Reg. No. : .................................

Name : ...................................

**First Semester M.Sc. Degree (CBSS – Supple. (One Time Mercy Chance)/Imp.)
Examination, October 2023
(2014 to 2022 Admissions)
PHYSICS
PHY1C04 : Electronics**

Time : 3 Hours                                                                 Max. Marks : 60

## SECTION – A

Answer **both** questions (either **a** or **b** from **each** question)                    (2×12=24)

1. a) Discuss the basic characteristics of an ideal Op-Amp. Explain the high frequency equivalent circuit of an Op-Amp and analyse the variation of open loop gain as a function of frequency.

OR

   b) Describe how a square wave generator can be constructed using Op-Amp. How will you use this circuit to generate triangular and saw tooth wave ?

2. a) i) Explain in detail the construction and working of Monostable Multivibrators using 555 timer. What are the main applications of Monostable Multivibrator ?

   ii) Describe in detail the designing and working of an Astable Multivibrator using 555 timer. What point you have to keep in mind while selecting the resistors, if you want to get an almost approximate square wave output ?

OR

   b) What are synchronous and asynchronous counters ? Explain the working of up and down ripple counters with the help of suitable examples. Discuss the effect of propagation delay in asynchronous counters.

P.T.O.

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## SECTION – B

Answer **any 4**. (**1** mark for Section **a**, **3** marks for Section **b** and **5** marks for Section **c**)                                                            (4×9=36)

3. a) What is a multiplexer ?
   b) Draw the schematic diagram of a multiplexer and explain its working.
   c) How will you implement the logic expression $A \oplus B \ominus C$, using multiplexer ?

4. a) What is the purpose of ADC in digital systems ?
   b) With the help of suitable block diagram explain the working of successive approximation type ADC.
   c) Demonstrate with suitable example how an analog signal is converted to corresponding digital signal by successive approximation method.
      A 10-bit A/D converter of the successive approximation type has a resolution of 10 mV. Determine the digital output for an analogue input of 4.365 V.

5. a) What are flip flops ?
   b) Describe any three applications of flip flops.
   c) Explain the working of positive and negative edge triggered JK flip flops. How will you convert a JK flip flop to SR flip flop ?

6. a) Explain the term slew rate of an Op-Amp.
   b) Deduce the slew rate equation.
   c) i) Explain how this parameter is related to the signal distortion during amplification. What is the importance of this parameter while designing a circuit using Op-Amp ?
      ii) What would be the maximum frequency of signal that an Op-Amp of slew rate 0.5 V/μs can handle without distortion if the signal swings between + 14V and – 14V ?

7. a) What are Low pass and High pass filters ?
   b) How will you construct a low pass filter using Op-Amp ? What is the pass band gain of this filter ?
   c) i) Explain how the voltage gain changes with the frequency of input signal.
      ii) Calculate the cut-off frequency of a first order low pass filter $R_1 = 1.2$ kΩ and $C_1 = 0.02$ μF.

8. a) What is a shift register ?
   b) What are the various types of shift registers used ?
   c) Draw the logic diagram and symbol of an 8-bit parallel-in-serial-out shift register and explain it's working.

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