C **Reg. No. :** | | | | | | | | | | | | |

Question Paper Code: R3405

B.E./B.Tech. DEGREE EXAMINATION, NOV 2024

Third Semester

Electronics and Communication Engineering

R21UEC305 – ELECTRONIC CIRCUITS

(Regulation R2021)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART A - (5 x 1 = 5 Marks)

1. Improper biasing of a transistor circuit leads to ------ CO1-U

   a) Excessive heat production at collector terminal.

   b) Distortion in output signal

   c) Faulty location of load line

   d) Heavily loading of emitter terminal.

2. The capacitive effects of transistor junction manifest themselves in CO1-U

   a) Low frequency b) high frequency c) middle frequency d) all the above

3. For a transistor TJ=160^{o}C,TA=40^{o}C and θ_J-A=80^{o}C Calculate the power that the transistor can safely dissipate in free air CO2- App

   (a) 2.3W (b) 5.8W (c) 4.0W (d) 1.5W

4. When current feedback (negative) is applied to an amplifier, its input impedance CO1-U

   (a) Is decreased (b) Is increased (c) Remains the same (d) None of the above

5. For a phase shift oscillator the gain of the amplifier stage must be greater than CO1-U

   (a) 19 (b) 29 (c) 30 (d) 1

PART – B (5 x 3= 15Marks)

6. Define thermal runaway. CO1-U

7. State Miller's theorem CO1-U

8. What is crossover distortion? How it can be eliminated CO1-U

9. Define the Nyquist criterion of stability. CO1-U

10. Write down the advantages of RC phase shift oscillator. CO1-U

PART – C (5 x 16= 80 Marks)

11. (a) Derive the expression of stability factor for a bipolar junction transistor with a common emitter configuration by applying your understanding of potential divider bias. CO2-App (16)

Or

(b) Derive the necessary expressions and analyze Voltage gain (A_v), Current Gain(A_i), Input Impedance(Z_i), output admittance($Y_{o)}$ from small signal model of BJT using h-parameters for Common emitter configurations of BJT. CO2-App (16)

12. (a) Analysis the BJT circuit for LF amplifier coupling capacitors C_1 and C_2 are used to block DC components and allow AC signals to pass. The emitter bypass capacitor CEC_ECE improves the amplifier's AC gain. CO4-Ana (16)

Or

(b) Analysis the BJT circuit for HF amplifier coupling capacitors C_1 and C_2 are used to block DC components and allow AC signals to pass. The emitter bypass capacitor CEC_ECE improves the amplifier's AC gain. CO4-Ana (16)

13. (a) Prove that the class B power amplifier provides the efficiency of 78.5% by calculating its input and output power. Also explain its operation CO1-U (16)

Or

(b) Explain the operation of class A transformer coupled power amplifier circuit using power transistor and calculate its maximum efficiency. CO1-U (16)

14. (a) Design a Voltage- series, feedback amplifier for deriving voltage gain, input resistance and output resistance. Assume necessary data CO2- App (16)

Or

(b) Design a feedback amplifiers to derive the input and output resistance for shunt-series feedback connection. Assume necessary data CO2- App (16)

15. (a) Explain Colpitts oscillator and derive the equation for oscillation? CO1-U (16)

Or

(b) Discuss about Wein bridge oscillator and derive its frequency of oscillation. CO1-U (16)