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## INDIA INTERNATIONAL SCHOOL

### MID TERM EXAMINATION (2016-17)
### CLASS XI - MATHEMATICS

Time- 3 hrs                                                                                    M.M- 80

General Instructions
- (i)     Q.No 1 to 4 carry 1 mark each
- (ii)    Q.No 5 to 12 carry 2 marks each
- (iii)   Q.No 13 to 21 carry 4 marks each
- (iv)    Q.No 22 to 25 carry 6 marks each

1.   Let A = {x, y, z} ,  B = {1,2} Find the number of relation from A to B

2.   Find the range of the function f(x) = 2 - 3x ,  x $\in$ R ,  x> 0

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

4.   Evaluate $\sin 105^0 + \cos 105^0$

5.   Find the domain and range of the function f defined by f(x) = $\sqrt{x-1}$

6.   Find the degree measure of the angle subtended at the centre of a circle of radius 100 cm by an arc length 22 cm ( $\pi$ = 22/7).

7.   Prove that    $\sin 150^0 \cos 120^0 + \cos 330^0 \sin 660^0 = -1$

8.   If (a,8) and (2,b)  are ordered pairs which belongs to the function f defined by f(x) = 3x + 4  where x$\in$R, find a and b.

9.   Find the principal and general solutions of Cosec x  = -2

10.  Prove that    $\dfrac{\sin x - \sin 3x}{\sin^2 x - \cos^2 x}$ = 2sinx

11.  Prove that   $(\cos x - \cos y)^2 + (\sin x - \sin y)^2 = 4\sin^2 \dfrac{x-y}{2}$

12.  Evaluate        $\sum_{k=1}^{11}(2 + 3^k)$

13.  Find the sum of the sequence   7, 7, 777, 7777, ..................... to  n terms.
                                          OR
     Find the sum of the series upto n terms
     $\dfrac{1^3}{1} + \dfrac{1^3+2^3}{1+3} + \dfrac{1^3+2^3+3^3}{1+3+5} + $ .....................

14.  The ratio of the sum of m and n terms of an A.P is  $m^2 : n^2$ . Show that the ratio of m th and n th term is  (2m - 1) : (2n - 1)

15.  Find the modulus and argument of a complex number  $\dfrac{1+3i}{1-2i}$ .

16. (a) If A and B are two sets and U is the universal set such that n(U)=800, n(A)= 200, n(B)=300 and n(A∩B)=100. Find n(A'∪ B')

(b) If U = {0,1,2,3,4,5,6,7,8,9}, A= {2,3,4,8}, B={1,3,4}, verify
(i) A - B =A∩B'          (ii) (A ∩ B)' = A'∪ B'

17. A college of 400 students, 180 students take mathematics as major subject, 160 take physics as major subject and 150 take neither. Find (a) how many students take both mathematics and physics as major subjects (b) How many take mathematics as major but not physics?

18. Find the domain and range of the real function $f(x) = \sqrt{9 - x^2}$

OR

Let $f = \left\{\left(x, \frac{x^2}{1+x^2}\right), x \in R\right\}$ be a function from R into R. Determine the range of f.

19. Prove by using the principle of mathematical induction for all n∈N
$1^2 + 3^2 + 5^2 + \ldots\ldots\ldots\ldots + (2n - 1)^2 = \frac{n(2n-1)(2n+1)}{3}$

20. (a) Prove that $\cos\left(\frac{3\pi}{4} + x\right) - \cos\left(\frac{3\pi}{4} - x\right) = -\sqrt{2}\sin x$

(b) Prove that $\cot^2(\pi/6) + \csc(5\pi/6) + 3\tan^2(\pi/6) = 6$

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

OR

If A.M and G.M of two positive numbers a and b are 10 and 8 respectively, find the numbers.

22. (a) If a, b , c are in A.P ; b, c , d are in G.P and 1/c , 1/d, 1/e are in A.P. Prove that a, c , e are in G.P.

(b) Find the general solution of $\cos 3x + \cos x - \cos 2x = 0$

23. Pove that $\cos^2 x + \cos^2(x + \pi/3) + \cos^2(x - \pi/3) = 3/2$

OR

Prove that $\cos 2x \cos(x/2) - \cos 3x \cos(9x/2) = \sin 5x \sin(5x/2)$

24. (a) If $(x + iy)^3 = u + iv$, then show that $\frac{u}{x} + \frac{v}{y} = 4(x^2 - y^2)$

(b) Solve the equation $x^2 + x + \frac{1}{\sqrt{2}} = 0$

25. (a) The difference between any two interior angles of a polygon is $5^0$. if the smallest angle is $120^0$, find the number of the sides of the polygon.

(b) Prove by using Principle of mathematical induction for all n∈ N
$(2n + 7) < (n + 3)^2$