

DSY

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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

27 Jan 2023

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

Examination: SY Semester: III

Course Code: AIC302/ CEC302 and Course Name: Discrete structures and Graph Theory

Duration: 02 Hours

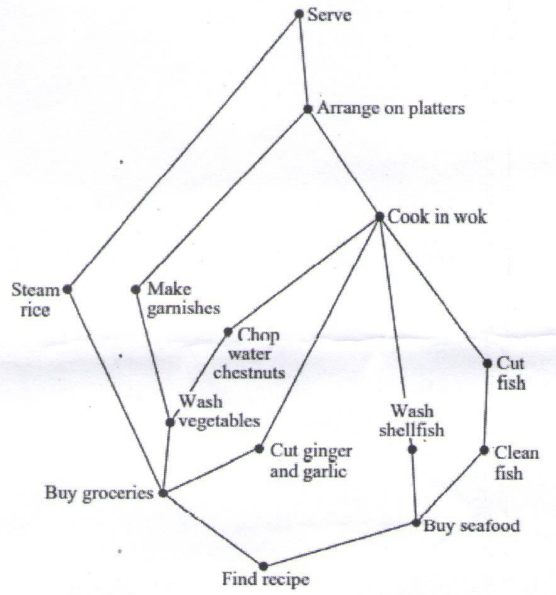
Max. Marks: 45

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)	Which of these sentences are propositions? What are the truth values of those that are propositions? a) Boston is the capital of Massachusetts. b) Miami is the capital of Florida. c) $2 + 3 = 5$. d) $5 + 7 = 10$	3	1	A
ii)	Define three equivalence relations on the set of buildings on a college campus. Determine the equivalence classes for each of these equivalence relations.	3	2	A
iii)	Give a poset that has a) a minimal element but no maximal element. b) a maximal element but no minimal element. c) neither a maximal nor a minimal element.	3	3	A

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iv)	<p>PizzaHut is currently serving the following kinds of individual meals: Pizzas- Supreme, Takoyaki, Kimchi, Hawaiian, Smoked House, Seafood, Veggie Delight, Veggie, Beef Pastas : Seafood Marinara, Chicken, Curry Veggie, Seafood Carbonara, Lasagna, Bolognaise. Using Sum Rule Find how long does it take for bruce to try each meal once?</p>	3	4	A
v)	Define Algebraic structures & list down its properties.	3	5	U
vi)	Describe the following term w.r.t to Graph a) Planar Graph b) Cut Set c) Cut Vertex	3	6	U
Q.2	Solve any three questions out of four.	15		
i)	Use De Morgan's laws to find the negation of each of the following statements. a) Kwame will take a job in industry or go to graduate school. b) Yoshiko knows Java and calculus. c) James is young and strong. d) Rita will move to Oregon or Washington.	5	1	A
ii)	Schedule the tasks needed to cook a Chinese meal by specifying their order, if the Hasse diagram representing these tasks is as shown here  <p>a) Find all chains in the posets with the Hasse diagram shown in above figure. b) Find all antichains in the posets with the Hasse diagram shown in above figure</p>	5	3	A

iii)	Describe a discrete structure based on a graph that can be used to model airline routes and their flight times.	5	6	A
iv)	Describe various operations on graph	5	6	U
Q.3	Solve any three questions out of four.	15		
i)	Find the smallest relation containing the relation $\{(1, 2), (1, 4), (3, 3), (4, 1)\}$ that is a) reflexive and transitive. b) symmetric and transitive. c) reflexive, symmetric, and transitive.	5	2	A
ii)	A factory makes custom sports cars at an increasing rate. In the first month only one car is made, in the second month two cars are made, and so on, with n cars made in the n th month. a) Set up a recurrence relation for the number of cars produced in the first n months by this factory. b) How many cars are produced in the first year?	5	4	A
iii)	What is the solution of the recurrence relation $a_n = -a_{n-1} + 4a_{n-2} + 4a_{n-3}$ with $a_0=8$, $a_1=6$ and $a_2=26$?	5	4	A
iv)	Illustrate the concept of Ring algebraic Structure	5	5	U

03/03



Q2 ii) Consider the $(2,6)$ group encoding function

$e: B_2 \rightarrow B_6$ defined by $E(00) = 000000$,

$e(01) = 011110$, $e(10) = 101101$, $e(11) = 110011$

Decode the following relative to maximum likelihood decoding function 1) 001110 2) 111101 3) 110010

Q3 iii) i) Define cyclic group. Prove that the

set $A = \{0, 1, 2, 3, 4, 5, 6\}$ is an finite abelian group under addition modulo 6.

ii) Show that the $G = \{1, 5, 7, 11\}$ is an abelian group under multiplication modulo 12

Q1. vi) give write definition

1) directed graph

2) undirected graph

3) complete graph