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**University Examinations 2015/2016**

SECOND YEAR, FIRST SEMESTER EXAMINATION FOR DEGREE OF BACHELOR OF SCIENCE IN ACTUARIAL SCIENCE , BACHELOR OF SCIENCE IN MATHEMATICS AND COMPUTER SCIENCE, BACHELOR OF EDUCATION SCIENCE, AND BACHELOR OF SCIENCE PHYSICS OPTION

**SMA 3211: LINEAR ALGEBRA I**

**DATE: November, 2015 TIME: HOURS**

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

**QUESTION ONE – (30 MARKS)**

1. Show that (0,1,0) is a linear combination of (3,0,9) (0,5,1) and (-1, 0,0) (3 Marks)
2. Given the points (1, -1,4) , (2,1, -1) and (-1, -2, -3).
3. Find the general vector on the plane through these points. (3 Marks)
4. Find the equation of the plane containing the points (4 Marks)
5. Given that  and that  evaluate  and (4 Marks)
6. Let G = in . Show whether G is a subspace of

(4 Marks)

1. Determine if vectors (1 ,2, 3,) , (4, 5, 6), (2, 1, 0) are linearly independent. (4 Marks)
2. Let f: be linear. Prove that Ker f is a subspace of (4 Marks)
3. Show that the vector  and  forms the basis for the vector space (4 Marks)

**QUESTION TWO (20 MARKS)**

1. (i) Find the angle between (2,2,1) and (1,4,8) (2 Marks)

(ii) Determine C so that B =  are perpendicular.

 (2 Marks)

1. Show that  and - are parallel. (2 Marks)
2. Prove that the diagonals of a rhombus are orthogonal to one another. (5 Marks)
3. (i) Find the equation of the plane which passes through ( -1,2,3) and is perpendicular to the planes 2x – 3y + 4z = 1 and 3x – 5y + 2z = 3 (4 Marks)

(ii) Find the parametric and symmetric equation equations of lines L passing through the points P(2, -1,6) and Q (3,1,-2) (5 Marks)

**QUESTION THREE (20 MARKS)**

1. Define the rank nullify of a linear transformation. (3 Marks)
2. If T: define by T (x, y z) =
3. Show that T is linear. (7 Marks)
4. Find (a) Kernel and nullity of T

 (b) Image and Rank of T (10 Marks)

**QUESTION FOUR (20 MARKS)**

1. Define a subspace of a vector space. (3 Marks)

1. Determine whether;
2. = is a subspace of
3. = is a subspace of (8 Marks)
4. If U,V are subspaces of , show whether U V is a subspace of (4 Marks)
5. Let U $ W be the following subspaces of , and W= , Find the dimension and basis for:
6. U
7. W
8. U
9. U + W

**QUESTION FIVE (20 MARKS)**

1. Show that can be written as a linear combination of vectors and (4 Marks)
2. Solve the system;

4x + 5y + 6z = 24

3x + y- 2z = 4 (5 Marks)

1. Find a basis for the space spanned by (1, 2, -3), (-2,0,4) (0, 4, -2) (11 Marks)