MATHS

BOOKS - MBD MATHS (ODIA ENGLISH)

MATHEMATICAL REASONING

Question Bank

1. Negation of 'Paris is in France and London is in England' is.

   A. Paris is in England and London is in France.

B. Paris is not in France or London is not in England.

C. Paris is in England or London is in France.

D. Paris is not in France and London is not in England

Answer: B

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2. The conditional $(p \wedge q) \to p$ is :

A. a tautology

B. a contradiction

C. neither a tautology nor a contradiction

D. none of these

Answer: A

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3. Which of the following is a contradiction ?

A. $(p \wedge q) \wedge \sim(p \wedge q)$

B. $p \vee (\sim p \wedge q)$

C. $(p \rightarrow q) \rightarrow p$

D. None of these

Answer: A

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4. Which of the following is logically equivalent to

$$\approx (\approx p \rightarrow q)$$

A. $p \wedge q$

B. $p \wedge \approx q$

C. $\approx p \wedge q$

D. $\approx p \wedge \approx q$

Answer: D

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5. $(\approx (\approx p) \wedge q$ is equivalent to

A. $\approx p \wedge q$

B. $p \wedge q$

C. $p \wedge \approx q$

D. $\approx p \wedge \approx q$

6. If p: It rains today, q : I go to school, r: I shall meet any friend and s : I shall go for a movie , then which of the following is the proposition.

If it does not rain or if I do not go to school, then I shall meet any friend and go for a movie ?

A. $\approx (p^q) \rightarrow (r \wedge s)$

B. $\approx (p \wedge q) \rightarrow (r \wedge s)$

C. $\approx (p \wedge q) \rightarrow (r \vee s)$

D. none of these

Answer: A

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7. Which of the following is true ?

A. $p \rightarrow q = \ \approx p \rightarrow \ \approx q)$

B. $\approx (p \rightarrow \ \approx q) = \ \approx p \wedge q)$

C. $\approx (\approx p \rightarrow \approx q) = \approx p \wedge q)$

D.

$$\approx (p < \Rightarrow q) = [\approx (p \rightarrow q) \wedge \approx (q \rightarrow P)]$$

Answer: C

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8. The Inverse of the proposition $(p \wedge \approx q) \rightarrow r$

is:

A. $\approx r \rightarrow (\approx p \vee q)$

B. $\approx p \vee q \rightarrow \approx r$

C. $r \rightarrow (p \wedge \approx q)$

D. None of these

Answer: B

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9. The contrapositive of $(p \vee q) \rightarrow r$ is

A. $r \rightarrow (p \vee q)$

B. $\approx r \rightarrow (p \vee q)$

C. $\approx r \rightarrow (\approx p \wedge \approx q)$

D. $p \rightarrow (q \lor r)$

Answer: C

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10. Which of the following is inverse of the proposition : If a number is a prime then it is odd.

A. If a number is not prime then it is odd.

B. if a number is not a prime, then it is not odd.

C. if a number is not odd, then it is not a prime.

D. If a number is not odd, then it is a prime.

Answer: B

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11. Give examples, five in each case, of sentences that are propositions

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12. Give examples, five in each case, of sentences that are not-proposition

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13. Illustrate the use of all connectives and the modified 'not' in five separate examples of propositions

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14. Try to construct an example of a proposition involving all connectives and also the modifier 'not'.

15. Which of the following sentences are propositions and which are not ? Write with reason : $2 < 5$

16. Which of the following sentences are propositions and which are not ? Write with reason :Is $9 < 3$?

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17. Which of the following sentences are propositions and which are not ? Write with reason : x is greater than 100.

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18. Which of the following sentences are propositions and which are not ? Write with reason :Why are you crying ?

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19. Which of the following sentences are propositions and which are not ? Write with reason :May God grant you long life .

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20. Which of the following sentences are propositions and which are not ? Write with reason :Cuttack is a big city .

21. Which of the following sentences are propositions and which are not ? Write with reason :It is possible that there is life in Mars.

22. Which of the following sentences are propositions and which are not ? Write with reason : Ram is a friend of Hari.

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23. Which of the following sentences are propositions and which are not ? Write with reason : $x^2 - x + 1 = 0$

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24. Which of the following sentences are propositions and which are not ? Write with reason : Oh ! What a schubert ?

25. Which of the following sentences are propositions and which are not ? Write with reason :You must go to school everyday .

26. Which of the following sentences are propositions and which are not ? Write with reason : It was raining yesterday.

27. Write down negations of If you read, you will pass.

28. Write down negations of John is a friend of Thomas.

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29. Write down negations of Fifteen is greater than five.

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30. Write down negations of Either Pramod is clever or he is laborious.

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31. Write down negations of Money is necessary for happiness.

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32. Write down negations of It is raining and Mahanadi is flooded.

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33. Write down negations of Pen is mightier than sword.

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34. Write down negations of $|x|$ is equal to either x or -x.

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35. Write down negations of It is raining and it is cool.

36. Write down negations of $3 + 6 > 8$ and $2 + 3 < 6.$

37. Translate "If you do not work hard, then you will repent" propositions into symbolic form , stating the prime components.

38. Translate "Jamini will be rewarded if and only if he is punctual" propositions into symbolic form, stating the prime components

39. Translate "If there is a will, there is a way" propositions into symbolic form, stating the prime components

40. Translate "Time and tide waits for none" propositions into symbolic form, stating the prime components

41. Translate "29 is a prime number which is a sum of two squares" propositions into symbolic form, stating the prime components

42. Translate "Life is short, but virtue is lasting" propositions into symbolic form, stating the prime components

43. Translate" If the boy is poor, then he will be hungry and if he is hungry, then he cannot be honest" propositions into symbolic form, stating the prime components

44. Translate "A year consists of twelve months while a month does not consist of more than thirty one days" propositions into symbolic form, stating the prime components

45. Translate "If the government cannot solve the unemployment problem, then public opinion will rise against it which will lead to a strengthening of opposition" propositions into symbolic form, stating the prime components

46. Translate "Chinu and Minu went to Calcutta, but Minu came back earlier since she lost all her money" propositions into symbolic form, stating the prime components

47. Let p,q, r denote respectively the statements :" you are honest ", "you are laborious ",and " you

will receive a promotion " Translate $(p \lor q) \rightarrow r$ statements into English language .

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48. Let p,q, r denote respectively the statements :" you are honest ", "you are laborious ", " you will receive a promotion " Translate $\approx r \rightarrow \approx p$ statements into English language .

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49. Let p,q, r denote respectively the statements :" you are honest ", "you are laborious ", " you will receive a promotion " Translate $\approx (p \vee q) \rightarrow \approx r$ statements into English language .

50. Let p,q, r denote respectively the statements :" you are honest ", "you are laborious "," You will receive a promotion" Translate

$|r \vee (\approx p)| \rightarrow \approx q$statements into English language.

51. Let p,q, r denote respectively the statements :" you are honest ", "you are laborious ","you will receive a promotion" Translate $p \wedge q \wedge r$ `statements into English language.

52. Construct truth tables for the following and indicate which of these are tautologies

$p \wedge q \to P \vee q.$

53. Construct truth tables for the following and indicate which of these are tautologies

$p \wedge q \to P.$

54. Construct truth tables for the following and indicate which of these are tautologies $p \wedge (p \text{ or } q) \rightarrow q$.

55. Construct truth tables for the following and indicate which of these are tautologies $p \rightarrow p \wedge q$.

56. Construct truth tables for the following and indicate which of these are tautologies $p \rightarrow (\sim q)$

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57. Construct truth tables for the following and indicate which of these are tautologies $\sim p \wedge (p \wedge q)$arrow q

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58. Construct truth tables for the following and indicate which of these are tautologies

$(p \lor \approx q) \land (q \lor \approx p)$

59. Construct truth tables for the following and indicate which of these are tautologies

$p \rightarrow (\sim q \land r)$

60. Construct truth tables for the following and indicate which of these are tautologies

$(p \rightarrow q) \rightarrow [(q \rightarrow r) \rightarrow (p \rightarrow r)]$

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61. Construct truth tables for the following and indicate which of these are tautologies

$p \vee q \rightarrow \approx (p \wedge q)$

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62. Construct truth tables for the following and indicate which of these are tautologies

$$(p \rightarrow \approx p) \rightarrow \approx p$$

63. Construct truth tables for the following and indicate which of these are tautologies

$$(\approx p \lor p) \rightarrow (\approx q \lor q)$$

64. Construct truth tables for the following and indicate which of these are tautologies

$$((p \wedge q) \rightarrow p) \rightarrow q$$

65. Construct truth tables for the following and indicate which of these are tautologies

$$(p \Leftrightarrow q) \wedge (q \Leftrightarrow r) \rightarrow (p \Leftrightarrow r)$$

66. Construct truth tables for the following and indicate which of these are tautologies

$$[p \rightarrow (p \vee q)] \rightarrow [q \rightarrow (p \wedge q)]$$

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67. If p has truth value T, what can be said about the truth values of $\approx p \wedge q \rightarrow p \vee q$.

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68. If p has truth value T, what can be said about the truth values of $p \vee q \rightarrow \, \approx p \wedge q$.

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69. Determine the truth values of `p

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70. State the converse, inverse and contrapositive of if triangle ABC is equilateral, then its three

angles are congruent propositions. Stating it as a conditional, wherever necessary.

71. State the converse, inverse and contrapositive of If Gopal is clever, then he is rich propositions. Stating it as a conditional, wherever necessary.

72. State the converse, inverse and contrapositive of $p \rightarrow \approx q$ propositions. Stating it as a

conditional, wherever necessary.

73. State the converse, inverse and contrapositive of Sum of two odd integers is even prepositions. Stating it as a conditional, wherever necessary.

74. State the converse, inverse and contrapositive of The square of an integer is a natural number

propositions. Stating it as a conditional, wherever

necessary.

75. State the converse, inverse and contrapositive

of A parallelogram which is inscribed in a circle is

a rectangle propositions. Stating it as a

conditional, wherever necessary.

76. State the converse, inverse and contrapositive of The ground being wet, there has been rainfall at night propositions. Stating it as a conditional, wherever necessary.

77. Are the following pair of statements negation of each other ? (i) The number π is not a rational number.(ii)The number π is not an irrational number.

78. Are the following pair of statements negation of each other ? (i) The number π is not a rational number.(ii)The number π is not an irrational number.

79. Write the component statement "24 is multiple of 4 and 6 "compound statements and check whether the compound statement is true or false.

80. Write the component statement "the school is closed if there is a holiday or a Sunday" compound statements and check whether the compound statement is true or false.

81. Write the component statement "7 is an rational number or irrational number" compound

statements and check whether the compound statement is true or false.

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82. Write the component statement "57 is divisible by 2 or 3" compound statements and check whether the compound statement is true or false.

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83. Write the component statement "All things have two eyes and two legs" compound statements and check whether the compound statement is true or false.

84. Write the component statement "2 is an even number and a prime number"compound statements and check whether the compound statement is true or false.

85. Write the component statement "Every parallelogram is a trapezium or a rhombus" compound statements and check whether the compound statement is true or false.

86. Identify the quantifier in the following statements and write the negation of the statement.(i)There exists a number which is equal to its square.

87. Identify the quantifier in the following statements and write the negation of the statement.(ii)For every real number x,x is less than x+1.

88. Identify the quantifier in the following statements and write the negation of the

statement.(iii)There exists a capital for every state of india

89. prove that :-For all$x \in R \sin^2 x + \cos^2 x = 1$

90. Find the Quantifiers There exists an even prime number other than 2.

91. Find the logical quantifier of the following ;

For every negative integer x, x^3 is also a negative integer.

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92. Identify the quantifiers of the following statements For every real number x, $x^2 \neq x$

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93. write the negation of following statements

Every living person is not 150 year old

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94. Write the negation of the following statements There exists x in N, $x + 3 = 10$

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95. Negative of the statement: All the students completed their homework.

96. Identify the quantifier in the statement and write the negation of the statement. There exists a number which is equal to its square.

97. Identify the quantifier in the statement and write the negation of the statement. For every real number x, $x + 4$is greater than x.

98. Identify the quantifier in the statement and write the negation of the statement.Everyone who lives in India is an indian.

99. Check the validity of $p: 100$ is a multiple of 5 and 4.

100. Check the validity of $q : 125$ is a multiple if 5 and 7.

101. Check the validity of $r : 60$ is a multiple of 3 or 5.

102. Check the validity of "The sum of an irrational number and a rational number is irrational " by

contradiction method.

103. Check the validity of If n is a real number with `n > 3, then n2 > 9 by the method of contradiction.

104. Check the validity of "If x, y are integers such that xy is odd then both x and y are odd" by the method of contrapositive.

105. Check the validity of 'If x is an integer and x^2 is even then 'x is also even method of contrapositive.

106. By giving counter examples , show that "If measures of all the angles of a triangle are equal, then the triangle is an obtuse angled triangle" are not true:

107. By giving counter examples , show that for every real number x and y, x^2=y^2 implies x =y` are not true:

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108. By giving counter examples , show that the equation $x^2 - 1 = 0$ does not have any root lying between 0 and 2 are not true:

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