BRAINWARE UNIVERSITY

Term End Examination 2021 - 22
Programme – Bachelor of Computer Applications
Course Name – Numerical Method
Course Code - GEBS301
(Semester III)

Time : 1 Hr.15 Min. **Full Marks : 60**

[The figure in the margin indicates full marks.]

Group-A
(Multiple Choice Type Question) 1 x 60=60

Choose the correct alternative from the following :

(1) Which of the following digit is not significant of the number 0.025?
a) 0 b) 2
c) 5 d) none of these

(2) The number of significant digits in the number 3.0056 is
a) 3 b) 4
c) 5 d) 2

(3) When 0.1 is approximated to 0.09, the relative error is
a) 1/9 b) 0.11111
c) 0.11 d) None of these.

(4) After being rounding off to three places of decimal the number 57.1092 becomes
a) 57.109 b) 57.100
c) 57.110 d) 0.109

(5) When 0.0081 is the approximate value of 0.00809, the error is
a) 0.001 b) 0.00001
c) -0.00001 d) None of these.

(6) If $E = e_1 e_2$ with $e_1 = 5.43, e_2 = 3.82$ and if error in both e_1, e_2 is 0.01, then the relative error of E is
a) 0.0425 b) 0.0045
c) 0.045 d) None of these.

(7) Round-off of the number 0.005723 up to three significant digits is
a) 0.005 b) 0.00572
c) 0.006 d) None of these.

(8) Round-off of the number 0.0456 up to five significant figures is

a) 0.0456
b) 0.04560
c) 0.045600
d) None of these.

(9) Round-off of the number 0.0000123 up to four decimal is

a) 0.0001
b) 0.0000
c) 0.0002
d) None of these.

(10) Round-off of the number 5.45852 up to four significant figures is

a) 5.457
b) 5.459
c) 5.458
d) None of these.

(11) Which are the following digits are not significant digit of the number 1.025?

a) 0
b) 2
c) 1
d) None of these.

(12) The number of significant digits in 1.00234 is

a) 4
b) 6
c) 3
d) 5

(13) After rounding off to three places of decimals the number 15.23186 becomes

a) 15.231
b) 15.232
c) 15.241
d) 15.2

(14) After rounding off to three places of decimals the number 7.16528 becomes

a) 7.17
b) 7.16
c) 7.2
d) 7.165

(15) After rounding off to three places of decimals the number 0.199561 becomes

a) 0.199
b) 0.190
c) 0.200
d) 0.210

(16) After being rounded off to one place of decimal the number 35.956 becomes

a) 36.0
b) 36
c) 35.9
d) 35.0

(17) When 9.8 is approximated to 9.79 the percentage error becomes

a) -0.01
b) 0.01
c) 0.00102145
d) 0.102041

(18) When 0.0082 is approximated to 0.00809 the error is

a) 0.001
b) 0.00011
c) -0.00001
d) None of these.

(19) **For an equation like $x^2 = 0$, a root exists at x=0. The Bisection method cannot be adopted to solve this equation in spite of the root existing at x=0 because the function $f(x) = x^2$**

a) is a polynomial
b) has repeated roots at x=0

c) is always non-negative

d) slope is zero at x=0

(20) The Newton-Raphson iterative formula for finding the square root of a real number R i s

a) $x_{i+1} = \frac{x_i}{2}$

b) $x_{i+1} = \frac{3x_i}{2}$

c) $x_{i+1} = \frac{1}{2}\left(x_i + \frac{R}{x_i}\right)$

d) None of these.

(21) The accuracy attainable with Newton-Raphson method

a) does not depend upon the value of the derivative of f(x)

b) depend upon the value of the derivative of f(x)

c) may depend upon the value of the derivative of f(x)

d) none of these.

(22) The order of convergence of Newton-Raphson method is

a) 3

b) 2

c) 1

d) None of these.

(23) Newton- Raphson method for solution of the equation f(x)=0 fails when

a) $f'(x) = 1$

b) $f'(x) = 0$

c) $f'(x) = -1$

d) None of these.

(24) In Gaussian elimination method, the given system of equations represented by AX=B is converted to another system UX=Y where U is

a) diagonal matrix

b) null matrix

c) identity matrix

d) upper triangular matrix.

(25) Which of the following is an iterative method?

a) Gauss Elimination Method

b) Gauss Jordan Method

c) LU decomposition Method

d) Gauss-Seidel Method

(26) To solve the system of equations AX=B by Gaussian elimination method, A is transformed to a

a) lower triangular matrix

b) upper triangular matrix

c) diagonal matrix

d) none of these.

(27) A square matrix $[A]_{n\times n}$ is diagonally dominant if

a) $|a_{ii}| \geq \sum_{j=1, j\neq i}^{n} |a_{ij}|, i = 1,2,\ldots,n$

b) $|a_{ii}| \leq \sum_{j=1, j\neq i}^{n} |a_{ij}|, i = 1,2,\ldots,n$

c) $|a_{ii}| > \sum_{j=1, j\neq i}^{n} |a_{ij}|, i = 1,2,\ldots,n$

d) $|a_{ii}| \geq \sum_{j=1,}^{n} |a_{ij}|, i = 1,2,\ldots,n$

(28) Gauss elimination method fails even if one of the pivotal elements is equal to

a) 0

b) 1

c) 2

d) 3

(29) The convergence condition for Gauss-Seidel iterative method for solving a system of linear equation is

a) the co-efficient matrix is singular

b) the co-efficient matrix has rank zero

c) The coefficient matrix must be strictly diago nally dominant.

d) None of these

(30) Which of the following does not always guarantee convergence?

a) Bisection method

b) Newton-Raphson method

c) Regula -Falsi method

d) none of these.

(31)

Let $A = \begin{pmatrix} 1 & 1 & 2 \\ 1 & 1 & 3 \\ 2 & 3 & 4 \end{pmatrix}$ and $B = \begin{pmatrix} 2 & 2 & 3 \\ 2 & 2 & 4 \\ 9 & 8 & 7 \end{pmatrix}$

Consider the following statements:
S1: LU decomposition for the matrix A is possible.
S2: LU decomposition for the matrix B is not possible.

a) Both S1 and S2 are true.

b) only S1 is true

c) only S2 is true

d) neither S1 nor S2 is true.

(32) If f(x) is a continuous function and f(a).f(b)<0, then

a) there exists one root in (a,b)

b) there lies odd number of real roots in (a,b)

c) f(x) has odd number of roots

d) none of these.

(33) Bisection method is used for finding the real root of a transcendental equation is

a) an analytical method

b) graphical method

c) iterative method

d) none of these.

(34) Newton Raphson method is also known as

a) normal method

b) tangent method

c) parallel method

d) None of these.

(35) The iterative method is known as

a) direct method

b) indirect method

c) derivative method

d) none of these.

(36) A matrix A can be factorized into lower and upper triangular matrix if all the principal minors of A are

a) singular

b) Non singular

c) zero

d) None of these

(37) Backward substitution method is used to solve a system of equations by .....

a) Gauss elimination method

b) Gauss-Jordan method

c) Matrix factorization method

d) None of these.

(38) **In Regula-Falsi method, the n-th approximate root(x_n) lies between a_n and b_n, then the next approximate root is**

a)

b)

$x_{n+1} = a_n - \frac{f(a_n)}{f(a_n) - f(b_n)}(b_n - a_n)$

$x_{n+1} = a_n - \frac{f(b_n)}{f(a_n) - f(b_n)}(a_n - b_n)$

c) $x_{n+1} = a_n - \frac{f(a_n)}{f(b_n) - f(a_n)}(b_n - a_n)$

d) $x_{n+1} = a_n + \frac{f(a_n)}{f(a_n) + f(b_n)}(b_n - a_n)$

(39) Geometrically the Lagrange's interpolation formula for two points of interpolation repr esents a

a) circle

b) straight line

c) ellipse

d) None of these.

(40) The value of $(1 + \Delta)(1 - \nabla)$is

a) 0

b) 1

c) 2

d) 3

(41) If y=f(x) are known only at (n+1) distinct interpolating points then the Lagrangian poly nomial has degree

a) at most n

b) at least n

c) exactly n

d) exactly n+1

(42) For a given set of values of x and f(x) , the interpolation polynomial is

a) unique

b) not unique

c) has degree 4

d) none of these.

(43) Newton's backward interpolation formula is used to interpolate

a) near end

b) near central position

c) near the beginning

d) none of these.

(44) The n-th order divided difference of a polynomial of degree n is

a) n

b) constant

c) zero

d) all of these.

(45) If $\Delta$and $\nabla$are the forward and backward difference operators respectively, then $\Delta - \nabla$is equal to

a) $\Delta + \nabla$

b) $\Delta.\nabla$

c) $-\Delta.\nabla$

d) $\frac{\Delta}{\nabla}$

(46) If $\Delta$and $\nabla$are the forward and backward difference operators respectively, then which of the following is not correct?

a) $\Delta^m.\nabla^n = \Delta^n.\nabla^m$

b) $\Delta^m.\Delta^n = \Delta^{m+n}$

c) $\Delta.\nabla = \nabla.\Delta$

d) $(1 + \Delta)(1 - \nabla) = 1$

(47) If $\Delta$and $\nabla$are the forward and backward difference operators respectively and E be the shifting operator, then which of the following is correct?

a) $\nabla = 1 + E$
b) $\Delta = 1 + E$
c) $\nabla = -1 + E$
d) $\Delta = -1 + E$

(48) The second degree polynomial passes through (0,1),(1,3),(2,7),(3,13) is

a) $x^2 + 2x + 2$
b) $x^2 - x + 2$
c) $x^2 + x + 1$
d) $x^2 + x + 2$

(49) The n-th divided difference of n degree polynomial $a_0 x^n + a_1 x^{n-1} + a_2 x^{n-2} + \ldots + a_n (a_0 \neq 0)$ is

a) $a_0 x + a_1$
b) a_0
c) a_n
d) none of these.

(50) The technique for computing the value of the function inside the given argument is call ed

a) interpolation
b) extrapolation
c) partial fraction
d) inverse interpolation

(51) The Delta of power two is called the ____order difference operator.

a) First
b) Second
c) Third
d) Fourth

(52) Find $\Delta(x + cosx)$.

a) 1+2sin(x+1/2).sin1/2
b) 1 -2sin(x+1/2).sin1/2
c) 1 -2sin(x -1/2).sin1/2
d) 1+2sin(x -1/2).sin1/2

(53) In Trapezoidal rule for finding $\int_a^b f(x)dx$, f(x) is approximated by

a) line segment
b) parabola
c) circular sector
d) none of these.

(54) In Trapezoidal rule for evaluating the approximate value of $\int_a^b f(x)dx$, the area given by this integral is approximated by the sum of area of some

a) rectangle
b) sectorial figure
c) trapezium
d) none of these.

(55) Simpson's one-third rule is applicable only if the number of sub-interval is....

a) even
b) odd
c) either odd or even
d) none of these.

(56) The degree of precision of Trapezoidal rule is

a) 1
b) 2
c) 3
d) 5

(57) Error in one step formula of Simpson's one-third rule in $\int_a^b f(x)dx$ is

a) $\frac{-h^5}{90}f^{iv}(c) a < c < b$
b) $\frac{-h^5}{90}f^{v}(c) a < c < b$
c) $\frac{-h^4}{90}f^{iv}(c) a < c < b$
d) $\frac{-h^3}{90}f''(c) a < c < b$

(58) Let $f(0) = 1.76, f(1) = 4.24$ and then the Trapezoidal rule gives approximate value of $\int_0^1 f(x)dx$ is

a) 6
b) 3
c) 3.12
d) 3.98

(59) In Trapezoidal rule if the interval of integration $\int_2^9 f(x)dx$ is divided into 7 equal sub-intervals then h=

a) 2
b) 0.5
c) 1
d) 1.5

(60) In Trapezoidal rule if the length of each sub- interval is 0.5, when the interval of integr ation is [1,9], then number of sub-interval is

a) 8
b) 16
c) 18
d) 10