



Daffodil International University

Department of Computer Science & Engineering

Faculty of Science & Information Technology

Midterm Examination, Semester: Summer'2019

Course Title: Mathematics-III (Ordinary and Partial Differential Equation)

Course Code: MAT131

Section: All

Level/Term: L1T3

Course Teachers: Ali

Time: 1.5 hours

Full Marks: 25

Answer any five(5) from the following six(6) questions

(5 * 5) = 25

1. (a) Find the order and degree of the following differential equation:

2+3

(i) $\left[1 + \left(\frac{dy}{dx}\right)^2\right]^{\frac{3}{2}} = a \frac{d^2y}{dx^2}$

(ii) $x\left[y \frac{d^2y}{dx^2} + \left(\frac{dy}{dx}\right)^2\right] = y \frac{dy}{dx}$

- (b) By eliminating the constants A and B, obtain the differential equation of which $xy = Ae^x + B e^{-x} + x^2$ is a solution.

2. Solve the differential equation by separating variables:

2.5+2.5

(a) $x \frac{dy}{dx} = (1 - 2x^2) \tan y$

(b) $\sec^2 x \tan y dx + \sec^2 y \tan x dy = 0$

3. Solve the non-homogeneous differential equation by reducing it to homogeneous form:

5

$$\frac{dy}{dx} = \frac{3y - 7x + 7}{3x - 7y - 3}$$

4. (a) Write down the Standard form of first order linear differential equation.

1+4

(b) solve the linear differential equation: $x \left(\frac{dy}{dx}\right) + 2y = x^4$

5. (a) write down the Bernoulli's equation.

1+4

(b) Solve the Bernoulli's equation: $\left(\frac{dy}{dx}\right) = x^3 y^3 - xy$

6. Check whether the differential equation is homogeneous or not?

1+4

Hence Solve: $\frac{dy}{dx} = \frac{y^3 + 3x^2 y}{x^3 + 3xy^2}$