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



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

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| **Code :** | **18MA3009** | **Duration :** | **3hrs** |
| **Sub. Name :** | **NUMERICAL ANALYSIS** | **Max. Marks :** | **100** |

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| **Q. No.** | **Sub Div.** | **Questions** | **CO** | **Marks** |
| **ANSWER ANY FIVE QUESTIONS (5 x 16 = 80 Marks)** | | | | |
| 1. | a. | From the following data, find y at x = 43 using Newton’s forward formula.   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | x | 40 | 50 | 60 | 70 | 80 | 90 | | y | 184 | 204 | 226 | 250 | 276 | 304 | | CO1 | 8 |
| b. | Using Lagrange’s interpolation formula, find y(10) from the following table.   |  |  |  |  |  | | --- | --- | --- | --- | --- | | x | 5 | 6 | 9 | 11 | | y | 12 | 13 | 14 | 16 | | CO1 | 8 |
|  |  |  |  |  |
| 2. | a. | Derive the differentiation formula with the order of accuracy using forward difference formula. | CO3 | 8 |
| b. | Given the following data, find the first two derivatives of the function tabulated below at x = 56.   |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | | x | 50 | 51 | 52 | 53 | 54 | 55 | 56 | | y | 3.6840 | 3.7084 | 3.7325 | 3.7563 | 3.7798 | 3.8030 | 3.8259 | | CO3 | 8 |
|  |  |  |  |  |
| 3. | a. | Find a real root of the equation *x*3 – *x* = 1 correct to 4 decimal places using Bisection Method. | CO2 | 8 |
| b. | Find a real root of the equation 3*x* – *cosx* – 1 = 0 correct to 6 decimal places using Newton Raphson Method. | CO2 | 8 |
|  |  |  |  |  |
| 4. |  | Evaluate using (i) Composite Trapezoidal Rule (ii) Composite Simpson’s 1/3 Rule (iii) Composite Simpson’s 3/8 Rule | CO4 | 16 |
|  |  |  |  |  |
| 5. | a. | Using Taylor method compute *y*(0.2) and *y*(0.4) correct to 4 decimal places given and . | CO5 | 8 |
| b. | Solve the equation , given using Modified Euler’s Method for x = 0.1, 0.2 and 0.3. | CO5 | 8 |
|  |  |  |  |  |
| 6. | a. | Using Newton’s backward formula find a polynomial of degree two which takes the values.   |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | | x | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | | y | 1 | 2 | 4 | 7 | 11 | 16 | 22 | 29 | | CO3 | 8 |
| b. | Solve for a positive root of *x*3 – 4*x* + 1 = 0 by Regula Falsi Method. | CO3 | 8 |
|  |  |  |  |  |
| 7. |  | Apply the fourth order Runge-Kutta Method to find *y*(0.2) and *y*(0.4) given that , and *h* = 0.2 | CO5 | 16 |
| **COMPULSORY QUESTION (1 x 20 = 20 Marks)** | | | | |
| 8. |  | Solve over the square mesh with sides  *x* = 0, *y* = 0, *x* = 3, *y* = 3 with *u* = 0 on the boundary and mesh length 1 unit. | CO6 | 20 |