AI-DS
Sem III
Scheme III

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

~~Nov- Dec 2024-2025~~ Jan/Feb 2025
(B. Tech) Program: Artificial Intelligence & Data Science Scheme :-IIB
Supplementary ~~Regular~~ Examination: SY Semester: III
Course Code: AIC305 and Course Name: Discrete structure& Data Science
Date of Exam: ~~30/11/2024~~ 07-02-25 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: (05 marks each)	10		
a)	Use the Law of Logics to show that $[(p \rightarrow q) \wedge \sim q] \rightarrow \sim p$ is a tautology.		1	Ap
b)	Construct the truth tables for the following statements $(p \vee \sim q) \vee \sim p$		2	Ap
c)	Draw the Hasse Diagram of D40.		3	Ap
Q 2	Solve any **two** questions out of three: (05 marks each)	10		
a)	How many license plates can be made using either two or three letters followed by either two or three digits?		4	Ap
b)	Prove that set G = {1,2,3,4,5,6} is a finite abelian group of order 6 with respect to multiplication module 7.		5	Ap
c)	Is every Eulerian graph a Hamiltonian? Explain with necessary graph		6	U
Q.3	Solve any **two** questions out of three. (10 marks each)	20		
a)	Prove using Mathematical Induction $2+5+8+\ldots+(3n-1)= \frac{n(3n+1)}{2}$		1	Ap
b)	Find the generating function for the following finite sequence i) 2,2,2,2,2,2 ii)1,1,1,1,1,1		4	An
c)	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 works relative to a maximum likelihood decoding function i) 11110 ii) 10011 iii) 10100		5	Ap
Q.4	Solve any **two** questions out of three. (10 marks each)	20		

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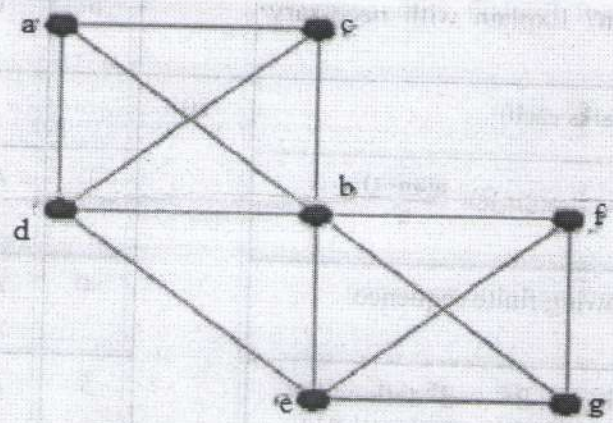
a)	Let A={a1,a2,a3,a4,a5} and R be a Relation on A whose Matrix is $M=\begin{vmatrix} 1 & 0 & 0 & 1 & 0 \\ 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 1 \\ 1 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 1 \end{vmatrix}$ Find M_R* by warshall's algorithm		2	An
b)	For the set X={ 2,3,6,12,24,36},a relation ≤ is defined as x≤y if x divide y. Draw the Hasse diagram for (x,≤). Answer the following i) What are the maximal and minimal elements? ii) Give one example of chain and antichain Is the Poset is lattice.		3	Ap
c)	Determine Euler circuit and Euler path in graph and Elementary path Elementary circuit shown below 		6	Ap

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