



BRAINWARE UNIVERSITY

Term End Examination 2023
 Programme – BCA-2020
 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 15=15

1. Choose the correct alternative from the following :

(i) If, $y = 2x^3 - 15x^2 + 36x + 8$ then calculate $\frac{dy}{dx} =$

a) $5x^2 - 30x + 36$

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

c) $6x^2 - 30x + 36$

d) None of these

(ii) 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

(iii)

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

(iv) Select the correct statement

a) $(B \cup A) \cap (B \cup C) = B \cup (A \cap C)$

b) $A \cap (B \cup C) = (A \cup B) \cap (A \cup C)$

c) $A \cap (B - C) = (A \cup B) - (A \cup C)$

d) $(A - B) \cup (B - C) \cup (C - A) = (A \cup B) - (B \cap C)$

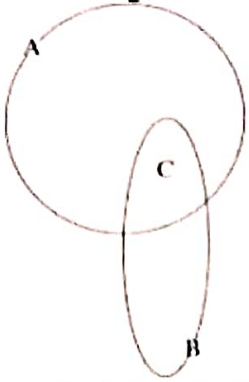
(v) If, $y = \frac{x^2 - 3x + 4}{x + 3}$ then calculate $\frac{dy}{dx} =$

a) $\frac{x^2 + 5x - 13}{(x + 3)^2}$

b) $\frac{x^2}{(x + 3)^2}$

- c) $\frac{x^2 + 6x - 13}{(x+3)^2}$
- (vi) Calculate $\frac{d}{dx}(\sin x^2) =$
- a) $2x \cos x$
 b) $2x \cos(x^2)$
 c) 3
 d) None
- (vii) Calculate $\frac{d}{dx}(\sin x^0) =$
- a) $\cos x^0$
 b) $\cos x$
 c) $\cos \frac{x}{\pi}$
 d) $\frac{\pi}{180} \cos x^0$
- (viii) If $y = \log(\log x)$, then calculate the value of $\frac{dy}{dx}$ is
- a) $\frac{1}{\log x}$
 b) $\frac{1}{x \log x}$
 c) $\frac{x}{\log x}$
 d) None of these
- (ix) If $\tan A = 2, \tan B = 3$, then identify $A + B =$
- a) 135°
 b) 45°
 c) 60°
 d) 90°
- (x) If $\cos(90^\circ - \theta) = \frac{1}{2}$, then identify the value of θ
- a) 15°
 b) 40°
 c) 0°
 d) 30°
- (xi) Identify if $\tan 35^\circ = 0.7$, then the value of $\tan(-665^\circ)$ is
- a) 0.7
 b) -0.7
 c) 0
 d) None of these
- (xii) Identify the value of $\sec(-945^\circ)$
- a) $\sqrt{2}$
 b) $\frac{1}{\sqrt{2}}$
 c) $\sqrt{2}$
 d) $\frac{1}{\sqrt{2}}$
- (xiii) Tell which set is equivalent to the set $\{2, 3, 5, 7, 11\}$?
- a) $\{x: x \text{ is an odd number lying between 1 and 13}\}$
 b) $\{21, 23, 25\}$
 c) $\{x: x \text{ is a prime number less than 12}\}$
 d) None of these

(xiv) 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

(xv) 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

(Short Answer Type Questions)

3 x 5=15

2. $\int \frac{x + \sin x}{1 + \cos x} dx$ is equal to (3)

3. Show that $\frac{\sqrt{\operatorname{cosec} x + 1}}{\sqrt{\operatorname{cosec} x - 1}} = \frac{\cos x}{1 - \sin x}$ (3)

4. Show that $\sin(A+B) \cdot \sin(A-B) + \sin(B+C) \cdot \sin(B-C) + \sin(C+A) \cdot \sin(C-A) = 0$ (3)

5. If $f(x) = \begin{cases} kx + 3, & x \geq 1 \\ x^2 + k^2, & x < 1 \end{cases}$ (3)
 If $f(x)$ is continuous at $x = 1$. Calculate the value of k .

6. Show that $\cos 306^\circ + \cos 234^\circ + \cos 162^\circ + \cos 18^\circ = 0$ (3)

OR

Show that $\tan 35^\circ + \tan 10^\circ + \tan 35^\circ \cdot \tan 10^\circ = 1$ (3)

Group-C

(Long Answer Type Questions)

5 x 6=30

7. Show that $\frac{\sqrt{1 + \cos \alpha}}{\sqrt{1 - \cos \alpha}} = \operatorname{cosec} \alpha + \cot \alpha = \cot \frac{\alpha}{2}$ (5)

8. Evaluate $\frac{dy}{dx}$, where $y = \left\{ (\tan x)^{\tan x} \right\}^{\tan x}$, when $x = \frac{\pi}{4}$. (5)

9. I) Evaluate roster form of the given sets (5)
 $A = \{x: x \text{ is an integer and } -3 \leq x < 7\}$ and $B = \{x: x \text{ is a natural number less than } 6\}$

(II) Evaluate $A \cup B$, $A \cap B$.

10. (5)
Identify the inverse of the matrix $\begin{pmatrix} 1 & 0 & -1 \\ 3 & 4 & 5 \\ 0 & -6 & -7 \end{pmatrix}$ if exists.

11. (5)
Examine the matrix $\begin{pmatrix} 1 & 3 & 5 \\ 2 & 4 & 9 \\ 5 & 7 & 8 \end{pmatrix}$ as the sum of symmetric and skew-symmetric matrices.

12. (5)
In a committee, 50 people speak French, 20 speak Spanish and 10 speak both Spanish and French. Evaluate how many speak at least one of these two languages?

If $A = \{a, b, d, e\}$, $B = \{b, c, e, f\}$ and $C = \{d, e, f, g\}$ (5)
OR

(I) Test $A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$

(II) Test $A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$

Also test with Venn diagram
