**Code No.BS303HS**

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

**B.E. (CIVIL/MECH) III-Semester (AICTE) (Regular) Examination, Feb -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** | **Write Regula-Falsi iteration formula to find a root of the equation.** | **2** | **CO1** |  |
| **b** | **Explain Gauss-Seidel iteration method.** | **2** | **CO1** |  |
| **c** | **Write Trapezoidal Rule.** | **2** | **CO2** |  |
| **d** | **Explain Euler’s method.** | **2** | **CO2** |  |
| **e** | **Construct divided difference table to the following data.**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **X** | **0** | **1** | **2** | **3** |
| **Y** | **1** | **2** | **1** | **10** |

 | **2** | **CO3** |  |
| **f** | **Write the normal equations to fit a second degree polynomial**  | **2** | **CO3** |  |
| **g** | **Derive a partial differential equation by eliminating the constants a, b from**  | **2** | **CO4** |  |
| **h** | **Form a partial differential equation by eliminating the arbitrary function f from**  | **2** | **CO4** |  |
| **i** | **Classify the equation**  | **2** | **CO5** |  |
| **j** | **Write one dimensional wave equation.** | **2** | **CO5** |  |

**PTO**

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**PART-B**

**Answer Any Five questions**.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q.No.** |  |  **Questions** | **Marks** | **CO** | **BTL** |
| **2.** | **a** | **Using Bisection method, find the root of the equation , correct to two decimal places.** | **6** | **CO1** |  |
| **b** | **Explain Newton-Raphson method.** | **2** |  |  |
| **3.** | **a** | **Use Simpson’s 1/3 rd rule to find by taking six intervals.** | **5** | **CO2** |  |
| **b** | **Apply Runge-Kutta fourth order method, to find an approximate value of y when x=0.2, given that dy/dx = x+y and y=1 when x=0.** | **3** |  |  |
| **4.** | **a** | **Evaluate f(3) using Lagrange’s interpolation formula to the following data.**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **x** | **0** | **1** | **2** | **5** |
| **f(x)** | **2** | **3** | **12** | **147** |

 | **5** | **CO3** |  |
| **b** | **Fit a straight line y=a+bx to the following data**

|  |  |  |  |
| --- | --- | --- | --- |
| **x** | **1** | **3** | **5** |
| **y** | **2** | **4** | **0** |

 | **3** |  |  |
| **5.** | **a** | **Solve by Charpit’s method.** | **8** | **CO4** |  |
|  |  |  |  |  |
| **6.** | **a** | **Solve the Laplace equation subject to the conditions**  | **8** | **CO5** |  |
|  |  |  |  |  |
| **7.** | **a** | **Solve by Jacobi’s iteration method, the equations correct to two decimal places.** | **6** | **CO1** |  |
| **b** | **Explain Picard’s method.** | **2** | **CO2** |  |
| **8.** | **a** | **Using Newton’s forward interpolation formula, evaluate y(1) for the following data.**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **x** | **3** | **4** | **5** | **6** | **7** | **8** | **9** |
| **y** | **4.8** | **8.4** | **14.5** | **23.6** | **36.2** | **52.8** | **73.9** |

 | **5** | **CO3** |  |
| **b** | **Solve**  | **3** | **CO4** |  |
| **9.** | **a** | **Solve by separation of variables method**  | **4** | **CO5** |  |
| **b** | **Find by Taylor’s series method the value of y at x=0.1 to five places of decimals from**  | **4** | **CO2** |  |

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