K. J. Somaiya Institute of Technology, Sion, Mumbai-22
(Autonomous College Affiliated to University of Mumbai) DSY (AI-DS)

Nov – Dec 2024
(B. Tech / M. Tech.) Program: Artificial Intelligence & Data Science Scheme :-III
Regular Examination: SY Semester: III
Course Code: AIC305 and Course Name: Discrete structure& Data Science
Date of Exam: 16/12/2024 Duration: 02.5 Hours Max. Marks: 60

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

Q. No.	Question	Max. Marks	CO	BT level
Q 1	Solve any **two** questions out of three: (05 marks each)	10		
a)	Use the law of Logic to simple the expression $p \vee \sim(\sim p \rightarrow q)$		1	Ap
b)	Find the power set of set A{αβγ}		2	Ap
c)	Draw the Hasse Diagram of D24 i.e set of integers which divide 24 with divisibility.		3	Ap
Q 2	Solve any **two** questions out of three: (05 marks each)	10		
a)	Explain hole Principle with one example		4	R
b)	Let Z_4 .i.e G = {0,1,2,3} i) Prepare its composition table with respect to X_4 ii) Is it a group?		5	Ap
c)	Can a single graph of 8 vertices have 40 edges excluding self-loop?		6	U
Q.3	Solve any **two** questions out of three. (10 marks each)	20		
a)	Solve that $1^3 + 2^3 + 3^3 + \ldots\ldots n^3 = (1+2+3+\ldots\ldots)^2$ by Mathematical Induction		1	Ap
b)	Find how many integers between 1 to 60 are divisible by 2 nor by 3 and nor by 5 ?		4	An
c)	Consider the (3,5) group encoding function e :$B^3 \rightarrow B^6$ defined by e(000)=00000 e(100)=10011 e(001)=00110 e(101)=10101 e(010)=01001 e(110)=11010 e(011)=01111 e(111)=11100 Decode the following words relative to maximum likelihood decoding function.		5	Ap
Q.4	Solve any **two** questions out of three. (10 marks each)	20		
a)	Let A= {1,2,3,4} and Let R = (1,1),(1,2),(1,4), (2,4), (3,1), (3,2), (4,2), (4,3), (4,4). Find Transitive closure by Warshall's algorithm		2	An

K. J. Somaiya Institute of Technology, Sion, Mumbai-22
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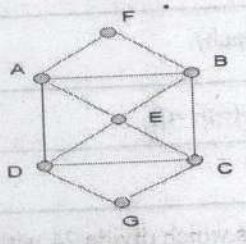
b)	Determine the matrix of the Partial order of divisibility on the set. Draw the Hassee diagram of the Poset .Indicate those whose are chains? (1) A={1,2,3,5,6,10,15,30} ,(2) A={3,6,12,36,72}		3	Ap
c)	Define Euler Path, Euler Circuit, Hamiltonian Path and Hamiltonian Circuit. Determine if following diagram has Euler Path, Euler Circuit, Hamiltonian Path and Hamiltonian Circuit and state the path/circuit. 		6	Ap

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