

KAMARAJ COLLEGE (Autonomous)

Accredited with A+ Grade by NAAC

(Affiliated to Manonmaniam Sundaranar University, Tirunelveli)

THOOTHUKUDI – 628 003

(5 Pages)

Reg. No:

Question. Code No : 25E03309

Sub Code : 24PEPH14

PG Degree - End Semester Examinations, April 2025

First Semester

M.Sc. PHYSICS

Elective - Linear and Digital ICs and Applications

(For those who joined in July 2024 onwards)

Time : 3 Hours

Maximum : 75 Marks

PART - A ($10 \times 1 = 10$ Marks)

Answer ALL Questions

Choose the correct answer :

1. For an ideal Op-amp, the input impedance and bandwidth are
 - (a) Zero and infinite
 - (b) Infinite and infinite
 - (c) Infinite and zero
 - (d) Zero and zero

2. The circuits of an inverting and non-inverting amplifier comprises of _____ and _____ number of resistors.
- (a) 2 and 2 (b) 3 and 3
(c) 3 and 2 (d) 2 and 3
3. One of the features of an instrumentation amplifier is
- (a) Low noise (b) Low gain
(c) High thermal drift (d) High time drift
4. If both inputs are positive, the multiplier circuit is said to be a
- (a) Four quadrant (b) Two quadrant
(c) One quadrant (d) None of the above
5. In which filter the output and input voltages are equal in amplitude for all frequencies?
- (a) All-pass filter (b) Low pass filter
(c) High pass filter (d) All of the above
6. The output voltage of phase detector is
- (a) Phase voltage (b) Free running voltage
(c) Error voltage (d) None of the above
7. IC 723 is
- (a) A full-wave rectifier (b) A half-wave rectifier
(c) A Clipper (d) A voltage regulator
8. Which of the following method is employed for ADC?

(a) Ladder network

(b) Successive
approximation type

(c) PWM type

(d) None of the above

9. In CMOS logic circuit the n-MOS transistor acts as:

(a) Load

(b) Pull up network

(c) Pull down network

(d) Not used in CMOS
circuits

10. A multiplexer is also known as _____

(a) Data selector

(b) Counter

(c) Decoder

(d) None of the above

PART – B (5 X 5 = 25 Marks)

Answer ALL Questions choosing either (a) or (b).

Answer should not exceed 250 words.

11. (a) Brief about the classification of Integrated Circuits.

(OR)

(b) Write down the characteristics of an Operational
Amplifier.

12. (a) How to convert voltage to current using operational
amplifier? Explain with neat circuit diagram.

(OR)

(b) What is sample and hold circuit? Explain with circuit diagram.

13. (a) Mention any five applications of filters.

(OR)

(b) Draw the functional diagram of the IC 555 timer.

14. (a) What are regulators? Give the general theory of basic series op-amp regulators.

(OR)

(b) Discuss the method of basic DAC technique through weighted resistor method.

15. (a) Draw the circuit diagram for 1 to 16 multiplexer with truth table.

(OR)

(b) Implement any four logic gates using the respective 74XX ICs.

PART – C (5 X 8 = 40 Marks)

Answer ALL Questions choosing either (a) or (b).

Answer should not exceed 600 words.

16. (a) Explain the Internal circuit of an Operational Amplifier with neat sketch.

(OR)

(b) Discuss the AC performance characteristics of an Operational Amplifier.

17. (a) Solve the given simultaneous equation using Op-Amp
 $x + 2y = 3$ and $2x - y = 1$.

(OR)

(b) Draw a circuit diagram for the Schmitt trigger and explain its concept.

18. (a) Compare the first and second order low and high pass filters with circuit diagram.

(OR)

(b) Explain the basic principle and its working as analog phase detector of monolithic PLL.

19. (a) Discuss the function of Op-amp as the Voltage Regulator IC723.

(OR)

(b) Convert the given signal from digital to analog using R-2R ladder network and explain the process of conversion.

20. (a) Implement a circuit for CMOS – NAND and NOR gate. Brief the working principle.

(OR)

(b) Draw the layout of IC 7474 and IC 7473 Flip Flops. Verify its respective truth tables.

