21. A Describe the internal circuit of an operational amplifier with a neat diagram.

OR

B Explain the operational amplifier characteristics and its parameters.

22. A Describe the procedure for solving a second order differential equation. How are the initial conditions set up?

OR

B Draw and explain the operation of a triangular wave generator.

23. A Explain the second order low pass and high pass Butterworth filters.

OR

B Explain how the 555 timer works as a monostable multivibrator. Compare the theoretical and experimental value of the pulse width of the waveform obtained.

24. A Explain the working of IC 723 general purpose regulators.

OR

B Explain the working of a 4-bit R- 2R Ladder D/A converter with a neat diagram.

25. A Explain the working of a universal shift register using IC 74194.

OR

B Explain JK flip flop. How will you construct JK flip flop from SR flip flop.

4/12/23

Four Pages
S. No. 70713

23PPHCT03

Reg. No.								

END SEMESTER EXAMINATION NOV/DEC-2023

First Semester

M.Sc Physics

CORE PAPER III – LINEAR AND DIGITAL IC'S AND APPLICATIONS

Time: Three Hours **Maximum: 75 marks**

SECTION A – (15 x 1 = 15 marks)
ANSWER ALL QUESTIONS

1. The output impedance of an ideal op amp is _____.
   A infinity B one
   C Zero D 75 ohms
2. The voltage gain for non - inverting summing amplifier is _____.
   A $A_{CL} = 1-R_f / R_1$ B $A_{CL} = 1+R_f / R_1$
   C $A_{CL} = R_f / R_1$ D $A_{CL} = R_1 / R_f$
3. The Op-Amp circuit, in which the output equals input and in phase is called as _____.
   A voltage doubler B voltage rectifier
   C voltage follower D average voltage
4. Schmitt trigger is a special comparator which uses _____.
   A negative feedback B positive feedback
   C no feedback D negative and positive feedbacks
5. _____ circuit is very useful in digital interfacing and pulse code modulation systems.
   A Sample and hold B Log amplifier

C Antilog amplifier D Instrumentation amplifier

6. Astable multivibrator is also known as _____ wave generator.
   A sine B saw tooth
   C square D Triangular
7. Determine the time period of a monostable 555 multivibrator.
   A T = 0.33RC B T = 1.1RC
   C T = 3RC D T = RC
8. Which characteristic of PLL is defined as the range of frequencies over which PLL can acquire lock with the input signal?
   A Free-running state B Pull-in time
   C Lock-in range D Capture range
9. Name the filter that has two stop bands.
   A Band-pass filter B High pass filter
   C Low pass filter D Band-reject filter
10. Drawback of counter type A/D converter is _____.
    A counter clears automatically B high conversion time
    C more complex D low speed
11. The series pass transistor in a linear IC voltage regulator is always in the _____ zone.
    A active B passive
    C cut-off D saturation
12. A 4 bit resistor divider D/A converter uses 80K ohm resistor for MSB, the resistor value used for LSB is _____.
    A 160 K ohm B 40 K ohm
    C 20 K ohm D 10 K ohm
13. The main advantage of CMOS is its _____.

A high power rating B switching capability
C small single operation D low power consumption

14. How many AND gates are required for the construction of 8:1 multiplexers?
    A 2 B 4
    C 6 D 8
15. A flip-flop which has only one input and which transfers the input data to the output on application of a clock pulse is called _____ flip flop.
    A SR B JK
    C D D T

SECTION B – (2 x 5 = 10 marks)

ANSWER ANY TWO QUESTIONS

16. Discuss the working of inverting amplifier.
17. Explain the working of Schmitt trigger using Op - Amp.
18. Explain the working voltage controlled oscillator using IC 566.
19. Explain the working of counter type A/D converter.
20. Explain the working of a CMOS NAND gate.

SECTION C – (5 x 10 = 50 marks)

ANSWER ALL QUESTIONS