Hall Ticket No | | | | | | | | | | | Question Paper Code: AEC004

INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

B.Tech IV Semester End Examinations (Regular) - May, 2019

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) Define h parameters and plot h-parameter model for CB,CE and CC configurations. **[7M]**
   (b) Compute A_I, R_I, A_V, A_{IS}, A_{VS} and R_O for the CE amplifier given R_s= 1kΩ, R_L=10kΩ. h_{ie} = 1.1k Ω, $h_{re} = 2.5\times10^{-4}$, h_{fe} = 50 and h_{oe} = 25μA/V. **[7M]**

2. (a) State and explain Miller theorem and dual of Millers theorem. **[7M]**
   (b) The h-parameters of a transistor used in a CC circuit are h_{ic} = 1.2k Ω, h_{rc} = 1, h_{fc} = -101 and h_{oc} = 25μA/V. The load resistance for the transistor is 20kΩ. Determine A_I, R_I, A_V, Z_O, A_{IS} and A_{VS}. Assume R_S = 1000 Ω. **[7M]**

UNIT – II

3. (a) Draw the hybrid- equivalent of a CE transistor valid for high frequency and explain significance of each parameter. **[7M]**
   (b) A BJT has the following parameters measured at room temperature I_C=1mA, h_{ie}=3k , h_{fe}=100, C_C =2pF , C_e =18pF, f_T=4Mhz. Find rbb', rb'e, g_m & f_H for R_L=1KΩ. **[7M]**

4. (a) Derive the expression for the CE short-circuit current gain A_i without resistive load at high frequency. **[7M]**
   (b) A CE amplifier is measured to have a bandwidth of 4MHz with the R_L=600 Ω calculate R_s that will give the required bandwidth. Assume typical hybrid-π parameters r_{bb}'=100Ω , ,h_{fe}=100, C_C =2pF, g_m=50mS, f_T=300Mhz. **[7M]**

UNIT – III

5. (a) Explain about the different coupling schemes used in amplifiers with diagrams. **[7M]**
   (b) A CE-CC amplifier uses R_S=500Ω, R_{C1}= 5KΩ, R_{E2}=10KΩ.The h-parameters are h_{ie}=1.1KΩ, h_{fe}=50 and neglect h_{re}, h_{oe}. Compute individual & overall A_I & A_V, R_i & R_o. **[7M]**

6. (a) Draw the circuit for BJT single tuned amplifier. Explain its working. **[7M]**
   (b) A single tuned RF amplifier uses a transistor with an output resistance of 50KΩ, output capacitance of 15pF and input resistance of next stage is 20KΩ.The tuned circuit consists of 47 pF capacitance in parallel with series combination of 1μH inductance and 2Ω resistance. Calculate i) Resonant frequency ii) Effective quality factor and iii) Bandwidth of the circuit. **[7M]**

UNIT – IV

7. (a) Draw the circuit for voltage shunt feedback amplifier and justify the type of feedback. Derive the expressions for Av, Ri and Ro for the circuit. **[7M]**

   (b) An amplifier has mid-band gain of 125 and a bandwidth of 250KHz.

   i. If 4% negative feedback is introduced, find the new bandwidth and gain

   ii. If bandwidth is restricted to 1MHz, find the feed back ratio. **[7M]**

8. (a) Derive the expression for frequency of oscillation and condition for sustained oscillation of a Hartley oscillator. **[7M]**

   (b) In a Colpitts oscillator, if C_1=0.2µF, C_2=0.02µF. If the frequency of oscillator is 10kHz, find the value of the inductor. Also find the required gain for oscillations. **[7M]**

UNIT – V

9. (a) Classify power amplifiers. Derive the expression for efficiency of a series fed coupled Class A power amplifier. **[7M]**

   (b) A series fed class A amplifier uses a supply voltage of 10V and load resistance of 20 Ω. The A.C input voltage results in a base current of 4mA peak. Calculate **[7M]**

   i. D.C input power

   ii. A.C output power

   iii. % Efficiency

10. (a) Explain about heat sinks. Explain the term thermal resistance. Give the sketches of heat sinks. **[7M]**

    (b) A class B, push-pull amplifier drives a load of 16Ω, connected to the secondary of the ideal transformer. The supply voltage is 25V. If turns ratio is 200:50, Calculate maximum power output, DC power input and efficiency. **[7M]**

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