Course Code: OMC100C Last Date of Submission: 31.12.2023

Course Title: Mathematical Foundation of Computer Science Maximum Marks: 30

Assignment No.: 1 Session: July 2023

Note:

1. The assignment will have two parts, A and B. Part A is of 10 MCQ-type Questions of 1 mark each.

2. Part B is of 20 Marks having 8 Descriptive Questions. Attempt any 5 out of 8.

Part-A (10x1=10 Marks)

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| Q.No | Question | CO |
| 1 | If x is a set and the set contains an integer which is neither positive nor negative then the set x is \_\_\_\_\_\_\_\_\_\_\_\_.  a) Set is Empty b) Set is Non-empty  c) Set is Finite. d) Set is both Non- empty and Finite. | CO1 |
| 2 | If a relation R has the property that for every (a, b) in R, (b, a) is also in R, what type of relation is R?  a. Reflexive  b. Symmetric  c. Transitive  d. Antisymmetric | CO1 |
| 3 | What is a partial order relation?  a. Any relation with more than two elements  b. A relation that is neither symmetric nor antisymmetric  c. A relation that is reflexive, antisymmetric, and transitive  d. A relation with only one element | CO1 |
| 4 | In the principle of mathematical induction, find which of the following steps is mandatory?  a) induction hypothesis b) inductive reference  c) induction set assumption d) minimal set representation | CO1 |
| 5 | According to principle of mathematical induction, if is true then \_\_\_\_\_ must be true.  a) b)  c) d) | CO1 |
| 6 | If {1, 3, 5} and B = {1, 3, 5, 7} then A is a …. subset of B A) smaller B) proper C) improper D) normal | CO1 |
| 7 | A----------- is a set S with a relation R on it which is reflexive, anti-symmetric, and transitive. A) equivalent set B) ordered set C) implicit set D) Partially ordered set | CO1 |
| 8 | If every element in the domain is mapped to a unique element in the codomain, the function is said to be:  a. One-to-one  b. Onto  c. Invertible  d. Surjective | CO1 |
| 9 | Which function is often used to round down a real number to the nearest integer?  a. Floor function  b. Ceiling function  c. Ackermann's function  d. Mod function | CO1 |
| 10 | A function f: A → B is said to be …….. If for every y in B there exists at least one element x in A such that f(x) = y. A) surjective B) bijective C) injective D) Automorphism | CO1 |

Part-B (5x4=20 Marks)

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| Q.No | Question | CO |
| 1 | Determine whether the relation R on the set of all Web pages is reflexive, symmetric, antisymmetric, and/or transitive, where (a,b)∈ R if and only if a) everyone who has visited Web page a has also visited Web page b . b) There are no common links found on both Web page a and Web page b. c) There is at least one common link on Web page a and Web page b. d) There is a Web page that includes links to both Web page a and Web page b. | CO5 |
| 2 |  | CO3 |
| 3 | Write set builder notation to give a description of each of these sets. a) {0,3,6,9,12} b) {−3,−2,−1,0,1,2,3} c) {m,n,o,p} | CO1 |
| 4 | Let X= {1, 2, 3, 4, 5} and relation R= {(x, y)/x>y}. Construct the graph of ‘R’ and also give its matrix. | CO3 |
| 5 | Use Mathematical Induction to show that + + ⋯ + = - 1 | CO3 |
| 6 | Write the Procedure for Euclidean algorithm to calculate gcd of two numbers. | CO3 |
| 7 | Verify by mathematical induction,  + + ⋯ + | CO5 |
| 8 | 4. What is the Cartesian product of A = {1, 2} and B = {a, b}?  a) {(1, a), (1, b), (2, a), (b, b)}  b) {(1, 1), (2, 2), (a, a), (b, b)}  c) {(1, a), (2, a), (1, b), (2, b)}  d) {(1, 1), (a, a), (2, a), (1, b)  4. What is the Cartesian product of A = {1, 2} and B = {a, b}?  a) {(1, a), (1, b), (2, a), (b, b)}  b) {(1, 1), (2, 2), (a, a), (b, b)}  c) {(1, a), (2, a), (1, b), (2, b)}  d) {(1, 1), (a, a), (2, a), (1, b)  4. What is the Cartesian product of A = {1, 2} and B = {a, b}?  a) {(1, a), (1, b), (2, a), (b, b)}  b) {(1, 1), (2, 2), (a, a), (b, b)}  c) {(1, a), (2, a), (1, b), (2, b)}  d) {(1, 1), (a, a), (2, a), (1, b)  Use the Euclidean algorithm to Compute the greatest common divisor of 46 and 21. | CO2 |