Department of Computer Science

Date: 13th April 2020

Midterm Assignment –Spring 2020

Course Title: Differential Equations

Instructor: Engr. Latif Jan

Program: BS (CS-SE-EE) **Total Marks: 30** **Time Allowed: 6 days**

Note: Attempt all Questions:

Q 1: a) Define differential equation along with 2 examples? **(1+1 Marks)**

b) Define a Separable Differential Equation (DE)? **(1+4+3 Marks)**

i. Solve the following **Initial Value Problem (IVP) using separable DE** and find the interval of validity of the solution**.**

(a) $\boldsymbol{y' = \frac{xy^3}{\sqrt{1+x^2}} \quad y(0) = -1}$

(b) $\boldsymbol{y' = e^{-y}\,(2x-4) \quad y(5) = 0}$

Q 2: a) Solve the following IVP using Linear Differential method **(2+5+3 Marks)**

(i) **Explain the steps for solving Linear Differential Equation.**

(ii) $\boldsymbol{cos(x)y' + sin(x)y = 2cos^3(x)sin(x) - 1 \quad y\left[\frac{\pi}{4}\right] = 3\sqrt{2}, \quad 0 \le x \le \frac{\pi}{2}}$

(iii) $\boldsymbol{x' + 2x = sint}$

Q 3: Solve the following IVP for the exact equation and find the interval of validity for the solution. **(5+5 Marks)**

(i) $\boldsymbol{2xy - 9x^2 + (2y + x^2 + 1)\frac{dy}{dx} = 0, \quad y(0) = -3}$

(ii) $\boldsymbol{\frac{2ty}{t^2+1} - 2t - (2 - ln(t^2+1))y' = 0 \quad y(5) = 0}$