CBCS Scheme

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

15EC32

Third Semester B.E. Degree Examination, June/July 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. Draw r_e and h-parameter models of a transistor in common – emitter configuration. Also give relation between r_e and h-parameter **(05 Marks)**

b. Draw the emitter follower circuit. Derive expressions for i) Z_i ii) Z_0 iii) Av using r_e model. **(06 Marks)**

c. Draw and explain the hybrid-π model of transistor in CE configuration mentioning significance of each component in model. **(05 Marks)**

OR

2 a. Derive expressions for Z_i, Z_0, Av and A_I for common–emitter fixed bias configuration using hybrid equivalent model. **(08 Marks)**

b. For the circuit shown below, taking $r_0 = \infty\Omega$ calculate i) r_e ii) Z_i iii) Z_0 iv) Av. **(08 Marks)**

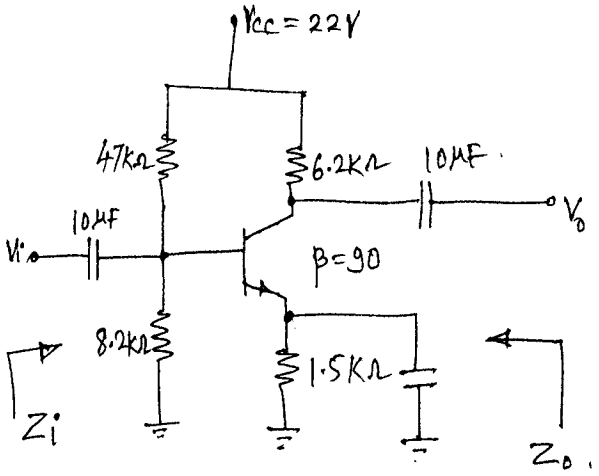

Fig.Q2(b)

Module-2

3 a. With circuit diagram of JFET small signal model, determine g_m and r_d. **(08 Marks)**

b. For the JFET common-source amplifier using fixed-bias configuration. Derive expressions for Z_i , Z_0 and Av using AC equivalent circuit. **(08 Marks)**

OR

4 a. For the JFET common-gate configuration shown below, calculate Z_i, Z_0 and Av. **(08 Marks)**

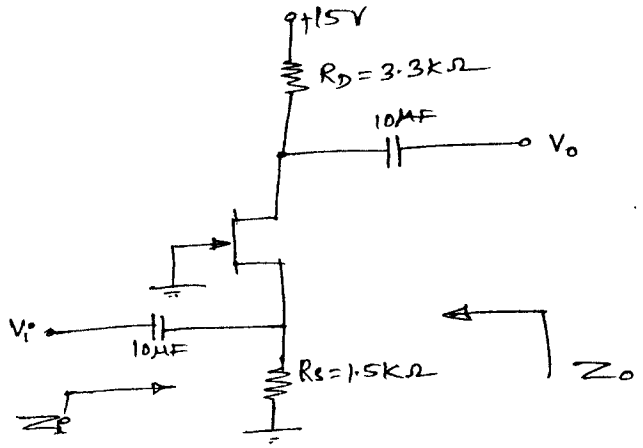

Fig.Q4(a)

b. With neat diagram, explain construction of n-channel JFET, and also draw its characteristics. **(08 Marks)**

Module-3

5 a. Describe Miller-effect and derive an equation for miller input and output capacitance. **(08 Marks)**

b. Discuss low frequency response of BJT amplifier and give expressions for low frequency due to input coupling capacitor C_S and output coupling capacitor C_C. **(08 Marks)**

OR

6 a. Explain high-frequency response of FET amplifier, and derive expression for cutoff frequencies defined by input and output circuits(f_{Hi} and f_{H0}). **(08 Marks)**

b. For the circuit shown.

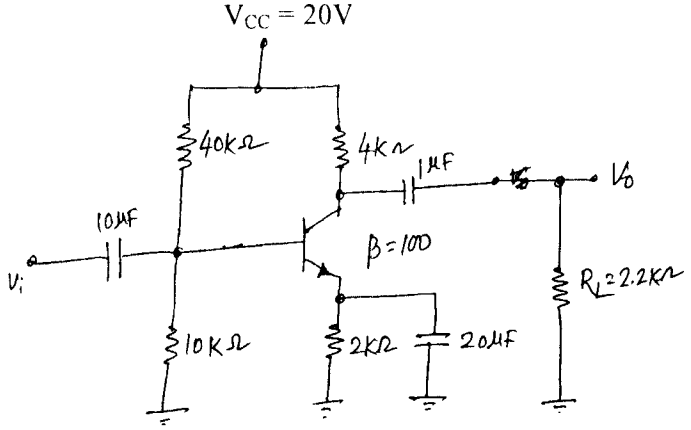

Fig.Q6(b)

$r_0 = \infty\Omega$, $C_\pi(cbe) = 36pF$, $C_u(cbc) = 4pF$, $C_{cc} = 1$ pF, $C_{wi} = 6$ pF, $C_{w0} = 8pF$

i) determine f_{Hi} and f_{H0}

ii) find f_β and f_T. **(08 Marks)**

Module-4

7 a. What is Barkhausen criterion? Explain how oscillations start in an oscillator. **(04 Marks)**

b. With the help of a neat circuit diagram, explain transistor colpitts oscillator. Write the expression for frequency of oscillations. **(08 Marks)**

c. A quartz crystal has L = 0.12H, C = 0.04 pF C_M = 1pF and R = 9.2 kΩ, Find :
i) series resonant frequency ii) Parallel resonant frequency. **(04 Marks)**

OR

8 a. Explain characteristics of a quartz crystal. With a neat diagram explain the crystal oscillator in parallel resonant mode. **(08 Marks)**

b. The following component values are given for the Wein-bridge oscillator of the circuit of $R_1 = R_2 = 33k\Omega$ $C_1 = C_2 = 0.001\mu F$ $R_3 = 47\ k\Omega$, $R_4 = 15k\Omega$.
i) Will this circuit oscillate?
ii) Calculate the resonant frequency. **(08 Marks)**

Module-5

9 a. Explain series – fed class – A power amplifier. Show that its maximum conversion efficiency is 25%. **(08 Marks)**

b. Explain with circuit diagram the operation of Class-B push-Pull amplifier using complementary–symmetry transistor pair. Also mention advantages and disadvantages of the circuit. **(08 Marks)**

OR

10 a. An ideal class –B push-pull power amplifier with input and output transformers has V_{CC} = 20V, $N_2 = 2N_1$ and R_L = 20Ω. The transistors has h_{fe} = 20. Let the input be sinusoidal. For the maximum output signal at $V_{CE(P)} = V_{CC}$, determine :
i) The output signal power
ii) The collector dissipation in each transistor
iii) Conversion efficiency. **(08 Marks)**

b. The following distortion readings are available for a power amplifier,
$D_2 = 0.2$, $D_3 = 0.02$, $D_4 = 0.06$, with $I_1 = 3.3A$ and $R_C = 4\Omega$.
i) Calculate the total harmonic distortion
ii) Determine the fundamental power component
iii) Calculate the total power. **(08 Marks)**

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