

Set-A

APPENDIX-III

Question Paper Template (For Online Examination)

K. J. Somaiya Institute of Engineering and Information Technology, Sion, Mumbai-22

(Autonomous College Affiliated to University of Mumbai)

End Semester Exam

Feb 2022

(B.Tech) Program: Artificial Intelligence & Data science/ Computer Engineering

Examination: SY Semester: III

Course Code: 1UAIC302/1UCEC302 and Course Name: Discrete structures and Graph Theory

Duration:02 Hours

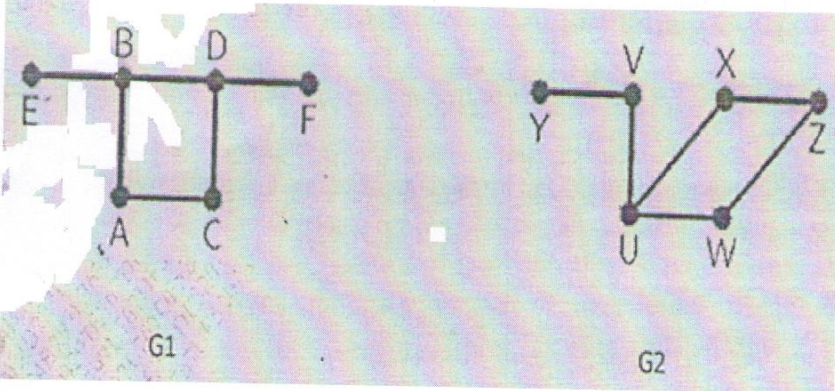
Max. Marks: 45

Instructions:

- (1) All questions are compulsory.
- (2) Draw neat diagrams wherever applicable.
- (3) Assume suitable data, if necessary.

		Max. Marks	CO	BT level
Q 1	Solve any 5 questions out of six.	15		
i)	Use Mathematical induction to show that $n^3 + 2n$ is divisible by 3 for all $n \geq 1$	3	1	Analysis

ii)	Let $A=\{a_1,a_2,a_3,a_4,a_5\}$ and R be a Relation on A whose Matrix is $M_R = \begin{pmatrix} 1 & 0 & 0 & 1 & 0 \\ 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 1 \\ 1 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 1 \end{pmatrix}$ Find M_R^* by warshall's algorithm	3	2	Apply
iii)	Explain the term :- (i) Lattice (ii) Poset	3	3	Apply
iv)	Find the number of way a Person can distribute Rs 601 as Pocket Money to his three sons so that no son should receive more than the combined total of the two other (Assume no fraction of rupees is allowed)	3	4	Apply
v)	Prove that set $G = \{1,2,3,4,5,6\}$ is a finite abelian group of order 6 with respect to multiplication module 7	3	5	Analysis
vi)	1) Is every Hamiltonian graph a Eulerian? Explain with necessary graph	3	6	Apply
Q.2	Solve any three questions out of four.	15		
i)	Prove De Morgan's Law using truth table	5	1	Analysis
ii)	Determine the matrix of the Partial order of divisibility on the set. Draw the Hassee diagram of the Poset .Indicate those whose are chains? (1) $A=\{1,2,3,5,6,10,15,30\}$ (2) $A=\{3,6,12,36,72\}$	5	3	Apply
iii)	How many vertices are necessary to construct a graph with exactly 6 edges in which each vertex is of degree 2.	5	6	Apply

iv)	Prove $\neg(p \vee (\neg p \wedge q))$ and $\neg p \wedge \neg q$ are logically Equivalent by developing a series of logic equivalences.	5	1	Analysis
Q.3	Solve any three questions out of four.	15		
i)	Let the function f,g and h define as follows:- $f:R \rightarrow R$ $f(x) = 2x+3$, $f:R \rightarrow R$ $g(x) = 3x+4$, $f:R \rightarrow R$ $h(x) = 4x$. Find $(g \circ f)$, $(f \circ g)$, $(f \circ h)$, $(g \circ f \circ h)$.	5	2	Apply
ii)	What is the minimum number of students required in a class to ensure that at least six will receive the same grade if there are five possible grades A, B, C, D, E?	5	4	Apply
iii)	Determine if following graphs G1 and G2 are isomorphic or not.	5	5	Analysis
				
iv)	Let $A = \{1,2,3,4\}$ and $R = \{(1,2), (2,3), (3,4), (2,1)\}$. Find the transitive closure of R by using Warshall's algorithm.	5	2	Apply