

(7 pages)

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Code No.: 7781

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M.Sc. (CBCS) DEGREE EXAMINATION,  
NOVEMBER 2024.

First Semester

Physics – Core

LINEAR AND DIGITAL ICS AND APPLICATIONS

(For those who joined in July 2023 onwards)

Time : Three hours

Maximum : 75 marks

PART A — (15 × 1 = 15 marks)

Answer ALL questions.

Choose the correct answer:

1. An input impedance in ideal op-amp is \_\_\_\_\_.

- (a) 0                      (b) infinite  
(c) constant            (d) 1

2. ICs have advantage over discrete, device circuits which is \_\_\_\_\_.

- (a) lower cost            (b) high reliability  
(c) smaller size          (d) all of the above

3. What is the most popular IC used in timing circuit?

- (a) IC 741                (b) IC 723  
(c) 555 timer            (d) IC 566

4. The sample and hold circuit is commonly used in \_\_\_\_\_ system.

- (a) Pulse modulation  
(b) Digital to Analog  
(c) Analog to digital  
(d) Zero crossing detector

5. The amplitude of triangular wave \_\_\_\_\_ with an increase in its frequency.

- (a) decreases            (b) increases  
(c) remains constant    (d) attains 0

6. \_\_\_\_\_ circuit converts an irregular shaped waveform to square form.

- (a) Astable                (b) Monostable  
(c) Bistable                (d) Schmitt trigger

7. If the value of  $Q > 10$ , we will call the filter as \_\_\_\_\_.

- (a) high pass filter
- (b) low pass filter
- (c) narrow band pass filter
- (d) wide band pass filter

8. Voltage controlled oscillator (IC 566) converts the applied input voltage into

- (a) output voltage      (b) output current
- (c) output frequency      (d) output impedance

9. A flip-flop has \_\_\_\_\_ stable states.

- (a) two      (b) three
- (c) four      (d) five

10. Demultiplexer transmits the information on one of \_\_\_\_\_ possible output lines.

- (a)  $2^{n+1}$       (b)  $2^n$
- (c)  $2^{n-1}$       (d) none of the above

11. Toggle condition is present in which of the following?

- (a) D Flip-Flop      (b) Clocked SR Flip-Flop
- (c) SR Latch      (d) JK Flip-Flop

12. Two or more parallel \_\_\_\_\_ blocks are connected to perform addition of large binary numbers.

- (a) Subtractor      (b) Multiplier
- (c) Adder      (d) Divider

13. Which type of regulator is considered more efficient?

- (a) All of the mentioned
- (b) Special regulator
- (c) Fixed output regulator
- (d) Switching regulator

14. The full form of SR is \_\_\_\_\_.

- (a) System rated      (b) Set reset
- (c) Set ready      (d) Set rated

15. The time period of monostable 555 multivibrator

- (a)  $T = 0.33 RC$       (b)  $1.1 RC$
- (c)  $T = 3RC$       (d)  $T = RC$

PART B — (5 × 4 = 20 marks)

Answer ALL questions, choosing either (a) or (b).  
Each answer should not exceed 250 words.

16. (a) What are the characteristics of an ideal operational amplifier?

Or

- (b) Write down the classification of IC's with a flow chart.

17. (a) Give an account on instrumentation amplifier with the block diagram.

Or

- (b) Describe divider circuit using operational amplifier with neat circuit diagram.

18. (a) Write a brief note on all-pass filter with a neat circuit diagram.

Or

- (b) Explain the operation of Astable multivibrator using IC 555 with circuit diagram.

19. (a) Discuss about the series Op-amp regulator with circuit diagram.

Or

- (b) Write about the DAC and ADC specifications.

20. (a) Explain multiplexer with truth table and circuit diagram.

Or

- (b) Describe four-bit parallel adder (IC 7483) with neat diagram.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b).  
Each answer should not exceed 600 words.

21. (a) Explain the basic information of op-amp 741 with its salient features.

Or

- (b) Discuss the practical operational amplifier characteristics.

22. (a) Elucidate Schmitt trigger with a circuit diagram.

Or

- (b) Explain triangular waveform generator with a neat circuit diagram.

23. (a) Give an explanation for  
(i) First order high pass butterworth filter.  
(ii) Second order high pass butterworth filter.

Or

- (b) Explain monolithic phase locked loop (PLL) with neat circuit diagram.

24. (a) Describe the basic DAC technique and explain about the Weighted Resistor DAC.

Or

- (b) Illustrate R-2R ladder method to convert digital signal to analog signal.
25. (a) Discuss encoders (IC 74XX147) with logic diagram and truth table.

Or

- (b) Explain Universal shift register with neat circuit diagram.
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