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



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

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
| **Code :** | **14MA2012** | **Duration :** | **3hrs** |
| **Sub. Name :** | **NUMERICAL METHODS** | **Max. Marks :** | **100** |

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

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Q. No.** | **Sub Div.** | **Questions** | **Course Outcome** | **Marks** |
| 1. | a. | Fit a straight line to the data.   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | x | 5 | 10 | 15 | 20 | 25 | | y | 15 | 19 | 23 | 26 | 30 | | CO1 | 10 |
| b. | Fit a parabola to the data.   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | x | 1 | 2 | 3 | 4 | 5 | | y | 5 | 12 | 26 | 60 | 97 | | CO1 | 10 |
| **(OR)** | | | | |
| 2. | a. | Fit a curve of the form *y = abx* to the data   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | x | 1 | 2 | 3 | 4 | 5 | 6 | | y | 151 | 100 | 61 | 50 | 20 | 8 | | CO1 | 10 |
| b. | Fit a curve of the form *y = aebx* to the data   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | x | 0 | 5 | 8 | 12 | 20 | | y | 3.0 | 1.5 | 1.0 | 0.55 | 0.18 | | CO1 | 10 |
|  | | | | |
| 3. | a. | Find a real root of the equation 2*x*3 – 3*x* – 6 = 0 correct to 5 decimal places using Newton Raphson Method. | CO1 | 10 |
| b. | Solve 2*x* + 3*y* – *z* = 5 ; 4*x* + 4*y* – 3*z* = 3, 2*x* – 3*y* +2*z* = 2 using Gauss Elimination Method. | CO1 | 10 |
| **(OR)** | | | | |
| 4. | a. | Find a real root of the equation *x*3 – 6*x* + 4 = 0 correct to 5 decimal places using Newton’s Raphson Method. | CO1 | 10 |
| b. | Solve *x* + *y* + 54*z* = 110 ; 27*x* + 6*y* – *z* = 85; 6*x* + 15*y* + 2*z* = 72 using Gauss-Jacobi Method correct to 4 decimal places. | CO1 | 10 |
|  | | | | |
| 5. | a. | Using Newton’s Backward Interpolation formula find for the following data.   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | *x* | 140 | 150 | 160 | 170 | 180 | | *y* | 3.685 | 4.854 | 6.302 | 8.076 | 10.225 | | CO2 | 10 |
| b. | Using Lagrange’s Interpolation formula find for the following data.   |  |  |  |  |  | | --- | --- | --- | --- | --- | | *x* | 7 | 8 | 9 | 10 | | *y* | 3 | 1 | 1 | 9 | | CO2 | 10 |
| **(OR)** | | | | |
| 6. | a. | Using Newton’s Forward Interpolation formula find for the following data.   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | *x* | 40 | 50 | 60 | 70 | 80 | 90 | | *y* | 184 | 204 | 226 | 250 | 276 | 304 | | CO2 | 10 |
| b. | Apply Gauss’ Forward Interpolation Formula to find the value of y at  x = 3.75 from the following table.   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | *x* | 2.5 | 3.0 | 3.5 | 4.0 | 4.5 | 5.0 | | *y* | 24.145 | 22.043 | 20.225 | 18.644 | 17.262 | 16.047 | | CO2 | 10 |
|  | | | | |
| 7. |  | Find the and of y at x = 0.4 and x = 0.8 for the following data.   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | *x* | 0.4 | 0.5 | 0.6 | 0.7 | 0.8 | | *y* | 1.5836 | 1.7974 | 2.0442 | 2.3275 | 2.6511 | | CO3 | 20 |
| **(OR)** | | | | |
| 8. |  | Evaluate using (i) Trapezoidal Rule (ii) Simpson’s 1/3 Rule  (iii) Simpson’s 3/8 Rule | CO3 | 20 |
|  | | **Compulsory**: |  |  |
| 9. |  | Apply the fourth order Runge-Kutta Method to find y(0.1) and y(0.2) given that , and h = 0.1 | CO3 | 20 |