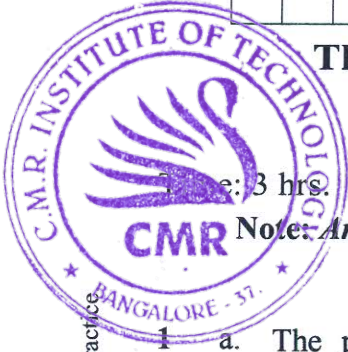


# CBCS SCHEME

USN

|  |  |  |  |  |  |  |  |  |  |
|--|--|--|--|--|--|--|--|--|--|
|  |  |  |  |  |  |  |  |  |  |
|--|--|--|--|--|--|--|--|--|--|

21EE32



## Third Semester B.E. Degree Examination, Jan./Feb. 2023 Analog Electronic Circuits and Op-Amps

Time: 3 hrs.

Max. Marks: 100

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

### Module-1

- 1 a. The parameters of voltage Divider Biasing circuit are as  $V_{CC} = 16V$ ,  $R_1 = 62K\Omega$ ,  $R_2 = 9.1K\Omega$ ,  $R_c = 3.9K\Omega$ ,  $R_E = 680\Omega$ ,  $\beta = 80$  and  $V_{BE} = 0.7V$ . Find the quiescent base current, collector current and  $V_{CE}$ . Also determine the values of collector voltage, Emitter voltage and base voltage with respect to ground. (12 Marks)
- b. Draw and explain the working of clamper circuit which clamps the positive peak of a signal to zero. (08 Marks)

OR

- 2 a. Derive the expression for stability factor for voltage Divider Biasing circuit with respect to  $I_{CO}$  and  $V_{BE}$ . (10 Marks)
- b. Derive an expression for input impedance, output impedance, current gain and voltage gain for Emitter follower configuration. (10 Marks)

### Module-2

- 3 a. Explain the need of cascading Amplifier. Draw and explain the block diagram of three stage cascade amplifier. (08 Marks)
- b. For the voltage series feedback Amplifier, derive an expression for transfer gain, input resistance and output resistance. (12 Marks)

OR

- 4 a. The parameters of Darlington Emitter follower configuration are as  $V_{CC} = 18V$ ,  $R_B = 3.3\mu\Omega$ ,  $R_E = 390\Omega$ ,  $r_i = 5K\Omega$ ,  $\beta_D = 8000$  and  $V_{BE} = 1.6V$ . Calculate Input and output impedances, voltage gain and current gain. Also draw its circuit diagram, Also find  $V_0$  for  $V_i = 120mV$ . (12 Marks)
- b. For the current shunt feedback amplifier, derive an expression for Input resistance and output resistance. (08 Marks)

### Module-3

- 5 a. Explain the operation of class-B pushpull amplifier. Prove that the maximum efficiency of class B configuration is 78.5%. (10 Marks)
- b. With neat circuit diagram, explain working and characteristics of N-channel JFET. (10 Marks)

OR

- 6 a. Explain the operation of Class A transformer coupled power amplifier and prove that the maximum efficiency is 50%. (10 Marks)

- b. With the help of neat diagrams, explain the construction, working and characteristics of N-channel Depletion type MOSFET. (10 Marks)

**Module-4**

- 7 a. Design an active high pass filter to meet the following specification  
 i) Butterworth response  
 ii) Cutoff frequency = 6KHz and use  $C_2 = C_3 = C = 1000\text{PF}$   
 iii) Decay rate in the stop band = 40dB/decade  
 Also draw the designed circuit diagram. (10 Marks)
- b. Draw the practical voltage regulator using LM337 and justify the use of each component. Write three applications of IC LM337. (10 Marks)

**OR**

- 8 a. Design a second order low pass filter for cut-off frequency of 100Hz and draw its circuit diagram. (10 Marks)
- b. What is Instrumentation Amplifier? Find the expression for output of three op-amp instrumentation Amplifier. (10 Marks)

**Module-5**

- 9 a. Design the capacitor coupled zero crossing detector using op-amp 741 having  $I_{B(\text{max})} = 500\text{nA}$  and minimum signal frequency is 500Hz. The supply voltages are  $\pm 12\text{V}$ . Also draw the design circuit. (12 Marks)
- b. Sketch the circuit of triangular/rectangular waveform generator. Draw the output waveforms from the circuit and explain its operation. (08 Marks)

**OR**

- 10 a. Design an inverting Schmitt trigger to have trigger voltages of  $\pm 4\text{V}$ . Use op-amp 741 with supply of  $\pm 15\text{V}$ . Draw the designed circuit. Write three differences between Schmitt trigger and comparator. (12 Marks)
- b. Sketch the circuit of sawtooth wave generator. Draw its waveforms and explain its operation. (08 Marks)

\* \* \* \* \*