

ADDITIONAL MATHEMATICS

OBJECTIVE

The objective of the examination is to test the ability of candidates to understand and to apply more advanced mathematical concepts.

THE EXAMINATION

The examination will consist of one paper of $2\frac{1}{2}$ hours' duration. The paper will be divided into two sections. Section A (62 marks) will consist of 11 to 13 short questions, all of which are to be attempted. Section B (48 marks) will consist of long questions and candidates will be required to answer 4 out of 5 questions.

Notes: 1. Knowledge of topics in the current Mathematics syllabus is assumed.
 SI and metric units will be used in the examination.
 Electronic calculators* and mathematical drawing instruments may be used in the examination.

2. *Syllabus Topics*

Notes

3.

1. The six trigonometric functions of angles of any magnitude and their graphs.

Formulas for $\sin(A\pm B)$, $\cos(A\pm B)$ and $\tan(A\pm B)$, sum and product formulas.

Proofs of these formulas are not required but their applications to multiple and half angles are expected.

General solution of simple trigonometric equations.

Problems in two and three dimensions.

Questions harder than those in the Mathematics papers may be set.

Syllabus Topics

6. Vectors in the two-dimensional space. Unit vectors and the zero vector. Position vectors. Representation of a vector by $a\mathbf{i} + b\mathbf{j}$ and by a directed line segment. Sum and difference of vectors. Multiplication of a vector by a scalar. Scalar product (dot product) of two vectors.

Application of vector method to problems involving parallelism, perpendicularity and division of a line segment.

7. Differentiation from first principles. Differentiation of powers of x and trigonometric functions. Differentiation of a sum, a product and a quotient of functions. Differentiation of a composite function and an implicit function. Second derivatives.

Application of differentiation to gradients, rates of change, tangents and normals to a curve, maxima and minima, and sketching of simple curves.

Notes

The notations used in the examination papers will include :

\overrightarrow{AB}	the vector from A to B
\mathbf{i}, \mathbf{j}	unit coordinate vectors
$\mathbf{0}$	the zero vector
\mathbf{r}, \mathbf{p}	vectors
$ \mathbf{r} , \overrightarrow{AB} $	magnitudes of vectors

Although in examination papers vectors may be represented by bold-type letters, candidates are however advised to use appropriate symbols such as $\underline{\mathbf{u}}$, $\underline{\mathbf{v}}$, $\underline{\mathbf{i}}$, $\underline{\mathbf{j}}$, $\underline{\mathbf{0}}$ or $\underline{\mathbf{0}}$ in their working.

Candidates are expected to know that if $a_1\mathbf{u} + b_1\mathbf{v} = a_2\mathbf{u} + b_2\mathbf{v}$, where \mathbf{u} and \mathbf{v} are non-parallel, then $a_1 = a_2$ and $b_1 = b_2$.

The differentiation of inverse trigonometric functions will not be examined.

Excluding points of inflexion and asymptotes.

*Syllabus Topics**Notes*

8. Indefinite integration as the reverse process of differentiation.

The integrals of $(ax + b)^n$ (excluding $n = -1$), $\sin(ax + b)$ and $\cos(ax + b)$.

Definite integrals and their simple properties.

Applications in finding plane areas and finding volume of solids of revolution formed by revolving about the coordinate axes.

Excluding integration of $\frac{1}{x}$ and integration by parts.

Integration by substitution is not required.

Proofs of these properties are not required.

* See Regulation 5.15.