U.S.N | | | | | | | | | | |

P.E.S. College of Engineering, Mandya - 571 401

(An Autonomous Institution affiliated to VTU, Belgaum)

Fifth Semester, B.E. - Electrical and Electronics Engineering

Semester End Examination; Dec. - 2015

Operational Amplifier and Linear Linear Integrated Circuits

Time: 3 hrs *Max. Marks: 100*

***Note**: i) Answer **FIVE** full questions, selecting **ONE** full question from each **unit**.*
ii) Assume missing data suitably if any.
iii) Use of resistor and capacitor standard values list and op-amp data sheets are permitted.

UNIT - I

1 a. Sketch and design a capacitor coupled voltage follower and briefly explain the operation of the name. 6

b. Design a high input impedance capacitor coupled voltage follower with a cut off frequency of 50 Hz and load resistance of 3.9 kΩ. Also determine the minimum theoretical input impedance of the circuit. 8

c. Sketch the circuit of an inverting amplifier and show how the upper cut off frequency can be set for the same. 6

2 a. Sketch and design a high Z_{in} capacitor coupled non investing amplifier and briefly explain the operation of the same. 6

b. Using a 741 op-amp, design a capacitor coupled non investing amplifier to have a voltage gain of 66 with load resistor of 2.2 kΩ and LCF of 120 Hz. Assume V_i = 15 mV. 8

c. Sketch and design a capacitor coupled inverting amplifier using single polarity supply. 6

UNIT - II

3 a. Sketch typical gain / frequency and phase / frequency response, and discuss the stability of high gain and low gain amplifiers. 8

b. Sketch the circuit for phase lag and phase lead compensation and briefly explain the circuit operation. 6

c. Using a 709 op-amp, design an inverting amplifier to have A_u = 100 and V_s = 50 mV. Select suitable compensating components. 6

4 a. Discuss the effect of stray capacitance on op–amp circuit stability. Write the equations to determine the value of input stray capacitance that might produce instability. 8

b. Explain miller effect. Derive an equation relating the input capacitance of an inverting amplifier to the capacitance connected between input and output terminals. 6

c. Using LM 108 op-amp, design an inverting amplifier to amplify a 100 mV signal by a factor 3. Select suitable frequency compensation. 6

Contd…2

UNIT - III

5	a.	With neat circuit diagram and relevant waveforms, explain precision full wave rectifier.	8
	b.	Design an adjustable peak clipping circuit to clip at approximately ± (3 V to 5 V). The circuit is to have unity voltage gain before clipping.	6
	c.	With neat circuit diagram and relevant waveforms explain plan shift oscillator.	6
6	a.	Draw the circuit of a triangular / rectangular waveform generator which has frequency and duty cycle controls. Show all waveforms and explain the circuit operation.	8
	b.	Using a BIFET op-amp with a supply of ± 12 V, design a Wein bridge oscillator to have an output frequency of 15 kHz.	6
	c.	With a neat circuit diagram and relevant waveforms, explain sample - and - hold circuit.	6

UNIT - IV

7	a.	Draw an op-amp Non – Inverting Schmitt trigger circuit and explain its operation.	6
	b.	Using 741 op-amp with a supply of ± 12 V, design an Inverting Schmitt trigger circuit to have trigger points of ± 2 V.	8
	c.	Sketch the circuit of second order active high pass filter. Briefly explain its operation.	6
8	a.	Draw an Astable multivibrator. Explain the circuit operation with relevant waveforms.	8
	b.	Discuss the differences between wide band and narrow band pass filters. Sketch typical frequency responses and write the related equation.	6
	c.	Using 741 op-amp, design a first order active low pass filter to have cut off frequency of 1 kHz.	6

UNIT - V

9	a.	Briefly explain the action of a dc voltage regulator. Write the equations for line regulation, load regulation and ripple rejection.	8
	b.	Briefly explain the circuit operation of adjustable output regulator.	6
	c.	Draw the relevant sketch and explain the operation of a universal Active filter.	6
10	a.	What is PLL? Mention its application and explain its principle of operation using relevant diagrams.	8
	b.	Explain the basic circuits 723 Integrated circuit voltage regulation.	6
	c.	What is a power booster? With example explain the need of it.	6

* * * *