SE-sem-IV-old-Electrical.

E C D

4/12/15

QP Code : 1397

(3 Hours) **[Total Marks : 100**

N.B.

1. **Q 1 is compulsory**
2. Answer **any four** out of remaining **six** questions
3. Assumptions made should be clearly stated
4. Assume any suitable data wherever required but justify the same

Q.1 (A) What are the different types of coupling used in BJT amplifiers? Draw the frequency response of a BJT amplifier and explain why the gain is dropping at low and high frequencies. (06)

(B) State the 'Barkhausen Criteria' of oscillation and explain how the oscillations build up in an oscillator. (04)

(C) Draw the frequency response for the open loop operation of an op-amp like IC 741 (typical gain bandwidth product- 1 MHz). If it is used for non-inverting amplifier application with gain of 50, what will be the modified frequency response? (05)

(D)Compare Class A, B and AB power amplifiers. (05)

Q.2 (A) Explain the impact of cascading on the performance of overall system (10)

(i) A CC amplifier stage followed by a CE amplifier stage

(ii) A CE amplifier stage followed by a CB amplifier stage

(B)What is Darlington pair? What are its features? Derive expression for its ac parameters. State and explain any one application of it in detail. (10)

Q.3 (A) Design a two stage RC coupled CE amplifier using BC147B transistors, with following specifications: (15)

Voltage gain (A_v) >= 2000 Output Voltage (V_o) = 2.5 volts

Overall stability factor (S) <= 10 Lower cutoff freq. (f_{low}) = 20Hz

Assume the resistive load (R_L) connected to the output of the second stage is 10kΩ.The specifications of BC147B are as given below:

$h_{FE\,typ}$ = 290 $h_{fe\,typ}$ = 330 $h_{fe\,min}$ = 240 $h_{fe(max)}$ = 500

h_{ie} = 4.5 kohm h_{oe} = 30 μ℧ h_{re} = 2×10^{-4}

(B) Draw the schematic of circuit which give output voltage $V_O = -0.5*(V_1+V_2)$ where V_1 and V_2 are dc input voltages. Also calculate the values of components. (05)

Q.4. (A) Draw the neat diagram of a RC phase shift oscillator. Explain its operation. Derive the expression for frequency of output signal. (10)

(B) Derive the equation for frequency of oscillation of a Colpitts oscillator. Also derive the condition for sustained oscillation (10)

Q.5 (A) Design a class A transformer coupled amplifier with output power of 6 watts, load resistance of 8 ohms. Assume transformer efficiency of 85% and supply voltage of 15 volts. Use the transistor with following specifications

P_{Dmax} (at 25°C)= 30 W, V_{CEO} = 40 V, I_{Cmax} (at 25°C) = 5A, V_{CEsat} = 1V (15)

(B) For the above design calculate the power dissipation in the transistor when delivering full power output and also its efficiency. (05)

Q.6 (A) Draw the circuit diagram of subtractor using op-Amp and derive the expressions for output voltages (06)

(B)With the help of a neat circuit diagram, explain the working of a Schmitt trigger circuit. Draw the relevant waveforms (08)

(C)What are active filters? Explain the classifications of active filters with their frequency response curve. (06)

Q.7 Write short notes on **any three** (20)

(i) Precision Rectifier (ii) Sample and Hold circuit (iii) Gyrator

(iv) UJT Relaxation Oscillator (v) Op-amp: Clipping and clamping circuits

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