BRAINWARE UNIVERSITY

Term End Examination 2022
Programme – BCA-2019/BCA-2020/BCA-2021
Course Name – Basic Mathematics
Course Code - GEBS101
(Semester I)

Full Marks : 60   **Time : 2:30 Hours**
[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 30=30

1.   *Choose the correct alternative from the following :*

(i)
Evaluate the value of the determinant $\begin{vmatrix} 11 & 12 & 13 \\ 13 & 14 & 15 \\ 12 & 13 & 14 \end{vmatrix}$ is

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

(ii)
Evaluate co-factor of -3 in the determinant $\begin{vmatrix} 2 & -3 & 4 \\ 1 & 0 & 1 \\ 0 & -1 & 4 \end{vmatrix}$

a) 4   b) -4
c) 0   d) None of these

(iii)
Evaluate the value of the determinant $\begin{vmatrix} 41 & 42 & 43 \\ 47 & 48 & 49 \\ 44 & 45 & 46 \end{vmatrix}$ is

a) 4   b) 0
c) -1   d) None of these

(iv)
Evaluate the value of the determinant $\begin{vmatrix} 1 & \cos 60° & \cos 30° \\ \frac{1}{2} & \sin 30° & \sin 60° \\ 1 & 0 & 2 \end{vmatrix}$

a)   b)

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

$$\frac{1}{2}$$

c) 0 d) None of these

(v) What is the nature of trasepose matrix of

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

a) Lower trianguler b) Upper trianguler
c) Null matrix d) None of these

(vi) Solve $\begin{bmatrix} x+3 & x+2y \\ z-1 & 4t-6 \end{bmatrix} = \begin{bmatrix} 0 & 7 \\ 3 & 2t \end{bmatrix}$ and find the value of x, y, z, t

a) 3, -2, -4, 3 b) -3, 5, 4, 3
c) -3, 2, 4, -3 d) None of these

(vii) Select the correct option

a) $\int \sec^2 x dx = \cot x + c$ b) $\int \sec^2 x dx = \tan x + c$

c) $\int \sec^2 x dx = -\tan x + c$ d) $\int \sec^2 x dx = -\cot x + c$

(viii) What are diagonal elements of the matrix

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

a) 5,3,1 b) 3,2,4
c) 1,1,4 d) 3,2,4

(ix) There are 8 students on the curling team and 12 students on the Badminton team. Tell what is the total number of students on the two teams if three students are on both teams.

a) 20 b) 17
c) 15 d) 14

(x) $\int \sin 3x dx = k \cos 3x$ then evaluate k is equal to

a) 3 b) 1/3
c) -1/3 d) None of these

(xi) Tell the cardinality of the power set of the set is

a) 128 b) 64
c) 32 d) 14

(xii) In a Venn diagram, Select the correct representation of the overlapped area between two circles

a) The union of two sets b) The intersection of two sets
c) The elements that are not in two sets d) The difference between the number of elements in two sets.

(xiii) Tell which of these sets are equal:

$A = \{r,t,s\}$, $B = \{s,t,r\}$, $C = \{t,s,r\}$, $D = \{r,s,t\}$

a) A and B
b) B and C
c) A and D
d) All of these

(xiv) $\frac{dy}{dx} = x^2 + \sin x$ then evaluate y

a)
2x + cos x

b) $\frac{x^3}{3} + \cos x$

c) $\frac{x^3}{3} - \cos x$

d)
None of these

(xv) Evaluate $\int e^{3\log x} dx$ is equal to

a) $x^3 + c$

b) $\log x + c$

c) $\frac{x^4}{4} + c$

d) $x^4 + c$

(xvi)

Tell if A,B,C are subsets of the universal set S and $A \cup B = A \cup C$ & $A \cap B = A \cap C$

then

a) A=B
b) A=C
c) B=C
d) None of these

(xvii) Tell if $A \cup B = B$ holds for all sets B, then

a) $A = \phi$
b) A = B

c) $A = \phi$ and $A = B$
d) None of these

(xviii) Calculate $\frac{d}{dx}(x\sin x) =$

a) sinx + cosx
b) sinx + xcosx
c) xsinx + cosx
d) None of these

(xix) Calculate $\frac{d}{dx}(x^2 \cos x) =$

a) $x(2\cos x - x\sin x)$
b) $x^2(2\cos x - x\sin x)$
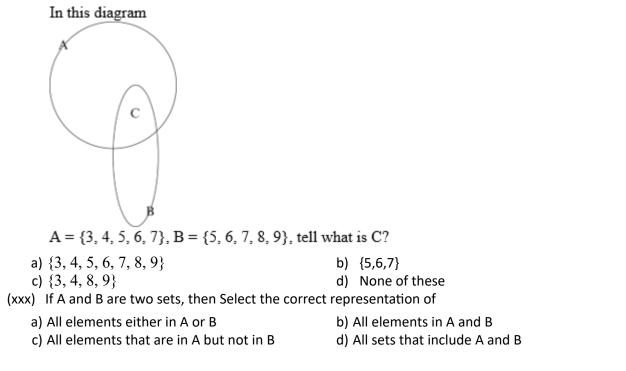c) $x^2(2\cos x - x^2 \sin x)$
d) None of these

(xx) Calculate $\frac{d}{dx}(\sin x^2) =$

a) 2xcosx
b) $2x\cos(x^2)$
c) 3
d) None

(xxi)

Identify $\sin(\alpha - 540°) =$

a) $\sin \alpha$

b) $\cos \alpha$

c) $-\sin \alpha$

d) None of these

(xxii) If $y = \log \tan x$ then calculate $\dfrac{dy}{dx}$

a) 2sec2x

b) $2\sec^3 x$

c) 2cosec2x

d) $2\cos ec^3 x$

(xxiii) If $f(x) = \log e^x + e^{\log x}$, then calculate $f'(x) =$

a) 1

b) 2

c) 3

d) None of these

(xxiv) Write the nature of the transpose of the matrix $\begin{bmatrix} 1 & 0 & 0 \\ 5 & 1 & 0 \\ 3 & 2 & 4 \end{bmatrix}$

a) a diagonal

b) an upper triangular

c) a lower triangular

d) a symmetric matrix

(xxv) If $\tan A = 2, \tan B = 3$, then identify $A + B =$

a) $135°$

b) $45°$

c) $60°$

d) $90°$

(xxvi) If $\cos(90° - \theta) = \dfrac{1}{2}$, then identify the value of θ

a) $15°$

b) $40°$

c) $0°$

d) $30°$

(xxvii) Identify if $\tan 35° = 0.7$, then the value of $\tan(-665°)$ is

a) 0.7

b) -0.7

c) 0

d) None of these

(xxviii) Identify the value of $\sec(-945°)$

a) $\sqrt{2}$

b) $\dfrac{1}{\sqrt{2}}$

c) $\sqrt{2}$

d) $\dfrac{1}{\sqrt{2}}$

(xxix)

In this diagram

A = {3, 4, 5, 6, 7}, B = {5, 6, 7, 8, 9}, tell what is C?

a) {3, 4, 5, 6, 7, 8, 9}   b) {5,6,7}
c) {3, 4, 8, 9}   d) None of these

(xxx) If A and B are two sets, then Select the correct representation of

a) All elements either in A or B   b) All elements in A and B
c) All elements that are in A but not in B   d) All sets that include A and B

Group-B
(Multiple Choice Type Question)   3 x 10=30

2. *Choose the correct alternative from the following :*

(i)
Evalute $\int (\sqrt{x} + \frac{1}{\sqrt{x}}) \, dx =$

a) $\frac{1}{x} x^{\frac{1}{3}} + 2x^{\frac{1}{2}} + c$

b) $\frac{2}{3} x^{\frac{4}{3}} + \frac{1}{2}x^2 + c$

c) $\frac{2}{3} x^{\frac{3}{2}} + 2x^{\frac{1}{2}} + c$

d) $\frac{3}{2} x^{\frac{3}{2}} + \frac{1}{2}x^{\frac{1}{2}} + c$

(ii) The value of the expression [cosec (75° + θ) − sec (15° − θ) − tan (55° + θ) + cot (35° − θ)] is

a) -1   b) 0
c) 1   d) none of these

(iii)

Suppose
$$\begin{cases} f(x) = \dfrac{3x(x-1)}{x^2 - 3x + 2} \text{ for } x \neq 1, 2, \\ f(1) = -3, \\ f(2) = 4. \end{cases}$$

Then $f(x)$ is continuous

a) except at x=1   b) except at x=2
c) except at x=1 and x=2 d) none of these

(iv)

If
$$\begin{cases} f(x) = \dfrac{x^2 - x}{2x} \text{ for } x \neq 0, \\ f(0) = k, \end{cases}$$

and if f is continuous at $x = 0$, then $k =$

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

(v) Identify

$$\left[\frac{\sin^2(22°)+\sin^2(68°)}{\cos^2(22°)+\cos^2(68°)} + \sin^2(63°) + \cos 63° \sin 27°\right]$$

a) 0

b) 1

c) 2

d) none of these

(vi)

Evalute $\int \frac{dx}{\sqrt{x}} =$

a) $\sqrt{x} + k$

b) $2\sqrt{x} + k$

c) $x + k$

d) $\frac{2}{3}x^{3/2} + k$

(vii)

Evalute $\int x \log x \, dx$

a) $\frac{x^2 \log x}{2} - \frac{x^2}{4} + C$

b) $\frac{x \log x}{2} - \frac{x}{4} + C$

c) $x^2 \log x - \frac{1}{4x} + C$

d) $\frac{(\log x)^2}{2} - \frac{x^2}{4} + C$

(viii)

Evalute $\int x \sec^2 x \, dx =$

a) $\tan x + \log \cos x + c$

b) $\frac{x^2}{2} \sec^2 x \log \cos x + c$

c) $x \tan + \log \sec x + c$

d) $x \tan x + \log \cos x + c$

(ix) If x = a(cos θ + θ sin θ), y = a(sin θ - θ cos θ), then at $\theta = \frac{\pi}{4}$, we have

a) $\frac{dy}{dx} = 1$

b) $\frac{d^2y}{dx^2} = \frac{8\sqrt{2}}{a\pi}$

c) $\frac{dy}{dx} = -1$

d) $\frac{d^2y}{dx^2} = \frac{-8\sqrt{2}}{a\pi}$

(x)

The solution of differential equation cos(x + y) dy = dx is given by

a) $y = x \sec\left(\frac{y}{x}\right) + c$

b) $y + \cos^{-1}\left(\frac{y}{x}\right) = c$

c) $y = \tan\left(\frac{x+y}{2}\right) + c$

d) $y = \cot\left(\frac{x+y}{2}\right) + c$

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