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Sample Paper-03 (unsolved)
Mathematics
Class - XI

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Time allowed: 3 hours   Maximum Marks: 100

General Instructions:

a) All questions are compulsory.
b) The question paper consists of 26 questions divided into three sections A, B and C. Section A comprises of 6 questions of one mark each, Section B comprises of 13 questions of four marks each and Section C comprises of 7 questions of six marks each.
c) All questions in Section A are to be answered in one word, one sentence or as per the exact requirement of the question.
d) Use of calculators is not permitted.

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Section A

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1   Write the condition for which $^{n}C_{r}$ is greatest when n is even

2.   Write the coordinates of the end points of the diameter of the circle represented by the equation

$$x^2 + y^2 + 2gx = 0$$

3.   Write down the length of the latus rectum of a parabola represented by the equation $y^2 = 4ax$

4.   Write down the coordinates of the centroid of the triangle with vertices (a_1, a_2, a_3), (b_1, b_2, b_3),

(c_1, c_2, c_3)

5.
Write the domain and range of the function $\sin^{-1} x$

6.   How many 4 digits numbers can be formed with the digits $1, 2, 3, 4, 5$ that are divisible by 4.

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Section B

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7.   Find all values of a for which the roots of the quadratic equation $(a-3)x^2 - 2ax + 5a = 0$ are real and positive

8.   Find the index n of the binomial in the expansion of $\left(\frac{x}{7} + \frac{2}{7}\right)^n$ if the 9th term of it has the greatest coefficient.

9.   Solve the inequality $\left|x+1\right| + \left|x-4\right| > 7$

10. In a triangle ABC m points are taken on side AB n points are taken on side BC and k points are taken on side AC. But no points taken are at the vertices A, B, C. Find how many triangles can be formed with those points taken as vertices.

11. Find the domain of the function $f(x) = \sqrt{x(3-x)} \log(x-1)$

12. Prove that $\dfrac{\sin\theta + \cos\theta}{\cos^3\theta} = \dfrac{1 - \tan^4\theta}{1 - \tan\theta}$

13. Find the limit $\lim\limits_{x \to 0} x \cot 3x$

14. Solve $\sin 5\theta \cos 3\theta = \sin 6\theta \cos 2\theta$

15. Find $fog(x)$ and $gof(x)$ if $f(x) = 2^x$ and $g(x) = x^2$

16. Prove that the x-intercept and y - intercept made by the circle $x^2 + y^2 + 2gx + 2fy + c = 0$

    is $2\sqrt{g^2 - c}$ and $2\sqrt{f^2 - c}$ respectively

17. Prove that $\sin^{-1} x + \cos^{-1} x = \dfrac{\pi}{2}$

18. Prove by mathematical induction that $10^{2n} - 1$ is $divisible$ by 11 for all positive integer values of n

19. If $P(A') = 0.4$; $P(A \cup B) = 0.7$ and $A\& B$ are independent events find the value of $P(B)$

Section C

20. An AP is such that when third term is subtracted from the sum of second and fifth term is 10 and the sum of second and ninth term is 17. Find the AP

21. A bag contains 5 white balls and 8 red balls. Two drawings are made successively containing 3 balls each. Balls are not replaced after the first trial... Find the probability that the first drawing will give 3 white and the second drawing will give 3 red balls.

22. How many diagonals are there in a polygon of n sides.

23. Differentiate $x^2 \cos x$ from the first principle with respect to x

24. Find the sum of n terms of the series $1^2 + 2^2 + 3^2 \ldots \ldots + n^2$

25. Prove that the equation $x^2 - 3y^2 - 2x + 18y - 35 = 0$ represents a hyperbola and find its foci and directrix

26. Calculate the mean deviation from the mean for the following data $6, 20, 8, 4, 12, 13, 10, 7, 6$