BRAINWARE UNIVERSITY

Term End Examination 2020 - 21

Programme – Diploma in Civil Engineering

Course Name – Mathematics I

Course Code - DCE104

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)

The logarithm of 1728 to the base $2\sqrt{3}$

a) 3 b) 6

c) 9 d) none of these

(ii)

$\log_{25}^{27} \times \log_{3}^{5} =$

a) 6 b) 9/2

c) 3/2 d) none of these

(iii)

$\log_{y^2}^{y} \times \log_{z^2}^{z} \times \log_{x^2}^{x} =$

a) 1/2 b) 1/3

c) 1/4 d) 1/8

(iv)

If one root of the equation $x^2-8x+m=0$ is 2 , then the other roots is

a) 14
b) 6
c) - 8
d) 10

(v)

If one root of the equation $x^2-6x+m=0$ be double of the other then the value of m is

a) 4
b) 6
c) 8
d) - 8

(vi)

If a and b are two roots of $4x^2+3x+7=0$ then $a^{-3}+b^{-3}=$

a) 43/9
b) 251/341
c) 225/343
d) 0

(vii)

If $\frac{1}{4-3i}$ is a root of the equation $px^2+qx+1=0$, where p ,q are real then the value p, q are

a) 25,-8
b) 25,8
c) 5,-4
d) none of these .

(viii)

The least positive integral value of n for which $\left(\frac{1+i}{1-i}\right)^n = 1$ is

a) 6
b) 4
c) 2
d) 0

(ix)

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

(x)

The value of $(1-\omega)(1-\omega^2)(1+\omega^8)(1+\omega^4) =$

a) 1
b) 3
c) 2
d) 4w

(xi)

$\frac{3}{1+4i}+\frac{i}{2+i} =$

a)
b)
$\frac{32-i}{85}$
$\frac{32-26i}{83}$
c)
d)

$\frac{32+26i}{85}$

$\frac{32-26i}{85}$

(xii)

$\left(1-\frac{1}{i}\right)(1-i)=$

a) - 2i

b) 1

c) 2

d) 2i

(xiii)

$\log_b^a \times \log_c^b \times \log_d^c =$

a)

b)

$\log_c^a$

$\log_b^a$

c)

d)

$\log_d^c$

$\log_d^a$

(xiv)

$\frac{2}{5-3i}=$

a)

b)

$\frac{5}{8}-\frac{3}{8}i$

$\frac{5}{8}+\frac{3}{8}i$

c)

d)

$\frac{5}{17}+\frac{3}{17}i$ $\frac{5}{17}-\frac{3}{17}i$

(xv)

If $\log_{10}^{2}=0.3010$ then the value of $\log_{10}^{80}=$

a) 1.6020 b) 1.9030

c) 3.9030 d) none

(xvi)

(9+8i) - (4+8i)+(9+2i) =

a) b)

16+18i 14+2i

c) d)

-2-2i -2+2i

(xvii)

If $C=\begin{vmatrix}1 & 2 & 3\\ -3 & 0 & -1\\ 5 & -6 & 7\end{vmatrix}$, then the co-factor of the element 2 is

a) 6 b) -16

c) 14 d) 16

(xviii)

The value of $\begin{vmatrix} 1 & -2 & 3 \\ 2 & -1 & 4 \\ -2 & 3 & 1 \end{vmatrix}$ is

a) 20

b) 13

c) 19

d)

none of these.

(xix)

The matrix $\begin{bmatrix} 1 & 0 & 0 \\ 5 & 1 & 0 \\ 3 & 2 & 4 \end{bmatrix}$ is

a)

b)

a diagonal

an upper triangular

c)

d)

a lower triangular matrix

a symmetric matrix

(xx)

$\begin{bmatrix} x+3 & x+2y \\ z-1 & 4t-6 \end{bmatrix} = \begin{bmatrix} 0 & 7 \\ 3 & 2t \end{bmatrix}$, then the value of x, y, z, t are respectively

a)

b)

3, -2, -4, 3

-3, 5, 4, 3

c)

d)

-3, 2, 4, -3

none of these .

(xxi)

The matrix $\begin{bmatrix} x & 3 \\ 1 & 5 \end{bmatrix}$ is singular, the value of x is

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

(xxii)

If A and B are square matrices and A^{-1} , B^{-1} exist, then $(AB)^{-1}=$

a) $B^{-1}A^{-1}$
b) $A^{-1}B^{-1}$
c) AB^{-1}
d) $A^{-1}B$

(xxiii)

The value of the determinant $\begin{vmatrix} 31 & 32 & 33 \\ 33 & 34 & 35 \\ 32 & 33 & 34 \end{vmatrix}$ is

a) 1
b) -1
c) 0
d) 67

(xxiv)

The value of $\begin{vmatrix} 5 & 6 \\ -1 & 2 \end{vmatrix}$ is

a) 14

b) 16

c) 2

d)

none of these

(xxv)

value of the determinant $\begin{vmatrix} 1 & \cos 60^\circ & \cos 30^\circ \\ \frac{1}{2} & \sin 30^\circ & \sin 60^\circ \\ 1 & 0 & 2 \end{vmatrix}$ is

a)

b) 1/2

$\frac{\sqrt{3}}{2}$

c) 0

d)

none of these

(xxvi)

A matrix having m rows and n columns with $m \neq n$ is said to be a

a)

b)

scaler matrix

identity matrix

c)

d)

square matrix

rectangular matrix

(xxvii)

The angle between the vectors $2i + 4j - 7k$ and $3i + 2j + 2k$ is

a)

b)

$\frac{\pi}{2}$

c)

$\frac{\pi}{3}$

d)

$\frac{\pi}{4}$

none of these .

(xxviii)

The value of x for which the vectors $-i+5j+xk$ and $xi+2j+3k$ are Perpendicular is

a) 3

b) -5

c) 5

d) 0

(xxix)

If $\vec{a}=i+j+k$ and $\vec{b}=i-j$ then $\left(\vec{a}+\vec{b}\right).\vec{a}$ is equal to

a) 1

b) -1

c) 3

d) -3

(xxx)

If $\vec{\alpha}=6i+9j-3k$ and $\vec{\beta}=2i+3j-k$ then $\vec{\alpha}$ and $\vec{\beta}$ are

a)

coplanar

b)

independent

c)

collinear

d)

none of these .

(xxxi)

If the co-ordinate of two points A and B are (1,0,5) and (-1,5,2) respectively then $\vec{AB} =$

a) 5i + 7k

b) -2i + 5j -k

c) 3i + 2j - k

d) -2i + 5j - 3k

(xxxii)

The vector in the direction of the vector $\vec{a} = \hat{i} - 2\hat{j} + 2\hat{k}$ that has magnitude 9 is:

a) $\hat{i} - 2\hat{j} + 2\hat{k}$

b) $\frac{1}{3}\left(\hat{i} - 2\hat{j} + 2\hat{k}\right)$

c) $3\left(\hat{i} - 2\hat{j} + 2\hat{k}\right)$

d) $9\left(\hat{i} - 2\hat{j} + 2\hat{k}\right)$

(xxxiii)

If $\vec{a}$ and $\vec{b}$ be two vectors such that $\left|\vec{a}\right| = \left|\vec{b}\right| = \sqrt{2}$ and $\vec{a}.\vec{b} = -1$ then the angle between $\vec{a}$ and $\vec{b}$ is :

a) $\frac{\pi}{3}$

b) $\frac{\pi}{4}$

c) $\frac{2\pi}{3}$

d) none of these

(xxxiv)

If $\vec{a}=2\hat{i}+3\hat{j}-\hat{k}, \vec{b}=-\hat{i}+2\hat{j}-4\hat{k}$ and $\vec{c}=\hat{i}+\hat{j}+\hat{k}$ then $\left(\vec{a}\times\vec{b}\right).\left(\vec{a}\times\vec{c}\right)$ is:

a) 74

b) -74

c) 52

d) -52

(xxxv)

The unit vector in the direction of $\vec{a}=3i-2j+6k$ is

a)

$$\frac{\vec{a}}{\left|\vec{a}\right|}=\frac{1}{7}(3i-2j+6k)$$

b)

$$\frac{\vec{a}}{\left|\vec{a}\right|}=\frac{1}{7}(3i+2j+6k)$$

c)

$$\frac{\vec{a}}{\left|\vec{a}\right|}=\frac{1}{7}(3i-2j-6k)$$

d)

$$\frac{\vec{a}}{\left|\vec{a}\right|}=\frac{1}{7}(3i+2j-6k)$$

(xxxvi)

The value of $\dfrac{\sin 20^\circ+\cos 20^\circ}{\sin 20^\circ-\cos 20^\circ}$ is

a)

$-\tan 65^\circ$

b)

$\tan 65^\circ$

c)

d)

none of these

$\cos 2A$

(xxxvii)

If $\tan A + \frac{1}{\tan 2A} =$

a) $\cos 2A$

b) $\sec 2A$

c) $\sin 2A$

d) $\operatorname{cosec} 2A$

(xxxviii)

The value of $\sin 420^\circ \cos 390^\circ - \cos(-300^\circ)\sin(-330^\circ)$ is

a) - 1/2

b) 1/2

c) 0

d) none of these

(xxxix)

The value of $\cos 1^\circ \cos 2^\circ \cos 3^\circ \ldots \cos 179^\circ$ is

a) $\frac{1}{\sqrt{2}}$

b) 0

c) 1

d) none of these .

(xl)

If $\sin x = \frac{3}{4}$ then $\cos x$ is

a) $\frac{2}{3}$

b) $\frac{\sqrt{3}}{2}$

c) $\frac{\sqrt{7}}{4}$

d) $\frac{1}{2}$

(xli)

$\cos\left(\sin^{-1}\frac{\sqrt{3}}{2}\right) = ?$

a) 0

b) 1

c) 1/2

d) $\sqrt{3}$

(xlii)

The value of $\sin 15^\circ \sin 75^\circ$ is

a) 1/2

b) 1

c) 1/4

d) none of these .

(xliii)

If $\tan\theta = 3$, then the value of $\cos 2\theta$ is

a) - 4/5
b) 4/3
c) 1/3
d) 2/3

(xliv)

If $\cos x + \sin x - 1 = 0$, then $\sin 2x =$

a) 0
b) -1
c) 2
d) 1

(xlv)

If $0 \le \theta \le \frac{\pi}{4}$ and $\sin 2\theta = \frac{4}{5}$, then the value of $\tan\theta$ is

a) 2
b) 1/2
c) - 1/2
d) -2

(xlvi)

The value of $\frac{\sqrt{3}}{2\cos 10^\circ} - \frac{1}{2\sin 10^\circ}$ is

a) -2
b) 2
c) -1
d) 1

(xlvii)

Which of the following points on the line y = 3x+2 ?

a)

(1,3) , (-1,-1)

b)

(1,5) , (-1,-1)

c)

(-1,1) , (0,2)

d)

(-1,-1) ,(-2,4)

(xlviii)

What is the equation between the two points (1 , -1) , (-2 , -3) ?

a) $2x-3y=5$

b) $2x+3y=-1$

c) $3y-4x=-7$

d) $4x-3y=7$

(xlix)

$$\lim_{x\to 3}\frac{x^3-27}{x^2-9}=$$

a) 9/5
b) 27
c) 9/2
d) 2/9

(l)

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

a) 3/2
b) - 3/2
c) 2/3
d) 3

(li)

If $f(x)$ is continuous in $[0,4]$ and $f(2)=\frac{2}{5}$ then $\lim_{x\to 2} f(x)=$

a) 2/5
b) 5/2
c) 4
d) 0

(lii)

If $y = \tan^{-1}\frac{\sin x}{1+\cos x}$ then the value of $\frac{dy}{dx}$

a) - 1/2

b) 1/2

c) -1

d) none of these

(liii)

If $y = \log(\log x)$ (base of the log are e) then the value of $\frac{dy}{dx}$

a) $\frac{1}{\log x}$

b) $\frac{1}{x \log x}$

c) $\frac{x}{\log x}$

d) none of these

(liv)

$\lim_{x \to 0} \frac{x}{x} =$

a) 0

b) 1

c) 2

d) 3

(lv)

$\lim_{x\to 2}\frac{x^3-8}{x^2-4}=$

a) 4 b) 0

c) 1 d) 3

(lvi)

If $y=\tan^{-1}\frac{a+bx}{1-bx}$, then $\frac{dy}{dx}=$

a) b)

$\frac{1}{1+x^2}$ $-\frac{1}{1+x^2}$

c) d)

$1+x^2$ none of these.

(lvii)

$y=\tan^{-1}\frac{\sqrt{1+\cos 2x}}{\sqrt{1-\cos 2x}}$, then $\frac{dy}{dx}=$

a) -1 b) 1

c) 2 d) 0

(lviii)

If $y=\cot^{-1}(\tan x)+\tan^{-1}(\cot x)$, then the value of $\frac{dy}{dx}$ is

a) -2 b) -1

c) d)

$-\frac{1}{1+x^2}$

$\frac{1}{1+x^2}$

(lix)

If $y = \sin^{-1}\frac{2x}{1+x^2}$, then $\frac{dy}{dx} =$

a) 2

b) $\frac{1}{1+x^2}$

c) $\frac{2}{1+x^2}$

d) none of these.

(lx)

$\lim_{x\to 2}\frac{x^2-4}{x^2+4} =$

a) 1

b) 0

c) -1

d) 2