CBCS SCHEME

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15EE34

Third Semester B.E. Degree Examination, June/July 2018
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. Derive an expression for E_{Th}, I_B and V_{CE} for voltage divider bias circuit using exact analysis. **(08 Marks)**

b. For the emitter bias network of Fig.Q1(b), determine the following parameters:
(i) I_B (ii) I_C (iii) V_{CE} (iv) V_C (v) V_E (vi) V_B (vii) V_{BC} **(08 Marks)**

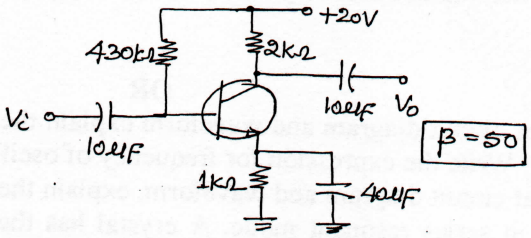

Fig.Q1(b)

OR

2 a. Derive the expression for stability factor for fixed bias circuit with respect to I_{CO}, V_{BE} and β. **(10 Marks)**

b. With a neat circuit diagram explain the operation of self bias circuit. **(06 Marks)**

Module-2

3 a. With the help of r_e equivalent model, derive an equation for input impedance, output impedance and voltage gain for an emitter follower configuration. **(08 Marks)**

b. For the collector feedback configuration having R_F = 180 kΩ, R_C = 2.7 kΩ, C_1 = 10 μF, C_2 = 10 μF, β = 200, $r_0 = \infty$ Ω and V_{CC} = 9 volts, determine the following parameters:
(i) r_e (ii) Z_i (iii) Z_o (iv) A_V **(08 Marks)**

OR

4 a. High frequency response BJT Amplifier has the following parameters:
R_S = 1 kΩ, R_1 = 40 kΩ, R_2 = 10 kΩ, R_E = 2 kΩ, R_C = 4 kΩ, R_L = 2.2 kΩ, C_S = 10 μF, C_C = 1 μF, C_E = 20 μF, β = 100, r_e = 15.76 Ω, R_i = 1.32 kΩ, A_{Vmid}(Amplifier) = –90 , $r_o = \infty$ Ω, V_{CC} = 20 V, C_{be} = 36 pF, C_{bc} = 4 pF, C_{ce} = 1 pF, C_{wi} = 6 pF, C_{wo} = 8 pF
(i) Determine f_{Hi} and f_{Ho} (ii) Determine f_β and f_T **(08 Marks)**

b. Derive equations for Miller input capacitance and Miller output capacitance **(08 Marks)**

Module-3

5 a. Derive expressions for Z_i and A_i for a Darlington emitter follower circuit. **(10 Marks)**

b. Explain the need of a cascading amplifier? Draw and explain the block diagram of two stage cascade amplifier. **(06 Marks)**

OR

6 a. List the general characteristics of negative feedback amplifiers. **(04 Marks)**

b. Determine the voltage gain, input impedance and output impedance with feedback for voltage series feedback amplifier having $A = -100$, $R_i = 10\ k\Omega$, $R_o = 20\ k\Omega$ for feedback of (i) $\beta = -0.1$ and (ii) $\beta = -0.5$. **(06 Marks)**

c. For a current series feedback amplifier, derive an expression for output impedance with feedback. **(06 Marks)**

Module-4

7 a. With a neat circuit and waveforms, explain the operation of a transformer coupled class-A power amplifier. **(08 Marks)**

b. Show that maximum efficiency of class-B push pull power amplifier circuit is 78.54%. **(08 Marks)**

OR

8 a. With a neat circuit diagram and waveform explain the operation of RC phase shift oscillator using BJT. Write the expression for frequency of oscillation. **(08 Marks)**

b. With a neat circuit diagram and waveform, explain the working principle of crystal oscillator operating in series resonant mode. A crystal has the following parameters: L = 0.334 H, C = 0.065 PF and R = 5.5 kΩ. Calculate the resonant frequency. **(08 Marks)**

Module-5

9 a. Derive the expression for A_v, Z_i and Z_o for a JFET common source amplifier with fixed bias configuration. **(08 Marks)**

b. For a self bias JFET circuit, $V_{DD} = +12V$, $R_D = 2.2\ k\Omega$, $R_G = 1\ m\Omega$, $R_S = 1\ k\Omega$, $I_{DSS} = 8mA$, $V_P = -4$ volts. Determine the following parameters:
(i) V_{GS} (ii) I_D (iii) V_{DS} (iv) V_S (v) V_G (vi) V_D **(08 Marks)**

OR

10 a. Derive expression for V_{GS}, I_D, V_{DS}, V_D and V_S for a voltage divider bias circuit using FET. **(08 Marks)**

b. With neat sketches, explain the basic operation and characteristics of n-channel depletion type MOSFET. **(08 Marks)**

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