Total No. of Questions : 8] *[Total No. of Printed Pages : 2*

Roll No .....

CS/IT-302 (GS)

B.E. III Semester Examination, June 2020

Grading System (GS)

Discrete Structure

Time : Three Hours

Maximum Marks : 70

Note: i) Attempt any five questions.
ii) All questions carry equal marks.

1. Let A = {2, 3, 4} and B = {3, 4, 5, 6, 7}. Assume a relation R from A to B such that (x, y) ∈ R when a divides 6. Determine R, its domain and range.

2. If A be the set of all triangles in a plane and R = {(a, b) : a = Δb}, i.e. aRb ↔ area of the triangle a = Area of the triangle, then prove that R is an equivalence relation.

3. Let A = B = C = R, and Let f : A → B, g : B → C be defined by $f(a) = a + 1$ and $g(b) = b^2 + 2$, find
   i) (gof) (–2)
   ii) (fog) (x)
   iii) (gog) (y)
   iv) (gof) (x)

4. If A, B and C are any three sets, prove that :
   i) $A - (B \cap C) = (A - B) \cup (A - C)$
   ii) $A - (B \cup C) = (A - B) \cap (A - C)$

5. Among integers 1 to 300, how many of them are divisible neither by 3, nor by 5, nor by 7? How many of them are divisible by 3 but not by 5, nor by 7?

6. State Euler's formula for a planar graph. Give an example of a planar graph with 5 vertices and 5 regions and venty Euler's formula for your example.

   OR

   Show that the maximum number of edges in simple graph with n vertices is $\frac{n(n-1)}{2}$

7. Which of the following formulas are tautologies? Explain what is meant by "tautology" and write down truth tables to justify your answers.
   i) $p \Rightarrow q$
   ii) $(p \Rightarrow q) \Rightarrow p$
   iii) $((p \Rightarrow q) \Rightarrow p) \Rightarrow p$

OR

Solve the recurrence relation:

$a_r - 7a_{r-1} + 10a_{r-2} = 0$ given $a_0 = 0$ and $a_1 = 6$

8. Write the short notes. (any two)
   a) Graph Coloring
   b) Types of functions
   c) Recurrence relation
   d) Conjunctive and Disjunctive Normal Form
   e) Lattice

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