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17EC33

Third Semester B.E. Degree Examination, Dec.2019/Jan.2020
Analog Electronics

Time: 3 hrs. Max. Marks: 100

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

Module-I

1 a. Derive the expression for input impedance, output impedance, voltage gain and current gain for common emitter voltage divider bias configuration using re model. **(10 Marks)**

b. For the emitter-follower circuit shown in Fig.Q.l(b). Determine:

i) Input impedance
ii) Output resistance
iii) Voltage gain
iv) Current gain.

V

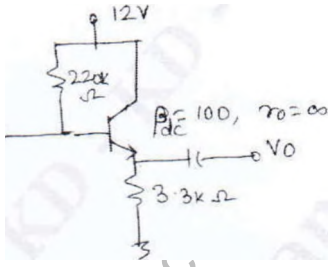

Fig.Q.1(b)

(10 Marks)

OR

2 a. Derive the expression for voltage gain, current gain, input resistance, output resistance CE transistor amplifier using hybrid parameters. (10 **Marks)**

b. Describe the hybrid n-model. **(04 Marks)**

c. Determine Zi, Z_0, A,, Ai for the circuit shown in Fig.Q.2(c) using approximate hybrid model. Given data hi_e = 1.1K.Q, = 100, h,,, = 201.tA/V **(06 Marks)**

i2v

2.2k

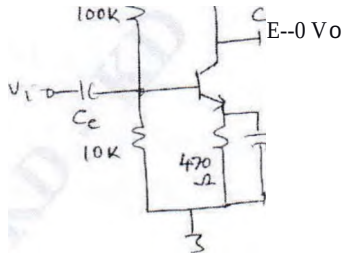

Fig.Q.2(c)

Module-2

3 a. Indicate various operating regions of JFET. Also determine parameters from the characteristics. **(06 Marks)**

b. Analyze self bias configuration of JFET and derive the expression for voltage gain, output impedance and input impedance. **(07 Marks)**

c. Compute g_m, zi, z_0 and A, for the circuit shown in Fig.Q.3(c). Given V_{GSQ} = 'Do 2.03mA, IDss = 10mA, V_p = -4V and rd = 40K.Q. **(07 M**

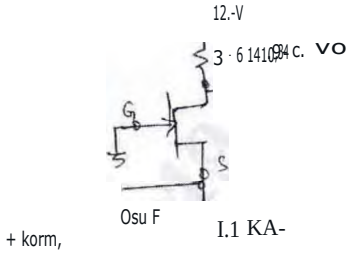

Fig.Q.3(c)

OR

4 a. Explain the characteristics of enhancement type MOSFET. Also indicate various operating regions. **(06 Marks)**

b. Derive the expression voltage gain, input resistance and output resistance of the source follower. **(07 Marks)**

c. Evaluate z,, z_0 and for the JFET circuit shown in Fig.Q.4(c). Given: 1DSS = 12mA, V_P -3V, gm= 2mU, rd = 401“2 **(07 Marks)**

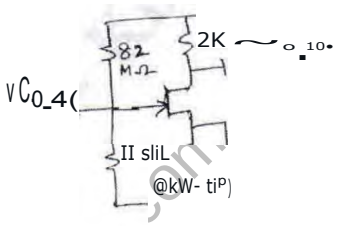

Fig.Q.4(c)

Module-3

5 a. Derive the expression for cut-off frequency due to source capacitor and coupling capacitor of a BJT amplifier. **(06 Marks)**

b. If the applied ac power to a system is 511w at 100mV and the output power is 48W, Determine: i) Power gain in dB ii) The voltage gain in dB if the output impedance is 40K0 iii) The input impedance. **(06 Marks)**

c. Derive an expression for Miller input and output capacitance. Also draw the equivalent circuit. **(08 Marks)**

OR

6 a. Derive the expression f_t' and fi for the multistage amplifier. **(06 Marks)**

b. For the circuit shown in Fig.Q.6(b) determine ffii and filo, given C_{wt} = 3pF, C. = 5pF, C_{ad} = 4pF, C_{gs} = 6pF, Cds 1pF, IDSS 6mA, V_p = -6V rd = 00 and g,,, = 2mU. **(08 Marks)**

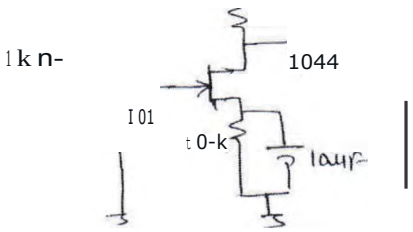

Fig.Q.6(b)

c. Determine overall lower 3dB and upper 3dB frequency for a four stage amplifier having an individual value of fi = 40Hz and fi = 2.5MHz. Also calculate overall bandwidth. **(06 Marks)**

Module_4

7 a. Explain the concept of feed back using block diagram. **(06 Marks)**

b. Derive the expression for input resistance and output resistance of a voltage series feedback amplifier. **(08 Marks)**

c. If the gain of an amplifier changes from a value of -WOO by 10%, calculate the gain change, if the amplifier used in a feedback circuit having = $\frac{I}{20}$. **(06 Marks)**

OR

8 a. Explain the operation of FET phase shift oscillator. **(08 Marks)**

b. Describe the Wein bridge oscillator for the oscillating frequency f0 = 2.2kHz. Also draw the circuit diagram. **(06 Marks)**

c. Determine the oscillating frequency of the Colpitts oscillator for the given specifications CI = 750pF, C2 = 2500pF and L = 40µI-l. Also calculate the feedback factor of the Colpitts oscillator. **(06 Marks)**

Module_5

9 a. Derive an expression for conversion efficiency of transformer coupled class-A amplifier. **(08 Marks)**

b. Calculate the second harmonic distortion for an output waveform having measured values of $VcE_{tn}i_n$ = 2.4V VcE0 = 10V and V_{CEmax} = **20V.** **(04 Marks)**

c. Explain with the help of neat circuit diagram, voltage series regulator operation. **(08 Marks)**

OR

10 a. Derive an expression for conversion efficiency of class B push pull amplifier. **(08 Marks)**

b. A transformer coupled class-A amplifier drives a 1652 speaker through 4:1 transformer using a power supply of Vcc = 36V, the circuit delivers 2W to the load. Calculate : i) P(ac) across transformer primary ii) V_L(ac). **(06 Marks)**

c. Calculate the harmonic distortion components for an output signal having fundamental amplitude of 2.1V, second harmonic component amplitude of 0.3V, third harmonic component of 0.1V and fourth harmonic component of 0.05V. Also calculate total harmonic distortion. **(06 Marks)**