

B.Tech III Year I Semester (R13) Supplementary Examinations June 2017

LINEAR & DIGITAL IC APPLICATIONS

(Electrical and Electronics Engineering)

Time: 3 hours

Max. Marks: 70

PART – A

(Compulsory Question)

- 1 Answer the following: (10 X 02 = 20 Marks)
- Explain a typical gain versus frequency graph for an operational amplifier.
 - Obtain the gain expression of inverting amplifier using 741 op-amp.
 - Define and calculate the resolution of 8-bit DAC.
 - Mention any two applications of monostable multivibrator.
 - State the Barkhausen criteria for sustained oscillations.
 - Design a first-order active LPF to have a cut off frequency of 5 kHz.
 - Define noise margin in IC logic family.
 - Give the comparison between TTL and CMOS logic families.
 - Realize 8x1 Multiplexer using 4x1 Multiplexers.
 - Draw the logic diagram for master slave JK-flip-flop.

PART – B

(Answer all five units, 5 X 10 = 50 Marks)

UNIT – I

- 2 (a) Discuss about the DC characteristics of operational amplifier.
(b) Draw the circuit diagram and briefly explain the operation of instrumentation amplifier.
- OR**
- 3 (a) Draw the block diagram of operational amplifier and explain the functionality of each stage.
(b) Design an op-amp based astable multivibrator to generate a square waveform of frequency 2 kHz. (Make necessary assumptions)

UNIT – II

- 4 (a) Draw the internal schematic of IC 555. Configure it for astable operation and explain the working.
(b) Explain the working of A to D converter using successive approximation method.
- OR**
- 5 (a) Draw the diagram of PLL and explain its operation.
(b) Explain the working of 3-bit D to A converter using R-2R ladder network.

UNIT – III

- 6 (a) A Second-order high-pass filter using a 741 op-amp has $R_1 = 56 \text{ k}\Omega$, and $C_1 = 600 \text{ pF}$. Calculate the circuit cut off frequency and obtain its transfer function.
(b) Draw the block diagram of VCO and explain its operation. Obtain the expression for its frequency of oscillations.
- OR**
- 7 (a) Using a 741 op-amp with a supply of $\pm 12 \text{ V}$, design a RC phase shift oscillator to have an output frequency of 3.5 kHz.
(b) Design a BPF with Lower cut-off frequency of 2 kHz and upper cutoff frequency of 5 kHz using IC 741.

UNIT – IV

- 8 Draw the circuit diagram for two-input TTL NAND gate and explain its operation with the help of functional table.

OR

- 9 (a) Give the construction of transmission gate and explain its working.
(b) Discuss about TTL and CMOS Interfacing methods.

UNIT – V

- 10 (a) Draw and explain the operation of (IC 74LS138) 3x8 decoder.
(b) Design a 4-bit universal shift register and explain its working in detail.
- OR**
- 11 (a) Design a 4-bit parallel adder/subtractor circuit.
(b) Draw the logic diagram of a decade counter and explain its working.
