Reg. No.

B.E. / B.Tech. (Full Time) DEGREE END SEMESTER EXAMINATIONS, APRIL / MAY 2014

ELECTRONICS AND COMMUNICATION ENGINEERING

Fourth Semester

EC8452 - OPERATIONAL AMPLIFIERS AND ANALOG INTEGRATED CIRCUITS.

(Regulations :2008)

Duration: 3 Hrs. **Maximum Marks: 100**

Answer All Questions

Part A **10 X 2 = 20 Marks.**

1. A certain op-amp has an open-loop voltage gain of 100,000 and a common mode gain of 0.25. Determine the CMRR and express it in decibels.
2. List four common types of typical op-amp packages.
3. Determine the gain of an non inverting amplifier if the open loop voltage gain of the op-amp is 150,000 and the Ri and Rf are 100K and 4.7K respectively.
4. What is a precision rectifier?
5. Draw the circuit diagram for current to voltage conversion using operational amplifier.
6. The basic step of a 9 bit DAC is 10.3 mV. If 000000000 represents 0V, what output is produced if the input is 101101101?
7. What is the number of comparators required to design an 10 bit Flash ADC.
8. How will you use PLL as a AM demodulator?
9. Give the advantage of SMPS over linear voltage regulator.
10. What is a tuned amplifier?

Part B **5 X 16= 80 Marks.**

11.(i). Define slew rate. Give the method for improving slew rate? (8)

(ii). Explain Widlar current source and derive the equation for the same. (8)

12.(a)(i). Design an adder circuit using an op-amp to get the output expression as follows
Vo = - (0.1V1 + V2 + 10V3). (4)

(ii). You are provided with 8 LEDs and op-amps. Design a system to find out the water level in the over head tank, depending up on the water level in the tank the LEDs should glow. Assume all other required relevant details. (4)

(iii). Give the important features of an instrumentation amplifier. Explain how the gain of an instrumentation amplifier can be set by the gain setting resistor RG (8)

(OR)

P.T.O

12(b)(i).With a neat diagram explain the working of inverting Schmitt trigger. Give its application. (8)

(ii).You are provided with a (0-10)V analog Voltmeter, operational amplifier and a temperature sensor (linear) which gives 35 mV for every change in degree centigrade. Design a system to measure and display the temperature from (0-100) degree centigrade. Assume all other relevant details. (4)

(iii). Derive the output equation of the op-amp based integrator. (4)

13.(a)(i).Briefly explain the working of Voltage controlled oscillator. Give its output equation. (8)

(ii). With a neat diagram explain the construction of frequency synthesizer using PLL. (4)

(iii). Briefly explain the relationship between capture range and lock range relationship in PLL. (4)

(OR)

13.(b). With a neat diagram explain the working four quadrant variable transconductance multiplier. Derive the expression for the same and give its various condition of operation. (16)

14.(a) (i). Explain the working of sample and hold IC. (8)

(ii). A dual slope ADC uses a 16-bit counter and a 4MHz clock rate. The maximum input voltage is +10V. The maximum integrator output voltage should be -8V when the counter has cycled through 2^n counts. The capacitor used in the integrator is 0.1µF. Find the value of the resistor R of the integrator. (8)

(OR)

14.(b).(i). With a neat diagram explain the working of Successive approximation ADC. (8)

(ii). With a neat diagram explain the working of R-2R ladder DAC. (8)

15.(a). Briefly explain the design and working of Switch mode power supply. (16)

(OR)

15.(b)(i). Draw and explain the audio power amplifier. Design an intercom system using the same. (8)

(ii). Design a 555IC based system to repeatedly toggle an LED with approximately 1 second ON time and 2 seconds OFF time. Assume all other required details. (8)