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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. - 2014
Operational Amplifiers and Linear Integrated Circuits

Time: 3 hrs   *Max. Marks: 100*

Note: *i) Answer any **FIVE** full questions, selecting at least **TWO** full questions from each part*
       ii) Op-amp data sheet and resistor, capacitor standard value list are permitted.

PART - A

1. a. Sketch the circuit of a high Z_{in} capacitor-coupled voltage follower. Briefly explain the design operation.   8

   b. A capacitor coupled non-inverting amplifier is to be designed to have $A_v = 90$ and $V_o = 3$ V. The load resistance is 10 kΩ and the lower cut off frequency is to be 70 Hz. Design the circuit using a 741 Op-amp. Assume; $R_2 = 56$ kΩ 8

   c. Sketch the circuits for:

   i) Capacitor coupled voltage follower using a single polarity supply.   4

   ii) Capacitor coupled non inverting amplifier using a single polarity supply.

2. a. What is Barkhausen Criteria? Explain phase margin and also sketch typical gain/frequency response, and phase/frequency response graphs.   8

   b. With a neat circuit show that compensating for stray capacitance can be achieved by making time constant $C_2R_2 = C_5R_1$ 6

   c. List out any six precautions that should be met for OP-amp circuit stability.   6

3. a. With a neat circuit diagram, explain precision full-wave rectifier with a combination of Half wave rectifier and summing circuit.   8

   b. With a neat circuit explain symmetrical precision clipper with the necessary waveforms.   10

   c. List the advantages of precision rectifier over an ordinary diode circuit.   2

4. a. Discuss the circuit operation of an inverting op-amp Schmitt trigger circuit with relevant Diagrams.   6

   b. Draw the circuit of an op-amp Monostable multi vibrator. Show the relevant voltage waveforms and explain its operation.   8

   c. A capacitor coupled zero-crossing detector is to handle a 1khz square wave input with a peak-to-peak amplitude of 6 V. Design a suitable circuit using a 741 op-amp with a $\pm$ 12 V supply. Assume $V_{BE} = 0.1$V and $\Delta V = 1$V.   6

PART - B

5 a. Draw the circuit of a RC phase shift oscillator with amplitude stabilization. Discuss the role of adjustable resistor included in such a circuit and explain the design issues concerned.   10

  b. Sketch a Wein Bridge Oscillator and explain circuit operation. Also design Wein Bridge Oscillator using a BIFET op-amp with a supply a $\pm$ 12 V, to have an output frequency of 15 kHz.   10

6 a. Show how a band stop filter can be constructed using a low pass filter and a high –pass filter. Draw the expected frequency response and explain the band-stop filter operation.   10

  b. Design:

    i) First-order active low-pass filter circuit with a cut-off frequency of 1 kHz

    ii) Second order active low-pass filter circuit with a cut off frequency of 1 kHz. Both using 741 Op-amp.   10

7 a. What is PLL? Mention its application and explain its principle of operation using relevant diagrams.   6

  b. Draw the circuit of a universal active filter and explain its operations.   6

  c. Explain integrated circuit-voltage regulator with relevant circuit diagram.   8

8.   Write explanatory notes on the following with relevant diagram and waveforms:

     i) Small signal and power amplifiers.   6

     ii) Triangular/Rectangular wave generator   8

     iii) Adjustable output regulator.   6

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