



Iqra National University, Peshawar

Department of Computer Science

Spring Semester, Date: 25th June 2020

Final term – Semester Examination

Course Title: Differential Equations

Instructor: Engr. Latif Jan

Course Code:

Program: BS (CS-SE & EE)

Total Marks: 50 Time Allowed: 120 minutes

Note: Attempt all Questions:

Q 1: a) Define 2nd order linear homogenous/non-homogenous differential equation along with examples? **(1+1 Marks)**

b) Solve the following 2nd order Linear homogeneous /non-homogenous differential equation? **(5+5 Marks)**

- i. $4y'' - 6y' + 7y = 0$
- ii. $y'' - 4y' - 12y = 3e^{5x}$

Q 2: Solve the following IVP for the 2nd order linear equations. **(5+5+5+5 Marks)**

- (i) $16y'' - 40y' + 25y = 0$ $y(0) = 3$ $y'(0) = -9/4$
- (ii) $y'' + 14y' + 49y = 0$ $y(-4) = -1$ $y'(-4) = 5$
- (iii) $y'' - 4y' + 9y = 0$ $y(0) = 0$ $y'(0) = -8$
- (iv) $y'' - 8y' + 17y = 0$ $y(0) = -4$ $y'(0) = -1$

Q 3: Define Laplace transform along with example? **(2 Marks)**

A. Find the Laplace transforms of the given functions. **(2+2+2 Marks)**

1. $f(t) = 6(e^{-5t}) + e^{3t} + 5(t^3) - 9$
2. $g(t) = 4\cos(4t) - 9\sin(4t) + 2\cos(10t)$
3. $h(t) = e^{3t} + \cos(6t) - e^{3t}\cos(6t)$

Q4: Solve the following IVP using Laplace Transform. **(5+5 Marks)**

- (i) $y'' - 10y' + 9y = 5t$, $y(0) = -1$, $y'(0) = 2$
- (ii) $y'' - 6y' + 15y = 2\sin(3t)$, $y(0) = -1$, $y'(0) = -4$