8. What is capacitance of a capacitor ? Explain Kirchhoff's laws of current and voltage with the help of suitable diagram. Also explain their application with the help of examples.

9. Define resistance of a conductor. Explain the factors on which the resistance of conductor depends. State Ohm's law and deduce relation drift velocity and current of conductor. Find the total resistance when various resistors are connected (i) in series, (ii) in parallel.

Time : 1½ Hours]   [*Maximum Marks : 70*

Note :– The question paper is divided into two Sections A and B. Write answers as per the given instructions.

Section–A   4×3½=14

(Very Short Answer Type Questions)

Note :– Answer any *four* questions. As per the nature of the question delimit your answer in one word, one sentence or maximum up to **30** words. Each question carries 3½ marks.

1. (i)   What is the effect of heating a conductor on its resistance ?

(ii) Describe Barkhausen criterion.

(iii) Define Electric Current.

(iv) What is multi-loop circuit ?

(v) State 'phase' and 'phase difference'.

(vi) What is the earthing ?

(vii) Distinguish between electrons and holes.

(viii) What is a light emitting diode ?

Section–B   **4×14=56**

(Short Answer Type Questions)

Note :– Answer any *four* questions. Answer should not exceed **200** words. Each question carries 14 marks.

2. What is Register ? Explain the purpose of shift register. Draw and explain the circuit with waveform diagram of asynchronous (ripple counter.

3. What are encoder and decoder ? Draw and explain the circuit of 3 to 8 linedecoder with its operation. Also explain, how decoder is different from demultiplexer ?

4. Define the terms 'Minterm' and 'Maxterm' in Boolean algebra. Simplify the following Boolean function :

$$F(w, x, y, z) = \Sigma(0, 2, 5, 7, 10, 13)$$

and don't care conditions :

$$d(w, x, y, z) = \Sigma(1, 6, 9, 11)$$

5. Explain the action of a transistor as an amplifier. Derive expressions for current gain, voltage gain, input impedance and output impedance in terms of h parameters.

6. What is Rectification ? Draw the circuit diagram of a half-wave rectifier and explain its operation. Draw the input and output waveform of the half-wave rectifier. Also prove that efficiency and ripple factors of half-wave rectifier is 40.6 and 1.21.

7. What is an alternating current ? In an alternating current circuit, an inductance L, a capacitance C and a resistance R are connected in series. Derive expression for impedance and phase angle.