Iqra National University, Peshawar

Department of Computer Science

Summer Semester Examination, Date: 24th Aug 2020

Mid – Semester Examination

Course Code: **Course Title: Differential Equations**

Instructor: Engr. Latif Jan

Program: BS (CS-SE-Tele) **Total Marks: 30** **Time Allowed: 4Hours**

Note: Attempt all Questions:

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

b) Define a **Separable Differentia**l (SD) Equation? **(1+4+3 Marks)**

i. Solve the following **Initial Value Problem (IVP)** and find the interval of validity of the solution for SD equations.

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

ii. Solve the following for SD equations:

$$\frac{dx}{dt} = \frac{t}{x}$$

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

a) Explain the steps for solving Linear Differential Equation.

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

(ii) $x' + 2x = sint$

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

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

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