CBCS SCHEME

USN | | | | | | | | | | |

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 $R_L = 10\ K\Omega$ and $f_l = 100$ 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 and also mention the advantages of IC voltage regulators. **(08 Marks)**

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

OR

8 a. Show how a band pass filter can be constructed by the use of a low pass filter and a high pass filter. Sketch the expected frequency response and explain the operation of a single stage Band Pass Filter. **(08 Marks)**

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

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 Marks)**

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

OR

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

b. Explain the working of R-2R network D-A converter and derive expression for output voltage. **(08 Marks)**

* * * * *