

CBCS SCHEME



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17EC33

Third Semester B.E. Degree Examination, Dec.2018/Jan.2019 Analog Electronics

Time: 3 hrs.

Max. Marks: 100

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 RE common emitter amplifier using r_e model. (10 Marks)
- b. For the network of Fig.Q1(b), determine : i) r_e ii) Z_i iii) Z_o , ($r_o = \infty\Omega$) iv) A_v ($r_o = \infty\Omega$) v) the parameters of parts ii through iv if $r_o = 50K\Omega$ for $R_1 = 56K\Omega$, $R_2 = 8.2K\Omega$, $C_1 = 10\mu f$, $C_2 = 10\mu f$, $R_E = 1.5K\Omega$, $C_E = 20\mu f$, $R_C = 6.8K\Omega$, $\beta = 90$ and $V_{CC} = 22V$. (10 Marks)

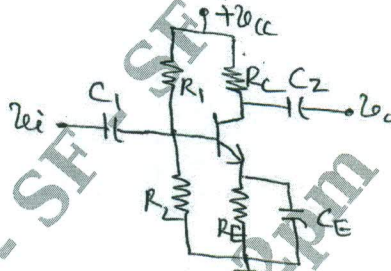


Fig.Q1(b)

OR

- 2 a. Derive an expression of input impedance, output impedance, voltage gain and current gain of fixed bias CE amplifier using h-parameter. (10 Marks)
- b. Determine r_e , h_{fe} , h_{ie} , Z_i , Z_o , A_v and A_i for the circuit shown in Fig.Q2(b) using hybrid equivalent model. (10 Marks)

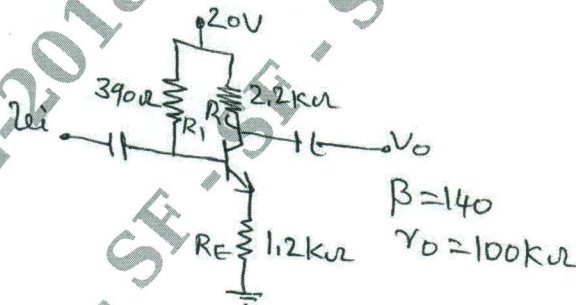


Fig.Q2(b)

Module-2

- 3 a. Explain the working principle of JFET, and explain the transfer characteristics of JFET. (08 Marks)
- b. Derive an expression for input impedance, output impedance, voltage gain and current gain of fixed bias FET amplifier. (08 Marks)
- c. Distinguish between JFET and MOSFET. (04 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

OR

- 4 a. With neat diagram explain construction and working principle of n-channel depletion type MOSFET. (10 Marks)
- b. Derive an expression for input impedance, output impedance and voltage gain of common – Gate FET amplifier. (10 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 . (10 Marks)
- b. Determine the lower cutoff frequency for the network of Fig.Q5(b) using the following parameters $C_i = 10\mu\text{f}$, $C_E = 20\mu\text{f}$, $C_C = 1\mu\text{f}$, $R_S = 1\text{k}\Omega$, $R_1 = 40\text{K}\Omega$, $R_2 = 10\text{K}\Omega$, $R_E = 2\text{K}\Omega$, $R_C = 4\text{K}\Omega$, $R_L = 2.2\text{K}\Omega$, $\beta = 100$, $r_o = \infty\Omega$ and $V_{CC} = 20\text{V}$, plot the response. (10 Marks)

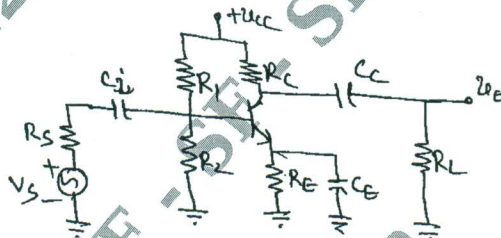


Fig.Q5(b)

OR

- 6 a. Define Miller's theorem, determine equivalent input and output capacitances of the circuit. (10 Marks)
- b. Determine the lower cutoff frequency for the network of Fig.Q6(b) using the following parameters. $C_G = 0.01\mu\text{f}$, $C_C = 0.5\mu\text{f}$, $C_S = 2\mu\text{f}$, $R_{\text{Sig}} = 10\text{K}\Omega$, $R_G = 1\text{M}\Omega$, $R_O = 4.7\text{K}\Omega$, $R_S = 1\text{K}\Omega$, $R_L = 2.2\text{K}\Omega$, $I_{DSS} = 8\text{mA}$, $V_P = -4\text{V}$, $r_d = \infty\Omega$, $V_{DD} = 20\text{V}$, $V_{GSQ} = -2\text{V}$ and $I_{DQ} = 2\text{mA}$. Plot the frequency response. (10 Marks)

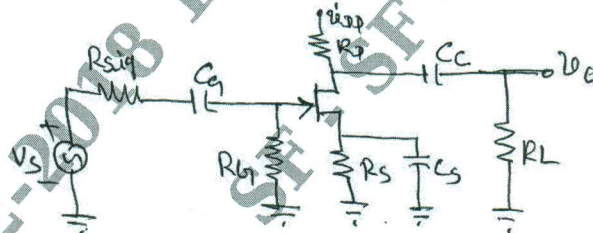


Fig.Q6(b)

Module-4

- 7 a. Determine input resistance and output resistance of voltage shunt feedback amplifier. (06 Marks)
- b. Determine the voltage, input and output impedance with feedback for voltage series feedback having $A = 100$, $R_i = 10\text{K}\Omega$ and $R_o = 20\text{K}\Omega$ for feedback of i) $\beta = 0.1$ ii) $\beta = 0.5$. (07 Marks)
- c. Explain the characteristics of negative feedback amplifier. (07 Marks)



OR

- 8 a. What is Barkhausen criteria for sustained oscillation? Explain basic principle of operation of oscillators. (08 Marks)
- b. Explain the working of Wein bridge oscillator. Write the equation for frequency of oscillations. (08 Marks)
- c. For the colpitts oscillators, $C_1 = 0.005\mu\text{f}$, $C_2 = 0.01\mu\text{f}$, $L = 100\mu\text{H}$, $L_{\text{PFC}} = 0.5\text{mH}$, $C_C = 10\mu\text{f}$ and $h_{fe} = 110$.
- i) Calculate frequency of oscillation
- ii) Check the condition for oscillation is satisfied. (04 Marks)

Module-5

- 9 a. Explain the operation of transformer coupled class – A power amplifier and show that the maximum percentage efficiency is 50%. (07 Marks)
- b. Explain with neat circuit diagram, the working of a complementary symmetry class – B amplifier. (07 Marks)
- c. Derive an expression for second harmonic distortion using 3 – point method. (06 Marks)

OR

- 10 a. Define voltage regulator. Explain the operation of series regulator circuit. (07 Marks)
- b. Explain the operation of shunt regulator using OP-Amp with neat circuit diagram. (07 Marks)
- c. Calculate the output voltage and Zener current in the regulator circuit of Fig.Q10(c) for $R_L = 1\text{K}\Omega$, $V_Z = 12\text{V}$, $R = 220\Omega$, $v_i = 20\text{V}$ and $\beta = 50$. (06 Marks)

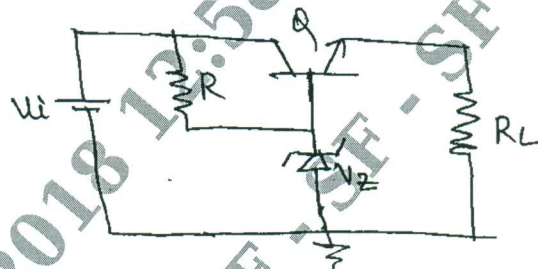


Fig.Q10(c)
