



**zeta classes**  
**RKM BUILDING, M02 DUBAI ALQIADHA**

**CLASS 12 - MATHEMATICS**

**Relations and Functions**

**Time Allowed: 1 hour and 30 minutes**

**Maximum Marks: 40**

**Section A**

1.  $f : \mathbb{R} \rightarrow \mathbb{R}: f(x) = x^3$  is [1]
  - a) many one and into
  - b) one one and onto
  - c) many one and onto
  - d) one one and into
2. Let  $A = \{1, 2, 3\}$  and let  $R = \{(1,1), (2, 2), (3, 3), (1, 2), (2,1), (2, 3), (3, 2)\}$ . Then,  $R$  is [1]
  - a) reflexive and transitive but not symmetric
  - b) an equivalence relation
  - c) symmetric and transitive but not reflexive
  - d) reflexive and symmetric but not transitive
3. A relation  $R$  on the set  $\mathbb{N}$  of natural numbers is defined as  $R = \{(a, b): a + b \text{ is even}, \forall a, b \in \mathbb{N}\}$ , then  $R$  is [1]
  - a) a reflexive relation but not symmetric
  - b) an equivalence relation
  - c) symmetric but not transitive
  - d) not an equivalence relation
4. If  $R$  is the largest equivalence relation on a set  $A$  and  $S$  is any relation on  $A$ , then [1]
  - a)  $S \subset R$
  - b)  $R = S$
  - c) None of these
  - d)  $R \subset S$
5. Let  $f(x) = \frac{x^2}{(1+x^2)}$  Then, range  $(f) = ?$  [1]
  - a)  $(0, 1]$
  - b)  $[0, 1)$
  - c)  $[-1, 1]$
  - d)  $[1, \infty)$
6. Let  $A = \{1, 2, 3, \dots, n\}$  and  $B = \{a, b\}$ . Then the number of surjections from  $A$  to  $B$  is [1]
  - a)  ${}^n P_2$
  - b) none of these
  - c)  $2^n - 2$
  - d)  $2^n - 1$
7. Let  $f(x) = \frac{1}{(1-x^2)}$  Then, range  $(f) = ?$  [1]
  - a)  $[-1, 1]$
  - b) none of these
  - c)  $(-\infty, 1]$
  - d)  $[1, \infty)$
8. Let  $f(x) = \sqrt{9 - x^2}$  then,  $\text{dom } f(x) = ?$  [1]
  - a)  $(-\infty, -3]$
  - b)  $[-3, 3]$





reflexive

- c) Reflexive and symmetric but not transitive
- d) Reflexive and transitive but not symmetric
28. Let  $R$  be a relation on the set  $N$  of natural numbers defined by  $nRm$  if  $n$  divides  $m$ . Then  $R$  is [1]
- a) Transitive and symmetric
- b) Reflexive and symmetric
- c) Reflexive, transitive but not symmetric
- d) Equivalence
29. Let  $A = \{x \in R : -1 \leq x \leq 1\} = B$  and  $C = \{x \in R : x \geq 0\}$  and let  $S = \{(x, y) \in A \times B : x^2 + y^2 = 1\}$  and  $S_0 = \{(x, y) \in A \times C : x^2 + y^2 = 1\}$ . Then [1]
- a)  $S$  defines a function from  $A$  to  $C$
- b)  $S_0$  defines a function from  $A$  to  $B$
- c)  $S_0$  defines a function from  $A$  to  $C$
- d)  $S$  defines a function from  $A$  to  $B$
30. Let  $f : [2, \infty) \rightarrow R$  be the function defined by  $f(x) = x^2 - 4x + 5$ , then the range of  $f$  is [1]
- a)  $[4, \infty)$
- b)  $[5, \infty)$
- c)  $R$
- d)  $[1, \infty)$

### Section B

31. Fill in the blanks: [5]
- a) A relation in a set  $A$  is called \_\_\_\_\_ relation, if each element of  $A$  is related to itself.
- b) The set of second elements of all ordered pairs in  $R$ , i.e.  $\{y : (x, y) \in R\}$  is called the \_\_\_\_\_ of relation  $R$ .
- c) A function  $f : X \rightarrow Y$  is said to be an \_\_\_\_\_ function, if every element of  $Y$  is image of some element of set  $X$  under  $f$ .
- d) The set of first elements of all ordered pairs in  $R$ , i.e.,  $\{x : (x, y) \in R\}$  is called the \_\_\_\_\_ of relation  $R$ .
- e) A function  $f : X \rightarrow Y$  is said to be a \_\_\_\_\_ function, if it is both one-one and onto.
32. State True or False: [5]
- a) Consider the set  $A = \{1, 2, 3\}$  and the relation  $R = \{(1, 2), (1, 3)\}$ .  $R$  is a transitive relation.
- b) If  $f: X \rightarrow Y, g: Y \rightarrow Z$ , then if  $f$  and  $g$  are one-one, then  $g \circ f$  is also one-one.
- c) Two equivalence classes are either disjoint or identical.
- d) If  $f: X \rightarrow Y, g: Y \rightarrow Z$ , then if  $f$  and  $g$  are onto, then  $g \circ f$  is not onto.
- e) Every relation which is symmetric and transitive is also reflexive.