VIT®

Vellore Institute of Technology

(Deemed to be University under section 3 of UGC Act, 1956)

School of Advanced Sciences

Fall Semester 2024-2025

Continuous Assessment Test – I

Programme Name & Branch : B.Tech. Computer Science with all Specializations

Slot: C2+TC2+TCC2

Course Name & code: Discrete Mathematics and Graph Theory & BMAT205L

Class Number (s): 2538, 2559, 2562, 2563, 2564, 2565, 2567, 2569, 2570, 2571, 2572, 2573, 2576, 2579, 2581, 2583, 2586

Faculty Name (s): Prof(s). Manimaran A, Ezhilmaran D, Sumit, Praveen, Amrit Das, Venkateswarlu B, Nalliah M, Niranjan Hari, Deepa G, Vijayakumar V, Ankush Chanda, Parthiban A, Murugan V, Jayalakshmi M, Juhi Baroi, Saravanarajan M C, Jagatheswari S

Exam Duration: 90 Min. **Maximum Marks: 50**

General instruction(s): **Answer ALL the questions**

Q.No.	Question	Max Marks	CO	BL
1.	Obtain the PDNF and PCNF of the following formula and hence conclude whether it is a tautology? $(P \rightarrow (Q \wedge R)) \wedge (\neg P \rightarrow (\neg Q \wedge \neg R))$	10	1	1
2.	Verify whether the conclusion logically follows from the given arguments. "If you send me an e-mail message, then I will finish writing the program." "If you do not send me an e-mail message, then I will go to sleep early." "If I go to sleep early, then I will wake up feeling refreshed." Leads to the conclusion, "If I do not finish writing the program, then I will wake up feeling refreshed."	10	1	2
3.	Show that the conclusion $(\forall x)\ (F(x) \rightarrow \neg S(x))$ follows logically from the premises $(\exists x)(F(x) \wedge S(x)) \rightarrow (\forall y)(M(y) \rightarrow W(y))$ and $(\exists y)(M(y) \wedge \neg W(y))$.	10	1	3
4.	Define a subgroup with an example. Prove that "A non-empty subset H of a group G is a subgroup of (G, $*$) if and only if $a, b \in H \Rightarrow a * b^{-1} \in H$.	10	2	4
5.	Let G denote the set of all matrices of the form $\begin{bmatrix} x & x \\ x & x \end{bmatrix}$ where $x \in R^+$. Prove that G is a group under matrix multiplication.	10	2	3