Miscellaneous Exercises - 5

Q.1 Multiple choice questions. Four possible answers are given for the following questions. Tick mark ( ) the correct answer.

1. The different number of ways to describe a set are
   (a) 1 (b) 2
   (c) 3 (d) 4

2. The set $\{x / x \in W \wedge x \leq 101\}$ is
   (a) infinite set (b) subset
   (c) Null set (d) finite set

3. A collection of well-defined distinct objects is called
   (a) subset (b) power set
   (c) set (d) none of these

4. If $A \subseteq B$ then $A \cup B$ is equal to
   (a) A (b) B
   ϕ

5. A set $Q = \frac{a}{b} | a, b \in Z \wedge b \neq 0$ is called a set of
   (a) Whole numbers
   (b) Natural numbers
   (c) Irrational numbers
   (d) Rational numbers

6. If $A \subseteq B$ then $A - B$ is equal to
   (a) A (b) B
   (c) ϕ (d) None of these

7. If A and B are disjoint sets, then $A \cup B$ is equal to
   (a) A (b) B
   (c) ϕ (d) $B \cup A$

8. The number of elements in power set $\{1,2,3\}$ is
   (a) 4 (b) 6
   (c) 8 (d) 9

9. A set with no element is called
   (a) subset (b) empty set
   (c) singleton set (d) super set

10. If $A \subseteq B$ then $A \cap B$ is equal to
    (a) A (b) B
    (c) ϕ (d) None of these

11. The set having only one element is called
    (a) Null set (b) power set
    (c) singleton set (d) subset

12. The relation {(1,2),(2,3),(3,3)(3,4)} is
    (a) onto function
    (b) into function
    (c) not a function
    (d) one-one function

13. If $A \subseteq B$ and $B \subseteq A$, then
    (a) A = B (b) A ≠ B
    (c) A ∩ B = ϕ (d) A ∪ B = ϕ

14. Power set of an empty set is
    (a) ϕ (b) $\{a\}$
    (c) $\{\phi,\{a\}\}$ (d) $\{\phi\}$

15. If number of elements in set A is 3 and in set B is 4, then number of elements in A×B is
    (a) 3 (b) 4
    (c) 12 (d) 7

16. Point (-1,4) lies in the quadrant
    (a) I (b) II
    (c) III (d) IV

17. The domain of R ={(0,2),(2,3),(3,3)(3,4)} is
    (a) {0,3,4} (b) {0,2,3}
    (c) {0,2,4} (d) {2,3,4}

18. The point (−5 , −7) lies in … quadrant
    (a) I (b) II
    (c) III (d) IV

19. If number of elements in se A is 3 and in set B is 2, then number of binary relations in A×B is

(a) 2^3 (b) 2^6

(c) 2^8 (d) 2^2

20. $(A \cup B) \cup C$ is equal to

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

(c) $A \cup (B \cup C)$ (d) $A \cap (B \cap C)$

21. If $A \cap B = \phi$, then set A and B are ....sets.

(a) sub (b) over lapping

(c) disjoint (d) power

22. $A \cup (B \cap C)$ is equal to

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

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

(c) $(A \cap B) \cap (A \cap C)$

(d) $A \cup (B \cup C)$

23. The range of {(a,a), (b,b), (c,c)} is.....

(a) {a,b} (b) {a,b,c}

(c) {a} (d) ϕ

24. The complement of ϕ is .....

(a) U (b) ϕ

(c) impossible (d) union

25. $A \cap A^c$ = ...

(a) U (b) A

(c) A^c (d) ϕ

26. Venn diagram was first used by.....

(a) John Venn

(b) Netwon

(c) Arthur Cayley

(d) John Napier

27. The set { x | x ∈ A and x ∉ B } is .....

(a) A ∪ B (b) A ∩ B

(c) A – B (d) B – A

28. The Range of R $=\{(1,3),(2,2),(3,1)(4,4)\}$ is

(a) {1,2,4} (b) {3,2,4}

(c) {1,2,3,4} (d) {1,3,4}

29. $N \cup W$ = ...

(a) ϕ (b) {0}

(c) N (d) W

30. y co-ordinate of every pint on x – axis is..

(a) +ve (b) –ve

(c) zero (d) 1

31. By definition, which of the following is a set?

(a) {a,b,c,a} (b) {1,2,3,2}

{ ,m,n,o} {0,1,2,3,1}

32. The domain of {(a,b), (b,c), (c,d)} is...

(a) {a,b,c} (b) {b,c,d}

(c) {a,b} (d) {a,b,c,d,}

33. The complement of U is ....

(a) U (b) ϕ

(c) impossible (d) union

34. $A \cup A^c$ = ...

(a) U (b) A

(c) A^c (d) ϕ

35. Which of the following is true?

(a) $P \subseteq N \subseteq Z \subseteq W$

(b) $P \subseteq N \subseteq W \subseteq Z$

(c) $P \subseteq W \subseteq N \subseteq Z$

(d) $P \subseteq Z \subseteq N \subseteq W$

36. W – N = ...

(a) ϕ (b) {0}

(c) N (d) W

37. N – W = ...

(a) ϕ (b) {0}

(c) N (d) W

38. The relation $\{(a,b),(b,c),(a,d),\}$ is....

(a) a function (b) not a function

(c) range (d) domain 05(091)

39. x co-ordinate of every pint on y – axis is..

(a) +ve (b) –ve

(c) zero (d) 1

40. Which of the following is true?

(a) $W \subseteq N$

(b) $Z \subseteq W$

(c) $N \subseteq P$

(d) $P \subseteq W$

41. A subset of $A \times A$ is called……in A.

(a) set (b) relation

(c) function (d) into function

42. Which of the following is true?

(a) N and $W \subseteq Z$

(b) P and $O \subseteq W$

(c) O and $E \subseteq W$

(d) P and $E \subseteq N$

43. If $x \in A$ and $x \in B$, then $\{x\}$ is equal to

(a) $A - B$ (b) A^c

(c) $A \cap B$ (d) B^c

44. The point (4, –6) lies in …. Quadrant

(a) I (b) II

(c) III (d) IV

45. If $f: A \to B$ and range of $f \neq B$, then f is an ……..

(a) into function

(b) onto function

(c) bijective function

(d) function

46. If $f: A \to B$ and range of $f = B$, then f is an……

(a) into function

(b) onto function

(c) bijective function

(d) function

47. If set A has all its elements common with set B then set A is called….set.

(a) sub (b) overlapping

(c) disjoint (d) super

48. $O \cup E =$ .....

(a) ϕ (b) O

(c) E (d) Z

49. Which of the following is commutative law?

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

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

(c) $A \cap B = B \cap A$

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

50. Which of the following is associative law of intersection?

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

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

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

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

51. Which of the following is distributive property of intersection over union?

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

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

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

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

52. $N \cap W =$ .....

(a) ϕ (b) $\{0\}$

(c) N (d) W

53. If A is subset of U, then $\left(A^C\right)^C =$ ……

(a) A (b) A^c

(c) ϕ^C (d) U^c

54. If two sets have some elements common but not all are called….sets.

(a) sub (b) overlapping

(c) disjoint (d) super

55. Which of the following is De-Morgan's law?

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

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

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

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

56. Which of the following is associative law of union?

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

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

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

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

57. $O - E =$ .....

(a) ϕ (b) O

(c) E (d) Z

58. If union and intersection of two sets are equal then sets are .....sets.

(a) disjoint (b) overlapping

(c) equal (d) super

59. Which of the following is complete description of Real numbers?

(a) $N \cup W = R$ (b) $O \cup E = R$

(c) $P \cup Q = R$ (d) $Q \cup Q' = R$

60. $E - O =$ .....

(a) ϕ (b) O

(c) E (d) Z

61. Two sets having no common element, are called ..... sets.

(a) subet (b) overlapping

(c) disjoint (d) super

62. If $x \in U$ and $x \notin A$, then $\{x\}$ is equal to.....

(a) U^C (b) A^C

(c) ϕ^C (d) $A - U$

63. $O \cap E =$ .....

(a) ϕ (b) O

(c) E (d) Z

64. A and A^C are .....sets.

(a) universal (b) overlapping

(c) disjoint (d) super

65. Which of the following is distributive property of union over intersection?

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

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

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

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

66. If $x \in A$ and $x \notin B$, then $\{ x \}$ is equal to.....

(a) $A - B$ (b) $B - A$

(c) $A \cap B$ (d) A^c

ANSWER KEY

1	c	**2**	d	**3**	c	**4**	b	**5**	d	**6**	c	**7**	d	**8**	c
9	b	**10**	a	**11**	c	**12**	c	**13**	a	**14**	d	**15**	c	**16**	b
17	b	**18**	c	**19**	b	**20**	c	**21**	c	**22**	a	**23**	b	**24**	a
25	d	**26**	a	**27**	c	**28**	c	**29**	d	**30**	c	**31**	c	**32**	a
33	b	**34**	a	**35**	b	**36**	b	**37**	a	**38**	b	**39**	c	**40**	d
41	b	**42**	a	**43**	c	**44**	d	**45**	a	**46**	b	**47**	a	**48**	d
49	c	**50**	b	**51**	d	**52**	c	**53**	a	**54**	b	**55**	b	**56**	a
57	b	**58**	c	**59**	d	**60**	c	**61**	c	**62**	b	**63**	a	**64**	c
65	c	**66**	a												

Q.2 Write short answers of the following questions.

(i) Define a subset and give one example.

Subset: If A and B are two sets and every element of A is an element of B then set A is called subset of set B. It is denoted by $A \subseteq B$.

Example: $A = \{1, 2\}$, $B = \{1, 2, 3, 4\}$

As all elements of Set A are also present in Set B. Therefore $A \subseteq B$.

(ii) Write all subsets of the set {a, b}

Solution:

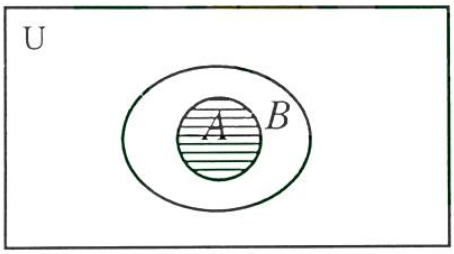
All subsets $(2^n = 2^2 = 4)$

$\{\ \}$, $\{a\}$, $\{b\}$, $\{a, b\}$

(iii) Show $A \cap B$ by Venn Diagram when $A \subseteq B$.

Solution:

If $A \subseteq B$ then $A \cap B = A$



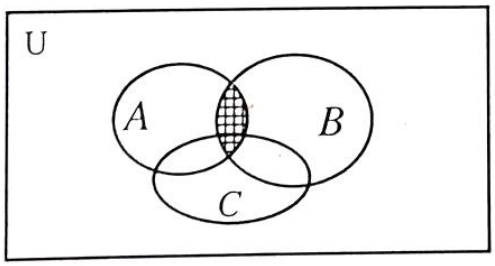
$A \cap B$

Horizontal line segments show $A \cap B$

(iv) Show by Venn Diagram $A \cap (B \cup C)$

Solution:

$A \cap (B \cup C)$ by Venn diagram



- Horizontal line segments and squares show $B \cup C$.
- $A \cap (B \cup C)$ is shown by squares.

(v) Define intersection of two sets.

Intersection of two sets:

The intersection of two sets A and B, written as $A \cap B$ (read as A intersection B) is the set consisting of all the common elements of A and B.

(vi) Define a function.

Function: Suppose A and B are two non-empty sets, then relation $f : A \to B$ is called a function if

(i) Dom f = A

(ii) Every $x \in A$ appears in one and only and ordered pair in f.

(vii) Define an one – one function.

One – one function:

A function $f : A \to B$ is called one – one function, if all distinct elements of A have distinct images in B, i.e:

$f(x_1) = f(x_2) \quad x_1 = x_2 \in A$ or

$\forall\ x_1 \neq x_2 \in A \quad f(x_1) \neq f(x_2)$

(viii) Define an onto function.

Onto function:

A function $f : A \to B$ is called an onto function, if every element of set B is an image of at least one element of set A.

i.e. Range of f = B

(ix) Define a Bijective function.

Bijective function:

A function $f : A \to B$ is called bijective function iff function f is one-one and onto.

(x) Write De Morgan's law.

De Morgan's Law:

If two sets A and B are the sub sets of U then De-Morgan's laws are expressed as

(i) $(A \cup B)' = A' \cap B'$

(ii) $(A \cap B)' = A' \cup B'$

Q.3 Fill in the Blanks

i. If $A \subseteq B$ then $A \cup B =$ _____.

ii. If $A \cap B = \phi$ then A and B are _____.

iii. If $A \subseteq B$ *and* $B \subseteq A$ then_____.

iv. $A \cap (B \cup C) =$ _____.

v. $A \cup (B \cap C) =$ _____.

vi. The complement of U is _____.

vii. The complement of ϕ is_____.

viii. $A \cap A^c =$ _____.

ix. $A \cup A^c =$ _____.

x. The set $\{x | x \in A \text{ and } x \notin B\} =$ _____.

xi. The point (-5, -7) lies in _____ quadrant.

xii. The point (4,-6) lies in _____quadrant.

xiii. The y co-ordinate of every point is _____on x-axis.

xiv. The x co-ordinate of every point is _____on y-axis.

xv. The domain of {(a,b), (b,c), (c,d)} is _____.

xvi. The range of {(a,a), (b,b), (c,c)} is _____.

xvii. Venn-diagram was first used by_____.

xviii. A subset of A x A is called the _____in A.

xix. If $f : A \longrightarrow B$ and range of f=B, then f is an _____function.

xx. The relation of {(a,b), (b,c), (a,d)} is _____ function.

Answers:

(i) B (ii) Disjoint sets

(iii) A = B (iv) $(A \cap B) \cup (A \cap C)$

(v) $(A \cup B) \cap (A \cup C)$

(vi) ϕ (vii) U

(viii) ϕ (ix) U

(x) $A \setminus B$ (xi) IIIrd

(xii) IVth

(xiii) Zero (xiv) Zero

(xv) {a, b, c}

(xvi) {a, b, c} (xvii) John venn

(xviii) Binary relation

(xix) onto (xx) not