CHAPTER-14
MATHEMATICAL REASONING

ONE MARKS QUESTION

1. Define mathematically acceptable statement. (K)

2. Define negation of a statement. (K)

3. Define a compound statement. (K)

4. Write the negation of "New Delhi is a city". (U)

5. Write the negation of "Both the diagonals of a rectangle have the same length". (U)

6. Write the negation of "$\sqrt{7}$ is rational". (U)

7. Write the negation of "There does not exist a quadrilateral which has all its sides are equal". (U)

8. Write the negation of "Every natural number is greater than zero". (U)

9. Define converse of the statement. (K)

10. DefineContra positive of the statement. (K)

11. Write the negation of "Everyone in Germany speaks German". (U)

12. Write the negation of "Chennai is the capital of Tamil Nadu". (U)

13. Write the negation of "All triangles are not equilateral triangle" (U)

14. Write the negation of "The number 2 is greater than 7". (U)

15. Write the negation of "Every natural number is an integer". (U)

16. Define quantifiers. (K)

17. Write the statement "You get a job implies that your credentials are good" in the form 'If-then'. (U)

18. Write the statement "The Banana trees will bloom if it stays warm for a month" in the form 'If-then'. (U)

19. Write the statement "A quadrilateral is a parallelogram if its diagonals bisect each other" in the form 'If-then'. (U)

20. Write the statement "To get an A^+ in the class, if it is necessary that you do all the exercise of the book". (U)

21. Write the negation of the "For every positive real number x, the number x-1 is also positive" (U)

22. Write the negation of the "All cats scratch". (U)

23. Write the negation of the "For every real number x, either x>1 or x<1" (U)

24. Write the negation of the"there exists a number x such that 0<x<1" (U)

25. Write the contra positive of the statement: "If a number is divisible by 9, then it is divisible by 3." (U)

26. Write the contra positive of the statement: "If you are born in India, then you are a citizen of India". (U)

27. Write the contra positive of the statement:"If a triangle is equilateral, it is isosceles". (U)

28. Write the converse of thestatement: "If a number n is even, then n^2 is even". (U)

29. Write the converse of the statement: "If you do all the exercises in the book, you get an A grade in the class". (U)

30. Write the converse of thestatement: "If two integers a and b are such that a>b, then a-b is always a positive integer". (U)

31. Write the negation of the statement: "For every real number x, $x^2>x$". (U)

32. Write the negation of the statement: "there exists a rational number x such that $x^2=2$". (U)

33. Write the negation of the statement:"All birds have wings". (U)

34. Write the negation of the statement: "All students study mathematics at the elementary level". (U)

TWO MARKS QUESTIONS

1. Write the component statement of the following compound statement and check whether the compound statement is true or false:"Zero is less than every positive integer and every negative integer". (U)

2. Write the component statement of the following compound statement and check whether the compound statement is true or false:"A line is straight and extends indefinitely in both directions". (U)

3. Write the component statement of the following compound statement and check whether the compound statement is true or false:"All living things have two legs and two eyes". (U)

4.Identifythe type of “or” used in the following statement and check whether the statement is true or false:” $\sqrt{2}$ is a rational number or an irrational number”. (U)

5. Find the component statement of the following compound statement and check whether they are true or false:” A square is a quadrilateral and its four sides equal”. (U)

6. Find the component statement of the following compound statement and check whether the statement is true or false:”All prime numbers are either even or odd”. (U)

7. Find the component statement of the following compound statement and check whether the statement is true or false:”A person who has taken Mathematics or Computer Science can go for MCA”. (U)

8. Find the component statement of the following compound statement and check whether the statement is true or false:”Chandigarh is the capital of Haryana and UP”. (U)

9. Find the component statement of the following compound statement and check whether the statement is true or false:” $\sqrt{2}$ is a rational number or an irrational number”. (U)

10. Find the component statement of the following compound statement and check whether the statement is true or false:” 24 is a multiple of 2, 4, 8”. (U)

11. Find the component statement of the following compound statement and check whether the statement is true or false:”Number 3 is primeor it is cold”. (U)

12. Find the component statement of the following compound statement and check whether the statement is true or false:”All integers are positive or negative”. (U)

13. Find the component statement of the following compound statement and check whether the statement is true or false:” 100 is divisible by 3, 11, 5”. (U)

14. Are the following pairs of statements negations of each other: The number x is not a rational number; Thenumber x is not an irrational number. (U)

15. Are the following pairs of statements negations of each other: The number x is a rational number;

the number x is an irrational number. (U)

16. Write the negation of the statement:"Australia is a continent" and check whether the resulting statement is true or false. (A)

17.Write the negation of the statement:"There does not exist a quadrilateral which has all its sides equal" and check whether the resulting statement is true or false. (A)

18. Write the negation of the statement:"Every natural number is greater than 0" and check whether the resulting statement is true or false. (A)

19. Write the negation of the statement:"The sum of 3 and 4 is 9" and check whether the resulting statement is true or false. (A)

20.State whether 'or' used in the statement:"Sun rises or moon sets" is exclusive or inclusive. Give reason for your answer. (U)

21. State whether 'Or' used in the statement:"To enter a country, you need a passport or a voter registration card" is exclusive or inclusive. Give reason for your answer. (U)

22. State whether 'Or' used in the statement:" To apply for a driving license, you should have a ration card or apassport " is exclusive or inclusive. Give reason for your answer. (U)

23. State whether 'or' used in the statement:"The school is closed if it is a holiday or a Sunday" is exclusive or inclusive. Give reason for your answer. (U)

24. State whether 'or' used in the statement:"All integers are positive or negative" is exclusive or inclusive. Give reason for your answer. (U)

25. State whether 'or' used in the statement:"Two linesintersect at a point or are parallel" is exclusive or inclusive. Give reason for your answer. (U)

26. State whether 'or' used in the statement:"Students can take French or Sanskrit as their third language" is exclusive or inclusive. Give reason for your answer. (U)

27.Identify the type of "or" used in the following statement and check whether the

statement is true or false:"To enter into a public library children need an identity card from the school or a letter from the school authorities". (U)

28 In the following Compound statement first identify the connecting word and then break it into component statement:" All rational numbers are real and all real numbers are not complex" (U)

29. In the following Compound statement first identify the connecting word and then break it into component statement: " Square of an integer is positive or negative" (U)

30. In the following Compound statement first identify the connecting word and then break it into component statement:" The sand heats up quickly in the Sun and does not cool down fast at night " (U)

31. In the following Compound statement first identify the connecting word and then break it into component statement:"x=2 and x=3 are the roots of the equation $3x^2$-x-10=0" (U)

32. Identify the quantifier in the given statement and write the negation of the statement: "There exists a number which is equal to its square". (U)

33. Identify the quantifier in the given statement and write the negation of the statement: "For every real number x,x is less than x+1 ". (U)

34. Identify the quantifier in the given statement and write the negation of the statement:" There exists a capital for every state in India". (U)

35. Check whether given pair of statements are negation of each other. Give reasons for your answer.

i) x + y = y + x is true for every real numbers x and y.

ii) "Thereexists real numbers x and y for which x+y=y+x" (A)

36. Write the converse and contra positive of "If x is a prime number, then x is odd" (U)

37. Write the converse and contra positive of "If the two lines are parallel, then they do not intersect in the same plane." (U)

38.Write the converse and contra positive of "Something is cold implies that it has low temperature." (U)

39. Write the converse and contra positive of "You cannot comprehend geometry if you do not know how to reason deductively." (U)

40 .Write the converse and contra positive of "If a number is divisible by 9, then it is divisible by 3." (U)

41. Write the converse and contra positive of "If you are born in India, then you are a citizen of India." (U)

42. Write the converse and contra positive of "If triangle is equilateral, then it is isosceles." (U)

43. Write the converse and contra positive of "If a number n is even, then n^2 is even." (U)

44. Write the converse and contra positive of "If you do all the exercises in the book you get an A grade in the class." (U)

45. Write the following statement in the form 'if-then':

"you get a job implies that your credentials are good." (U)

46. Write the following statement in the form 'if-then':

"The banana trees will bloom if it stays warm for a month." (U)

47. Write the following statement in the form 'if-then':

"A quadrilateral is a parallelogram if its diagonals bisect each other." (U)

48. Write the following statement in the form 'if-then':" To get an A^+ in the class, it is necessary that you do all the exercise of the book". (U)

49. Check Whether "Or" used in the following compound statement is exclusive or inclusive? Write the component statements of the compound statements and use them to check whether the compound statement is true or not. Justify your answer. "You are wet when it rains or you are in a river." (A)

THREE MARKS QUESTION.

1. Verify by the method of contradiction: p: $\sqrt{7}$ is irrational (S)

2. Check whether the following statement is true or not. If$x, y \in \mathbb{Z}$, are such that x and y are odd, then xy is odd. (S)

3. Check whether the following statement is true or false by proving its contra positive, If $x, y \in \mathbb{Z}$,

such that xy is odd, then both x and y are odd. (S)

4. By giving a counter example, show that the following statement is false. If n is an odd integer, then n is prime. (S)

5. Show that the statement: p:If x is a real number such that $x^3+4x=0$ then x is 0" is true by direct method. (S)

6. Show that the statement: p:If x is a real number such that $x^3+4x=0$ then x is 0" is true by

method contradiction. (S)

7. Show that the statement: p:If x is a real number such that $x^3+4x=0$ then x is 0" is true by

method of contra positive. (S)

8. Show that the statement "For any real numbers a and b, $a^2=b^2$, implies that a=b" is not true

by giving a counter example. (S)

9. Show that the following statement is true by method of contra positive "If x is an integer and x^2 is even,

then x is also even" (S)

10. By giving a counter example, show that the following statement is not true:"

If all the angles of a triangle are equal, then it is an obtuse angled triangle". (S)

11.By giving a counter example, show that the following statement is not true

" The equation $x^2-1=0$ does not have a root lying between 0 and 2". (S)

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