2018

M.Sc.

2nd Semester Examination

ELECTRONICS

PAPER—ELC-206

Subject Code—27

(Practical)

Full Marks : 50

Time : 3 Hours

The figures in the right-hand margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

Illustrate the answers wherever necessary.

(*Semiconductor Device Lab.*)

Answer any *one* question selecting it by a lucky draw.

1. Determine the carrier concentration and mobility of a semiconductor sample using Hall measurement.

2. Determine Barrier height of a Schottky diode using activation energy method. Extend your work to determine electronically active area of the device.

3. Study the transfer characteristic of a field effect transistor for different drain voltages. In each case determine threshold voltage of the device plot V_{Th} Vs. V_d.

4. Determine storage delay time of a p-n junction diode using a CRO. Record your data from 300 Hz to 10 kHz. Plot Normalized value of storage delay time (t_{sd}/T) with frequency.

5. Study Id-Vd characteristics of a field effect transistor for various gate voltages. Draw the Id-Vd curve in a mm graph paper. Determine γ_d, μ and g_m from your graph.

6. Study the I-V characteristics of a p-n junction diode. Record the data and calculate reverse saturation current and ideadity factor of the device from your graph.

7. Determine the band gap of a semiconductor using a p-n junction diode and a PID temperature controller.

8. Study the C-V characteristics of a p-n function diode. Calculate the carrier concentration of an N-type semiconductor of a P^+-N junction from $\frac{1}{C^2}$ vs V plot.

9. Measure the resistivity of a silicon water using four-prove method. Determine the band gap of a semiconductor using temperature sensitive junction voltage measurement of the diode.

10. Write a computer program in C to calculate the diode current using following relation :

$$I = I_0\left(e^{qv/nkT} - 1\right).$$

Plot I vs V in Excel using your result.

11. Write down a program in C to calculate thermionic current of a Metal-semiconductor diode using the following relation :

$$I = A^* T^2 e^{\frac{-q\phi_{Bn}}{kT}}\left(e^{qv/kT} - 1\right)$$

Plot I vs. V for different ϕ_{Bn} in Excel.

Distribution of Marks

Theory	:	**10 Marks**
Circuit	:	**05 Marks**
Experiment	:	**15 Marks**
Discussion	:	**05 Marks**
Viva-Voce	:	**10 Marks**
Lab. Note Book	:	**05 Marks**
Total	:	**50 Marks**

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