## ST. XAVIER'S SENIOR SECONDARY SCHOOL, DELHI - 110054

Pre-Board Examination 2018 in MATHEMATICS

## Set 1

STD. 10
18-01-2018
MAX. MARKS : 80
TIME : 3 HRS.
General Instructions:
i) All questions are compulsory.
ii) The question paper consists of 30 questions divided into four sections $A, B, C$ and $D$.
iii) Section $A$ contains 6 questions of 1 mark each. Section $B$ contains 6 questions of 2 marks each. Section C contains 10 questions of 3 marks each. Section D contains 8 questions of 4 marks each.
iv) There is no overall choice. However, an internal choice has been provided in four questions of 3 marks each and three questions of 4 marks each. You have to attempt only one of the alternatives in all such questions.
v) Use of calculators is not permitted.

## SECTION : A

1. Write whether $\frac{2 \sqrt{45}+3 \sqrt{20}}{2 \sqrt{5}}$ on simplification gives a rational or irrational number.
2. If the sum of the roots of the equation $3 x^{2}-(3 k-2) x-(k-6)=0$ is equal to the product of its roots, find the value of $k$.
3. Find the $20^{\text {th }}$ term from the end of the A.P. $6,10,14,18$ 174.
4. Write the coordinates of the reflections of the point $(3,5)$ along $x$ and $y$ axes.
5. In the given figure, $P Q \| B C$ and $A P: P B=1: 2$. Find $\frac{\operatorname{Ar} \cdot(\triangle \mathrm{APQ})}{\operatorname{Ar} .(\triangle \mathrm{ABC})}$.

6. If $\mathrm{A}+\mathrm{B}=90^{\circ}$ and $\tan \mathrm{A}=\frac{3}{4}$ what is $\cot \mathrm{B}$ ?

## SECTION : B

7. Find the least number of square tiles required to pave the ceiling of a room 15 m 17 cm long and 9 m 2 cm broad, without any cutting of the tiles.
8. For what value of k will the following pair of linear equations have infinitely many solutions.

$$
\begin{aligned}
& 2 x-3 y=7 \\
& (k+1) x+(1-2 k) y=5 k-4 .
\end{aligned}
$$

9. The sum of $n$ terms of an A.P. is $\frac{5 n^{2}}{2}+\frac{3 n}{2}$. Find its $30^{\text {th }}$ term.
10. If the vertices of a triangle are (1, -3$),(4, p)$ and $(-9,7)$ and its area is 15 sq. units, find the value of $p$.
11. Find the probability of getting 53 Fridays in an ordinary year.
12. 50 cards are made by writing numbers $0,1,2,3$. $\qquad$ on it. If a card is drawn at random, find the probability that the number on the drawn card is
a) a multiple of 5 or 10 .
b) a perfect square.

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## SECTION : C

13. Prove that $\sqrt{5}$ is irrational.
14. What must be added to $4 x^{4}+2 x^{3}-2 x^{2}+x-1$ so that the resulting polynomial is divisible by $x^{2}+2 x-3$.
15. Points $A$ and $B$ are 90 km apart from each other on a highway. $A$ car starts from $A$ and another from $B$ at the same time. If they go in the same direction they meet in 9 hours and if they go in opposite directions they meet in $\frac{9}{7}$ hours. Find their speeds.
16. In what ratio is the line segment joining the points $(-2,-3)$ and $(3,7)$ divided by the $y$-axis? Also, find the coordinates of the point of division.
(OR)
$A(1,-2), B(3,6), C(5,10)$ and $D(3,2)$ are the vertices of a parallelogram. Find the height of the parallelogram taking $A B$ as the base.
17. $B L$ and $C M$ are medians of a triangle $A B C$ right angled at A.
Prove that $4\left(\mathrm{BL}^{2}+C M^{2}\right)=5 B C^{2}$
(OR)

$\triangle A B C$ is right angled at $B$ and $D$ is the midpoint of $B C$. Prove that $A C^{2}=4 A D^{2}-3 A B^{2}$

18. Prove that opposite sides of a quadrilateral circumscribing a circle subtend supplementary angles at the centre of the circle.
19. Without using trigonometric tables, evaluate,
$\frac{2}{3} \operatorname{cosec}^{2} 58-\frac{2}{3} \cot 58 \tan 32-\frac{5}{3} \tan 1337 \tan 45 \tan 53 \tan 77$
(OR)
If $\sec \theta+\tan \theta=m$, prove that $\frac{m^{2}-1}{m^{2}+1}=\sin \theta$.
20. In the given figure, ABC is a right angled triangle, $\angle B=90^{\circ}, A B=28 \mathrm{~cm}$ and $B C=21 \mathrm{~cm}$. With $A C$ as diameter a semicircle is drawn and with $B C$ as radius a quarter circle is drawn. Find the area of the shaded region correct to two decimal places.

21. A right triangle, whose sides are 15 cm and 20 cm is made to revolve about its hypotenuse.

Find the volume and surface area of the double cone so formed. (use $\pi=3.14$ )
(OR)
A cylindrical tub of radius 5 cm and length 9.8 cm is full of water. A solid in the form of a right circular cone mounted on a hemisphere is immersed into the tub. If the radius of the hemisphere is 3.5 cm and the height of the conical part is 5 cm , find the volume of the water left in the tub.

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22. Find the mean of the following :

| Class | $0-20$ | $20-40$ | $40-60$ | $60-80$ | $80-100$ |
| :--- | :---: | :---: | :---: | :---: | :---: |
| Frequency | 15 | 18 | 21 | 29 | 17 |

## SECTION - D

23. A peacock is sitting on the top of a pillar, which is 9 m high. From a point 27 m away from the bottom of the pillar, a snake is coming to its hole at the base of the pillar. Seeing the snake the peacock pounces on it. If their speeds are equal, at what distance from the hole the snake caught?

Find the discriminant of the equation $9 \times 2-15 x+6=0$ and hence write the nature of its roots. Find them, if they are real using the method of completing the square.
24. The sum of the first six terms of an arithmetic progression is 42 . The ratio of its $10^{\text {th }}$ term to its $30^{\text {th }}$ term is $1: 3$. Calculate the first and $13^{\text {th }}$ term of this A.P.
25. State and prove basic proportionality theorem.
(OR)
Prove that the ratio of the areas of two similar triangles is equal to the square of the ratio of their corresponding sides.
26. Draw a right triangle $A B C$ in which $A C=A B=4.5 \mathrm{~cm}$ and $\angle A=90^{\circ}$. Draw a triangle similar to $\triangle A B C$ with its sides equal to $\frac{5}{4}$ th of the corresponding sides of $\triangle A B C$.
27. Prove that $\frac{\sin \theta-\cos \theta+1}{\sin \theta+\cos \theta-1}=\frac{1}{\sec \theta-\tan \theta}$.
28. A man standing on the bank of a river observes that the angle of elevation of the top of a tree standing on the opposite bank is $60^{\circ}$. When he moves 40 m away from the bank, he finds the angle of elevation to be $30^{\circ}$. Find the height of the tree and the width of the river.
29. Jay Prakash, a juice seller has set-up his juice shop. He has two types of glasses of inner diameter 7 cm to serve the customers. Type A : glass with a plane bottom \& Type B: glass with hemispherical raised base of same radius. The height of both types of glasses is 10 cm . He decided to serve the customers in type A of glasses.
a) Find the volume of both type of glasses.
b) By choosing a glass of type A, which value is depicted by the juice seller?
30. The mean of the following frequency distribution is 62.8 Find the missing frequency $f$.

| Class | $0-20$ | $20-40$ | $40-60$ | $60-80$ | $80-100$ | $100-120$ |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: |
| Frequency | 5 | 8 | f | 12 | 7 | 8 |

(OR)
From the following frequency distribution, prepare the more than ogive:

| Score | $400-450$ | $450-500$ | $500-550$ | $550-600$ | $600-650$ | $650-700$ |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: |
| No. of | 20 | 35 | 40 | 32 | 24 | 27 |

candidates
Also find the median from the ogive.

