CBCS SCHEME

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15EC46

Fourth Semester B.E. Degree Examination, July/August 2021
Linear Integrated Circuits

Time: 3 hrs. Max. Marks: 80

Note: Answer any FIVE full questions.

1 a. Explain the basic operational amplifier circuit with necessary diagram and expression. **(08 Marks)**

b. Derive the output voltage equation of 3 input inverting summing circuit and show how it can be converted into averaging circuit. **(08 Marks)**

2 a. Sketch the circuit of difference amplifier. Derive the equation for the output voltage and explain its operation. **(08 Marks)**

b. Explain direct coupled voltage follower with necessary diagram. Also compare voltage follower with emitter follower. **(08 Marks)**

3 a. Design a high Z_{in} capacitor coupled non inverting amplifier to have a low cut off frequency of 200 Hz. The input and output voltages are to be 15 mV and 3V respectively and minimum load resistance is 12 KΩ. Use LF353 BIFET op-amp. Assume R_2 = 1 MΩ (feedback resistor) **(08 Marks)**

b. Draw the circuit of an instrumentation amplifier and explain. Also show the method of nulling common mode output and how dc output nulling can be level shifted. **(08 Marks)**

4 a. Explain precision voltage source using op-amp and Zener diode. Also find the relationship between V_0 and V_2 for the same circuit. **(08 Marks)**

b. Discuss the operation of high input impedance full wave precision rectifier with necessary waveforms. **(08 Marks)**

5 a. Explain the working of RC phase shift oscillator with necessary expression and waveform. **(08 Marks)**

b. Design a differentiating circuit to give an output of 5V when the input changes by 1V in a time of 100 μs. Use an op-amp with a bipolar input stage. **(08 Marks)**

6 a. Explain the operation of fundamental log amplifier. Also derive its output voltage. **(08 Marks)**

b. Explain the operation of inverting Schmitt trigger using 741 op-amp, design a circuit for inverting Schmitt trigger to have trigger point of UTP = 0V and LTP = −1V with supply of ±12V. **(08 Marks)**

7 a. Design a second order low pass filter to have a cut off frequency of 1 kHz. **(08 Marks)**

b. Explain the functional diagram of 723 general purpose regulator. **(08 Marks)**

8 a. Explain single stage band pass filter with necessary design equation. **(08 Marks)**

b. Explain how fixed regulator used as adjustable regulator and also design on adjustable regulator using 7805 such that V_0 = 7.5 V, I_Q = 4.2 mA and I_{R_1} = 25 mA. **(08 Marks)**

9 a. Explain with internal diagram the operation of monostable multivibrator using 555 timer with necessary waveforms and equation. **(08 Marks)**

b. With necessary diagram, explain R-2R DAC. What output voltage would be produced by a DAC whose output range is 0 to 5V and whose input binary number is

(i) 1011 (for 4 bit DAC)

(ii) 11001011 (for 8 bit DAC) **(08 Marks)**

10 a. With a neat block diagram, explain the operation PLL related to

(i) Lock in range

(ii) Capture range

(iii) Pull-in time **(08 Marks)**

b. A 555 Astable multivibrator has $R_A = 2.2\ K\Omega$ and $R_B = 6.8\ K\Omega$ and $C = 0.01\ \mu F$. Calculate :

(i) t_{HIGH}

(ii) t_{LOW}

(iii) Free running frequency

(iv) Duty cycle D

Draw the connection diagram. **(08 Marks)**

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