9   Half Yearly Examination - 2022   A

Time: 3.00hrs   **MATHEMATICS**   Max. Marks : 100

PART - A

I.   Choose the correct answer   14×1=14

1. The set $P = \{x | x \in Z , -1 < x < 1\}$ is a

a. Singleton set   b. Power set   c. Null set   d. Sub set

2. For any three sets P, Q and R, $P - (Q \cap R)$ is

a. $P - (Q \cup R)$ b. $(P \cap Q) - R$ c. $(P - Q) \cup (P-R)$ d. $(P - Q) \cap (P -R)$

3. Which one of the following, has a terminating decimal expansion?

a. $\frac{5}{64}$ b. $\frac{8}{9}$ c. $\frac{14}{15}$ d. $\frac{1}{12}$

4. $4\sqrt{7} \times 2\sqrt{3} =$.

a. $6\sqrt{10}$ b. $8\sqrt{21}$ c. $8\sqrt{10}$ d. $6\sqrt{21}$

5. The type of polynomial $4 - 3x^3$ is

a. Constant polynomial   b. linear polynomial

c. quadratic polynomial   d. cubic polynomial

6. If (2,3) is a solution of linear equation $2x + 3y = k$ then , the value of k is

a. 12   b. 6   c. 0   d. 13

7. $(3 - x)$ is a factor of p(x), if $P(\_\_) = 0$

a. -3   b. $\frac{-1}{3}$ c. +3   d. $\frac{1}{3}$

8. The exterior angle of a triangle is equal to the sum of two

a. Exterior angles   b. interior opposite angles   c. Alternate angles   d. interior angles

9. The angles of the triangle are $3x - 40$, $x + 20$ and $2x - 10$ then the value of x is

a. 40^0 b. 35^0 c. 50^0 d. 45^0

10. If Q_1, Q_2, Q_3, Q_4 are the quadrants in a Cartesian plane then $Q_2 \cap Q_3$ is

a. $Q_1 \cup Q_2$ b. $Q_2 \cup Q_3$ c. Null Set   d. Negative x - axis

11. The ratio in which the x - axis divides the line segment joining the points (6,4) and (1,-7) is

a. 2 : 3   b. 3 : 4   c. 4 : 7   d . 4 : 3

12. If D is the midpoint of AC and C is the midpoint of AB then find the length of AB if AD = 4 cm

a. 4   b. 8   c. 12   d. 16

13. If $\tan\theta = \cot 37^0$, then the value of θ is

a. $37°$ b. $53°$ c. $90°$ d. $1°$

14. The value of $\cosec(70^0 + \theta) - \sec(20^0 - \theta) + \tan(65^0 + \theta) - \cot(25^0 - \theta)$ is

a. 0   b. 1   c. 2   d. 3

PART – B

II. Answer any 10 questions. (Q. No. 28 is compulsory) $10 \times 2 = 20$

15. Find the number of subsets and the number of proper subsets of a set $X = \{ a, b, c, x, y, z\}$

16. Find the symmetric difference between the following sets.

   $X = \{5,6,7\}$ and $Y = \{ 5,7,9,10\}$

17. Find the value of $81^{\frac{5}{4}}$

18. Represent the following numbers in scientific notation $(0.000001)^{11} \div (0.005)^3$

19. Find the degree of the following polynomials   i) $\dfrac{x^3 - x^4 + 6x^6}{x^2}$ ii) $2\sqrt{5}p^4 - \dfrac{8p^3}{\sqrt{3}} + \dfrac{2p^2}{7}$

20. Find the GCD of the following : $2a^2 + a$, $4a^2 - 1$

21. Prove that $\left[a + \frac{1}{a}\right]^2 - \left[a - \frac{1}{a}\right]^2 = 4$

22. Find the value of x^0 in the following figure
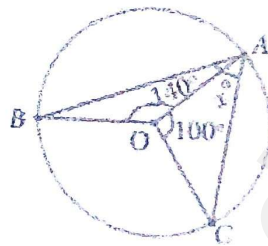
23. In a quadrilateral ABCD, $\angle A = 72^0$ and $\angle C$ is the supplementary of $\angle A$. The other two angles are $2x - 10$ and $x + 4$. Find the value of x and the measure of all the angles

24. Find the distance between the following pair of points $(3,4)$ and $(-7,2)$

25. If $(3,x)$ is the midpoint of the line segment joining the points $A(8,-5)$ and $B(-2,11)$ then find the value of 'x'.

26. If the centroid of a triangle is at $(-2,1)$ and two of its vertices are $(1,-6)$ and $(-5,2)$, then find the third vertex of the triangle.

27. If $2\cos\theta = \sqrt{3}$, then find all the trigonometric ratios of angle θ

28. Evaluate : $\dfrac{\sec 63^0}{\csc 27^0}$

PART - C

**III.   Answer any 10 questions. (Q. No. 42 is compulsory)**   **10×5=50**

29. Verify AU (B∩C) = (AUB) ∩ (AUC) using Venn diagrams.

30. In a class, all students take part in either music or drama or both. 25 students take part in music, 30 students take part in drama and 8 students take part in both music and drama. Find

    (i) The number of students who take part in only music.

    (ii) The number of students who take part in only drama.

    (iii) The total number of students in the class.

31. Find the value of a and b if $\frac{\sqrt{7}-2}{\sqrt{7}+2} = a\sqrt{7} + b$

32. Represent $3.\overline{45}$ on the number line upto 4 decimal places.

33. The area of a rectangle is $x^2+7x+12$. If its breadth is (x+3) then find its length.

34. Factorise: $x^3 - 5x^2 - 2x + 24$.

35. If $x^2+\frac{1}{x^2} = 23$, then find the value of $x +\frac{1}{x}$ and $x^3 + \frac{1}{x^3}$.

36. In a parallelogram ABCD, the bisectors of the consecutive angles ∠A and ∠B intersect at P. Show that ∠APB = 90°.

37. Find all the angles of the given cyclic quadrilateral ABCD in the figure
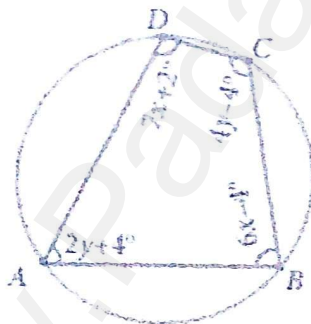
38. Orthocentre and centroid of a triangle are A (-3,5) and B (3,3) respectively. If C is the circumcentre and AC is the diameter of this circle, then find the radius of the circle.

39. Show that the points A(-1, -2), B(3, -2),C(2, 3), D(-2,3) taken in that order form the vertices of a parallelogram

40. Find the area of the right angled triangle with hypotenuse 5cm and one of the acute angle is 48°30'. (sin48°30' = 0.7490, cos48°30' = 0.6626)

41. From the given figure, find the values of   (i) sin B   (ii) sec B   (iii) cot B
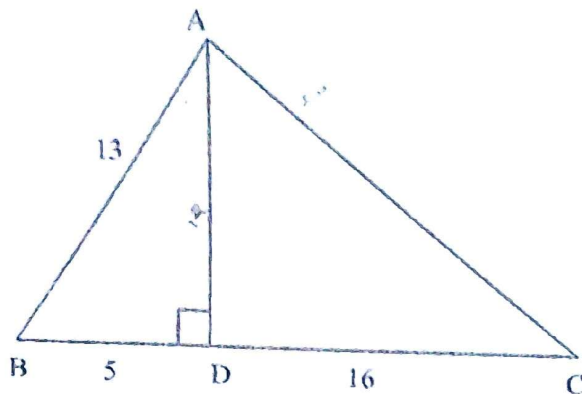
(iv) cos C   (v) tan C   (vi) cosec C

42. Find the value of 'a' such that PQ = QR where P, Q and R are the points whose coordinates are (6, -1), (1, 3) and (a, 8) respectively.

PART – D

IV.   Answer the following.   2×8=16

43.   a) Construct ΔPQR whose sides are PQ = 6cm, ∠Q = 60° and QR = 7cm and locate its orthocentre

OR

b) Construct the right triangle PQR whose perpendicular sides are 4.5cm and 6cm. Also locate its circumcentre and draw the circumcircle.

44. a) Draw the graph of y = 3x – 1

OR

b) Two cars are 100 miles apart. If they drive towards each other they will meet in one hour. If they drive in the same direction they will meet in two hours. Find their speed by using graphical method.