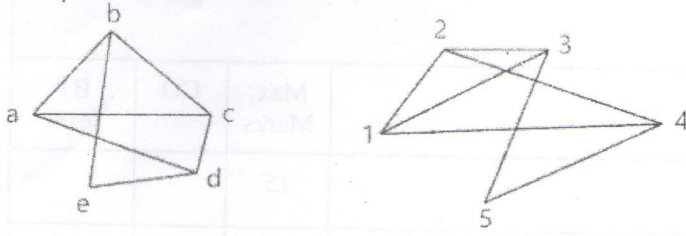


**K. J. Somaiya Institute of Engineering and Information Technology, Sion, Mumbai-22**  
**(Autonomous College Affiliated to University of Mumbai)**

Subject Code: CEC302      Subject Name: Discrete Structure & Graph Theory      Date: 06/12/2022

Nov -Dec 2022 (B.Tech) Program: Computer Engineering Examination: SY Semester: III Course Code: CEC302 and Course Name: Discrete Structure & 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)	Represent the following statements in symbolic form a) The sun is bright and the humidity is not high b) If I finish my homework before dinner and it does not rain, then I will go to play game c) If you do not see me tomorrow, it means I have gone to Chicago	3M	CO1	AP
ii)	Show that $A - (B - C) = (A - B) \cup (A \cap B \cap C)$	3M	CO2	AP
iii)	Define Distributive Lattice along with one appropriate example	3M	CO3	U
iv)	A restaurant offers 5 choices of appetizer, 10 choices of the main course and 4 choices of dessert. A customer can choose to eat just one course, or two different courses, or all three courses. Assuming that all food choices are available, how many different possible meals does the restaurant offer?	3M	CO4	Ap
v)	Prove that every cyclic group is an abelian	3M	CO5	An
vi)	Define the term w.r.t to Graph a) Undirected Graph b) Directed graph c) Simple graph	3M	CO6	R
Q.2	Solve any three questions out of four.	15		
i)	Show that using mathematical Induction $1.2.3 + 2.3.4 + 3.4.5 + \dots + n(n+1)(n+2) = n(n+1)(n+2)(n+3)/4, n \geq 1$	5M	CO1	Ap
ii)	Find the greatest lower bound and least upper bound of the set $\{3, 9, 12\}$ and $\{1, 2, 4, 5, 10\}$ if they exist in the poset $(Z+, /)$ . Where $/$ is the relation of divisibility	5M	CO3	Ap

iii)	Draw a multigraph $g$ corresponding to the following adjacency matrix $A = \begin{bmatrix} 0 & 2 & 0 & 1 \\ 2 & 1 & 1 & 1 \\ 0 & 1 & 0 & 1 \\ 1 & 1 & 1 & 0 \end{bmatrix}$	5M	CO6	Ap
iv)	Define Isomorphic graphs. Show that following graphs are Isomorphic or not 	5M	CO6	Ap
Q.3	Solve any three questions out of four.	15		
i)	Given $S = \{1, 2, 3, 4\}$ and a Relation $R$ on $S$ given by $R = \{(4, 3), (2, 2), (2, 1), (3, 1), (1, 2)\}$ a) Show that $R$ is not transitive b) Find transitive closure of $R$ by Warshall's algorithm	5M	CO2	Ap
ii)	Find the complete solution of the recurrence relation $an + 2an = n + 3$ for $n \geq 1$ and with $a_0 = 3$ .	5M	CO4	Ap
iii)	Given the parity check matrix $H = \begin{bmatrix} 1 & 1 & 0 \\ 0 & 1 & 1 \\ 1 & 0 & 1 \\ 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$ Determine the group code $eH: B^3 \rightarrow B^6$	5M	CO5	Ap
iv)	Explain the properties of Algebraic structures with example.	5M	CO5	U

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