MODERN PUBLIC SCHOOL SEC.37 FBD

CLASS XI SUB. MATHS

(HOLIDAY HOMEWORK)

CHAPTER-1 (SETS )

MULTIPLE CHOICE QUESTIONS::

Q.1 If A, B and C are any three sets, then A × (B ∪ C) is equal to:

A. (A × B) ∪ (A × C) B. (A ∪ B) × (A ∪ C)

C. (A × B) ∩ (A × C) D. None of the above

Q.2 The range of the function f(x) = 3x – 2‚ is:

A. (- ∞, ∞) B. R – {3} C. (- ∞, 0) D. (0, – ∞)

Q.3 How many elements are there in the complement of set A?

A. 0 B. 1 C. All the elements of A

D. None of these

Q.4 Empty set is a \_\_\_\_\_\_\_.

A. Infinite set B. Finite set C. Unknown set D. Universal set

Q.5: The number of elements in the Power set P(S) of the set S = {1, 2, 3} is:

A. 4 B. 8 C. 2 D. None of these

Q.6 Order of the power set P(A) of a set A of order n is equal to:

A. n B. 2n C. 2n D. n2

Q.7 Which of the following two sets are equal?

A. A = {1, 2} and B = {1} B. A = {1, 2} and B = {1, 2, 3}

C. A = {1, 2, 3} and B = {2, 1, 3} D. A = {1, 2, 4} and B = {1, 2, 3}

Q.8 Let U = {1, 2, 3, 4, 5, 6, 7, 8, 9, 10}, P = {1, 2, 5}, Q = {6, 7}. Then P ∩ Q’ is :

A. P B. Q C. Q’ D. None

Q.9 The cardinality of the power set of {x: x∈N, x≤10} is \_\_\_\_\_\_.

A. 1024 B. 1023 C. 2048 D. 2043

Q.10 Write X = {1, 4, 9, 16, 25,…} in set builder form.

A. X = {x: x is a set of prime numbers} B. X = {x: x is a set of whole numbers}

C. X = {x: x is a set of natural numbers} D. X = {x: x is a set of square numbers}

EXTRA QUESTIONS::

Q. 1: Write the following sets in the roster form.

(i) A = {x | x is a positive integer less than 10 and 2x – 1 is an odd number}

(ii) C = {x : x2 + 7x – 8 = 0, x ∈ R}

Q. 2: Write the following sets in roster form:

(i) A = {x : x is an integer and –3 ≤ x < 7}

(ii) B = {x : x is a natural number less than 6}

Q. 3: Given that N = {1, 2, 3, …, 100}, then

(i) Write the subset A of N, whose elements are odd numbers.

(ii) Write the subset B of N, whose elements are represented by x + 2, where x ∈ N

Q. 4: Let X = {1, 2, 3, 4, 5, 6}. If n represent any member of X, express the following as sets:

(i) n ∈ X but 2n ∉ X

(ii) n + 5 = 8

(iii) n is greater than 4

Q. 5: Let U = {1, 2, 3, 4, 5, 6}, A = {2, 3} and B = {3, 4, 5}.

Find A′, B′, A′ ∩ B′, A ∪ B and hence show that ( A ∪ B )′ = A′∩ B′.

Q. 6: Use the properties of sets to prove that for all the sets A and B, A – (A ∩ B) = A – B

Q. 7: Let U = {1, 2, 3, 4, 5, 6, 7}, A = {2, 4, 6}, B = {3, 5} and C = {1, 2, 4, 7}, find

(i) A′ ∪ (B ∩ C′)

(ii) (B – A) ∪ (A – C)

Q. 8: In a class of 60 students, 23 play hockey, 15 play basketball,20 play cricket and 7 play hockey and basketball, 5 play cricket and basketball, 4 play hockey and cricket, 15 do not play any of the three games. Find

(i) How many play hockey, basketball and cricket

(ii) How many play hockey but not cricket

(iii) How many play hockey and cricket but not basketball

Q. 9: Let U = {x : x ∈ N, x ≤ 9}; A = {x : x is an even number, 0 < x < 10}; B = {2, 3, 5, 7}. Write the set (A U B)’.

Q. 10: In a survey of 600 students in a school, 150 students were found to be drinking Tea and 225 drinking Coffee, 100 were drinking both Tea and Coffee. Find how many students were drinking neither Tea nor Coffee.

Q.11 Let A, B and C be sets, then show that A ∩ (B ∪ C) = (A ∩ B) ∪ (A ∩ C).

Q.12 Out of 100 students; 15 passed in English, 12 passed in Mathematics, 8 in Science, 6 in English and Mathematics, 7 in Mathematics and Science; 4 in English and Science; 4 in all the three. Find how many passed:

i) in English and Mathematics but not in Science

ii) in Mathematics and Science but not in English

iii) in Mathematics only

iv) in more than one subject only

Q.13 Two finite sets have m and n elements, respectively. The total number of subsets of first set is 56 more than the total number of subsets of the second set. The values of m and n respectively are: (A) 7, 6 (B) 5, 1 (C) 6, 3 (D) 8, 7

Q.14 Let A and B be two sets, if A ∩ X = B ∩ X = φ and A U X = B U X for some set X, prove that A =B.

Q.15 Let P be the set of prime numbers and let S = {t | 2t – 1 is a prime}. Prove that S ⊂ P.

Q.16 If A and B are subsets of the universal set U, then show that:

(i) A ⊂ A ∪ B

(ii) A ⊂ B ⇔ A ∪ B = B

(iii) (A ∩ B) ⊂ A

Q17 A, B and C are subsets of Universal Set U. If A = {2, 4, 6, 8, 12, 20} B = {3, 6, 9, 12, 15}, C = {5, 10, 15, 20} and U is the set of all whole numbers, draw a Venn diagram showing the relation of U, A, B and C.

Q18. In a town of 10,000 families it was found that 40% families buy newspaper A, 20% families buy newspaper B, 10% families buy newspaper C, 5% families buy A and B, 3% buy B and C and 4% buy A and C. If 2% families buy all the three newspapers. Find:

(a) The number of families which buy newspaper A only.

(b) The number of families which buy none of A, B and C

Q.19 If X and Y are two sets such that X ∪ Y has 18 elements, X has 8 elements and Y has 15 elements; how many elements does X ∩ Y have?

Q20. If X= { a, b, c, d } and Y = { f, b, d, g}, find: (i) X – Y (ii) Y – X (iii) X ∩ Y

Q.21 Out of 100 students; 15 passed in English, 12 passed in Mathematics, 8 in Science,6 in English and Mathematics, 7 in Mathematics and Science; 4 in English and Science; 4 in all the three. Find how many passed

(i) in English and Mathematics but not in Science

(ii) in Mathematics and Science but not in English

(iii) in Mathematics only

(iv) in more than one subject only

Q22. Let F1 be the set of parallelograms, F2 the set of rectangles, F3 the set of rhombuses, F4 the set of squares and F5 the set of trapeziums in a plane. Then F1may be equal to

(a) F2 ∩F3. (b) F3 ∩F4

(c) F2 u Fs. (d) F2 ∪ F3 ∪ F4 ∪ F1

Q23 If X= {1, 2, 3}, if n represents any member of X, write the following sets containing all numbers represented by

(i) 4n (ii) n + 6 (iii) n/2 (iv) n-1

CHAPTER 2 RELATION AND FUNCTIONS

MULTIPLE CHOICE QUESTIONS

1. If f(x) = x3 – (1/x3), then f(x) + f(1/x) is equal to

(a) 2x3. (b) 2/x3 (c) 0. (d) 1

2. Let n (A) = m, and n (B) = n. Then the total number of non-empty relations that can be defined from A to B is

(a) mn. (b) nm – 1 (c) mn – 1 (d) 2mn – 1

3. If f(x) = x2 + 2, x ∈ R, then the range of f(x) is

(a) [2, ∞) (b) (-∞, 2]

(c) (2, ∞) (d) (-∞, 2) U (2, ∞)

4. What will be the domain for which the functions f(x) = 2x2 – 1 and g(x) = 1 – 3x are equal?

(a) {-2, 1} (b) {1/2, -2} (c) [2, 12] (d) (-1, 2)

5. If [x]2 – 5 [x] + 6 = 0, where [ . ] denotes the greatest integer function, then

(a) x ∈ [3, 4] (b) x ∈ (2, 3]. (c) x ∈ [2, 3]. (d) x ∈ [2, 4)

6. If f(x) = ax + b, where a and b are integers, f(–1) = – 5 and f(3) = 3, then a and b are equal to

(a) a = – 3, b = –1 (b) a = 2, b = – 3

(c) a = 0, b = 2 (d) a = 2, b = 3

7. The domain of the function f(x) = x/(x2 + 3x + 2) is

(a) [-2, -1] (b) R – {1, 2} (c) R – {-1, -2} (d) R – {2}

8. The range of f(x) = √(25 – x2) is

(a) (0, 5) (b) [0, 5]. (c) (-5, 5) (d) [1, 5]

9. The domain and range of the real function f defined by f(x) = (4 – x)/(x – 4) is given by

(a) Domain = R, Range = {–1, 1}

(b) Domain = R – {1}, Range = R

(c) Domain = R – {4}, Range = {– 1}

(d) Domain = R – {– 4}, Range = {–1, 1}

10. The domain and range of the function f given by f(x) = 2 – |x −5| is

(a) Domain = R+ , Range = ( – ∞, 1]

(b) Domain = R, Range = ( – ∞, 2]

(c) Domain = R, Range = (– ∞, 2)

(d) Domain = R+ , Range = (– ∞, 2]

EXTRA QUESTIONS:

Q.1: Write the range of a Signum function.

Q.2: The Cartesian product A × A has 9 elements among which are found (–1, 0) and (0,1). Find the set A and the remaining elements of A × A.

Q.3: Express the function f: A—R. f(x) = x2 – 1. where A = { -4, 0, 1, 4) as a set of ordered pairs.

Q.4: Assume that A = {1, 2, 3,…,14}. Define a relation R from A to A by R = {(x, y) : 3x – y = 0, such that x, y ∈ A}. Determine and write down its range, domain, and codomain.

Q.5: Let f(x) = x2 and g(x) = 2x + 1 be two real functions. Find

(f + g) (x), (f –g) (x), (fg) (x), (f/g ) (x)

Q.6: Redefine the function: f(x) = |x – 1| – |x + 6|. Write its domain also.

Q.7: Find the domain and range of the real function f(x) = x/1+x2.

Q.8 Let A = {1, 2, 3}, B = {4} and C = {5}

(i) Verify that: A x (B – C) = (A x B) – (A x C)

(ii) Find (A x B) ∩ (A x C).

Q.9 Find x and y if: (i) (4x + 3, y) = (3x + 5, – 2) (ii) (x – y, x + y) = (6, 10)

Q.10 Find the domain for which the functions f (x) = 2x2 – 1 and g (x) = 1 – 3x and check whether they are equal.

Q.11. Find the domain and range of the real function f(x) = 1/(1 – x2).

Q12.. A relation R is defined from a set A = {2, 3, 4, 7} to a set B = { 3, 6, 9, 0} as follows R = ((x,y) ∈ R : x is relatively prime to y; x ∈ A, y ∈ B). Express R as a set of ordered pairs and determine the domain and range.

Q13. Draw the graph of the function f: R → R defined by f (x) = x3, x ∈ R

Q.14. If R3 = {(x, x) | x is a real number} is a relation, then find the domain and range of R3.

Q.15. Redefine the function f (x) = |x − 2| + |2 + x| , – 3 ≤ x ≤ 3.

Q.16. In each of the following cases, find a and b.

(i)(2a + b, a – b) = (8, 3)

(ii) {a/4, a – 2b) = (0, 6 + b)

Q.17.. If R1 = {(x, y)| y = 2x + 7, where x∈ R and -5 ≤ x ≤ 5} is a relation. Then find the domain and range of R1.

Q.18.. Let f and g be real functions defined by f(x) = 2x+ 1 and g(x) = 4x – 7.

(i) For what real numbers x, f(x) = g(x)?

(ii) For what real numbers x, f (x) < g(x)?

Q.19. The ordered pair (5, 2) belongs to the relation R ={(x, y): y = x – 5, x, y∈Z}

Q.20 The function f is defined by

{1-x,x<0}

f(x)= {1,x=0}

{x+1,x>0}

Draw the graph of f(x).

CHAPTER 5 (COMPLEX NUMBERS)

MULTIPLE CHOICE QUESTIONS::

1. The value of 1 + i2 + i4 + i6 + … + i2n is

(a) positive (b) negative (c) 0 (d) cannot be evaluated

2. If a + ib = c + id, then

(a) a2 + c2 = 0 (b) b2 + c2 = 0. (c) b2 + d2 = 0 (d) a2 + b2 = c2 + d2

3. If a complex number z lies in the interior or on the boundary of a circle of radius 3 units and centre (– 4, 0), the greatest value of |z +1| is

(a) 4 (b) 6 (c) 3 (d) 10

4. The value of arg (x) when x < 0 is

(a) 0 (b) π/2 (c) π. (d) none of these

5. If 1 – i, is a root of the equation x2 + ax + b = 0, where a, b ∈ R, then the value of a – b is

(a) -4 (b) 0 (c) 2 (d) 1

6. Number of solutions of the equation z2 + |z|2 = 0 is

(a) 1 (b) 2 (c) 3 (d) infinitely many

7. If [(1 + i)/(1 – i)]x = 1, then

(a) x = 2n + 1, where n ∈ N. (b) x = 4n, where n ∈ N

(c) x = 2n, where n ∈ N. (d) x = 4n + 1, where n ∈ N

8. If the complex number z = x + iy satisfies the condition |z + 1| = 1, then z lies on

(a) x-axis (b) circle with centre (1, 0) and radius 1. (c) circle with centre (–1, 0) and radius1 (d) y-axis

9. The simplified value of (1 – i)3/(1 – i3) is

(a) 1 (b) -2 (c) -i (d) 2i

(a) x = nπ. (b) x = [n + (1/2)] (π/2) (c) x = 0 (d) No value of x

EXTRA QUESTIONS::

Q.1 Write the given complex number (1 – i) – ( –1 + i6) in the form a + ib

Q.2 Express the given complex number (-3) in the polar form.

Q.3 Solve the given quadratic equation 2x2 + x + 1 = 0.

Q.4 For any two complex numbers z1 and z2, show that Re(z1z2) = Rez1 Rez2– Imz1Imz2

Q.5 Find the modulus of [(1+i)/(1-i)] – [(1-i)/(1+i)]

Q.6 If |z2-1|= |z|2+1, prove that z lies on the imaginary axis.

Q.7 Compute the value of p, such that the difference of the roots of the equation is x2+px+8=0 is 2.

Q.8 Express each of the following complex numbers in the form a+ib

(i) 3(7 + i7) + i (7 + i7). (ii) i9 +i11. (iii) [(⅓)+3i]3

Q.9 Solve the following quadratic equations:

(a) x²+3x+5 = 0. (b) x²+x+(1/√2)= 0

Q.10 Determine the real numbers x and y if (x-iy)(3+5i) is the conjugate of -6-24i.

Q.11 If arg (z – 1) = arg (z + 3i), then find (x – 1) : y, where z = x + iy.

Q.12 Find the complex number satisfying the equation z + √2 |(z + 1)| + i = 0.

Q.13 Solve the system of equations Re (z2) = 0, |z| = 2.