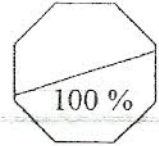


ALLIANCE HIGH SCHOOL
TERM II ELECTRICITY 448/1
TRIALS PAPER 1
TIME: 2½hrs

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

SECTION A	MARKS 48
SECTION B	MARKS 52
11	
12	
13	
14	
15	

This paper consists of -15- 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 – Describe the type of shoes required to be worn at a construction site. [1mark]

II – List **two** safety precautions taken while working with machines with rotating parts. [1marks]

(b) Explain the danger posed in each of the following; [2marks]

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

(ii) **Two** safety precautions to be observed when charging batteries.

2.(a) Define the 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 four functions of control centers used in control of power transmission.

[2marks]

(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 $80\mu\text{F}$ capacitor. If the supply voltage is $v = 220 \sin 754t$, calculate; [4marks]

(i) The impedance,

(ii) Circuit current,

(iii) Power factor,

(iv) Resonance frequency,

5. (a) I – State two differences between primary and secondary cells. [1mark]

II – Explain the operation of a lead acid cell. [2marks]

(b) With the aid of a labeled diagram of the wheatstone bridge, derive the equation for determining the value of an unknown resistor under balanced conditions; [2marks]

6. (a) State two advantages of each of the following; [3marks]

(i) Rotating field type alternator over the rotating armature,

(ii) D.c source over a.c. source,

(iii) Single phase over three phase.

(b) State the main factor that determines each of the following cable ratings. [1marks]

(i) Voltage,

(ii) Current.

7. (a) State **three** reasons for using alternators instead of d.c. generators in modern automobiles. [1½marks]

(b) Explain **three** characteristics for connecting bulbs in each of the following methods; [3marks]

(i) Series connection,

(ii) Parallel connection.

8. (a) With the aid of circuit diagrams, distinguish between a center tapped isolation transformer and an auto transformer. Indicate the direction of primary and secondary currents. [3marks]

(b) State two traits and two characteristics of an entrepreneur.

[2marks]

(c) Outline the procedure of locating a fault using the end to start method of fault diagnosis. Name two test equipment.

[2marks]

9 (a) Draw the truth table for each of the following gates;

[2marks]

- (i) NOR,
- (ii) NOT.

(b) Convert ;

[2marks]

- (i) 189_{10} to binary,
- (ii) 10010100111 to decimal,
- (iii) 1517 to hexadecimal,
- (iv) $9 E 7$ to decimal.

10 (a) Explain the term dielectric as applied to capacitors. List two materials used in dielectric.

[1marks]

(b) Figure 2 below shows two views of a bracket drawn in 1st angle orthographic projection. Sketch in good proportion the oblique view of the object. Make edge Z – Z the lowest point. [3marks]

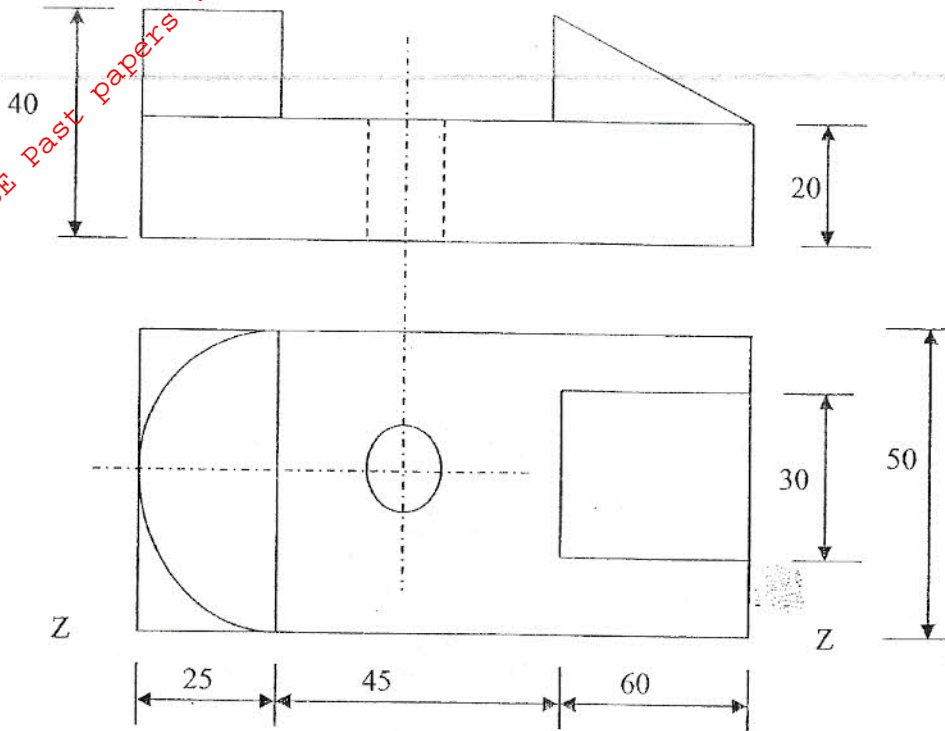


Figure 2

SECTION B (52 MARKS)

Answer any FOUR questions from this section.

11 (a) Figure 2 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.

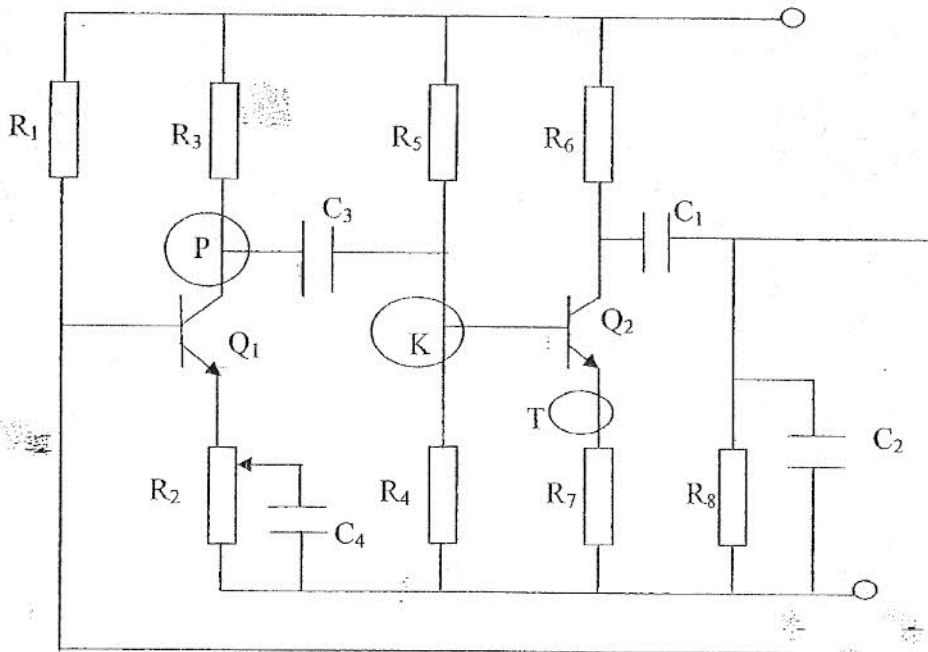


Figure 2

(b) Outline the procedure of carrying out an insulation resistance test on a new domestic installation. [4marks]

- (c) Outline the procedure for determining the condition of the PNP transistor shown in figure 6 and state the expected result in each step if the transistor is in good working condition. [2marks]

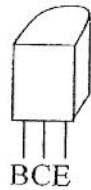


FIGURE 6

- II - 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) Thermo runaway,

(ii) Coupling,

(iii) Load line,

(iv) Saturation,

(b) In the voltage regulator circuit of figure 6 the h_{FE} for transistor Q_1 is 150. The zener voltage is 6V and forward breakdown voltage is 0.6V. Calculate; [3marks]

- (i) Load current I_L ,
- (ii) Collector – emitter voltage,
- (iii) Base current I_B .

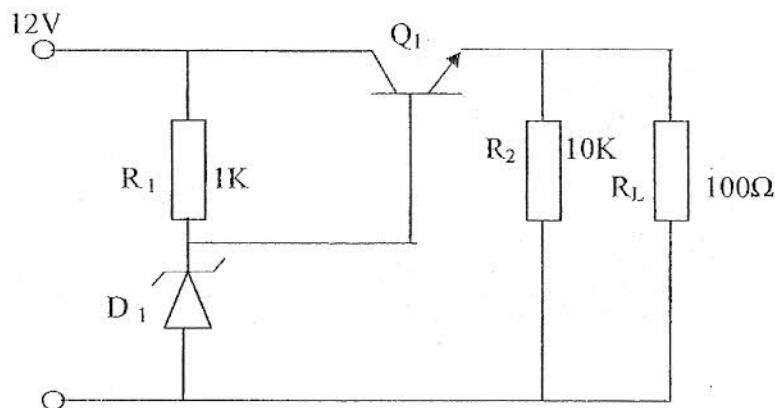


Figure 6

(c) A current of 10A flows through a coil connected to a dc source of 220V. When the same coil is connected to 220V 50Hz ac source a current of 4A 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 220V 50Hz source if a $50\mu\text{F}$ capacitor is connected in series with the coil.

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

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

(d) State **two** advantages of each of the following lamps; [2marks]

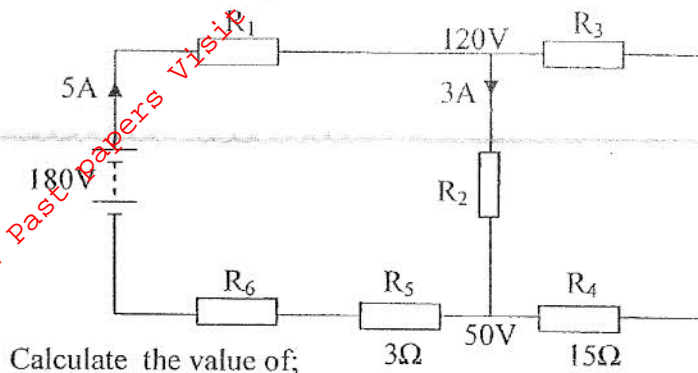
(i) LEDs over filament lamps,

(ii) Fluorescent lamp over tungsten halogen lamps.

15 (a) I – Explain the **four** methods of cooling a transformer. [2marks]

II – Explain **four** methods of reducing alternator losses. [2marks]

(b) Figure 8 shows a network of resistors. [3marks]



Calculate the value of;

- (i) Power in resistor R_3 ,
- (ii) Energy dissipate by resistor R_6 if it works for 45 minutes,
- (iii) R_1 and R_T .

(c) 12 cells of a bus battery are to be charged from a 50V dc constant current source. The terminal voltage per cell is 1.85V when discharged. The charging resistor is 3Ω and the internal resistance of each cell is 0.2Ω . Determine; [2marks]

- (i) The value of initial charging current,
- (ii) The value of resistance at the end of charging if the volt per cell raises to 2.2V.

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

end