Part – a
QUANTITATIVE METHODS

1. If $\tan\theta + \cot\theta = 2$, then the value of $\tan^{100}\theta + \cot^{100}\theta$ is
(A) 2 (B) 0
(C) 1 (D) $\sqrt{3}$

2. The angles of elevation of the top of a tower from the points P and Q at distances of 'a' and 'b' respectively from the base of the tower and in the same straight line with it are complementary. The height of the tower is
(A) $\sqrt{ab}$ (B) $\frac{a}{b}$
(C) ab (D) a^2b^2

3. The value of
$(3+\sqrt{8}) + \frac{1}{3-\sqrt{8}} - (6+4\sqrt{2})$ is
(A) 8 (B) 1
(C) $\sqrt{2}$ (D) 0

4. The area (in sq. unit) of the triangle formed in the first quadrant by the line $3x + 4y = 12$ is
(A) 8 (B) 12
(C) 6 (D) 4

5. If A and B are the H.C.F. and L.C.M. respectively of two algebraic expressions x and y, and $A + B = x + y$, then the value of $A^3 + B^3$ is
(A) $x^3 - y^3$ (B) x^3
(C) y^3 (D) $x^3 + y^3$

6. If $x > 1$ and $x^2 + \frac{1}{x^2} = 83$, then $x^3 - \frac{1}{x^3}$ is
(A) 764 (B) 750
(C) 756 (D) 760

7. If $\left(a + \frac{1}{a}\right)^2 = 3$, then $a^3 + \frac{1}{a^3} = ?$
(A) $2\sqrt{3}$ (B) 2
(C) $3\sqrt{3}$ (D) 0

8. If the internal bisectors of the $\angle ABC$ and $\angle ACB$ of ΔABC meet at O and also $\angle BAC = 80°$, then $\angle BOC$ is equal to
(A) 50° (B) 160°
(C) 40° (D) 130°

9. O is the in-centre of the ΔABC, if $\angle BOC = 116°$, then $\angle BAC$ is
(A) 42° (B) 62°
(C) 58° (D) 52°

10. The area of the circumcircle of an equilateral triangle is 3π sq. cm. The perimeter of the triangle is
(A) $3\sqrt{3}$ cm (B) 9 cm
(C) 18 cm (D) 3 cm

11. In ΔABC, $\angle A = 90°$ and $AD \perp BC$ where D lies on BC. If BC = 8 cm, AC = 6 cm, then $\Delta ABC : \Delta ACD = ?$
(A) 4 : 3 (B) 25 : 16
(C) 16 : 9 (D) 25 : 9

12. Inside a triangle ABC, a straight line parallel to BC intersects AB and AC at the points P and Q respectively. If AB = 3PB, then PQ : BC is
(A) 1 : 3 (B) 3 : 4
(C) 1 : 2 (D) 2 : 3

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13. There are 50 boxes and 50 persons. Person 1 keeps 1 marble in every box. Person 2 keeps 2 marbles in every 2^{nd} box, person 3 keeps 3 marbles in every third box. This process goes on till person 50 keeps 50 marbles in the 50^{th} box. Find the total no. of marbles kept in the 50^{th} box.

(A) 43 (B) 78
(C) 6 (D) 93

14. 252 m of pant cloth and 141 m of shirt cloth are available in a cloth store. To stitch one pant and one shirt, $2\frac{1}{2}$ m and $1\frac{3}{4}$ m of cloth are needed respectively. Then the approximate number of pants and shirts that can be made out of it are

(A) (80, 100) (B) (100, 80)
(C) (100, 90) (D) (90, 80)

15. The greatest number that divides 411, 684, 821 and leaves 3, 4 and 5 as remainders, respectively, is

(A) 254 (B) 146
(C) 136 (D) 204

16. If $a = 7 - 4\sqrt{3}$, the value of $a^{\frac{1}{2}} + a^{-\frac{1}{2}}$ is

(A) $3\sqrt{3}$ (B) 4
(C) 7 (D) $2\sqrt{3}$

17. Terms a, 1, b are in Arithmetic Progression and terms 1, a, b are in Geometric Progression. Find 'a' and 'b' given $a \neq b$.

(A) 2, 4 (B) –2, 1
(C) 4, 1 (D) –2, 4

18. There are two groups A and B of a class, consisting of 42 and 28 students respectively. If the average weight of group A is 25 kg and that of group B is 40 kg, find the average weight of the whole class.

(A) 69 (B) 31
(C) 70 (D) 30

19. The average monthly salary of all the employees in an industry is ₹ 12,000. The average salary of male employees is ₹ 15,000 and that of female employees is ₹ 8,000. What is the ratio of male employees to female employees ?

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

20. Arun marks up the computer he is selling by 20% profit and sells them at a discount of 15%. Arun's net gain percent is

(A) 4 (B) 2
(C) 3.5 (D) 2.5

21. A dealer buys a table listed at ₹ 1,500 and gets successive discounts of 20% and 10%. He spends ₹ 20 on transportation and sells at a profit of 20%. Find the Selling Price of the table (in rupees).

(A) 1320 (B) 1080
(C) 1200 (D) 1230

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22. A sells an article to B at a gain of 20% and B sells it to C at a gain of 10% and C sells it to D at a gain of $12\frac{1}{2}\%$. If D pays ₹ 29.70, A purchased the article for
(A) ₹ 40 (B) ₹ 10
(C) ₹ 20 (D) ₹ 30

23. By selling 80 ball pens for ₹ 140/-, a retailer loses 30%. How many ball pens should he sells for ₹ 104/- so as to make a profit of 30% ?
(A) 32 (B) 52
(C) 48 (D) 42

24. Nitin borrowed some money at the rate of 6% p.a. for the first three years, 9% p.a. for the next five years and 13% p.a. for the period beyond eight years. If the total interest paid by him at the end of eleven years is ₹ 8,160, the money borrowed by him (in ₹) was
(A) 12,000 (B) 6,000
(C) 8,000 (D) 10,000

25. A boy started from his house by bicycle at 10 a.m. at a speed of 12 km per hour. His elder brother started after 1 hr 15 mins by scooter along the same path and caught him at 1.30 p.m. The speed of the scooter will be (in km/hr)
(A) 4.5 (B) 36
(C) $18\frac{2}{3}$ (D) 9

26. Two pipes A and B can fill a cistern in 3 hours and 5 hours respectively. Pipe C can empty in 2 hours. If all the three pipes are open, in how many hours the cistern will be full ?
(A) can't be filled (B) 10 hours
(C) 15 hours (D) 30 hours

27. Two men can do a piece of work in x days. But y women can do that in 3 days. Then the ratio of the work done by 1 man and 1 woman is
(A) $3y : 2x$ (B) $2x : 3y$
(C) $x : y$ (D) $2y : 3x$

28. A clerk received as annual salary of ₹ 3,660 in the year 1975. This was 20% more than his salary in 1974. What was his salary in 1974 ?
(A) 3,005 (B) 3,000
(C) 3,500 (D) 3,050

29. Out of his total income, Mr. Kapur spends 20% on house rent and 70% of the rest on house-hold expenses. If he saves ₹ 1,800, what is his total income (in rupees) ?
(A) 7,800 (B) 7,000
(C) 8,000 (D) 7,500

30. The sides of a triangle are in the ratio $\frac{1}{4} : \frac{1}{6} : \frac{1}{8}$ and its perimeter is 91 cm. The difference of the length of longest side and that of shortest side is
(A) 19 (B) 20
(C) 28 (D) 21

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31. A box contains ₹ 56 in the form of coins of one rupee, 50 paise and 25 paise. The number of 50 paise coins is double the number of 25 paise coins and four times the number of one rupee coins. How many 50 paise coins are there in the box ?
(A) 52 (B) 64
(C) 32 (D) 16

32. The perimeter of an isosceles right angled triangle is 2p cm. Its area is
(A) $(3 + 2\sqrt{2})$p sq cm
(B) $(3 - 2\sqrt{2})p^2$ sq cm
(C) $(2 - \sqrt{2})$p sq cm
(D) $(2 + \sqrt{2})p^2$ sq cm

33. The ratio between the areas of two circles are 4 : 7. What will be the ratio of their radii ?
(A) $2 : \sqrt{7}$ (B) 4 : 7
(C) 16 : 49 (D) $4 : \sqrt{7}$

34. The perimeter of a non-square rhombus is 20 cm. One of its diagonal is 8 cm. The area of the rhombus is
(A) 28 sq cm (B) 20 sq cm
(C) 22 sq cm (D) 24 sq cm

35. If each edge of a cube is increased by 50%, the percentage increase in its surface area is
(A) 150% (B) 75%
(C) 100% (D) 125%

36. The diameter of a copper sphere is 18 cm. The sphere is melted and is drawn into a long wire of uniform circular cross-section. If the length of the wire is 108 m, the diameter of the wire is
(A) 1 cm (B) 0.9 cm
(C) 0.3 cm (D) 0.6 cm

37. A semicircular sheet of metal of diameter 28 cm is bent into an open conical cup. The capacity of the cup (taking $\pi = \frac{22}{7}$) is
(A) 624.26 cm^3 (B) 622.26 cm^3
(C) 622.56 cm^3 (D) 623.20 cm^3

38. If surface area and volume of a sphere are S and V respectively, then value of $\frac{S^3}{V^2}$ is
(A) 32 unit (B) 9 unit
(C) 18 unit (D) 27 unit

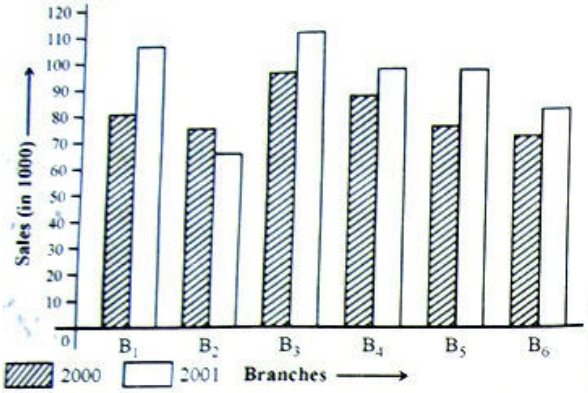
39. $\frac{\tan\theta}{1 - \cot\theta} + \frac{\cot\theta}{1 - \tan\theta}$ is equal to
(A) $1 - \tan\theta - \cot\theta$
(B) $1 + \tan\theta - \cot\theta$
(C) $1 - \tan\theta + \cot\theta$
(D) $1 + \tan\theta + \cot\theta$

40. If $\sec\theta = x + \frac{1}{4x}$ $(0° < \theta < 90°)$, then $\sec\theta + \tan\theta$ is equal to
(A) $\frac{x}{2}$ (B) $2x$
(C) x (D) $\frac{1}{2x}$

41. The circular measure of an angle of an isosceles triangle is $\frac{5\pi}{9}$. Circular measure of one of the other angles must be
(A) $\frac{5\pi}{18}$ (B) $\frac{5\pi}{9}$
(C) $\frac{2\pi}{9}$ (D) $\frac{4\pi}{9}$

SPACE FOR ROUGH WORK

Bar-chart showing the Sales of Books (in 1000) from six-branches B_1, B_2, B_3, B_4, B_5 and B_6 of a Publishing Company in 2000 and 2001 is given below. Study the chart and answer questions (**42-45**).

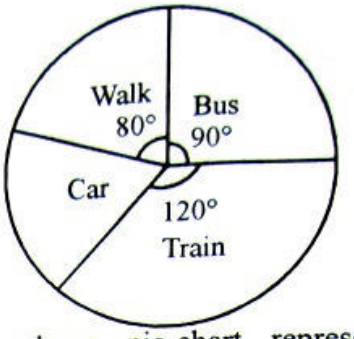


42. Total sales of branch B_6 for both the years is what percent of the total sales of branch B_3 for both the years ?
(A) 71.11% (B) 73.17%
(C) 68.54% (D) 77.26%

43. What is the ratio of the total sales of branch B_2 for both the years to the total sales of branch B_4 for both years ?
(A) 2 : 3 (B) 3 : 5
(C) 5 : 7 (D) 7 : 9

44. What percent of the average sales of branches B_1, B_2 and B_3 in 2001 is the average sales of branches B_1, B_3 and B_6 in 2000 ?
(A) 87.5% (B) 75%
(C) 77.5% (D) 85%

45. What is the average sale of books from all the branches for the year 2000 ?
(A) 70 (B) 80
(C) 70.5 (D) 80.5



The above pie-chart represents the number of students using different transport to a school in which total no. of students is 2160.
Answer Qn. Nos. **46-50** based on the above diagram.

46. The no. of students who come to school by car is
(A) 70 (B) 290
(C) 420 (D) 480

47. The ratio of the number of students who came to school by car to the number of students who came to school by bus is
(A) 21 : 24 (B) 21 : 27
(C) 36 : 27 (D) 36 : 21

48. The total no. of students coming to school either by walking or by bus is
(A) 480 (B) 540
(C) 1020 (D) 170

49. The no. of students who don't come to school by train is
(A) 720 (B) 1020
(C) 2040 (D) 1440

50. The no. of students coming to school by bus exceeds the no. of students coming to school walking, by
(A) 10% (B) 12.5%
(C) 11% (D) 11.5%

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