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CBSE CLASS XI HALF YEARLY EXAM 2016-17

TIME: 03:00Hrs **MATHEMATICS** **Maximum mark 100**

General instruction

i) All questions are compulsory

ii) The question paper contains 29 questions.

iii) Question 1 – 4 in section A are Very Short Answer Type Questions carrying 1 mark each

iv) Question 5 – 12 in Section B are Short Answer Type Questions carrying 2 marks each

v) Question 13 – 23 in Section C are Long Answer –I Type Questions carrying 4 marks each

vi) Question 24 -29 in section D are Long Answer II Type Question carrying 6 marks each

SECTION A

Q. No.	Answer the following
1	Write the following sets in the set-builder form: $\left\{\frac{1}{2}, \frac{2}{3}, \frac{3}{4}, \frac{4}{5}, \frac{5}{6}, \frac{6}{7}\right\}$
2	$If\ \left(\frac{x}{3}+1,\ y-\frac{2}{3}\right)=\left(\frac{5}{3}, \frac{1}{3}\right)$, then find the values of x and y.
3	Find the values of the trigonometric functions: $\sin\left(-\frac{11\pi}{3}\right)$
4	Find the equation of the line which passes through (1,-1) and (3,2).
	SECTION B

5	Let A = {1, 2}, B = {1, 2, 3, 4}, C ={5, 6}, D={5, 6, 7, 8}. Verify: A X C is a subset of B X D.
6	In a circle of diameter 40cm, the length of a chord is 20 cm. Find the length of minor arc of the chord.
7	Find the multiplicative inverse of the following complex numbers.4 – 3i.
8	Rohit obtained 70 and 75 marks in first two tests. Find the minimum marks she should obtain in the third unit test to have an average of at least 60 marks.
9	Find r, if ${}^{5}P_{r} = 2\ {}^{6}P_{r-1}$
10	Insert six numbers between 4 and 25 such that the resulting sequence is an A.P.
11	If the angle between two lines is $\frac{\pi}{4}$ and slope of one of the lines is $\frac{1}{2}$ find the slope of the other line.
12	Find the equation of the line, which makes intercepts 2 and -3 on the x and y-axes respectively.
	SECTION C
13	If U = {1,2,3,4,5,6,7,8,9}, A = {1,2,3,4}, B = {2,4,6,8}. Verify that (i) $(A \cup B)' = A' \cap B'$ (ii) $(A \cap B)' = A' \cup B'$
14	The function f is defined by $f(x) = \begin{cases} 1-x & if\ x<0 \\ 1 & if\ x=0 \\ x+1 & if\ x>0 \end{cases}$

	Draw the graph of $f(x)$.
15	If $x-iy=\sqrt{\frac{a-ib}{c-id}}$, prove that $(x^2+y^2)^2=\frac{a^2+b^2}{c^2+d^2}$
16	Represent the complex number $z=\frac{1+7i}{(2-i)^2}$ in polar form. (or) Find $\sqrt{3+4i}$
17	In how many arrangements of the letters of the word INDEPENDENCE (i) do the words start with P? (ii) do the words begin with I and end with P? **What is the importance of celebrating Independence Day? Do you love your national flag?**
18	A group consists of 4 girls and 7 boys. In how many ways can a team of 5 members be selected if the team has at least one girl and one boy?
19	Find $(x+1)^6+(x-1)^6$. Hence, evaluate $(\sqrt{2}+1)^6+(\sqrt{2}-1)^6$ (or) Find the coefficient of x^5 in the product $(1+2x)^6(1-x)^7$ using Binomial Theorem.

20	If $\sin x = \frac{1}{4}$, x lies in II quadrant, the find the values of $\sin \frac{x}{2}, \cos \frac{x}{2}$ *and* $\tan \frac{x}{2}$
21	Find the sum of the first n terms of the series : 3 x 8 + 6 x 11 + 9 x 14 + ….
22	The vertices of Δ PQR are P(-2 ,1) , Q(-2, 3) and R(4, 5). Find the equation of median through the vertex R.
23	Fine the equation of the line passing through the point of intersection of the lines x + 3y = 1 and 3x – y = 5 and having equal intercepts on the axes. (or) Find the angles between the lines $\sqrt{3}x + y = 1$ and $\sqrt{3}y = 1$.
	SECTION D
24	A college awarded 38 medals in football, 15 in basketball and 20 in cricket. If these medals went to a total of 58 men and only 3 men got medals in all the three sports, how many received medals in exactly two sports? **What is the importance of sports in life?**
25	Prove the following: (i) $\frac{\sin x + \sin 3x + \sin 5x + \sin 7x}{\cos x + \cos 3x + \cos 5x + \cos 7x} = \tan 4x$ (ii) $\cos 4x = 1 - 8\sin^2 x \cos^2 x$
26	For all $n \in N$, prove that by PMI $1 + 4 + 7 + \ldots + (3n - 2) = \frac{n(3n-1)}{2}$

27	Solve the following system of linear inequalities graphically: $x + 2y \leq 10,\quad x + y \geq 1,\quad x - y \leq 0,\quad y \geq 0$.
28	Find n, if the ratio of the fifth term from the beginning to the fifth term from the end in the expansion of $\left(\sqrt[4]{2} + \frac{1}{\sqrt[4]{3}}\right)^n$ is $\sqrt{6} : 1$ (or) The coefficients of three consecutive terms in the expansion of $(1 + a)^n$ are in the ratio 1 : 7 : 42. Find n.
29	The sum of two numbers is 6 times their geometric mean. Show that numbers are in the ratio $(3 + 2\sqrt{2}) : (3 - 2\sqrt{2})$. (or) If a, b are the roots of x^2 -3x + p =0 and c, d are roots of x^2 – 12x + q = 0 , where a, b, c, d form a G.P. Prove that (q + P) : (q –p)
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