MATHEMATICS

Real Numbers

1. The nearest integer to 58701 which is divisible by 567 is-
   (A) 58968 (B) 58434
   (C) 58401 (D) 58989

SOL : $567 \times 103 + 300 = 58701$

ANS : A

2. The greatest number of five digits exactly divisible 279 is-
   (A) 99603 (B) 99837
   (C) 99882 (D) 99881

SOL : $279 \times 359 = 99882$ is the nearest to 99999

ANS : C

3. The least perfect square number which is divisible by 8, 15, 20, 22 is -
   (A) 435600 (B) 43560
   (C) 39600 (D) 465660

SOL : L.C.M. of 8, 15, 20, 22 is 1320

ANS : A

4. The greatest number of five digits which on being divided by 56, 72, 84 and 96 leaves 50, 66, 78 and 90 as remainders is -
   (A) 98784 (B) 98778
   (C) 98790 (D) 97778

SOL : $98784 \div 56$ R = 60

$98784 \div 72$ R = 66

$98784 \div 78$ R = 78

$98784 \div 96$ R = 90

ANS : B

5. H.C.F. of $(x^3 - 3x + 2)$ and $(x^2 - 4x + 3)$ is -
   (A) $(x - 1)$ (B) $(x - 2)^2$
   (C) $(x - 1)(x + 2)$ (D) $(x - 1)(x - 3)$

SOL : $(x^2 - 34 + 2) = (x - 2)(x - 1)$

and $(x^2 - 4x + 3) = (x - 3)(x - 1)$

H.C.F. = $(x - 1)$

ANS : A

6. A number lies between 300 and 400. If the number is added to the number formed by reversing the digits, the sum is 888 and if the unit's digit and the ten's digit change places, the new number exceeds the original number by 9. Find the number.
(A) 339 (B) 341
(C) 378 (D) 345

ANS : D

7. Euclid's division Lemma states that if a and b are any two positive integers, then there exist unique integers q and r such that -
(A) $a = bq + r, 0 < r \leq b$ (B) $a = bq + rm\ 0 \leq q < b$
(C) $a = bq + r, 0 \leq r < b$ (D) $a = bq + r, 0 < q \leq b$

SOL : By Euclid lemma $a = bq + c, 0 \leq r$ cb

ANS : C

8. H.C.F of two numbers is 18 and the first 4 quotients obtained in the division are 2, 1, 2, 2. Then the two numbers are

(A) 342, 126 (B) 343, 126

(C) 342, 125 (D) none

SOL : 39GwAQ7PeH7fJTFa4DXguurfn7GULq2pTs

ANS : A

9. The G.C.D of (2002, k) = 4, then the value of k is
(A) All even values (B) 4 only

(C) All odd values (D) For all values of k, it is not possible

SOL : $2002 = 2 \times 1001 = 2 \times 7 \times 11 \times 13$

G.C.D $(2 \times 7 \times 11 \times 13, k) = 1$ or 2 or 7 or 11 or 13 or their products.

But G.C.D (2002, k) = 4, it is not possible

ANS : D

10. The largest number which divides 62, 132 and 237 and leaves the same remainder in each case is

(A) 34 (B) 33

(C) 35 (D) 36

SOL : Required number = H.C. F of (132 – 62), (237 – 132) and (237– 62)

= H.C. F of 70, 105 and 175 = 35

ANS : C

11. Three numbers which are co-primes to each other are such that the product of the first two is 551 and that of the last two is 1073. The sum of the three numbers is

(A) 75 (B) 81

(C) 85 (D) 89

SOL : Required length = H.C.F of 495 cm, 900 cm and 1665 cm

$495 = 3^2 \times 5 \times 11$, $900 = 2^2 \times 3^2 \times 5^2$, $1665 = 3^2 \times 5 \times 37$ $\therefore$ H.C.F $= 3^2 \times 5 = 45$

Hence required length = 45 cm

ANS : C

12. The G.C.D of two numbers is 16 and the first 4 quotients obtained in the division are equal to 2. Then the numbers are

(A) 342, 126 (B) 464, 192

(C) 232, 90 (D) 768, 336

SOL : Let the required numbers be p and q.

While finding G.C.D of 'p' and 'q', let 'p' be divisor and 'q' be dividend and first quotient is 2 and let first remainder be 'y' and second remainder be 'z' and the last non-zero remainder is 16.

$\Rightarrow$ $z = 16 \times 2 + 0 = 32$ (Q Dividend = Divisor × quotient + remainder)

$y = 2 \times z + 16 = 2 \times 32 + 16 = 80$

$p = 2 \times y + z = 2 \times 80 + 32 = 192$

$q = 2 \times p + y = 2 \times 192 + 80 = 384 + 80 = 464$

$\therefore$ $q = 464$, $p = 192$.

ANS : B

13. ln a problem involving division, the divisor is eight times the quotient and four times the remainder. If the remainder be 12, then the dividend is

(A) 400 (B) 342

(C) 300 (D) 450

SOL : Remainder is 12 $\Rightarrow$ divisor $= 4 \times 12 = 48$

Dividend $= 6 \times 48 + 12 = 300$

ANS : C

14. The traffic lights at three different road crossings change after every 48 sec, 72 sec and 108 sec respectively. If they all change simultaneously at 8.20.00 hours, then at what time will they again change simultaneously?

(A) 8:27:12 (B) 7:23:06

(C) 8:20:24 (D) 8:30:16

ANS : A

15. The number of prime factors in the expansion $(6)^4 \times (9)^6 \times (10)^8 \times (12)^{16}$ is

(A) 76 (B) 78

(C) 77 (D) 79

ANS : A

16. $\sqrt{2}$ is –

(A) An integer (B) A rational number

(C) An irrational number (D) None of these

ANS : C

17. $\frac{1}{\sqrt{3}}$ is –

(A) A rational number (B) An irrational number

(C) a whole number (D) None of these

ANS : B

18. $7\sqrt{3}$ is –

(A) An irrational (B) A natural number

(C) A rational number (D) None of these

ANS : A

19. $5-\sqrt{3}$ is –

(A) An integer (B) A rational number

(C) An irrational number (D) None of these

ANS : C

20. $\pi = \dfrac{\text{Circumference of the circle}}{\text{Diameter of the circle}}$

(A) A rational number

(B) A whole number

(C) A positive integer

(D) None of these

ANS : D

21. HCF(p, q) × LCM (p, q) =

(A) p + q (B) $\frac{p}{q}$ (C) p × q (D) p^q

ANS : C

22. HCF(p, q, r) . LCM (p, q, r) =

(A) $\frac{pq}{r}$ (B) $\frac{qr}{p}$ (C) p, q, r (D) None of these

ANS : D

23. If $\sqrt[3]{32} = 2^x$ then x is equal to

(A) 5 (B) 3 (C) $\frac{3}{5}$ (D) $\frac{5}{3}$

ANS : D

24. 0.737373... =

(A) $(0.73)^3$ (B) $\frac{73}{100}$ (C) $\frac{73}{99}$ (D) None of these

ANS : C

25. If p is a positive prime integer, then $\sqrt{p}$ is –

(A) A rational number

(B) An irrational number

(C) a positive integer

(D) None of these

ANS : B

26. LCM of three numbers 28, 44, 132 is –

(A) 528 (B) 231 (C) 462 (D) 924

ANS : D

27. If a is a positive integer and p be a prime number and p divides a^2, then

(A) a divides p (B) p divides a (C) p^2 divides a (D) None of these

ANS : B

28. Evaluate $\sqrt[3]{\left(\frac{1}{6}\right)^{-2}}$

(A) 4 (B) 16 (C) 32 (D) 64

ANS : B

29. If $a = \frac{a+\sqrt{3}}{2-\sqrt{3}}$, $b = \frac{2-\sqrt{3}}{2+\sqrt{3}}$ then the value of a + b is –

(A) 14 (B) – 14 (C) $8\sqrt{3}$ (D) $-\sqrt{3}$

ANS : B

30. If $x = 0.\overline{16}$, then 3x is –

(A) $0.\overline{48}$ (B) $0.\overline{49}$ (C) $0.\overline{5}$ (D) 0.5

ANS : A

31. Find the value of x then $\left(\frac{3}{5}\right)^{2x-3} = \left(\frac{5}{3}\right)^{x-3}$

(A) x = 2 (B) x = - 2 (C) x = 1 (D) x = - 1

ANS : A

32. $1.\overline{3}$ is equal to –

(A) 3/4 (B) 2/3 (C) 4/3 (D) 2/5

ANS : C

33. The product of $4\sqrt{6}$ and $3\sqrt{24}$ is –

(A) 124 (B) 134 (C) 144 (D) 154

ANS : C

34. If x = (7 + $4\sqrt{3}$), then the value of $x^2 + \frac{1}{x^2}$ is –

(A) 193 (B) 194 (C) 195 (D) 196

ANS : B

35. If $16 \times 8^{n+2} = 2^m$, then m is equal to –

(A) n + 8 (B) 2n +10 (C) 3n + 2 (D) 3n + 10

ANS : D

36. The greatest possible number with which when we divide 37 and 58, leaves the respective remainder of 2 and 3, is -

(A) 2 (B) 5 (C) 10 (D) None of these

ANS : B

37. The largest possible number with which when 60 and 98 are divided, leaves the remainder 3 in each case, is –

(A) 38 (B) 18 (C) 19 (D) None of these

ANS : C

38. The largest possible number with which when 38, 66 and 80 are divided the remainders remain the same is –

(A) 14 (B) 7 (C) 28 (D) None of these

ANS : A

39. What is the least possible number which when divided by 24, 32 or 42 in each case it leaves the remainder 5 ?

(A) 557 (B) 677 (C) 777 (D) None of these

ANS : B

40. In Q.N. 4, how many numbers are possible between 666 and 8888 ?

(A) 10 (B) 11 (C) 12 (D) 13

ANS : D

41. What is the least number which when divided by 8, 12 and 16 leaves 3 as the remainder in each case, but when divided by 7 leaves no remainder ?

(A) 147 (B) 145 (C) 197 (D) None of these

ANS : A

42. What is the least possible number which when divided by 18, 35 or 42 leaves 2, 19, 26 as the remainders respectively ?

(A) 514 (B) 614 (C) 314 (D) None of these

ANS : B

43. What is the least possible number which when divided by 2, 3, 4, 5, 6 leaves the remainders 1, 2, 3, 4, 5 respectively ?

(A) 39 (B) 48 (C) 59 (D) None of these

ANS : C

44. In Q.No. 8, what is the least possible 3 digit number which is divisible by 11 ?

(A) 293 (B) 539 (C) 613 (D) None of these

ANS : B

45. How many numbers lie between 11 and 1111 which when divided by 9 leave a remainder of 6 and when divided by 21 leave a remainder of 12 ?

(A) 18 (B) 28 (C) 8 (D) None of these

ANS : A

46. If x divides y (written as $x \mid y$) and $y \mid z$, $(x, y, z \in z)$ then –

(A) $x \mid z$ (B) $z \mid y$ (C) $z \mid x$ (D) None of these

ANS : A

47. If $x \mid y$, where $x > 0$, $y > 0$ $(x, y \in z)$ then –

(A) $x < y$ (B) $x = y$ (C) $x \leq y$ (D) $x \geq y$

ANS : C

48. If $a \mid b$, then gcd of a and b is –

(A) a (B) b (C) ab (D) Can't be determined

ANS : A

49. If gcd of b and c is g and $d \mid b$ & $d \mid c$, then –

(A) d = g (B) $g \mid d$ (C) $d \mid g$ (D) None of these

ANS : C

50. If $x, y \in R$ and $|x| + |y| = 0$, then –

(A) $x > 0$, $y < 0$ (B) $x < 0$, $y > 0$ (C) $x = 0$, $y = 0$ (D) None of these

ANS : C

51. If $a, b, c \in R$ and $a^2 + b^2 + c^2 = ab + bc + ca$, then –

(A) a = b = c (B) a = b = c = 0 (C) a, b, c are distinct (D) None of these

ANS : A

52. If x, y $\in$ R and x < y $\Rightarrow$ $x^2 > y^2$ then –

(A) x > 0 (B) y > 0 (C) x < 0 (D) y < 0

ANS : D

53. If x, y $\in$ R and x > y $\Rightarrow$ | x | > | y | , then –(A)(B)(C)(D)

(A) x > 0 (B) y > 0 (C) x < 0 (D) y < 0

ANS : B

54. If x, y $\in$ R and x > y $\Rightarrow$ | x | < | y | , then –

(A) x < 0 (B) x > 0 (C) y > 0 (D) y < 0

ANS : A

55. π and e are –

(A) Natural numbers (B) Integers (C) Rational numbers (D) Irrational numbers.

ANS : D

56. If a, b $\in$ R and a < b, then –

(A) $\frac{1}{a} < \frac{1}{b}$ (B) $\frac{1}{a} > \frac{1}{b}$ (C) $a^2 > b^2$ (D) Nothing can be said

ANS : D

57. If x is a non-zero rational number and xy is irrational , then y must by –

(A) a rational number (B) an irrational number (C) non-zero (D) an integer

ANS : B

58. The arithmetical fraction that exceeds it's square by the greatest quantity is –

(A) $\frac{1}{4}$ (B) $\frac{1}{2}$ (C) $\frac{3}{4}$ (D) None of these

ANS : B

59. If x and y are rational numbers such that $\sqrt{xy}$ is irrational , then $\sqrt{x} + \sqrt{y}$ is –

(A) Rational (B) Irrational (C) Non-real (D) None of these

ANS : B

60. If x and y are positive real numbers, then –

(A) $\sqrt{x}+\sqrt{y}>\sqrt{x+y}$ (B) $\sqrt{x}+\sqrt{y}<\sqrt{x+y}$

(C) $\sqrt{x}+\sqrt{y}=\sqrt{x+y}$ (D) None of these

ANS : A

61. If $(\sqrt{2}+\sqrt{3})^2=a+b\sqrt{6},$ where a, b $\in$ Q, then –

(A) a = 5, b = 6 (B) a = 5, b = 2 (C) a = 6, b = 5 (D) None of these

ANS : B

62. If x $\in$ R, then | x | =

(A) x (B) –x (C) max {x, -x} (D) min {x, -x}

ANS : C

63. $\frac{15}{\sqrt{10}+\sqrt{20}+\sqrt{40}-\sqrt{125}}$ is equal to –

(A) $\sqrt{5}(5+\sqrt{2})$ (B) $\sqrt{5}(2+\sqrt{2})$ (C) $\sqrt{5}(\sqrt{2}+1)$ (D) $\sqrt{5}(3+\sqrt{2})$

ANS : D

64. $\sqrt{2+\sqrt{3}}+\sqrt{2-\sqrt{3}}$ is equal to –

(A) $\sqrt{3}$ (B) $\frac{\sqrt{3}}{\sqrt{2}}$ (C) $\frac{\sqrt{2}}{\sqrt{3}}$ (D) $\sqrt{6}$

ANS : D

65. The expression $\frac{\sqrt{3}-1}{2\sqrt{2}-\sqrt{3}-1}$ is equal to –

(A) $\sqrt{2}+\sqrt{3}+\sqrt{4}+\sqrt{6}$ (B) $\sqrt{6}-\sqrt{4}+\sqrt{3}-\sqrt{2}$

(C) $\sqrt{6}-\sqrt{4}-\sqrt{3}+\sqrt{2}$ (D) None of these

ANS : A

66. If x, y, z are real numbers such that $\sqrt{x-1}+\sqrt{y-2}+\sqrt{z-3}$ = 0 then the values of x, y, z are respectively

(A) 1, 2, 3 (B) 0, 0, 0

(C) 2, 3, 1 (D) None of these

ANS : A

67. If a, b, c $\in$ R and a > b $\Rightarrow$ ac < bc, then –

(A) $c \geq 0$ (B) $c \leq 0$

(C) c > 0 (D) c < 0

ANS : D

68. If a, b, c $\in$ R and ac = bc $\Rightarrow$ a = b, then –

(A) $c \geq 0$ (B) $c \leq 0$

(C) $c = 0$ (D) $c \neq 0$

ANS : D

69. Between any two distinct rational numbers –

(A) There lie infinitely many rational numbers.

(B) There lies only one rational number.

(C) There lie only finitely many numbers.

(D) There lie only rational numbers.

ANS : A

70. The total number of divisors of 10500 except 1 and itself is –

(A) 48 (B) 50

(C) 46 (D) 56

ANS : C

71. The sum is the factors of 19600 is –

(A) 54777 (B) 33667

(C) 5428 (D) None of these

ANS : A

72. The product of divisors of 7056 is –

(A) $(84)^{48}$ (B) $(84)^{44}$

(C) $(84)^{45}$ (D) None of these

ANS : C

73. The number of odd factors (or divisors) of 24 is –

(A) 2 (B) 3 (C) 1 (D) None of these

ANS : A

74. The number of even factors (or divisors) of 24 is –

(A) 6 (B) 4 (C) 8 (D) None of these

ANS : A

75. In how many ways can 576 be expressed as a product of two distinct factors ?

(A) 10 (B) 11 (C) 21 (D) None of these

ANS : A

76. The value of i^{457} is -

(A) 1 (B) – 1 (C) i (D) – i

ANS : C

77. The value $i^{37} + \frac{1}{i^{67}}$ is –

(A) 1 (B) – 1 (C) 2i (D) –2

ANS : C

78. The value of $\left(i^{41} + \frac{1}{i^{257}} \right)^9$ is –

(A) 1 (B) 0 (C) –1 (D) 2

ANS : B

79. The value of $(i^{77} + i^{70} + i^{87} + i^{414})^3$

(A) – 8 (B) – 6 (C) 6 (D) 8

ANS : A

80. The value of the expression $\frac{i^{592} + i^{590} + i^{588} + i^{586} + i^{584}}{i^{582} + i^{580} + i^{578} + i^{576} + i^{574}}$ is -

(A) –1 (B) 1 (C) 0 (D) i

ANS : A

81. The standard form of (1 + i) (1 + 2i) is –

(A) 3 + I (B)–3 + i (C) 1 – 3i (D) 1 – + 3i

ANS : B

82. The standard form of $\frac{(1+i)(1+\sqrt{3i})}{(1-i)}$ is –

(A) $-\sqrt{3}+i$ (B) $\sqrt{3}-i$ (C) $1-i\sqrt{3}$ (D) $1+i\sqrt{3}$

ANS : A

83. The standard form of $\frac{3-4i}{(4-2i)(1+i)}$ is –

(A) $\frac{1}{4}+\frac{3}{4}i$ (B) $\frac{1}{4}-\frac{3}{4}i$ (C) $\frac{3}{4}+\frac{1}{4}i$ (D) $\frac{3}{4}-\frac{1}{4}i$

ANS : B

84. If (x + iy) (2 – 3i) = 4 + i , then real values of x and y are –

(A) $x = 5,\ y = 14$ (B) $x = \frac{13}{5},\ y = \frac{14}{13}$

(C) $x = \frac{5}{13},\ y = \frac{14}{13}$ (D) None of these

ANS : C

85. If $\frac{(1+i)x - 2i}{3+i} + \frac{(2-3i)y + i}{3ii} = i,$ then real values of x and y are –

(A) $x = 3,\ y = -1$ (B) $x = -1,\ y = 3$

(C) $= 1,\ y = -2$ (D) $x = -1,\ y = -3$

ANS : A

86. The conjugate of 4 – 5i is –

(A) 4 + 5i (B) – 4 – 5i (C) – 4 + 5i (D) 4 – 5i

ANS : A

87. The conjugate of $\frac{1}{3+5i}$ is –

(A) $\frac{1}{34}(3+5i)$ (B) 3 + 5i (C) $\frac{1}{3-5i}$ (D) $\frac{34}{3-5i}$

ANS : A

88. The conjugate of $\frac{(1+i)(2+i)}{3+i}$ is –

(A) $\frac{3}{5} + \frac{4}{5}i$ (B) $\frac{3}{5} - \frac{4}{5}i$ (C) $-\frac{3}{5} - \frac{4}{5}i$ (D) $\frac{3}{5} + \frac{4}{5}i$

ANS : B

89. The multiplicative inverse of 1 – i is –

(A) 1 + i (B) $\frac{1}{1+i}$ (C) $\frac{1}{2}+\frac{1}{2}i$ (D) None of these

ANS : C

90. The multiplicative inverse of $(1+\sqrt{3})^2$ is –

(A) $-\frac{1}{8}-\frac{i\sqrt{3}}{8}$ (B) $(1-i\sqrt{3})^2$ (C) $\frac{1}{8}+\frac{i\sqrt{3}}{8}$ (D) None of these

ANS : A

91. The value of $2x^3 + 2x^2 – 7x + 72$, when $x=\frac{3-5i}{2}$ is –

(A) 4 (B) – 4 (C) 2 (D) 0

ANS : A

92. The value of $x^4 + 4x^3 + 6x^2 + 4x + 9$. when $x=-1+\sqrt{2}$ is –

(A) 12 (B) 10 (C) 14 (D) 8

ANS : A

93. If $a+ib=\frac{c+i}{c-i}$, where c is real, then $a^2 + b^2$ =

(A) i (B) 1 (C) – 1 (D) 0

ANS : B

94. If $(x + iy)^{1/3} = a + ib$, x, y, a b $\in$ R, then $\frac{x}{a}+\frac{y}{b}=$

(A) 4 (B) $4(a^2 + b^2)$ (C) $4(a^2 – b^2)$ (D) $(a^2 – b^2)$

ANS : C

95. The greatest possible number with which when we divide 37 and 58, leaves the respective remainder of 2 and 3, is –

(A) 2 (B) 5 (C) 10 (D) None of these

ANS : B

96. The largest possible number with which when 60 and 98 are divided, leaves the remainder 3 in each case, is –

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97. The largest possible number with which when 38, 66 and 80 are divided the remainders remain the same is –

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99. In Q.No. 4, how many numbers are possible between 666 and 8888?

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ANS : D

100. What is the least number which when divided by 8, 12 and 16 leaves 3 as the remainder in each case, but when divided by 7 leaves no remainder?

(A) 147 (B) 145 (C) 197 (D) None of these

ANS : A