GC University Lahore

Final term Exam 2021

Semester: III BSCS | **Time: 2h**

Course Title: Differential Equation | **Total Marks: 40**

Course Code: CS-Math 3201

Subjective

Note: Attempt any four questions. Each question carries equal marks.

Q2 (a): Solve the differential equation $(x^2 + y^2)dx + 2xydy = 0$ $3xy^2 + x^3 = c$ (5,5)

(b) Solve the exact differential equation $(y\sec^2 x + \sec x \tan x)dx + (\tan x + 2y)dy = 0$ $y^2 + y\tan x + \sec x = c$

Q3 (a) Solve by finding the integrating factor $(x^2 - 2x + 2y^2)dx + 2xydy = 0$ $x^2(x^2 - \frac{8}{3}x + 4y^2) = c$ (5,5)

(b) Find the equation of family of orthogonal trajectory of the family $y^2 = x^2 + cx$. $x^2y + y^3/3 = c$

Q4 (a)Find the general solution of the differential equation $\frac{d^3y}{dx^3} + \frac{dy}{dx} = 2x^2 + 3\sin x$. (5,5)

(b)Solve the Partial differential equation $\frac{\partial z}{\partial y} = 0$

Q5 (a) Solve by the method of variation of parameter of the following differential equation and find y_p. (5,5)

$$\frac{d^2y}{dx^2} + 4\frac{dy}{dx} + 5y = e^{-2x}\sec x$$

$e^{-2x}(c_1\cos x + c_2\sin x - \cos x \ln\cos x + x\sin x)$

(b) Solve by the method of Undetermined Coefficient (U.C) the given differential equation

$$y'' - 4y' + 4y = e^{2x}$$

$y_c = (c_1 + c_2x)e^{2x} + \frac{1}{2}x^2e^{2x}$

Q6 (a) A Physical system is governed by the initial value problem

$$y' - y = e^{-t} \quad y(0) = 0$$

$y(t) = \sinh t$

Find the solution to this system with help of Laplace transformation. (5,5)

(b) Compute the Laplace inverse of the function $F(s) = \frac{1}{s^2+2s-15}$

$\frac{1}{4}e^{-t}\sinh 4t$