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Department of Computer Science and Engineering

B. Sc. (Hons.) 1st Semester Final Examination (Assignment), April-2020

Course No.: CSE 1105, Course Name: Mathematics-I

Full Marks: 30

(Answer all questions)

1. What is a function? Explain with example. Also, explain the domain and range of a function. 5

2. Let $X = \{1, 2, 3, 4\}$. Determine whether or not each relation below is a function from X into X. 5

   (a) $f = \{(2,3),\ (1,4),\ (2,1),\ (3,2),\ (4,4)\}$

   (b) $g = \{(3,1),\ (4,2),\ (1,1)\}$

   (c) $h = \{(2,1),\ (3,4),\ (1,4),\ (2,1),\ (4,4)\}$

3. i) Show that, $\lim_{x \to a} \frac{x^n - a^n}{x - a} = na^{n-1}$, for all rational values of n and a is positive. 5

   ii) Show that, $\lim_{x \to 0} \frac{\sin x}{x} = 1$.

4. Evaluate 5

   i) $\lim_{n \to \infty} x^n$

   ii) $\lim_{n \to \infty} \frac{x^n - 1}{x^n + 1}$

5. The function $f(x) \frac{x^2 - 16}{x - 4}$ is undefined at $x = 4$. What value must be assigned to $f(4)$, if $f(x)$ is to be continuous at $x = 4$. 5

6. Differentiate the following with respect to x 5

$$\frac{1 + \sin x}{1 - \sin x}$$