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



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

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| **Code :** | **18MA2010** | **Duration :** | **3hrs** |
| **Sub. Name :** | **MATHEMATICAL AND NUMERICAL METHODS** | **Max. Marks :** | **100** |

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| **Q. No.** | **Questions** | **Course Outcome** | **Marks** |
| **PART – A (10X1 = 10 MARKS)** | | | |
| 1. | State Rounding off error. | CO1 | 1 |
| 2. | Find one of the root of the equation , whose roots are in Arithmetic Progression. | CO1 | 1 |
| 3. | Using Bisection method find the positive approximate root  of . | CO2 | 1 |
| 4. | Find the approximate root  of , using Regula falsi method. | CO2 | 1 |
| 5. | State the condition of convergence of Gauss Seidel method. | CO5 | 1 |
| 6. | Write down the direct method used to solve the system of linear equations. | CO5 | 1 |
| 7. | Prove that | CO6 | 1 |
| 8. | Reduce in to linear law: | CO6 | 1 |
| 9. | When Simpson’s 3/8 th rule will be applied? | CO3 | 1 |
| 10. | What is the truncation error obtained in trapezoidal rule? | CO3 | 1 |

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| **PART – B (6 X 3 = 18 MARKS)** | | | |
| 11. | Form the third degree equation, two of whose roots are 1+i and 5. | CO1 | 3 |
| 12. | If the secant method is used on  with , , then | CO5 | 3 |
| 13. | Solve the following system of equations using Gauss Elimination Method. | CO4 | 3 |
| 14. | Form the difference table to the following data and hence find   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | x | 10 | 20 | 30 | 40 | 50 | | y | 32 | 75 | 80 | 191 | 125 | | CO6 | 3 |
| 15. | A curve passes through the points (1, 2), (1.5, 2.4), (2, 2.7), (2.5, 2.8), (3, 3), (3.5, 2.6) and (4, 2.1). Obtain the area bounded by the curve , x axis and x=1 and x=4. | CO2 | 3 |
| 16. | Using Euler’s method, solve numerically the equation  for x= 0.01(0.01)(0.04) | CO3 | 3 |

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| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q.no 17 to 23. Q.No 24 is a Compulsory Question)** | | | | |
| 17. | a. | Solve the equation , whose roots are in harmonic progression. | CO1 | 6 |
| b. | Discuss the nature of the roots of . | CO1 | 6 |
|  |  |  |  |  |
| 18. |  | Solve the equation for a root given that the starting approximate root is  using Newton Raphson Method. | CO4 | 12 |
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| 19. |  | Solve the following system by Gauss Jacobi Method. | CO5 | 12 |
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| 20. |  | Fit a straight line and a parabola to the following data using the method of least squares and find out which one is most appropriate. Reason out for your conclusions.   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | x | 0 | 1 | 2 | 3 | 4 | | y | 1 | 1.8 | 1.3 | 2.5 | 6.3 | | CO6 | 12 |
|  |  |  |  |  |
| 21. |  | Evaluate  using (i) Trapezoidal rule (ii) Simpson’s 1/3rd rule  (iii) Simpson’s 3/8 th rule. Also check the result by actual Integration. | CO2 | 12 |
|  |  |  |  |  |
| 22. | a. | Using Newton’s Forward Interpolation formula, find  when x= 21.   |  |  |  |  |  | | --- | --- | --- | --- | --- | | x | 20 | 23 | 26 | 29 | | y | 0.3420 | 0.3907 | 0.4384 | 0.4848 | | CO4 | 6 |
| b. | Using Lagrange’s Interpolation formula, find y(4) from the following data.   |  |  |  |  |  | | --- | --- | --- | --- | --- | | x | -1 | 0 | 2 | 3 | | y | -8 | 3 | 1 | 12 | | CO6 | 6 |
|  |  |  |  |  |
| 23. |  | Find the first three derivatives of the function tabulated below at x=1.5.   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | x | 1.5 | 2 | 2.5 | 3 | 3.5 | 4 | | y | 3.375 | 7 | 13.625 | 24 | 38.875 | 59 | | CO2 | 12 |
|  |  | **Compulsory:** |  | |
| 24. |  | Using R-K method of fourth order, solve  at x=0.2, 0.4.(correct to 4 decimal places) | CO3 | 12 |