

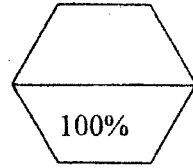
**ALLIANCE HIGH SCHOOL**  
**TERM I ELECTRICITY 448/1**  
**CAT TWO PAPER 1**

**TIME: 2½ hrs**

Date of CAT;.....

Date of returning scripts;.....

Date of revising scripts;.....



NAME;.....CLASS;.....ADMNO;.....

**INSTRUCTIONS :**

Answer all questions in section A and any **FOUR** in section B.

Candidates should have the following for this examination:

- Drawing instruments,
- Calculator / mathematical table.
- Drawing paper size A4

All dimensions in millimeters.

Do not write on this table

<b>SECTION A</b>	<b>MARKS 48</b>
<b>SECTION B</b>	<b>MARKS 52</b>
11	
12	
13	
14	
15	

**This paper consists of 14 printed pages.**  
**Candidates should check the question paper to ensure that all the pages are printed as indicated and no questions are missing.**

**SECTION A (48 MARKS)**

Answer all the questions in this section.

- 1.(a) Explain the significance of using only one hand when working on high voltage system. [1mark]
- (b) State two causes of electrical accidents to the operator in a workshop. [1mark]
- 2.(a) Explain how an ohmmeter would be used to distinguish between resistors and semiconductor diodes if all are not marked. [1mark]
- (b) State the function of each of the following features of analog instruments. [2marks]
- (i) Damping device,
  - (ii) Deflecting devices,
  - (iii) Controlling device,
  - (iv) Iron core.
3. (a) List three parts that are exempted from earthing in a domestic installation. [3marks]

(b) Draw the current and voltage charge and discharge curve for an inductor. [2marks]

8. (a) In each of the following situations state the magnetic law which applies. [3marks]

(i) A bar magnet cut into small rectangular pieces,

(ii) Two conductors carrying current in the same direction are placed next to each other,

(iii) A bar magnet is suspended freely on string.

(b) State and draw how each of the following motors can be reversed; [2marks]

(i) Capacitor start induction run motor,

(ii) universal motor.

9. (a) State the **four** variables which determine resonance condition in an RLC parallel circuit. [2marks]

(b) Sketch the symbol for each of the following logic gates; [1marks]

(i) NOT,

(ii) XOR.

(c) Draw the truth table for each of the following logic gates; [4marks]

(i) OR,

(ii) AND,

(iii) NOT,

(iv) XNOT.

10 (a). List **two** behavior patterns of each of the following in successful entrepreneurs; [2marks]

(i) traits,

(ii) characteristics.

(b) Convert;

[4marks]

(i)  $267_{10}$  to binary,

(ii) 89 to hexadecimal,

(iii)  $1010110111_2$  to decimal,

(iv) 78B to decimal.

**SECTION B (52 MARKS)**

Answer any **FOUR** questions from this section.

11 (a) Give **Three** advantages a circuit breaker has over a re - wireable fuse. [3marks]

(b) Draw a line diagram of the grid system. [5marks]

(c) With the aid of a labeled diagram, describe the construction and operation of a Circuit breaker. [5marks]



12.(a) Draw and label equipment at the consumer intake point.

[5marks]

(b) A coil of inductance 40mH and 10ohms is connected across a 220V, 60Hz supply.

Calculate the;

[5marks]

(i) Circuit current,

(ii) Phase angle,

(iii) Power factor,

(iv) Apparent power,

(v) Active power,

(c) With the aid of a labeled diagram explain how a moving coil speaker operates.

[3marks]

13 (a) With the aid of a labeled diagram, describe the construction and operation of a moving coil meter movement. [5marks]



(b) State **three** advantages of each of the following meter movement; [3marks]

(i) Moving coil,

(ii) Moving iron.

(c) A parallel circuit consisting of a  $25 \mu\text{F}$  capacitor and a  $45 \text{ mH}$ ,  $15 \Omega$  coil is connected across a  $50\text{V}$  ac supply. Calculate the; [5marks]

(i) resonant frequency,

(ii) Supply current at resonance,

(iii) Current through the capacitor  $I_C$  and coil  $I_L$ ,

(iv) Circuit Q-factor,



(c) Outline the procedure of carrying out an insulation resistance test on a new domestic installation. [5marks]

14 (a) With the aid of labeled circuit diagram, explain how a consumer is protected from electric shock in a domestic installation. [5marks]



(b) Four resistors  $R_1$ ,  $R_2$ ,  $R_3$  and  $R_X$  are connected to form a wheatstone bridge. The circuit is such that  $R_1$  is parallel to  $R_2$  and  $R_3$  is parallel to  $R_X$ . Balance is obtained when  $R_1$  and  $R_2$  are  $40\Omega$  and  $60\Omega$  and  $R_3$  is  $35\Omega$ . [3marks]

(i) Draw the circuit for wheatstone bridge,

(ii) Calculate the value of the unknown resistor  $R_X$ .

(iii) Determine the power dissipated by resistor  $R_X$  if a 50V source is connected.

(c) With the aid of a labeled circuit diagram, explain the formation of a depletion layer in a P – N junction. [5marks]



15 (a) State two applications of each of the following motors; [3marks]

(i) capacitor start- induction run motor,

(ii) repulsion motor,

(iii) synchronous motor.

(b) Figure 1 shows a single stage NPN transistor amplifier. State the function of each of the following; [4marks]

(i)  $C_1$ ,

(ii)  $C_2$ ,

(iii)  $R_1$ ,

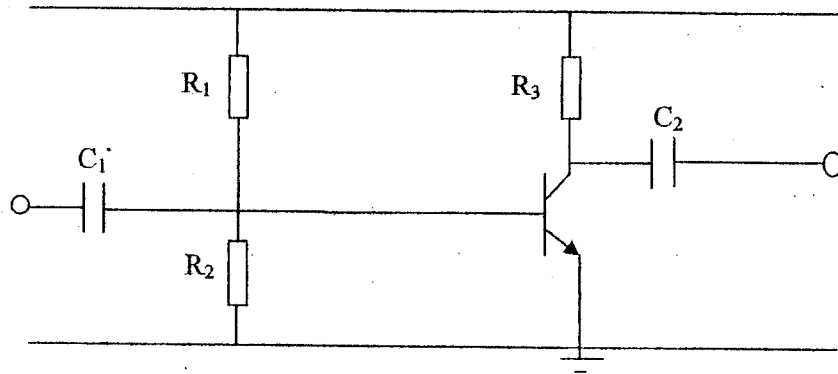


Figure 1

(c) Figure 2 below shows a simple voltage stabilizer circuit which employs a 20V, 2.8W zener diode. If the minimum operating current is 5mA and the input supply needed to stabilize the circuit is 35V, calculate; [3marks]

(i) the series resistor R which provides a 25V stabilized supply for a load current  $I_L = 0$ ,

(ii) the maximum load current.

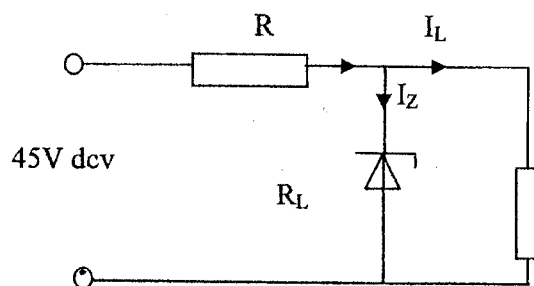


Figure 2

(d) I- Name **four** factors that determine the generated emf when a conductor cuts a magnetic field. [2marks]

II- State **two** reasons why the power company uses the tariff system to charge consumers for power consumed. [1mark]

end