

Name: \_\_\_\_\_ Hall Ticket No. 

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Answer All Questions. All Questions Carry Equal Marks. Time: 20 Min. Marks: 10.

**I Choose the correct alternative:**

1. Adams method requires information about how many previous points to predict the current value [      ]  
 A. 3                                      B. 4                                      C. 2                                      D. 5

2. Which of the following is not a step by step method. [      ]  
 A. Eulers method.      B. Modified Eulers method.      C. Taylors Series method.      D. RK-4

3. F(x) is given by

X	0	1	2	3	4	5	6
F(x)	1	1/2	1/3	1/4	1/5	1/6	1/7

Then the value of  $\int_0^1 F(x) dx$  by Simpsons 3/8 rule is [      ]

- A. 1.966                                      B. 1.854                                      C. 1.632                                      D. 1.543

4. Two of the Eigen values of a 3<sup>rd</sup> order matrix are 3, -1 and trace is 6 then the third eigen value is [      ]  
 A. 2                                      B. 3                                      C. 4                                      D. 5

5.  $f_{xx} - 2f_{xy} + f_{yy} = 0$  represents \_\_\_\_\_ equation [      ]  
 A. Parabolic                                      B. Hyperbolic                                      C. Elliptical                                      D. None

6. The differential equation  $2 \frac{dy}{dx} + x^2 y = 2x + 3$ ,  $y(0) = 5$  [      ]  
 A. Linear                                      B. Non-linear                                      C. Linear with fixed constants      D. None

7. To solve the ODE  $3 \frac{dy}{dx} + xy^2 = \sin x$ ,  $y(0) = 5$  by Runge-kutta method, we need to rewrite the equation as [      ]

- A.  $\frac{dy}{dx} = \sin x - xy^2$ ,  $y(0) = 5$                                       B.  $\frac{dy}{dx} = \frac{1}{3}(\sin x - xy^2)$ ,  $y(0) = 5$   
 C.  $\frac{dy}{dx} = \frac{1}{3}(\sin x) - y^2$ ,  $y(0) = 5$                                       D. None

8. In a general second order linear partial differential equation with two independent variables

$A \frac{\partial^2 u}{\partial x^2} + B \frac{\partial^2 u}{\partial xy} + C \frac{\partial^2 u}{\partial y^2} + D = 0$ , where A, B, C are functions of x and y and D is a function of x, y,

$\frac{\partial u}{\partial x}, \frac{\partial u}{\partial y}$  then the partial differential equation is parabolic if [      ].

- A.  $B^2 - 4AC < 0$                                       B.  $B^2 - 4AC > 0$                                       C.  $B^2 - 4AC = 0$                                       D. None

9. If  $x=0$  the equation  $X\mu_{xx} + \mu_{yy} = 0$  is [      ]  
 A. Hyperbolic      B. Elliptic      C. Parabolic      D. None
10. A partial differential equation requires [      ]  
 A. Exactly one independent variable      B. 2 or more independent variables  
 C. More than one dependent variable      D. None.

## II Fill in the blanks

11. The definition of the first derivative of a function  $f(x)$  is \_\_\_\_\_
12. \_\_\_\_\_ order ordinary differential equations can be solved by using Euler's method.
13. Euler's method is a numerical technique to solve ODE of the form \_\_\_\_\_
14. Consider  $y=f(x)$  over  $[x_0, x_3]$  where  $x_1=x_0+h$ ,  $x_2=x_0+2h$ ,  $x_3=x_0+3h$ . Simpsons 3/8 rule is \_\_\_\_\_
15. In a general second order linear Partial Differential Equation with two independent variables  $A\frac{\partial^2 u}{\partial x^2} + B\frac{\partial^2 u}{\partial xy} + C\frac{\partial^2 u}{\partial y^2} + D = 0$ , where A, B, C are functions of x and y and D is a function of  $x, y, \frac{\partial u}{\partial y}, \frac{\partial u}{\partial y}$ , if  $B^2 - 4AC < 0$  then the PDE is \_\_\_\_\_.
16. The value of  $\int_1^2 \frac{dx}{x}$  by Simpsons 1/3 rule (taking  $n=4$ ) is \_\_\_\_\_
17. Predictor – Corrector methods are not \_\_\_\_\_ methods.
18. The steady of pressure waves in a fluid lead to \_\_\_\_\_ equations.
19. The nth difference of a polynomial of degree n is \_\_\_\_\_
20. In Ordinary Differential Equation, if the conditions on y are prescribed at the same values of x are called \_\_\_\_\_ problems.

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A. 2                                      B. 3                                      C. 4                                      D. 5
2.  $f_{xx}-2f_{xy}+f_{yy}=0$  represents \_\_\_\_\_ equation [      ]  
A. Parabolic                              B. Hyperbolic                              C. Elliptical                              D. None
3. The differential equation  $2\frac{dy}{dx} + x^2y = 2x + 3, y(0)=5$  [      ]  
A. Linear                              B. Non-linear                              C. Linear with fixed constants      D. None
4. To solve the ODE  $3\frac{dy}{dx} + xy^2 = \sin x, y(0)=5$  by Runge-kutta method,, we need to rewrite the equation as [      ]  
A.  $\frac{dy}{dx} = \sin x - xy^2, y(0) = 5$                               B.  $\frac{dy}{dx} = \frac{1}{3}(\sin x - xy^2), y(0) = 5$   
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5. In a general second order linear partial differential equation with two independent variables  $A\frac{\partial^2 u}{\partial x^2} + B\frac{\partial^2 u}{\partial xy} + C\frac{\partial^2 u}{\partial y^2} + D=0$ , where A, B, C are functions of x and y and D is a function of x, y,  $\frac{\partial u}{\partial x}, \frac{\partial u}{\partial y}$  then the partial differential equation is parabolic if [      ].  
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8. Adams method requires information about how many previous points to predict the current value [      ]  
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9. Which of the following is not a step by step method. [      ]  
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10. F(x) is given by

X	0	1	2	3	4	5	6
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- A. 1.966                      B. 1.854                      C. 1.632                      D. 1.543

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11. Consider  $y=f(x)$  over  $[x_0, x_3]$  where  $x_1=x_0+h$ ,  $x_2=x_0+2h$ ,  $x_3=x_0+3h$ . Simpsons 3/8 rule is \_\_\_\_\_
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|------|---|-----|-----|-----|-----|-----|-----|
| X    | 0 | 1   | 2   | 3   | 4   | 5   | 6   |
| F(x) | 1 | 1/2 | 1/3 | 1/4 | 1/5 | 1/6 | 1/7 |
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