



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

(An Autonomous Institution affiliated to VTU, Belagavi)

**Fourth Semester, B.E. - Electrical and Electronic Engineering**

**Semester End Examination; July / August - 2022**

**Op-amp and Linear ICs**

Time: 3 hrs

Max. Marks: 100

### Course Outcomes

The Students will be able to:

CO1: Apply the knowledge of AC amplifier to describe the characteristics and operation of op-amps has AC amplifier.

CO2: Analyze the frequency response and stability of op-amps.

CO3: Design the op-amp has signal processing & waveform generator circuits for a given specifications.

CO4: Design the op-amp has nonlinear circuits & filters for a given specifications.

CO5: Analyze the operation of specialized IC's and different types voltage regulators.

**Note: I) PART - A is compulsory. Two marks for each question.**

**II) PART - B: Answer any Two sub questions (from a, b, c) for a Maximum of 18 marks from each unit.**

Q. No.	Questions	Marks	BLs	COs
<b>I : PART - A</b>		<b>10</b>		
I a.	Sketch the circuit systems for an Op-amp and identify all terminals.	2	L3	CO1
b.	Define Slew Rate.	2	L1	CO2
c.	Discuss amplitude stabilization.	2	L2	CO3
d.	Mention the classification of filter.	2	L1	CO4
e.	Define Load Regulation.	2	L2	CO5
<b>II : PART - B</b>		<b>90</b>		
<b>UNIT - I</b>		<b>18</b>		
1 a.	Sketch and explain the operation of high $Z_{in}$ capacitor coupled Non-inverting amplifier, with necessary equation.	9	L2	CO1
b.	Design a capacitor- coupled voltage follower using 741 op-amps. The lower cutoff frequency for the circuit is to be 50Hz and the load resistance is $R_L = 5.5k\Omega$	9	L5	CO3
c.	Briefly discuss upper frequency of an op-amp circuit and show how the cutoff frequency can be set for non-inverting amplifier.	9	L2	CO1
<b>UNIT - II</b>		<b>18</b>		
2 a.	Sketch a lag lead compensation circuit. Explain its operation and show how it affects the frequency and phase response graphs of an op-amp?	9	L2	CO2
b.	With a neat circuit diagram, analyze the concept of $Z_{in}$ mod compensation.	9	L4	CO2
c.	Discuss op-amp circuit stability and show how Feedback in an inverting amplifier can produce instability and explain the conditions need to be satisfied for the same.	9	L2	CO2

**UNIT - III****18**

- 3 a. Sketch op-amp precision rectifier peak detector circuits draw the input and output waveform, and explain the circuit operation. 9 L2 CO2
- b. Explain what a dead zone circuit does. Sketch an op-amp dead zone circuit. Show the waveform throughout and explain its operation. 9 L5 CO2
- c. With relevant circuit diagram and waveform. Explain the operation of precision full wave rectifier circuit. 9 L2 CO3

**UNIT - IV****18**

- 4 a. Sketch the circuit diagram of an op-amp Astable multivibrator. Draw the circuit waveform and explain the operation. 9 L5 CO3
- b. Design a triangular waveform generator to produce a  $\pm 2$  V, 1 kHz output. Use a  $\pm 15$  V supply and specify the minimum op-amp SR(slew note). 9 L6 CO4
- c. Sketch the circuit of a first order active high pass filter and explain how the circuit operates? 9 L5 CO4

**UNIT - V****18**

- 5 a. Draw the basic block diagram and waveform for a PLL system. Identify each component part and explain the function. 9 L3 CO4
- b. i) With a neat diagram, explain the operation of an adjustable output Regulator. 9 L5 CO5
- ii) With a neat diagram, explain the operation of precision voltage Regulator.
- c. Explain the theory of operation of the universal active filter. 9 L5 CO5

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