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INDIA INTERNATIONAL SCHOOL

MID TERM EXAMINATION (2015-16)
CLASS - XI MATHEMATICS

TIME: 3 HOURS   M.M- 80

General Instructions

   (i)   Q.No 1 to 10 carry 1 mark each
   (ii)   Q.No 11 to 20 carry 4 marks each
   (iii)   Q.No 21 to 25 carry 6 marks each

1 Find the slope of the line ,which makes an angle of 30^0 with positive direction of y-axis measured anticlockwise.

2 If three points (h,0), (a,b) and (0,k) lie on a line, show that $\frac{a}{h} + \frac{b}{k} = 1$

3 Find the domain and range of the real function $f(x) = \sqrt{x-1}$

4 Find the value of $\cos55°+\cos125°+\cos300°$

5 Find the principal solutions $\operatorname{cosec} x = \frac{-2}{\sqrt{3}}$

6 Prove that $(\cos x + \cos y)^2 + (\sin x - \sin y)^2 = 4\cos^2\frac{x+y}{2}$

7 The sum of a certain number of terms in an A.P is 5500. If the first
And the last term are 100 and 1000 respectively , find the number of
Terms.

8 Solve for x $1+6+11+16+\ldots\ldots\ldots\ldots+x =148$

9 Insert 4 geometric mean between 1 and 243.

10 Prove that $\sin(\frac{\pi}{4} + A) \cdot \sin(\frac{\pi}{4} - A) = \frac{1}{2}\cos2A$

11 Solve $2\cos^2x + 3\sin x = 0$

12 Prove that $\frac{\sin5x-2\sin3x+\sin x}{\cos5x-\cos x} = \tan x$

13 Find the value of n so that $(a^{n+1} + b^{n+1}) \div (a^n + b^n)$ may be geometric mean
between a and b .

                                   Or

     If a, b, c are in G.P and $a^{1/x} = b^{1/y} = c^{1/z}$ Prove that x, y, z are in A.P

14 Let S be the sum , P the product and R the sum of reciprocals of n
Terms in a G.P. Prove that $P^2R^n = S^n$

15 The slope of a line is double of the slope of another line . If tangent of the angle between them is 1/3 ,find the slope of the lines .

16 (a) Let $f = \{(x, \frac{x^2}{1+x^2}); x \in R)\}$ be a function from R into R.

Determine the range of f.

(b) Write the power set of the set A = {a, b ,c }

17 Find the value of $\tan\frac{\pi}{8}$.

Or Prove that $\sin 20° \sin 40° \sin 60° \sin 80° = \frac{3}{16}$

18 The ratio of the sums of m and n terms of an A.P. is $m^2 : n^2$. Show that the ratio of mth and n^{th} term is $(2m - 1) : (2n - 1)$

19 $\cos x = -\frac{1}{3}$, x in quadrant 3rd . Find $\sin\frac{x}{2}$, $\cos\frac{x}{2}$ and $\tan\frac{x}{2}$

20 (a) If A= {1,2,3,4,5}, B = {1,3,5,8} , C = {2,5,7,8}. Verify that

$A - (B \cup C) = (A- B) \cap (A-C)$

(b) Write the relation R = {(x,x^3): x is a prime number less than 10}

In roster form. Find domain and range of R

21 Prove that $\cos^2 x + \cos^2(x + \frac{\pi}{3}) + \cos^2(x - \frac{\pi}{3}) = \frac{3}{2}$

22 In a survey of 60 people ,it was found that 25 people read
newspaper H , 26 read newspaper T , 26 read newspaper I ·
9 read both H and I , 11 read both H and T , 8 read both T and I , 3
Read all three newspapers . Find :
(a) The number of people who read at least one of the newspapers.
(b) The number of people who read exactly one newspaper.
(c) Explain briefly the role of newspaper in our lives.

23 Prove by using the principle of mathematical induction
$41^n - 14^n$ is a multiple of 27
Or
Prove by using the principle of mathematical induction
$X^{2n} - y^{2n}$ is divisible by x + y

24 The ratio of the A.M. and G.M. of two positive numbers a and b is
m:n. Show that $a:b=(m+\sqrt{m^2 - n^2}):(m-\sqrt{m^2 - n^2})$

or
Find the sum to n terms of the series
$5 + 11 + 19 + 29 + 41 + \dots\dots\dots\dots$

25(a) Prove that $\cos 6x = 32 \cos^6 x - 48 \cos^4 x + 18 \cos^2 x - 1$
(b) If the sum of first P terms of an A.P. is equal to the sum of the first q terms then find the sum of the first (p +q) terms.