Paper Code - 3686

M.Sc. (C.A. & IT) Semester-III
July-Septermber-2021
301 Numerical Methods

કુલ સમય :– : ૬૦ મીનીટ   કુલ પ્રશ્નો : ૫૦   વિદ્યાર્થીએ ટીક કરવાના પ્રશ્નો : ૩૫

નોંધ : વિદ્યાર્થીએ માત્ર ૩૫ પ્રશ્નો જ ટીક કરવાના રહેશે. જો વધારે ટીક કરેલ હશે તો પ્રથમ ૩૫ પ્રશ્નો જ ગણતરીમાં લેવામાં આવશે.

1 $x_{n+1} = x_n - \frac{f(x_n)}{f'(x_n)}$ is The Iterative formula of
(a) Taylor Series method (b) Newton-Raphson method (c) Euler's method (c) Trapezoidal Rule

2 Which of the following step is not involved in Gauss Elimination Method?
(a) Elimination of unknowns (b) Reduction to an upper triangular system
(c) Finding unknowns by back substitution (d) Evaluation of cofactors

3 Using Bisection method, negative root of $x^3 - 4x + 9 = 0$ correct to three decimal places is
(a) -2.506 (b) -2.706 (c) - 2.406 (d) None of these

4 Find the approximated value of x till 6 iterations for x^3-4x+9=0 using Bisection Method. Take a = -3 and b = -2.
(a) -2.703125 (b) -1.903125 (c) -3.903125 (d) -0.703125

5 Which of the following is correct according to calculating relative error as a measure of Precision?
(a) (Absolute error/ True value)*100 (b) (Absolute error/True value)
(c) (measurement being taken/Absolute error)*100 (d) (Absolute error/measurement being taken)

6 Simpson's rule will give exact result, if the entire curve $y = f(x)$ is itself a _________
(a) Ellipse (b) Hyperbola (c) Parabola (d) Linear

7 Error in the Trapezoidal formula is of the order
(a) h (b) h^2 (c) h^3 (d) h^4

8 Match the following:

A. Newton-Raphson	1. Integration
B. Runge-kutta	2. Root finding
C. Gauss-seidel	3. Ordinary Differential Equations
D. Simpson's Rule	4. Solution of system of Linear Equations

The correct sequence is
(a) A2-B3-C4-D1 (b) A3-B2-C1-D4 (c) A1-B4-C2-D3 (d) A4-B1-C2-D3

9 $$y = f(x) = \frac{(x-x_1)(x-x_2)\dots(x-x_n)}{(x_0-x_1)(x_0-x_2)\dots(x_0-x_n)}y_0 + \frac{(x-x_0)(x-x_2)\dots(x-x_n)}{(x_1-x_0)(x_1-x_2)\dots(x_1-x_n)}y_1 + \dots\dots + \dots\dots + \frac{(x-x_0)(x-x_1)\dots(x-x_{n-1})}{(x_n-x_0)(x_n-x_1)\dots(x_n-x_{n-1})}y_n$$ is The formula of
(a) Taylor Series method formula (b) Newton-Raphson method formula (c) Euler's method formula (d) Lagrange's interpolation formula

10 The _____ does not have units.
(a) Absolute error (b) Relative error (c) None of the above (d) All above mentioned

11 A quadratic equation x^2-4x+4=0 is defined with an initial guess of 10 and 20. Find the approximated value of x_2 using Secant Method.
(a) 7.538 (b) 7.853 (c) 7.358 (d) 7.835

12 Secant Method is also called as?
(a) 2-point method (b) 3-point method (c) 4-point method (d) 5-point method

13 The Newton Raphson method fails if __________
(a) $f'(x_0)=0$ (b) $f''(x_0)=0$ (c) $f(x_0)=0$ (d) $f'''(x_0)=0$

14 The equation f(x) is given as $x^3 - x^2 + 4x - 4 = 0$. Considering the initial approximation at x=2 then the value of next approximation correct upto 2 decimal places is given as __________
(a) 0.67 (b) 1.33 (c) 1.00 (d) 1.50

15 The equation f(x) is given as x^2-4=0. Considering the initial approximation at x=6 then the value of x_1 is given as ____________
(a) 10/3 (b) 4/3 (c) 7/3 (d) 13/3

16 $P_n(x) = 1 + \frac{u}{1!}\Delta y_0 + \frac{u(u-1)}{2!}\Delta^2 y_0 + \frac{u(u-1)(u-2)}{3!}\Delta^3 y_0 + \cdots$ Where, $u = \frac{x-x_0}{h}$ is The formula of
(a) Newton's forward difference formula (b) Newton-Raphson method formula
(c) Euler's method formula (d) Lagrange's interpolation formula

17 The next iterative value of the root of x^2-4=0 using the Newton-Raphson method, if the initial guess is 3, is
(a) 1.5 (b) 2.067 (c) 2.167 (d) 3.000

18 The equation f(x) is given as x^3+4x+1=0. Considering the initial approximation at x=1 then the value of x_1 is given as _______________
(a) 1.67 (b) 1.87 (c) 1.86 (d) 1.85

19 What is the percentage decrease in an interval containing root after iteration is applied by Bisection Method?
(a) 20% (b) 30% (c) 40% (d) 50%

20 The Bisection method is also known as ___________________
(a) Binary Chopping (b) Quaternary Chopping (c) Tri region Chopping (d) Hex region Chopping

21 The convergence of which of the following method depends on initial assumed value?
(a) False position (b) Gauss Seidel method (c) Newton Raphson method (d) Euler method

22 $f(x) = f(x_0) + (x - x_0)f(x_0, x_1) + (x - x_0)f(x_0, x_1, x_2) + \cdots + [(x - x_0)(x - x_1) \dots (x - x_{n-1})]f(x_0, x_1, \dots, x_n)$ is The formula of
(a) Taylor Series method (b) Newton's divided difference interpolation
(c)Simpson's 3/8th rule (d) Trapezoidal Rule

23 Solve this system of equations and comment on the nature of the solution using Gauss Elimination method.
x + y + z = 0 -x – y + 3z = 3 -x – y – z = 2
(a) Unique Solution (b) No solution (c) Infinitely many Solutions (d) Finite solutions

24 While solving by Gauss Seidal method, which of the following is the first Iterative solution system; x – 2y = 1 and x + 4y = 4?
(a) (1, 0.75) (b) (0.25,1) (c) (0,0) (d) (1,0.65)

25 Newton-Raphson method is used to find the root of the equation $x^2 - 2 = 0$. If iterations are started from - 1, then iterations will be
(a) Converge to -1 (b) Converge to $\sqrt{2}$ Converge to $-\sqrt{2}$ (d) No Converge

26 The improved Euler method is based on the average of-----
(a) Slopes (b) Points (c) Curve (d) None of these

27 An approximate value of π is given by x1 = 22/7 = 3.1428571 and its true value is x = 3.1415926. Find the absolute error.
(a) 0.0012645 (b) 0.0004025 (c) 0.314285 (d) 1.141596

28 Using Newton-Raphson method, find a root correct to three decimal places of the equation sin x = 1 – x
(a) 0.511 (b) 0.500 (c) 0.555 (d) None of these

29 Gauss Seidal method is also termed as a method of _____
(a) Successive displacement (b) Eliminations (c) False positions (d) Iterations

30 Which of the following method is employed for solving the system of linear equations?
(a) RungeKutta (b) Newton Raphson (c) Gauss Seidal (d) Simpson's Rule

31 Division by zero during in Gaussian elimination of the set of equations [A] * [X]=[C] signifies the coefficient matrix [A] is _____
(a) Invertible (b) Non Singular (c) Not determinable to be singular or non-singular (d) Singular

32. Error in the simpson formula is of the order
(a) h (b) h^2 (c) h^3 (d) h^4

33 The Gauss-Seidel method is applicable to strictly diagonally dominant or symmetric_____ definite matrices.
(a) Positive (b) Negative (c) Zero (d) Equal

34 The aim of elimination steps in Gauss elimination method is to reduce the coefficient matrix to _____
(a) diagonal (b) identity (c) lower triangular (d) upper triangular

35 If n is a multiple of 3, $\int_{x_0}^{x_0+nh} f(x)dx = \frac{3h}{8}[(y_0 + y_n) + 3(y_1 + y_2 + y_4 + y_5 + \cdots + y_{n-1}) + 2(y_3 + y_6 + y_9 + \cdots + y_n)]$ is The formula of
(a) Taylor Series method (b) Newton-Raphson method (c) Simpson's 3/8th rule (d) Trapezoidal Rule

36 Taylor series method will be very useful to give some _____ for powerful numerical methods.
(a) Initial value (b) Finial value (c) Initial starting value (d) Middle value

37 Which of the following method is called step by step method
(a) Taylor's method (b) Rungekutta method (c) Milne's method (d) Newton's method

38 A quadratic equation x^2-4x+4=0 is defined with an initial guess of 3 and 2.5. Find the approximated value of root using Secant Method.
(a) 1.33 (b) 2.33 (c) 3.33 (d) 4.33

39 $\int_a^b ydx = \frac{h}{2}[(sum of the first and last ordinate) + 2(remaining ordinates)]$ is The formula of
(a) Taylor Series method (b) Newton-Raphson method (c) Euler's method (d) Trapezoidal Rule

40 In Euler's method, if h is small, the method is too slow and if h is large, it gives -------- value.
(a) Inaccurate (b) Accurate (c) Indefinable (d) Zero

41 The first two steps of the fourth-order Runge-Kutta method finds the value at which point?
(a) At the $(n+0.5)^{th}$ point (b) At the $(n+1)^{th}$ point (c) At the $(n-1)^{th}$ point (d) At the n^{th} point

42 Interpolation means
Adding new data points Only aligning old data points
Only removing old data points None of the mentioned
How many steps does the fourth-order Runge-Kutta method use?
(a) Two steps (b) Five steps (c) Four steps (d) Three steps

44 Which of the following method is used to solve differential equations.
(a) Lagrange's formula (b) Gauss seidal method (c) Rungekutta method (d) Secant method

45 To solve the ordinary differential equation $3\frac{dy}{dx} + 5y^2 = \sin x, y(0)=5$ by Euler's method, you need to rewrite the equation as
(a) $\frac{dy}{dx} = \sin x - 5y^2,\ y(0) = 5$ (b) $\frac{dy}{dx} = \frac{1}{3}(\sin x - 5y^2),\ y(0) = 5$
(c) $\frac{dy}{dx} = \frac{1}{3}\left(-\cos x - \frac{5y3}{3}\right),\ y(0) = 5$ (d) $\frac{dy}{dx} = \frac{1}{3}\sin x, y(0) = 5$

46 For $y(x)$ about $x - x_0 y(x) = y_0 + (x - x_0)y_0' + \frac{(x - x_0)^2}{2!}y_0'' + \ldots$ is the expansion given by
(a) Taylor Series method (b) Newton's divided difference interpolation
(c) Simpson's 3/8th rule (d) Trapezoidal Rule

47 Runge-Kutta method is better than Taylor's method because
(a) it does not require prior calculations of higher derivatives (b) it require at most first order derivatives
(c) it require prior calculations of higher derivatives (d) all the above

48 Use two steps of Euler's Method with h=0.1 on $y' = x\sqrt{y},\ y(1)=4$To three decimal places
(a) 4.413 (b) 4.408 (c) 4.420 (d) 4.425

49 An approximate value of π is given by x1 = 22/7 = 3.1428571 and its true value is x = 3.1415926. Find the relative error.
(a) 0.0012645 (b) 1.0261434 (c) 0.0004025 (d) 1.141596

50 To solve the ordinary differential equation $\frac{dy}{dx} + xy^2 = \sin x,\ y(0) = 5$ by Rungekutta 2nd order method, you 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) $\frac{dy}{dx} = \frac{1}{3}\left(-\cos x - \frac{xy^3}{3}\right),\ y(0) = 5$ (d) $\frac{dy}{dx} = \frac{1}{3}\sin x,\ y(0) = 5$