PAPER B

1. If one root is common in equations $x^2 + bx + a = 0$ and $x^2 + ax + b = 0$ *and* $a \neq b$, then which one of the following is correct ?
   (a) $a + b = -1$ (b) $a + b = 1$
   (c) $a - b = 1$ (d) $a - b = -1$
2.. What is the nature of the roots of the equation $px^2-(p - q)\,x - q = 0$ where p, q are integers and $p \neq 0$?
   (a) Both roots are always integers
   (b) Both roots are always rationals
   (c) One root is rational and other is irrational
   (d) Both roots are always of opposite sign.
3. Let 1, *m* and *n* be real numbers such that $l + n \neq m$. What is the quotient on dividing $l^3 - m^3 + n^3 + 3\,lmn$ by $(l - m + n)$?
   (a) $l^3 + m^2 + n^2 - lm - mn - ln$
   (b) $l^2 + m^2 + n^2 + lm + mn - ln$
   (c) $l^2 - m^2 + n^2 + lm + mn - ln$
   (d) $l^2 - m^2 + n^2 - lm - mn + ln$
4. Consider the following statements:
   1. $a^n + b^n$ is *divisible by* $a + b$ if $n = 2k + 1$, where k is a positive integer.
   2. a^n-b^n is divisible by $a - b$ if $n = 2k$, where k is a positive 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
5. If the roots of the equation $x^2 + x + 1 = 0$ are α and β, and the roots of the equation $x^2 + ax + b = 0$ are $\frac{\alpha}{\beta}$ and $\frac{\beta}{\alpha}$, what is the value of a ?
   (a) 1 (b) 2
   (c) –1 (d) –1
6. What is the remainder when $x^4 + 1$ is divided by $x - 2$?
   (a) 17 (b) 15
   (c) 7 (d) 1
7. If the value of $\log_y 10 = \frac{1}{x}$, then what will be the value of $\log_{10}\left(\frac{y}{10}\right)$?
   (a) $\frac{x}{10}$ (b) $10x$
   (c) $\frac{}{x-1}$ (d) $\frac{1}{10x}$
8. If $x + y + z = 0$ and $xyz \neq 0$, then what is the value of $\frac{1}{x^2 + y^2 - z^2} + \frac{1}{y^2 + z^2 - x^2} + \frac{1}{z^2 + x^2 - y^2}$?
   (a) 0 (b) 1
   (c) -1 (d) $\frac{1}{2}$
9. If $\log_{10} x + \log_{10} y = \log_{10}(x + y)$, then what is the value of $\log_{10} x - \log_{10} y$?
   (a) $\log_{10}(x + y)$ (b) $\log_{10}(y - 1)$
   (c) $\log_{10}(1-y)$ (d) $-\log_{10}(y - 1)$
10. If α and β are the roots of the equation $x^2 + ax + b = 0$?
    (a) $\alpha, -\beta$ (b) $-\alpha, \beta$
    (c) $-\alpha, -\beta$ (d) α, β
11. For what value of p is the coefficient of x^2 in the product $(2x - 1)(x - k)(px + 1)$ Equal to 0 and the constant term equal to 2?
    (a) 2 (b) $\frac{2}{5}$
    (c) $\frac{5}{2}$ (d) $\frac{}{5}$
12. If m and n are natural numbers such that $2^m - 2^m = 960$, what is the value of m ?
    (a) 10 (b) 12
    (c) 16 (d) Cannot be determined
13. When $x^3 + 2x^2 + 4x + b$ is divided by $x + 1$, the quotient is $x^3 + ax + 3$ and remainder is $-3 + 2b$. What are the values of a and b respectively ?
    (a) 1, 0 (b) –1, 0
    (c) 1, 1 (d) –1, –1
14. If $y + \frac{1}{z} =$ and $x + \frac{1}{y} = 1$ what is the value of xyz ?
    (a) 1 (b) -1
    (c) 0 (d) $\frac{1}{2}$
15. If $\frac{\sin\theta}{1+\cos\theta} + \frac{1+\cos\theta}{\sin\theta} = 4$ Then what is the value of θ, where $0 \leq \theta \leq \frac{\pi}{2}$?
    (a) 30° (b) 45°
    (c) 60° (d) 90°
16. If $2\sin\theta = \sec\theta$, what is the value of $\sin^4\theta + \cos^4\theta$?
    (a) 1 (b) $\frac{1}{2}$
    (c) $\frac{1}{4}$ (d) $\frac{1}{8}$
17. If $x = a\cos^2\theta \sin\theta$, $y = a\sin^2\theta\cos\theta$, then which one of the following expression is independent of θ ?
    1. $(x^2+y^2)^3 / (x^2 y^2)$
    2. $\left(x^2 + y^2\right)/3 \quad xy$

    Select the correct answer using the codes given below:
    Codes :
    (a) 1 only (b) 2 only
    (c) Both 1 and 2 (d) Neither 1 nor 2

18. If $x = a(1 + \cos\theta\cos\phi)$
$y = b(1 + \cos\theta\sin\phi)$
and
$z = c(1 + \sin\theta)$
then which one of the following is correct ?
(*a*) $\left(\frac{x-a}{a}\right)^2 + \left(\frac{y-b}{b}\right)^2 + \left(\frac{z-c}{b}\right)^2 = 1$
(*b*) $\frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{c^2} = 1$
(*c*) $x^2+y^2+z^2 = a^2 + b^2 + c^2$
(*d*) $\frac{(x-a)^2}{a} + \frac{(y-b)^2}{b} + \frac{(z-c)^2}{c} = 1$

19. What is the value of expression
$3\tan^2\frac{\pi}{6} + \frac{4}{3}\cos^2\frac{\pi}{6} - \frac{1}{2}\cot^3\frac{\pi}{4} - \frac{2}{3}\sin^2\frac{\pi}{3} + \frac{1}{8}\sec^4\frac{\pi}{3}$?
(a) 3 (b) 2
(c) 4 (d) 5

20. What is the value of
(tan *A* + cot *A* + sec. *A)* (tan *A* + cot *A* – *sec. A)* ?
(a) $\sin^2 A$ (b) $\text{cosec}^2 A$
(c) $\cos^2 A$ (d) $\sec^2 A$

21. How many solutions does the equation $\sin\theta + \cos\theta = 2$ have ?
(a) It has no solution
(b) It has only one solution
(c) It has two solution
(d) It has infinite number of solutions.

22. What is the value of
$\frac{\sin 2° \sin 4° \sin 6° \ldots\ldots \sin 88°}{\cos 88° \cos 86° \cos 84° \ldots\ldots \cos 20°}$?
(a) 0 (b) 1
(c) 2 (d) 4

23. If $\cos\alpha + \sin\alpha = \sqrt{2}\cos\alpha$, then what is the value of $\cos\alpha - \sin\alpha$? then what is the value of $\cos\alpha - \sin\alpha$?
(a) $\sqrt{2}\cos\alpha$ (b) $\sqrt{2}\sin\alpha$
(c) $\sqrt{2}$ (d) 1

24. What is the value of $\frac{1 - \sin A \cos A}{\cos A(\sec A - \text{cosec} A)}$
$\frac{\sin^2 A - \cos^2 A}{\sin^3 A + \cos^3 A}$?
(a) cos A (b) sec A
(c) sin A (d) cosec A

25. Shadow of a person *X,* when angle of elevation of the sun is α, is equal in length to the shadow of a person *Y*, when angle of elevation of the sun is $\left(\frac{\alpha}{2}\right)$ which one of the following is correct?
(a) Persons X is shorter than persons Y
(b) Persons X is twice as tall as Y
(c) Persons X is taller than persons Y but is not twice as tall as Y.
(d) Both X and Y are of equal height.

26. If an angle of a triangle remains unchanged but each of its two including sides is doubled, then by what factor does the area get multiplied?
(a) 2 (b) 3
(c) 4 (d) 6

27. The length of a rectangle *R* is 10% more than the side of a square *S*. The width of the rectangle *R* is 10% less than the side of the square *S*. What is the ratio of the area of *R* to that of *S*?
(a) 1 : 1 (b) 99 : 100
(c) 199 : 200 (d) 201 : 200

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

Codes:
(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

28. **Assertion (A):** $\sqrt{3}x^3 + \frac{13}{2}x^2 + \frac{5}{2}x + \frac{7}{\sqrt{5}}$ is a rational expression.
Reason (R): Every polynomial is a rational expression.

29. **Assertion (A):** $\left(\left(\sqrt{3}\right)^{\sqrt{3}}\right)^{\sqrt{3}}$ is irrational number.
Reason (R): $\left(\left(\sqrt{a}\right)^{\sqrt{a}}\right)^{\sqrt{a}}$ is always irrational if $\sqrt{a}$ is irrational.

30. **Assertion (A):**
$\log_{10}(1+2+3) = \log_{10}1 + \log_{10}2 + \log_{10}3$
Reason (R): $\log_{10}(a+b+c) =$
$\log_{10}a + \log_{10}b + \log_{10}c$
Where *a*, *b*, *c* are positive real numbers.

31. **Assertion (A):** sin *x* lies between 0 and + 1 for $0 < x < 90°$.
Reason (R): sin *x* increases as *x* increases from 0 to 90°.

32. **Assertion (A):** The system of the equations
$2x + 4y + 1 = 0$ $4x + 8y + 3 = 0$
has no solution.
Reason (R): The system of equations
$a_1x + b_1y + c_1 = 0$ $a_2x + b_2y + c_2 = 0$
has no solution, if $\frac{a_1}{a_2} = \frac{b_1}{b_2}$.

33. What are the values of *A* and *B* respectively, if
$\frac{\sqrt{5}-1}{\sqrt{5}+1} + \frac{\sqrt{5}+1}{\sqrt{5}-1} = A + B\sqrt{5}$?
(a) 3, 0 (b) 0, 3
(c) 0, 0 (d) 3, 3

34. A circle touches all the four sides of a quadrilateral *ABCD*. Which one of the following is always correct?
(a) $AB + BC = CD + DA$

(b) $AB + AD = BC + CD$
(c) $AB + CD = BC + DA$
(d) $AB + BC + CD + DA$ = 4 times the diameter of the circle

35. ABC is an isosceles triangle with $AB = AC$. Side BA is produced to D, such that $AB = AD$.
Consider the following:
1. ΔACD is an isosceles triangle.
2. ΔBCD is an isosceles triangle.
3. ΔBCD is an isosceles triangle.
Which of the statements given above are correct?
(a) 1 and 2 (b) 1 and 3
(c) 2 and 3 (d) 1, 2 and 3

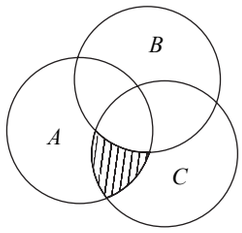
36. Out of three circles having centres P, Q and R, each circle touches remaining two circles externally. If PQ = 4 cm, QR = 6 cm and PR = 8 cm, what is sum of the radii of circle?
(a) 18 cm (b) 15 cm
(c) 12 cm (d) 9 cm

37. A person made 165 telephone calls in the month of May in a year. There was Friday on 1st May of the year. The average telephone call on Sundays of the month was 7. What was the average calls per day on the rest days of the month?
(a) $\frac{165}{31}$ (b) 5
(c) $\frac{137}{26}$ (d) $\frac{137}{27}$

38. Which one of the following statements is ***not*** correct for a bar graph?
(a) All bars have different thickness
(b) Distance between two consecutive bars is the same
(c) The bars can touch each other
(d) The thickness has no significance

39. There are 256 farmers in a village. In a season, out of these, 130 farmers did not use any pesticide while the remaining 126 farmers used some pesticides and total expenditure on pesticides by these 126 farmers was Rs 8,780. What is the median expenditure per farmer in the village?
(a) $\frac{8780}{126}$ (b) $\frac{8780}{256}$
(c) 0 (d) Median cannot be computed

40.



Let A, B, C be subsets of the universal set X represented by the circles. Let A', B' and C' denote their complements in X. Then which of below corresponds to the shaded portion in the figure given above?
(a) $A' \cap B \cap C$ (b) $A \cap B' \cap C$
(c) $A \cap B' \cap C'$ (d) $A' \cap B' \cap C$

41. Match List-I with List-II and select the correct answer using the codes given below the Lists:

List-I		*List-II*
(a)	$(E - A) \cup (E - A')$	1. Φ
(b)	$E - (A \cup A') - (A \cap A')$	2. A
(c)	$(E \cap (A - A')) \cup A$	3. A'
(d)	$((E - \Phi) \cup (\Phi - E)) - A$	4. E

Here A' is the complement set of A, E is the universal set and Φ is an empty set.

	A	B	C	D
(a)	4	1	2	3
(b)	4	3	2	1
(c)	2	3	4	1
(d)	2	1	4	3

42. 1 man or 2 women or 3 boys can do a piece of work in 55 days. In how many days can 1 man, 1 woman and 1 boy do the same work?
(a) 27 days (b) 30 days
(c) 36 days (d) 42 days

43. A number when divided by 765 leaves a remainder 42. What will be the remainder if the number is divided by 17?
(a) 8 (b) 7
(c) 6 (d) 5

44. Match List-I (*Product*) with List-II (*Digit in the Unit Place*) and select the correct answer using the codes given below the Lists:

List-I (*Product*)	*List-II* (*Digit in the Unit Place*)
(a) $(1827)^{16}$	1. 1
(b) $(2153)^{19}$	2. 3
(c) $(5129)^{21}$	3. 5
	4. 7
	5. 9

Codes:

	A	B	C
(a)	1	4	3
(b)	4	2	3
(c)	4	2	5
(d)	1	4	5

45. Let $(A \cup B) \cup (A \cap B) = A \cup B$
Consider the following:
1. A is a proper subset of B.
2. B is a proper subset of A.
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

46. What least number x must be subtracted from 797 so that $(797 - x)$ on being divided by 8, 9 and 11 leaves in each case the same remainder 4?
(a) 0 (b) 1
(c) 2 (d) 3

47. A mixture (40 litres) contains wine and water in the ratio 3 : 1. To make the ratio 5 : 2, how much additional amount of water is required?
(a) 5 litres (b) 4 litres
(c) 3 litres (d) 2 litres

48. A train leaves Amritsar at 6 a.m. and reaches Delhi at 12

Noon. Another train leaves Delhi at 8 a.m. and reaches Amritsar at 5 p.m. At what time do the two trains cross one another?

(a) 10:00 a.m. (b) 10:12 a.m.
(c) 10:20 a.m. (d) 10:24 a.m.

49. What is the first value of n, for which $n^2 + n + 41$ is not a prime?

(a) 1 (b) 10
(c) 20 (d) 40

50. A dishonest dealer professes to sell his goods at cost price but uses a false weight and thus gains $11\frac{1}{9}\%$. For a kg, what is the weight used by him?

(a) 960 gm (b) 940 gm
(c) 900 gm (d) 990 gm

51. If 11,109,999 is divided by 1111, then what is the remainder?

(a) 1098 (b) 11888
(c) 1010 (d) 1110

52. When a certain number is multiplied by 18, the product consists entirely 2's. What is the minimum number of such 2's in the product?

(a) 7 (b) 8
(c) 9 (d) 10

53. Two rectangles A and B are such that the length of A equals the sum of the diagonal and the greater side of B, while the breadth of A equals the difference of the diagonal and the greater side of B. Which one of the following is correct?

(a) Area of A is greater than the area of B
(b) Area of A is equal to the area of B
(c) Area of A is equal to the area of a square with its side equal to the smaller of B
(d) Area of A is equal to the area of a rectangle whose dimensions are those of the diagonal and the shorter side of B

54. A right circular cone is cut by two planes parallel to the base and trisecting the altitude. What is the ratio of the volumes of the three parts: top, middle and bottom respectively?

(a) 1 : 7 : 19 (b) 1 : 2 : 3
(c) 1 : 8 : 27 (d) 1 : 7 : 18

55. A square of side α cm is cut from each corner of a rectangular sheet of metal of 10 cm by 14 cm. The resulting projections are folded up and the seams welded to construct an open box. What is the volume of the box thus obtained?

(a) $140a - 48a^2 + 4a^3$ (b) $140a + 48a^2 + 4a^3$
(c) $140a + 24a^2 + a^3$ (d) $140a - 24a^2 + a^3$

56. A sphere of radius 13 cm is cut by a plane whose distance from the centre of the sphere is 5 cm. What is the circumference of the plane circular section?

(a) 10π cm (b) 12π cm
(c) 24π cm (d) 26π cm

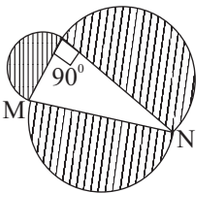
57. The radius of a cylindrical cistern is 10 metres and its height is 15 mitres. Initially the cistern is empty. We start filling the cistern with water through a pipe whose diameter is 50 cm. Water is coming out of the pipe with a velocity of 5m/s. How many minutes will it take in filling the cistern with water?

(a) 20 (b) 40
(c) 60 (d) 80

58. The radius and height of a right solid circular cone are r and h respectively. A conical cavity of radius $\frac{r}{2}$ and height $\frac{h}{2}$ is cut out of the cone. What is the whole surface area of the rest of the portion?

(a) $\frac{\pi r}{4}\left(5\sqrt{r^2+h^2}+3r\right)$ (b) $\frac{5\pi r}{4}\sqrt{r^2+h^2}$
(c) $\frac{3\pi r}{4}\left(\sqrt{r^2+h^2}+r\right)$ (d) $\frac{3\pi r}{7}\left(\sqrt{r^2+h^2}+r\right)$

59.



If in the figure given above, MN = x, what is the area of the shaded region?

(a) $\frac{\pi x^2}{2}$ (b) $\frac{\pi x^2}{4}$
(c) πx^2 (d) $4\pi x^2$

60. The external and internal diameters of a hemisphere bowl are 10 cm and 8 cm respectively. What is the total surface area of the bowl?

(a) 257 cm^2 (b) 286 cm^2
(c) 292 cm^2 (d) 302 cm^2

61. A spherical iron ball is dropped into a cylindrical vessel of base diameter 14 cm, containing water. The water level is increased by $9\frac{1}{3}$ cm. What is the radius of the ball?

(a) 3.5 cm (b) 7 cm
(c) 9 cm (d) 12 cm

62. Two concentric spheres A and B, have radii r and $2r$ respectively. A cone is inscribed in the latter so as to circumscribe the former. What is the curved surface area of the cone?

(a) $2\pi r^2$ (b) $4\pi r^2$
(c) $6\pi r^2$ (d) $8\pi r^2$

63. Except for one face of a given cube, identical cubes are glued through their faces to all the other faces of the given cube. If each side of the given cube measures 3 cm, then what is the total surface area of the solid body thus formed?

(a) 225 cm^2 (b) 234cm^2
(c) 270 cm^2 (d) 279 cm^2

64. A circle of 5 cm radius is drawn and another circle of 3 cm radius is cut out of this circle. What is the radius of a circle which has the same area as the area of the bigger circle excluding the cut one?

(a) 2 cm (b) 3 cm
(c) 4 cm (d) 4.5 cm

65. If total length of diagonals of a cube is 12 cm, what is the total length of edges of the cube?

(a) 15 cm (b) 12 cm
(c) $6\sqrt{3}$ cm (d) $12\sqrt{3}$ cm

66. V_1, V_2, V_3 and V_4 are the volumes of four cubes of side lengths x cm, $2x$ cm, $3x$ cm, and $4x$ cm respectively. Some statements regarding these volumes are given below:

1. $V_1 + V_2 + 2V_3 < V_4$
2. $V_1 + 4V_2 + 2V_3 < V_4$
3. $2(V_1 + V_3) + V_2 = V_4$

Which of the above are correct?
(a) 1 and 2 (b) 1 and 3
(c) 2 and 3 (d) 1, 2 and 3

67. In a triangle ABC, the angle C is obtuse. Which one of the following is correct?
(a) $AB^2 > AC^2 + BC^2$ (b) $AB^2 < AC^2 + BC^2$
(c) $AC^2 > AB^2 + BC^2$ (d) $BC^2 > AB^2 + AC^2$

68. What is the least number by which 3675 be multiplied so that the product is a perfect square?
(a) 2 (b) 3
(c) 5 (d) 7

69. A sum of money placed at compound interest trebles itself in 5 years. In how many years will it amount to nine times itself?
(a) 10 years (b) 12 years
(c) 15 years (d) 18 years

70. The area of a circle varies as the square of its radius. If the area of circle of radius 10 cm is 300 cm^2, then what is the area of circle with radius 12 cm?
(a) 360 cm^2 (b) 423 cm^2
(c) 432 cm^2 (d) 452.5 cm^2

71. A machine is sold at a profit of 10%. Had it been sold for Rs 40 less, there would have been a loss of 10%. What is the cost price of the machine?
(a) Rs 175 (b) Rs 200
(c) Rs 250 (d) Rs 400

72. What is the LCM of $\frac{3}{8}$, $\frac{5}{36}$, $\frac{7}{72}$ and $\frac{15}{96}$?
(a) $\frac{105}{4}$ (b) $\frac{4}{105}$
(c) $\frac{105}{8}$ (d) $\frac{105}{288}$

73. 12 workers after working for 10 hours a day assemble some instruments in 15 days. How much number of days is required to assemble the same number of instruments if 15 workers are employed working 8 hours a day?
(a) 10 days (b) 12 days
(c) 15 days (d) 18 days

74. A train started from a station with certain number of passengers. At the first halt, half the number of passengers got down and 120 passengers got in. At the second halt, half the passengers got down, and then the train left for its destination with 360 passengers. How many passengers were there in the train when it started from the first station?
(a) 800 (b) 900
(c) 1000 (d) 1200

75. A man can walk uphill at the rate of $2\frac{1}{2}$ km/hr and downhill at the rate of $3\frac{1}{4}$ km/hr. If the total time required to walk a certain distance up the hill and return to the starting point was 4 hr 36 min, then what was the distance he walked up the hill?
(a) $6\frac{1}{2}$ km (b) $5\frac{1}{2}$ km
(c) $4\frac{1}{2}$ km (d) 4 km

76. In an election a total of 5,00,000 voter participated. A candidate got 2,55,000 votes which was 60% of the total valid votes. What was the percentage of invalid votes?
(a) 10% (b) 12%
(c) 15% (d) $\frac{300}{17}$%

77. x, y and z are three sums of money such that y is simple interest on x and z is simple interest on y of the same time and rate. Which one of the following is correct?
(a) $x^2 = yz$ (b) $y^2 = zx$
(c) $z^2 = xy$ (d) $xyz = 1$

78. What is the angle of elevation of sun for length of shadow to be same as height of the person?
(a) 0° (b) 30°
(c) 45° (d) 60°

79. What is the value of $\sin^2 x \cos^2 y + \cos^2 x \sin^2 y + \sin^2 x \sin^2 y + \cos^2 x \cos^2 y$?
(a) 0 (b) -1
(c) 1 (d) $\frac{1}{2}$

80. AB is the hypotenuse of a rightangled triangle ABC. If BC = x and AB + AC = y, then which one of the following is correct?
(a) $\sin A = 2xy/(x^2 + y^2)$ (b) $\sin A = 2xy/(x^2 - y^2)$
(c) $\sin A = 2x/(x + y)$ (d) $\sin A = 2y/(x + y)$

81. If $\sin A = \frac{2mn}{m^2 + n^2}$ what is the value of tan A?
(a) $\frac{2mn}{m^2 + n^2}$ (b) $\frac{2mn}{m^2 + n^2}$
(c) $\frac{m^2 - n^2}{2mn}$ (d) $\frac{m^2 + n^2}{m^2 - n^2}$

82. What is the GCD of $(x^4 + 4y^4)$ and $(x^3 - x^2y + 2y^3)$?
(a) $x^2 + 2y^2 + 2xy$ (b) $x^2 + 2y^2 - 2xy$
(c) $x^2 - 2y^2 - 2xy$ (d) $x^2 - 2y^2 + 2xy$

83. If $x^4 + y^4 = 17$ and $x + y = 1$, what is the value of $x^2y^2 - 2xy$?
(a) 8 (b) 10
(c) 12 (d) 16

84. if $\frac{1}{a} + \frac{1}{b} + \frac{1}{c} = \frac{1}{a + b + c}$ where $a + b + c \neq 0$, $abc \neq 0$, what is the value of $(a + b)(b + c)(c + a)$?
(a) 0 (b) 1
(c) -1 (d) 2

85. What is the value of $\log_4 \log_3 \log_2 512$?
(a) 1 (b) 2
(c) $\frac{1}{2}$ (d) $\frac{1}{4}$

86. If the difference in roots of the equation $x^2 - px + q = 0$ is unity, then which one of the following is correct?
(a) $p^2 + 4q = 1$ (b) $p^2 - 4q = 1$
(c) $p^2 + 4q = -1$ (d) $p^2 - 4q = -1$

87. Which one of the following is divisible by $(1 + a + a^5)$ and $(1 + a^4 + a^5)$ individually?
(a) $(a^2 + a + 1)(a^3 + a^2 + 1)(a^3 + a + 1)$
(b) $(a^4 - a + 1)(a^3 + a^2 + 1)(a^3 + a - 1)$
(c) $(a^4 + a + 1)(a^3 - a^2 + 1)(a^3 + a + 1)$
(d) $(a^2 + a + 1)(a^3 - a^2 + 1)(a^3 - a + 1)$

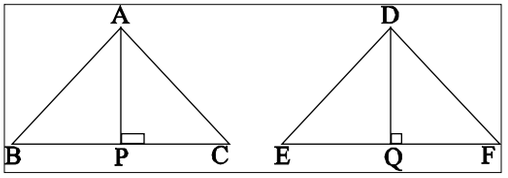
88. ABC is a right-angled triangle, right angled at A and AD is the altitude on BC. If AB : AC = 3 : 4, what is the ratio of BD to DC?
(a) 3 : 4 (b) 9 : 16
(c) 2 : 3 (d) 1 : 2

89. ABC and PQR are two triangles such that AB = AC = PQ = PR. $\angle BAC = \alpha$ and $\angle QPR = \theta$, and $\alpha \neq \theta$. What is the relation between α and θ, such that the area of ΔABC = area of ΔPQR?
(a) $\alpha + \theta = 180°$ (b) $\alpha + \theta = 90°$
(c) $\alpha + \theta = 240°$ (d) $\alpha + \theta = 120°$

90. A solid sphere is cut into four equal parts. If the total surface area of each part now is x times that of the sphere, then what is the value of x?
(a) $\frac{1}{4}$ (b) $\frac{1}{2}$
(c) $\frac{3}{4}$ (d) $\frac{3}{8}$

91. Two spheres of radii 6 cm and 1 cm are inscribed in a right circular cone. The bigger sphere touches the smaller one and also the base of the cone. What is the height of the cone?
(a) 14 cm (b) 15 cm
(c) $\frac{85}{6}$ cm (d) $\frac{72}{5}$ cm

92. ABCD is cyclic quadrilateral whose side AB is a diameter of the circle through the points A, B, C and D. If $\angle ADC = 130°$, what is the value of $\angle BAC$?
(a) 30° (b) 40°
(c) 50° (d) 60°

93. 

Triangles ABC and DEF are similar. If the length of the perpendicular AP from A on the opposite side BC is 2 cm and the length of the perpendicular DQ from D on the opposite side EF is 1 cm, then what is the area of the triangle ABC?
(a) On and half times the area of the triangle DEF
(b) Four times the area of the triangle DEF
(c) Twice the area of the triangle DEF
(d) Three times of area of the triangle DEF

94. A semi-circular thin sheet of metal of diameter 28 cm is bent and an open conical cup is made. What is the ratio of radius to slant height of the conical cup?
(a) 1 : 2 (b) 1 : 3
(c) 2 : 3 (d) 1 : 4

95. s and t are transversals cutting a set of parallel lines such that a segment of length 3 in s corresponds to a segment of length 5 in t. What is the length of segment in t corresponding to a segment of length 12 in s?
(a) 20 (b) $\frac{36}{5}$
(c) 14 (d) $\frac{5}{4}$

96. Squares ABDE and ACFH are drawn externally on the sides AB and AC respectively, of a scalene triangle ABC. Which one of the following is correct?
(a) BH = CE (b) AD = AF
(c) BF = CD (d) DF = EH

97. O and O′ are the centres of the two circles with radii 7 cm and 9 cm respectively. The distance between the centres is 20 cm. If PQ be the transverse common tangent to the circles, which cuts OO′ at R, what is the length of OR?
(a) 10 cm (b) 12 cm
(c) $\frac{35}{4}$ cm (d) $\frac{45}{4}$ cm

98. In ΔPQR, QR = 10, RP = 11 and PQ = 12 D is the midpoint of PR, DE in drawn parallel to PQ meeting QR in E. EF is drawn parallel to RP meeting PQ in F. What is the length of DF?
(a) $\frac{11}{2}$ (b) 6
(c) $\frac{33}{4}$ (d) 5

99. In a locality there are 500 households out of which 260 households have no land and total land possessed by the rest 240 households is 500 acres. What is the mean landholding per household?
(a) 240 acres (b) 1 acre
(c) $\frac{24}{12}$ acres
(d) Mean cannot be computed with the given data

100. The proportions of male students and female students in a class are equal. The average height of male students of the class is 128 cm and average height of all students of the class is 127 cm. What is the average height of female students of the class?
(a) 126 cm (b) 125 cm
(c) 134 cm
(d) Average cannot be computed with the given data

ANSWERS

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