

Green University of Bangladesh

Department of Computer Science and Engineering

Midterm Assessment (Google form), Fall 2021

Course Code: MAT 103 **Course Title: Ordinary & Partial Differential Equations and Co-ordinate Geometry**

Full Marks: 20

Time: 1 Hour

Sample questions are given below:

[The [CO#] represents mapping of the question with one of the expected outcomes of the course.]

1. Determine whether the following differential equation is exact or not [CO1] 1 Multiple Choice
$$(2y \sin x \cos x + y^2 \sin x)dx + (\sin^2 x - 2y \cos x)dy = 0$$
 - A. Yes
 - B. No
 - C. Both A and B
 - D. Undecided

2. A differential equation is considered to be ordinary if it has [CO1] 1 Multiple Choice
 - A. one dependent variable
 - B. more than one dependent variable
 - C. one independent variable
 - D. more than one independent variable

3. If the non exact differential equation is homogenous then what is the integrating factor? [CO1] 1 Multiple Choice
 - A. $e^{\int f(x)dx}$
 - B. $\frac{1}{Mx+NY}$
 - C. $\frac{1}{Mx-NY}$
 - D. $Mx + Ny$

4. What is the solution of the following differential equation? [CO1] 1 Multiple Choice
$$\frac{dy}{dx} = e^{2x} 4y$$
 - A. $\frac{1}{2} \ln y - e^{2x} = c$
 - B. $\frac{1}{4} (\ln y)^2 - e^{2x} = c$
 - C. $3 \ln y - e^{-2x} = c$
 - D. $4 \ln x - e^{-2y} = c$

5. The particular integral of $(D^2 + 2)y = e^{3x+2}$ is- [CO1] 1 Multiple Choice
- A. $\frac{1}{9}e^{3x}$
 B. $\frac{1}{11}e^{3x+2}$
 C. $\frac{1}{6}e^{3x+2}$
 D. None of the above
6. Complementary function for the following differential equation is [CO1] 1 Multiple Choice
- $$(D^2 - 2D + 1)y = 0$$
- A. $m = 0, 1$
 B. $m = 1, -1$
 C. $y = (c_1 + c_2x)e^x$
 D. $y = c_1e^{-x} + c_2e^x$
7. Write down the solution of the following differential equation [CO1] 2 Short Answer
- $$\frac{dy}{dx} + y \cot x = y^2 \sin^2 x$$
8. Using appropriate technique solve the differential equation [CO1] 3 File upload
- $$(x^2 + y^2)dy - 2x^2dx = 0$$
9. Construct the general solution for the following differential equation [CO1] 4 File Upload
- $$9\frac{d^2y}{dx^2} + 12\frac{dy}{dx} + 4y = e^{-\frac{2}{3}x}$$
10. If x denotes the amount of the quantity present at time t , then dx/dt denotes the rate at which the quantity changes and we are at once led to a differential equation. [CO2] 5 File Upload
- The rate at which radioactive nuclei decay is proportional to the number of such nuclei that are present in a given sample. Half of the original number of radioactive nuclei have undergone disintegration in a period of 1500 years.
- (i) What percentage of the original radioactive nuclei will remain after 4500 years?
- (ii) In how many years will only one-tenth of the original number remain?