**CBSE Question Paper 2019 (Set-1)**

**Class 11 Mathematics**

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**Time**: 3 Hr

**MM**: 90

**Total Pages**: 3

**General Instructions**:

i. All questions are compulsory.

ii. The question paper consists of 27 questions divided into 4 sections A, B, C and D. Section A comprises of 4 questions of one mark each. Section B comprises of 8 questions of two marks each. Section C comprises of 10 questions of four marks each. Section D comprises of 5 questions of six marks each

iii. There is no overall choice. However internal choice has been provided in 3 questions of four marks and 2 questions of six marks.

iv. Omission of essential working will result in loss of marks.

**Section - A**

1. Let A = {x : $x^2$ - 5x + 6 = 0},B={2 ,4}, C = {4, 5}. Write $A X (B \cap C)$.
2. If A = {1,2,3,4,5}, then write the number of proper subsets of A.
3. If the arcs of same length in two circles subtend angles of 30° and 75° at their centres. Find the ratio of their radii.
4. Let f= {(1, 1),(2, 3),(0, -1).(-1,-3)} be a linear function from Z to Z, find f(x).

**Section - B**

5. If n arithmetic means are inserted belween 20 and 80 such that the ratio of first mean to the last mean is 1:3, find the value of n.
6. If in a triangle ABC, angle B= 60° and b : c = 5 : 42, then find angle A.
7. Solve the equation sin x + sin 3x + sin x = 0.
8. If one geometric mean 'G' and two arithmetic means 'p' and 'q' be inserted between two given quantities. prove that $G^2$ = (2p - q)(2q - p).

9. Solve the equation $2x^2 + 3ix + 2=0$ using general expression for a quadratic equation.
10. If $y = \sin\left(\frac{x}{2}\right) + \cos\left(\frac{x}{2}\right)^2$, find dydx at $x = \frac{\pi}{4}$.
11. Solve the inequation $\left|\frac{3x-4}{2}\right| = \frac{5}{12}$
12. Find the sum of n terms of the series $1^2 + 3^2 + 5^2 + 7^2 + .....$

**Section - C**

13. Show by using principle of mathematical induction that for $n \in N$.
    $\cos\alpha . \cos 2\alpha . \cos 4\alpha ..... \cos(2^{n-1}\alpha) = \frac{\sin 2^n\alpha}{2^n \sin\alpha}$
14. Two cards are drawn at random from a pack of 52 cards. Find the probability that both the cards are of red colour or they are queen.
15. If $\frac{3}{2+\cos\theta - i\sin\theta} = a + ib$, prove that $a^2 + b^2 = 4a - 3$.

**OR**

If $(1 + x)^n = a_0 + a_1x + a_2x^2 + a_3x^3 + ..... + a_nx^n$, prove that $2^n = (a_0 - a_2 + a_4 - .....) + (a_1 - a_3 + a_5 - .....)$.

16. Find the centre and radius of the circle
    $(x\cos\alpha + y\sin\alpha - a)^2 + (x\sin\alpha - y\cos\alpha - b^2) = k^2$ . If $\alpha$ varies, show that the locus of its centre is again a circle.
17. Find the equation of the parabola whose focus is (1.1) and tangent the vertex is x + y = 1.
18. Find the locus of a point such that the sum of its distances from the points (0.2) and (0.-2) is 6.
19. Find $\text{limit}_{x\to 0} \frac{\cot 2x - \csc 2x}{x}$

**OR**

Evaluate $\text{limit}_{x\to 0} \frac{\sqrt{1+x^2} - \sqrt{1+x}}{x}$

20. Find the derivative of tan(2x + 1) with respect to x from the first principles
21. (i)
    i. How many different words can be formed with the letters of the word HARYANA?
    ii. How many of these words begin with 11 and end with N?
    iii. In how many of these words have H and N are together?

**OR**

From 6 gentlemen and 4 ladies, committee of 5 is to he formed in how many ways can this be done if (i) there is no restriction? (ii) the committee is to include at least one lady?

22. Find the ratio in which the line joining the points A(2,1, 5) and B(3, 4, 3) is divided by the plane 2x + 2y - 2z = 1. Also, find the coordinates of the point of division.

**Section - D**

23. If $3^{rd}$, $4^{th}$, $5^{th}$ terms in the expansion of $(a + x)^2$ be 84, 280 and 360, find X. a and n.
24. Prove that tan 6°.tan 42°.tan 66°.tan 78° = 1

**OR**

If $a\sin\theta = b\sin\left(\theta + \frac{2\pi}{3}\right) = c\sin\left(\theta + \frac{4\pi}{3}\right)$ prove that ab + bc +ca.

25. One side of a rectangle lies along the line 4x +7y + 5 = 0. Two of its vertices are (-3, 1) and (1, 1). Find the equation of the other three sides of the rectangle.
26. Show that the equation $9x^2 - 16y^2 - 72x + 96y - 144 = 0$ represents a hyperbola. Find the coordinates of the centre, length of latus-rectum, eccentricity, coordinates of foci and the equations of directrices.

**OR**

Identify the curve $4x^2 + 9y^2 - 8x - 36y + 4 = 0$. Find the eccentricity.coordinates of centre, coordinates of foci, equations of directrices and length of latus rectum of the curve.

27. Calculate the mean and standard deviation for the following data :

| **Wages upto (in Rs.)** | 15 | 30 | 45 | 60 | 75 | 90 | 105 | 120 |
|---|---|---|---|---|---|---|---|---|
| **No. of workers** | 12 | 30 | 65 | 107 | 157 | 202 | 222 | 230 |