

**MERU UNIVERSITY OF SCIENCE AND TECHNOLOGY**

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**University Examinations 2014/2015**

SECOND YEAR, SPECIAL/SUPPLEMENTARY EXAMINATION FOR DIPLOMA IN CIVIL AND ELECTRICAL ENGINEERING

**SMA 0211: ENGINEERING MATHEMATICS IV**

**DATE: OCTOBER, 2015 TIME: HOURS**

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

**QUESTION ONE – (30 MARKS)**

1. Evaluate; (3 Marks)
2. Find the general term an for the sequence.

 (3 Marks)

1. Use limit comparison test to show that the series converges (5 Marks)
2. Solve the O.D.E (5 Marks)
3. Show that the geometric series  converges to  for  but diverges for (3 Marks)
4. Evaluate (5 Marks)
5. Solve the value problem (5 Marks)

**QUESTION TWO – (15 MARKS)**

1. Find the Taylor’s series expansion of about (5 Marks)
2. Use the ratio test to investigate the convergence of the series  (5 Marks)
3. Use the integral test to show that the harmonic series  diverges.

 (5 Marks)

**QUESTION THREE – (15 MARKS)**

1. Find the adjoint of the matrix;

B = (4 Marks)



1. Use Cramer’s rule to solve the simultaneous equation

 (7 Marks)

1. Let A = and B =

Find:

1. A – B (2 Marks)
2. (2 Marks)

**QUESTION FOUR – (15 MARKS)**

1. Solve the following IVP;

  (5 Marks)

1. Show that the differential equation is exact, , hence find its general solution. (5 Marks)
2. (i) Define a second order linear differential equation. (1 Mark)

(ii) Solve the IVP (4 Marks)

**QUESTION FIVE – (15 MARKS)**

1. Determine the amplitude , period and mid-line of the function ; (3 Marks)
2. Obtain the Taylor’s series expansion of the function ln x about (5 Marks)
3. Find the fourier series coefficient and fourier series of a square wave function defined by

 and (7 Marks)