SIDDHARTH GROUP OF INSTITUTIONS :: PUTTUR
Siddharth Nagar, Narayanavanam Road – 517583

QUESTION BANK (DESCRIPTIVE)

Subject with Code : AEC(16EC411) **Course & Branch**: B.Tech –EEE

Year & Sem: II B.Tech & II-Sem **Regulation:** R16

UNIT 1
MULTI STAGE AMPLIFIES

1. a) Derive the equation for the overall voltage gain of a multistage amplifier in terms of the individual voltage gains. [10M]
   b) What are multi-stage amplifiers. [2M]
2. Describe different methods used for coupling multistage amplifiers with their frequency response. [12M]
3. Draw the block diagram of CE-CC cascaded amplifier and analyze its various parameters. [12M]
4. Draw the cascode amplifier circuit and derive expressions for voltge gain,current gain,input impedance and output impedance. [12M]
5. With neat diagram, analyze the two stage RC coupled amplifier. [12M]
6. The following figure shows CE-CE cascade amplifier with their biasing arrangements. Calculate R_i, A_i, A_v, R_i', A_{vs} and A_{is} if circuit parameters are: R_s=1K, R_{c1} = 15K, R_{E1}= 100Ω, R_{C2} = 4 KΩ, R_{E2} = 330Ω with R_1 = 200K and R_2 = 20K for first stage & R_1 = 47K and R_2 = 4.7K for second stage. Assume that h_{ie} = 1.2kΩ, h_{fe} = 50, h_{re} = 2.5 x 10^{-4} and h_{oe} = 25 x 10^{-6} A/V. [12M]

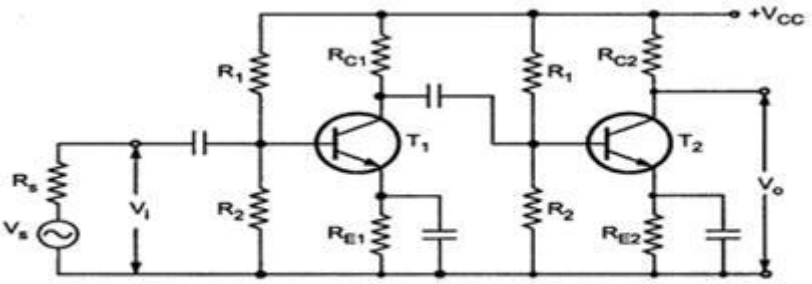

Fig. CE-CE Cascade amplifier

7. Discuss the concept of gain -band width product. [12M]
8. Explain the calculation of band width of single and multi stage amplifier. [12M]
9. Draw the block diagram of two stage RC coupled using FET amplifier and it frequency response. [12M]
10. Let us consider the two stage amplifier, the first stage in the circuit is a CE amplifier and second stage is CC amplifier, calculate R_i, A_i, A_v, R_i', A_{vs} and A_{is} if circuit parameters are: R_s=1K, R_{c1} = 3.3K, R_{E2}= 4.7kΩ.Assume that h_{ie}= 2k, h_{fe} = 50, h_{re} =0 and h_{oe} =0. [12M]

UNIT-II
FEEDBACK AMPLIFIERS

1. Explain the characteristics of negative feedback amplifiers. [12M]
2. Calculate the gain, input impedance and output impedance of voltage series feedback Amplifier having gain A = -300, R_{in}= 1.5 kΩ and R_{out}= 50 kΩ, β = 0.05. [12M]

3. a) Explain Feedback topologies. [5M]
   b) Give the detailed analysis of Current Series feedback amplifier. [7M]
4. Derive the expressions of input and output resistances for Voltage Shunt Feedback amplifiers. [12M]
5. a) Draw the block diagram of an amplifier with feedback and explain its concept. [6M]
   b) Derive the stabilization gain of negative feedback amplifier. [6M]
6. An amplifier has voltage gain with feedback of 100.if the gain without feedback changes by 20% and the gain with feedback should not vary more than 2%, determine the values of open loop gain A and feedback ratio β . [12M]
7. Derive the expressions of input and output resistances for current series Feedback amplifiers. [12M]
8. a) A voltage series negative feedback amplifier has a voltage gain without feedback of A = 500, input resistance Ri = 3 kΩ , output resistance R_O = 20 kΩ and feedback ratio β = 0.01.calculate the voltage gain A_f, input resistance Rif and output resistance R_{of} of the amplifier with feedback. [5M]
   b) Give the detailed analysis of voltage Series feedback amplifier. [7M]
9. Derive the expressions of input and output resistances for current shunt Feedback amplifiers. [12M]
10. a) Give the detailed analysis of voltage shunt feedback amplifier. [7M]
    b) An amplifier has an open loop gain of 1000 and a feedback ratio of 0.04. if the open loop gain changes by 10% due to temperature ,find the percentage change in gain of the amplifier with feedback. [5M]

UNIT-III
SINUSOIDAL OSCILLATORS

1. a) Draw the circuit diagram of RC phase shift Oscillator and Explain its working. [7M]
   b) Explain the concept of frequency stability of Oscillators. [5M]
2. a) State and explain Barkhausen criterion of Oscillations. [7M]
   b) In a Hartley oscillator, the value of the capacitor in the tuned circuit is 500 pF and the two sections of coil have inductances 38 µH and 12 µH. Find the frequency of oscillations and the feedback factor β. [5M]
3. a) Find the frequency of the oscillations of a transistorized Colpitts oscillator having C_1 = 150 pF,C_2 = 1.5nF and L = 50 µH . [5M]
   b) Draw the circuit diagram of a Colpitts Oscillator and explain the principle of operation. [7M]
4. Derive the expression for frequency of Oscillations of a Wein - Bridge Oscillator. [12M]
5. a) In a Hartley oscillator, L_2 = 0.4 mH and C = 0.004 µF. if the frequency of the oscillator is 120kHz , find the value of L_1 . Neglect the mutual inductance. [7M]
   b) What is piezoelectric effect? Draw and explain a.c equivalent circuit of a crystal. [5M]
6. Draw the circuit of Hartley oscillator and explain its working. Derive the expressions for frequency of oscillation. [12M]
7. a) Explain the principle of operation of clapp oscillator. [7M]
   b) A tank circuit contains an inductance of 1 mH. Find out the range of tuning capacitor value if the resonant frequency ranges from 540 – 1650 kHz. [5M]
8. a) Draw the circuit diagram of Colpitts oscillator and explain its working. [7M]
   b) In Colpitts oscillator, C1 = 0.2 µF and C2 = 0.02 µF. if the frequency of the oscillator is 10 KHz , find the value of the inductor .Also find the required gain for oscillation. [5M]
9. a) Draw the circuit diagram of tuned collector oscillator and explain its working. [7M]
   b) A tuned collector oscillator in a radio receiver has a fixed inductance of 60 µH and has to be tunable over the frequency band of 400 to 1200 kHz. Find the range of variable capacitor to be used. [5M]
10. a) Draw the circuit diagram of Wien- bridge oscillator and explain its working. [7M]
    b) In a Wien – bridge oscillator , if the value of R is 100 KΩ, and frequency of oscillations is 10 kHz, Find the value of capacitor C. [5M]

UNIT – IV

LARGE SIGNAL AMPLIFIERS

1. a) Explain the classification of amplifiers based on the based on biasing condition. [7M]
   b) Write short note on class A amplifiers. [5M]
2. a) Compare series fed and transformed coupled class A amplifiers. [7M]
   b) write short note on power output and efficiency of class A power amplifiers. [5M]
3. a) Explain about transformed coupled class A amplifier. [7M]
   b) Calculate the effective resistance R_L' seen looking into the primary of a 10:1 transformer connected to an output load of 16Ω. [5M]
4. a) Draw the circuit diagram of push pull class B amplifier and explain its working principle. [7M]
   b) What are the Advantages & disadvantages of push pull class B amplifier. [5M]
5. A class A power amplifier has zero signal collector current of 100mA.If the collector supply voltage is 5V, determine . [12M]
   a) Maximum a.c power output
   b) Power rating of transistor
   c) Maximum collector efficiency.
6. a) Draw the circuit diagram of complementary symmetry class B amplifier and explain its working principle. [7M]
   b) What are the Advantages & disadvantages of complementary symmetry class B amplifier. [5M]
7. a) Discuss the primary function of phase inverters. [7M]
   b) For a transistor, Tj = 160^0c, T_A = 40^0c, and Θ_{j-A} = 80^0c/W. Calculate the power that the transistor can safely dissipate in free air. [5M]
8. a) What are the types of Heat sinks and Explain the concept of power dissipation thermal stability. [7M]
   b) Determine the power dissipation capability of a transistor which has been mounted with a heat sink having thermal resistance Θ_{Hs-A} = 8^0c/w,T_A = 40^0c, Tj = 160^0c, Θ_{j-A} = 85^0c/W. [5M]
9. a) Explain about Power dissipation thermal stability for a transistor. [7M]
   b) In a class B amplifier, V_{CE} (min) = 2V and supply voltage V_{CC} = 15 v. Find the collector circuit efficiency. [5M]
10. a) what is crossover distortion? Explain. [7M]
    b) In a class B amplifier, V_{CE} (min) = 1V and supply voltage V_{CC} = 18 v. Find the collector circuit efficiency. [5M]

UNIT – V

Linear Wave shaping & Multivibrators

1. a) Draw a high pass RC circuit and its frequency response . [7M]
   b) How Low pass RC circuit be used as a Integrator. [5M]
2. a) Derive the response of a high pass RC circuit for step Input. [7M]
   b) How High pass RC circuit be used as a Differentiator. [5M]
3. a) Derive the Response of a low pass RC circuit for Step input. [7M]
   b) Determine the upper 3-dB frequency for low pass RC circuit, if a pulse of 0.4 µsec is required to pass without distortion. Find the value of resistance if the capacitor is 0.001µF. [5M]
4. a) A Pulse generator with an output resistance R_s=500Ω is connected to an oscilloscope with an input capacitance of C_i=30 pF.Determine the fastest rise time that can be displayed. [7M]
   b) Derive the response of a high pass RC circuit for square wave Input. [5M]
5. A 10Hz square wave is fed to an amplifier. Calculate and plot the output waveform under the following conditions: The lower 3 dB frequency is i) 0.3 Hz ii) 3 Hz iii) 30 Hz [12M]
6. Explain the basic series clipper above and below reference voltage. [12M]
7. a) Explain the negative clamper circuit with wave forms. [7M]
   b) Explain the positive clamper circuit with wave forms. [5M]
8. a) what is multivibrator? How multivibrators are classified. [7M]
   b) With help of diagram explain the operation of Mono stable Multivibrator. [5M]
9. a) With help of diagram explain the operation of Bi-stable Multivibrator. [7M]
   b) Write a note on free running multivibrator. [5M]
10. With help of diagram explain the operation of Schmitt Tigger circuit using transistors. [12M]