Question Paper (2014-2015) set 1

CBSE Class XI Mathematics

General Instruction:

- All the questions are compulsory.
- 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 consists of 13 questions of four marks each.
- Section-C comprises of 7 questions of Six marks each.
- There is no overall choice. However, an internal choice has been provided in 4 questions of four marks each and 2 questions of six marks each. You have to attempt only one of the alternatives in all such questions.
- Use of calculator is not permitted.

SECTION – A

1. If X = {a, b, c, d} and Y = {f, b, d, g}. find find X – Y.

2. Find multiplicative inverse of – i.

3. Solve 24x < 100 when x is a natural number.

4. Evaluate 7! – 5!.

5. Find the radius of the circle x^2 + y – 4x – 8y – 5 = 0

6. P(A) $= \frac{3}{5}$, find P (not A)

SECTION – B

7. In a survey of 400 students in a school, 100 were listed as taking apple juice, 150 as taking orange juice and 75 were listed as taking both apple as well as orange juice.

8. Let A = {1, 2, 3, 4, 5, 6, 7, 8, 9, 10}. Let R be a relation defined on A by R = {(x, y): y = 2x x,

$y \in A$ } Write R in the Roster form. Also write the domain, co-domain and range of R.

9. Prove that Cot4x(Sin5x + Sin3x) = Cotx(Sin3x – Sin3x)

OR

Solve :- Sin2x – Sin4 + Sin6x = 0

10. Prove that (Cosx + Cosy)2 + (Sinx – Siny)^2 $= 4\,\mathrm{Cos}^2\left(\frac{x+y}{2}\right)$

OR

Solve:- Sin2x – Sin4x + Sin6x = 0

11. Using principal of mathematical induction,

Prove that $41^n - 14^n$ is multiple of 27.

12. Convert into polar form $z = \frac{i - I}{\cos\left(\frac{\pi}{3}\right) + i\sin\left(\frac{\pi}{3}\right)}$

OR

Find the square root of complex number -5 – 12i

13. Find all pairs of consecutive odd natural numbers, both of which are larger than 10, such that their sum is less than 40.

14. Form a class of 25 students, 10 are to be chosen for an excursion party, there are 3 students who decided that either all of them will join or none of them will join. In how many ways can the excursion party be chosen?

15. Find the image of the point (3, 8) with respect to the line x + 3y = 7 assuming the line to be a plane mirror.

16. Find the equation of the circle passing through the points (2, 3) and (-1, 1) and whose centre is on the line x – 3y – 11 = 0

OR

Find the equation of the ellipse, whose length of the major axis is 20 and foci are (0, ± 5).

17. Three vertices of a parallelogram ABCD are A (3, -1, 2), B(1,2, -4) and C(-1, 1, 2). Find the coordinates of the fourth vertex.

18. Write the contrapositive of the following statement:

(i) If a number is divisible by 9, then it is divisible by 3.

(ii) If a triangle is equilateral, it is isosceles.

What is the importance of values in life?

19. Find the proability that when a hand of 7 cards is drawn from a well shuffled deck of 52 cards, it contains (i) all kings (ii) 3 kings

SECTION – C

20. There are 200 individuals with a skin disorder, 120 had beer exposed to the chemical C_1, 50 to chemical C_2, and 30 to both the chemicals C_1 and C_2. Find the number of individuals exposed to

(1) Chemical C_1 but not chemical C_2

(2) Chemical C_2 but not chemical C_1

(3) Chemical C_1 or chemical C_2

21. If tan $x = \frac{3}{4}$, $\pi < x < \left(\frac{3\pi}{2}\right)$

Find the value of $\sin\left(\frac{\pi}{2}\right), \cos\left(\frac{x}{2}\right)$ and $\tan\left(\frac{x}{2}\right)$

OR

Show that $\tan 4x = \frac{4\tan x(1-\tan^2 x)}{1-6\tan^2 x+\tan^4 x}$

22. A group consist of 4 girls and 7 boys in how many ways can a committee of live member be selected if the committee has

i) no girl

ii) at least 1 boy and 1 girl

iii) at least 3 girls

23. The 2nd, 3rd, and 4th terms in the expansion of $(x + a)^n$ are 240, 720 and 1080, find x, a and n.

24. The ratio of the A.M and G.M. of two positive number a and b, is m: n. Show that

$$a : b = m+\sqrt{m^2-n^2} : m-\sqrt{m^2-n^2}$$

OR

If S1, S2, S3 are the sums of first n natural numbers, their squares and their cubes respectively, show that 9 $S_2^2 = S_3(1+8S_1)$.

25. (i) Evaluate $\lim_{x\to 0}\frac{\cos 2x-1}{\cos x-1}$

(ii) Find the derivative of $\frac{4x+\sin x}{3x+7\cos x}$

26 The mean of 5 observations is 4.4 and their variance is 8.24. If three of the observations are 1, 2 and 6, find the other two observations.