

**VIT**Vellore Institute of Technology
(Deemed to be University under section 3 of UGC Act, 1956)

SCHOOL OF ADVANCED SCIENCES
DEPARTMENT OF MATHEMATICS
CONTINUOUS ASSESMENT TEST-II (April 2024)
WINTER SEMESTER 2023-24

SLOT C1

Programme Name & Branch: MIC and MID

Course Code: MAT1014

Course Name: Discrete Mathematics and Graph theory

Exam Duration: 90 minutes

Maximum Marks: 50

General instruction(s): Answer all questions $5 \times 10 = 50$

Open Text Book / Open Note Book mode. Students are permitted to bring any number of text books and hand written note books (class notes).

Sl.No.	Question	Marks
1.	a) Find the code words generated by encoding function $e: B^2 \rightarrow B^5$ with respect to the parity check matrix $H = \begin{bmatrix} 1 & 0 & 0 \\ 1 & 1 & 0 \\ 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$ b) The encoding function $e: B^3 \rightarrow B^6$ given by $e(000)=000000, e(011)=011110, e(110)=110011,$ $e(010)=010101, e(001)=001011, e(100)=100110,$ $e(111)=111000, e(101)=101101.$ How many errors 'e' will detect? 3	5+5
2.	Let $A = \{1, 2, 3, \dots, 4\}$. Define a relation R from A to A by $R = \{(x, y): 3x - y = 0 \text{ where } x, y \in A\}.$ i) Write down the relation R. (1/3) ii) Verify reflexive, symmetric, anti-symmetric and transitive properties on R.	10

3.	Draw the Hasse diagram for divisibility on the set $\{1,2,3,4,5,6,7,8\}$ Find (i) the maximal and minimal elements (ii) the greatest and least elements (iii) the upper bounds and LUB of $\{2,3\}$ (iv) the lower bounds and GLB of $\{4,6\}$. Also determine whether the POSET with the Hasse diagram is lattice.	10
4.	a) Simplify the expression $a' \cdot b \cdot (a' + c) + a \cdot b' \cdot (b' + c)$ $a' + a \cdot b'$ b) Find sum of products canonical form and product of sums canonical form for the Boolean function $f(x, y, z) = (x' \cdot y)' \cdot (x + z)$.	5+5
5.	Simplify the Boolean expression $\overline{A}\overline{B}\overline{C} + \overline{A}\overline{B}C + \overline{A}BC + \overline{A}B\overline{C} + ABC + AB\overline{C}$ 000 001 011 010 111 110 using Karnaugh Map.	10