

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

(Autonomous College Affiliated to University of Mumbai)

End Semester Exam

Nov - Dec 2021

Program: B.Tech

Examination: SY Semester: III

Course Code: IUCEC302 and Course Name: Discrete Structures and Graph Theory

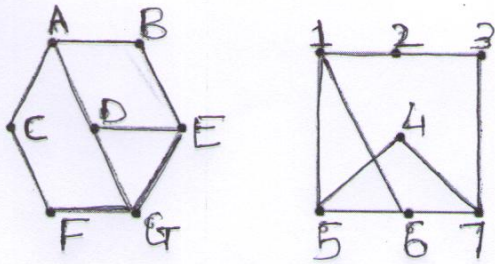
Duration:02 Hours

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)	Using laws of logic, show that : $[(p \vee q) \wedge \sim (\sim p \wedge q)] = p$	3	CO1	A
ii)	Compute the inverse of the function, where $f(x) = (4x + 3)/(5x - 2)$, given $(x \neq 2/5)$.	3	CO2	U
iii)	Draw the Hasse diagram for the following set. $\{(a, b) \mid a \text{ divides } b\}$ on $\{1, 2, 3, 4, 6, 8, 12\}$	3	CO3	A
iv)	If any 5 numbers are chosen from 1 to 8, show that the sum of two of	3	CO4	A

	them will be 9.			
v)	If R is the set of all real numbers other than zero and if $a * b = 2ab$ Prove that $(R, *)$ is an Abelian group.	3	CO5	A
vi)	Is every Hamiltonian graph Eulerian? Explain with the help of an example.	3	CO6	U
Q.2	Solve any three questions out of four.	15		
i)	Prove by Mathematical Induction that $11^{(n+2)} + 12^{(2n+1)}$ is divisible by 133.	5	CO1	A
ii)	Show that the set of all divisors of 70 form a lattice.	5	CO3	A
iii)	Determine if the following graphs (G_1 & G_2 respectively) are isomorphic or not. 	5	CO6	E
iv)	Define Planar Graphs. A connected planar graph has 10 vertices each of degree 3. Into how many regions does a representation of this planar graph split the plane?	5	CO6	A
Q.3	Solve any three questions out of four.	15		
i)	For $x, y \in Z$, xRy if and only if $2x + 5y$ is divisible by 7. Is R an equivalence relation?	5	CO2	E

ii)	Let $A = \{1, 2, 3, 4\}$ and let $R = \{(1, 2), (2, 3), (3, 4), (2, 1)\}$. Find transitive closure of R using Warshall's algorithm.	5	CO2	E
iii)	Find the solution of the recurrence relation $a_n = 6a_{n-1} - 11a_{n-2} + 6a_{n-3}$ with the conditions $a_0 = 2$, $a_1 = 5$ and $a_2 = 15$.	5	CO4	E
iv)	Consider the $(2, 5)$ group encoding function $e : B^2 \rightarrow B^5$ defined by $e(00) = 00000$, $e(01) = 01110$, $e(10) = 10101$, $e(11) = 11011$ Decode the following words relative to maximum likelihood decoding function. a) 11110 b) 10011	5	CO5	E