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

(An Autonomous Institution affiliated to VTU, Belagavi)

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

Semester End Examination; Dec - 2017/Jan - 2018

Operational Amplifiers and Linear Integrated Circuits

Time: 3 hrs *Max. Marks: 100*

***Note**: i) Answer **FIVE** full questions, selecting **ONE** full question from each unit*
ii) Use of standard registers, capacitors and data sheets of Op-Amps are allowed.

UNIT - I

1 a. Sketch the circuit for capacitor coupled voltage follower. Design and explain its operation. 10

b. A capacitor coupled non-inverting amplifier using 741 Op-Amp is to have A_v = 100 and V_s = 5 V. The load resistance is 10 kΩ and lower cut-off frequency is to be 100 Hz. Design a suitable circuit. 10

2 a. Sketch the circuit of high input impedance capacitor coupled non-inverting amplifier. Briefly explain the circuit diagram. 10

b. Draw a sketch to show how a capacitor coupled voltage follower should be with a single polarity supply. Briefly explain. 10

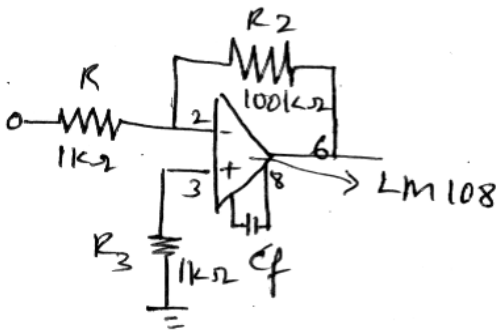
UNIT - II

3 a. Show how feedback on an Op-Amp inverting amplifier can produce instability. State the Bark Hausen criteria and explain condition for oscillations. 10

b. Explain Miller effect, and show how it can be used to stabilize an Op-Amp circuit. 10

4 a. Define bandwidth, gain bandwidth product and unity gain frequency for an Op-Amp. Briefly explain. 8

b. Determine the typical upper cutoff frequency for the inverting amplifier in Fig. 1.



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When the comnpensating capacitor (c_f) value is, i) 30 pF ii) 3 pF.

c. Explain how load capacitance can cause instability? 4

UNIT - III

5 a. Sketch the circuit of a saturating type half-wave precision rectifier. Explain with neat waveforms. 10

Contd…2

	b.	Design a precision full wave rectifier to produce a 2 V peak output from a sine wave input with a 0.5 peak value and 1 MHz frequency use bi-polar Op-Amps with a supply voltage of ±15 V.	10
6	a.	Design a triangular waveform generator to produce a ±2 V, 1 kHz output. Use ±15 V supply and specify the minimum Op-Amp SR (Slew Rate).	10
	b.	Explain the operation of Wein-bridge oscillator with neat diagram.	10

UNIT - IV

7	a.	Sketch the circuit of an Op-Amp employed as a non-inverting zero-crossing detector. Explain with neat waveforms.	10
	b.	Sketch and explain a typical input /output characteristics for an inverting Schmitt trigger circuit.	10
8	a.	Sketch the circuit of a second order low pass active filter and explain its operation.	10
	b.	Define cutoff frequency, bandwidth, pass band, stop band and insertion loss.	10

UNIT - V

9	a.	Draw the circuit of a state-variable filter. Briefly explain the circuit operation and write equations for Q and f_0.	10
	b.	Draw the basic block diagram and waveforms for a PLL system. Explain briefly.	10
10	a.	With reference to voltage regulator, define source effect, load effect, line regulation and load regulation with equations.	10
	b.	Design the voltage regulator circuit to produce a 12 V output with a 50 mA maximum load current.	10

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