CBCS SCHEME

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15EC46

Fourth Semester B.E. Degree Examination, Aug./Sept. 2020
Linear Integrated Circuits

Time: 3 hrs. Max. Marks: 80

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

Module-1

1 a. Explain the working of a basic operational amplifier, circuit with $R_C = 6.8k\Omega$, $R_E = 4.7k\Omega$ and powered by ± 10V supply. **(08 Marks)**

b. Solve direct coupled inverting amplifier to amplifier a DC input of 150mV by a factor of 40 use a Bi-polar op-amp with $I_{B(max)} = 500nA$. **(04 Marks)**

c. Define CMRR of an op-amp. If an non-inverting amplifier is having a gain of 100 with 95dB CMRR, calculate the common mode output ($V_{0(cm)}$) for a common mode input ($V_{i(cm)}$) of 2V. **(04 Marks)**

OR

2 a. Define the following op-amp parameters and mention their typical values for 1C741 :
i) Input voltage range
ii) PSRR
iii) Input offset voltage
iv) Slew rate. **(08 Marks)**

b. With a neat circuit diagram, explain direct coupled non-inverting amplifier. **(04 Marks)**

c. Two signals each ranging from 0.1V to1V are to be summed using 741 op-amp. Design suitable inverting summing circuit. **(04 Marks)**

Module-2

3 a. Explain the realization of a high Z_{in} capacitor coupled voltage follower for AC amplifier obtain the expression for Z_{in} of the circuit. **(08 Marks)**

b. Solve precision voltage source to provide an output of 9V. The available supply is ±12V. Allow for approximately ± 10% tolerance on the zener diode voltage. Use 741 op-amp and $I_{B(max)} = 500nA$, $I_Z = 20mA$. **(08 Marks)**

OR

4 a. Derive an expression for the differential gain of an instrumentation amplifier. **(08 Marks)**

b. Design a capacitor coupled inverting amplifier for a gain of 50 and output voltage 2.5V, $f_1 = 10Hz$, $f_2 = 1KHz$, $R_L = 250\Omega$, use bipolar op-amp. **(08 Marks)**

Module-3

5 a. Explain the working of a sample and hold circuit with signal control and output waveform. **(06 Marks)**

b. Using a 741 op-amp with a supply of ±12V design an inverting Schmitt trigger circuit to have trigger points of ±2V. **(04 Marks)**

c. With a neat sketch, explain the working Wein bridge oscillator circuit. **(06 Marks)**

OR

6 a. With a suitable derivation, explain logarithmic amplifier. **(06 Marks)**

b. Design RC phase shift oscillator for a output frequency of 5KHz use μA741 op-amp with ±15V supply and $I_{B(max)}$ = 500nA. **(05 Marks)**

c. With a neat circuit diagram, explain op-amp integrating circuit. **(05 Marks)**

Module-4

7 a. Sketch the circuit of a second order active high pass filter. Explain its working. **(06 Marks)**

b. Mention the advantages of IC voltage regulators. Draw the functional diagram for IC723 regulator. Briefly explain the working. **(10 Marks)**

OR

8 a. What are the advantages of active filters over passive filters? **(04 Marks)**

b. Explain the working of series voltage regulator with current limiting protection. **(06 Marks)**

c. Design 2nd order low pass filter to have cutoff frequency of 1KHz. **(06 Marks)**

Module-5

9 Explain the following with neat circuit diagrams and waveforms.

a. PLL **(08 Marks)**

b. 555 timer as Astable Multivirator. **(08 Marks)**

OR

10 Explain the following with neat circuit diagrams and wave forms.

a. 566 voltage controlled oscillator **(08 Marks)**

b. Successive approximation ADC. **(08 Marks)**

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