

## JEXPO 2013 Solved paper Mathematics

1. If  $A:B=2:5$ ,  $B:C=8:11$ ,  $C:D=11:12$ ,  $D:E=13:14$ , then  $A:E$  is equal to-

Ans.: If my calculation not wrong then answer should be 26:105 (no such options are given)

2. The average of three numbers is 135. The largest number is 180 and the difference of others is 25. The smallest number is

Ans.: (A) 100

3. In a mixture of 45 liters, the ratio of milk and water is 3:2. The quantity of water that should be added to make the ratio 9:11 is

Ans.: (B) 15 liters

4. A student multiplied a number  $x$  by  $\frac{3}{5}$  instead of  $\frac{5}{3}$ . The error in the calculation is

Ans.: (D) 64%

5. On selling a book for Rs.40, the loss is 20%. To make a profit of 40%, the book must be sold at

Ans.: (D) Rs.70

6. If 8 carpenters can make 18 boxes in 3 days, 4 carpenters can make 18 boxes in

Ans.:(A) 6 days

7. A factor of  $x^2-x-600$  is

Ans.:(B)  $x-25$

8. If  $3x+\frac{1}{4x}=3$  and  $x\neq 0$  then the value of  $64x^3+\frac{1}{27x^3}$  is

Ans.: (D) 48

9. If  $a=\sqrt{6} + \sqrt{5}$  and  $ab=1$ , then the value of  $a^2 + b^2$  is

Ans.: (D)22

10. If  $x\neq a$  and  $x\neq b$ , the solution of the equation  $\frac{a}{(x-a)} + \frac{b}{(x-b)} = \frac{(a^2+b^2)}{(x-a)(x-b)}$  is

Ans.: (B)  $a+b$

11. If  $\frac{a}{(x+y)} = \frac{b}{(y+z)} = \frac{c}{(z-x)}$ , then we have

Ans.:(D)  $c+a-b=0$

12. If H.C.F. and L.C.M. of two numbers  $x$  and  $y$  are  $a$  and  $b$  respectively and  $x+y=a+b$ , then the value of  $x^3 + y^3$  is

Ans.:(A)  $a^3 + b^3$

13. If  $\frac{(x-a)}{(b+c)} + \frac{(x-b)}{(c+a)} + \frac{(x-c)}{(a+b)} = 3$  and  $\frac{1}{(b+c)} + \frac{1}{(c+a)} + \frac{1}{(a+b)} \neq 0$ , then the value of  $x$  is

Ans.:(A)  $a+b+c$

14. If  $x=5+2\sqrt{6}$ , then the value of  $\sqrt{x} - \frac{1}{\sqrt{x}}$  is

Ans.: (C)  $2\sqrt{2}$

15. If 4 workers can make 42 toys in 6 days, then 24 workers can make 42 toys in

Ans.: (B) 1 day

16. If  $\sqrt{15}=x$ , then the value of  $\sqrt{\frac{3}{5}}$  is

Ans.: (C)  $\frac{3}{x}$

17. The simplified value of  $\sqrt{5+\sqrt{11+\sqrt{19+\sqrt{29+\sqrt{49}}}}}$  is

Ans.: (D) 3

18. If  $x=103$ , then the L.C.M. of  $x^2 - 4$  and  $(x+2)(x^2 - 5x + 6)$  is

Ans.: (B)1060500

19. If  $x > 0$ , the positive square root of  $x^2 + 2x - 1 + \frac{1}{x^2 + 2x + 1}$  is  
 Ans.: (C)  $x + 1 - \frac{1}{x + 1}$
20. If  $x - \frac{4}{5} = 81$ , the value of  $x$  is  
 Ans.: (B) 81 (approx.)
21. If the sum of a positive number and its square is 182, then the number is  
 Ans.: (C) 13
22. If the difference between a two digit number and the number obtained by interchanging the positions of the digits of the number is 54, then the difference between the digit of that number is  
 Ans.: (A) 6
23. If  $p = 999$ , the value of  $(p(p^2 + 3p + 3) + 1)^{1/3}$  is  
 Ans.: (D) 1000
24. If  $x \neq 1$ , the value of  $\frac{1}{x-1} - \frac{1}{x+1} - \frac{2}{x^2+1} - \frac{4}{x^4+1} - \frac{8}{x^8+1} - \frac{16}{x^{16}+1}$  is  
 Ans.: (B) 0 ( Just put the value  $x=0$  in the equation you will get the answer)
25. If  $936216 + x$  is exactly divisible by 7, then the minimum value of  $x$  is  
 Ans.: (A) 6
26. The equation  $kx - y = 2$  and  $6x - 2y = 3$  will have no solution if  
 Ans.: (A)  $k = 3$
27. The equations  $kx + 3y = k - 3$  and  $12x + ky = k$  will have infinity as a solution if  
 Ans.: (C)  $k = 6$
28. If  $-5 \leq 2x - 7 \leq 1$ , the maximum value of  $x$  is  
 Ans.: (A) 4
29. If  $7 < 2x - 3 < 17$  and  $x$  is an integer as well as a perfect square, then the value of  $x$  is  
 Ans.: (C) 9
30. The expression  $9x^2 - 24x + 7$  assumes the minimum value at  
 Ans.: (B)  $x = \frac{4}{3}$  (minimum value is -9)
31. If the expression  $49x^2 + 56x + t$  is a perfect square for any real value of  $x$ , then the value of  $t$  is  
 Ans.: (A) 16
32. ABC is a right angled triangle with  $\angle A = 90^\circ$ . If D is the midpoint of BC, then  
 Ans.: (A)  $AD : BC = 1 : 2$
33. If O is a point inside  $\triangle ABC$ , then  
 Ans.: (B)  $2(OA + OB + OC) > AB + BC + AC$
34. If each side of an equilateral triangle is 6 cm, then the radius of its circumcircle is  
 Ans.: (B)  $2\sqrt{3}$  cm
35. If the circumcenter of an equilateral triangle ABC is O, then the value of  $\angle BOC$  is  
 Ans.: (D)  $120^\circ$
36. ABCD is a cyclic quadrilateral such that AB is the diameter of the circle. If  $\angle ADC = 140^\circ$ , the value of  $\angle BAC$  is  
 Ans.: (B)  $50^\circ$
37. If ABC and DEF are two similar triangles with  $\angle A = \angle D, \angle B = \angle E, \angle C = \angle F$ ,  $EF = 16$  cm,  $BC = 24$  cm and  $p_1, p_2$  are the perimeter of  $\triangle ABC$  and  $\triangle DEF$  respectively, then  
 Ans.: (C)  $p_1 : p_2 = 3 : 2$
38. If a chord of a unit circle subtends an angle  $120^\circ$  at the center, then its length is

Ans.: (B)  $\sqrt{3}$

39. ABC is a triangle in which  $AB+AC$ , the base BC is produced to D and  $\angle ACD=130^\circ$ . Then  $\angle A$  is equal to

Ans.: (A)  $80^\circ$

40. If AB and CD are two diameters perpendicular to each other, then the length of the chord AC is

Ans.: (D)  $\frac{1}{\sqrt{2}} AB$

41. ABCD is a cyclic quadrilateral. If the chord AC subtends an angle  $90^\circ$  at the center, then the value of  $\angle ABC$  is

Ans.: (D)  $135^\circ$

42. Two equal circles of radius r intersect each other such that each passes through the center of the other. The length of the common chord is

Ans.: (C)  $r\sqrt{3}$

43. The ratio of the area of a circle to the area of a square whose diagonal is equal to the diameter of the circle is

Ans.: (D)  $\pi:2$

44. A solid metallic sphere is melted into a solid right circular cylinder whose height is equal to  $\frac{9}{2}$  times the radius of its base. The ratio of the radius of the sphere to that of the base of the cylinder is

Ans.: (A) 3:2

45. If the area and perimeter of a rhombus are 1 sq.cm. and 4 cm. respectively, then the ratio of its diagonals is

Ans.: (C) 1:1

46. A steel wire when bent in the form of a square encloses an area of 121 sq.cm. If the same wire is bent in the form of a circle, then the circle encloses an area of

Ans.: (D) 154 sq. cm.

47. If the volume of two spheres are in ratio 8:27, then the ratio of their surface area is

Ans.: (A) 4:9

48. A metallic hemisphere is melted into a solid cone with same base radius as that of the hemisphere. The ratio of the height of the cone to the radius of its base is

Ans.: (B) 1:2

49. A cylinder and a cone have equal radii of their bases and equal height. The ratio of the volume of the cylinder to that of the cone

Ans.: (A) 3:1

50. Two circles touch internally. If the sum of their areas is  $116\pi$  sq.cm. and the distance between their centers is 6 cm., then the ratio of major radius to the minor is

Ans.: (A) 5:2

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51. A cylinder and a cone have equal radii of their bases and equal heights. If their curved surface areas are in the ratio 8:5, then the ratio of radius of the base of the cone to its height is

Ans.: (A) 3:4 (Question in bengali version was wrongly printed)

52. The value of  $\tan 260^\circ - 2 \sin 60^\circ + \cot 30^\circ$  is  
 Ans.: (C) 3
53. If  $x \sin 60^\circ \cos 230^\circ = \tan 245^\circ \sec 60^\circ / \operatorname{cosec} 60^\circ$ , then the value of x is  
 Ans.: (A)  $8/3$
54. If  $\tan^2 \theta - (\sqrt{3} + 1)\tan \theta + \sqrt{3} = 0$  and  $45^\circ < \theta < 90^\circ$ , the value of  $\cos 2\theta - \sin 2\theta$  is  
 Ans.: (B) -0.5
55. In a triangle ABC, the value of  $\tan \frac{(B+C)}{2} \tan \frac{A}{2}$  is  
 Ans.: (A) 1
56. If  $\sin \theta - \cos \theta = 7/13$ , then the value of  $\sin \theta + \cos \theta$  is  
 Ans.: (B)  $17/13$
57. If the sum of the two angles is  $135^\circ$  and their difference is  $\pi/12$ , then the value of the greatest angle in circular measure is  
 Ans.: (D)  $5\pi/12$
58. If  $x \sin \theta = 2y \cos \theta$  and  $2x \sec \theta - y \operatorname{cosec} \theta = 3$  then the value of  $x^2 + 4y^2$  is  
 Ans.: (D) 4
59. If x and  $\theta$  both are real and  $\cos \theta = x + 1/x$ , then the value of  $\theta$  is  
 Ans.: (D) None of the above
60. The value of  $\cos 2013\pi/3 + \cos 20135\pi/6 + \cos 20134\pi/3 + \cos 201311\pi/6 + \dots$  is  
 Ans.: (C) 0
61. If  $\tan 4\theta + \tan 6\theta = \tan 2\theta \sec 2\theta$  and  $0^\circ < \theta \leq 90^\circ$ , then the value of  $\theta$  is  
 Ans.: (B)  $45^\circ$
62. If  $\cos \theta - \sqrt{2} \sin \theta = \sqrt{3} \sin \theta$ , then the simplified value of the expression  $\sin \theta + \sqrt{2} \cos \theta$  is  
 Ans.: (B)  $\sqrt{3} \cos \theta$
63. Numerical value of  $7/(1 + \tan 2\theta) + 3/(1 + \cot 2\theta) + 4 - 4 \cos 2\theta$  is  
 Ans.: (A) 7
64. If  $(1 + \cos \theta + \sin \theta)/(1 + \sin \theta) = x$ , the value of  $(1 + \cos \theta - \sin \theta)/\cos \theta$  is  
 Ans.: (A) x
65. If  $3 - 3 \sin \theta - \cos 2\theta = 0$  and  $0^\circ \leq \theta \leq 90^\circ$ , then the value of  $\theta$  is  
 Ans.: (C)  $90^\circ$
66. If  $4 \sin 2\theta - 4x \sin \theta + 2x^2 - 2x + 1 = 0$  and  $0^\circ \leq \theta \leq 90^\circ$ , then the value of  $\theta$  is  
 Ans.: (A)  $30^\circ$
67. If  $\triangle ABC$  is similar to  $\triangle DEF$  and  $\angle A = 47^\circ$ ,  $\angle E = 83^\circ$ , then  $\angle C$  is equal to  
 Ans.: (C)  $50^\circ$
68. The equation  $(k-4)x + 4y = 3$  and  $x + (k-4)y = 1$  will have a unique solution, If  
 Ans.: (A)  $k \neq 6$  and  $k \neq 2$
69. If  $x = (k+12)/10$  and  $x = (k-12)/10$  are the solutions of  $5x^2 + 2x - 7 = 0$ , then the possible value of k is  
 Ans.: (B) -2
70. A person travels 70% of his tour by train, 22% by bus, 6% by taxi and rest 3 km by walk. The distance he travelled by bus is  
 Ans.: (C) 33 km
71. The electric poles are placed along the railway tracks, the distance between two consecutive electric poles is 70 meters. A passenger in a running train counts that in 7 minutes 71 poles passed. The speed of the train is

Ans.: (B) 42 km/hour

72. A particular work can be done by Raghu and Bimal in 10 days, by Bimal and Arif in 12 days and by Arif and Raghu in 15 days. The work done by all of them together in

Ans.: (C) 8 days

73. A train 120 meters long, passes a signal post in 6 seconds, The speed of the train is

Ans.: (D) 72 km/hour

74. A train of length 150 meters passed a railway platform of length 200 meters completely in 35 seconds. The speed of the train at that time was

Ans.: (B) 36 km/hour

75. A car goes a distance at a speed of 60 km/hour and returns the same distance at a speed of 40 km/hour. The average speed of the car is

Ans.: (A) 48 km/hour

76. If  $\frac{8}{x+2} = \frac{6}{x+5}$ , then x is equal to

Ans.: (D) -14

77. If  $-3 \leq x \leq 3$  and x is a whole number the maximum value of  $x^2 + 2$  is

Ans.: (D) 11

78. The solution of the equations :  $S \frac{1}{x} + \frac{1}{y} = \frac{5}{8}$  and  $\frac{1}{x} - \frac{1}{y} = \frac{3}{8}$  is

Ans.: (A)  $x=2, y=8$

79. The solution of the equation  $(\sqrt{x} - 1)/(\sqrt{x} - \sqrt{3}) = (\sqrt{x} - \sqrt{3})/\sqrt{x}$  is

Ans.: (B) 9

80. The H.C.F. of  $x^3+xy^2, x^2+xy$  and  $x^2y+xy^2$  is

Ans.: (C) x

81. If  $(a-x)(x-b) > 0$ , where  $a < b$ , then the value of x will be

Ans.: (B)  $a < x < b$

82. If the roots of the equation  $x^2 + 2px + q = 0$  are real and unequal then

Ans.: (A)  $p^2 > q$

83. If  $x = (\sqrt{5} + \sqrt{3})/(\sqrt{5} - \sqrt{3})$  then the value of  $x^2 - 8x + 8$  is

Ans.: (C) 7

84. One of the factors of  $x^4 + x^3 - 10x^2 + 7x + 2$  is

Ans.: (D)  $x-2$

85. A rectangular parallelepiped, whose length, breadth and height are respectively 8 units, 4 units and 2 units, have the same volume as a cube. The surface area of the cube is

Ans.: (B) 96 sq. units

86. Two right circular cones have the same volume. If the ratio of the radii of their bases is 1:2, the ratio of their heights will be

Ans. : (C) 4:1

87. A solid cube of side 15 cm is melted to form small cubes of side 3 cm. The number of small cubes is

Ans. : (D) 125

88. The lines OB and OC trisect the right angle  $\angle AOD$  such that  $AB \perp OB, BC \perp OC$  and  $CD \perp OD$ . If  $OA = 1$  unit, then OD is equal to

Ans.: (D)  $3\sqrt{3}/8$

89. Elevation of a tower from a place is  $30^\circ$ , after moving towards the tower by 100 meter elevation becomes  $45^\circ$ , Height of the tower is

Ans.: (B) 136.6 meter

90. If  $2 \cos 2x = 7 \sin x - 2$ , then  $x =$

Ans.: (A)  $\pi/6$

91. The elevation of the top of a tower observed from the ground floor and roof of a building of height 10 meter are respectively  $60^\circ$  and  $45^\circ$ . The distance of the tower from the building is

Ans.: (D)  $10/(\sqrt{3}-1)$

92. If  $(x-y) \propto 1/z$ ,  $(y-z) \propto 1/x$ ,  $(z-x) \propto 1/y$  and  $k, l, m$  are their constant of variation respectively, then the relation between  $k, l$  and  $m$  is

Ans.: (B)  $k+l+m=0$

93. If  $a/(b+c) + b/(c+a) + c/(a+b) = 1$ , then the value of  $a^2/(b+c) + b^2/(c+a) + c^2/(a+b)$

Ans.: (Unable to solve this question by me.)

94. If  $(5x-2y):(2x+3y)=2:3$ , then which of the four relation is correct

Ans.: (C)  $x > y$

95. If  $f(x) = x^6 - 10x^5 - 10x^4 - 10x^3 - 10x^2 - 10x + 10$ , then the value of  $f(11)$  is

Ans.: (D) 21

96. The base of the prism is a square and the height of the prism is 10 cm. If the whole surface area of the prism be 192 sq. cm., then the volume of the prism is

Ans.: (B) 160 c.c.

97. If  $a = 3 + 2\sqrt{2}$  then the value of  $(a^6 + a^4 + a^2 + 1)/a^3$  is

Ans.: (A) 204

98. If the square of an odd positive integer is divided by 8 then the remainder is always

Ans.: (B) 1

99. The simplified value of  $999(994/999) \times 999$  is

Ans.: (D) 998995

100. ABCD is a cyclic quadrilateral. AB and DC when produced meet each other at the point P. Then which of the following is true?

Ans.: (B)  $PA \cdot PC = PB \cdot PD$