ALLIANCE HIGH SCHOOL
TERM II ELECTRICITY 448/1
TRIALS PAPER 1
TIME:2½hrs

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

100 %

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 -17- 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) I – State the most immediate action to be taken when rescuing a worker found unconscious and still in contact with a live wire.

II – List **two** safety precautions taken while drilling through two metal pieces. [2marks]

(b) Explain the danger posed in each of the following; [4marks]

(i) **Two** hazards an improperly dressed welder is exposed to when arc welding,

(ii) **Two** precautions to be taken in the event of rain accompanied by a thunderstorm,

(iii) **Two** safety precautions to be taken when handing ultraviolet radiation,

(iv) **Two** safety precautions to be observed when replacing lamps and lampholders.

2.(a) Define he following with reference to magnetic materials; [2marks]

(i) Hard,

(ii) soft,

(iii) Reluctance,

(iv) Screening.

(b) List **three** differences between synchronous motors and induction motors. [1½marks]

3. (a) List **three** applications of shaded pole motor. [1½marks]

(b) With the aid of a labeled sketch, explain the charge behavior at the P–N junction of a rectifier diode in reverse bias. [3marks]

4. (a) Draw a ring circuit diagram consisting of three socket outlets and a spur. [3marks]

(b) In a parallel RLC circuit, a 40Ω resistor is connected across a 20mH inductor and a 80μF capacitor. If the supply voltage is v = 120 Sin 848t, calculate; [4marks]

(i) The impedance,

(ii) Circuit current,

(iii) Power factor,

(iv) Resonance frequency,

(v) Draw a labeled phasor diagram.

5. (a) A network of capacitors are connected as shown in figure 1. Calculate; [3marks]

(i) The total charge,

(ii) Energy stored in capacitor C_1 and C_3.

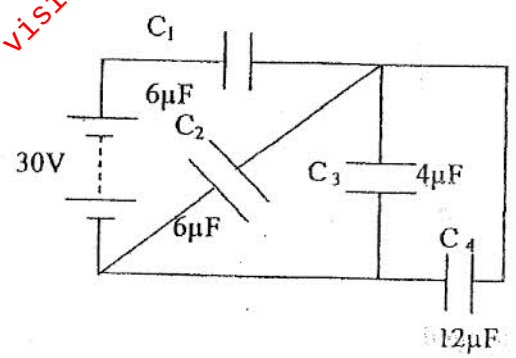

Figure 1

(b) Figure 2 shows a distribution system of a large industrial premises. Name the parts labeled; [2marks]

(i) A.
(ii) B
(iii) C
(iv) D

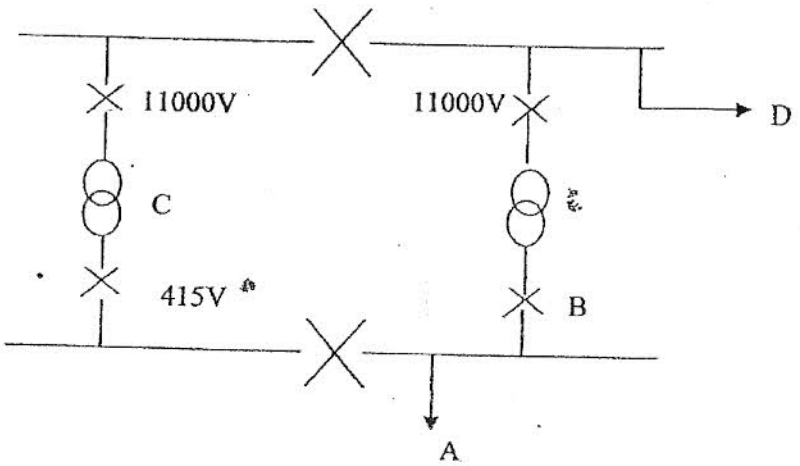

Figure 2

6. (a) State the difference between field windings of series connected and shunt connected d.c generator. [1marks]

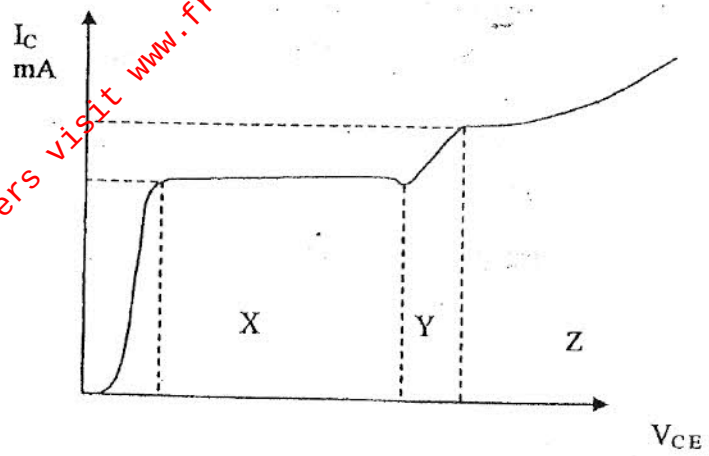

Figure 3

(b) State **two** traits and **two** characteristics of an entrepreneur. [2marks]

(c) State the reason for rating a.c machines in KVA instead of kilowatts. [½marks]

9 (a) Draw the truth table for each of the following gates; [2marks]

(i) NOR,

(ii) NOT.

(b) Convert ;

(i) 78_{10} to binary, [2marks]

(ii) 10110011 to decimal,

(iii) 115 to hexadecimal,

(iv) 8D 7 o decimal.

10 (a) Explain **three** causes of transformer losses. State **three** methods to minimize each of the losses. [3marks]

(b) Figure 4 below shows two views of a bracket drawn in 1st angle orthographic projection. Sketch in good proportion the isometric view of the object. Make corner X the lowest point. [3marks]

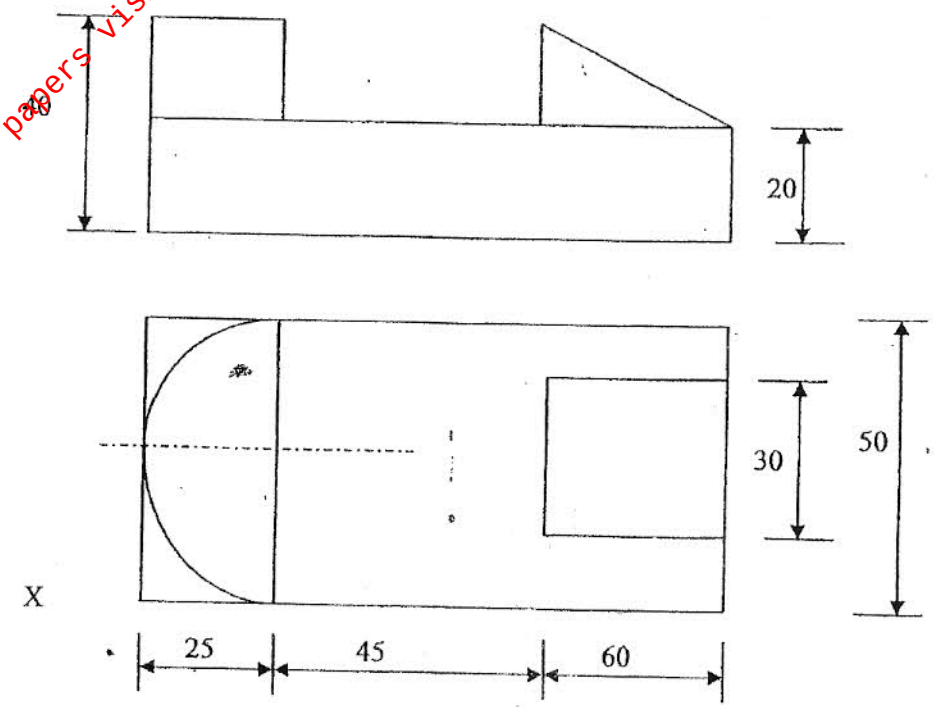

Figure 4

SECTION B (52 MARKS)

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

11 (a) Figure 5 shows a two – transistor shift oscillator. Explain the fault if the voltage at test point [3marks]

(i) P is 12Volts,

(ii) T is 12 volts,

(iii) K is zero volts.

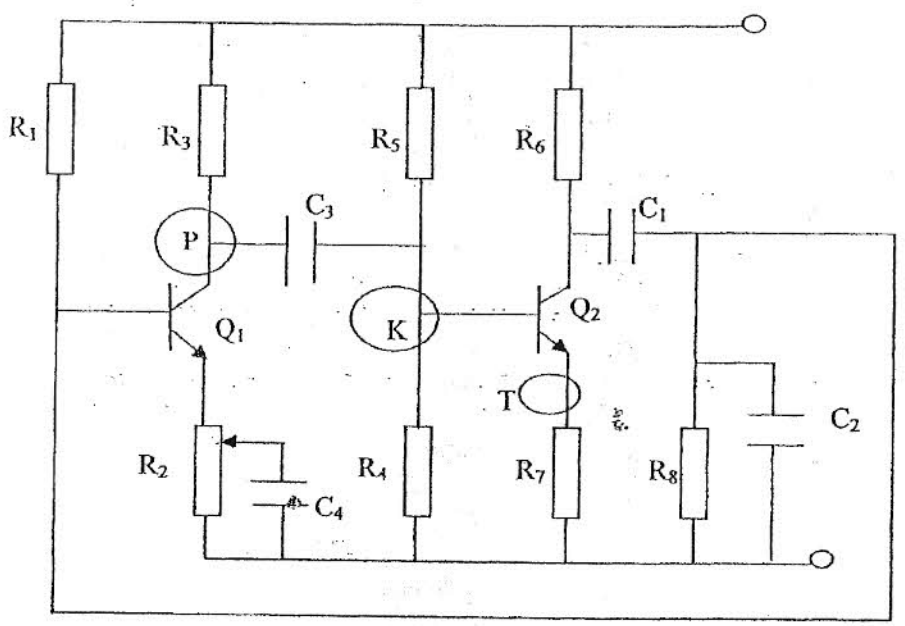

Figure 5

(b) The following devices are connected to the power supply of a domestic consumer; [6marks]

- 6 lamps of 14W used for 3hrs a day,
- 80W computer used for 4hrs daily,

- 1500W microwave used for 1hr daily,
- 4500 instant water heater used for 2hrs daily,
- 80W tv set used for 6hrs daily,
- 1200W iron box used for 45 minutes daily.

Calculate;

(i) The total energy in Kwh,

(ii) The total months charge if;

Fixed charge	= ksh 120
Consumption charge @ ksh 9.50 /Kwh	=
Forex adj @76cns / Kwh	=
Fuel cost @ 539cts / Kwh	=
Inflation adj. @ 29cnts /Kwh	=
REP levy @ 5% of consumption	=
ERC levy @ 3cnts / Kwh	=
VAT @ 12% f fixed charge	=
TOTAL	

(c) With the aid of a labeled diagram, explain the construction and operation of a NPN transistor. [4marks]

12.(a) Explain the following terms with reference to transistors. [2marks]

(i) Saturation,

(iii) Thermo runaway,

(iv) Coupling,

(v) Load line

(b) In the voltage regulator circuit of figure 6 the h_{FE} for transistor Q1 is 150. The zener voltage is 6.V and forward breakdown voltage is 0.6V. Calculate; [3marks]

(i) Load current I_L,

(ii) Collector – emitter voltage,

(iii) Base current I_B.

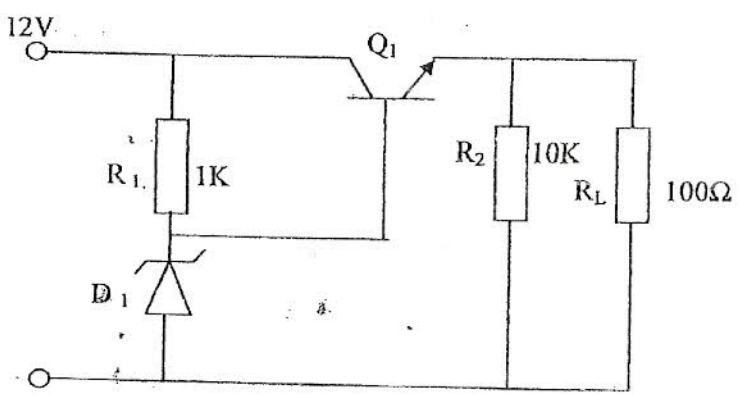

Figure 6

(c) A current of 8A flows through a coil connected to a dc source of 180V. When the same coil is connected to 180V 60Hz ac source a current of 3A flows. Calculate; [4marks]

(i) Inductive reactance,

(ii) Inductance of the coil,

(iii) Energy of coil in dc and ac circuit connection,

(iv) Current drawn from the 180V 60Hz source if a 50μF capacitor is connected in series with the coil.

(d) Sketch a circuit diagram for each of the following meter movements; [4marks]

(i) Three range ac voltmeter,

(ii) Three range dc ammeter,

13 (a) An oscilloscope is screen displays a sinusoidal waveform which occupies 7 divisions when he volt selector is set a 500mV/cm and 5divisiins when time selector is set at 0.5mS/cm. Calculate; [4marks]

(i) Amplitude,

(ii) Frequency,

(iii) RMS value,

(iv) Instantaneous voltage at 55^0.

(b) A 15 V peak ac source is connected to the input of a circuit shown in figure 7. If the diode is 6.8V and its forward voltage is 0.6V; [3marks]

(i) Sketch the waveform across R_L and indicate the maximum value and minimum value,

(ii) Calculate he forward current across R_L.

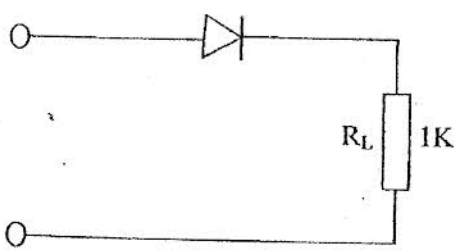

Figure 7

(c) Explain the meaning of the term stroboscopic effect. Outline **three** methods used to minimize the effect. [4marks]

(d) State **two** advantages of single phase over three phase system. [2marks]

14 (a) Explain the following terms as used in motors; [2marks]

(i) Slip,

(ii) Transformer emf;

(iii) Speed emf.

(iv) Frequency.

(b) List **five** parts of an ac motor. Explain the function of each part; [5marks]

(c) Explain the term armature reaction as used in dc motors. Outline **three** methods of minimizing armature reaction [4marks]

(d) State **two** advantages **two** disadvantages of dc over ac. [2marks]

15 (a) Explain the **four** methods of cooling a transformer. [4marks]

(b) Draw and the **three** types of transformer cores. [3marks]

(c) List the **four** connections of the three phase transformer. [2marks]

(d) With the aid of a labeled diagram, explain how a tungsten halogen lamp operates. [4marks]

end