Code: 9A02405

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B.Tech III Year I Semester (R09) Supplementary Examinations December 2015

ANALOG ELECTRONIC CIRCUITS
(Electrical & Electronics Engineering)

Time: 3 hours   Max Marks: 70

Answer any FIVE questions
All questions carry equal marks
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1   (a)   a Draw Hybrid–π model for a transistor in the CE configuration and explain the significance of every component in this model.
    (b)   Given a germanium p-n-p transistor whose base width is 10^{-4} cm. At room temperature and for a dc emitter current of 3 mA, find: (i) Emitter diffusion capacitance. (ii) f_T [Assume Diffusion constant as 47 cm^2/sec].

2   Derive the voltage gain, input admittance and input miller capacitance of CS amplifier using its high frequency equivalent circuit.

3   (a)   Derive the voltage gain, input and output resistance for single stage voltage-series feedback amplifier.
    (b)   An RC coupled amplifier has a voltage gain of 1000, f_1= 50 Hz, f_2 = 200 kHz and a distortion of 5% without feedback. Find the amplifier voltage gain, f_{1f}, f_{2f} and distortion when a negative feedback is applied with feedback ratio of 0.01.

4   Design a phase-shift oscillator to operate at a frequency of 6 kHz. Use JFET with μ = 60 and r_d = 5.5k. The phase shift network is not to load down the amplifier. Find the minimum value of the drain circuit resistance Rd for which the circuit will oscillate, and find the product of RC.

5   (a)   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%.
    (b)   A transistor in a transformer coupled (Class–A) power amplifier has to deliver a maximum of 5 watts to a load of 4 Ω load. The quiescent point is adjusted for symmetrical swing, and the collector supply voltage is V_{CC} = 20 volts. Assume V_{min} = 0 volts.
          (i) What is the transformer turns ratio?
          (ii) What is the peak collector current?

6   (a)   A 10 Hz square wave is fed to an amplifier. Calculate and plot the output waveform under the following conditions. The lower 3dB frequency is: (i) 0.3 Hz. (ii) 3.0 Hz. (iii) 30 Hz.
    (b)   Draw the output waveform of an RC high pass circuit with a square wave input under different time constants. Explain the same.

7   Write short notes on:
    (a)   BJT as a switch.
    (b)   Latching phenomena in a transistor.

8   (a)   Explain the reason for the occurrence of overshoot at the base of normally ON transistor of one shot. Derive an expression for overshoot.
    (b)   Discuss a few applications of a monostable multivibrator. Explain how it differs with that of a binary.