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INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

B.Tech IV Semester End Examinations (Supplementary) - July, 2018

Regulation: IARE – R16

ELECTRONIC CIRCUIT ANALYSIS

Time: 3 Hours

(ECE)

Max Marks: 70

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the question must be answered in one place only

UNIT – I

1. (a) Design an emitter follower having $R_i = 600 \text{ k}\Omega$, $R_o = 10 \Omega$. Assume $h_{fe} = 150$, $h_{ie} = 1 \text{ k}\Omega$, $h_{oe} = 25 \mu\text{A/V}$. Find A_I , A_V for the emitter follower using h-parameters. [7M]
- (b) Define h- parameters of CE configuration from the input and output characteristics. [7M]
2. (a) Derive the expression for voltage gain, input and output impedance of a common emitter configuration with neat circuit diagram. [7M]
- (b) Discuss the importance of Miller's theorem in analyzing the amplifiers. [7M]

UNIT – II

3. (a) Draw the high frequency small circuit of emitter follower amplifier and derive an expression for upper corner frequency. [7M]
- (b) Derive an expression for short circuit current gain of a transistor with the help of hybrid- π model. [7M]
4. (a) It is required to find the midband gain and the upper 3dB frequency of the common emitter amplifier shown in Figure 1, with $R_{sig} = 5 \text{ k}\Omega$, $R_B = 100 \text{ k}\Omega$, $R_C = 8 \text{ k}\Omega$, $R_L = 5 \text{ k}\Omega$, $V_{CC} = V_{EE} = 10 \text{ V}$, DC current $I = 1 \text{ mA}$ at which $\beta_0 = 100$, $r_\pi = 50 \Omega$, $f_T = 800 \text{ MHz}$, $C_\pi = 1 \text{ pF}$. [7M]

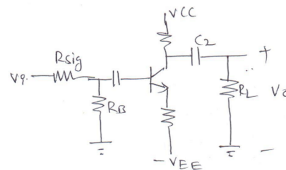


Figure 1

- (b) Determine the 3dB frequency of the short circuit current gain of a bipolar transistor, given $r_\pi = 2.6 \text{ k}\Omega$, $C_\pi = 2 \text{ pF}$ & $C_\mu = 0.1 \text{ pF}$. [7M]

UNIT – III

5. (a) Write a short note on transformer coupling, direct coupling schemes used in multistage amplifiers. [7M]
- (b) Draw the circuit diagram of Cascoded amplifier and derive the h-parameters of it? [7M]
6. (a) Draw the circuit diagram of darlington configuration and derive the expressions for input, output impedance, voltage and current gains? [7M]
- (b) Calculate overall cut off frequency of 5 stage cascaded amplifiers having single stage lower cut off frequency of 5k Hz. [7M]

UNIT – IV

7. (a) With the help of equivalent circuit, derive the expression for input and output resistance of current series feedback amplifier. [7M]
- (b) An amplifier with a closed loop gain of 200 is required & this gain should not vary more than 1% when the inherent gain of the amplifier without feedback varies by 20%. Find the values of A_v & β . [7M]
8. (a) Explain how oscillators are classified and conditions for oscillations. [7M]
- (b) Write short notes on [7M]
- Colpitts & Hartley Oscillator
 - RC phase shift Oscillator

UNIT – V

9. (a) Explain the operation of class B push pull amplifier and also derive the expression for maximum conversion efficiency. [7M]
- (b) A single stage class A amplifier has $V_{CC}=20V$, $V_{CEQ}=10V$, $I_{CQ}=600mA$ and collector load resistor $R_L=16\Omega$. The ac output current varies by $\pm 300mA$ with the ac input signal. Determine [7M]
- The power supplied by the dc source to the amplifier circuit.
 - DC power consumed by the load resistor
 - AC power developed across the load resistor
 - DC power delivered to the transistor
 - DC power wasted in transistor collector
 - Overall efficiency
10. (a) Explain the operation of transformer coupled class A amplifier & derive the maximum conversion efficiency. [7M]
- (b) With a neat diagram, explain the classification of power amplifiers based on location of Q-points. [7M]

