Q1.

a. State the ohm’s law.  
(01 Mark)

b. From the Figure 1 find,  
(06 Marks)

i. Resistance of the entire circuit.  
ii. Current in each resistor.  
iii. Voltage drops across 10K resistor.
c. Find the voltage $V_{AB}$ in the circuit shown Figure 2. (03 Marks)

\[\text{Figure 2}\]

\[\text{Figure 3}\]

Find the currents in the various branches of the circuit in Figure 3 by nodal analysis. (10 Marks)
Q2

a) Draw the VI characteristics of Zener diode and show the main regions (05 Marks)
b) Zener diode finds numerous applications in transistor circuitry. what are common uses (03 Marks)
c) Using the Zener Diode circuit shown in figure 2, compute the following.
   Consider Zener Voltage (VZ )= 50V
   I. State weather the Zener diode is in “On Stage” or “Off Stage” (12 Marks)
   II. Voltage across the 10 KΩ
   III. Voltage drop through the series resister (R)
   IV. Current through the diode (Iz )

Q3

a) Draw the input characteristic curve for common emitter transistor. (4 Marks)

b) In the collection- feedback bias circuit Vcc= 12V of figure 2 compute (16 Marks)
   i. The three transistor currents.
   ii. Drop across R_c and R_B
   iii. Value of V_CE
Q4

a. Draw logic circuit solutions for the below Boolean expression. (08 Marks)

i. \((A + B) \cdot \overline{C} \cdot (D + E) = Y.\)

ii. \(\overline{A} \cdot (B + C) \cdot D = Y.\)

iii. \(A + (B \cdot C) + \overline{D} = Y.\)

iv. \(A \cdot B + \overline{C} + D \cdot E = Y.\)
b. Simplify the Boolean expression from Karnaugh maps (K Maps) (12 Marks)

a) \( \overline{A} \overline{B} \overline{C} + \overline{A} \overline{B} \overline{C} + \overline{A} \overline{B} \overline{C} + A \overline{B} \overline{C} = Y \)

b) \( \overline{A} \overline{B} \overline{C} \overline{D} + \overline{A} \overline{B} \overline{C} \overline{D} + \overline{A} \overline{B} \overline{C} \overline{D} + \overline{A} \overline{B} \overline{C} \overline{D} + A \overline{B} \overline{C} \overline{D} = Y \)

Q5

\[ R = 250 \, \Omega, \, L = 1.20 \, \text{mH}, \, C = 1.80 \, \mu \text{F}, \, V_p = 120v, \, f = 60\text{Hz} \]

Determine the following:

(a.) \( X_L \) - Inductive reactance

(b.) \( X_C \) - Capacitive reactance

(c.) \( Z \) - Impedance

(d.) \( \theta \) - Phase angle

(e.) \( I_p \) - Peak current

(20 Marks)