Question Paper Code : 90185

Time : Three Hours   Maximum : 100 Marks

Answer ALL questions

PART – A   (10×2=20 Marks)

1. What are the characteristics of an ideal operational amplifier ?

2. Why is collector resistance replaced by a constant current source in differential amplifier ?

3. What are the disadvantages of basic operational amplifier differentiator ?

4. Audio filters are usually Butterworth filter. Justify.

5. List the applications of Multiplier ICs.

6. Differentiate Lock-in-Range and Capture Range of PLL.

7. What are the demerits of weighted resistor Digital to Analog Converter ?

8. Estimate the conversion time of a 10 bit successive approximation Analog to Digital Converter, if the input clock is 5 MHz.

9. List the limitations of three terminal IC voltage regulator.

10. Compute the pulse width of a monostable multivibrator using OP-AMP, if $R_1 = R_2$, $R = 10$ K ohms and $C = 0.1$ microfarad.

PART – B   (5×13=65 Marks)

11. a) Analyze the operation of basic BJT current mirror and thus explain its volt-ampere characteristics.

(OR)

   b) Analyze the small signal model of BJT differential amplifier using h parameter and deduce the expression for differential and common mode gains for differential output.

12. a) i) Explain the function of Instrumentation amplifier and derive the expression for gain.   (7)

      ii) Explain the function of full wave rectifier using OP-AMP and diodes.   (6)

(OR)

   b) i) Draw the circuit of temperature independent logarithmic amplifier and explain its operation. Also deduce the expression for output voltage.   (8)

      ii) Explain the function of positive clipper circuit with its input and output waveforms.   (5)

13. a) i) Draw and explain the block diagram of Voltage controlled oscillator and show that the output frequency is directly proportional to the applied control voltage.   (8)

      ii) Show that the lock-in range of PLL is directly proportional to the free running frequency of voltage controlled oscillator.   (5)

(OR)

   b) i) Explain the function of Gilbert Multiplier cell and obtain the output differential current in terms of hyperbolic function.   (7)

      ii) Show that PLL IC can be used as AM demodulator.   (6)

14. a) i) Describe the function of R-2R Ladder Digital to Analog Converter with suitable diagrams.   (8)

      ii) Estimate the value of LSB, MSB and full scale output for an 8-bit DAC for the 0 to 10V range.   (5)

(OR)

   b) i) Draw the basic circuit of Flash type A/D converter and elucidate its function with the help of truth table.   (7)

      ii) Sketch the functional block diagram of successive approximation A/D converter and describe its function for a typical analog input.   (6)

15. a) i) Draw the circuit of Wien bridge oscillator and explain its function. Derive the expression for frequency of oscillation.   (8)

      ii) Design a phase shift oscillator using operational amplifier to oscillate at 1000 Hz with C = 0.1 µf.   (5)

(OR)

   b) With suitable functional block diagram, explain the function of low voltage regulator using 723 IC. Discuss the current foldback technique in 723 voltage regulator.

PART – C   (1×15=15 Marks)

16. a) Show that the ON and OFF time of astable multi-vibrator using 555 timer IC is $T_{HIGH} = 0.69 (R_A + R_B) C$, $T_{LOW} = 0.69 R_B C$. Also evaluate the free running frequency and duty cycle, if $R_A = 6.8$ KΩ, $R_B = 3.3$ KΩ and C = 0.1 µf.

(OR)

   b) Analyze second order narrow band pass active filter circuit and obtain the expressions for transfer function, quality factor, bandwidth and centre frequency.