CBCS SCHEME

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21EE32

Third Semester B.E. Degree Examination, June/July 2024
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. Draw a double ended clipper circuit and explain the working principle with transfer characteristics. **(10 Marks)**

b. Derive the expression for stability factor for Voltage Divider Biasing circuit, with respect is I_{Ca} and V_{BE} . **(10 Marks)**

OR

2 a. Define Clamper Circuit. Draw and explain the working of Clamper circuit which clamps the positive peak of a signal to zero. **(10 Marks)**

b. The parameters of voltage divider biasing circuit are as V_{CC} = 16V, R_1 = 62 kΩ, R_2 = 9.1 kΩ, R_C = 3.9 kΩ, R_E = 680 Ω, β = 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. **(10 Marks)**

Module-2

3 a. Explain the need of cascading amplifier. Draw and explain the block diagram of 2 stage cascade amplifier. **(10 Marks)**

b. Explain the concept of feedback with suitable block diagram. **(10 Marks)**

OR

4 a. Draw the circuit of a Darlington emitter follower with voltage divider bias. Calculate input impedance voltage gain and output impedance. Take $\beta_1 = \beta_2 = 100$, $R_1 = R_2 = 100K$. R_E = 5 kΩ. Take r_e = 0.1 kΩ. **(10 Marks)**

b. For the current shunt feedback amplifier, derive an expression input resistance and output resistance. **(10 Marks)**

Module-3

5 a. With a neat circuit diagram and waveform, explain the operation of a transforms coupled Class-A power amplifier. Also mention its advantages and disadvantages (Any 3). **(10 Marks)**

b. With the help of neat diagram, explain the construction, working and characteristics of P-channel enhancement type MOSFET. **(10 Marks)**

OR

6 a. Explain the operation of Class-B push pull amplifier. Prove that the maximum efficiency of Class-B configuration is 78.5%. **(10 Marks)**

b. With a neat circuit diagram, explain the working and characteristics of P-channel JFET. **(10 Marks)**

Module-4

7 a. With a neat circuit diagram and frequency response curve, explain the operation of First order lowpass Butterworth filter. Also obtain the expression for gain. **(10 Marks)**

b. With a neat circuit diagram, explain the working of voltage follower regulator using op-Amp. **(10 Marks)**

OR

8 a. What is an Instrumentation Amplifier? Find the expression for output of 3 op-Amp instrumentation amplifier? **(10 Marks)**

b. Design a second order low pass filter for a cut-off frequency of 1 kHz and draw its circuit diagram. Assume C = 1 μF. **(10 Marks)**

Module-5

9 a. Sketch the circuit of triangular/rectangular waveform generator. Draw the output waveforms from the circuit and explain its operation. **(10 Marks)**

b. With a neat circuit diagram, explain the working of voltage to current converter with grounded load. Also derive the expression for the same. **(10 Marks)**

OR

10 a. With a neat circuit diagram and waveform explain (i) Integrator (ii) Differentiator. **(10 Marks)**

b. With a help of neat circuit diagram and waveform explain the working of Inverting Schmitt trigger. Also draw its Transfer characteristics. **(10 Marks)**

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