1ST SEMESTER MATHEMATICS (Honours)

ASSIGNMENT CC – 1

TOTAL MARKS – 20

1. Let $g(x) = [x]$, where $[x]$ denotes the greatest integer not exceeding x. Show that g is discontinuous at the points $x = 0, \pm 1, \pm 2, \pm 3, \ldots\ldots$ and is continuous at every other point. (5)

2. Does the function $h(x) = |x - 2|$ satisfy the conditions of Rolle's theorem in the interval $[1, 3]$? Justify your answer. (5)

3. Determine the values of p and q for which $\lim_{x \to 0} \frac{x(1 + p\cos x) - q\sin x}{x^3}$ exists and equals to 1. (5)

4. Show that the repeated limits exists but the double limit does not exist when $(x, y) \to (0, 0)$ for the function (5)

$$f(x, y) = \frac{x^2 y^2}{x^4 + y^4 - x^2 y^2}$$