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

(An Autonomous Institution affiliated to VTU, Belgaum)

Sixth Semester, B.E. - Electronics and Communication Engineering

Semester End Examination; June/July - 2015

Operational Amplifier and Application

Time: 3 hrs *Max. Marks: 100*

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

UNIT - I

1. a. Explain the following: i) CMRR ii) input offset voltage (iii) Slew rate — 9

   b. Using a 741 op-amp, design a non inverting amplifier to have a voltage gain of 66. The signal amplitude is 15 mV. — 5

   c. Show that non-inverting amplifier can be employed as a summing circuit. — 6

2 a. Explain difference amplifier. — 7

   b. Design a capacitor-coupled voltage follower using 741 op-amp. The lower cut-off frequency for the circuit is to be 50 Hz and the load resistance is RL = 3.9 kΩ. — 7

   c. Sketch the circuit of a capacitor-coupled non-inverting amplifier. Briefly explain the circuit operation. — 6

UNIT – II

3 a. Explain how the upper cutoff frequency can be set for inverting amplifier. — 7

   b. Describe capacitor- coupled difference amplifier. — 6

   c. Explain capacitor coupled inverting amplifier using a single polarity supply. — 7

4. a. Explain different frequency compensation methods. — 10

   b. Describe the precautions that should be observed for op-amp circuit stability. Draw the necessary diagram. — 10

UNIT - III

5. a. Draw the circuit of a precision voltage source using an op-amp and a Zener diode. Explain the circuit operation and derive the equation relating V_0 and V_2 — 10

   b. Design a precision full-wave rectifier to provide 2 V peak output from a sine-wave input with a peals value of 0.5 V and frequency of 1 MHz. — 10

6. a. Draw an op-amp sample and hold circuit. Sketch the signal, control and output voltage wave forms. Explain the circuit operations — 10

   b. A ± 5 V, 10 kHz square wave from a signal source with a resistance of 100 Ω is to have its positive peak clamped precisely at ground level. Tilt on the output is not to exceed 1% of the peak amplitude of the wave. Design a suitable op-amp circuit. — 10

Contd…2

UNIT - IV

7. a. Sketch the circuit of a triangular /rectangular waveform generator. Draw the output waveform from the circuit showing their phase relationship. Explain the circuit operation. 10

   b. State the Barkhausen Critetria for sine wave oscillator. Explain the operation of op-amp phase shift oscillator. 10

8. a. Using a 741 op-amp with a supply of ± 12 V, design an inverting Schmitt trigger circuit to have trigger points of ± 2 V. 10

   b. Sketch the circuit of a second-order low-pass active filter. Explain its operation. 10

UNIT - V

9. a. Write a circuit diagram of a op-amp series voltage regulator. Explain its operation. 10

   b. Sketch the basic circuit of a 723 IC Voltage regulator. Explain. 10

10 a. What is a PLL? Explain its operating principles. 10

   b. Describe the working of digital of analog converter. 10

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