2017

M.Sc. 2nd Semester Examination

ELECTRONICS

PAPER—ELC-206

(Practical)

Full Marks : 50

Time : 3 Hours

The figures in the 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 *one* question selecting it by a lucky draw.

1. Measure the resistivity of a silicon water / Al-foil using four probe method. Determine band gap of a semiconductor using temperature, sensitive junction voltage measurements of a P-N Junction diode.

2. Determine carrier-concentration and mobility of a semiconductor sample using Hall measurement.

3. Use activation energy method to determine the barrier height of a metal-semiconductor diode.

4. Study the Id-V_3 characteristics of a FET for various for different drain voltages. In each case determine threshold voltage V_{th} plot V_{th} vs. V_D.

5. Determine storage delay time of a P-N function diode using a CRO. Record your data from 300 Hz to 10 KHz. Plot the normalized value of storage delay time (Tsd/T) with frequency.

6. Study the output characteristics of a FET operated under common-source configuration. Record your data and draw the output characteristics. Determine rd and gm from the characteristics.

7. Study the temperature dependent threshold voltage of a Field Effect Transistor.

8. Study the I-V characteristics of a P-N junction diode. Record the data and determine ideality factor and reverse saturation current from your graph. Also determine cut-in-voltage of the diode.

9. 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 C-V measurement.

10. Repeat Expt. (5) for a Schottley diode.

11. Write down a program in C to calculate diode current

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

Plot in Excel your result (I vs. V).

12. Write down a program in C to calculate thermionic current of a Metal-semiconductor diode

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

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

13. Study the transfer characteristics of a FET and determine the threshold voltage. Do the experiment for different temperature to study the variation of temperature dependency of threshold voltage.

14. Study the operational characteristics of a DIAC.

Distribution of Marks

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