PVP 20

Code: 20EC3401

II B.Tech - II Semester – Regular Examinations – JULY 2022

ANALOG CIRCUITS
(ELECTRONICS & COMMUNICATION ENGINEERING)

Duration: 3 hours Max. Marks: 70

Note: 1. This paper contains questions from 5 units of Syllabus. Each unit carries 14 marks and have an internal choice of Questions.
2. All parts of Question must be answered in one place.

UNIT – I

1. a) Draw a feedback amplifier in block-diagram form. Identify each block, and state its function. 6 M

   b) What are the four possible topologies of a feedback amplifier? Identify the output signal X_o and the feedback signal X_f for each topology. 8 M

OR

2. a) With a neat block diagram explain the working of voltage series feedback amplifier. How are the overall gain, input and output impedances affected in these amplifiers? 8 M

   b) Determine the voltage gain, input and output impedances with feedback for a voltage series feedback amplifier having A=100, R_i=10kΩ, R_o=20kΩ for a feedback factor of i) β=1 and ii) β= 0.5 6 M

UNIT – II

3. a) Explain with a neat diagram and relevant expressions an op-amp non inverting amplifier. 8 M

b) The op-amp 741 is connected as an inverting amplifier with R_1=1kΩ and R_f =4.71kΩ. Compute the closed loop parameters: A_f, R_{if} and R_{of}. Given A=400000, R_i=33MΩ and R_o=60Ω; supply voltages are ±13V; Max output voltage swing=±13V, Unity gain bandwidth = 0.6MHz 6 M

OR

4. a) What is an instrumentation amplifier? With a neat circuit diagram explain an instrumentation amplifier using a transducer bridge. 8 M

b) With a neat circuit diagram explain the op-amp based inverting scaling amplifier and averaging circuit with relevant expressions for the output. 6 M

UNIT-III

5. a) What is an Oscillator? Explain the basic principles of Oscillators. 6 M

b) With a neat circuit diagram and relevant expressions explain the op-amp based RC phase shift Oscillator. 8 M

OR

6. a) Define power amplifiers and list the types of power amplifiers based on the location of Q point, conduction angle and efficiency. 6 M

b) Explain the Class B output stage. Prove that the maximum conversion efficiency of a class B transformer-coupled amplifier is 78.5%. 8 M

UNIT – IV

7. a) Explain the operation of 555 timer as a Monostable multivibrator with relevant expressions. 8 M

   b) In the astable multivibrator R_A=2.2kΩ, R_B=3.9kΩ and C=0.1μF. Determine the positive pulse width t_c, negative pulse width t_d and free-running frequency. 6 M

OR

8. a) Draw and Explain the circuit and frequency response of a wide band-pass filter. 6 M

   b) Explain the working of a first-order high pass Butterworth filter with a neat circuit diagram and frequency response. Write the relevant design equations. 8 M

UNIT – V

9. a) Explain the operation of Weighted Resistor DAC. 6 M

   b) Explain the operation of 4-bit R-2R DAC with neat circuit. For the R-2R DAC, with R=10kΩ and R_F=20kΩ and V_{REF}=5V, determine the output voltage when the inputs are b_0=b_1=5V and b_2=b_3=0V 8 M

OR

10. a) Explain the working of a successive approximation type ADC. 7 M

    b) Explain the operation of Dual-slope ADC. 7 M