Sample Paper – 2011
Class – XI
Subject – Mathematics

Time: 3Hrs.   **Max. Marks: 100**

General Instructions: (The question paper has two printed pages divided in 29 questions as under)

- ❖ All the questions are compulsory.
- ❖ The question paper has been divided in 3 sections A, B and C.
- ❖ Section A contains 10 questions of 1 mark each.
- ❖ Section B contains 12 questions of 4 marks each.
- ❖ Section C contains 7 questions of 6 marks each.
- ❖ There is no overall choice however internal choice has been provided in section B & C.
- ❖ Use of calculators is not permitted.

Section – A

1. Write the set A= {1, 4, 9, 16…} in set builder form.

2. If (x+1, y -2) = (3, 1) find the value of x and y.

3. Find the value of $\tan\left(tan^{-1}\dfrac{19\pi}{3}\right)$.

4. Convert the complex number $(1 + i)$ in polar form.

5. Find the value of n if $^{n-1}P_3 : {^nP_4} = 1 : 9$.

6. Find the sum of 'n' terms of the series: $\dfrac{1}{1X2}+\dfrac{1}{2X3}+\dfrac{1}{3X4}+\cdots$.

7. Find the equation of the line through (-2, 3) with slope - 4.

8. Write the converse of the following statement, "If a number n is even, then n^2 is even".

9. Write the contra positive of the statement "If a triangle is equilateral, it is isosceles".

10. Evaluate $\displaystyle\lim_{x \to 0}\dfrac{sinax}{sinbx}$.

Section – B

11. For U= { 1,2,3,4,5,6,7,8,9,10} A={2,4,6,8} B={2,3,5,7,8} verify DeMorgan's Law

    i.e. (A U B)' = A' $\cap$ B'   and   (A $\cap$ B)' = A'UB'

12. Let f(x) = x^2 and g(x) = 2x + 1 be two real functions, find (f+g)(x), (f - g)(x), (f.g)(x) and $\dfrac{f}{g}(x)$.

13. Prove that $\quad\quad\quad$ cotx.cot2x – cot2x.cot3x – cot3x.cotx = 1

Or

If tanx = $\frac{3}{4}$, $\pi < x < \frac{3\pi}{2}$, find the value of sin$\frac{x}{2}$, cos$\frac{x}{2}$ and tan$\frac{x}{2}$.

14. If $(x +iy)^3 = u + iv$ prove that $\frac{u}{x} + \frac{v}{y} =$ 4 $(x^2 – y^2)$.

15. In how many of the distinct permutations of the letter **MISSISSIPPI** do the for I's not come together?

Or $\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad$ P.T.O.

A committee of 7 members has to be formed from 9 boys and 4 girls. In how many ways can this be done, when the committee consists of (i) exactly 3 girls (ii) at least 3 girls (iii) at most 3 girls?

16. Find the term independent of 'x' in the expansion of $\left(\frac{3x^2}{2} - \frac{1}{3x}\right)^6$.

17. The sum of the first three terms of a G.P. is $\frac{13}{12}$ and their product is – 1. Find the common ratio and the terms.

18. The lines through the points (4, 3) and (h, 1) intersect the line 7x – 9y – 19 = 0 at right angle. Find the value of 'h'. $\quad\quad\quad\quad\quad\quad$ **Or**

Find the coordinates of the foot of the perpendicular from the point (-1, 3) to the line 3x – 4y= 16.

19. Find the equation of the circle passing through the points (4, 1) and (6, 5) whose centre lies on the line 4x + y =16.

20. Using section formula, prove that the three points (4, 6, 10), (2, 4, 6) and (14, 0,-2) are collinear.

21. Compute the derivative of tan x using first principle.

22. A box contains 10 red, 20 blue and 30 green marbles. 5 marbles are drawn from the box. What is the probability that (i) all will be blue (ii) at least one will be green.

Section – C

23. A college awarded 38 medals on foot-ball, 15 in basket-ball and 20 in cricket. If these medals went to a total of 58 men and only 3 men received medal in all three sports, how many received medals is there in exactly two of the three sports.

24. Use mathematical induction for the series to prove that

$$1.3 + 3.5 + 5.7 +.....+ (2n – 1)(2n + 1)= n\left(\frac{4n^2 + 6n - 1}{3}\right).$$

Or

$$1^2 + 3^2 + 5^2 + ...+(2n -1)^2 = \frac{n(2n – 1)(2n + 1)}{3}.$$

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25. Solve the following system of inequalities graphically: $x + 2y \leq 10$, $x + y \geq 1, x - y \leq 0, x \geq 0, y \geq 0.$

26. The coefficient of the $(r-1)^{th}$, r^{th} and $(r+1)^{th}$ terms in the expansion of $(x+1)^n$ are in the ration 1:3:5. Find 'n' and 'r'.

27. Find the coordinates of the foci, the vertices, the length of major ,minor axis, the eccentricity and the length of latus rectum for the ellipse $36x^2 + 4y^2 = 144$. **Or**

    Find the equation of the hyperbola whose foci is (0, $\pm\sqrt{10}$). passing through the point (2,3).

28. The ratio of the sums of m and n terms of an AP is $m^2 : n^2$. Show that the ratio of mth and n^{th} term is (2m – 1): (2n – 1)

29. Find the mean and the standard deviation using the short cut method.

X	60	61	62	63	64	65	66	67	68
frequency	2	1	12	29	25	12	10	4	5

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