A Reg. No. : | | | | | | | | | | |

**Question Paper Code: 94B02**

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2024

Fourth Semester

Biomedical Engineering

19UBM402-ANALOG AND DIGITAL INTEGRATED CIRCUITS

(Regulation 2019)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. If $R_1$ = 10KΩ, Voltage gain = -10, Calculate the feedback resistance of inverting amplifier. CO1- App

   (a) 100 KΩ (b) 10KΩ (c) 1000 KΩ (d) 1KΩ

2. Open loop voltage gain of an ideal operational amplifier is ____ . CO1- R

   (a) 0 (b) 1 (c)∞ (d) 10

3. Schmitt trigger circuit is used to convert a very slowly varying input voltage into a _____ output. CO2 -R

   (a) Triangular wave (b) Square wave (c) Rectangular wave (d) Ramp signal

4. For processing, transmission and storage purpose, it is convenient to express the variables in _____ form. CO2- R

   (a) Digital signal (b) Analog signal (c) Ramp signal (d) step signal

5. The 555 timer IC is a highly stable device for generating accurate CO3- R

   (a) frequency (b) time (c) time delay (d) Amplitude

6. Phase locked loop is an important building block of _____ systems. CO3- R

   (a) Linear (b) Non -linear (c) time variant (d) time invariant

7. Data selectors are basically the same as CO4- R

   (a) Decoders (b) Demultiplexers (c) Multiplexers (d) Encoders

8. If an priority encoder has its 0,2,5 and 6 inputs are at the active level, the active high binary output is — CO4- R

(a) 101 (b) 110 (c) 000 (d) 010

9. A reduced state table has 14 rows. What is the minimum number of flip flop needed to build the sequential circuit? — CO5- R

(a) 4 (b) 3 (c) 2 (d) 1

10. A PROM is a — CO5- R

(a) Non-volatile memory (b) Volatile memory

(c) Read/write memory (d) Byte organized memory

PART – B (5 x 2= 10Marks)

11. An operational amplifier has a slew rate of 25V/ms. How long will it take for the output to change from0 to 15 V? . — CO2- App

12. Illustrate the first order low pass filter circuit using operational amplifier with its response curve. — CO2- R

13. Mention the applications of PLL. — CO3- R

14. Explain the design steps of combinational logic circuits. — CO4- R

15. Distinguish between Synchronous and Asynchronous counter circuits. — CO5-Ana

PART – C (5 x 16= 80Marks)

16. (a) Derive the closed loop gain of non-inverting amplifier in both ideal and practical case — CO1- U — (16)

Or

(b) Explain the application of OP-AMP as a clipper and clamper. — CO1- U — (16)

17. (a) Design a phase shift oscillator circuit using OP-AMP to oscillate at 100 Hz. — CO2- E — (16)

Or

(b) Design a 4 bit R-2R ladder DAC and compute the analog equivalent of the binary input 1011. — CO2- E — (16)

18. (a) Explain the operation of Astable multivibrator using 555 timer IC. — CO3-U — (16)

Or

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| | (b) | Describe the operation of monostable multivibrator circuit using 741IC in detail. | CO3- U | (16) |
| 19. | (a) | (i) Design a half adder circuit that has two inputs x and y and two outputs s and c respectively. | CO4- Ana | (8) |
| | | (ii) Design a half subtractor with inputs x and y and outputs Diff and Bout. The circuit subtracts the bits x-y and places the difference in Diff and borrows in Bout. | CO4- Ana | (8) |

Or

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| | (b) | Simplify the following function using Quine McCluskey methodF(A,B,C,D) =Σ(1,3,4,5,6,7,9,12,13).Also obtain the NAND implementation of the simplified expression. | CO2 -Ap | (16) |
| 20. | (a) | With neat diagram, explain the operation of Set Reset flip flop with its characteristics of excitation tables. | CO2-U | (16) |

Or

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| | (b) | Design a mod-10 Synchronous binary counter using JK flip-flops. | CO2-App | (16) |