Daffodil International University

Department of Computer Science & Engineering
Faculty of Science and Information Technology
Midterm Examination, Semester: Spring 2017

Course Code: MAT 111 | **Course Title: Mathematics-I**
Section: All | **Course Teacher: All**

Time: 1.5 hours | **Full Marks: 25**

Answer any Five (05) from the following questions

1. (a) Define function. [1]

(b) Find the domain and range of $y = \frac{1+x}{5-x}$ [2]

(c) Draw the graph of the function $y = 2 + \sqrt{x-1}$ [2]

2. (a) If $f(x) = \frac{1}{1-e^{1/x}}$ then find limits from the left and the right of $x = 0$. Does the limit of $f(x)$ at $x = 0$ exist? [2]

(b) Test the continuity of the function $f(x) = |x| + |x-2|$ at the point $x = 2$. [3]

3. (a) Find $\frac{dy}{dx}$ of the following function $y = (\sin x)^{\ln x}$ [2]

(b) Differentiate $\tan^{-1}\left(\frac{2x}{1-x^2}\right)$ with respect to $\sin^{-1}\left(\frac{2x}{1+x^2}\right)$ [3]

4. (a) If $y = e^{px}$, then find y_n. [2]

(b) If $y = \sin(\alpha x + \beta)$, then find y_n. [3]

5. (a) State Leibnitz's theorem. [1]

(b) If $y = \cot^{-1} x$ then show that $(1+x^2)y_{n+2} + 2(n+1)xy_{n+1} + n(n+1)y_n = 0$ [4]

6. (a) Find the inflection points of the function $f(x) = 2x^3 - 3x^2 - 12x$ [2]

(b) Find the maximum or minimum value of $f(x) = x^3 - 9x^2 + 24x - 12$ [3]