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**GARISSA UNIVERSITY**

**UNIVERSITY EXAMINATION 2018/2019 ACADEMIC YEAR THREE**

**SECOND SEMESTER EXAMINATION**

**SCHOOL OF BIOLOGICAL AND PHYSICAL SCIENCES**

**FOR THE DEGREE OF BACHELOR OF EDUCATION**

**COURSE CODE: MAT 304**

**COURSE TITLE: ORDINARY DIFFERENTIAL EQUATION II**

**EXAMINATION DURATION: 2 HOURS**

**DATE: 07/02/2020 TIME: 09.00-11.00 AM**

**INSTRUCTION TO CANDIDATES**

* **The examination has FIVE (5) questions**
* **Question ONE (1) is COMPULSORY**
* **Choose any other TWO (2) questions from the remaining FOUR (4) questions**
* **Use sketch diagrams to illustrate your answer whenever necessary**
* **Do not carry mobile phones or any other written materials in examination room**
* **Do not write on this paper**

**This paper consists of THREE (3) printed pages *please turn over***

**QUESTION ONE (COMPULSORY)**

**(a)** If and  are two solutions of the differential equation,

 , show that  and  are linearly independent solutions. **(4 marks)**  **(b)** Solve the differential equation:  **(6 marks)**

 **(c)** Prove that the necessary condition for integrability of the total differential

**** is where  **(6 marks)**

 **(d)** If  and are two solutions of the equation ,

then prove that being an arbitrary constant. **(8 marks)**

 **(e)** Solve the total differential equation:  **(6 marks)**

**QUESTION TWO (20 MARKS)**

 **(a)** Show that the linearly independent solutions of the equation are and

 . What is the general solution? Find the solution  with properties and

  **(13 marks)**

 **(b)** Show that and are linearly independent solutions of the

 differential equation . Determine the constants and so that the solution

  **(7 marks)**

**QUESTION THREE (20 MARKS)**

 **(a)**  Show that the differential equation is exact. Hence solve

 the equation given that , when  **(11 marks)**

 **(b)** Show the following differential equation by reducing it to normal form.

 ** (9 marks)**

**QUESTION FOUR (20 MARKS)**

**(a)** Find  such that the total differential equation is

 integrable. Hence solve it. **(12 marks)**

**(b)** Find the curves represented by the solution of  which lie in the

 plane  **(8 marks)**

**QUESTION FIVE (20 MARKS)**

Solve the following differential equations:

 **(a)**  **(10 marks)**

 **(b)  (10 marks)**