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 relevant waveforms and functional diagram. Derive an expression for pulse width. (10)

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 applications of PLL. (10)

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 using IC723 voltage regulator. (10)

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

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