NAME:
STREAM: $\qquad$

LIGHT ACADEMY SECONDARY SCHOOL MOCK SET II TERM 22017
TIME: 3 HOURS
S. 6 PURE MATHEMATICS

## INSTRUCTIONS:

$>$ Attempt all questions in Section A and any FIVE in section B.
$>$ Begin every question on a fresh page.
$>$ Show all the necessary working.

## SECTION A

1. $\log _{2} x+\log _{x} 16=4$
2. Find the Cartesian equation of the locus Z of $|Z-2+i|=1$.
3. Find the Cartesian equation of a line through points $(2,0,1)$ and $(-1,4,1)$.
4. Solve the equation: $2 \cos \alpha+3 \sin \alpha=5$ for $-\pi \leq \alpha \leq \pi$.
5. Evaluate $\int_{0}^{1} \frac{1}{\sqrt{9-4 x^{2}}} d x$
6. Find the equation of the tangent to the curve $2 x y=3$ at the point when $x=3$.
(5 marks)
7. Find the acute angle between the lines $3 y-x-6=0$ and $y-2 x+4=0 . \quad$ (5 marks)
8. Find the Cartesian equation of a curve whose polar equation is $r=4 \sin \theta$.

## SECTION B

9. (a) Find the distance of the point $(2,1,2)$ from the line $x-1=y-2=Z-3$.
(7 marks)
(b) Find the position vector of the point of intersection of the planes $x-2 y-2 z=0$, $2 x+3 y+z=1$ and $3 x-y-3 z=3$
(5 marks)
10. (a) Prove by induction:

$$
\begin{equation*}
\sum_{r=1}^{n} r^{2}=\frac{1}{6} n(n+1)(2 n+1) \tag{6marks}
\end{equation*}
$$

(b) The fifth term of an AP is 25 and the fifteenth term is 75 . Find the $10^{\text {th }}$ term. (6 marks)
11. Express $\frac{3 x^{2}+x+1}{(x-2)(x+1)^{3}}$ into partial fractions. Hence compute $\int_{3}^{4} \frac{3 x^{2}+x+1}{(x-2)(x+1)^{3}} d x$
12. (a) Solve for $\theta$ if $\sin ^{2} \frac{\theta}{2}=2+\cos \theta$ for $180^{\circ} \leq \theta \leq 360^{\circ}$. (5 marks)
(b) Solve triangle ABC where $\mathrm{C}=5.2 \mathrm{~cm}, \mathrm{a}=7.4 \mathrm{~cm}$ and angle $\mathrm{B}=41^{\circ}$.
(7 marks)
13. (a) Find the equation of the circle which passes through the points $(1,2),(2,5)$ and $(-3,4)$.
(5 marks)
(b) $\quad \mathrm{A}$ and B are points $(3,0)$ and $(-1,-3)$ respectively. P is a variable point such that angle APB is right angled. Find and sketch the locus of P.
(7 marks)
14. Differentiate
(i) $\cot ^{-1}(\operatorname{In} x)$
(ii) $(\sin x)^{x}$
(12 marks)
15. Solve
(a) $x<\frac{2}{x-1}$
(5 marks)
(b) $\sqrt{3 x+1}+\sqrt{4 x+5}=\sqrt{16 x+9}$
(7 marks)
16. (a) Find the general solution of

$$
\frac{d y}{d x}=\frac{x^{2}+y^{2}}{x(x+y)}
$$

(b) The rate at which a radioactive material decays are proportional to the amount of such material present.

Half of the original; mass M of the radioactive material undergoes disintegration in a period of 1500 years
(i) What percentage of the original mass will remain after 3000 years?
(ii) In how many years will one tenth of the original mass remain?

## END.

