**Code No.BS303HS**

**METHODIST COLLEGE OF ENGINEERING & TECHNOLOGY (An Autonomous Institution)**

**B.E. (CIVIL/MECH) III-Semester (AICTE) (Supplementary) Examination, AUG -2023**

**Subject: NUMERICAL METHODS & PARTIAL DIFFERENTIAL EQUATIONS**

**Time: 3 hours Max.Marks:60**

**Note: Missing data, if any, maybe suitably assumed.**

**PART-A**

**Answer All the questions.**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Q.No.** | **Questions** | **Marks** | **CO** | **BTL** |
| **1. a**  | **Explain bisection method to find a root of .** | **2** | **CO1** |  |
| **b** | **Explain Jacobi’s iteration method.** | **2** | **CO1** |  |
| **c** | **Write Simpson’s 3/8th rule.** | **2** | **CO2** |  |
| **d** | **Write Taylor’s series.** | **2** | **CO2** |  |
| **e** | **State Lagrange’s interpolation formula.** | **2** | **CO3** |  |
| **f** | **Using the method of least squares, fit a straight line y=a+bx for the following data.**

|  |  |  |  |
| --- | --- | --- | --- |
| **x** | **0** | **1** | **2** |
| **y** | **2** | **3** | **4** |

 | **2** | **CO3** |  |
| **g** | **Form a partial differential equation by eliminating arbitrary function from )** | **2** | **CO4** |  |
| **h** | **Derive a partial differential equation by eliminating arbitrary constants a, b from**  | **2** | **CO4** |  |
| **i** | **Classify the equation**  | **2** | **CO5** |  |
| **j** | **Write two dimensional Laplace’s equation.** | **2** | **CO5** |  |

**PTO**

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**PART-B**

**Answer Any Five questions**.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q.No.** |  |  **Questions** | **Marks** | **CO** | **BTL** |
| **2.** | **a** | **Find the positive root of correct to three decimal places, using Newton-Raphson method.** | **6** | **CO1** |  |
| **b** | **Write Regula-Falsi iteration formula to find a root of the equation.** | **2** |  |  |
| **3.** | **a** | **Evaluate by taking 6 intervals using Trapezoidal rule.** | **4** | **CO2** |  |
| **b** | **Given with initial condition y=1 at x=0, find y for x=0.1 taking h=0.02 by Euler’s method.** | **4** |  |  |
| **4.** | **a** | **Using Newton’s divided difference formula, evaluate f(9) for the following data**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **x** | **5** | **7** | **11** | **13** | **17** |
| **f(x)** | **150** | **392** | **1452** | **2366** | **5202** |

 | **6** | **CO3** |  |
| **b** | **Write the normal equations to fit a parabola**  | **2** |  |  |
| **5.** | **a** | **Solve by Charpit’s method.** | **8** | **CO4** |  |
|  |  |  |  |  |
| **6.** | **a** | **A tightly stretched string with fixed end points x=0 and x=L is initially in a position given by . If it is released from rest from this position, find the displacement y(x,t).** | **8** | **CO5** |  |
|  |  |  |  |  |
| **7.** | **a** | **Apply Gauss-Seidel iteration method to solve the equations of**  | **6** | **CO1** |  |
| **b** | **Write Runge-Kutta method of order four.** | **2** | **CO2** |  |
| **8.** | **a** | **Fit a curve of the form for the following data.**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **x** | **61** | **26** | **7** | **2.6** |
| **y** | **350** | **400** | **500** | **600** |

 | **5** | **CO3** |  |
| **b** | **Solve**  | **3** | **CO4** |  |
| **9.** | **a** | **Solve by the method of separation of variables.** | **4** | **CO5** |  |
| **b** | **Using Picard’s method, obtain a solution up to the third approximation of the equation dy/dx = x + y, such that y=1 when x=0.** | **4** | **CO2** |  |

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