Reg.No. \_\_\_\_\_\_\_\_\_\_\_\_\_



**End Semester Examination – Nov / Dec – 2019**

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
| **Code :** | **17MA2006** | **Duration :** | **3hrs** |
| **Sub. Name :** | **NUMERICAL MATHEMATICS AND COMPUTING** | **Max. marks :** | **100** |

**ANSWER ALL QUESTIONS (5 x 20 = 100 Marks)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Q. No.** | **Sub Div.** | **Questions** | **Course**  **Outcome** | **Marks** |
| 1. | a. | Convert to nested form. Find using nested multiplication. Also write the pseudocode of nested multiplication. | CO1 | 10 |
| b. | Derive the Taylor’s series for at *c* = 0 and prove that it converges to by using Taylor’s Theorem. | CO1 | 10 |
| **(OR)** | | | | |
| 2. | a. | Expand in powers of *h*. Then compute and | CO2 | 10 |
| b. | Convert to octal, binary and hexadecimal forms. | CO2 | 10 |
|  | | | | |
| 3. | a. | Using Bisection Method, find a root of the equation  correct to 4 decimal places. | CO3 | 10 |
| b. | Write the pseudocode of Newton’s Raphson Method. | CO3 | 10 |
| **(OR)** | | | | |
| 4. | a. | Using Newton’s Method, find a root of correct to 4 decimal places. | CO3 | 10 |
| b. | Find an iterative formula for and hence find correct to 4 decimal places using Newton’s Raphson Method. | CO3 | 6 |
| c. | If a = 0.1 and b = 1.0, how many steps of the bisection method are needed to determine the root with an error of at most | CO3 | 4 |
|  | | | | |
| 5. | a. | Using Newton’s Algorithm, find the interpolating polynomial of least degree and also find from the following table   |  |  |  |  |  | | --- | --- | --- | --- | --- | | x | 0 | 1 | – 1 | 2 | | f | – 5 | – 3 | – 15 | 39 | | CO4 | 10 |
| b. | Convert  to nested form then find using nested multiplication. | CO4 | 6 |
| c. | Write the pseudocode of Newton’s Divided Difference Formula. | CO4 | 4 |
| **(OR)** | | | | |
| 6. | a. | Find an interpolating polynomial using Newton’s Divided difference formula and also find from the following table.   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | x | 0 | 1 | 3 | 2 | 5 | | y | 2 | 1 | 5 | 6 | – 183 | | CO4 | 10 |
| b. | Find a polynomial of least degree from the following table of values using Lagrange’s interpolation method.   |  |  |  |  |  | | --- | --- | --- | --- | --- | | x | – 2 | – 1 | 0 | 1 | | y | 2 | 14 | 4 | 2 | | CO4 | 10 |
|  | | | | |
| 7. | a. | Evaluate with 7 uniform points using (i) Trapezoidal Rule (ii) Simpson’s 1/3rd Rule (iii) Simpson’s 3/8th Rule | CO5 | 15 |
| b. | Write the pseudocode of Simpson’s 1/3rd Rule. | CO5 | 5 |
| **(OR)** | | | | |
| 8. | a. | Approximate using Romberg’s Algorithm by evaluating R(2,2) | CO5 | 10 |
| b. | Determine the Gaussian Quadrature Formula for the interval [ – 4,4] and the nodes are – 1, 0, 1. | CO5 | 10 |
|  | |  |  |  |
|  | | **Compulsory**: |  |  |
| 9. | a. | Determine whether the function given below is a first degree spline function | CO6 | 5 |
| b. | Determine whether the function given below is a quadrature spline function. | CO6 | 5 |
| c. | Derive the equation of the natural cubic interpolating spline from the following data .   |  |  |  |  | | --- | --- | --- | --- | | x | – 1 | 0 | 1 | | y | 1 | 2 | – 1 | | CO6 | 10 |