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

Carry-On Exam

July-Aug 2025

(B. Tech / M. Tech.) Program: Artificial Intelligence & Data Science Scheme :-III

Supplementary ~~Regular~~ Examination: SY Semester: III

Course Code: AIC305 and Course Name: Discrete structure for Data Science

Date of Exam: 26-08-25 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: (0 5 marks each)	10		
a)	Let P denote Raju is rich q denote raju is happy write each of the following in symbolic form. 1. Raju is poor but happy 2. Raju is neither rich nor happy 3. Raju is either rich or un happy 4. Raju is poor or else he is rich and unhappy		1	An
b)	Let A={1,3,5,7,9} B={2,4,6,8}: a R b if and only if b<a		2	Ap
c)	Determine the Hasse Diagram of the relation R A = {1,2,3,4} R = {(1,1),(1,2),(2,2),(2,4),(1,3),(3,3),(3,4),(1,4),(4,4)}		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)	Show that for any positive interger n,$(11)^{n+2} + (12)^{n+1}$ is divisible by 133		1	Ap
b)	Find how many integers between 1 to 60 are divisible by 2 nor by 3 and nor by 5 ?		4	Ap
c)	Prove that if a,b $\in$ R the (a+b) = a^2+ab+ba+b^2 where x^2 mean xx		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	Ap
b)	Determine the matrix of the Partial order of divisibility on the set. Draw		3	Ap

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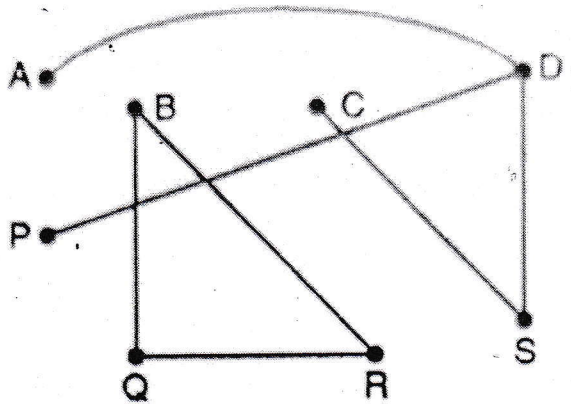
	the Hassee diagram of the Poset .Indicate those whose are chains? (1) A={1,2,3,5,6,10,15,30} ,(2) A={3,6,12,36,72}			
c)	Determine whether the graph shown below is connected or disconnected .if disconnected find the connected component 		6	Ap

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