

APPENDIX-III

Question Paper Template (For Online Examination)

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

(B.Tech) Program: Artificial Intelligence & Data science

Examination: SY Semester: III

Course Code: 1UAIC302 and Course Name: Discrete structures and Graph Theory

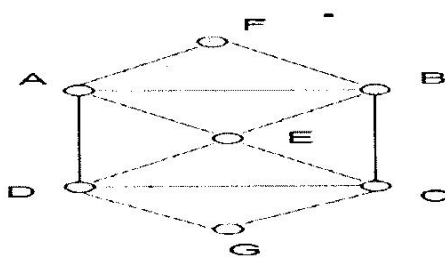
Duration: 02 Hours

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)	Given that value of $P \rightarrow q$ is true, can you determine the value of $\overline{P} \vee (P \leftrightarrow q)$	3	1	Analysis

ii)	<p>Comment Whether the Function f is one to one or onto.</p> <p>Consider Function $F: \mathbb{N} \rightarrow \mathbb{N}$ where \mathbb{N} is set of Natural numbers including Zero</p> $f(j) = j^2 + 2$	3	2	Apply
iii)	<p>Let $A = \{A, b, c\}$ show that $(P(A), \subseteq)$ is a Poset .Draw the Hasse diagram</p>	3	3	Apply
iv)	<p>Two dice are rolled, find the probability that the sum is</p> <p>(i) Equal to 1 (ii) If Equal to 4 (iii) Less than 13</p>	3	4	Apply
v)	<p>Let $H = \{ [0]_6, [3]_6 \}$ find the left and right cosets in group Z_6. Is H a normal subgroup of group of Z_6</p>	3	5	Analysis
vi)	<p>1) Is every Eulerian graph a Hamiltonian? Explain with necessary graph</p>	3	6	Apply
Q.2	<p>Solve any three questions out of four.</p>	15		
i)	<p>If p is True and q is False find the truth value of the following Proposition $p: T, q: F$</p> <p>a) $\sim(p \leftrightarrow q) \wedge p$</p> <p>b) $\sim(p \leftrightarrow q) \vee \sim \sim p$</p>	5	1	Analysis
ii)	<p>Draw the Hasse diagram of D_{60}. Also find whether it is a lattice.</p>	5	3	Apply
iii)	<p>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.</p> 	5	6	Apply

iv)	<p>Find PDNF of the following $(((p \wedge \bar{q}) \vee r) \vee (p \vee \bar{q})) \wedge r$</p>	5	1	Analysis
Q.3	Solve any three questions out of four.	15		
i)	<p>Let $A=B=R$ the set of real numbers.</p> <p>Let $f: A \rightarrow B$ be a given by the formula $f(x) = 2x^3 - 1$ and</p> <p>Let $g: A \rightarrow B$ be a given by</p> $g(y) = \sqrt[3]{\frac{1}{2}y + \frac{1}{2}}$ <p>Show that f is a bijection between A and B and g is bijection between B and A</p>	5	2	Apply
ii)	Use and draw a tree diagram to determine the number of subset of $(3,7,9,11,24)$ with that sum of the elements in the subset is less than 29.	5	4	Apply
iii)	Let G be the set of the real number and Let $a, b = ab/2$. show that $(G, *)$ is a abelian group	5	5	Analysis
iv)	<p>Let $f(x) = x + 2$, $g(x) = x - 2$ and $h(x) = 3x$ for $x \in R$ where $R =$ set of real numbers</p> <p>Find $(g \circ f), (f \circ g), (g \circ g), (f \circ h), (h \circ g), (h \circ f), (f \circ h \circ g)$</p>	5	2	Apply