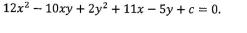
## Bangladesh Army University of Science and Technology

Department of Computer Science and Engineering Referred/Improvement/Backlog Examination, Fall 2018 Level-1 Term-II Course Code: MATH 1243 Course Title: Math-II(Ordinary and Partial Differential Equations and Co-ordinate geometry) Time: 03 (Three) hours Full Marks: 210 N.B.: (i) Answer any three questions from each PART (ii) Use separate answer script for each PART (iii) Marks allotted are indicated in the margin (iv) Symbols have their usual meanings PART A Define differential equation with example. What do you mean by order and degree of a 10 differential equation? Find the solution of the homogeneous differential equation  $(x^2 + y^2) \frac{dy}{dx} = xy$ . 10 Solve the equation  $\frac{dy}{dx} + \frac{y}{x} = x^2$ . 15 a) Solve the differential equation  $\frac{y^2z}{x}p + xzq = y^2$  with the help of Lagrange's method, where 15  $p = \frac{\partial z}{\partial x}$  and  $q = \frac{\partial z}{\partial y}$ . Find the solution the wave equation  $\frac{\delta u}{\delta x} = 2 \frac{\delta u}{\delta t} + u$ . 20 Solve the equation  $\frac{\partial^2 v}{\partial r^2} = \frac{\partial v}{\partial t}$  by separation of variables. 20 Find the solution of the differential equation  $x^2 \frac{d^2y}{dx^2} - x \frac{dy}{dx} + y = 0$ . 15 4. Determine the solution of the differential equation  $D^3y - 9D^2y + 23Dy - 15y = 0$ . a) 10 Solve the differential equation  $(D^2 - 2D + 5)y = e^{2x} \sin x$ . 10 Find the solution of  $(D^2 - 3D + 2)y = x^2$ . 15 PART B Find the condition that the general equation of the  $2^{nd}$  degree  $ax^2 + 2hxy + by^2 + 2gx + 2hxy + by^2 + 2gx + 2hxy + 2hxy$ 25 2fy + c = 0 may represent a pair of straight lines. Find point of intersection. By transforming to parallel axes through a properly chosen point (h, k). Prove that the 10 equation  $12x^2 - 10xy + 2y^2 + 11x - 5y + 2 = 0$  may be reduced to one containing only the term of the 2<sup>nd</sup> degree. 6. Find the value of c if the following equations may represent pairs of straight lines 10



Reduce the equation in standard form  $x^2 + 12xy - 4y^2 - 6x + 4y + 9 = 0$ . Hence identify it.

- a) Prove that the equation  $3y^2 8xy 3x^2 29x + 3y 18 = 0$  represent a pair of straight lines. Find angle between this two lines.
- b) Is the equation  $x^2 + 6xy + 9y^2 + 4x + 12y 5 = 0$  represent a pair of parallel straight 15 lines? If it represent a pair of parallel straight lines then find point of intersection.
- a) Find the equation of the circle which passes through the point (3,5) and (5,-3) and has its center on the line 2x + y = 27.
  - b) Find the equations of the planes passing through (2,3,1) and (4,-5,3) and parallel to the x- 20 axis, y-axis and z-axis respectively.