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**JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY**

**SCHOOL OF MATHEMATICS AND ACTUARIAL SCIENCE**

**UNIVERSITY EXAMINATION FOR DEGREE OF MASTER OF SCIENCE**

**1ST YEAR 2NDSEMESTER 2016/2017 ACADEMIC YEAR**

**MAIN CAMPUS**

**COURSE CODE: SMA 818**

**COURSE TITLE: ORDINARY DIFFERENTIAL EQUATIONS II**

**EXAM VENUE: STREAM:**

DATE: EXAM SESSION:

TIME: 3.00 HOURS

**Instructions:**

1. **Answer any THREE questions.**
2. **Candidates are advised not to write on the question paper.**
3. **Candidates must hand in their answer booklets to the invigilator while in the examination room.**

**QUESTION ONE (20 MARKS)**

1. Define the following terms
2. Orthogonality (3 marks)
3. Orthornomal set of functions (3 marks)
4. Determine the constants , , so that ,,  and  are mutually orthogonal in  and then obtain the corresponding orthonormal set (14 marks)

**QUESTION TWO (20 MARKS)**

a) Find the Eigenvalues and the eigenfunctions of a Sturm-Liouvillle Problem, (12 marks)

1. Solve the boundary value problem , ,  (8 marks)

**QUESTION THREE (20 MARKS)**

Consider a Bessel Equation of order n given by 

1. By assuming a solution  show that the roots of the indical equation are  and . (3 marks)
2. From *a*) above use  and  to obtain the possible bessel functions (3 marks)
3. Considering non integral and non zero values of *n* determine the complete solution of the Bessel’s equation giving your answer in terms of (gamma) (5 marks)
4. Taking  and leting the solution be for integral values of *n* Show that the complete solution is  (9 marks)

**QUESTION FOUR(20 MARKS)**

Solve in series the equation  given 

**QUESTION FIVE (20 MARKS)**

Use frobenius method to solve

