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**University Examinations 2014/2015**

SECOND YEAR, FIRST SEMESTER EXAMINATION FOR THE DEGREE OF BACHELOR OF ACTURIAL SCIENCE

**SMA 2321: NUMERICAL ANALYSIS I**

**DATE: DECEMBER 2014 TIME: 2 HOURS**

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

**QUESTION ONE (30 MARKS)**

1. (i) Find by iterative method the root near 3.8 of the equation $2x$-correct to four decimal places. (5 marks)

(ii) Using Newton-Raphson iterative formula establish the iterative formula  to calculate the root of N where N is a real number, hence find the cube-root of 12 to 4 decimal places. (7 marks)

1. Find (i)  (2 marks)

 (ii)  (2 marks)

1. Given 

find. (4 marks)

1. Evaluate y$=e^{2x}$ for x=0.05 from the following table using Newton’s backward interpretation formula (7 marks)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| x | 0.00 | 0.10 | 0.20 | 0.30 | 0.40 |
| y=$e^{2x}$ | 1.000 | 1.2214 | 1.4918 | 1.8221 | 2.255 |

1. Evaluate  (3 marks)

**QUESTION TWO (20 MARKS)**

1. From the following table of values of x and y find $ $and for x=1.05, using Newton’s forward interpolation formula. (10 marks)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| x | 1.00 | 1.05 | 1.10 | 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 two decimal places for which y is maximum and find this value of y. (10 marks)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| x | 1.2 | 1.3 | 1.4 | 1.5 | 1.6 |
| y | 0.9320 | 0.9636 | 0.9855 | 0.9975 | 0.996 |

**QUESTION THREE (20 MARKS)**

1. (i) Using Lagrange’s interpolation formula, find a polynomial which passed through the

 points

 (0,-12), (1,0), (3,6), (4,12). (10 marks)

(ii) Using Lagrange’s interpolation formula, find the value of y corresponding to x=10

 from the following table. (10 marks)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| x | 5 | 6 | 9 | 11 |
| y | 12 | 13 | 14 | 16 |

**QUESTION FOUR (20 MARKS)**

1. Calculate the value of  correct to three significant figures taking six intervals by toxpezadal rule. (8 marks)
2. Find the value of, using n=6 correct to five significant figures by Simpon’s rule. (7 marks)
3. Find the value of  from , using Euler-maclaurin formula (5 marks)

**QUESTION FIVE (20 MARKS)**

1. Find the iterative methods based on the Newton-Raphson method for finding and where N is a positive real number. Apply the methods when N=18 to obtain the results correct to 2 decimal (6 marks)
2. Perform two iterations of the linear iteration method followed by one iteration of the Aitken’s method to find the root of the equation $f(x)$=$e^{-x}$ (7 marks)
3. A real-root of the equation $f(x)=x^{3}-5x+1$=0 lies in the interval (0,1). Perform four iterations of the Regula-Falsi method to obtain this root. (7 marks)