Total No. of Questions : 4]

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S.E. (Computer Engineering/Computer Science & Design Engg/Artificial Intelligence & Data Science Engg.) (Insem)

DISCRETE MATHEMATICS

(2019 Pattern) (Semester - III) (210241)

Time : 1 Hour] *[Max. Marks : 30*

Instructions to the candidates:

1) *Answer Q1 or Q2, Q3 or Q4.*
2) *Neat diagrams must be drawn wherever necessary.*
3) *Figures to the right side indicate full marks.*
4) *Assume Suitable data, if necessary.*

Q1) a) Let A ={1, 2, 3} and B = {1, 2, 3, 4, 5}. Find **[5]**

i) P(A ∪ B)

ii) P(A ∩ B)

iii) A – B

b) By using mathematical induction prove that **[5]**

$S_n = 1 + 3 + ... + (2n-1) = n^2$; for all integers $n \geq 1$

c) Let P : I will study hard and Q: I will get admission in IIT.

Statement: If I study hard then I will get admission in IIT.

Write the Converse, Inverse & Contrapositive of the above statement. **[5]**

OR

Q2) a) Suppose 100 Computer Engineering students studies at least one of the following language C, C++ and Python. It is given that 65 students studies C language, 45 studies C++ language and 42 studies Python language. 20 students studies C and C++ language, 25 student studies C and Python language, 15 students studies C++ and Python language. Find students studying : **[5]**

i) Only C and C++ language, not Python language

ii) Only C and Python language, not C++ language

P.T.O.

b) Use mathematical induction to prove [5]

$S_n = 2 + 4 + 6 + 8 + \ldots + 2n = n(n + 1)$ for all positive integer n.

c) What is Logical Equivalence? Show that $\sim(q \rightarrow p) \vee (p \wedge q) \equiv q$ [5]

Q3) a) Let A = (0, 2, 4, 6, 8, 10 } and Relation aRb defined on set A as

aRb = {(a,b) | (a–b) % 2 == 0 ; ∀a,b ∈ A}.

Find aRb is Equivalence Relation or not? [5]

b) Write the relation pairs and Draw the Hasse Diagram for the Relation defined on set 'X' as aRb = {(a, b) | a divides b ; ∀a,b ∈ X };

where X = { 10, 20, 30, 40, 50, 60, 80, 100 }. [5]

c) If f(x) = 2x + 5 and g(x) = 5x + 2 find [5]

i) fog (5)

ii) fog (2) + gof(2)

OR

Q4) a) If X = {10,20,30,40,50} & Relation on set 'X' is represented as

aRb = { (a, b) | a divides b; ∀a,b ∈ X }. Find a relation aRb is Partial Order Relation or not? [5]

b) Let A = { 1, 2, 4, 8, 16, 24, 32, 48 }. A relation on set 'A' is defined as aRb = { (a, b) || a divides b; ∀a,b ∈ A}. [5]

i) Write Relation aRb

ii) Write any two Chain of aRb on set 'A'

iii) Write any two Anti Chain of aRb on set 'A'

c) If $f(x) = 16x^2 + 12$. Find Inverse of $f(x)$. Is the inverse of $f(x)$ is function? Justify. [5]