

NUMERICAL ANALYSIS PAPER - 2 MCQ

Q1. The error that is produced when a calculator or computer is used to perform real number calculations is called

- a. Round-off error b. System error c. Mechanical error d. None of these

Q2. The floating-point form of π using five-digit chopping is a. 3.1416 b. 3.1415

- c. 3.14159 d. 0.3141

Q3. Suppose that p^* is an approximation to p . Then the actual error is

- a. $p - p^*$ b. $|p - p^*|$ c. $|p - p^*| |p|$ d. None of these

Q4. Suppose that p^* is an approximation to p . Then the absolute error is

- a. $p - p^*$ b. $|p - p^*|$ c. $|p - p^*| |p|$ d. None of these

Q5. Suppose that p^* is an approximation to p . Then the relative error is

- a. $p - p^*$ b. $|p - p^*|$ c. $|p - p^*| |p|$ d. None of these

Q6. If t is the largest nonnegative integer for which $|p - p^*|$

- a. Error bound b. Five-digit chopping c. Significant digits d. None of these $|p|$

Q7. The root of the equation $(x) = x^2 - 2x + 1 = 0$ is

- a. 2 b. 1 c. 0 d. $-1 \leq 5 \times 10^{-t}$, then t is called

Q8. Using bisection method, the first approximation to the root of the equation $(x) = x^3 + 4x^2 - 10 = 0$ in $[1,2]$ is a. -5 b. 14 c. 1 d. 1.5

Q9. Use the bisection method to find p_2 for $(x) = \sqrt{x}$ a. 0 b. 0.5 $-\cos x = 0$ on $[0,1]$. c. 0.625 d. 0.75

Q10. For $x^3 - 7x^2 + 14x - 6 = 0$ on $[0,1]$, using Bisection method, p_3 lies in the interval a. $(0.5, 0.75)$ b. $(0.75, 1)$ c. $(0.5, 0.625)$ d. None of these

Q11. Number of fixed points of the function $(x) = x^2 - 2$ a. 1 b. 2 c. 0 d. 3

Q12. What is the iteration formula of Newton Raphson method? a. $p_1 = p_0 - p_0(p_0)$ b. $p_1 = p_0 - p_0 f''(p_0)$ c. $p_1 = p_0 - p_0 f'(p_0)$ d. None of these

Q13. What is the iteration formula of Secant method? a. $p_n = p_{n-1} - \frac{f(p_{n-2})(p_{n-1} - p_{n-2})}{f(p_{n-1}) - f(p_{n-2})}$ b. $p_n = p_{n-2} - \frac{f(p_{n-1})(p_{n-1} - p_{n-2})}{f(p_{n-1}) - f(p_{n-2})}$ c. $p_n = p_{n-1} - \frac{f(p_{n-1})(p_{n-1} - p_{n-2})}{f(p_{n-1}) - f(p_{n-2})}$ d. None of these

Q14. Find the first approximation of $(x) = x^3 + x - 1 = 0$ by Newton's method. a. 0.5 b. 0.45 c. 0.24 d. 0.75

Q15. For $(x) = x^3 - 2x^2 - 5 = 0$ on $[1,4]$, find p_1 using Newton's method if $p_0 = 2$ a. 3.25 b. 2.86 c. 1.45 d. None of these

Q16. For $(x) = x^3 - 2x^2 - 5 = 0$ on $[1,4]$, find p_2 using method of false position.

a. 3.252 b. 1.545 c. 2.869 d. None of these

Q17. For $(x) = x^3 - 2x^2 - 5 = 0$ on $[1,4]$, find p_2 using Secant method. a. 3.252 b. 2.869 c. 1.545 d. None of these

Q18. Using secant method what is the first approximation of $(x) = x^3 + 3x^2 - 1$ in $[-3, -2]$. a. -2.75 b. 2.75 c. -2.1 d. -1.5

Q19. Using method of false position what is the first approximation of $x^3 + x - 1$ in $[0,1]$. a. -0.5 b. 0.5 c. 0.65 d. -3.75

Q 20. Let $(x) = x^2 - 6$ and $p_0 = 1$. Use Newton's method to find p_2 . a. 0.607 b. 1.607 c. 2.607 d. 3.607

Q 21. Let $(x) = x^2 - 6$ and $p_0 = 3, p_1 = 2$. Use the method of False Position to find p_3 . a. 2.444 b. 3.111 c. 2.999 d. 3.121

Q 22. If $f \in C^1[a,b]$ and $f(p) = 0$ but $f'(p) \neq 0$. Then f a. has no zeros b. has a zero of multiplicity m for any $m > 1$ c. has a zero of multiplicity 2 d. has a zero of multiplicity 1

Q23. If $(x) = e^x - x - 1$, then at $x = 0$, f has a zero of multiplicity a. 2 b. 1 c. 0 d. 3

Q24. If a solution p of $(x) = 0$ is a zero of multiplicity m of f , then a. $f(x) = (x-p)^{m-1}q(x)$, where $\lim_{x \rightarrow p} q(x) \neq 0$. b. $(x) = (x-p)^m q(x)$, where $\lim_{x \rightarrow p} q(x) \neq 0$. c. $(x) = (x-p)^{m+1}q(x)$, where $\lim_{x \rightarrow p} q(x) \neq 0$. d. None of these.

Q 25. The function $f \in C^n[a,b]$ has a zero of multiplicity m at p in (a,b) if and only if a. $0 = f(p) = f'(p) = f''(p) = \dots = f^{(m-2)}(p)$, but $f^{(m-1)}(p) \neq 0$. b. $0 = f(p) = f'(p) = f''(p) = \dots = f^{(m)}(p)$, but $f^{(m+1)}(p) \neq 0$. c. $0 = f(p) = f'(p) = f''(p) = \dots = f^{(m-1)}(p)$, but $f^{(m)}(p) \neq 0$. d. None of these.

Q26. Given a set of tabular values $(x_0,0), (x_1,y_1), \dots, (x_n,y_n)$ satisfying $y = f(x)$ where $f(x)$ is not known explicitly and the values of $f(x)$ corresponding to certain given values of x in the range $x_0 < x < x_n$ is a. Extrapolation b. Interpolation c. Estimation d. None of these

Q27. If f is defined and continuous on $[a, b]$, then for each $\epsilon > 0$, there exists a polynomial $P(x)$, with the property that $|f(x) - P(x)| < \epsilon$, for all x in $[a,b]$. This theorem is known as a. Stone Weierstrass theorem b. Bolzano Weierstrass theorem c. Weierstrass extreme value theorem d. Weierstrass Approximation Theorem

Q28. The linear Lagrange interpolating polynomial that passes through the points $(2,4)$ and $(5, 1)$ is a. $-x+6$ b. $-x+5$ c. $x-6$ d. $x-5$

Q29. What is the degree of the n th Lagrange interpolating polynomial that passes through $(n+1)$ points? a. $n+1$ b. at most $n+1$ c. n d. at most n

Q30. Using the numbers $x_0 = 2, x_1 = 2.75$, and $x_2 = 4$, find $L_0(x)$. a. $\frac{2}{3}(x-2.75)(x-4)$ b. $-\frac{16}{15}(x-2)(x-4)$ c. $\frac{2}{5}(x-2)(x-4)$ d. $\frac{2}{5}(x-2.75)(x-4)$

Q31. Using the numbers $x_0 = 2, x_1 = 2.75$, and $x_2 = 4$, find $L_1(x)$. a. $\frac{2}{3}(x-2.75)(x-4)$ b. $-\frac{16}{15}(x-2)(x-4)$ c. $\frac{2}{5}(x-2)(x-4)$ d. $-\frac{16}{5}(x-2)(x-4)$

Q32. Using the numbers $x_0 = 2, x_1 = 2.75$, and $x_2 = 4$, find $L_2(x)$. a. $\frac{2}{3}(x-2.75)(x-4)$ b. $-\frac{16}{15}(x-2)(x-4)$ c. $\frac{2}{5}(x-2)(x-4)$ d. $\frac{2}{3}(x-2)(x-2.75)(x-2)(x-2.75)$

Q33. If $L_0(x) = \frac{2}{3}(x-2.75)(x-4)$, $L_1(x) = -\frac{16}{15}(x-2)(x-4)$ and $L_2(x) = \frac{2}{5}(x-2)(x-2.75)$, then what is the second Lagrange interpolating polynomial for $\diamond \diamond(x) = 1/x$. a. $1.22x^2 + 35.88x + 49.44$ b. $1.22x^2 - 35.88x + 35.88x^2 - 35.88x - 49.44x - 49.44x + 49.44$ c. $1.22x^2 - 35.88x^2 + 35.88x^2 - 35.88x - 49.44x - 49.44x + 49.44$ d. $1.22x^2 - 35.88x^2 + 35.88x^2 - 35.88x - 49.44x - 49.44x + 49.44$

Q34. Use Lagrange interpolating polynomial of degree 3 to approximate (9.2) if $f(9) = 2.19722$, $f(9.5) = 2.25129$, $f(10) = 2.30259$, $f(11) = 2.39790$ a. 2.21920 b. 2 c. 1.21920 d. 2.3426

Q35. Use the Lagrange interpolating polynomial of degree two to approximate (2.7) for $\diamond \diamond(x) = \ln x$ if $x_0 = 2, x_1 = 2.5, x_2 = 3$ and so $f(x_0) = 0.69315$, $f(x_1) = 0.91629$, $\diamond \diamond(x_2) = 1.09861$. a. 1.9941164 b. 0.9941164 c. 0.8841164 d. 0.8941164

Q36. Let $P_3(x)$ be the interpolating polynomial for the data $(0,0), (0.5,y), (1,3)$, and $(2, 2)$. The coefficient of x^3 in $P_3(x)$ is 6. Find y . a. 3.25 b. 2.25 c. 4.25 d. 5.25

Q37. For $f(x) = \cos x$, and $x_0 = 0$, and $x_1 = 0.6$, find interpolation polynomial of degree at most one. a. $0.148878x + 1$ b. $-0.148878x - 1$ c. $0.148878x - 1$ d. $-0.148878x + 1$

Q38. For $f(x) = \sqrt{1+x}$ degree at most one, and $x_0 = 0$, and $x_1 = 0.6$, find interpolation polynomial of degree at most one. a. $0.467251x + 1$ b. $0.467251x - 1$ c. $-0.467251x + 1$ d. $-0.467251x - 1$

Q39. For $f(x) = \ln(x+1)$, and $x_0 = 0$, and $x_1 = 0.6$, find interpolation polynomial of degree at most one. a. $1.874548x$ b. $0.874548x$ c. $0.874548x+1$ d. $1.874548x+1$

Q40. For $f(x) = \tan x$, and $x_0 = 0$, and $x_1 = 0.6$, find interpolation polynomial of degree at most one. a. $1.031121x + 1$ b. $0.031121x - 1$ c. $1.031121x$ d. $0.031121x - 1$

Q41. For a given sequence $\{p_n\}_{n=0}^{\infty}$ a. $p_n - p_{n-1} \approx$ the forward difference Δp_n is defined by b. $p_{n+1} - p_{n-1}$ c. $p_{n-1} - p_n$ d. $p_{n+1} - p_n$

Q42. For a given sequence $\{p_n\}_{n=0}^{\infty}$ the forward difference $\Delta^2 p_n$ is given by a. $p_{n+2} - 2p_{n+1} + p_n$ b. $p_{n+2} - p_{n+1} + p_n$ c. $p_{n+2} + 2p_{n+1} + p_n$ d. $p_{n+2} - p_{n+1} - p_n$

Q43. The first divided difference of f with respect to x_i and x_{i+1} , $f[x_i, x_{i+1}]$ is a. $\frac{f[x_i] - f[x_{i-1}]}{x_i - x_{i-1}}$ b. $\frac{f[x_{i+1}] - f[x_i]}{x_{i+1} - x_i}$ c. $\frac{f[x_{i+1}] - f[x_{i-1}]}{x_{i+1} - x_{i-1}}$ d. $\frac{f[x_{i+1}] + f[x_i]}{x_{i+1} - x_i}$

Q44. The first divided difference of f with respect to x_i and x_{i+1} , $f[x_i, x_{i+1}, x_{i+2}]$ is a. $\frac{f[x_{i+1}, x_i] - f[x_i, x_{i+2}]}{x_{i+2} - x_i}$ b. $\frac{f[x_{i+2}, x_{i+1}] - f[x_i, x_{i+1}]}{x_{i+2} - x_i}$ c. $\frac{f[x_{i+1}, x_{i+2}] - f[x_i, x_{i+1}]}{x_{i+2} - x_i}$ d. $\frac{f[x_{i+1}, x_{i+2}] + f[x_i, x_{i+1}]}{x_{i+2} - x_i}$

Q45. The n th divided difference of f is $f[x_0, x_1, \dots, x_n] = a$. $f[x_1, x_2, \dots, x_{n-1}] - f[x_0, x_1, \dots, x_n]$ $x_n - x_0$ b. $f[x_1, x_2, \dots, x_{n+1}] - f[x_0, x_1, \dots, x_n]$ $x_n - x_0$ c. $f[x_0, x_2, \dots, x_n] - f[x_1, x_1, \dots, x_{n-1}]$ $x_n - x_0$ d. $f[x_1, x_2, \dots, x_n] - f[x_0, x_1, \dots, x_{n-1}]$ $x_n - x_0$

Q46. The Newton's divided difference formula is a. $P_n(x) = f[x_0] + \sum_{k=1}^n f[x_0, x_1, \dots, x_k](x - x_0) \dots (x - x_{k-1})$ b. $P_n(x) = \sum_{k=1}^n f[x_0, x_1, \dots, x_k](x - x_0) \dots (x - x_{k-1})$ c. $P_n(x) = f[x_1] + \sum_{k=1}^n f[x_1, x_2, \dots, x_{k+1}](x - x_1) \dots (x - x_k)$ d. $P_n(x) = f[x_0] + \sum_{k=1}^n f[x_0, x_1, \dots, x_k](x - x_0) \dots (x - x_{k-1})$

Q47. The first divided difference involving x_0 and x_1 , where $x_0 = 1.0$, $x_1 = 1.3$, $f(x_0) = 0.7651977$ and $f(x_1) = 0.6200860$ is a. 0.4837057 b. -0.4837057 c. 1.4837057 d. -1.4837057

Q 51. The Trapezoidal rule is used for approximation of a. differentiation b. integration c. both a. and b. d. none of the above

Q52. The Simpson's rule is used for approximation of a. differentiation b. integration c. both a. and b. d. none of the above

Q53. The three-point midpoint formula is used for the approximation of a. differentiation b. integration c. both a. and b. d. none of the above

Q54. The three-point midpoint formula is used for the approximation of a. differentiation b. integration c. both a. and b. d. none of the above

Q55. The approximation $\int_a^b f(x) dx \approx h [f(x_0) + f(x_1)]$ is a. Newton's formula b. Simpson's 1/3rd rule c. Trapezoidal rule d. Simpson's 3/8th rule

Q56. The approximation $\int_a^b f(x) dx \approx h [f(x_0) + 4f(x_2) + f(x_2)]$ is a. Newton's formula b. Three-point formula c. Trapezoidal rule d. Simpson's rule

Q57. By Trapezoidal rule $\int_0^2 \sqrt{1+x^2} dx$ is a. 3.326 b. 2.964 c. 2.958 d. 2.5

Q58. By Simpson's rule $\int_0^2 \sqrt{1+x^2} dx$ is a. 3.326 b. 2.964 c. 2.958 d. 2.5

Q59. By Trapezoidal rule $\int_0^2 \sin x dx$ is a. 1.416 b. 0.455 c. 0.909 d. 1.425

Q60. By Simpson's rule $\int_0^2 \sin x dx$ is a. 1.416 b. 0.455 c. 0.909 d. 1.425

Q 61. By Trapezoidal rule $\int_0^2 x^2 dx$ is a. 4 b. 2.667 c. 2 d. 1.333

Q62. By Simpson's rule $\int_0^2 x^2 dx$ is a. 4 b. 2.667 c. 2 d. 1.333

Q63. By Trapezoidal rule $\int_0^2 x^4 dx$ is a. 6.4 b. 8 c. 16 d. 6.667

Q64. By Simpson's rule $\int_0^2 x^4 dx$ is a. 6.4 b. 8 c. 16 d. 6.667

Q65. By Trapezoidal rule $\int_0^2 (x+1)^{-1} dx$ is a. 1.333 b. 1.111 c. 1.099 d. 0.099

Q 66. By Simpson's rule $\int_0^1 (x+1)^{-1} dx$ is a. 1.333 b. 1.111 c. 1.099 d. 0.099

Q67. By Trapezoidal rule $\int_0^1 e^{-x} dx$ is a. 6.389 b. 4.164 c. 8.389 d. 6.421

Q68. By Simpson's rule $\int_0^1 e^{-x} dx$ is a. 6.389 b. 4.164 c. 8.389 d. 6.421

Q 69. The Trapezoidal rule has degree of precision a. 1 b. 2 c. 3 d. 4

Q70. The Simpson's rule has degree of precision a. 1 b. 2 c. 3 d. 4

Q71. Approximation $\int_0^1 e^{-x^2} dx$ by means of Mid-point rule gives a. 0.747181 b. 0.778801 c. 0.683939 d. None of these

Q 72. A function $f(t,y)$ is said to satisfy a Lipschitz condition in the variable y on a set $D \subset \mathbb{R}^2$ if a constant $L > 0$ exists satisfying a. $|f(t,y_1) - f(t,y_2)| \leq L|y_1 - y_2|$ b. $|f(t,y_1) - f(t,y_2)| \geq L|y_1 - y_2|$ c. $|f(t,y_1) - f(t,y_2)| = L|y_1 - y_2|$ d. $|f(t,y_1) + f(t,y_2)| \leq L|y_1 + y_2|$

ANS

1. a 2. b 3. a 4. b 5. c 6. c 7. d 8. d 9. d 10. a 11. b 12. c 13. c 14. d 15. a 16. b 17. c 18. a 19. b 20. c
21. a 22. d 23. a 24. b 25. c 26. b 27. d 28. a 29. d 30. a 31. b 32. c 33. d 34. a 35. b 36. c 37. d 38.
a 39. b 40. c 41. d 42. a 43. b 44. c 45. d 46. a 47. b 48. c 49. d 50. a 51. b 52. b 53. a 54. a 55. c
56. d 57. a 58. b 59. c 60. d 61. a 62. b 63. c 64. d 65. a 66. b 67. c 68. d 69. a 70. c 71. b 72. a

Q1 The Newton Raphson method is also called as _____

- a) Tangent method OK
- b) Secant method
- c) Chord method
- d) Diameter method

Q2 The points where the Newton Raphson method fails are called?

- a) floating
- b) continuous OK
- c) non-stationary
- d) stationary

Q3 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 OK

Q4