

**MERU UNIVERSITY OF SCIENCE AND TECHNOLOGY**

**P.O. Box 972-60200 – Meru-Kenya**

**Tel: 020-2069349, 061-2309217. 064-30320 Cell phone: +254 712524293, +254 789151411**

**Fax: 064-30321**

**Website:** [**www.must.ac.ke**](http://www.must.ac.ke) **Email:** **info@must.ac.ke**

**University Examinations 2015/2016**

THIRD YEAR, FIRST SEMESTER EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE MATHAMTICS AND COMPUTER, AND BACHELOR OF SCIENCE

**SMA 2321 : NUMERICAL ANALYSIS I**

**DATE: November, 2015 TIME:** $2$**HOURS**

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

**QUESTION ONE - (30 MARKS)**

1. (i) If x = $^{8}/\_{9}$ and the approximate value of x to 3 decimal places is 0.889. Show that

 EA = 0.0005. (3 Marks)

 (ii) How many digit will you take in evaluating the square-root of thirty so that the error you make is less than 0.1% (3 Marks0

1. Convert $(58)\_{10}$ into its corresponding octal form. (4 Marks)
2. By using an iterative method to 2 decimal places, find the root of the equation $x^{3}=1-x$ given that the root lies near 1. (4 Marks)
3. By applying the Newton- Raphson formula twice, find the cube-root of twelve(4 Marks)
4. Find $∆^{4}f\_{0}$, given that $f\_{o}$ =1, $f\_{1}$ =1$1 , f\_{2}$=21 , $f\_{3}$ =28 and $f\_{4}$ =29 (4 Marks)
5. By using the method of synthetic division, express f(x) = $x^{4}-5x^{3}+3x+4$ , in terms of factorial polynomials. (4 Marks)
6. Find f(0.4), if f(0.3)= 0.61, f(0.5) = 0.69 and f(0.6) = 0.72 (4 Marks)

**QUESTION TWO (20 MARKS)**

1. State the number of significant figures in each of the following numbers;
2. 7.00 (1 Mark)
3. 6900 (1 Mark)
4. (i) If the absolute error of the approximate number 11.2461 is 2.5 x $10^{-3}$, state the num**b**er of significant figures in the number. (2 Marks)

(ii) If 3.14 is used instead of $π=22/7$, find the percentage error. (3 Marks)

1. Given that u = $5xy^{2}z^{-3}$,$∆x , ∆y$ and $∆z$ denote the errors in x, y and z respectively such that x = y = z=1 and $∆x= ∆y=∆z=0.001$ Find the maximum error in u

(3 Marks)

1. Find by Newton’s method the root of the equation $e^{x}$= 4x, which is approximately 2, correct to 3d.p (5 Marks)
2. Solve the equation x tanx = -1 by Regular-falsi method starting with 2.5 and 3.0 as the initial approximation to the root. (5 Marks)

**QUESTION THREE (20 MARKS)**

1. (i) Show that $∆logx=log\left[1+\frac{h}{x}\right]$ (3 Marks0

(ii) Find the 1st term of the series whose second term and subsequent terms are 8,3,0,-1,… (3 Marks)

1. Using the successive bisection method, find a root of the equation $x^{3}=x+4$ that lies between 1 and 2 to 3 decimal places. (10 Marks)
2. A second degree polynomial passes through the points (1, -1) , (2 ,-1), (3, -1) , (4,5). Find the polynomial. (4 Marks)

**QUESTION FOUR (20 MARKS)**

1. From the following table, find $y^{'}\left(1.05\right) $and $y^{''}\left(1.05\right)$

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| x | 1.00 | 1.05 | 1.1 | 1.15 | 1.20 | 1.25 | 1.30 |
| y | 1.00000 | 1.02470 | 1.04881 | 1.07238 | 1.09544 | 1.11803 | 1.14017 |

1. From the following table find x correct to 2dp for which y is maximum and find the corresponding values of y

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| x | 1.2 | 1.3 | 1.4 | 1.5 | 1.6 |
| y | 0.9320 | 0.9636 | 0.9855 | 0.9975 | 0.9996 |

**QUESTION FIVE (20 MARKS)**

1. By taking seven ordinates, Evaluate  using Simpsons rule. (6 Marks)
2. Calculate , correct to 4 decimal place. (6 Marks)
3. Evaluate  (4 Marks)
4. The following is a table of a polynomial degree 5. It is known that $f(3)$ is an error. Correct the error. (5 Marks)