CBCS Scheme

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15EC32

Third Semester B.E. Degree Examination, Dec.2016/Jan.2017
Analog Electronics

Time: 3 hrs. Max. Marks: 80

Note: Answer any FIVE full questions, choosing one full question from each module.

Module-1

1 a. Derive an expression for input impedance, output impedance, voltage gain and current gain of un bypassed R_E common emitter amplifier using r_e model. **(08 Marks)**

b. Write the re-model of a Darlington emitter follower. Also determine input impedance, output impedance and voltage gain for the circuit. **(08 Marks)**

OR

2 a. Derive an expression for input impedance, output impedance, voltage gain and current gain of transistor amplifier using h-parameters. **(08 Marks)**

b. Determine voltage gain and current gain of emitter follower. Where $V_{CC} = 10V$, $R_B = 100K$, $R_E = 1K\Omega$, $h_{ie} = 1.1K\Omega$, $h_{fe} = 100$. Use approximate hybrid model. **(04 Marks)**

c. Design common emitter amplifier shown in Fig.Q.2(c) hfe = 100, $V_{CE} = 5V$. **(04 Marks)**

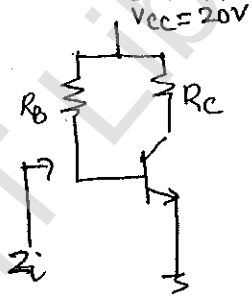

Fig.Q.2(c)

Module-2

3 a. Explain the working principle of JFET. Determine JFET parameters from characteristics. **(06 Marks)**

b. Derive an expression for output resistance and voltage gain of fixed bias FET amplifier. **(06 Marks)**

c. Calculate voltage gain of self bias FET amplifier. The circuit uses $R_D = 2K\Omega$, $R_S = 1K\Omega$, $r_d = 40K\Omega$, $g_m = 2mA/V$, $R_G = 2M\Omega$. **(04 Marks)**

OR

4 a. Explain construction and working principle of enhancement type MOSFET. **(06 Marks)**

b. Derive an expression for output impedance input impedance and voltage gain of common gate amplifier. **(07 Marks)**

c. Distinguish between JFET and enhancement type MOSFET. **(03 Marks)**

Module-3

5 a. Derive an expression for low frequency response of BJT amplifier due to capacitors C_S, C_E and C_C. **(08 Marks)**

b. Estimate F_{LG}, F_{LS} and F_{LC} of the circuit shown in Fig.Q.5(b). The circuit uses R_{sig} = 10KΩ, R_G = 1MΩ, R_D = 2.2K, R_L = 4.7KΩ, r_d = ∞, R_S = 1KΩ, g_m = 2ms, C_G = 0.01μF, C_S = 0.47 μF, C_C = 0.1 μF. Plot the response. **(08 Marks)**

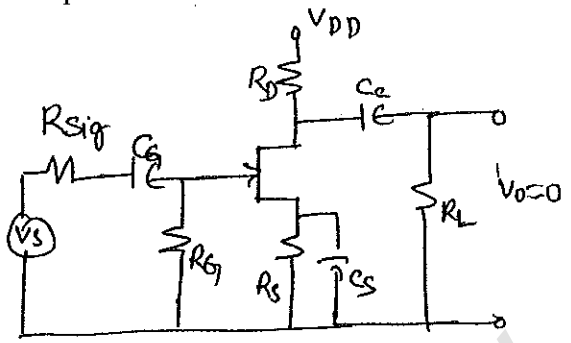

Fig.Q.5(b)

OR

6 a. Define Miller's theorem. Determine equivalent input and output capacitances of the circuit. **(08 Marks)**

b. Calculate the f_{Hi} of BJT amplifier. The transistor amplifier uses silicon transistor with V_{CC} = 20V, R_1 = 90KΩ, R_2 = 10KΩ, R_C = 5K, R_L = 5KΩ, R_E = 1.5KΩ, C_S = C_C = C_E = 0.1μF, r_0 = r_{ce} = ∞, C_{be} = 100pF, C_{bc} = 3pF, C_{ce} = 5pF, c_{wi} = C_{wo} = 6pF, β = 100, R_S = 10KΩ. **(08 Marks)**

Module-4

7 a. Determine input resistance and output resistance of voltage series feedback amplifier. **(06 Marks)**

b. Briefly explain characteristics of negative feedback amplifier. **(06 Marks)**

c. An amplifier without feedback gives a fundamental output 36V with 7 percent second-harmonic distortion when the input is 0.028V. If 1.2 percent of the output is feedback into the input in a negative voltage series feedback circuit. Determine the output voltage. **(04 Marks)**

OR

8 a. Explain FET phase shift oscillator with neat diagram and necessary equation. **(06 Marks)**

b. Explain the working of wein bridge oscillator. **(06 Marks)**

c. Calculate the oscillator frequency for an FET Hartley oscillator with tank circuit elements C = 250pF, L_1 = 1.5mH and L_2 = 2.5mH. Also calculate the gain of an amplifier. **(04 Marks)**

Module-5

9 a. Derive and expression for second harmonic distortion. **(05 Marks)**

b. Show that maximum conversion gain of transformer coupled class A amplifier is 50%. **(06 Marks)**

c. Calculate the harmonic distortion components for an output signal having fundamental amplitude of 2.1V, second harmonic amplitude of 0.3V, third harmonic component of 0.1V and fourth harmonic component of 0.05V. Also calculate the total harmonic distortion. **(05 Marks)**

OR

10 a. Derive an expression for conversion gain of class B push full amplifier with neat circuit diagram and waveform. **(08 Marks)**

b. Define voltage regulator. Explain the server voltage regulator using transistor. **(08 Marks)**

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