

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Fifth Semester B.Tech Degree Examination December 2023 (2019 Scheme)

Course Code: ECT 301

Course Name: LINEAR INTEGRATED CIRCUITS

Max. Marks: 100 | Duration: 3 Hours

PART A

(Answer all questions; each question carries 3 marks) (p. 1)

- 1. Discuss the frequency response curve of an operational amplifier. (p. 1)**
- 2. Differentiate between the open loop configurations of inverting and non-inverting amplifiers. (p. 1)**
- 3. Discuss the concept of virtual ground in inverting amplifiers. (p. 1)**
- 4. Explain the working of voltage to current converter with floating load. (p. 1)**
- 5. Design a notch filter to eliminate power supply hum (50Hz). (p. 1)**
- 6. Design a RC Phase Shift Oscillator for a frequency of oscillation of 600 Hz using μA 741. (p. 1)**
- 7. In a VCO, if input signal frequency is 10 kHz, free running frequency is 14kHz, voltage to frequency conversion factor is 2kHz/V, find the change in the dc control voltage, during lock. (p. 1)**
- 8. Explain how PLL can be used as a frequency multiplier. (p. 1)**
- 9. Find the resolution and dynamic range of a digital to analog converter, if the maximum peak to peak output voltage is 5V and the input signal is a 10 bit word. (p. 1)**

10. Explain how 723 IC can be used as a high voltage regulator. Give the equation for output voltage. (p. 1)
-

PART B

(Answer one full question from each module, each question carries 14 marks) (p. 1)

Module - 1

11. a) Explain the block diagram of an operational amplifier. List out any four ideal op amp characteristics. (7 marks) (p. 1)
- b) Define a) Power Supply Rejection Ratio b) Input Bias Current of an op amp. Draw the equivalent circuit of an opamp. (7 marks) (p. 1)

OR

12. a) Discuss the transfer characteristics of differential amplifiers. (7 marks) (p. 1)
- b) Explain how differential amplifier using constant current bias improves CMRR. (7 marks) (p. 2)

Module - 2

13. a) Derive the equation for the output voltage for an instrumentation amplifier using 3 op amps. (7 marks) (p. 2)
- b) Explain the working of full wave precision rectifier. (7 marks) (p. 2)

OR

14. a) Derive the equation for closed loop voltage gain, input and output resistance of voltage shunt feedback amplifier. (7 marks) (p. 2)
- b) Derive the equation for output voltage for a differentiator. Explain the frequency response of differentiator. (7 marks) (p. 2)

Module - 3

15. a) Illustrate how the following filters can be implemented using opamp. Draw their frequency response. 1) Band Pass Filter 2) Band Reject Filter. (7 marks) (p. 2)

b) Derive the equation for voltage gain for first order low pass filter. Using the gain magnitude equation illustrate the variation of gain with respect to frequency. What is frequency scaling? (7 marks) (p. 2)

OR

16. a) Explain the working of a monostable multivibrator using 741. Derive the equation for pulse width. (7 marks) (p. 2)

b) Explain the working of triangular wave generator. Derive the equation for frequency of oscillation. (7 marks) (p. 2)

Module - 4

17. a) Explain the astable operation of 555 timer I.C. Derive the equation for frequency of oscillation. (7 marks) (p. 2)

b) Draw the pin diagram of 555 timer I.C. Design a monostable multivibrator using 555 timer I.C for a pulse width of 1 ms. Draw the circuit diagram. (7 marks) (p. 2)

OR

18. a) Explain the block diagram of Voltage Controlled Oscillator. Derive the equation for frequency of oscillation. (7 marks) (p. 2)

b) Using closed loop analysis, find the transfer function of the Phase Locked Loop. (7 marks) (p. 2)

Module - 5

19. a) Discuss the functional block diagram of 723 regulators. Draw the pin configuration of I.C 723. (7 marks) (p. 2)

b) Using functional diagram, explain how regulation is achieved in low voltage regulators using 723. Draw the circuit diagram of low voltage regulator using 723 IC. (7 marks) (p. 3)

OR

20. a) Explain the working of flash type ADC. (7 marks) (p. 3)

b) An 8 bit Analog to Digital Converter accepts an input voltage signal of range 0 to 10V. What is the minimum value of the input voltage required to generate a change of 1 LSB? Determine the input voltage required to generate all 1's at the output? What is the digital output for an input voltage of 4.8 V? (7 marks) (p. 3)