

**B 2158**

B.E./B.Tech. DEGREE EXAMINATION, MAY/JUNE 2007.

Second Semester

Mechatronics Engineering

EC 153 — ELECTRONIC DEVICES AND CIRCUITS

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is a P-type semiconductor?
2. What is a biased PN junction?
3. What is meant by frequency response?
4. State the advantages of direct coupled amplifier.
5. What is noise in electronic circuits?
6. State Barkhausen's criteria for oscillations.
7. State the characteristics of an ideal operational amplifier.
8. What is the output of integrator when its input is a square wave?
9. Draw the input and output wave forms of Schmitt trigger.
10. What is a multivibrator?

PART B — (5 × 16 = 80 marks)

11. (a) (i) Explain the current equation which describes the forward and reverse characteristics of a semiconductor diode. (8)
- (ii) Explain the conduction of current in semiconductor with the aid of its energy band diagram. (8)

Or

- (b) (i) Explain in detail about the transistor current components. (8)
- (ii) Describe the circuit arrangement for obtaining the output characteristics of common base transistor. (8)

12. (a) With neat sketches explain the three different methods of biasing a transistor amplifier. (16)

Or

- (b) (i) Draw and Explain the low frequency hybrid pi — model of transistor in a common emitter configuration. (10)
- (ii) State the characteristics and uses of common emitter transistor amplifier. (6)
13. (a) (i) Explain the effect of negative feedback on gain and bandwidth of the system with proof. (10)
- (ii) State the different classification of oscillators with the range of frequency of their output. (6)

Or

- (b) (i) With a circuit diagram explain the operation of Wien bridge oscillator. (8)
- (ii) With a circuit diagram explain the operation of RC Phase Shift Oscillator. (8)
14. (a) (i) Draw the circuit of differential amplifier using op-amp. and explain its working. Also derive an expression for CMRR. (10)
- (ii) Explain the operation of differentiator circuit using op-amp. (6)

Or

- (b) Draw the circuit of instrumentation amplifier using op-amp and explain its operation in detail?
15. (a) Explain the operation of astable multi-vibrator using op-amp and draw the output waveform.

Or

- (b) Explain the applications of IC 555 timer in monostable multivibrator mode.