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

Question Paper Code : 90176

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2019

Third Semester

Biomedical Engineering

EC8353 – ELECTRON DEVICES AND CIRCUITS

(Common to Computer and Communication Engineering/Electrical and Electronics Engineering/Electronics and Instrumentation Engineering/ Instrumentation and Control Engineering/Robotics and Automation Engineering)

(Regulations 2017)

Time : Three Hours | Maximum : 100 Marks

Answer ALL questions

PART – A **(10×2=20 Marks)**

1. Why the depletion layer is very thin in zener diode ?
2. What is a rectifier and mention its types ?
3. How a FET is used as a voltage variable resistor ?
4. What is meant by "thermal runaway" in a transistor and how it can be avoided ?
5. Mention the significance of coupling and bypass capacitor on bandwidth of amplifiers.
6. State Miller's theorem.
7. A tuned circuit has a resonant frequency of 1600 kHz and a bandwidth of 10 kHz. Calculate the value of the Q factor.
8. What is the impact of crossover distortion in an amplifier ?
9. Which type of feedback circuit increases gain of an amplifier ?
10. Draw the equivalent circuit of Crystal oscillator.

PART – B (5×13=65 Marks)

11. a) i) Draw and explain the VI characteristics of PN junction diode. (5)

ii) Derive the expression of the space charge or transition capacitance of PN diode under reverse bias with neat diagram. (8)

(OR)

b) With neat sketches, explain the operation of a Half Wave rectifier circuit and also derive the expression for Transformer Utilization Factor (TUF), Peak Inverse Voltage (PIV) and efficiency.

12. a) i) With neat sketches, explain the input and output characteristics of an Emitter Follower. (6)

ii) Enumerate the selection of Q point for transistor bias circuit and discuss the limitations on the output voltage swing. (7)

(OR)

b) Describe the construction and working of UJT with its equivalent circuit and VI characteristics.

13. a) Explain about CC amplifier and derive the expression for h parameters of the same. Also derive the expression for gain, input impedance and output impedance of CC amplifier.

(OR)

b) Explain about CS amplifier and derive the expression for gain, input impedance and output impedance and also draw its small signal equivalent circuit.

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

(OR)

b) If Class C Tuned amplifier has R_L = 6kΩ and required tank circuit Q = 80. Estimate the values of L and C of the tank circuit. Assume V_{CC} = 20 V, resonant frequency as 5 MHz and worst case power dissipation as 20 mW.

15. a) With a neat block diagram, explain the operation of following feedback amplifiers.

i) Voltage series feedback amplifier **(6)**

ii) Current shunt feedback amplifier **(7)**

(OR)

b) With neat diagram, examine the Wein bridge oscillator and derive an expression for frequency of oscillation.

PART – C **(1×15=15 Marks)**

16. a) i) In a Colpitts oscillator, $C_1 = C_2 = C$ and $L = 100\times10^{-6}$ H. The frequency of oscillation is 500 kHz. Determine the value of C. **(5)**

ii) In Colpitts oscillator, the desired frequency is 500 kHz. Estimate the value of L by assuming C = 1000 pF. **(5)**

iii) A 1 mH inductor is available. Choose the capacitor values in a Colpitts oscillator so that f = 1 MHz and feedback factor is 0.25. **(5)**

(OR)

b) For a CB amplifier driven by voltage source of internal resistance $R_s = 1.2$ KΩ. The load impedance is $R_L = 1$kΩ. The h parameters are $h_{ib} = 22\Omega$, $h_{cb} = 3\times10^{-4}$, $h_{fb} = -0.98$ and $h_{ob} = 0.5$A/V. Estimate the current gain Ai, Input impedance Ri, voltage gain Av, overall current gain Ais, overall voltage gain Avs and output impedance Zo.