KNT/KW/16/5156

Bachelor of Science (B.Sc.) Semester—IV (C.B.S.) Examination

ELECTRONICS

(Analogue & Digital Techniques)

Compulsory Paper—1

Time : Three Hours] [Maximum Marks : 50

N.B. :— (1) **ALL** questions are compulsory and carry equal marks.

(2) Draw neat and well labelled diagrams wherever necessary.

EITHER

1. (A) State and derive Barkhausen criteria for oscillations. Explain working of phase-shift oscillator using OP-AMP. An RC oscillator with OP-AMP has three RC sections in the feedback loop with R = 22 kΩ and C = 10 pF. Calculate the frequency of its output. 4+4+2

OR

(B) Explain the equivalent circuit of a Piezoelectric crystal. With a neat circuit diagram, explain the construction and working of NOT gate based crystal oscillator. State advantages of crystal oscillator. 4+4+2

EITHER

2. (A) Explain construction and working of OP-AMP based Astable multivibrator. Derive the expression for the frequency of its output. Calculate the frequency of output of an astable multivibrator having R_1 = 35 kΩ, R_2 = 30 kΩ, R = 50 kΩ and C = 0.01 μF. 8+2

OR

(B) What is the need of Sample and Hold Circuit in electronic instrumentation ? Explain any one type of S/H circuit. Explain construction and working of an Instrumentation amplifier with three OP-AMPs. 2+4+4

EITHER

3. (A) With respect to a DAC, define the following :

(a) Resolution

(b) Accuracy.

Explain working of R – 2R type DAC. What are its advantages (any two) ? 2+6+2

OR

(B) Logic levels for a 4-bit R – 2R ladder are 1 = 5 V and 0 = 0 V. Calculate :

(i) Range

(ii) Resolution

(iii) Output voltage for (a) 1010 and (b) 0100.

State any two applications of DAC. 2+2+2+2+2

EITHER

4. (A) State and explain Sampling Theorem. With a neat circuit diagram, explain the construction and working of 3-bit flash type ADC. 3+7

OR

(B) Explain the Algorithm of a successive approximation ADC. Draw the block diagram of a successive approximation ADC and explain its working. 5+5

5. Answer any **TEN** :

(A) State any two factors affecting the stability of output frequency of an oscillator.

(B) Draw the circuit symbol of an oscillator.

(C) Why are LC oscillators used at high frequencies only ?

(D) State the type of feedback used in a nanostable multivibrator.

(E) Why do we use CMOS switches in a S/H circuit ?

(F) State any two applications of Data Acquisition System.

(G) What is the need of DAC in electronic instrumentation system ?

(H) State the principle of Dual bias DAC.

(I) Why is it useful to connect an OP-AMP at the output of a DAC ?

(J) State two disadvantages of a single slope ADC.

(K) What is quantisation error in ADC ?

(L) What is the role of a comparator in ADC ? 1×10=10