CBCS Scheme

USN | | | | | | | | | | |

15EE34

Third Semester B.E. Degree Examination, June/July 2017
Analog Electronic Circuits

Time: 3 hrs. Max. Marks: 80

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

Module-1

1 a. Explain DC analysis of collector to base bias circuit. **(05 Marks)**

b. For the biasing circuit as shown in Fig.Q1(b), calculate I_E, I_C, V_C and V_{CE}. Given that $V_{EE} = -8V$, $R_E = 2.2\ k\Omega$, $R_B = 1.8k\Omega$, $\beta = 100$. **(05 Marks)**

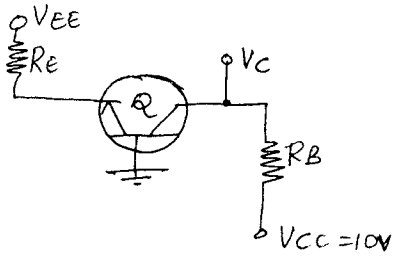

Fig.Q1(b)

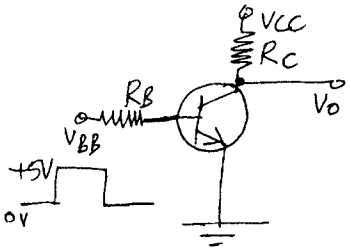

Fig.Q2(c)

c. For emitter stabilized bias circuit $V_{CC} = 10V$, $R_C = 1k\Omega$, $R_E = 500\Omega$, $R_B = 100\ k\Omega$, $\beta = 100$. Calculate I_B, I_C, V_{CE}, V_E and V_C. Draw the circuit diagram. **(06 Marks)**

OR

2 a. For the fixed bias circuit, derive expressions for S_{ICO}, S_β and S_{VBE}. **(06 Marks)**

b. For a voltage divider bias circuit, $R_C = 1k\Omega$, $R_E = 470\Omega$, $R_1 = 10k\Omega$, $R_2 = 5\ k\Omega$,, $\beta = 100$. Determine the stability factor S_{ICO}. Draw the circuit diagram. **(05 Marks)**

c. For the circuit shown in Fig.Q2(c), calculate the value of R_B that just saturates the transistor when $V_i = +5V$. Given that $R_C = 1k\Omega$, $\beta = 100$, $V_{CC} = 5V$, $V_{CE\,sat} = 0.2V$. **(05 Marks)**

Module-2

3 a. Explain hybrid equivalent model for a transistor. Develop h-parameter model for a transistor in CE, CB and CC modes. **(08 Marks)**

b. For the common base circuit shown in Fig.Q3(b), $R_C = 10\ k\Omega$, $R_E = 5\ k\Omega$, $R_S = 1\ k\Omega$, $R_L = 12\ k\Omega$, $h_{ib} = 22\Omega$, hob $= 0.49\ \mu A/V$, $h_{rb} = 2.9 \times 10^{-4}$, $h_{fb} = -0.98$, Use exact h–parameter model. Calculate A_I, Z_i, A_V and A_{VS}. **(08 Marks)**

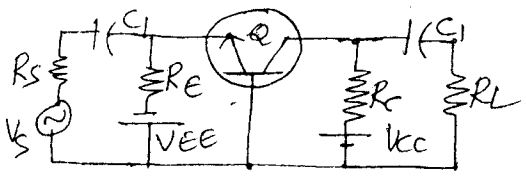

Fig.Q3(b)

OR

4 a. Explain the low frequency response by considering input RC network, output RC network. **(08 Marks)**

b. Calculate the high frequency response of amplifier circuit. Assume $R_C = 2.2k\Omega$, $R_E = 1k\Omega$, $R_1 = 68k\Omega$,, $R_2 = 22k\Omega$, $R_S = 680\Omega$, $\beta = 100$, $C_{Wi} = 6pF$, $C_{Wo} = 8pF$, $C_{ce} = 1pF$, $C_{be} = 20\ pF$, $C_{bc} = 4pF$, $h_{ie} = 1.1\ k\Omega$, $V_{CC} = 10V$. Draw the circuit diagram. $R_L = 10k\Omega$. **(08 Marks)**

Module-3

5 a. For the 2-stage amplifier circuit as shown in Fig.Q5(a), R_S = 1 kΩ, R_{C1} = 3.3 kΩ, R_{E2} = 4.7 kΩ, h_{ie} = 2 kΩ, h_{fe} = 50, h_{re} = 0, h_{oe} = 0, calculate the overall voltage gain Av and overall Z_0. **(08 Marks)**

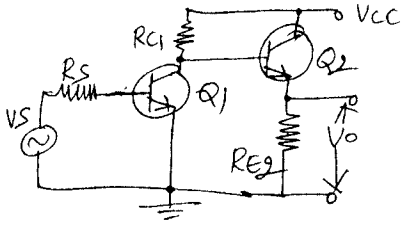

Fig.Q5(a)

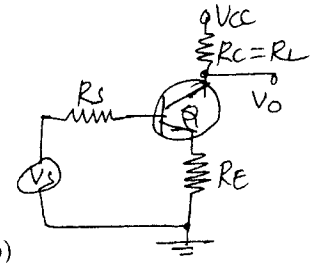

Fig.Q6(b)

b. For Darlington emitter follower circuit, obtain an expression for overall current gain A_I. **(08 Marks)**

OR

6 a. For voltage series feedback topology obtain expressions for Av and R_{if}. **(08 Marks)**

b. For the current series feedback as shown in Fig.6(b), R_L = 2.2 kΩ, R_E = 1.2 kΩ,, R_B = 1 kΩ, h_{ie} = 1.1 kΩ, h_{fe} = 50, calculate G_M, β, D, G_{MF}. **(08 Marks)**

Module-4

7 a. For transformer coupled class A power amplifier, obtain DC and AC operation and expression for maximum efficiency. **(08 Marks)**

b. A class B push pull amplifier drives a load of 16Ω, V_{CC} = 25V, number of turns in primary = 200 and that in secondary is 90. Calculate maximum power output, efficiency and maximum power dissipation per transistor. **(08 Marks)**

OR

8 a. State and explain Barkhausen criterion for sustained oscillations. **(05 Marks)**

b. Derive an expression for frequency of oscillations in Wien bridge oscillator. **(08 Marks)**

c. Calculate the frequency of oscillations of colpitts oscillator if C_1 = 150 pF, C_2 = 1.5 nF and α = 50 μH. **(03 Marks)**

Module-5

9 a. What are the advantages and drawback of FET Vs BJT? **(05 Marks)**

b. For the circuit shown in Fig.Q9(b), calculate V_{GSQ}, I_{DQ}, V_{DSQ} and V_D given I_{DSS} = 10mA and V_p = –4V. **(05 Marks)**

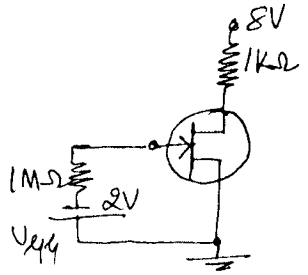

Fig.Q9(b)

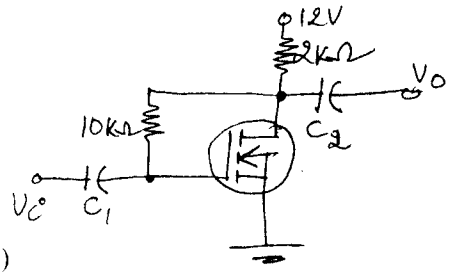

Fig.Q10(b)

c. For JFET, obtain the condition for zero current drift. **(06 Marks)**

OR

10 a. Explain construction, working and characteristics of n-channel depletion type MOSFET. **(08 Marks)**

b. For the circuit shown in Fig.Q10(b), calculate V_{GS}, I_D and V_{DS}. Given, $I_{D\ ON}$ = 6mA, $V_{GS\ ON}$ = 8V, $V_{GS\ TH}$ = 3V. **(08 Marks)**

* * * * *