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

10EC46

Fourth Semester B.E. Degree Examination, Jan./Feb. 2021
Linear IC's and Applications

Time: 3 hrs. Max. Marks:100

Note: ***Answer any FIVE full questions, selecting at least TWO full questions from each part.***

PART – A

1 a. Explain common mode input, common mode voltage gain and common mode rejection ratio for operational amplifier. **(06 Marks)**

b. Sketch an Op-Amp difference amplifier circuit. Explain the operation of the circuit and derive an equation for the output voltage. **(07 Marks)**

c. Design a non-inverting amplifier using 741IC to have a voltage gain of 66, the signal amplitude is to be 15mV. Take $I_{B(max)}$ = 500nA. **(07 Marks)**

2 a. Sketch the circuit of a capacitor-coupled voltage follower and explain its operation. **(08 Marks)**

b. Sketch the circuit of a capacitor coupled voltage follower using a single polarity supply and explain its operation. **(05 Marks)**

c. Using LF353BIFET Op-Amp design a high Z_{in} capacitor coupled non-inverting amplifier to have a lower cut off frequency of 200Hz. The input and output voltages are to be 15mV and 3V respectively, and minimum load resistance is 12KΩ. **(07 Marks)**

3 a. Explain phase lag and phase lead compensation. **(08 Marks)**

b. List the precautions that should be observed for Op-Amp circuit. **(08 Marks)**

c. Calculate the slew rate limited cutoff frequency for a voltage follower circuit using 741 Op-Amp. If the peak of sine wave output is to be 5V. Also determine the maximum peak value of the sinusoidal output voltage that will allow the circuit to operate at the 800kHz unity gain cut off frequency. Given typical slew rate for the 741 Op-Amp is 0.5V/micro sec. **(04 Marks)**

4 a. Draw the circuit of a precision voltage source using an Op-Amp and a zener diode. Explain the circuit operation. **(06 Marks)**

b. A voltage source is to be designed to provide constant output voltage of approximately 6V, the load resistance has a minimum value of 150Ω and the available supply voltage is ±12V. Design a suitable circuit using IC741 and a zener diode with a V_z of 6.3V. Sketch the circuit with designed components [consider I_z = 20mA]. **(06 Marks)**

c. Draw the circuit of a simple current to voltage converter. Then show how it should be modified to function as a current amplifier/attenuator with a grounded load. **(08 Marks)**

PART – B

5 a. Draw the circuit of an Op-Amp precision clamping circuit and explain its operation. **(08 Marks)**

b. Draw the circuit of an precision peak-detector and explain its operation. **(06 Marks)**

c. Draw the Op-Amp sample and hold circuit and explain its operation. **(06 Marks)**

6 a. Draw the circuit of a capacitor coupled crossing detector and explain its operation. **(06 Marks)**
b. With neat circuit diagram, explain the operation of inverting Schmitt trigger circuit. **(06 Marks)**
c. Draw the circuit of an Op-Amp monostable multivibrator, show the voltage waveforms and explain its operation. **(08 Marks)**

7 a. What is an voltage regulator? With neat figure, explain the working of series Op-Amp regulator. **(07 Marks)**
b. Explain the current limiting features of 723 regulator. **(07 Marks)**
c. Define the following performance parameters of a voltage regulators:
i) Line Regulation
ii) Load Regulation
iii) Ripple rejection **(06 Marks)**

8 a. Draw the block schematic of the PLL and explain its operation. **(06 Marks)**
b. With a neat block diagram, explain the operation of a astable multivibrator using 555 timer. **(08 Marks)**
c. With a neat figure explain the working of a R-2R ladder DAC. **(06 Marks)**

* * * * *