiconductor
(ii) N-type semiconductor with germanium and silicon

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(c) Draw three configurations of a PNP Bipolar transistor

8. (a) Write the values of the following resistors colour coded as

(i) R1 ⟶ Blue, Red, Brown and Gold

(ii) R2 ⟶ Red, Black, Red and silver.

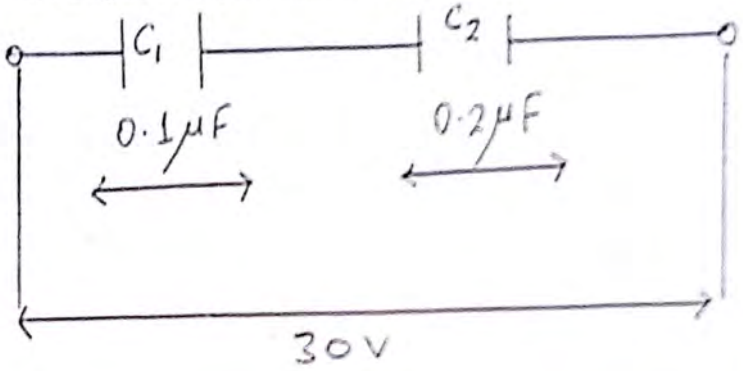
(b) Explain the peak inverse voltage.

(c) Distinguish between extrinsic and intrinsic in connection to semiconductors.

9. (a) Draw a neat-circuit diagram of a simple bridge rectifier and sketch its wave forms at the input and output

(b) Explain the uses of flux as applied in soldering electronic components.

10. (a) In the figure below, calculate the voltage across capacitor C1.



(b) Draw symbols for

(i) Semiconductor diode
(ii) Light emitting diode
(iii) Variable resistor
(iv) PNP transistor
(v) Electrolytic capacitor

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