**Sample Paper-03 (unsolved)**
**Mathematics**
**Class – XI**

Time allowed: 3 hours Maximum Marks: 1**00**

**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.

**Section A**

**1** Write the condition for which ${}^nC_r$ 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.

**Section B**

**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 $|x+1| + |x-4| > 7$

**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 $\frac{\sin\theta + \cos\theta}{\cos^3\theta} = \frac{1 - \tan^4\theta}{1 - tan\theta}$

**13**. Find the limit $\lim_{x\to 0} x\cot 3x$

**14.** Solve $sin5\theta\cos 3\theta = \sin 6\theta\cos 2\theta$

**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 $\sin^{-1} x + \cos^{-1} x = \frac{\pi}{2}$

**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 $6, 20, 8, 4, 12, 13, 10, 7, 6$