CBCS SCHEME

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

15EC32

Third Semester B.E. Degree Examination, Feb./Mar. 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. Derive an expression for input impedance, output impedance, voltage gain of a fixed biased common emitter amplifier using r_e model. **(08 Marks)**

b. For the emitter – follower network Fig.Q1(b) shown below determine r_e, Z_i, Z_0 and A_V.

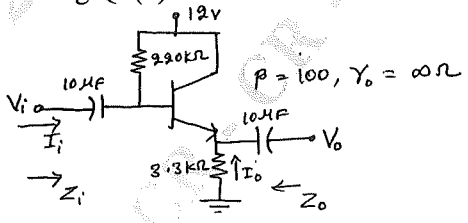

Fig.Q1(b) **(08 Marks)**

OR

2 a. Derive an expression for Z_i, Z_0, A_v and A_i for CE fixed bias configuration using hybrid equivalent model. **(08 Marks)**

b. For the network of Fig.Q2(b) shown below, determine Z_i, Z_0, A_v and A_i.

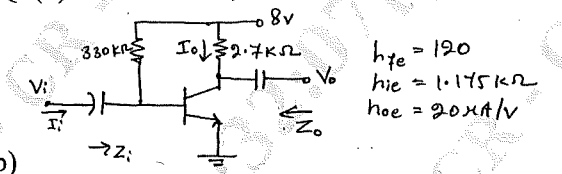

Fig.Q2(b) **(08 Marks)**

Module-2

3 a. Explain the construction and working principle of n-channel JFET and draw the characteristics. **(08 Marks)**

b. Derive an expression for Z_i, Z_0 and A_v of FET self bias configuration with by passed Rs. **(08 Marks)**

OR

4 a. Derive an expression for Z_i, Z_0 and A_v of common gate configuration with and without r_d. **(08 Marks)**

b. Explain construction and working principle of enhancement type MOSFET. **(08 Marks)**

Module-3

5 a. Derive an expression for low frequency response of BJT amplifier due to capacitors C_S and C_C. **(08 Marks)**

b. For the circuit shown below, determine : i) f_{Hi} and f_{H0} ii) f_β and f_T.
given that $r_0 = \infty\Omega$, $C_\pi(C_{be}) = 3PF$, $C_u(C_{bc}) = 4PF$, $C_{ce} = 1PF$, $C_{wi} = 6PF$, $C_{wo} = 8pF$, $A_v = -90$.

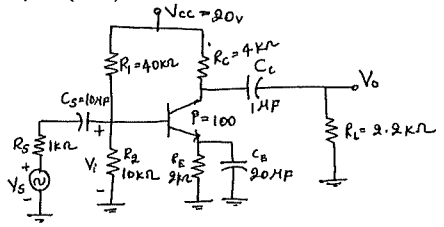

Fig.Q5(b) **(08 Marks)**

OR

6 a. Derive an expression for Miller's input and output capacitance. **(08 Marks)**

b. Determine f_{LG}, f_{LC} and f_{LS} for the Fig.Q6(b) shown below. Using the following parameters. $V_{GS_Q} = -2v$ and $I_{DQ} = 2mA$, $I_{DSS} = 8mA$, $V_P = -4v$, $r_d = \infty\Omega$.

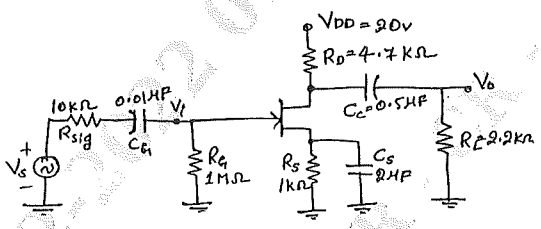

Fig.Q6(b) **(08 Marks)**

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 voltage series feedback connection type. **(08 Marks)**

c. Design the RC elements of a Wien bridge oscillator for operation at $f_0 = 10KHz$. Choose the value of $R = 100K\Omega$. **(04 Marks)**

OR

8 a. Explain the operation of coplitts oscillator using transistor with a neat diagram. **(06 Marks)**

b. Explain the construction and operation of UJT. **(06 Marks)**

c. A crystal oscillator having $L = 0.4H$, $C = 0.05$ PF and $C_m = 1PF$ with $R = 5K\Omega$ find f_s and f_P. **(04 Marks)**

Module-5

9 a. Explain the operation of transformer coupled class – A power amplifier with a neat circuit diagram. Show that maximum efficiency is 50%. **(08 Marks)**

b. Explain the operation of class – B push pull amplifier using complementary – symmetry transistor pair. **(06 Marks)**

c. Calculate the effective resistance seen looking into the primary of a 15 : 1 transformer connected to an 8-Ω load. **(02 Marks)**

OR

10 a. Define voltage regulator. Explain series voltage regulator using transistor. **(06 Marks)**

b. Calculate the harmonic distortion components for an output signal having fundamental amplitude of 2.5v, second harmonic amplitude of 0.25v, third harmonic amplitude of 0.1v and fourth harmonic amplitude of 0.05v. Also calculate the total harmonic distortion. **(04 Marks)**

c. The following distortion readings are available for a power amplifier. $D_2 = 0.1$, $D_3 = 0.02$ and $D_4 = 0.01$, with $I_1 = 4A$ and $R_C = 8\Omega$. Calculate the total harmonic distortion, fundamental power component, and total power. **(06 Marks)**

* * * * *