

CLASS - 11SETS

- Set $A = \{x: x \in \mathbb{N}, x \text{ is even prime number}\}$ is
(a) Null Set (b) Singleton set
(c) an infinite set (d) None of these
- If A and B are two sets then $(A \cap B) \cup B$ is equal to
(a) A (b) B (c) $A \cup B$ (d) $A \cap B$
- The number of non-empty subsets of set $A = \{a, 2, x\}$ is
(a) 8 (b) 9 (c) 7 (d) 4
- If $A = \{x: x^2 - 5x + 6 = 0\}$, $B = \{2, 4\}$ & $C = \{4, 5\}$ then $A \times (B \cap C)$ is
(a) $\{(2,4), (3,4)\}$ (b) $\{(1,4), (3,4)\}$
(c) $\{(2,4), (3,5)\}$ (d) $\{(2, 4), (3, 5)\}$
- Let $A = \{1, 2\}$, $B = \{p, q, r\}$, the number of relation from set A to set B will be
(a) 64 (b) 32 (c) 16 (d) 15
- Domain of real valued function $f(x) = 1/(3x-2)$ is
(a) $2/3$ (b) $-2/3$ (c) \mathbb{R} (d) $\mathbb{R} - \{2/3\}$
- The value of $\sin(1110)^\circ$
(a) 0 (b) 1 (c) $1/2$ (d) $\sqrt{3}/2$
- If $\sin \theta + \cos \theta = 1$, then the value of $\sin 2\theta$ is equal to
(a) 1 (b) 0 (c) $1/2$ (d) -1
- Value of i^{-37} is
(a) 1 (b) -1 (c) i (d) -i
- The value of $\sqrt{-36} \times \sqrt{-25}$ is
(a) 30 (b) 25 (c) -30 (d) None of these
- Find the multiplicative inverse of $\sqrt{5} + 3i$.
(a) $(\sqrt{5}+3i)/14$ (b) $(\sqrt{5}+3i)/-14$
(c) $(\sqrt{5}-3i)/14$ (d) $(-\sqrt{5}+3i)/14$

12. If $-3x + 17 < -13$, then
13. If $3/(x-1) < 0$ then,
(a) $x \in (1, \infty)$ (b) $x \in (-\infty, 1)$
(c) $x \in [1, \infty)$ (d) $x \in (-\infty, 4)$
14. If $nC_1 = nC_n$, then n is equal to
(a) 1 (b) 8 (c) 9 (d) 18
15. The number of four digit numbers that can be formed with the digits 2, 3, 4 & 7 and using each digit only once is
(a) 4 (b) 8 (c) 24 (d) 256
16. Every-one in a room Shakes hands with everybody else. The total number of hand-shakes is 66. The total number of persons in this room is
(a) 17 (b) 12 (c) 13 (d) 14
17. If n th term of a sequence is given by $a_n = (3^n - 2)(n^2 + 1)$, then third term of sequence is
(a) 175 (b) 200 (c) 250 (d) 225
18. The third term of Sequence defined as $a_n = 2n^3 + 1$ if $n \leq 2$ and $a_n = a_{n-1} + 5$ if $n > 2$ is
(a) 21 (b) 24 (c) 17 (d) 22

ASSERTION-REASON BASED QUESTIONS

(Question numbers 19 and 20 are Assertion-Reason based questions carrying 1 mark each. Two statements are given, one labelled Assertion (A) and the other labelled Reason (R). Select the correct answer from the options (a), (b), (c) and (d) as given below.)

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A).
(b) Both (A) and (R) are true but (R) is not the correct explanation of (A).
(c) (A) is true but (R) is false.
(d) (A) is false but (R) is true.

19. Assertion (A): The total number of terms in expansion of $(x^5 + y^5)^{10}$ is 10.

Reason (R): The total number of terms in expansion of $(x + y)^n$ is $n+1$.

20. Assertion (A): If $\sin x = 3/5$, $\cos y = -12/13$ then $\cos(x+y) = 33/65$ where both x and y lies in second quadrant.

Reason (R): $\cos(x+y) = \cos x \cos y - \sin x \sin y$.

SECTION-B [2x 5= 10]

(This section comprises of 5 very short answer (VSA) type questions of 2 marks each.)

(Question 21 - Question 25):

21. Write all subsets of set $\{ \varnothing, 1 \}$

Or

If $A = \{1, 2, 3, 4\}$, $B = \{2, 5, 6, 7\}$ and $U = \{1, 2, 3, 4, 5, 6, 7, 8\}$ find $A - B^c$ where B^c denotes complement of set B .

22. Let $f = \{(1, 1), (2, 3), (0, -1), (-1, -3)\}$ be a function from Z to Z defined by $f(x) = ax + b$ for some integers a and b , determine a and b .

23. In a circle of diameter 40 cm. the length of a chord is 20cm. Find the length of the minor arc of the chord.

24. Prove that $\frac{(\sin x - \sin 3x)}{(\sin^3 x - \cos^3 x)} = 2 \sin x$.

25. Solve the inequality: $2(2x + 3) - 10 < 6(x - 2)$

Or

Solve the inequality: $-3 \leq 4 - 7x/2 \leq 18$

SECTION-C [3x6=18]

(This section comprises of 6 short answer (SA) type questions of 3 marks each.)

(Question 26 - Question 31):

26. Show that $A \cup B = A \cap B$ implies $A=B$.

27. Find the domain and range of the following function:

$$F(x) = \sqrt{x^2-9}$$

OR

Let R be a relation on set N of all natural numbers such that $(a,b) \in R$ if $2a+3b=15$. Write R as a set of ordered pairs, also write domain and range of R.

28. Prove that $\cos 6x = 32 \cos^6 x - 48 \cos^4 x + 18 \cos^2 x - 1$

29. Find the modulus of $(1+i)/(1-i) - (1-i)/(1+i)$

Or

If $(x + iy)^3 = u + iv$ prove that $u/x + v/y = 4(x^2 - y^2)$.

30. A Committee of 5 persons is to be selected from 6 Men & 4 Women. In how many ways can this be done if committee consists of atleast one Man & one Woman.

Or

How many numbers greater than 10,00,000 Can be formed by using the digits 1,2,0,2,4,2,4 ?

31. Using Binomial Theorem, Prove that $9^{n+1} - 8n - 9$ is divisible by 64 whenever n is a positive integer.

SECTION-D [5x4= 20]

(This section comprises of 4 long answer (LA) type questions of 5 marks each.)

(Question 32 - Question 35):

32. If $A=(1,3,5,6)$, $B=(2,3,5,8)$ and $U=(1,2,3,4,5,6,7,8,9)$ then verify

(i) $(A \cup B)^c = A^c \cap B^c$

(ii) $(A \cap B)^c = A^c \cup B^c$

(iii) $(A^c)^c = A$

(iv) $(A - B)^c = A \cap B^c$

where A denotes complement of set A.

33. Prove that: $\sin^2 x + \sin^2 \left(x + \frac{\pi}{3}\right) + \sin^2 \left(x - \frac{\pi}{3}\right) = \frac{3}{2}$

Or

If $\tan x = -\frac{5}{12}$ and x lies in fourth quadrant.

find $\sin \frac{x}{2}$, $\cos \frac{x}{2}$ & $\tan \frac{x}{2}$. and x lies in fourth quadrant,

34. Using Binomial Theorem

Find $(a+b)^6 - (a-b)^6$ and hence evaluate $(\sqrt{5} + \sqrt{3})^6 - (\sqrt{5}-\sqrt{3})^6$

Or

Using Binomial Theorem, expand $(a^2 + \sqrt{a^2 - 1})^4 + (a^2 - \sqrt{a^2 - 1})^4$ and verify the result taking $a=1$.

35. A solution of 8% boric acid is to be diluted by adding 2% boric acid Solution to it. The resulting mixture is to be more than 4%. But less than 6% boric acid. If we have 720 liters of the 8% solution. How many liters of 2% solution will have to be added?

SECTION-E [4x3= 12]

(This section comprises of 3 case-study/passage-based questions of 4 marks each with subparts. The first two case study questions have three subparts (i), (ii), (iii) of marks 1, 1, 2 respectively. The third case study question has two subparts of 2 marks each)

(Question 36 - Question 38):

CASE STUDY -1

36. Republic day is a national holiday of India. It honors the date on which Constitution of India came into effect on 26. January 1950 replacing the Govt. of India Act (1935). Answer the following question, which based on the word. "REPUBLIC"

- (i) Find the number of arrangements of the letters of the word 'REPUBLIC', which starts with R. (1 MARK)
- (ii) In how many arrangements all vowels are together. (1 MARK)

(iii) In how many arrangements, not even two vowels are together.

OR

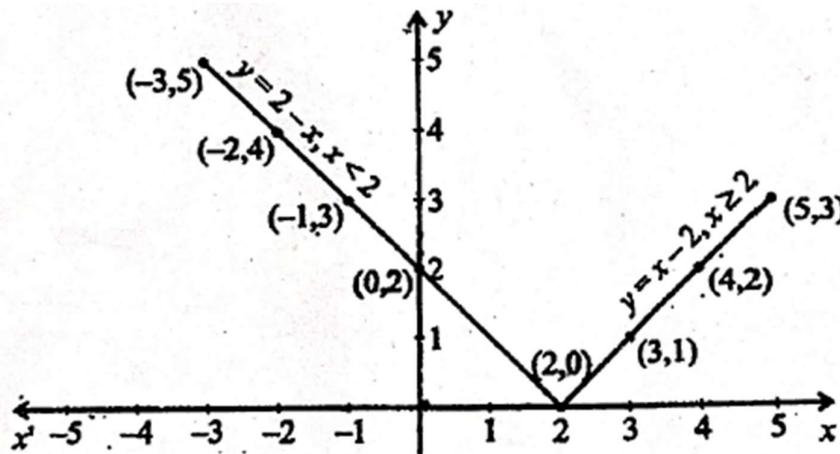
If the number of arrangements of the word 'REPUBLIC' is abcde

then find $a+b+c+d+e$.

(2 MARKS)

CASE STUDY - 2

37. Graph of function $f(x) = |x - 2| = \begin{cases} 2 - x, & \text{if } x < 2 \\ x - 2, & \text{if } x \geq 2 \end{cases}$ is as shown



Answer the following questions using the information given above.

(a) What is the value of $f(-2)$

(b) Check whether $(1, 3)$ lies on the graph or not?

(c) Write domain and range of $f(x) = |x - 2|$

Or

Find x such that $|x - 2| = 5$

CASE STUDY - 3

38. Consider $z = a + ib$, $\bar{z} = a - ib$, where a and b are real numbers, are conjugate to each other. Based on the above information answer the following questions:

(a) Find the conjugate of $(6 + 5i)^2$

(b) If the complex number $-3 + ix^2y$ and $x^2 + y + 4i$ are conjugate to each other then find the value of (x, y) .
