

## Third Semester B.E. Degree Examination, June/July 2023 Analog Electronic Circuit

Time: 3 hrs.

Max. Marks: 100

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

### Module-1

1.
  - a. Define Q or Operating point (02 Marks)
  - b. What is a clipper circuit? Explain the working of a double ended clipper with a suitable diagram. (08 Marks)
  - c. List various types of clamper circuit. With a neat circuit diagram, explain the working of a negative clamper. (10 Marks)

OR

2.
  - a. Discuss emitter stabilized bias circuit. Also derive expression for  $I_B$ ,  $I_C$ ,  $V_B$  and  $V_C$ . (10 Marks)
  - b. Determine the following for the fixed bias configuration of Fig.2(b). Assume  $\beta=50$ .  
(i)  $I_{BQ}$  and  $I_{CQ}$  (ii)  $V_{CEQ}$  (iii)  $V_B$  and  $V_C$  (iv)  $V_{BC}$

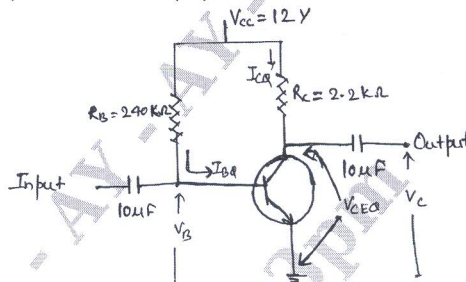


Fig.Q.2(b)

(10 Marks)

### Module-2

3.
  - a. Derive an expression for  $A_v$ ,  $Z_i$  and  $Z_o$  of CE voltage divider bias circuit using hybrid model. (10 Marks)
  - b. For the collector feedback configuration of Fig 3(b), calculate (i)  $r_c$  (ii)  $Z_i$  and  $Z_o$  (iii)  $A_v$  and  $A_f$  Consider  $\beta=200$ ,  $r_o=60K\Omega$ .

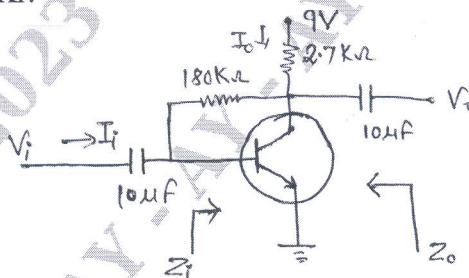


Fig.3(b)

(10 Marks)

OR

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.

- 4 a. For the network of fig 4(a), determine: (i)  $r_e$  (ii)  $Z_i$  (iii)  $Z_o$  ( $r_o = \infty$ ) (iv)  $A_v$  ( $r_o = \infty$ ) (10 Marks)

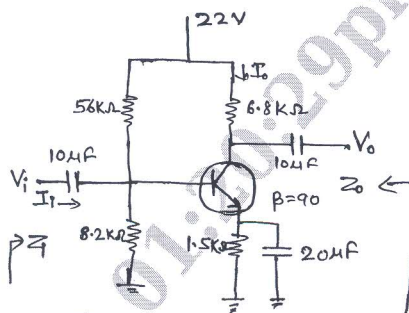


Fig.4(a)

- b. Why hybrid model is called as hybrid? Obtain h – parameters from equivalent circuit of common – emitter configuration. (10 Marks)

### Module-3

- 5 a. Define Multistage Amplifier. Derive voltage gain and current gain of a two stage cascaded amplifier. (10 Marks)  
 b. Derive an expression for  $Z_i$  and  $A_i$  for Darlington Emitter follower circuit. (10 Marks)

OR

- 6 a. Find out input and output impedance of a current series feedback amplifier. (10 Marks)  
 b. Determine the voltage gain, input and output impedance with feedback for voltage series feedback having  $A = -100$ ,  $R_i = 10\text{ k}\Omega$ ,  $R_o = 20\text{ k}\Omega$  for feedback of  
 i)  $\beta = -0.1$  and ii)  $\beta = -0.5$ . (10 Marks)

### Module-4

- 7 a. With a neat circuit diagram, explain the AC Operation of series – fed class – A amplifier. Also derive maximum efficiency of the amplifier. (10 Marks)  
 b. Show that maximum efficiency of Class – B push pull power amplifier is 78.54%. (10 Marks)

OR

- 8 a. Explain the working of R.C phase shift oscillator. If  $R = 1\text{ k}\Omega$ ,  $R_c = 1\text{ k}\Omega$  and  $C = 0.1\mu\text{f}$ , Calculate the frequency of oscillations. (10 Marks)  
 b. Discuss the working of Wein Bridge Oscillator, with a suitable diagram. (10 Marks)

### Module-5

- 9 a. Describe the working and characteristics of M – Channel JFET. (10 Marks)  
 b. For a self – bias circuit,  $V_{DD} = +20$ ,  $R_D = 3.3\text{ k}\Omega$ ,  $R_G = 1\text{ M}\Omega$ ,  $R_S = 1\text{ k}\Omega$ ,  $I_{DSS} = 8\text{ mA}$  and  $V_P = -6\text{ V}$ . Determine i)  $V_{GS}$  ii)  $I_D$  iii)  $V_{DS}$  iv)  $V_S$  v)  $V_G$  vi)  $V_D$ . (10 Marks)

OR

- 10 a. With a neat structure, explain the operation of an n – channel depletion type MOSFET. (10 Marks)  
 b. Compare JFET with MOSFET. Sketch the transfer characteristics for an N – channel depletion type MOSFET with  $I_{DSS} = 10\text{ mA}$  and  $V_P = -4\text{ V}$ . (10 Marks)

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