



1. Consider the following statements in respect of graphical representation of data.

1. It makes reading more interesting.
2. It is less time-consuming.
3. It is easily understandable

Which of the statement given above are correct?

- (a) 1 and 2                      (b) 1 and 3  
(c) 2 and 3                      (d) 1, 2 and 3

2. What is the median of the data 1, 2, 2, 3, 3, 4, 4, 4, ... up to 36 terms?

- (a) 4.5                              (b) 6.0  
(c) 6.5                              (d) 18

3. For a given data of 50 sampled observations, there are 30 observations that are less than or equal to the value 5.45. What does the value 5.45 indicate?

- (a) Mean                              (b) 30<sup>th</sup> percentile  
(c) 60<sup>th</sup> percentile              (d) 54.5<sup>th</sup> percentile

**Directions** The following five (5) items consist of two statements: one labelled as the 'Assertion (A)' and the other as 'Reason (R)'. You are to examine these two statements carefully and select the answers to these items using the code given below.

Code :

- (a) Both A and R are individually true, and R is the correct explanation of A.
- (b) Both A and R are individually true but R is not the correct explanation of A.
- (c) A is true but R is false.
- (d) A is false but R is true.

4. **Assertion (A)** : The rectangle whose perimeter is 20 units will have an area less than or equal to 25 square units.

**Reason (R)** : In comparison to all rectangles of given perimeter, a square of the same perimeter has the maximum area.

5. **Assertion (A)** : 3 and 8 are relatively prime. 8 and 13 are relatively prime. 3 and 13 are relatively prime.

**Reason (R)** : If a and b are relatively prime. b and c are relatively prime, then a and c must be relatively prime.

6. **Assertion (A)** : Mean is the best measure of central tendency.

**Reason (R)** : It is very much affected by the extreme values.

7. **Assertion (A)** : The more than and less than type frequency curves cut each other at median.

**Reason (R)** : Point of intersection divides the distribution into two equal parts.

8. **Assertion (A)** :  $4x - 5y = 1$  and  $-\frac{8}{5}x + 2y = -\frac{2}{5}$  have infinite number of solutions.

**Reason (R)** :  $a_1x + b_1y = c_1$  and  $a_2x + b_2y = c_2$  have infinite number of solutions.

$$\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$$

9. Which one of the following is correct?

- (a)  $\sqrt{2} < \sqrt[3]{3} < \sqrt[4]{6}$               (b)  $\sqrt[4]{6} < \sqrt[3]{3} < \sqrt{2}$   
(c)  $\sqrt{2} < \sqrt[4]{6} < \sqrt[3]{3}$               (d)  $\sqrt[4]{6} < \sqrt{2} < \sqrt[3]{3}$

10. If  $y + z$  exceeds  $x$  by 11 and  $z + x$  exceeds  $y$  by 7, how much does  $y$  exceed  $x$ ?

- (a) 1                                      (b) 2  
(c) 4                                      (d) Cannot be determined.

11. What is the digit in the unit place of the number represented by  $(7^{29} + 9^{26})$ ?

- (a) 5                                      (b) 6  
(c) 7                                      (d) 8

12. If  $\frac{x^3 + ax^2 + bx + 4}{x^2 + x - 2}$  is a polynomial of degree 1 in  $x$ , then

what are the values of  $a, b$  respectively?

- (a)  $-1, -4$                               (b)  $-1, 4$   
(c)  $3, -4$                               (d)  $3, 4$

13.  $(2x - 3y)^3 + (3y - 4z)^3 + (4z - 2x)^3$  can be factorised into which one of the following?

- (a)  $(2x + 3y + 4z)(2x - 3y - 4z)$   
(b)  $(2x + 3y - 4z)(2x - 3y - 4z)$   
(c)  $(2x - 3y)(3y - 4z)(4z - 2x)$   
(d)  $6(2x - 3y)(3y - 4z)(2z - x)$

14. If  $a, b$ , are natural numbers such that  $7a + 5b$  is divisible by 19, which one of the following is divisible by 19?

- (a)  $-7a - 5b$                               (b)  $14a + 2b$   
(c)  $9a + 20b$                               (d)  $13a + 6b$

15. The value of a machine depreciates every year by 4% its value at present is Rs. 6,250. What will be its value after two years?

- (a) Rs. 5,000                              (b) Rs. 5,550  
(c) Rs. 5,760                              (d) Rs. 6,000

16. Consider the following all real number  $a, b$ , and  $c$  :

1. If  $a^2 + b^2 + c^2 = ab + bc + ca$ , then  $a = b = c$
2. If  $a + b + c = 0$ , then  $a^3 + b^3 + c^3 + 3abc = 0$
3. If  $a + b = c$ , then  $a^3 + b^3 + c^3 + 3abc = 0$

Which of the above is/are correct?

- (a) 1 only                                      (b) 2 only  
(c) 1 and 2                                      (d) 1, 2, and 3

17. What is the HCF of the polynomials  $n^2(n+1)^2 - 1, n^4 - 3n^2 + 1, n^4 - (n-1)^2$ ?

- (a)  $n^2 - n - 1$                               (b)  $n^2 - n + 1$   
(c)  $n^2 + n + 1$                               (d)  $n^2 + n - 1$

18. When  $a + b + c + 3a^{1/3}b^{2/3} + 3a^{2/3}b^{1/3}$  is divided by  $a^{1/3} + b^{1/3} + c^{1/3}$ , by what is the remainder?

- (a)  $3a$                                       (b)  $3b$   
(c) 0    (d)  $c^{2/3}$

19. If  $\frac{x}{(b-c)(b+c-2a)} = \frac{y}{(c-a)(c+a-2b)}$   
 $= \frac{z}{(a-b)(a+b-2c)}$   
 what is the value of  $(x+y+z)$ ?  
 (a)  $a+b+c$  (b)  $a^2+b^2+c^2$   
 (c) 0 (d) 1
20. If  $A \cap B = \phi$  then which one of the following holds for  $A' \cap B$ ?  
 (a)  $B'$  (b)  $A'$   
 (c)  $A$  (d)  $B$
21. The minute hand of a clock is 14 cm long. If it moves between 8:00 a.m., what is the area covered by it on the face of the clock?  
 (a)  $512 \text{ cm}^2$  (b)  $462 \text{ cm}^2$   
 (c)  $264 \text{ cm}^2$  (d)  $196 \text{ cm}^2$
22. A cube having each side of unit length is cut into two parts by a plane through two diagonals of two opposite faces. What is the total surface of each of these parts?  
 (a)  $3 + \sqrt{2}$  square units (b)  $2 + \sqrt{3}$  square units  
 (c)  $3\sqrt{2}$  square units (d) 3 square units
23. On increasing the radius of a cylinder by 6 units, the volume increases by  $x$  cubic units. On increasing the altitude of the cylinder by 6 units, the volume also increases by  $x$  cubic units. If the original altitude is 2 units, what is the original radius?  
 (a) 2 units (b) 4 units  
 (c) 6 units (d) 8 units
24. A hollow right circular cylinder with height 8 cm and base radius 7 cm is opened out into a rectangle. What are the length, breadth of the rectangle respectively?  
 (a) 22 cm, 16 cm (b) 44 cm, 8 cm  
 (c) 22 cm, 8 cm (d) 44 cm, 16 cm
25. A right circular cone is separated into three solids of curved surface areas  $S_1, S_2, S_3$  by two planes which are parallel to the base and trisect the altitude. What is the value of  $S_1 : S_2 : S_3$ ?  
 (a) 1 : 1 : 1 (b) 1 : 2 : 3  
 (c) 1 : 3 : 5 (d) 1 : 3 : 6
26. A hemi-spherical bowl has its external diameter as 10 cm. Its thickness is 1 cm. What is the whole surface area of the bowl?  
 (a)  $258 \text{ cm}^2$  (b)  $280 \text{ cm}^2$   
 (c)  $284 \text{ cm}^2$  (d)  $286 \text{ cm}^2$
27. A circular piece of metal of maximum size is cut out of a square piece and then a square piece of maximum size is cut out of the circular piece. What is the total amount of metal wasted?  
 (a)  $\frac{1}{2}$  times the area of the original square piece.  
 (b)  $\frac{1}{4}$  times the area of the original square piece.  
 (c)  $\frac{1}{2}$  times the area of the circular piece.  
 (d)  $\frac{1}{4}$  times the area of the circular piece.
28. An equilateral triangle is inscribed in a circle and another

- circle is inscribed in this equilateral triangle. What is the ratio of area of the bigger circle to that of smaller circle?  
 (a) 2 : 1 (b) 3 : 2  
 (c) 3 : 1 (d) 4 : 1
29. A tradesman marks two prices on two similar items, one for the cash payment and the other at the credit of 6 months. What will be the ratio between the two prices if the rate of interest is 10% per annum?  
 (a) 10 : 11 (b) 20 : 21  
 (c) 40 : 41 (d) 50 : 51
30. Consider the following statements :  
 1. The product of an integer and a rational number can never be a natural number.  
 2. The quotient of division of an integer by a rational number can never be an integer.  
 Which of the statements given above is/are correct?  
 (a) 1 only (b) 2 only  
 (c) Both 1 and 2 (d) Neither 1 nor 2
31. What value must be given to \* so that the number  $8 * 76246$  is divisible by 11?  
 (a) 0 (b) 1  
 (c) 2 (d) 3
32. What is the angle of elevation of sun if a flag-staff of 3m high placed on top of a tower throws a shadow of  $\sqrt{3}$  m?  
 (a)  $30^\circ$  (b)  $45^\circ$   
 (c)  $60^\circ$  (d) Cannot be determined
33. If  $\sin A + \sin B + \sin C + \sin D = 4$ , what is the value of  $\cos A + \cos B + \cos C + \cos D$ ?  
 (a) 0 (b) 1  
 (c) 2 (d) 4
34. If  $\sin \theta + \cos \theta = \sqrt{2}$ , what is the value of  $\sin^6 \theta + \cos^6 \theta$ ?  
 (a)  $\frac{1}{4}$  (b)  $\frac{1}{2}$   
 (c) 1 (d) 2
35. If  $a \sin \theta + b \cos \theta = c$ , what is/are the value(s) of  $(a \cos \theta - b \sin \theta)$ ?  
 (a)  $c - a + b$  (b)  $c - b + a$   
 (c)  $\pm \sqrt{a^2 + b^2 - c^2}$  (d)  $\pm \sqrt{c^2 - a^2 - b^2}$
36. Is  $\sin A + \cos B = x$  and  $\cos A + \sin B = y$  what is the value of  $\sin A \cos B + \cos A \sin B$ ?  
 (a)  $x^2 - y^2 - 2$  (b)  $x^2 - y^2 - 2$   
 (c)  $\frac{(x^2 + y^2 - 2)}{2}$  (d)  $\frac{(x^2 + y^2 + 2)}{2}$
37. If  $0 < \theta < \frac{\pi}{4}$  and  $x = \sin \theta - \cos \theta$ , which one of the following is correct?  
 (a)  $x = 0$   
 (b)  $x$  is always positive  
 (c)  $x$  is always negative  
 (d)  $x$  may be positive or negative
38. If  $x = \cos^2 \theta + \sec^2 \theta$ , which one of the following is correct?  
 (a)  $0 < x < 1$  (b)  $1 < x < 2$   
 (c)  $x = 2$  (d)  $x \geq 2$
39. What is the value of  $(\operatorname{cosec} A - \sin A)(\sec A - \cos A)(\tan A + \cot A)$ ?  
 (a) 0 (b) 1  
 (c) 2 (d) 3



40. A person standing on the bank of a river observes that the angle subtended by a tree located on the opposite bank is  $60^\circ$ ; when he retires 40 m from the bank, he finds the angle to be  $30^\circ$ . What is the breadth of the river.  
 (a) 40 m (b) 20 m  
 (c) 10 m (d)  $20\sqrt{3}$  m
41. If  $\sec \theta = \sqrt{2 + \sqrt{2 + \sqrt{2 + \dots \infty}}}$   
 What is the value of  $\cos(1 + 2 \cos \theta)$ ?  
 (a) 0 (b) -1  
 (c) 1 (d) 2
42. A child of height 4 ft. wants that his shadow should be negligibly small (practically zero). What should be the angle of elevation of sun for such thing to happen?  
 (a) Angle of elevation of sun should be very small tending to  $0^\circ$ .  
 (b) Angle of elevation of sun should be nearer to  $90^\circ$ .  
 (c) Angle of elevation of sun should be  $45^\circ$ .  
 (d) Angle of elevation of sun should be between  $30^\circ$  and  $60^\circ$ .
43. If  $P = \cos x - \sin x$ ,  $q = \frac{1 - \sin^3 x}{1 - \sin x}$ ,  $r = \frac{1 + \cos^3 x}{1 + \cos x}$   
 What is the value of  $p + q + r$ ?  
 (a) 0 (b) 1  
 (c) 2 (d) 3
44. What is the value of  $\frac{\sin^3 x + \cos^3 x}{\sin x + \cos x} + \sin x \cos x$ ?  
 (a) 0 (b) 8  
 (c)  $\cos x$  (d) 1
45. If  $\tan(x^2 - 8x + 60)^\circ = \cot(6x - 5)^\circ$ , what is one of the values of  $x$ ?  
 (a) 7 (b) 8  
 (c) 9 (d) 10
46. Given that  $\sin A + \left(\frac{1}{\sin A}\right) = \frac{5}{2}$  and  $A$  is acute angle, what is the value of  $A$ ?  
 (a)  $\frac{\pi}{3}$  (b)  $\frac{\pi}{4}$   
 (c)  $\frac{\pi}{6}$  (d)  $\frac{\pi}{8}$
47. Consider the following :  
 1.  $\cos^6 A + \sin^6 A = 1 - 3 \sin^2 A \cos^2 A$   
 2.  $\cos^4 A + \sin^4 A = 1 - 2 \sin^2 A \cos^2 A$   
 3.  $\cos^4 A - \sin^4 A = 2 \cos^2 A - 1$   
 Which of the statements given above are correct?  
 (a) 1 and 2 (b) 2 and 3  
 (c) 1 and 3 (d) 1, 2 and 3
48. Equilateral triangles BCP, CAQ and ABR are drawn externally on the sides BC, CA, and AB respectively of a scalene triangle ABC.  
 Consider the following statements:  
 1.  $\triangle ACP$  and  $\triangle BCQ$  are similar.  
 2.  $\triangle BPR$  and  $\triangle AQR$  are similar.  
 Which of the following statement given above is/are correct?  
 (a) 1 only (b) 2 only  
 (c) Both 1 and 2 (d) Neither 1 nor 2
49. A train takes 18 seconds to pass completely through a station of 162 meters long and 15 seconds to pass completely through another station 120 metres long. What is the length of the train?  
 (a) 90 metres (b) 100 metres  
 (c) 110 metres (d) 120 metres
49. A train takes 18 seconds to pass completely through a station of 162 meter long and 15 seconds to pass completely through another station 120 metres long. What is the length of the train?  
 (a) 90 metres (b) 100 metres  
 (c) 110 metres (d) 120 metres
50. The simple interest on a sum during a period is  $\frac{9}{25}$  of the sum. If the rate of interest is  $R\%$  and the time period is  $R$  years, then what is the value of  $R$ ?  
 (a) 2 (b) 4  
 (c) 6 (d) 8
51. To cover a distance of 1 km down the stream a rower takes 10 minutes, while up the stream the rower takes 30 minutes for the same distance. What is the speed of the stream in km/hr?  
 (a) 1 (b) 2  
 (c) 3 (d) 4
52. A can do a piece of work in 4 days, B can do the same work in 6 days and C in 12 days. A started the work but had to leave after 1 day. In how many days can both B and C complete the remaining work?  
 (a) 2 days (b) 3 days  
 (c) 4 days (d) 6 days
53. A train travels a distance of 300 km at a constant speed. If the speed of the train is increased by 5 km/hr, the journey would have taken 2 hours less. What was the initial speed of the train in km/hr?  
 (a) 20 (b) 25  
 (c) 30 (d) 35
54. While dividing a number, the divisor is 8 times the quotient and 4 times the remainder. If the remainder is 12, what is the dividend?  
 (a) 288 (b) 300  
 (c) 360 (d) 396
55. Match List-I with List-II and select the correct answer using the code given below the Lists:  

<b>List-I</b>	<b>List-II</b>
A. $(A - A) - B$	1. $\phi$
B. $A - (A - B)$	2. $A$
C. $B - (A - B)$	3. $B$
	4. $A \cap B$
	5. $A \cup B$
- Code:  

A	B	C	A	B	C
(a) 1	2	3	(b) 3	4	5
(c) 1	4	3	(d) 3	2	5
56. Match List-I with List-II and select the correct answer using the code given below the lists:  

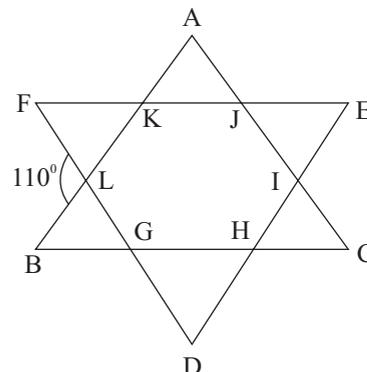
<b>List-I</b>	<b>List-II</b>
A. $27^{\log_3 2}$	1. 1
B. $49^{\log_7 4}$	2. 2
C. $25^{\log_5 2}$	3. 4
	4. 8
	5. 16

Code:

- |     |   |   |   |     |   |   |   |
|-----|---|---|---|-----|---|---|---|
|     | A | B | C |     | A | B | C |
| (a) | 4 | 1 | 3 | (b) | 2 | 1 | 4 |
| (c) | 2 | 5 | 4 | (d) | 4 | 5 | 3 |
57. If  $1.525252\dots$  is converted to a fraction, then what is the sum of its numerator and denominator?  
 (a) 152 (b) 249  
 (c) 250 (d) 252
58. A vessel can be filled by a pipe in 25 minutes and it can be emptied by a waste pipe in 20 minutes. If both the pipes are opened when the vessel is full, how much is the time taken to empty the vessel?  
 (a) 5 minutes (b) 45 minutes  
 (c) 50 minutes (d) 100 minutes
59. What is the compound interest on Rs. 24,000 at the rate of 10% per annum for  $1\frac{1}{2}$  years according to six-monthly system?  
 (a) Rs. 3,873 (b) Rs. 3,783  
 (c) Rs. 3,600 (d) Rs. 3,200
60. What least number must be added to 6591 to make the sum a perfect square?  
 (a) 33 (b) 78  
 (c) 133 (d) 278
61. What is the last digit in the expansion of  $3^{100}$ ?  
 (a) 1 (b) 3  
 (c) 7 (d) 9
62. A line through the vertex  $C$  of a quadrilateral  $ABCD$  parallel to its diagonal  $BD$  meets  $AB$  produced in  $E$ , while a line through  $D$  parallel to  $AB$  meets a line through  $A$  in  $F$ . If  $X, Y, Z$  are respectively the areas of the quadrilateral  $ABCD$ ,  $\triangle AED$  and  $\triangle AEF$ , then which one of the following is correct?  
 (a)  $X \neq Y \neq Z$  (b)  $X = Y \neq Z$   
 (c)  $X \neq Y = Z$  (d)  $X = Y = Z$
63. A closed right circular cone contains water up to a height  $h/2$  above the base, where  $h$  is the height of the cone. To what height does water rise if the cone is inverted?  
 (a)  $\frac{h}{2}$  (b)  $\frac{3h}{4}$   
 (c)  $\left(\frac{7}{8}\right)^{1/2} h$  (d)  $\left(\frac{7}{8}\right)^{1/3} h$
64. If  $V$  is volume of cuboid of dimensions  $a, b, c$  and  $S$  is its surface area, then what is  $S/V$  equal to?  
 (a)  $4\left(\frac{1}{a} + \frac{1}{b} + \frac{1}{c}\right)$  (b)  $3\left(\frac{1}{a} + \frac{1}{b} + \frac{1}{c}\right)$   
 (c)  $2\left(\frac{1}{a} + \frac{1}{b} + \frac{1}{c}\right)$  (d)  $\left(\frac{1}{a} + \frac{1}{b} + \frac{1}{c}\right)$
65. Three circles of radii  $r_1, r_2$  and  $r_3$  are drawn concentric to each other. The radii  $r_1, r_2$  are such that the area of the circle with radius  $r_1$  is equal to the area between the circles  $r_2$  and  $r_1$ . The area between the circles of radii  $r_3$  and  $r_2$  is equal to the area between the circles of radii  $r_2$  and  $r_1$ . What is the value of  $r_1 : r_2 : r_3$ ?  
 (a)  $1 : \sqrt{2} : \sqrt{3}$  (b)  $2 : \sqrt{3} : 2\sqrt{3}$   
 (c)  $1 : 2 : 3$  (d)  $1 : 2\sqrt{2} : 3\sqrt{3}$
66. There are 5 cones and 5 cylinders each of base radius  $r$  and

height  $r$ . What is the number of spheres of radius  $r$  that can be moulded out of these (assuming each body to be solid)?

- (a) 2 (b) 3  
 (c) 4 (d) 5
67. Two metal cubes, of edge 2 cm each, and one metal cube of edge 3 cm are melted. How many cubes of edge 1 cm each, are needed to be melted so that when combined with the previous melt, a cube, having an edge of minimum integral value, may be moulded?  
 (a) 2 (b) 4  
 (c) 6 (d) 21
68. If the sum of the lengths of the diagonals of a rhombus of side 4 cm is 10 cm, then what is its area?  
 (a)  $8 \text{ cm}^2$  (b)  $9 \text{ cm}^2$   
 (c)  $10 \text{ cm}^2$  (d)  $12 \text{ cm}^2$
69. A right-angled isosceles triangle is inscribed in a circle of radius  $r$ . What is the area of remaining portion of the circle?  
 (a)  $\frac{\pi r^2}{2}$  (b)  $\left(\pi - \frac{1}{2}\right)r^2$   
 (c)  $(\pi - 1)r^2$  (d)  $(\pi - 2)r^2$
70. In a right-angled triangle, the square of the hypotenuse is equal to twice the product of the other two sides. What is one of the acute angles of the triangle?  
 (a)  $15^\circ$  (b)  $30^\circ$   
 (c)  $45^\circ$  (d)  $60^\circ$
71. How many common tangents can be drawn if two circles on a plane do not intersect?  
 (a) Zero (b) Two only  
 (c) Three only (d) Zero or four
72. Which one of the following is correct? The areas of two similar triangles are in the ratio of the squares of the corresponding  
 (a) medians  
 (b) altitudes  
 (c) angle bisector segments  
 (d) All the above
73. Consider the following statements:  
 1. To construct the circumcircle of a triangle  $ABC$ , one has to draw perpendicular bisector of any two sides.  
 2. To construct the incircle of a triangle  $ABC$ , one has to draw angle bisectors of any two angles.  
 Which of the statements given above is/are correct?  
 (a) 1 only (b) 2 only  
 (c) Both 1 and 2 (d) Neither 1 nor 2
- 74.



- In the figure given above,  $DEF$  is an equilateral triangle. If  $\angle FLB = 110^\circ$ , what is  $\angle AKJ$ ?
- (a)  $50^\circ$  (b)  $55^\circ$   
(c)  $60^\circ$  (d)  $65^\circ$
75.  $AOB$  is the diameter of a circle with centre  $O$ .  $C$  is any point on the circle such that  $\angle AOC = 70^\circ$ . What is  $\angle OBC$ ?
- (a)  $20^\circ$  (b)  $35^\circ$   
(c)  $45^\circ$  (d)  $55^\circ$
76. Three parallel line  $l_1, l_2$  and  $l_3$  are such that  $l_2$  is between  $l_1$  and  $l_3$ . They are cut by two transversals  $PRE$  and  $QSF$  such that  $P, Q$  lie on  $l_1$ ;  $R, S$  lie on  $l_2$  and  $E, F$  lie on  $l_3$ . If  $PR = 8$ ,  $RE = 4$  and  $QS = 6$ , what is the length of  $SF$ ?
- (a) 12 (b)  $\frac{16}{3}$   
(c) 3 (d) 4
77.  $PR$  and  $QS$  are two diameters of a circle intersecting at  $O$ . If  $PR = 4$  and  $QR = 3$ , what is the length of  $PS$ ?
- (a) 2 (b) 3  
(c) 4 (d)  $\sqrt{5}$
78. In a right-angled triangle  $PQR$ ,  $\angle PQR = 90^\circ$  and  $S$  is the mid-point of the hypotenuse  $PR$ . If  $\angle PQS = 40^\circ$ , what is  $\angle QSR$ ?
- (a)  $60^\circ$  (b)  $80^\circ$   
(c)  $90^\circ$  (d)  $100^\circ$
79.  $AOBD$  is a quadrilateral such that  $\angle AOB = \angle ABD = 90^\circ$  and  $\angle DAB = 60^\circ$ . If  $OA = 3$  cm and  $OB = 4$  cm, what is the area of the quadrilateral  $AOBD$ ?
- (a)  $6 + \frac{5}{2\sqrt{3}}$  cm<sup>2</sup> (b)  $6 + \frac{25\sqrt{3}}{2}$  cm<sup>2</sup>  
(c)  $6 + \sqrt{3}$  cm<sup>2</sup> (d)  $6 + 25\sqrt{3}$  cm<sup>2</sup>
80. In a right-angled triangle  $ABC$ ,  $D$  is the foot of the perpendicular from  $B$  on the hypotenuse  $AC$ . If  $AB = 3$  cm and  $BC = 4$  cm, what is the area of the triangle  $ABD$ ?
- (a)  $\frac{72}{25}$  cm<sup>2</sup> (b)  $\frac{54}{25}$  cm<sup>2</sup>  
(c)  $\frac{36}{25}$  cm<sup>2</sup> (d)  $\frac{63}{25}$  cm<sup>2</sup>
81. Which one of the following statements is correct?  
If the diagonals of a quadrilateral bisect each other at right angles, then the quadrilateral is
- (a) a rhombus but not a square  
(b) a square but not a rhombus  
(c) either a rhombus or a square  
(d) a rectangle but not a square
82.  $ABCD$  is a cyclic quadrilateral whose diagonals intersect at  $O$ . If  $\angle CAB = 25^\circ$  and  $\angle BCD = 85^\circ$ , what is  $\angle CBD$ ?
- (a)  $60^\circ$  (b)  $70^\circ$   
(c)  $80^\circ$  (d)  $85^\circ$
83. If  $O$  is the circumference of a triangle  $ABC$  such that  $\angle BAC = 58^\circ$ , what is  $\angle OBC$ ?
- (a)  $29^\circ$  (b)  $32^\circ$   
(c)  $48^\circ$  (d)  $58^\circ$
84. If the angle included between the sides of lengths 3 cm and 4 cm of a triangle is  $60^\circ$ , then what is the area of the triangle?
- (a)  $3\sqrt{3}$  cm<sup>2</sup> (b)  $4\sqrt{3}$  cm<sup>2</sup>  
(c)  $\frac{3\sqrt{3}}{2}$  cm<sup>2</sup> (d)  $2\sqrt{3}$  cm<sup>2</sup>
85. If  $\sqrt{3x^2 - 4x + 34} + \sqrt{3x^2 - 4x - 11} = 9$  what is the value of the expression  $\sqrt{3x^2 - 4x + 34} - \sqrt{3x^2 - 4x - 11}$ ?
- (a) 0 (b) 3  
(c) 5 (d) 9
86. For what values of  $p$  and  $q$ , where  $p, q$  are real numbers and  $p \neq 0$ , does the equation  $3x - 5 + q = px + 1$  have solution?
- (a) For all  $p$  and  $q$  (b)  $p = 3, q \neq 6$   
(c)  $p \neq 3$  for any  $q$  (d)  $q \neq 6$  for any  $p$
87. If  $a + b + c = 0$  then what is the value of  $a^4 + b^4 + c^4 - 2a^2b^2 - 2b^2c^2 - 2c^2a^2$ ?
- (a) 0 (b) 1  
(c) -1 (d)  $\frac{1}{2}$
88. For what value of  $m$  will the expression  $3x^3 + mx^2 + 4x - 4m$  be divisible by  $(x + 2)$ ?
- (a) -4 (b) 0  
(c) For any value of  $m$  (d) No such value of  $m$  exists
89. If  $x^3 + px + q$  and  $x^3 + qx + p$  have a common factor which one of the following is correct?
- (a)  $p + q = 0$  (b)  $p + q - 1 = 0$   
(c)  $p + q + 1 = 0$  (d)  $p - q + 1 = 0$
90. What are the square roots of  $\left(a - \frac{1}{a}\right)^2 - 4\left(a + \frac{1}{a}\right) + 8$ ?
- (a)  $\pm\left(a + \frac{1}{a} - 2\right)$  (b)  $\pm\left(a + \frac{1}{a} + 2\right)$   
(c)  $\pm\left(a - \frac{1}{a} - 2\right)$  (d)  $\pm\left(a - \frac{1}{a} + 2\right)$
91. If  $\sqrt{a} = \sqrt{b} + \sqrt{c}$ , what is the simplified value of  $\left(\frac{a+b-c}{a-b+c}\right)^2$ ?
- (a) 1 (b)  $\frac{b}{c}$   
(c)  $\frac{c}{a}$  (d)  $\frac{a}{b}$
92. If  $\sqrt{16 - 6\sqrt{7}} = a + b\sqrt{7}$ , what can be the value of  $b$ ?
- (a) -2 (b)  $-\frac{3}{2}$   
(c) -1 (d)  $-\frac{1}{2}$
93. If  $x^2 + xy = 40$  and  $y^2 + xy = 60$ , what are the values of  $x + y$ ?
- (a)  $\pm 15$  (b)  $\pm 5$   
(c)  $\pm 10$  (d)  $\pm\sqrt{10}$
94. If  $\frac{b}{y} + \frac{z}{c} = 1$  and  $\frac{c}{z} + \frac{x}{a} = 1$ , then which one of the following corresponds to the value of the expression  $\frac{a}{x} + \frac{y}{b}$ ?
- (a) 0 (b) 1  
(c) -1 (d) 2
95. If  $x^2 = by + cz, y^2 = cz + ax, z^2 = ax + by$ ; then what is the expression  $\frac{a}{x+a} + \frac{b}{y+b} + \frac{c}{z+c}$  equal to?
- (a)  $\frac{1}{x} + \frac{1}{y} + \frac{1}{z}$  (b) 1  
(c) -1 (d) 0
96. If the roots of the equation  $x^2 + x + 1 = 0$  are in the ratio of  $m : n$ , then which one of the following relations holds?

(a)  $m + n + 1 = 0$       (b)  $\frac{m}{n} + \frac{n}{m} + 1 = 0$   
 (c)  $\sqrt{m} + \sqrt{n} + 1 = 0$       (d)  $\sqrt{\frac{m}{n}} + \sqrt{\frac{n}{m}} + 1 = 0$

97. If  $\frac{1}{\log_3 5} - \log_3 5 = 1$  what is the value of  $x$ ?

- (a) 1                              (b) 3  
 (c) 5                              (d) 15

98. If the equation  $ax^2 + bx + c = 0$  are equal in magnitude but opposite in sign, then which one of the following is correct?

- (a)  $a = 0$                               (b)  $b = 0$   
 (c)  $c = 0$                               (d)  $b = 0, c \neq 0, a \neq 0$

99. The sum of the digits in a two-digit number is 10. If 18 is subtracted from the number, the result is the number with the digits reversed. What is the number?

- (a) 46                              (b) 64  
 (c) 73                              (d) 37

100. What is the value of  $(1 + x^{a-b})^{-1} + (1 + x^{b-a})^{-1}$ ?

- (a) -1                              (b) 1  
 (c)  $a - b$                               (d) 0



## ANSWERS



- |         |         |         |         |         |         |         |         |         |          |
|---------|---------|---------|---------|---------|---------|---------|---------|---------|----------|
| 1. (d)  | 2. (b)  | 3. (c)  | 4. (b)  | 5. (c)  | 6. (d)  | 7. (a)  | 8. (a)  | 9. (d)  | 10. (b)  |
| 11. (d) | 12. (a) | 13. (d) | 14. (c) | 15. (c) | 16. (c) | 17. (d) | 18. (c) | 19. (c) | 20. (d)  |
| 21. (b) | 22. (b) | 23. (c) | 24. (b) | 25. (b) | 26. (d) | 27. (a) | 28. (d) | 29. (b) | 30. (d)  |
| 31. (c) | 32. (d) | 33. (a) | 34. (a) | 35. (c) | 36. (c) | 37. (c) | 38. (d) | 39. (b) | 40. (b)  |
| 41. (c) | 42. (b) | 43. (d) | 44. (d) | 45. (a) | 46. (c) | 47. (d) | 48. (a) | 49. (a) | 50. (c)  |
| 51. (b) | 52. (b) | 53. (b) | 54. (b) | 55. (c) | 56. (d) | 57. (c) | 58. (d) | 59. (b) | 60. (c)  |
| 61. (a) | 62. (c) | 63. (d) | 64. (c) | 65. (a) | 66. (d) | 67. (d) | 68. (*) | 69. (c) | 70. (c)  |
| 71. (d) | 72. (d) | 73. (c) | 74. (a) | 75. (b) | 76. (c) | 77. (b) | 78. (b) | 79. (b) | 80. (b)  |
| 81. (c) | 82. (b) | 83. (b) | 84. (a) | 85. (c) | 86. (c) | 87. (a) | 88. (c) | 89. (d) | 90. (a)  |
| 91. (b) | 92. (c) | 93. (c) | 94. (b) | 95. (b) | 96. (b) | 97. (d) | 98. (d) | 99. (b) | 100. (b) |