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T 3910

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2008.

Annual Pattern — First Year

Computer Science and Engineering

EC 1X11 — ELECTRON DEVICES AND CIRCUITS

(Common to Information Technology)

(Regulation 2004)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Mention the majority and minority carriers in n-type and p-type semiconductor.
2. What is the function of clipper and clamper circuits?
3. In a BJT, $I_E = 10 \text{ mA}$ and $I_{CBO} = 100 \mu\text{A}$. If $\alpha = 0.98$, find I_C .
4. What are the differences between depletion type MOSFET and enhancement type MOSFET?
5. Compare the input impedance and voltage gain of common emitter and common collector amplifier.
6. Mention the different types of negative feedback amplifiers.
7. Draw the V-I characteristics of SCR.
8. What is the function of a phototransistor?
9. Draw the circuit of inverting amplifier and write the expression for its output voltage.
10. What is the significance of Schmitt trigger?

PART B — (5 × 16 = 80 marks)

11. (a) (i) Explain the transition and diffusion capacitance in a diode. (8)
 (ii) Describe about the forward characteristics of tunnel diode. (8)

Or

- (b) (i) Explain the operation of half wave rectifier with neat waveforms. (8)
 (ii) Find the output voltage in the following circuits shown in figures 11. b1 and 11. b2. Assume ideal diode. (8)

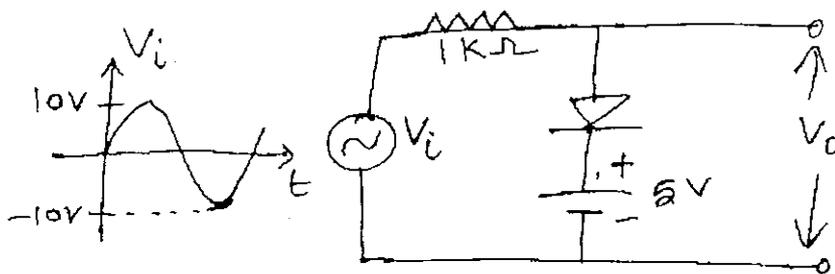


Fig. 11. b1

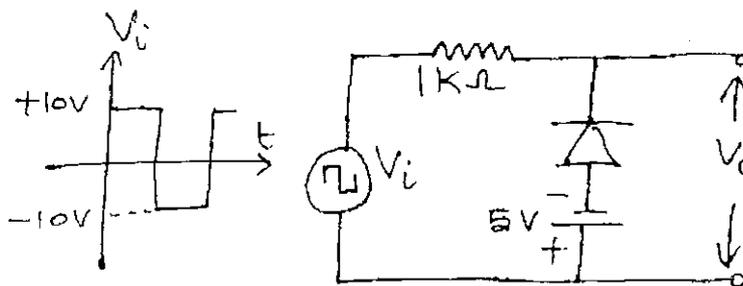


Fig. 11. b2

12. (a) (i) Explain the switching characteristics of transistor. (8)
 (ii) Describe about the drain-source characteristics of n-channel J-FET. (8)

Or

- (b) (i) Explain the transfer characteristics of n-channel enhancement MOSFET. (8)
 (ii) Derive the expression for I_{BQ} , I_{CQ} and V_{CEQ} in a BJT CE amplifier with self bias. (8)

13. (a) (i) Derive the expression for voltage gain in a CE amplifier with self bias and emitter capacitor (C_e), using low frequency hybrid model of transistor. Assume $h_{re} = 0$. (8)
- (ii) Derive the expression for overall voltage gain in a voltage-series negative feedback amplifier. (8)

Or

- (b) With neat circuit, explain the working principle of crystal oscillator. Also derive the expression for frequency of oscillation in it. (16)
14. (a) Explain the working principle of single phase fully controlled rectifier using SCRs with neat waveforms. (16)

Or

- (b) Describe the construction, working principle and characteristics of UJT. (16)
15. (a) (i) Draw the circuit of non-inverting amplifier and derive the expression for output voltage in it. (8)
- (ii) Explain the operation of astable multivibrator constructed using op-amp with waveforms. (8)

Or

- (b) Explain the working principle of monostable multivibrator constructed using IC 555 with neat waveforms and derive the expression for time duration of ON-State period of output voltage in it. (16)