USN ☐☐☐☐☐☐☐☐☐☐

15EC32

Third Semester B.E. Degree Examination, July/August 2022
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 the emitter follower circuit. Derive the expressions for
i) Z_i ii) Z_0 iii) A_v. Using r_e model. **(08 Marks)**

   b. Draw r_e and h-parameter models of a transistor in common-emitter configuration. Also give relation between r_e and h-parameters. **(08 Marks)**

OR

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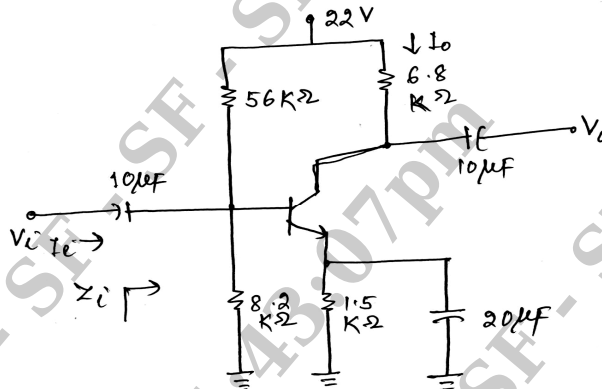
   b.

Fig Q2(b)

For the circuit shown determine : i) -r_e ii) -Z_i iii) Z_0 ($r_0 = \infty\Omega$) iv) A_v ($r_0 = \infty\Omega$).
(08 Marks)

Module-2

3 a. Explain with neat diagram the construction and characteristics of a depletion type MOSFET. How a depletion type MOSFET is different than an enhancement type of MOSFET. **(08 Marks)**

   b. Derive expression for Z_i, Z_0 and A_v for the JFET common-source amplifier fixed bias configuration. Suing ac equivalent circuit. **(08 Marks)**

OR

4 a. Draw JFET common drain configuration circuit. Derive Z_i, Z_0 and A_v using small signal model. **(08 Marks)**

b. A dc analysis of the source follower network of Fig Q4(b) results in V_{GSQ} = -2.86V and I_{DQ} = 4.56mA. Determine :   i) -gm   ii) -r_d iii) -Z_i iv) Z_0 with and without r_d v) A_v with and without r_d.

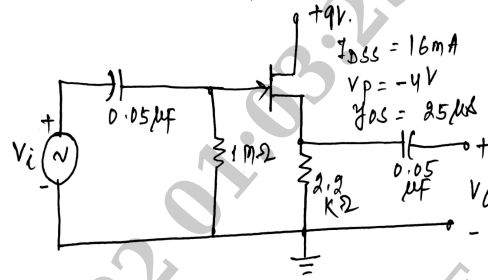Fig Q4(b)   **(08 Marks)**

Module-3

5   a. Explain the low frequency response of BJT amplifier and give expression for low frequency due to I/P coupling capacitor C_s and output coupling capacitor C_c with neat diagram.
(08 Marks)

b. Describe Miller-effect. Derive an equation for Miller input and output capacitance. **(08 Marks)**

OR

6   a. Explain high frequency response of FET amplifier. Derive expression for cutoff frequencies defined by input and output circuits.   **(08 Marks)**

b. Explain the multistage frequency effects on cutoff frequencies and the bandwidth with required waveforms and response curves.   **(08 Marks)**

Module-4

7   a. What are the advantages of negative feedback in amplifier?   **(04 Marks)**

b. Derive the expression for Z_{if} and Z_{of} for a voltage series feedback connection with neat diagram.   **(06 Marks)**

c. Determine the voltage gain, input and output impedance with feedback for a voltage series feedback having A = -100, R_i = 10kΩ and R_0 = 20kΩ for feedback of β = -0.1.   **(06 Marks)**

OR

8   a. What is Breackhausan's criteria for oscillation? How oscillation is generated in a circuit.
(04 Marks)

b. Explain the working of a FET phase shift oscillator with neat diagram. Give the expression for oscillation.   **(06 Marks)**

c. Draw the circuit diagram of uni-junction oscillator and explain the principle of operation and draw the characteristics curve.   **(06 Marks)**

Module-5

9   a. What is Power Amplifier? Explain the operation of a transformation coupled class – A power amplifier and show that maximum efficiency is 50%.   **(08 Marks)**

b. Define voltage Regulator. Explain series and shunt voltage regulator.   **(08 Marks)**

OR

10   a. Explain the operation of a class – B push-pull amplifier and show that maximum conversions efficiency is 78.5%.   **(08 Marks)**

b. For a class B amplifier using a supply of V_{CC} = 30V and driving a load of 16Ω, determine the maximum input power, output power, and transistor dissipation.   **(08 Marks)**

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