Code: 13A04402 **R13**

B.Tech II Year II Semester (R13) Supplementary Examinations May/June 2017

ELECTRONIC CIRCUITS ANALYSIS & DESIGN

(Common to ECE & EIE)

Time: 3 hours Max. Marks: 70

PART - A

(Compulsory Question)

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1 Answer the following: (10 X 02 = 20 Marks)

(a) What is a cascade amplifier? What is its advantage?

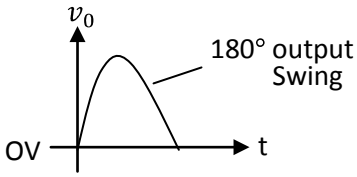
(b) An amplifier consists of 3 identical stages in cascade. The bandwidth of overall amplifier extends from 20 Hz to 20 kHz. Calculate the bandwidth of individual stage.

(c) Draw the small signal equivalent circuit for an emitter follower stage at high frequencies.

(d) State Barkhausen criteria for sustained oscillations.

(e) Distinguish between small signal and large signal amplifiers.

(f) The following is an example of the output swing for a class ------- amplifier. Explain.



(g) Why gain bandwidth product remains constant with the introduction of negative feedback?

(h) Why RC oscillators are not suitable for high frequency applications.

(i) What is the fundamental difference between audio amplifier and tuned amplifier?

(j) What is staggered tuning?

PART - B

(Answer all five units, 5 X 10 = 50 Marks)

UNIT - I

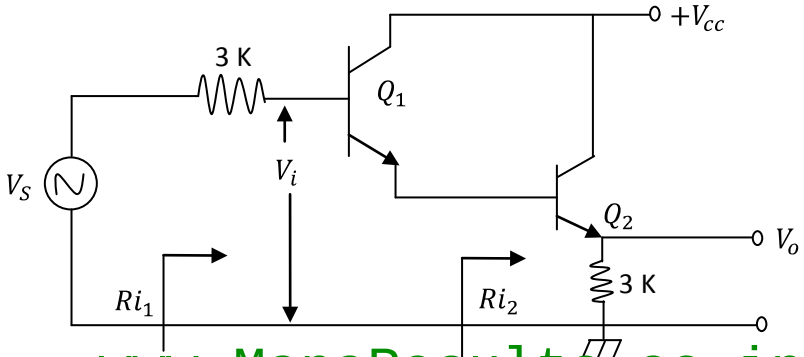
2 (a) Discuss the classification of amplifiers based on frequency range and type of coupling, power delivered and signals handled.

(b) Design a single stage emitter follower having $R_i = 500\ K\Omega$ and $R_o = 20\Omega$. Assume $h_{fe} = 50,\ h_{ie} = 1\ K,$ $h_{oe} = 25\ \mu A/V$.

OR

3 (a) What are the different types of distortions possible in amplifier outputs? Explain.

(b) For the circuit shown in figure below, calculate Ri, Ai, Av and Ro. Assume h_{ie} = 1.1 K, h_{fe} = 50, h_{re} = 2.5 x 10^{-4}, h_{oe} = 25 $\mu A/V$.



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UNIT - II

4 (a) Discuss the effect of emitter bypass capacitor and input & output coupling capacitors on the lower cut-off frequency if number of amplifiers are cascaded.

(b) The following low-frequency parameters are known for a given transistor at $I_C = 10\ mA$, $V_{CE} = 10\ V$ and at room temperature, $h_{ie} = 500\Omega$, $h_{oe} = 4 \times 10^{-5}\ A/V$, $h_{fe} = 100$, $h_{re} = 10^{-4}$. At the same operating point, $f_T = 50\ MHz$ and $C_c = 3PF$, compute the values of all the hybrid –π parameters.

OR

5 (a) Define f_α, f_β and f_T and derive the relation between f_β and f_T.

(b) What are the typical values of various components in hybrid – p model? Show that at low frequencies the hybrid – p model with r_{be} and r_{ce} taken as infinite reduces to the approximate CE h – parameter model.

UNIT - III

6 (a) An amplifier with an open loop voltage gain of 1000 delivers 10 W of power output at 10% harmonic distortion when input is 10 mV. If 40dB negative feedback is applied and output power is to remain at 10 W, determine required input signal Vs and second harmonic distortion with feedback.

(b) Draw the circuit diagram of a RC phase shift oscillator using BJT. Derive the expression for frequency of oscillations.

OR

7 (a) Explain effect of negative feedback on gain, stability, distortion and bandwidth of an amplifier.

(b) Discuss and explain the basic circuit of an LC oscillator and derive the condition for the oscillations.

UNIT - IV

8 (a) Explain with a neat circuit diagram, the working of a transformer coupled class A amplifier. Prove that the maximum efficiency is 50%.

(b) A transistor with a maximum junction temperature specification of 150℃ dissipates a maximum power of 40 watts at a case temperature of 25℃ and 2 watts at an ambient temperature of 25℃. Find
(i) The thermal resistance between the junction and the case.
(ii) The thermal resistance between the junction and ambient.
Maximum power dissipation capability for safe operation in free space at a temperature of 50℃.

OR

9 (a) Derive the expression for maximum collector power dissipation Pc(Max) in the case of class B power amplifiers.

(b) What are the advantages and disadvantages of push pull configuration? Show that in class-B push pull amplifier the maximum conversion efficiency is 78.5%.

UNIT - V

10 (a) Derive the expression for the 3dB bandwidth of a capacitance coupled single tuned amplifier.

(b) Explain the principle of stabilizing the double tuned transformer coupled amplifier response against the internal feedback.

OR

11 (a) Explain the reasons for oscillations in a tuned amplifier. Briefly explain the methods used to stabilize the tuned amplifiers against oscillations.

(b) Explain the operation of a double tuned amplifier. Explain the advantages of double tuned circuit over single tuned circuit.

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