Questions Paper (2014 - 15) Half Yearly
CBSE Class XI Mathematics

GENERAL INSTRUCTIONS:

- All questions are compulsory.
- The question paper consists of 26 questions divided into 3 section A, B and C. Section A comprises of 6 questions of 1 mark each, Section-B comprises of 13 questions of 4 marks each and section-c comprises of 7 questions of 6 marks each.
- There is no overall choice, however 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 calculators is not permitted.

(SECTION-A)

1. If U = {1,2,3,4,5,6,7,8,9}, A = {1,2,3,4}, B = {2,4,6,8}. Find (A-B).

2. If set A has 2 elements and set B has 3 elements, then how many relations from set A to Set B can be formed?

3. If $\sqrt{3}$ cosec x = -2, find x.

4. Solve the following equation.

$x^2 + 3x + 9 = 0$

5. If x $\in$ N, find the smallest value of x which satisfies the inequation.

$$2x + \frac{5}{3} \geq \frac{5x}{2} \div 1$$

6. Find the equation of the line, which makes intercepts -3 and 2 on the x- and y- axes respectively.

SECTION-B

7. If P(A) = P (B) show that A=B

OR

Let A and B be sets; if A∩X = B∩X = ∅ and A∪X = B∪X for some set X. show that A=B.

8. Find the domain and range of the function $f(x) = 1 - |x - 3|$

9. Let A = {1,2,3,4,5,6,7,8,9,10} a relation R from set A to A be define by R = {(x,y) : y =x+5}

(i) Write R in roster form

(ii) Find the domain of R.

(iii) Find the range of R

(iv) Depict R using an arrow diagram.

10. Prove that

$$(\cos x + \cos y)^2 + (\sin x - \sin y)^2 = 4\cos^2\left(\frac{x+y}{2}\right)$$

OR

For any ∆ABC, prove that

$$\frac{a+b}{c} = \frac{\cos\left(\frac{A-B}{2}\right)}{\sin\frac{c}{2}}$$

11. Find $\sin\frac{x}{2}$, if $\tan x = \frac{-4}{3}$ and x lies in quadrant IV.

12. Find the general solution for the equation $\sin 2x - \sin 4x + \sin 6x = 0$

13. For all n ≥ 1, prove the following by using the principle of mathematical induction

$$\frac{1}{1.2} + \frac{1}{2.3} + \frac{1}{3.4} + \cdots\cdots\cdots + \frac{1}{n(n+1)} = \frac{n}{n+1}$$

14. Find the polar form of complex number

$$\frac{-16}{1 + i\sqrt{3}}$$

OR

Find the square root of complex number -7-24i

15. A committee of 7 has to be formed form 9 boys and 4 girls. In how many ways can this be done when the committee consists of at least three girls?

16. How many words, with or without meaning each of 3 vowels and 2 consonants can be formed from the letters of the word INVOLUTE?

17. Find the middle term in the expansion of $(\frac{x}{3} + 9y)10$.

18. The sum of n terms of two arithmetic progressions are in the ratio (3n+8):(7n+15). Find the ratio of their 12th term.

OR

Find the sum of following series upto n terms.

$3x1^2 + 5x2^2 + 7x3^2 + \ldots\ldots\ldots\ldots\ldots$

19. The vertices of ΔPQR are P(2,1), Q(-2,3) and R(4,5). Find the equation of the median through the vertex R.

SECTION-C

20. A college awarded 38 medals in football, 15 in basketball and 20 in cricket. If these medals went to a total of 58 men only three men got medals in all the three sports, how many received medals in exactly two of the three sports?

21. Prove that 3^{2n+2} - 8n - 9 is divisible by 8 using P.M.I.

22. If α and β are different complex numbers with $|\beta|=1$, then find $\left|\dfrac{\beta-\alpha}{1-\bar{\alpha}\beta}\right|$

23. Solve the system of inequalities graphically

$4x+3y \leq 60$, $y \geq 2x$, $x \leq 3$, $x \geq 0$, $y \geq 0$

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

OR

If the coefficient of a^{r-1}, a^r and a^{r+1} in the expansion of $(1+a)n$ are in arithmetic progression, prove that n2-n(4r+1) + 4I*2 - 2=0

25. Let S be the sum, P the product and R the sum of reciprocals of n terms in a G.P. prove that $P^2R^n = S^n$

OR

The sum of two numbers in 6 times their geometric mean, show that numbers are in the ratio $(3+2\sqrt{2})$: $(3-\sqrt{2})$.

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