

**ALLIANCE HIGH SCHOOL**  
**TERM 1 CAT1**  
**ELECTRICITY FORM 3**  
**TIME: 2½hrs**

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

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

**INSTRUCTIONS :**

Answer all questions.

You must have the following items for this examination:

Calculator / mathematical table.

1.(a) List **three** protective gears required to be worn by an electrical wireman on a busy construction site. [3marks]

(b) Explain the procedure of how an analogue ohmmeter is used to measure resistance. [3marks]

(c) State why it is important to observe safety while handling electricity. [1mark]

2.(a) List **four** factors which determine the magnitude of the voltage induced in an alternator. [2marks]

(b) Show and explain how a wheatstone bridge can be used to determine the values of unknown resistor. [4marks]

(c) A domestic consumer has the following appliances; [2marks]

- 1 iron box of 1200w used for 35minutes a day,
- 1 TV set of 80W used for 4hrs a day,
- A computer of 85W used for 4hrs a day,
- Six 18W lamps used for 3hrs a day,
- A fridge of 80W used for 12hrs a day,
- A micro wave oven of 1800W used for 3hrs a day,
- An instant shower of 4800W used for 3hrs a day.

Determine;

(i) The energy consumed for the month of August in Kwh,

(ii) The charge for the month if; [5marks]

- Fixed charge..... = Ksh 120
- Consumption @ 1<sup>st</sup> 100 units @ 95 cents/Kwh =
- Next 100 units @ 105cents/Kwh =
- Next 100 units @ 115cents/Kwh =
- Remaining units @ 125cents/Kwh =
- Forex adj @ 80cents/Kwh =
- WARMA levy @ 3.0 cents / Kwh =
- Fuel cost @ 539cents/Kwh =
- Inflation adj cost @ 3.0cents/Kwh =
- ERC Levy @ 3.0cents/Kwh =
- REP @ 5% of consumption =
- VAT @ 16% of fixed charge =
- TOTAL =

3. (a) Sketch a domestic installation circuit of a 12 V electric bell controlled from two positions; [3marks]

(b) Define the following terms; [2marks]

(i) Tariff,

(ii) Armature reaction,

(iii) Slip,

(iv) Saturation.

(c) Describe the construction and operation of moving coil meter movement. [5marks]

4. (a) Calculate the supply frequency of a six pole alternator running at 1800 revolutions per minute. [1mark]

(b) State **three** advantages revolving field and **three** advantages of revolving conductor alternators. [3marks]

(c) State **three** advantages and **three** disadvantages of d.c current. [3marks]

5. (a) Explain the term catastrophic failure with respect to electronic components. Give **two** examples of catastrophic failure. [2marks]

(b) Draw a sinusoidal wave form and label **four** major items. [5marks]

(c) A power supply feeds a circuit with 35V dc. If the internal resistance of the source is  $15\Omega$  calculate; [3marks]

(i) Maximum power transferred,

(ii) Current at maximum power,

(iii) Volt drop across the load at maximum power.

6. (a) Sketch a diagram of four pole ac motor machine and label **four** main parts. [5marks]

(b) List **four** types of institutions which offer craft certificate courses in electrical engineering. [2marks]

(c) Explain the cause of a dry joint on a printed circuit board. [1mark]

7. (a) Give **three** reasons why silver is not commonly used as a conductor material in electrical installation. [3marks]

(b) Explain what is eddy current. State **two** areas where it is useful and **two** areas where it is not. [3marks]

(c) State **two** functions of each of the following motor parts. [3marks]

(i) slip rings,

(ii) end shield,

(iii) frame.

8. (a) Draw a diagram of a mercury cell and label **four** major parts. [5marks]

(b) State **four** applications of demagnetization.

[2marks]

(c) Name **four** types of capacitors

[2marks]

7 (a) List **two** safety precautions that need to be observed when handling each of the following.

[3marks]

(i) Cables and cords on appliances,

(ii) Microwaves,

(iii) Chemicals,

(b) Explain **three** reasons why the Kenya power uses the tariff system to charge consumers for consumed energy.

[3marks]

(c) **Three** capacitors  $C_1$ ,  $C_2$  and  $C_3$  are connected in parallel across a 120V d.c. supply. If capacitance for  $C_1$  is  $20\mu\text{F}$ , the total capacitance  $C_T$  is  $8\mu\text{F}$  and  $C_3$  stores a charge of  $1800\mu\text{C}$ , determine;

[5marks]

(i) The capacitance of capacitor  $C_2$  and  $C_3$ ,

(ii) The total charge  $Q_T$ .

(iii) The charge  $Q_1$  and  $Q_2$ .

10 (a) List **two** types of inductors.

[1mark]

(b) List **four** applications of inductors.

[2marks]

(c) **Two** coils of inductance 50H and 70H are connected in series with a mutual inductance of 30H. Calculate the; [3marks]

(i) Total inductance if the circuit is connected in series opposing,

(ii) Total inductance in series aiding,

(iii) coefficient of coupling.

11.(a) With the aid of labeled diagrams explain how rotating magnetic field in induction motors is produced. [5marks]



(b) State **three** effects of an electric current and give a practical application in each case.

[3marks]

(c) Draw the voltage and current magnetizing and demagnetizing characteristics of an inductor.

[2marks]

END