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R13

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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)
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1   Answer the following: (10 X 02 = 20 Marks)
 (a) Explain a typical gain versus frequency graph for an operational amplifier.
 (b) Obtain the gain expression of inverting amplifier using 741 op-amp.
 (c) Define and calculate the resolution of 8-bit DAC.
 (d) Mention any two applications of monostable multivibrator.
 (e) State the Barkhausen criteria for sustained oscillations.
 (f) Design a first-order active LPF to have a cut off frequency of 5 kHz.
 (g) Define noise margin in IC logic family.
 (h) Give the comparison between TTL and CMOS logic families.
 (i) Realize 8x1 Multiplexer using 4x1 Multiplexers.
 (j) 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 $R_1 = 56$ kΩ, and $C_1 = 600$ 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 ±12 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.

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