Reg. No. : | | | | | | | | | | | | |

Question Paper Code: 1053253

B.E. / B.Tech. DEGREE EXAMINATIONS, NOV/ DEC 2024
Third Semester
Electrical and Electronics Engineering
EC8353 – ELECTRON DEVICES AND CIRCUITS
(Regulation 2017)

Time: Three Hours | Maximum: 100 Marks

Answer ALL questions

PART – A (10 x 2 = 20 Marks)

1. An a.c. voltage of peak value 20 V is connected in series with a silicon diode and load resistance of 500 ohms. If the forward resistance of diode is 10 ohms. Find the peak current through the diode.

2. List the applications of laser diode.

3. How a FET is used as a voltage variable resistor?

4. Define thermal runaway in a transistor.

5. Outline the phase relationships of input/output currents and voltages of various transistor configurations.

6. State the need for coupling capacitor in a transistor amplifier.

7. A multistage amplifier employs five stages each of which has a power gain of 30. What is the total gain of the amplifier in dB?

8. Define differential mode signals of a differential amplifier.

9. Identify the type of feedback circuit increases the gain of an amplifier.

10. If a phase shift oscillator has all its resistance value as 1Mega ohms and all capacitance values as 68 pF. At what frequency does the circuit oscillate?

PART – B (5 x 13 = 65 Marks)

11. (a) Outline the charge carrier diffusion phenomenon across a PN junction. Explain the effect of forward and reverse biasing on the depletion region. (13)

(OR)

(b) Explain the operation of a Half Wave rectifier circuit and also derive the expression for TUF, PIV and efficiency. (13)

12. (a) (i) Enumerate the selection of Q point for transistor bias circuit and discuss the limitations of the output voltage swing. (7)
(ii) Describe the operation of an N channel depletion type MOSFET with a neat diagram. (6)

(OR)

(b) Discuss the construction and working of UJT with its equivalent circuit and V-I characteristics. (13)

13. (a) Determine the input impedance, output impedance, voltage gain and current gain of a transistor in CE configuration. Use h parameter model. (13)

(OR)

(b) (i) Explain the high frequency MOSFET model under CS configuration and its simplified equivalent model. (7)
(ii) Derive an expression for MOSFET unity gain frequency. (6)

14. (a) Draw the circuit of emitter coupled BJT differential amplifier and derive the expressions for differential gain, common mode gain and CMRR. (13)

(OR)

(b) Illustrate the behavior of a MOSFET based amplifier circuit with tuned load. Also deduce expressions for voltage gain at center frequency, Q and bandwidth. (13)

15. (a) With proper mathematical derivations, prove that bandwidth increases and output resistance reduces in a negative feedback amplifier. Assume a series shunt feedback scheme. (13)

(OR)

(b) Examine the Wein bridge oscillator with neat diagram and derive an expression for frequency of oscillation. (13)

PART – C (1 x 15 = 15 Marks)

16. (a) When a portion of the output signal is fed to input, as you are aware, feedback is generated. Develop the difference between negative feedback and positive feedback and elaborate on their individual advantages. How different parameters of an amplifier will be affected by these two types of feedback? (15)

(OR)

(b) Design an oscillator to operate at a frequency of 10kHz which gives an extremely pure sine wave output, good frequency stability and highly stabilized amplitude. Discuss the operation of this oscillator as an audio signal generator. (15)