SET THEORY
PRACTICE QUESTIONS

Education Bestower

1. Total number of elements in the power set of A containing 15 elements is
(a) 2^{15} (b) 15^2 (c) 2^{15-1} (d) $2^{15}-1$

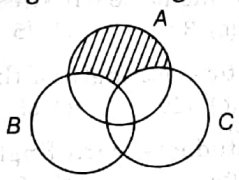
2. What is the number of proper subsets of a given finite set with n elements?
(a) $2n-1$ (b) $2n-2$ (c) 2^n-1 (d) 2^n-2

3. If $A = P(\{1, 2\})$, where P denotes the power set, then which one of the following is correct?
(a) $\{1,2\} \subset A$ (b) $1 \in A$ (c) $\phi \notin A$ (d) $\{1,2\} \in A$

4. If the cardinality of a set A is 4 and that of a set B is 3, then what is the cardinality of the set $A \Delta B$?
(a) 1 (b) 5
(c) 7 (d) Cannot be determined

5. If P, Q and R are three non-collinear points, then what is $PQ \cap PR$ equal to?
(a) Null set (b) $\{P\}$ (c) $\{P, Q, R\}$ (d) $\{Q, R\}$

6. The shaded region in the given figure is

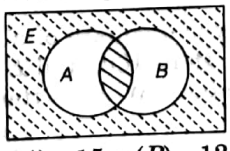


(a) $A \cap (B \cup C)$ (b) $A \cup (B \cap C)$
(c) $A - (B \cap C)$ (d) $A - (B \cup C)$

7. If A and B are subsets of a set X, then what is $\{A \cap (X - B)\} \cup B$ equal to?
(a) $A \cup B$ (b) $A \cap B$ (c) A (d) B

8. Let $n(U) = 700$, $n(A) = 200$, $n(B) = 300$, $n(A \cap B) = 100$, then $n(A' \cap B')$ is equal to
(a) 400 (b) 600
(c) 300 (d) None of these

9. Consider the following Venn diagram.



If $n(E) = 42$, $n(A) = 15$, $n(B) = 12$ and $n(A \cup B) = 22$, then the area represented by shaded portion in the above Venn diagram, is
(a) 25 (b) 27 (c) 32 (d) 37

10. If A is the set of the divisions of the number 15, B is the set of prime numbers smaller than 10 and C is the set of even numbers smaller than 9, then $(A \cup C) \cap B$ is the set
(a) $\{1, 3, 5\}$ (b) $\{1, 2, 3\}$ (c) $\{2\}$ (d) $\{2, 5\}$

11. In a college of 300 students, every student reads 5 newspapers and every newspaper is read by 60 students. The number of newspapers is
(a) atleast 30 (b) atmost 20
(c) exactly 25 (d) None of these

12. In an examination out of 100 students, 75 passed in English, 60 passed in Mathematics and 45 passed in both English and Mathematics. What is the number of students passed in exactly one of the two subjects?
(a) 45 (b) 60 (c) 75 (d) 90

13. If $A = \{4n + 2 \mid n$ is a natural number$\}$ and $B = \{3n \mid n$ is a natural number$\}$, then what is $(A \cap B)$ equal to?
(a) $\{12n^2 + 6n \mid, n$ is a natural number$\}$
(b) $\{24n - 12 \mid, n$ is a natural number$\}$
(c) $\{60n + 30 \mid, n$ is a natural number$\}$
(d) $\{12n - 6 \mid, n$ is a natural number$\}$

14. If $X = \{(4^n - 3n - 1) \mid n \in N\}$ and $Y = \{9(n-1) \mid n \in N\}$, then what is $X \cup Y$ equal to?
(a) X (b) Y (c) N (d) A null set

15. Let N denotes the set of natural numbers and $A = \{n^2 : n \in N\}$ and $B = \{n^3 : n \in N\}$. Which one of the following is correct?
(a) $A \cup B = N$
(b) The complement of $(A \cup B)$ is an infinite set
(c) $A \cap B$ must be a finite set
(d) $A \cap B$ must be a proper subset of $\{m^6 : m \in N\}$

16. Out of 800 boys in a school, 224 played cricket, 240 played hockey and 336 played basketball. Of the total, 64 played both basketball and hockey, 80 played cricket and basketball and 40 played cricket and hockey; 24 played all the three games. The number of boys, who did not play any game is
(a) 128 (b) 216 (c) 240 (d) 160

17. Consider the set A of all determinants of order 3 with entries 0 or 1 only. Let B be the subset of A consisting of all determinants with value 1. Let C be the subset of the set of all determinants with value -1. Then,
(a) C is empty
(b) B has as many elements as C
(c) $A = B \cup C$
(d) B has twice as many elements as C

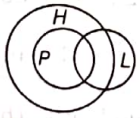
18. If $A=\{x:x^2-3x+2=0\}$ and $B=\{x:x^2+2x-8=0\}$, then $(A-B)$ is
(a) {1,2} (b) {2}
(c) {1} (d) {4, 3}

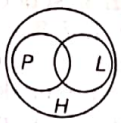
19. Let $A=\{x:x\in R,|x|<1\}$, $B=\{x:x\in R,|x-1|\geq 1\}$ and $A\cup B=R-D$, then the set D is
(a) $\{x:1<x\leq 2\}$ (b) $\{x:1\leq x<2\}$
(c) $\{x:1\leq x\leq 2\}$ (d) None of these

20. If $A=\{(x,y):x^2+y^2=25\}$ and $B=\{(x,y):x^2+9y^2=144\}$, then $A\cap B$ contains
(a) one point (b) three points (c) two points (d) four points

21. If two sets A and B having 3 and 6 elements respectively, then which of the following is/are correct?
I. The minimum number of elements of $(A\cup B)=6$.
II. The maximum number of elements of $(A\cap B)=3$.
Select the correct answer using the code given below.
(a) Only I (b) Only II
(c) Both I and II (d) Neither I nor II

22. If A is any set and $P(A)$ is its power set, then which of the following is/are correct?
I. $P(A)\cap P(B)=P(A\cap B)$
II. $P(A)\cup P(B)=P(A\cup B)$
Select the correct answer using the code given below.
(a) Only II (b) Only I
(c) Both I and II (d) Neither I nor II

23. Consider the following statements
I. All poets (P) are learned (L).
II. All learned (L) are happy (H).
Which one of the following Venn diagrams correctly represents both the above statements taken together?
(a) 

(b) 

(c) 

(d) 

24. A relation between three sets is established using two expressions, $(A\cup B)=(A\cup C)$ and $(A\cap B)=(A\cap C)$, which stays valid if and only if
I. $B=C$ II. $A=B=C$ III. $A=C$
Which of the above statement(s) is/are correct?
(a) Only I (b) Only II
(c) Both I and II (d) Only III

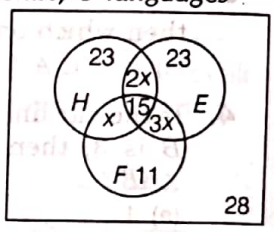
Directions (Q. Nos. 25-27) *In a city, 25% of the families have phone, 15% of the families have car, 65% of the families have neither phone nor car and 2000 families have both phone and car.*

25. Percentage of families having both phone and car, is
(a) 5% (b) 10% (c) 20% (d) 25%

26. Percentage of families having either phone or car, is
(a) 10% (b) 30% (c) 35% (d) 40%

27. What is the number of families in the city?
(a) 30000 (b) 40000
(c) 20000 (d) 10000

Directions (Q. Nos. 28-32) *In a class, 3 languages are offered mainly Hindi, English and French. The total number of students learning French is 46. In x denotes the number of students learning Hindi and French but bot English, then answer the following using adjacent Venn diagram.*



28. How many students learn precisely two languages?
(a) 55 (b) 40 (c) 30 (d) 13

29. How many students learn atleast two languages?
(a) 15 (b) 30 (c) 45 (d) 55

30. What is the total strength of the class?
(a) 124 (b) 100 (c) 96 (d) 66

31. How many students learn English and French?
(a) 30 (b) 43 (c) 45 (d) 73

32. How many students learn atleast one language?
(a) 45 (b) 51
(c) 96 (d) None of these

PREVIOUS YEARS' QUESTIONS *NDA*

33. If A and B are any two sets, then what is the value of $A\cap(A\cup B)$? **2012 I**
(a) Complement of A (b) Complement of B
(c) B (d) A

34. Let $A=\{x:x$ is a square of a natural number and x is less than 100$\}$ and B is a set of even natural numbers. What is the cardinality of $A\cap B$? **2012 I**
(a) 4 (b) 5
(c) 9 (d) None of these

35. Let $U=\{x\in N:1\leq x\leq 10\}$ be the universal set, N being the set of natural numbers.
If $A=\{1, 2, 3, 4\}$ and $B=\{2, 3, 6, 10\}$, then what is the complement of $(A-B)$? **2012 I**
(a) {6, 10} (b) {1, 4}
(c) {2, 3, 5, 6, 7, 8, 9, 10} (d) {5, 6, 7, 8, 9, 10}

36. Which one of the following is a null set? **2013 I**
(a) {0} (b) {{{}}}
(c) {{}} (d) $\{x \mid x^2 + 1 = 0, x \in R\}$

37. If A is a subset of B, then which one of the following is correct? **2013 II**
(a) $A^c \subseteq B^c$ (b) $B^c \subseteq A^c$ (c) $A^c = B^c$ (d) $A \subseteq A \cap B$

38. If $A = \{1, 3, 5, 7\}$, then what is the cardinality of the power set $P(A)$? **2013 II**
(a) 8 (b) 15 (c) 16 (d) 17

39. Consider the following
I. $A \cup (B \cap C) = (A \cap B) \cup (A \cap C)$
II. $A \cap (B \cup C) = (A \cup B) \cap (A \cup C)$
Which of the above statement(s) is/are correct? **2013 II**
(a) Only I (b) Only II (c) I and II (d) Neither I nor II

40. In a group of 50 people, two tests were conducted, one for diabetes and one for blood pressure. 30 people were diagnosed with diabetes and 40 people were diagnosed with high blood pressure. What is the minimum number of people who were having diabetes and high blood pressure? **2013 II**
(a) 0 (b) 10 (c) 20 (d) 30

41. Which one of the following is an example of non-empty set? **2013 II**
(a) Set of all even prime numbers
(b) $\{x : x^2 - 2 = 0$ and x is rational$\}$
(c) $\{x : x$ is a natural number, $x < 8$ and simultaneously $x > 12\}$
(d) $\{x : x$ is a point common to any two parallel lines$\}$

Directions (Q. Nos. 42-44) *Read the following information carefully to answer the questions that follow.*

In a survey of 25 students, it was found that 15 have taken Mathematics, 12 have taken Physics and 11 have taken Chemistry, 5 have taken Mathematics and Chemistry, 9 have taken Mathematics and Physics, 4 have taken Physics and Chemistry and 3 have taken all the three subjects. **2014 I**

42. The number of students who have taken only Physics, is
(a) 2 (b) 3 (c) 5 (d) 6

43. The number of students who have taken only two subjects, is
(a) 7 (b) 8 (c) 9 (d) 10

44. Consider the following statements
I. The number of students who have taken only one subject is equal to the number of students who have taken only two subjects.
II. The number of students who have taken atleast two subjects is four times the number of students who have taken all the three subjects.
Which of the above statement(s) is/are correct?
(a) Only I (b) Only II
(c) Both I and II (d) Neither I nor II

45. In a class of 60 students, 45 students like music, 50 students like dancing, 5 students like neither. Then, the number of students in the class who like both music and dancing, is **2015 I**
(a) 35 (b) 40 (c) 50 (d) 55

46. Let $A = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$. Then, the number of subsets of A containing exactly two elements is **2015 I**
(a) 20 (b) 40 (c) 45 (d) 90

47. If $A = \{x : x$ is a multiple of 3$\}$ and $B = \{x : x$ is a multiple of 4$\}$ and $C = \{x : x$ is a multiple of 12$\}$, then which one of the following is a null set?
(a) $(A \setminus B) \cup C$ (b) $(A \setminus B) \setminus C$ **2015 I**
(c) $(A \cap B) \cap C$ (d) $(A \cap B) \setminus C$

48. If $A = \{x \in R : x^2 + 6x - 7 < 0\}$ and $B = \{x \in R : x^2 + 9x + 14 > 0\}$, then which of the following is/are correct?
I. $(A \cap B) = (-2, 1)$ II. $(A \setminus B) = (-7, -2)$
Select the correct answer using the code given below. **2015 II**
(a) Only I (b) Only II
(c) Both I and II (d) Neither I nor II

49. A, B, C and D are four sets such that $A \cap B = C \cap D = \phi$. Consider the following
I. $A \cup C$ and $B \cup D$ are always disjoint.
II. $A \cap C$ and $B \cap D$ are always disjoint.
Which of the above statement(s) is/are correct?
(a) Only I (b) Only II **2015 II**
(c) Both I and II (d) Neither I nor II

50. What is the number of natural numbers less than or equal to 1000 which are neither divisible by 10 nor 15 nor 25? **2016 I**
(a) 860 (b) 854 (c) 840 (d) 824

ANSWERS

1	a	2	c	3	d	4	d	5	b	6	d	7	a	8	c	9	a	10	c
11	c	12	a	13	d	14	b	15	d	16	d	17	b	18	c	19	b	20	d
21	c	22	b	23	d	24	a	25	a	26	c	27	b	28	c	29	c	30	a
31	a	32	c	33	d	34	a	35	c	36	d	37	b	38	c	39	d	40	c
41	b	42	a	43	c	44	b	45	b	46	c	47	d	48	a	49	b	50	b