4.6 ELECTRICITY (448)

4.6.1 Electricity Paper 1 (448/1)

SECTION A (48 marks)

*Answer **all** the questions in this section in the spaces provided.*

1. a) Name **four** equipment belonging to the supply authorities at consumer's intake point. (2 marks)

    (b) List **four** types of capacitors. (2 marks)

2. (a) Draw the circuit diagrams for each of the following d.c. generators:

    (i) Separately excited generator

    (ii) Compound wound generator

    (4 marks)

3. (a) Name **two** types of semi-conductor diodes and state one application in each case. (2 marks)

    (b) Draw an NPN transistor in common base configuration. (3 marks)

4. (a) Name **three** types of measuring instruments and for each type state their use. (3 marks)

    (b) Sketch each of the following hand tools: (4 marks)

    (i) flat screw driver

    (ii) ball pein hammer

5. Make a free hand oblique drawing of a conduit switch box. (3 marks)

6. (a) List **four** categories of institutions which offer artisan certificate courses in electrical trade. (2 marks)

    (b) Outline the procedures of using a fire extinguisher. (2 marks)

7. (a) State **three** precautions to be observed to avoid accidents from electrical overhead power lines. (3 marks))

    (b) Explain **two** ways of identifying faults in electronic circuits during trouble shooting. (2 marks)

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8. (a) State **four** factors that determine the inductance of a coil.   (2 marks)

    (b) Two capacitors have capacitances of 6μF and 4μF respectively. Determine the total capacitance when they are connected in:

        (i)   Parallel

        (ii) Series

                                                                          (4 marks)

9. (a) State **two** factors that determine the strength of an electromagnet.   (2 marks)

    (b) (i)   Draw the sketches of magnetic field around two parallel conductors carrying current in the opposite directions.   (2 marks)

        (ii) State what happens between the two conductors in b(i) above.

                                                                          (1 mark)

10. (a) State **two** types of electricity tariffs.   (1 mark)

    (b) The average daily power consumption of a domestic consumer is as follows:

        Lighting   1.0 kw for 5 hours
        Instant shower   3.0 kw for 2 hours
        Cooking   6.0 kw for 3 hours
        Electric heater   4.0 kw for 2 hours

        Determine the:

        (i)   daily consumption in kWh

        (ii) cost of energy in Ksh if the rate is 70 ct per unit   (4 marks)

SECTION B (52 marks)

*Answer any **four** questions from this section in the spaces provided.*

11. (a) Define each of the following terms as used in alternating currents:

        (i)   Cycle

        (ii) Frequency

                                                                          (2 marks)

    (b) A sinusoidal voltage trace displayed on an oscilloscope has peak to peak voltage of 12 V and a period of 20 ms.

        Sketch and label the waveform.   (3 marks)

(c)   A coil of inductance 9.55 mH and resistance 4Ω is connected across a 200 V 50 Hz supply.

Calculate the :

(i)   Inductive reactance

(ii)   Impedance

(iii)   Supply current

(iv)   Phase angle

(8 marks)

12.   (a)   List **two** accessories used in PVC conduit installation and in each case state their function. (2 marks)

(b)   State **two** possible causes for a fluorescent lamp **not** to start. (2 marks)

(c)   (i)   Outline **four** IEE regulations requirements regarding 13A socket outlets.

(4 marks)

(ii)   Draw a wiring diagram of a lighting circuit comprising of two lamps L_1 and L_2 controlled by one way switches S_1 and S_2 separately through a joint box.

(5 marks)

13.   (a)   Describe the construction of the following parts of a D.C. machine:

(i)   Yoke

(ii)   Poles

(4 marks)

(b)   A 100KVA, 11 KV/240 V single phase transformer has 800 turns on the primary side.

Calculate the:

(i)   Primary current

(ii)   Number of secondary turns

(6 marks)

(c)   State **three** IEE regulations regarding bell transformers. (3 marks)

14.   (a)   Sketch the symbols for each of the following logic gates:

(i)   NAND

(ii)   NOR

(iii)   OR

(3 marks)

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(b)   **Figure 1** shows a transistor circuit. Take $\beta = 100$ and neglect V_{BE}.

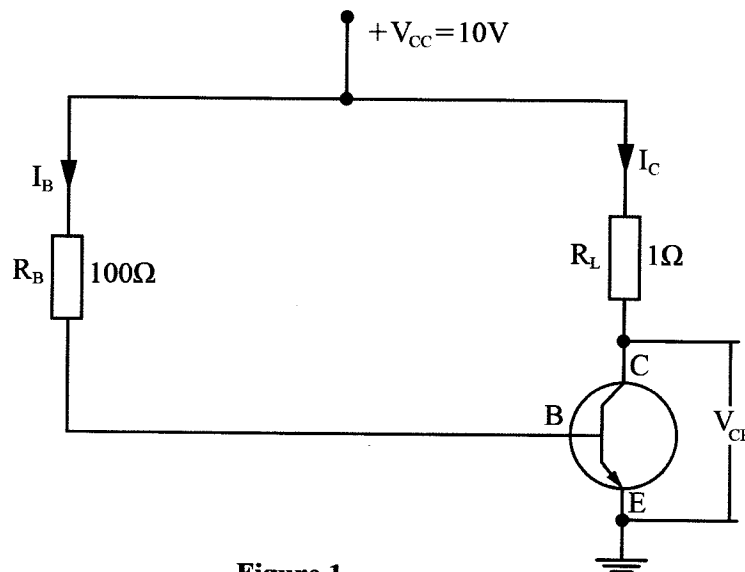Find the value of V_{CE} (6 marks)

Figure 1

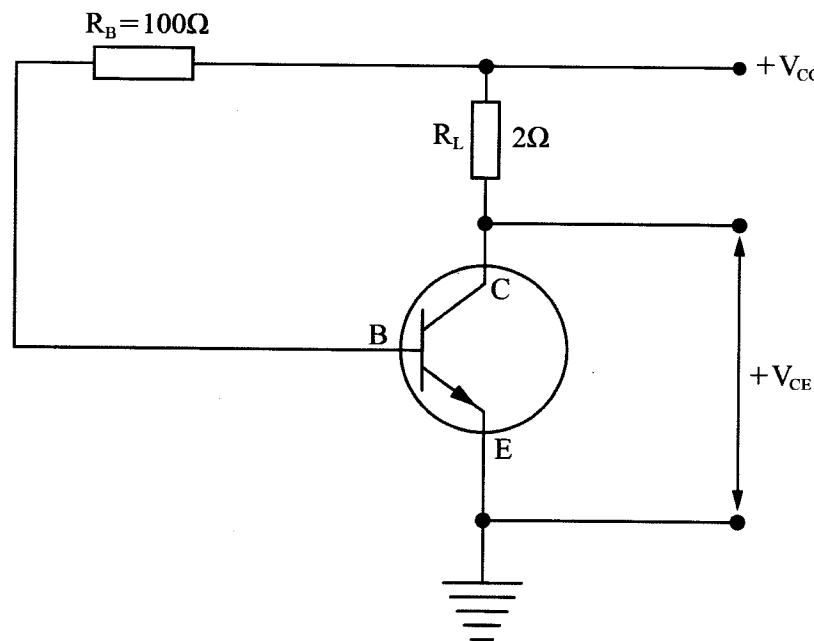(c)   **Figure 2** shows an amplifier circuit whose gain is 100. Neglecting V_{BE},

Figure 2

Find the value of:

(i) I_B

(ii) I_C

(iii) V_{CE}

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15. **Figure 3** shows three views of a solid drawn in 1st angle projection.
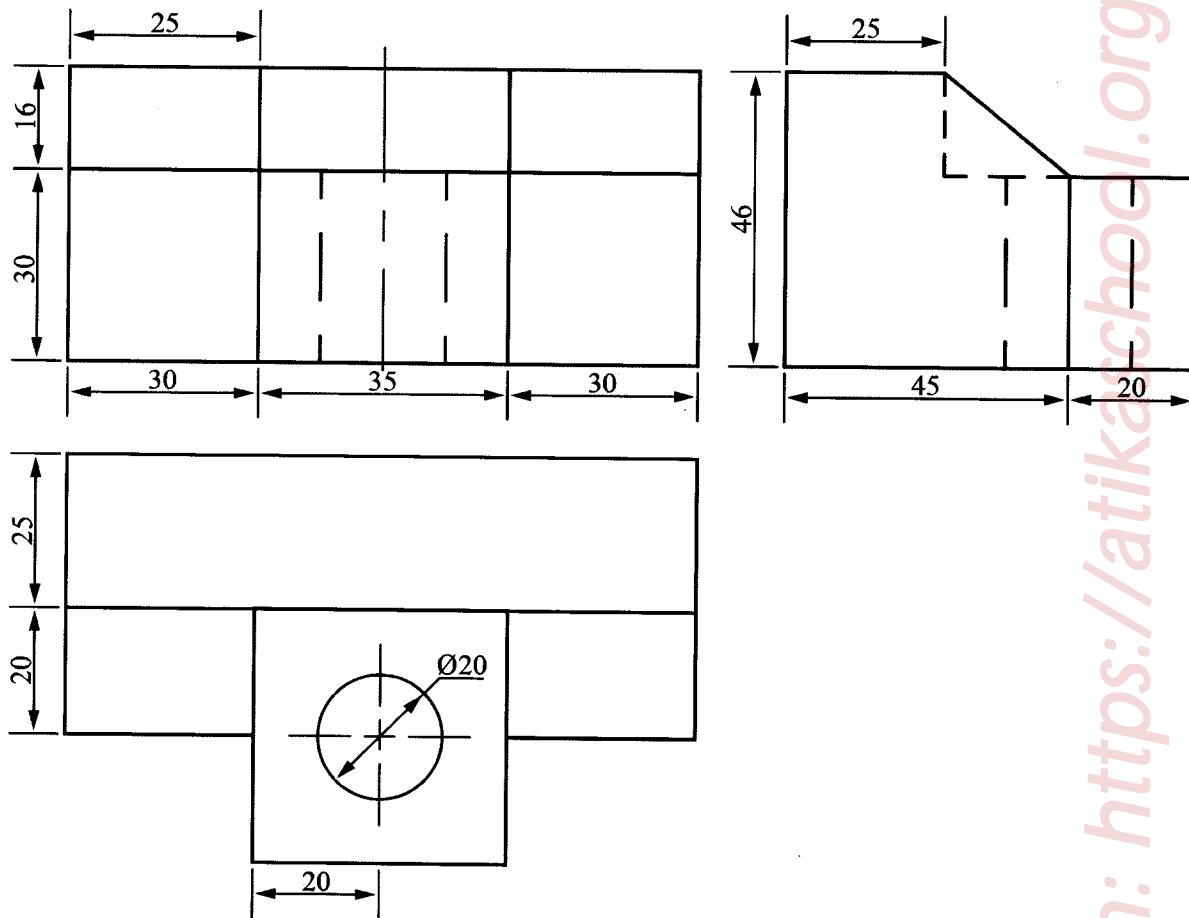Draw full size an isometric view of the object making corner X the lowest point. (13 marks)

Figure 3