

Reg No.: \_\_\_\_\_

Name: \_\_\_\_\_

**APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY**

Fourth semester B.Tech examinations (S), September 2020

**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) How a constant current bias circuit can be used to improve the CMRR of a differential amplifier? (7)
- b) Define slew rate. What causes slew rate? Derive the equation for maximum input frequency at which an undistorted signal is obtained in terms of slew rate? (8)
- 2 a) Explain with suitable diagram how voltage shunt feedback is implemented in op-amp based circuits and derive the following characteristics (i) Closed loop voltage gain (ii) Input resistance, (iii) Output resistance (iv) Bandwidth (12)
- b) A 741C op-amp is used as an inverting amplifier with a gain of 50. The voltage gain vs frequency curve of 741C is flat upto 20kHz. What maximum peak to peak input signal can be applied without distorting the output. (3)
- 3 a) List and explain the function of all the basic building blocks of an op-amp. (8)
- b) What is the principle of operation of Wilson current mirror and its advantages? Deduce the expression for its output current. (7)

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

- 4 a) Design a second order Butterworth low-pass filter with an upper cutoff frequency of 1kHz. (7)
- b) Explain the working of an inverting Schmitt trigger and draw its transfer characteristics. (8)
- 5 a) Draw the circuit of a temperature compensated logarithmic amplifier and show that it provides temperature independent logarithmic output. (7)
- b) Draw and explain the working of a practical differentiator and analyze its frequency response. (8)

- 6 a) Derive the frequency of oscillation of an RC phase shift oscillator using op-amp. (8)  
Also explain its working with suitable diagram.
- b) Explain how a free running square wave form can be obtained using op-amps. (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. (8)
- b) Give the block diagram of IC566 VCO and explain its operation. (6)
- c) Discuss in detail any two applications of PLL. (6)
- 8 a) Why is a current foldback protection circuit used in regulators? Explain with suitable diagrams. (8)
- b) Illustrate the principle of operation of PLL with its capture range and lock range. (7)
- c) Explain the working of successive approximation ADC. (5)
- 9 a) With a neat circuit diagram explain the working of a weighted resistor D/A converter. Discuss how digital signal is converted into analog signal in a weighted resistor DAC. (7)
- b) With a functional diagram, explain the principle of operation of Dual slope ADC. (8)
- c) Draw the circuit of a Schmitt trigger using 555 timer and explain its operation. (5)

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