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**University Examinations 2016/2017**

**SECOND YEAR, FIRST SEMESTER EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE IN MATHEMATICS AND COMPUTER SCIENCE, BACHELOR OF SCIENCE IN STATISTICS, BACHELOR OF SCIENCES,BACHELOR OF SCIENCE IN ACTURIAL SCIENCE, BACHELOR OF SCIENCE IN EDUCATION.**

**SMA 3211: LINEAR ALGEBRA I**

**DATE: DECEMBER, 2016 TIME: 2 HOURS**

**INSTRUCTIONS: - *Answer question one and any other two questions***

**QUESTION ONE (30 MARKS)**

1. **(i) solve for** $m$ **and** $n$ **such that  (2 marks)**

**(ii) Find the angle between the vectors  and  (3 marks)**

1. **Given that vectors  and  determine  (2 marks)**
2. **Determine the value of a scalar k such that the vectors  and  are orthogonal. ( 3 marks)**
3. **Write the vectors  as a linear combination of the vectors  and  (7 marks)**
4. **Find the parametric and symmetric equations of the line passing through the point** $(2,-3,4)$ **and parallel to the vectors** $(3,5,-6)$ **(5 marks)**
5. **Find the distance between the point** $(1,-4,-3)$ **and the plane** $2x-3y+6z=-1$ **(3 marks)**
6. **Show that is not a subspace of** $R^{3}$ **(5 marks)**

**QUESTION TWO (20 MARKS)**

1. **Prove that the lines  and  do not meet (7 marks)**
2. **Find the equation of a line passing through point** $(3,4) $**and orthogonal to the vector** $(1,2)$ **(6 marks)**
3. **Find the equation of the plane passing through the points  and  (7 marks)**

**QUESTION THREE (20 MARKS)**

1. **Determine whether vector **$ϵR^{3}$ **is a linear combination of the vectors  and  (7 marks)**
2. **Show that the vectors ,  and  are linearly independent. (7 marks)**
3. **Write the polynomial  as a linear combination of the polynomials  and  (6 marks)**

**QUESTION FOUR (20 MARKS)**

1. **Prove that  is a subspace of** $R^{2}$ **(8 marks)**
2. **Show that  span** $R^{3}$**. (7 marks)**
3. **Show that  is a basis of** $R^{2}$ **(5 marks)**

**QUESTION FIVE (20 MARKS)**

1. **Show that the transformation** $T:R^{2}⟶R^{2}$ **defined  is linear (7 marks)**
2. **Show that** $T:R^{3}⟶R^{3}$ **defined by  is invertible and hence find  (9 marks)**
3. **Given that** $T:R^{2}⟶R^{2}$ **is defined by . Find the Kernel of T. (4 marks)**