

2026

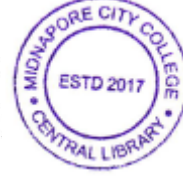
2nd Semester Examination (CCFUP : NEP)

COMPUTER SCIENCE

Paper Code : COSHMJ2

(Single Core Major)

(Digital Logic Design)



Full Marks : 40

Time : Two Hours

*The figures in the margin indicate full marks.
Candidates are required to give their answers
in their own words as far as practicable.*

Group - A

Answer any *five* questions : $2 \times 5 = 10$

1. Find 2's complement of 1101011.
2. Express decimal number 22 and 19 in corresponding BCD code.
3. Draw the logic diagram of function $f = X'Y + Z$.
4. What is Gray Code? Mention one application.
5. State De Morgan's theorems.
6. Why are NAND and NOR gates called universal gates?
7. What is the race-around condition in JK flip-flop?

P.T.O.

(2)

8. Distinguish between synchronous and asynchronous counters.

Group - B

Answer any *four* questions : 5×4=20

9. Convert the decimal number 275.75 into —

(i) Binary

(ii) Octal

(iii) Hexadecimal

2+2+1



10. Simplify the Boolean expression using Boolean algebra —

$$F = AB' + AB + A'B$$

11. Explain the working of a 4 : 1 Multiplexer with a neat diagram.

12. Describe the construction and operation of a Full Adder using logic gates.

13. Explain the operation of SISO, SIPO, PISO and PIPO shift registers.

14. Explain even parity and odd parity with suitable example.

Group - C

Answer any *one* question : 10×1=10

15. (a) Simplify the following Boolean function using a 4-variable Karnaugh Map :

$$F(A, B, C, D) = \Sigma m(0, 2, 5, 7, 8, 10, 13, 15)$$

(3)

16. Implement the simplified expression using NAND gates only. 6+4

16. Design a 3-bit synchronous binary counter using JK flip-flops. Draw the state diagram and explain its operation. 5+5

