Railway Engineering Mathematics for Apprentices

Revision Guide: 3

Integral Calculus II

I should be able to:

- Use integration by parts to evaluate more complicated integrals.
- Identify when it is appropriate to use integration by parts or by substitution.
- Use definite integration to calculate the area enclosed between two curves.

Complex Numbers

I should be able to:

- Represent a given complex number as an Argand diagram.
- Convert between polar and Cartesian (rectangular) forms of complex numbers.
- Conduct complex number arithmetic (addition, subtraction, multiplication, division) in Cartesian form and determine the conjugate and real and imaginary parts of a complex number.
- Multiply and divide complex numbers in polar form.
- Solve quadratic equations using complex numbers.

Matrices

I should be able to:

- Identify the order of a matrix.
- Conduct matrix arithmetic (addition, subtraction, scalar and matrix multiplication) and understand when these operations are valid.
- Calculate the determinant and inverse of a matrix where appropriate.
- Use matrix methods to solve pairs of linear simultaneous equations.

Statistics

I should be able to:

- Use EXCEL to determine the mean, median and mode of a data set.
- Use EXCEL to determine the range, IQR and standard deviation of a data set.
- Interpret the meaning of these statistics.
- Represent a data set using a histogram or bar chart where appropriate.
- Fit simple models to a data set and evaluate the goodness-of-fit.