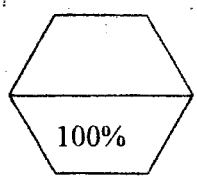
ALLIANCE HIGH SCHOOL
TERM I ELECTRICITY 448/1
CAT TWO PAPER 1
TIME:2½hrs

Date of CAT;.....
Date of returning scripts;.....
Date of revising scripts;.....



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

INTRUCTIONS :
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

SECTION A	**MARKS 48**
SECTION B	**MARKS 52**
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 semiconducto 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 μF capacitor and a 45 mH, 15Ω coil is connected across a 50V 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 40Ω and 60Ω and R_3 is 35Ω. [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,

(iv) R_3

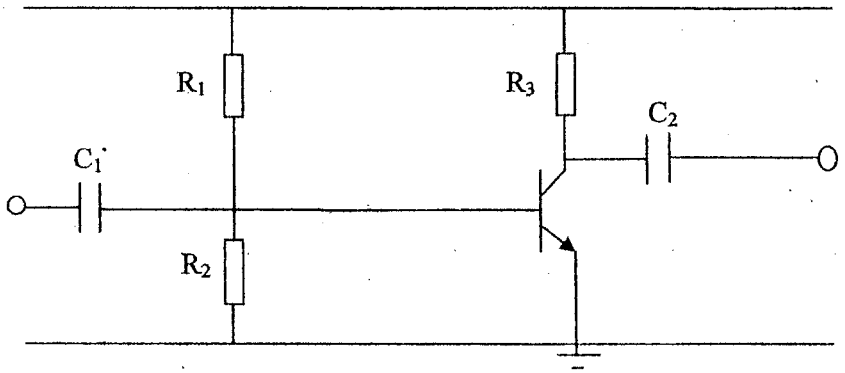


Figure 1

(c) Figure 2 below shows s 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.

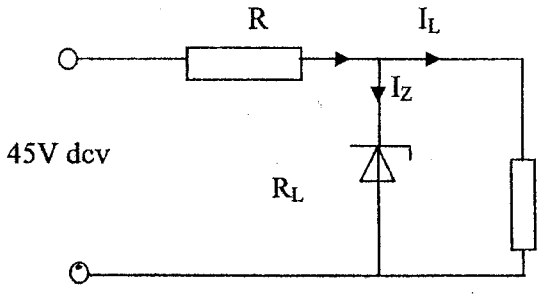


Figure 2

(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