Department of Electronics and Communication Engineering

II B.Tech (ECE) Sem-II QUESTION BANK
Subject: **Electronic Circuit Analysis (R16)**

Unit-I

1. a) Sketch the circuit of a Common Source amplifier. Derive an expression for the Voltage gain. (5)
   b) The h-parameters of the transistor used in CE amplifier are h_{fe}= 50, h_{ie}=1.1KΩ, h_{re}= 2.5×10^{-4}, h_{oe} = 24μA/V. Find out current gain and voltage gains with and without source resistance , input and output impedances , given that R_L= 10 K and R_S= 1 K (5)
2. a) State Miller's theorem. Explain its significance in transistor circuit analysis. (5)
   b) For the Common Gate amplifier, derive expressions for voltage gain, input impedance and output impedance. Neglect capacitances. (5)
3. a) Draw the circuit diagram of Common Drain amplifier and derive an expression for its Voltage gain. (5)
   b) Explain the frequency response of CE amplifier and Gain bandwidth product. (5)
4. a) Draw the equivalent diagram of a single stage CE amplifier at high frequencies. Derive the expression for gain under short circuited load conditions. (5)
   b) When a Ge PNP transistor is biased at 2mA, 15V, it has a base width of 1 micron. Find C_e and f_T if D_B=47cm^2/sec. (5)
5. a) Draw the High frequency model of a Transistor. Derive the relationship between high frequency and low frequency parameters. (5)
   b) Compare, CS, CG, and CD amplifier circuits at high frequencies. (5)

Unit-II

1. a) Explain the classification of amplifiers(5) b.) Explain methods of coupling. (5)
2. a) Explain the analysis of Cascaded transistor amplifier. (5)
   b) What are its advantages? (5)
3. a) Give the analysis of two stage RC coupled amplifier(5)
   b) What are its advantages? (5)
4. a) Explain the analysis of Darlington amplifier. (5)
   b) Explain the analysis of Cascode amplifier. (5)
5. a) Explain the analysis of Boot-strap amplifier. (5)
   b) Explain the analysis of Differential amplifier using BJT. (5)

Unit-III

1. a) Discuss quantitatively about the effect of negative feedback on

i) Gain ii) Bandwidth iii) Distortion v) Input resistance and vi) output resistance. (10)

2. a) Draw the circuit diagram of a current series feedback amplifier. Derive expressions to show the effect of negative feedback on input & output impedances (6)
   b) Calculate Transconductance with feedback. (4)
3. a) Draw the circuit diagram of a voltage series feedback amplifier. Derive expressions to show the effect of negative feedback on input & output impedances (6)
   b) Calculate Voltage gain with feedback. (4)
4. a) Draw the circuit diagram of a current shunt feedback amplifier. Derive expressions to show the effect of negative feedback on input & output impedances (6)
   b) Calculate Current gain with feedback. (4)
5. a) Draw the circuit diagram of a Voltage shunt feedback amplifier, Derive expressions to show the effect of negative feedback on input & output impedances(6)
   b) Calculate Transresistance with feedback. (4)

Unit-IV0

1. a) What are the differences between an oscillator and an amplifier? Explain the operating principle of an oscillator. (5)
   b) Explain frequency stability and amplitude stability. (5)
2. a) Draw and explain the operation of Colpitt's oscillator and derive its expression for frequency of oscillations. (7)
   b.) Explain briefly about Crystal Oscillator (3)
3. a) Draw and explain the operation of Hartley oscillator and derive its expression for frequency of oscillations. (7)
   b) Compare Colpitt's and Hartley Oscillators.(3)
4. a) Draw and explain the operation of Wein Bridge oscillator and derive its expression for frequency of oscillations. (7)
   b) What are the advantages of a crystal oscillator over an LC oscillator? (3)
5. a) Draw and explain the operation of RC Phase shift oscillator and derive its expression for frequency of oscillations. (6)
   b) Differentiate between LC and RC oscillators? (4)

Unit-V

1. a) Classify large signal amplifiers based on its operating point. Distinguish these amplifiers in terms of the conversion efficiency.(5)
   b) Draw the push-pull power amplifier circuit. Derive the expression for the output current in push-pull amplifier with base current as $I_b = I_{bm} \sin\omega t$. (5)
2. a) What is Harmonic distortion in transistor amplifier circuits? Discuss second harmonic distortion. (5)
   b) A single transistor is operating as an ideal class B amplifier with a 500 load. A dc meter in the collector circuit reads 10mA. How much signal power is delivered to the load? (5)
3. a) Explain the analysis of Class-A amplifier. (5)
   b) Explain about Class AB amplifier. (5)
4. a) Write short notes on requirement and types of heat sinks for power dissipation in large signal amplifiers. (5)

b) With the help of a neat circuit diagram, explain the operation of a complementary symmetry configured class B power amplifier. (5)

5. a) Derive the expressions for maximum Theoretical efficiency for (i) Transformer coupled

(ii) Series fed amplifiers. (6)

b) What are their advantages and disadvantages? (4)

Unit-VI

1. a) Draw the circuit diagram and small signal AC equivalent circuit of a single tuned amplifier (using BJT) with the tank circuit connected at the input side.(5)
   b) With a neat diagram show how to cascade tuned amplifiers and determine gain and bandwidth? (5)
2. a) What is synchronous tuning? Derive an expression for bandwidth of an n-stage synchronously tuned amplifier? (5)
   b) Show that for an 'n' stage synchronously tuned amplifier; maximum bandwidth is obtained
   when the single stage gain is 4.34 dB. (5)
3. a) Derive an expression for bandwidth of a capacitive coupled tuned amplifier in CE configuration. Make necessary assumptions and mention them. (7)
   b) What are staggered tuned amplifiers? (3)
4. a) Draw the circuit diagram of a Double tuned amplifier. Draw and explain in detail the frequency response for different values of coefficient of coupling (K) i.e. K=1, K= 1.5, K=2 and also (7)
   b) Explain what is Loose coupling and Tight coupling? (3)
5. a) Discuss the necessity of stabilization circuits in tuned amplifiers. (5)
   b) Explain the principle and working of wide band amplifiers. (5)