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**GARISSA UNIVERSITY**

**UNIVERSITY EXAMINATION 2019/2020 ACADEMIC YEAR TWO**

**SECOND SEMESTER EXAMINATION**

**SCHOOL OF SCHOOL OF PURE AND APPLIED SCIENCES**

**FOR THE DEGREE OF BACHELOR OF EDUCATION**

**COURSE CODE: MAT 211**

**COURSE TITLE: CALCULUS AND ANALYTIC GEOMETRY**

**EXAMINATION DURATION: 2 HOURS**

**DATE: 14/12/2020 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)** Evaluate where D is the region bounded by  and . **[6 marks]**

**(b)** Evaluate where C is defined as the curve  and  between 

and **[5 marks]**

**(c)** Evaluate where C is the right half of the circle  rotated in the counter

clockwise direction. **[6 marks]**

**(d)** Evaluate where C consists of the arc of the parabola from  to 

followed by the vertical line segment  from  to  **[7 marks]**

 **(e)** Use a polar double integral to show that a sphere of radius  has volume. **[6 marks]**

**QUESTION TWO (20MARKS)**

**(a)** Evaluate , xx **[5 marks]**

**(b)** Evaluate where E is the region under the plane  that lies in the first

octant. **[8 marks]**

**(c)**Find the surface area of the portion of the plane  that lies in the first octant.

 **[7 marks]**

**QUESTION THREE (20MARKS)**

 **(a)** Determine the volume of the region that lies under the sphere, above the plane

and inside the cylinder . **[9 marks]**

 **(b)** Convert into an integral in cylindrical coordinates. Hence evaluate. **[11 marks]**

**QUESTION FOUR (15MARKS)**

**(a)**Evaluate the following integral by converting them into polar coordinates,

 Where D is the region inside the circle . **[5 marks]**

**(b)**Use spherical coordinates to evaluate  where E is the ball 

 **[5 marks]**

 **(c)** Evaluate where C is the helix given by . **[5 marks]**

**(d)** Evaluate  where D is the portion of the region between circles of radius 2 and radius

 5 centered at the origin that lies in the first quadrant. **[5 marks]**

**QUESTION FIVE (20 MARKS)**

 **(a)**Find the surface area of that part of the paraboloid that lies above the plane 

 **[10 marks] (b)** Evaluate where E is the region that lies below the plane  above the 

 Plane and between the cylinders  and . **[10 marks]**