K23P 3102

Reg. No. : .....

Name : .....

I Semester M.Sc. Degree (C.B.C.S.S. – OBE – Regular) Examination, October 2023
(2023 Admission)
PHYSICS
MSPHY01C04 – Electronics

Time : 3 Hours Max. Marks : 60

SECTION – A

Answer **any 5**, **each one** carries **3** marks :

1. What are the characteristics of an ideal opamp ? Explain perfect balance.
2. Define the following basic opamp parameters. Give their typical values :
   a) Input offset voltage
   b) Input bias current
   c) Input offset current.
3. Distinguish between :
   a) Active filter and passive filter
   b) Low pass, High pass, Band pass and Band reject filters
   c) Butterworth filter and Chebyshev filter.
4. What are opamp comparators ? Explain the working of a ZCD. Why it is called so ?
5. Explain the following in a microprocessor and give their importance :
   a) ALE
   b) IO/$\overline{M}$
   c) S_1 and S_0
6. What are flip-flops ? Explain its use as a memory element with suitable example.

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SECTION – B

Answer **any 3**, **each one** carries **6** marks :

7. Describe the working of a three-input scaling amplifier. Design and construct an inverting scaling amplifier with output $0.5\ V_1 + 2V_2 + V_3$. Sketch the output if $V_1 = -2V$ DC, $V_2 = 1V$ DC and $V_3 = 2 \sin (100\pi t)$.

8. Determine the output voltage of an opamp for input voltages $V_1 = 1050\ \mu V$, $V_2 = 950\ \mu V$. Given the opamp has a differential gain $A_d = 1000$ and CMRR = 100 dB. What will be the result if the input voltages V_1 and V_2 are respectively 50 μV and 150 μV ? Comment on your answer.

9. Design and construct a first order low pass Butterworth filter of high cut off frequency of 3 KHz.

10. Design and implement an asynchronous decade counter using T flip-flops.

11. An 8-bit DAC has an output of 0.05 V for a digital input of 00000001. Determine :
    i) Step size
    ii) Full scale output
    iii) Resolution
    iv) Output voltage for an input of 00101100.

SECTION – C

Answer **any 3**, **each one** carries **9** marks :

12. Discuss the four closed loop configurations of opamp using block diagram representation. Analyse the voltage series feedback amplifier and evaluate closed loop :
    i) Voltage gain
    ii) Input resistance
    iii) Output resistance and
    iv) Bandwidth.

13. Describe the frequency response of a non-compensated opamp. Obtain the transfer function and analyse the high frequency equivalent of an opamp with single break frequency. How the stability of such amplifiers can be analysed ?

14. With the relevant schematic diagrams Explain the working of :

    i) Astable Multivibrator and

    ii) Schmitt Trigger.

    Explain the hysteresis in Schmitt trigger.

15. What are shift registers ? Which are the general data transmission scheme in them ? Explain any three among them in detail.

16. With the help of a block diagram discuss the internal architecture of intel 8085.