Sample Paper-03
Mathematics
Class – XI

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.

Section A

1. Find the domain of the function $f(x)=\frac{1}{\sqrt{2-x^2}}$
2. If $A=\{y=\sin x, 0\le x<\frac{\pi}{4}\}$ *and* $B=\{y=\cos x, 0\le x<\frac{\pi}{4}\}$ then what is $(A\cap B)$
3. What is the maximum value of a if $a=1-\sin x$
4. Name the locus of points (M), the sum of whose distance from two given points is a constant
5. Check whether the three points (2, 0), (5, 3), (2, 6) are collinear.
6. Write the condition so that the equation $ax^2+ay^2+bx+cy+d=0$ represents a circle.

Section B

7. Find the inverse of the function $f(x)=x^2-x+1, x>\frac{1}{2}$
8. Find the vertex, axis , Focus , Directrix and latus rectum of the parabola $8y^2+24x-40y+134=0$
9. Express $\frac{7-4i}{3+2i}$ in the form $a+ib$
10. Solve the inequality $(x-2)((x-3)>0$
11. Find the general value of x if $\tan 5x=\frac{1}{\tan 2x}$
12. In a single throw of 2 dies what is the probability of getting a prime number on each die.

13. If $f(x)=x^3-x;\phi(x)=\sin 2x$ Find the value $f[\phi(\frac{\pi}{12})]$

14. If $\tan A=\frac{m}{m+1}$ *and* $\tan B=\frac{1}{2m+1}$ prove that $\tan A+\tan B+\tan A\tan B=1$

15. If $f:R\to R$ is defined as follows: $f(x)=\begin{cases}1 & if\ x\in Q\\ -1 & if\ x\notin Q\end{cases}$ Find $f(\sqrt{3}), f(3), f(\sqrt{3+1})$

16. Prove that the equation

$sin\theta=x+\frac{1}{x}$ is impossible if x is real

17. Find the domain of the function for which $f(x)=\phi(x);, if\ f(x)=3x^2+1, and \phi(x)=7x-1$

18. Find the limit $\lim_{x\to 0}\frac{1-\cos x}{x}$

19. Solve $2\sin^2 x+14\sin x\cos x+50\cos^2 x=26$

Section C

20. Differentiate $\sin x$ from the first principle w.r.t. x

21. Find the sum of n terms of the series $12+16+23+33+46\ldots\ldots$

22. Find the equation of a circle whose diameter is the line joining the points (x_1,y_1) *and* (x_2,y_2)

23. Calculate the mean deviation about the mean from the following data

x_i	5	7	9	10	12	15
f_i	14	6	2	2	2	4

24. How many numbers can be formed with the digits $1,2,3,4,3,2,1$ so that odd digits are in odd places and even digits are in even places.

25. Two engineers go for an interview for two vacancies in the same grade. The probability of engineer 1 (E1) getting selected is $\frac{1}{3}$ and that of engineer 2 (E2) is $\frac{1}{5}$. Find the probability that only one of them will be selected.

26. How many numbers are there between 1 and 1000(both included) that are not divisible by 2, 3, and 5?