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_0, ($r_0 = \infty\Omega$) iv) $A_V(r_0 = \infty\Omega)$ v) the parameters of parts ii through iv if $r_0 = 50K\Omega$ 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)**

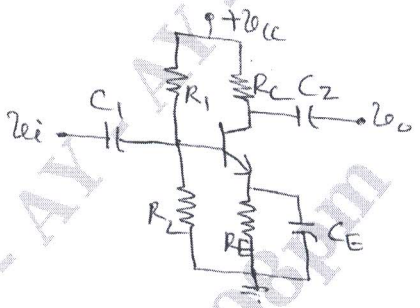

Fig.Q1(b)

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_0, A_V and A_i for the circuit shown in Fig.Q2(b) using hybrid equivalent model. **(10 Marks)**

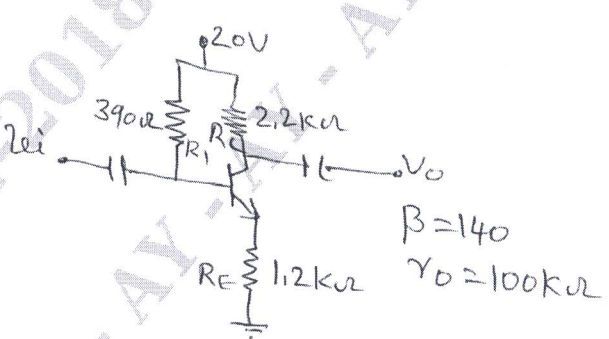

Fig.Q2(b)

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)**

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 $C_i = 10\mu f$, $C_E = 20\mu f$, $C_C = 1\mu f$, $R_S = 1k\Omega$, $R_1 = 40\ K\Omega$, $R_2 = 10K\Omega$, $R_E = 2K\Omega$, $R_C = 4K\Omega$, $R_L = 2.2K\Omega$, $\beta = 100$, $r_0 = \infty\Omega$ and $V_{CC} = 20V$, plot the response. **(10 Marks)**

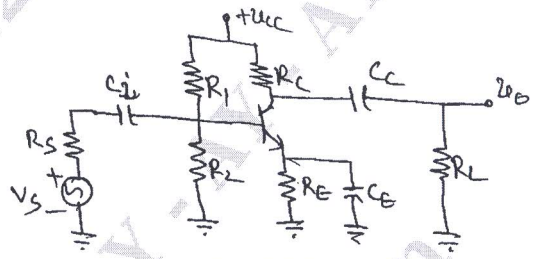

Fig.Q5(b)

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. $C_G = 0.01\mu f$, $C_C = 0.5\mu f$, $C_S = 2\mu f$, $R_{Sig} = 10K\Omega$, $R_G = 1M\Omega$, $R_0 = 4.7K\Omega$, $R_S = 1K\Omega$, $R_L = 2.2K\Omega$, $I_{DSS} = 8mA$, $V_P = -4V$, $r_d = \infty\Omega$, $V_{DD} = 20V$, $V_{GSQ} = -2V$ and $I_{DQ} = 2mA$. Plot the frequency response. **(10 Marks)**

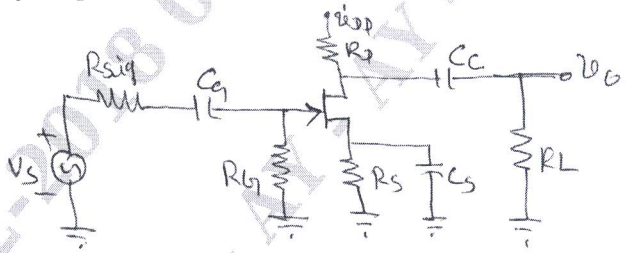

Fig.Q6(b)

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 $A = 100$, $R_i = 10K\Omega$ and $R_0 = 20K\Omega$ 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 Barkhasen 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, $C_1 = 0.005\mu f$, $C_2 = 0.01\ \mu f$, $L = 100\mu H$, $L_{PFc} = 0.5mH$, $C_C = 10\mu f$ 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 $R_L = 1K\Omega$, $V_z = 12V$, $R = 220\Omega$, $v_i = 20V$ and $\beta = 50$. **(06 Marks)**

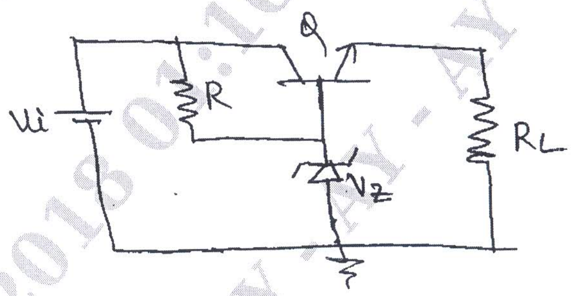

Fig.Q10(c)

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