Reg No.:_____   Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
FOURTH SEMESTER B.TECH DEGREE EXAMINATION, APRIL 2018
Course Code: EC204
Course Name: ANALOG INTEGRATED CIRCUITS (AE, EC)

Max. Marks: 100   Duration: 3 Hours

PART A
Answer any two full questions, each carries 15 marks.
     Marks

1   a)   Derive CMRR, input resistance and output resistance of a dual input balanced output differential amplifier configuration.   (8)

     b)   Define the following: (3)
        i)Input bias current   ii)Input offset current   iii) Input offset voltage

     c)   Implement the equation using two op-amps   (4)
        $V_0 = -5V_1 + 2V^2 - 10V3$

2   a)   Derive the following characteristics of voltage shunt amplifier: (8)
        i) Closed loop voltage gain   ii)Input resistance
        iii) Output resistance   iv)Bandwidth

     b)   What is slew rate? Derive an equation for it.   (4)

     c)   A differential amplifier has a common mode gain of 0.05 and difference mode gain of 1000.Calculate the output voltage for two signals V1 = 1mV and V2 = 0.9mV   (3)

3   a)   Explain the variation of differential gain of a differential amplifier with frequency of operation with relevant expressions.   (5)

     b)   Draw the circuit diagram of a differential instrumentation amplifier with a transducer bridge and show that the output voltage is proportional to the change in resistance.   (7)

     c)   How a constant current bias circuit can be used to improve the CMRR of a differential amplifier?   (3)

PART B
Answer any two full questions, each carries 15 marks.

4   a)   Draw the circuit of a temperature compensated logarithmic amplifier and show that it provides   temperature independent logarithmic output.   (8)

     b)   Explain the working of a triangular waveform generator with a neat circuit diagram. Also derive an expression for frequency of oscillation.   (7)

5   a)   Draw the circuit of a Wien Bridge oscillator using op-amp and derive an equation for frequency of oscillation.   (7)

     b)   With a neat circuit diagram explain the working of astable multivibrator using op-amp. Also derive an expression for time period.   (8)

6   a)   Draw the circuit of   second order low pass filter and derive its transfer function.   (8)

     b)   Draw the circuit of a precision full-wave rectifier and explain its working.   (7)

PART C
Answer any two full questions, each carries 20 marks.

7 a) Explain how a monostable multivibrator can be implemented with 555 IC with   (10)
        relevant waveforms and functional diagram. Derive an expression for pulse width.

   b) With a neat circuit diagram, explain the operation of a 3-bit flash converter.   (10)

8 a) With a neat block diagram explain the working of PLL. Explain any two   (10)
        applications of PLL.

   b) Explain the working of dual-slope ADC with a neat circuit diagram.   (10)

9 a) Explain how short circuit, fold back protection and current boosting are done   (10)
        using IC723 voltage regulator.

   b) With a neat circuit diagram explain the working of a weighted resistor D/A   (10)
        converter

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