

00/c
D 265

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2003.

Second Semester

Information Technology

IF 141 — ELECTRONIC DEVICES AND CIRCUITS

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Name two donor impurities.
2. Sketch the V-I characteristics of SCR.
3. How the change in I_c due to a change in I_{co} is opposed in a self-bias circuit?
4. Mention the characteristics of CC configuration.
5. State Barkhausen criterion.
6. Define positive feedback.
7. Calculate the pulse duration in a transistor monostable circuit with $R = 10 \text{ K}\Omega$ and $C = 100 \mu\text{F}$.
8. What is a bistable multivibrator?
9. Calculate the gain of an inverting op-amplifier where the feedback resistor $R_f = 10 \text{ K}$ and $R = 1 \text{ K}$.
10. Draw the circuit of an op-amp voltage follower.

PART B — (5 × 16 = 80 marks)

11. (i) Draw the internal architecture of IC 555. (8)
- (ii) Explain with a circuit the astable operation of IC 555 and derive an expression for the frequency of oscillation. (8)

(10) Sketch the op-amp (OB) input and output characteristics. (10)

Or

- (b) (i) Explain the construction and operation of n -channel JFET. (10)
- (ii) Sketch the typical family of drain characteristics for an n -channel JFET with various levels of V_{GS} . (6)
13. (a) (i) Sketch the circuit of a push-pull Class B amplifier. Briefly explain the operation of the circuit. (6)
- (ii) Derive an expression for the efficiency. (10)

Or

- (b) In a self-bias CE amplifier, emitter current = 5 mA, emitter resistance = 1000 ohms and beta = 49. Find the values R_1 and R_2 such that the stability factor is equal to 5 and $V_{BE} = 0.7$ volts. (16)
14. (a) Derive an expression for the frequency of oscillation in a transistor RC phase shift oscillator. (16)

Or

- (b) Discuss the effect of voltage series, current series, current shunt and voltage shunt negative feedback on the output impedance, input impedance, bandwidth and nonlinear distortion in an amplifier. (16)
15. (a) (i) Mention six characteristics of an ideal op-amp. (6)
- (ii) Derive an expression for the output voltage in an inverting op-amp adder. (5)
- (iii) Derive output voltage expression in an op-amp integrator. (5)

Or

- (b) (i) Draw the circuit of a second-order bandpass filter circuit using op-amp. (4)
- (ii) Design a second-order bandpass filter circuit with a midband gain of 50, a center frequency of 160 Hz and a 3dB bandwidth of 16 Hz. Assume $C_1 = C_2 = 0.1$ microfarads. (12)