



**BRAINWARE UNIVERSITY**

**Term End Examination 2020 - 21**

Programme – Bachelor of Science (Honours) in Computer Science

Course Name – Mathematics-I

Course Code - GEBS102

Semester / Year - Semester I

Time allotted : 75 Minutes

Full Marks : 60

[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

**Group-A**

(Multiple Choice Type Question)

1 x 60=60

1. (Answer any Sixty )

(i)

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Relation  $y = \log_z x$  implies

a)

$$x^y = z$$

c)

$$x^z = y$$

b)

$$z^y = x$$

d)

$$y^z = x$$

(ii)

---

The derivative of the function  $f(x) = \sin(nx)$  is

a)

even function

c)

constant function

b)

odd function

d)

None of these

(iii)

Logarithms having base '10' are called

a)

pure logarithms

c)

natural logarithms

b)

Common logarithms

d)

infinite logarithms

(iv)

The derivative of a differentiable odd function is

a)

odd function

c)

constant function

b)

even function

d)

zero

(v)

If  $g(x) = \frac{1-x}{1+x}$  then  $g(x) + g\left(\frac{1}{x}\right)$  is

a) -1

c) 2

b) 1

d) 0

(vi)

If  $f(x) = e^{2x}$  then  $f(\log_e^{10}) =$

a) 10

c) 100

b) 20

d)

None of these

(vii)

If  $\phi(x) = \frac{1 - \tan x}{1 + \tan x}$  then  $\phi\left(\frac{\pi}{4} - x\right) =$

a)

$\tan x$

c)

$-\tan x$

b)

$\tan \pi$

d)

$\cot x$

(viii)

If  $f(x) = \frac{1-x}{1+x}$  then  $f(\cos 2\theta) =$

a)

$\frac{1}{\cot^2 \theta}$

c)

$\frac{1}{\tan^2 \theta}$

b)

$\sin^2 \theta$

d)

None of these

(ix)

$\lim_{x \rightarrow 0} \frac{\sin 2x}{3x} =$

a)  $2/3$

c)  $1/3$

b)  $3/2$

d)  $1/2$

(x)

$$\lim_{x \rightarrow -\frac{1}{2}} \frac{2x^2 - 3x + 1}{2x - 1} =$$

a)  $3/2$

b)  $-5/2$

c)  $2/3$

d)

3

(xi)

If  $\log_x 81 = 4$  then  $x =$

a) 1

b) 2

c) 3

d)

none of these

(xii)

---

If  $z_1 = 1 + i$  and  $z_2 = 2 + i$  then the greatest value of  $|z_1 + z_2|$  is

a)

b) 10

$\sqrt{2} + \sqrt{3}$

c) 0

d)

$\sqrt{2} + \sqrt{5}$

(xiii)

If  $x + iy = (1 + 3i)(1 + 2i)(1 + i)$  then  $x^2 + y^2 =$

a) 10

b) 100

c) 1

d)

none of these

(xiv)

---

$$\log_4^{\log_4^{\log_4^{256}}} =$$

a) 1

b) 2

c) 4

d) 0

(xv)

Which of the following is not correct?

a)

$$\log_{10} 10 = 1$$

b)

$$\log(2+3) = \log(2 \times 3)$$

c)

---

$$\log_{10} 1 = 0$$

d)

$$\log(1+2+3) = \log 1 + \log 2 + \log 3$$

(xvi)

---

$$\lim_{x \rightarrow 0} \frac{\sin^2 x}{x} \text{ is equal to}$$

a) 0

b) -1

c) 1

d)

none of these.

(xvii)

The fourth root of 1 are

a) 1

b)

- c) 1, 0, -1
- d) 1, -1, i, -i

(xviii)

If  $z$  and  $w$  are two complex numbers, then

- a)  $\overline{z + w} = \bar{z} + \bar{w}$
- b)  $\overline{z + w} = \bar{z} \cdot \bar{w}$
- c)  $\overline{z + w} = \bar{z} - \bar{w}$
- d)  $\overline{z + w} = \bar{z} / \bar{w}$

(xix)

The reciprocal of the number  $i$  is

- a) 1
- b) -1
- c) -i
- d) i

(xx)

The argument of the number  $-1+i$  is

- a)  $180^\circ$
- b)  $45^\circ$
- c)  $135^\circ$
- d)  $90^\circ$

(xxi)

$$\overline{(\sin 30^\circ + \cos 30^\circ) - (\sin 60^\circ + \cos 60^\circ)}$$

- a) -1
- b) 0

c) 1

d) 2

(xxii)

The value of the expression

$[\operatorname{cosec}(75^\circ + \theta) - \sec(15^\circ - \theta) - \tan(55^\circ + \theta) + \cot(35^\circ - \theta)]$  is

a) 1

b) -1

c) 0

d) 2

(xxiii)

Co-efficient of  $x^5$  in the expansion of  $(1+x^2)^5 (1+x)^4$  is

a) 40

b) 50

c) 30

d) 60

(xxiv)

The co-efficient of  $x^p$  and  $x^q$  ( $p$  and  $q$  are positive integers) in the expansion of  $(1+x)^{p+q}$  are

a)

b)

equal

equal with opposite signs

c)

d)

reciprocals to each other

none of these.

(xxv)

An improper fraction can be reduced to proper fraction by

a)

b)

addition

subtraction

c)

d)

multiplication

division

(xxvi)

If A and B are two non-singular matrices ,then  $(AB)^{-1}$  equals to

a)

$B^{-1}$

c)

$B^{-1}A^{-1}$

b)

$A^{-1}$

d)

$A^{-1}B^{-1}$

(xxvii)

---

If  $A(BC) = (AB)C$ , where A,B and C are three matrices, the corresponding law is called

a)

Inverse law

c)

Cramer's law

b)

Associative law

d)

Additive law

(xxviii)

The diagonal elements of a Hermitian matrix are

a)

Complex number

c)

Natural numbers

b)

Real numbers

d)

None of these.

(xxix)



The eigen values of the matrix  $A = \begin{pmatrix} 5 & 3 \\ 3 & 5 \end{pmatrix}$  are

- |     |     |
|-----|-----|
| a)  | b)  |
| 8,8 | 8,3 |
| c)  | d)  |
| 8,2 | 0,0 |

(xxx)

A matrix obtained by changing rows into columns or vice versa of a matrix is called the ..... of

- |             |           |
|-------------|-----------|
| a)          | b)        |
| inverse     | transpose |
| c)          | d)        |
| determinant | order     |

(xxxii)

If A be a square matrix then the trace of A is the

- |                               |                           |
|-------------------------------|---------------------------|
| a)                            | b)                        |
| product of diagonals elements | sum of diagonals elements |
| c)                            | d)                        |
| sum of row elements           | sum of columns elements   |

(xxxiii)

If A is a non-null square matrix then  $A+A^T$  is a

- |                  |                       |
|------------------|-----------------------|
| a)               | b)                    |
| symmetric matrix | skew-symmetric matrix |
| c)               | d)                    |
| null matrix      | none of these         |

(xxxiii)

Transpose of a rectangular matrix is a

a)

rectangular matrix

c)

square matrix

b)

diagonal matrix

d)

scalar matrix

(xxxiv)

The number of non-zero rows in an echelon form is called

a)

reduced echelon form

c)

conjugate of the matrix

b)

rank of a matrix

d)

co-factor of the matrix

(xxxv)

Two matrices A and B are multiplied to get BA if

a)

no of columns of A is equal to columns of B

c)

no of columns of A is equal to rows of B

b)

no of rows of A is equal to rows of B

d)

no of rows of A is equal to columns of B

(xxxvi)

The rank of a null matrix is

- a) 0
- c) 2

- b) 1
- d) 3

(xxxvii)

If  $-\lambda^3 + 6\lambda^2 - 9\lambda + 4$  is the characteristic polynomial of a matrix  $A$  then  $\det(A)$  is

- a) 2
- c) 6

- b) -9
- d) 4

(xxxviii)

If 2, 4, 4, 4 are all eigen values of a matrix, then the algebraic multiplicity of 4 is

- a) 1
- c) 3

- b) 2
- d) 0

(xxxix)

The eigen values of the matrix  $\begin{pmatrix} -1 & 0 & 0 & 0 & 0 \\ 0 & 2 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 3 & 0 \\ 0 & 0 & 0 & 0 & 5 \end{pmatrix}$  are

- a) 0, 2, 3, 5, 0
- c) -1, 2, 1, 5, 3

- b) -1, -1, 2, 2, 3
- d) 0, 0, 0, 1, 3, 5

(xl)

If  $\lambda$  is a characteristic root of  $A$  then  $\lambda + k$  is a characteristic root of

a)

$$\overline{A+kI}$$

c) A

b)

$$A-kI$$

d)

None of these

(xli)

If  $\lambda$  is an eigen value of a non-singular matrix  $A$ , then  $\frac{\det(A)}{\lambda}$  is an eigen value of

a) A

b)

$$adj(A)$$

c)

d)

$$\overline{A^T}$$

$$A^{-1}$$

(xlii)

A square matrix in which all elements except at least one element

in diagonal are zeros is said to be a

a)

identical matrix

c)

square matrix

b)

null matrix

d)

diagonal matrix

(xliii)

If the determinant of a matrix is zero, then the matrix is

a)

singular matrix

c)

can't say

b)

nonsingular matrix

d)

none of the mentioned.

(xliv)

Let A be a nilpotent matrix of order n then

a)

$A^n = 0$

c)  $A = nI$

b)  $nA = 0$

d)

none of these.

(xlv)

---

What is 'a' if  $B = \begin{pmatrix} 1 & 4 \\ 2 & a \end{pmatrix}$  is a singular matrix?

a) 5

c) 7

b) 6

d) 8

(xlvi)

If a function  $f(x)$  satisfies all the conditions of Rolle's Theorem on  $[a,b]$ , then  $f'(x)$

vanishes

a)

everywhere on  $(a,b)$

c)

b)

at exactly one point of  $(a,b)$

d)

at least at one point of (a,b)

none of these

(xlvii)

---

If  $f(x) = |x|$ , then for interval  $[-1, 1]$ ,  $f(x)$

a)

b)

satisfied all the conditions

satisfied all the conditions of

of Rolle's Theorem

Cauchy Mean Value Theorem

c)

d)

none of these

does not satisfied the

conditions of Mean

Value Theorem

(xlviii)

If differentiation of any function is zero at any point and constant at other points then it means?

a)

b)

Function is parallel to

Function is parallel to y-axis at

x-axis at that point

that point

c)

d)

Function is constant

Function is discontinuous at that point

(xlix)

---

Temperature of a rod is increased by moving  $x$  distance from origin and is given by equation  $T(x) = x^2 + 2x$ , where  $x$  is the distance and  $T(x)$  is change of temperature w.r.t distance. If, at  $x = 0$ , temperature is  $40^\circ\text{C}$ , find temperature at  $x=10$ .

a)

b)

$472^\circ\text{C}$

$473^\circ\text{C}$

c)

d)

$474^\circ\text{C}$

$475^\circ\text{C}$

(l)

The series  $\sum_{n=1}^{\infty} \frac{1}{n^{(p+1)}}$  is divergent if

a)

b)  $p > 1$

$p \leq 0$

c)  $p > 0$

d)

$p \leq 1$

(li)

If the origin is shifted to the point  $(-1,2)$  without changing the directions of the axes, the coordinates

a)  $(2,3)$  b)  $(3,1)$

c)  $(1,3)$  d)  $(3,1)$

e)  $(-1,3)$  f)  $(3,-1)$

(lii)

$r = \frac{12}{2 - \cos \theta}$  is the equation of

a) ellipse b) circle

c) parabola d) hyperbola

e) parabola f) hyperbola

(liii)

To remove the terms containing  $x$  and  $y$  of degree one from  $ax^2 + bxy + cy^2 + px + qy + r = 0$ , the needed transformation is

a) translation b) rotation

c) translation followed by rotation d) none of these

e) translation followed by rotation f) none of these

(liv)



If the equation  $7x^2 - 2xy + 7y^2 - 16x + 16y - 8 = 0$  is transformed to the equation of the form  $AX^2 + BY^2 + C = 0$ , then the value of  $A$  and  $B$  are

a)

b)

8, 6

6, 8

c)

d)

Both (a) & (b)

None of these

(lv)

The centre of  $5x^2 - 6xy + 5y^2 - 4x - 4y - 4 = 0$  is

a)

b)

(1,1)

(-1,1)

c)

d)

(-1,1)

(-1,-1)

(lvi)

$r = 3 \sin \theta + 4 \cos \theta$  is the equation of

a)

b)

a circle

a parabola

c)

d)

an ellipse

a hyperbola

(lvii)

After rotation of coordinate axes by an angle  $\frac{\pi}{4}$ , if the coordinates of a point becomes

$(0, \sqrt{2})$ , then original coordinates are

a)

b)

(1,1)  
c)

(-1,1)  
d)

(-1,1)

(-1,-1)

(lviii)

The length of latus rectum of a parabola whose focus is (2,-3) and directrix is  $5x-12y+6=0$  is

a) 6

b) 7

c) 8

d) 9

(lix)

The equation of the locus of the point whose distance from y-axis

is half the distance from origin is

a)

$$\overline{x^2 + 3y^2 = 0}$$

b)

$$\overline{x^2 - 3y^2 = 0}$$

c)

$$\overline{3x^2 + y^2 = 0}$$

d)

$$\overline{3x^2 - y^2 = 0}$$

(lx)

$$\log_{\sqrt{7}} 49 =$$

a) 1

b) 2

c) 3

d) 4