# PRESIDENCY UNIVERSITY, KOLKATA <br> UG ADMISSION TEST, 2013 

## SAMPLE QUESTIONS

## STATISTICS

1. $\operatorname{Sin}^{-1}(1 / \sqrt{ } 5)+\operatorname{Sin}^{-1}(2 / \sqrt{ } 5)=$
a. $\pi / 4$
b. $\pi / 2$
c. $3 \pi / 4$ d. $2 \pi / 3$
2. A parked car is spotted from a hotel window which is 100 m above the car. If the angle of depression from the window to car is $15^{\circ}$, how far is the car from the window?
a. 375 m
b. 376 m
c. 377 m
d. None
3. The function $f(x)=x|x|$ is:
a. Not continuous at $\mathrm{x}=0$;
b. Not differentiable but continuous at $\mathrm{x}=0$;
c. Continuous and differentiable at $\mathrm{x}=0$, d. None of these
4. Let $A$ be a matrix of order $3 \times 3$ such that $A^{T} A=I_{3}$. Then $A^{-1}=$
a. $A^{T}$
b. $\mathrm{I}_{3}$
c. A
d. $2 \mathrm{I}_{3}$
5. If we divide $3^{2002}+7^{2002}+2002$ by 29 , the remainder will be
a. 1
b. 17 c. 23
d. 2
6. If a biased coin with $P$ (getting 'Head') $=1 / 3$ is to be tossed till a 'Head' appears for the first time, then $P$ (more than 3 tosses are required to get a 'Head' for the first time) is equal to
a. $1 / 3$
b. $(1 / 3)^{3}$
c. $(2 / 3)^{3}$
d. $(1 / 3)^{3}+(2 / 3)^{3}$
7. $\tan \pi / 12=$
a. $(\sqrt{3}+1) /(1-\sqrt{3})$
b. $(\sqrt{3}-1) /(\sqrt{3}+1)$
c. $(1-\sqrt{ } 3) /(\sqrt{ } 3+1)$
d. None
8. Let $\mathrm{f}(\mathrm{x})$ be a function such that $\lim _{x \rightarrow 0} f(x)=0$. Let $\mathrm{g}(\mathrm{x})$ be any other function on R which is defined near 0 . Then $\lim _{x \rightarrow 0} f(x) g(x)$ is
a. 0
b. Infinite
c. Cannot be determined from the above information
d. None
9. If $\mathrm{P}\left(\mathrm{A} \cap \mathrm{B}^{\mathrm{c}}\right)=0.2$ and $\mathrm{P}\left(\mathrm{A}^{\mathrm{c}} \cap \mathrm{B}\right)=0.5$, the only possibility for the value of P $(\mathrm{A} \cup \mathrm{B})$ is to be
a. less than 0.7
b. greater than or equal to 0.7
c. 0.7
d. 1
10. Suppose from the point $P(\alpha, \beta)$, two tangents $P Q$ and $P R$ are drawn to the points $Q$ and $R$ on the circle $x^{2}+y^{2}=a^{2}$. Then the area of the triangle $P Q R$ is
a. $\frac{a(a+1)}{\alpha+\beta}$
b. $\frac{a\left(\alpha^{2}+\beta^{2}-a^{2}\right)^{3 / 2}}{\alpha^{2}+\beta^{2}}$
c. $\frac{a\left(\alpha^{2}+\beta^{2}-a^{3}\right)^{3 / 2}}{\alpha^{2}+\beta^{2}}$
d. $\frac{a^{2}\left(\alpha^{2}+\beta^{2}-a^{2}\right)^{4}}{\alpha^{2}-\beta^{2}}$
11. Suppose two straight lines $3 x+4 y=5$ and $4 x-3 y=15$ cut each other at the point a. Take two points $B$ and $C$ on those two lines, respectively, such that $A B=A C$. If the line BC passes through the point $(1,2)$ then the possible equations of the straight line BC are
a. $\quad \mathrm{x}-7 \mathrm{y}+13=0$ or $7 \mathrm{x}+\mathrm{y}=9$
b. $x+7 y+9=0$ or $x-7 y-13=0$
c. $x=y+13$ or $x-y=9$
d. $x+.5 y-13=0$ or $7 x-y+9=0$
12. Let $f(x)=x[x]$ where $[x]$ denotes the greatest integer smaller than or equal to $x$. What is $f^{\prime}(x)$ when $x$ is not an integer?
a. 2 x
b. $[\mathrm{x}]$
c. $2[x]$
d. It does not exist.
13. The locus of the middle points of the chords drawn through the vertex of the parabola $x^{2}=4 a y$ is
a. $\quad x^{2}=-4 a y$
b. $\quad y^{2}=4 x^{2}$
c. $\quad x^{2}=2 a y$
d. $\quad y^{2}=2 a x$
14. Of the 200 candidates who were interviewed for a position at a call center, 100 had a two-wheeler, 70 had a credit card and 140 had a mobile phone. 40 of them had both, a two-wheeler and a credit card, 30 had both, a credit card and a mobile phone and 60 had both, a two wheeler and mobile phone and 10 had all three. How many candidates had none of the three?
a. 130
b. 190
c. 10
d. None of the above
15. In 2001 census, the following data regarding two villages 'Rajgarh' and 'Sukhgarh' were found
I. Rajgarh has 2104 more males Sukhgarh
II. Sukhgarh has 2041 fewer females than Rajgarh
III. Sukhgarh has 687 more males than females
IV. Rajgarh has 750 fewer females than males

What is the difference between the number of males in Sukhgarh and the number of females in Rajgarh?
a. 1300
b. 1354
c. 1000
d. None of the above
16. The following is the list of instructions to be followed

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\text { Step1: } \quad X=0 \quad A=2 \quad B=3
$$

Step2: If $\mathrm{X}<5$ then do Steps 3-6 otherwise Step7
Step3: $\quad \mathrm{Y}=\mathrm{A}+\mathrm{B}$ replace A by B , replace B by Y
Step4: Type Y
Step5: Increase X by 2
Step6: Go to Step2
Step7: Exit

When $X=4$ what value of $Y$ is typed?
a. 13
b. 14
c. 15
d. None of these
17. The equation $2 x^{2}+2(p+1) x+p=0$, where $p$ is real, always has roots that are
a. Equal
b. Equal in magnitude but opposite in sign
c. Irrational
d Real
18. This data sufficiency problem consists of a question and two statements, labeled I and II. You have to decide whether the information given in the statements are sufficient for answering the question. Using the information given in the statements, plus your knowledge of mathematics and everyday facts (such as the number of days in a leap year or the meaning of the word counterclockwise),

Choose 1 if the question can be answered by one of the statements alone and not by the other.

Choose 2 if the question can be answered by using either statement alone Choose 3 if the question can be answered by using both the statements together, but cannot be answered by using either statement alone

Choose 4 if the question cannot be answered even by using both statements together

What is the value of $X$, if $X$ and $Y$ are two distinct integers and their product is 30 ?
I. $\quad \mathrm{X}$ is an odd integer
II. $\quad \mathrm{X}>\mathrm{Y}$
a. 1
b. 2
c. 3
d. 4

