CBCS SCHEME

15EC46

Fourth Semester B.E. Degree Examination, June/July 2018
Linear Integrated Circuits

Time: 3 hrs.   Max. Marks: 80

Note:1. *Answer FIVE full questions, choosing one full question from each module.*
2. *Use of standard resistor value and standard capacitor value table is allowed.*

Module-1

1   a.   With neat circuit diagram, explain basic op-amp circuit.   **(06 Marks)**
    b.   Sketch an op-amp difference amplifier circuit. Derive an equation for output voltage and explain the operation.   **(05 Marks)**
    c.   A non inverting amplifier is to amplify a 100 mV signal to a level of 3 V. Using 741 op-amp design a suitable circuit.   **(05 Marks)**

OR

2   a.   Define following terms with respect to op-amp and mention their typical values:
         (i) PSRR   (ii) CMRR   (iii) Slew rate.   **(06 Marks)**
    b.   With neat circuit diagram, explain the operation of a direct coupled inverting amplifier with necessary design steps.   **(04 Marks)**
    c.   Obtain the expression for the three input inverting summing amplifier circuit and show how it can be converted into averaging circuit.   **(06 Marks)**

Module-2

3   a.   Sketch and explain high zin capacitor coupled voltage follower with necessary design steps and show that the input impedance is very high as compared to capacitor coupled voltage follower.   **(08 Marks)**
    b.   What are the advantages of precision rectifier over ordinary rectifier? Discuss the operation of precision full wave rectifier circuit using bipolar op-amp.   **(08 Marks)**

OR

4   a.   Draw the circuit diagram of instrumentation amplifier and explain its operation. Also show how voltage gain can be varied.   **(08 Marks)**
    b.   A capacitor coupled non-inverting amplifier is to have $A_V = 100$ and $V_0 = 5$ V with $R_L = 10$ KΩ and $f_1 = 100$ Hz. Design a suitable circuit using 741 op-amp.   **(08 Marks)**

Module-3

5   a.   Draw and explain the operation of sample and hold circuit with signal, control and output waveforms.   **(08 Marks)**
    b.   Using 741 op-amp with a supply of ± 12V, design a phase shift oscillator to have an output frequency of 3.5 kHz and voltage gain of 29. ($A_V = 29$)   **(08 Marks)**

OR

6   a.   With neat circuit diagram explain the working of precision clipping circuit, with necessary waveforms.   **(08 Marks)**
    b.   With neat circuit diagram, explain the operation of inverting Schmitt trigger circuit. Draw the output waveforms and discuss the design procedure.   **(08 Marks)**

Module-4

7 a. Draw the internal schematic for 723 IC low voltage regulator and explain its working an also mention the advantages of IC voltage regulators. **(08 Mark:**

b. Design and explain the operation of second order active low pass filter. Using 741 op-amp have a cut-off frequency of 2 kHz. **(08 Mark:**

OR

8 a. Show how a band pass filter can be constructed by the use of a low pass filter and a hig pass filter. Sketch the expected frequency response and explain the operation of a singl stage Band Pass Filter. **(08 Mark:**

b. Discuss the important characteristics of a three terminal IC regulator and design a 7805 I regulator to get the output voltage of 7.5 V (Choose $I_Q = 4.2$ mA, $I_{R_1} = 25$ mA) **(08 Mark:**

Module-5

9 a. With the help of neat block diagram, explain the operation of Phase – Locked Loop (PLl and define
(i) Lock-in range (ii) Capture range (iii) Pull-in time **(08 Mark:**

b. Explain the working of successive approximation Analog-to Digital Converter (ADC). **(08 Mark:**

OR

10 a. Draw the internal schematic of 555 timer IC and configure it for monostable operation an explain its working with necessary equations. **(08 Mark:**

b. Explain the working of R-2R network D-A converter and derive expression for outpi voltage. **(08 Mark:**

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