

# CBCS SCHEME

18EE34

Third Semester B.E. Degree Examination, July/August 2022

## Analog Electronic Circuits

Time: 3 hrs.

Max. Marks: 100

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

### Module-1

- Draw a double ended clipper circuit and explain the working principle with transfer characteristics. (08 Marks)
  - Explain the operation of transistor as a switch with suitable circuit and necessary waveforms. (05 Marks)
  - For the voltage divider bias circuit,  $V_{CC} = 16V$ ,  $V_{BE} = 0.7V$ ,  $\beta = 80$ ,  $R_1 = 62K\Omega$ ,  $R_2 = 9.1K\Omega$ ,  $R_C = 3.9K\Omega$ ,  $R_E = 680\Omega$ . Calculate quiescent base, collector currents and collector to emitter voltage. (07 Marks)

OR

- Derive an expression for  $S_{I_{CO}}$  and  $S_{V_{BE}}$  of emitter bias stabilization circuit. (08 Marks)
  - Draw and explain the working of clamper circuit which clamps negative peak of a single to zero. (06 Marks)
  - For the fixed bias configuration shown in Fig.Q2(c), determine  $I_{BQ}$ ,  $I_{CQ}$ ,  $V_{CEQ}$  and saturation level for the network. Given  $V_{BE} = 0.7V$ ,  $\beta = 50$ . (06 Marks)

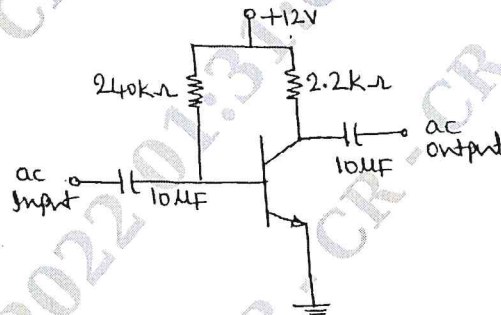


Fig.Q2(c)

### Module-2

- Compare the characteristics of CB, CE and CC configuration of transistor. (04 Marks)
  - Derive an expression for  $Z_i$  and  $Z_o$  for emitter follower configuration using approximate hybrid model. (08 Marks)
  - A CE amplifier uses  $R_L = R_S = 1K\Omega$ . The h-parameters are  $h_{ie} = 1.1K\Omega$ ,  $h_{re} = 2.5 \times 10^{-4}$ ,  $h_{fe} = 50$ ,  $h_{oe} = 25\mu A/v$ . Find voltage gain, current gain, input impedance and output admittance. (08 Marks)

OR

- Starting from the fundamentals, define h-parameters and obtain h-parameter equivalent circuit of common emitter configuration. (08 Marks)
  - State and prove Miller's theorem with its dual. (08 Marks)
  - The h-parameters for the transistor are  $h_{ie} = 1.1K\Omega$ ,  $h_{fe} = 99$ ,  $h_{re} = 2.5 \times 10^{-4}$  and  $h_{oe} = 25\mu A/v$ , find h-parameters for common base configuration. (04 Marks)

**Module-3**

- 5 a. Obtain expression for input impedance, current gain and voltage gain of a Darlington emitter follower circuit with hybrid parameter equivalent circuit. (10 Marks)  
 b. With a simple block diagram, explain the concept of feedback amplifier. (06 Marks)  
 c. The overall gain of a multistage amplifier is 100. When negative feedback is applied the gain reduces to 10. Find the fraction of the output that is feedback to the input. (04 Marks)

**OR**

- 6 a. With the help of circuit diagram discuss the importance of cascade connection of transistors. (06 Marks)  
 b. Mention the advantages of negative feedback amplifier. (04 Marks)  
 c. Using the block diagram approach, derive an expression for  $A_f$  and  $Z_{if}$  for voltage series feedback amplifier. (10 Marks)

**Module-4**

- 7 a. With circuit diagram, explain the operation of Wein bridge oscillator. Also derive its frequency of oscillation. (08 Marks)  
 b. With the help of circuit diagram, explain the working of Hartley oscillator. (06 Marks)  
 c. Calculate the power dissipated in the individual transistor of a class B push-pull power amplifier if  $V_{CC} = 18V$  and  $R_L = 4\Omega$ . (06 Marks)

**OR**

- 8 a. Explain the operation of series fed, directly coupled class A power amplifier. Derive its efficiency in terms of rms values. (10 Marks)  
 b. State the advantage of push pull operation. (04 Marks)  
 c. A crystal has these values  $L = 3H$ ,  $C_s = 0.5pF$ ,  $R = 5K\Omega$  and  $C_m = 10pF$ . Calculate  $f_s$  and  $f_p$  of the crystal. (06 Marks)

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**Module-5**

- 9 a. Explain the construction, operation and characteristics of n-channel JFET. (12 Marks)  
 b. Discuss the differences between FET and BJT. (04 Marks)  
 c. A JFET has  $g_m = 5mV$  at  $V_{GS} = 1V$ . Find  $I_{DSS}$  if pinch-off voltage  $V_p = -2V$ . (04 Marks)

**OR**

- 10 a. With neat sketches, explain the construction operations and characteristics of n-channel depletion type MOSFET. (12 Marks)  
 b. Draw the JFET amplifier using fixed bias configuration. Derive  $Z_i$ ,  $Z_o$  and  $A_v$  using small model. (08 Marks)

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