

**NATIONAL OPEN UNIVERSITY OF NIGERIA**

**Plot 91, Cadastral Zone, NnamdiAzikiwe Expressway, Jabi, Abuja.**

**FACULTY OF SCIENCES**

**January\February Examination 2018**

**Course Code: MTH307**

**Course Title: Numerical Analysis II**

**Credit Unit: 3**

**Time Allowed: 3 HOURS**

**Instruction: ATTEMPTNUMBER ONE (1) AND ANY OTHERFOUR (4) QUESTIONS**

1. (a) Find the best value of a and b so that fits the data given in the table below:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| ***x*** | 0 | 1 | 2 | 3 | 4 |
| ***y*** | 1.0 | 2.9 | 4.8 | 6.7 | 8.6 |

**[3 Marks]**

(b). (i)Show that 

whereis Chebyshev polynomial. **[4 Marks]**

(ii)Let, construct a free cubic spline. **[5 Marks]**

(c) (i)Evaluate  for  by applying Newton- Cotes formula. **[5 Marks]**

(ii) Solve the boundary value problem  **[5 Marks]**

1. (a) In the following table some observed values of *x and y* are given

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| ***x*** | 2 | 3 | 4 | 5 | 6 | 7 |
| ***y*** | 4 | 5 | 5.71 | 6.25 | 6.67 | 7 |

the law connecting *x and y* is given as: . Find the best value of *a and b.*

**[6 Marks]**

1. Find the cubic spline in the table below:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| *X* | 0 | 2 | 4 | 6 |
| *Y* | 1 | 9 | 41 | 41 |

**[6 Marks]**

1. (a) Find linear and quadratic least square approximation to

Using Legendre polynomials. **[6 Marks]**

1. Use Hermite cubic interpretation to estimate the value of taking [6 Marks]
2. (a) Express in terms of Legendre polynomials. **[6 Marks]**
3. For points (0,0), (1,0.5), (2,2) and (3,1.5), find the interpolation cubic spline *S(x)* satisfying and . **[6 Marks]**
4. (a) Evaluate the integral

 using trapezium Rule **[6 Marks]**

1. Evaluate the Integral, using Simpsons rule

**[6 Marks]**

1. (a) Find all the solution of the following boundary value problem

 **[6 Marks]**

1. Solve the Laplace equation



Subject to the boundary conditions





**[6 Marks]**