KITEBI SECONDARY SCHOOL BEGINNING OF TERM II EXAMINATIONS 2019

S6 PURE MATHEMATICS

Paper One 3

hours

INSTRUCTIONS

- Answer all questions in Section A and five questions from Section B.
- All working must be shown clearly and neatly.

SECTION A

Answer all the eight questions in this section.

- 1. Find all the values of x in the interval $180^{\circ} \square \square x$ 540° for which
cot $x \square$ $5\cos ec x^2 \square 6$.(5 marks)
- 2. Find the equation of the circle whose diameter is the line joining the points A(2,1) and B(6,5).

(5 marks) 1

3. Using Binomial expansion, find the quadratic function that approximates to $f x \square \square \square \frac{2 \text{ for}}{3 \square \square 3 x \square}$

- 4. Given that $y \square \prod_{x \square \square x} \frac{\sqrt{1}_{x \square \square x} \square \square x}{\sqrt{1}_{x \square \square x} \square \square x} \square \square \square where$ *a*is a constant, prove that: $<math display="block">\frac{dy}{dx} \square \frac{1}{\sqrt{xa_{\square}^2}}. \text{ Hence find } \frac{\overline{dy}}{dx^2}.$ (5 marks)
- 5. Evaluate: $\int_{a}^{\sqrt{5}} \frac{x^2}{\sqrt{x^4 \Box x^2}} dx.$ (5 marks)
- 6. Find the vector equation of a line which passes through the point A(4, 3, -2) and parallel to the vector $2\mathbf{i}$ + $3\mathbf{j} + 4\mathbf{k}$. Where does this line meet the line $x \square 0$? (5 marks)

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13. (a) Vectors $\mathbf{a} = 2\mathbf{i} - 2\mathbf{j} - 2\mathbf{k}$ and $\mathbf{b} = \mathbf{i} - 3\mathbf{j} + 2\mathbf{k}$ form two sides of a triangle. Find its area. (5 marks)

(b) Given the lines $\mathbf{r} = 5\mathbf{i} + 3\mathbf{j} - 5\mathbf{k} + \Box(\mathbf{i} + 2\mathbf{j} - 3\mathbf{k})$ and $\begin{array}{c} x\Box7 & y\Box1 z\Box 4 \\ \hline \Box & \Box & \Box \\ 3 & \Box2 & \Box2 \text{ of the point of} \\ \hline \mathbf{intersection and the a cute angle between them.} \end{array}$

14. (a) Use De Movires' theorem or otherwise to simplify:

 $\Box \cos \Box \Box i \sin \Box \Box \cos 2\Box \Box \Box i \sin \Box$ \vdots $\cos - \Box i \sin - \Box \Box$ $\Box \Box 2 2 \Box \Box$

- (b) If z is a complex number, find the Cartesian equation and illustrate the locus given by $z \Box 1$ $\begin{vmatrix} 2 \\ \Box \\ \vdots \end{vmatrix} = (12 \text{ marks}) z \Box \Box 1 i 3$
- 15. (a) Find the locus of point P which moves such that the sum of its distance from (2, 0) and (-2, 0) remains equal to $2\sqrt{5}$.
 - (b) Find the equation of the normal at $R a \square \cos \square \square b \sin \square$ to an ellipse $b x^{22} \square a y^{22} \square a b^{22}$. If the normal at R to the ellipse meets the x – axis at S. find the area of triangle ROS. (12 marks)
- 16. (a) Using small changes, evaluate $\sqrt[3]{28}$.

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(b) Water starts running into an empty vessel at a rate of 6□*cm³/s*. The vessel is in the shape of the surface formed when the curve 4y x□² is rotated completely about the y □*axis*. Show that when the depth of the water in the vessel is 2□y *cm²* ³. Find the rate at which the water level is rising when the water has been running for 3 seconds. (12 marks)

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END