2016

OLD

Part-II 3-Tier

ELECTRONICS

(General)

PAPER—III

(PRACTICAL)

Full Marks : 100

Time : 3 Hours

The figures in the margin indicate full Marks.

Group—A

(*Semiconductor Devices and Circuits*)

Answer any *one* question.

1. Construct a circuit to study the current voltage (I-V) characteristics curve of a forward biased P-N junction diode. Determine the cut-in voltage. Calculate the dynamic resistance and compare with theoretical value.

(Assume KT/q = 0·026V)

(Theory–5, Circuit–5, Data–8, Graph–6, Calculation–2+2+2, Discussion–5)

2. Study the reverse characteristics of a Zener-diode :

Specify the Zener region. Find Zener break-down voltage. Calculate dynamic resistance.

(Theory–5, Circuit–5, Data–10, Graph–5, Calculation–2+2+2, Discussion–4)

(Turn Over)

3. Study line regulation of a Zener diode. Consider two different values of zener current. Calculate regulation factor in each case.

(Theory–5, Circuit–5, Data–12, Graph–6, Calculation–4, Discussion–3)

4. Study the load regulation curves of a zener diode considering (a) $V_s = 1.3\ V_z$ and (b) $V_s = 1.5\ V_z$, where V_s = supply voltage, V_z = zener break down voltage. Calculate the percentage regulation in each case.

(Theory–5, Circuit–5, Data–8, Graph–5, Calculation–4+4, Discussion–4)

5. Construct a full-wave rectifier with a centre tapped transformer and a Π filter.

Plot $I_L - V_L$ graph for at least two different input voltages. Calculate percentage regulation of the rectifier.

(Theory–5, Circuit–5, Data–12, Graph–6, Calculation–5, Discussion–2)

6. Draw the Input characteristic curves of a given n-p-n transistor in CE mode for two values of V_{CE}. Calculate h_{ie} in each case.

(Theory–5, Circuit–5, Data–12, Graph–6, Calculation–4, Discussion–3)

7. Draw the output characteristic curve of a given n-p-n transistor in CE mode for three different values of base currents. Calculate h_{fe}.

(Theory–5, Circuit–5, Data–12, Graph–5, Calculation–4, Discussion–4)

8. Construct the bridge rectifier with a Π filter. Plot $I_L - V_L$ graph for two input voltages. Calculate percentage regulation in both cases.

(Theory–5, Circuit–5, Data–12, Graph–6, Calculation–5, Discussion–2)

Group—B

(*Instrumentation and Digital Electronics*)

Answer any *one* question.

9. Construct an astable-multivibrator with 555 times for a suitable given frequency. Study the waveform on a CRO and measure its duty cycle.

(Theory–8, Circuit–8, Data–10, Calculation of duty cycle–4, Discussion–5)

10. Measure the output offset voltage of an IC-741 OPAMP for different feedback resistances. Implement the circuit on a bread board and show the results.

(Theory–8, Circuit–5, Data–14, Calculation–6, Discussion–2)

11. Construct an adder amplifier with IC-741, and measure the output voltage for at least five input voltage. Measure output voltage V_0 in terms of different positive and negative input voltage.

(Theory–10, Circuit–5, Data–10, Graph–5, Calulation–3, Discussion–2)

12. Construct an integrator circuit with IC–741. Measure output voltages for at least five input voltages. Plot output voltage versus input voltage curve.

(Theory–8, Circuit–5, Data–10, Graph–5, Calculation–3, Comparison of output voltage with theoretical value–2, Discussion–2)

13. The logic expression $Y = \bar{A}B + \bar{A}B$.

Realise the operation using minimum number of NAND gates only.

Obtain the truth table.

Name the operation performed.

(Theory–5, Circuit–7, Implementation–10, Data–10, Discussion–3)

14. Design a circuit using available gates to realise the function $Y = (A + BC)(\overline{B} + CA)$.

Obtain the truth table and specify the minimum number of gates required.

(Theory–6, Circuit–6, Implementation–6, Data–12, Discussion–3)

15. Construct a half-adder circuit with minimum number of gates and verify its operation.

(Theory–8, Circuit–6, Circuit Implementation–6, Data–10, Discussion–5)

16. Construct a J–K flip-flop with minimum number of gates and verify its operation.

(Theory–8, Circuit–6, Implementation–8, Data–10, Discussion–3)

Marks Distribution

Group A Experiment	:	35
Group B Experiment	:	35
Viva–Voce (10+10)	:	20
Laboratory Note Book (5+5)	:	10
Total	:	100