

**NATIONAL OPEN UNIVERSITY OF NIGERIA**

**14/16 AHMADU BELLO WAY, VICTORIA ISLAND, LAGOS**

**SCHOOL OF SCIENCE AND TECHNOLOGY**

**JUNE/JULY EXAMINATION**

**COURSE CODE: MTH421**

**COURSE TITLE: Ordinary Differential Equation**

**TIME ALLOWED:3HOURS**

**INSTRUCTION: ANSWER EQUATION ONE AND ANY OTHER FOUR. (TOTAL 5 QUESTIONS)**

1. Test for Exactness and solve

 7marks

b. Solve the differential equation

 7marks

2 a) When will a set of points A of the xy plane said to be **CONNECTED**? 3marks

 b) When is a set of points A of the xy plane said to be **OPEN?** 3marks

 c) What do you call an **OPEN** and **CONNECTED** set in the xy plane? 2.5marks

 d) When is a point P said to be a **BOUNDARY POINT** of a domain D? 3marks

 e) What will you call a **DOMAIN PLUS** its **BOUNDARY POINTS**? 2.5marks

3.a Solve the differential equation. 7marks

b. Solve the initial valued problem 7marks

4a.  7marks

4b. Solve the initial value problem  7marks

5a. .Solve the equation  10marks

5b. Show that the solution to question [4a] are linearly independent. 4marks

6 Solve the initial value problem

 14marks

7a. find the non-trivial solution of the sturm-Liouville problem.

  7marks

7b. Find the characteristics value and the characteristics function of the Sturm-Liouville problem.

7marks

Where it is assumed that the parameter  is non-negative i.e=0 and >0.