Sample Paper-02 (solved)
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. Check whether the given lines are parallel or perpendicular.

$ax - by + c = 0 \quad and \quad \frac{ax}{2} - \frac{by}{2} + d = 0$

2. Find the area of the triangle whose vertices are (2,0),(5,3),(2,6)

3. Write the equation of a circle with center (0,0) and radius 5

4. Identify a function $f(x)$ so that $f(x).f(y) = f(x+y)$

5. If $A = \{(x, y) : y = a^x, x \in R\}$ $and B = \{(x, y) : y = a^{-x}, x \in R\}$ then what is $(A \cap B)$

6. If R is a relation from a set A containing p elements to a set B containing q elements the find the number of subsets of $A \times B$

Section B

7. If $f(x)$ is a function that contains 3 in its domain and range and satisfy the relation $f(f(x)).(1+f(x)) = -f(x)$ find f(3)

8. If $\tan A = \frac{1}{3}$ and $\tan B = \frac{1}{2}$ prove that $\sin 2(A+B) = 1$

9. Find two numbers such that their arithmetic mean is 15 and Geometric mean is 9 without using the identity $(a+b)^2 = (a-b)^2 + 4ab$

10. Let $f : R \to R$ be a function given by $f(x) = x^2 + 2$ find $f^{-1}(27)$

11. Find the domain and range of the function $f(x) = \frac{x-a}{a+1-x}$ where a is a positive integer.

12. Find the limit of $\lim_{x\to 0}\frac{\sqrt{a+x}-\sqrt{a}}{x}$

13. Find the sign and value of the expression $\sin 75^0 + \cos 75^0$

14. Solve $\cos 3x = -\frac{1}{2}$

15. Prove by mathematical induction that $1+2+3+\ldots\ldots+n=\frac{n(n+1)}{2}$

16. Find the square root of $\sqrt{-8i}$

17. Solve the inequality $\frac{2x+5}{x-2}\geq 3$

18. Find the value of x if ${}^{12}C_x = {}^{12}C_{x+4}$

19. Three cars are there in a race. Car A is 3times as likely to win as car B. Car B is twice as likely to win as car C. What is the probability of winning each car.

Section C

20. If the ratio of the roots of the equation $x^2+px+q=0$ is the same as $x^2+p_1x+q_1=0$ then prove that $p^2q_1 = p_1^2q$

21. Prove that $a.a^{\frac{1}{2}}.a^{\frac{1}{4}}.a^{\frac{1}{8}}\ldots\ldots\infty = a^2$

22. In a survey of 700 students in a medical college 200 went for regular entrance coaching, 295 attended only correspondence coaching, 115 attended both regular and correspondence coaching. Find how many got admission without any entrance coaching.

23. In how many ways can 3 students from Class 12, 4 from class 11, 4 from class 10 and 2 from class 9 be seated in a row so that those of the same classes sit together. Also find the number of ways they can be arranged in at a round table

24. A circle represented by the equation $(x-a)^2+(y-b)^2=r^2$

This makes two complete revolutions along the positive direction of the x axis. Find the equation of the circle in the new position

25. Show that the equation $x^2+4y^2+4x+16y+16=0$ represents an ellipse.

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

x_i	2	15	17	23	27
f_i	12	6	12	9	5