

**W1-2-60-1-6**

**JOMO KENYATTA UNIVERSITY OF AGRICULTURE AND TECHNOLOGY**

**UNIVERSITY EXAMINATIONS 2015/2016**

**YEAR IV SEMESTER II EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE (MATHEMATICS AND COMPUTER SCIENCE)**

**SMA 2422: ANALYTICAL APPLIED MATHEMATICS**

**DATE:DECEMBER 2015 TIME: 2 HOURS**

**INSRUCTIONS:** Answer question one (compulsory) and any other two questions.

QUESTION ONE (30 MARKS)

a. Define the following terms citing examples.

 i. Orthogonal matrix (2 marks)

 ii. Covariant tensor. (2 marks)

 iii. Contravariant tensor (2 marks)

 iv. Contraction. (2 marks)

b. Solve the equation

 u(x)=u(y) dy. (6 marks)

c. Find the laplace transform of L{cos ax} (5 marks)

d. Write the law of transformation of the tensors;

 i. A (2 marks)

 ii. B (2 marks)

 iii. Cm (2 marks)

e Prove that Jn(x)=(-1)n Jn(x) (5 marks)

QUESTION TWO (20 MARKS)

a. A quantity A(j, k,l, m) which is a function of coordinates x transform to another co- ordinate system x-I according to the rule.

 

 i. Is the quantity a tensor? (1 mark)

 ii. If so, write the tensor in suitable notation. (3 marks)

 iii. Give the contravariant and covariant order, and rank. (4 marks)

b. If f(x)=eax, find L{eax} (12 marks)

QUESTION THREE

Write  and in terms of sine and cosine, hence find  and (20 marks)

QUESTION FOUR (20 MARKS)

a Let  be a tensor, choose t=p and show that  where the summation conversion is employed is a tensor. What is its rank. (8 marks)

b. Find  (12 marks)