HELM Resources : Please find the section(s) you are interested in from the list below.

**1: Basic Algebra**

1.1 Mathematical notation and symbols

1.2 Indices

1.3 Simplification and Factorisation

1.4 Arithmetic of Algebraic Fractions

1.5 Formulae and Transposition

**2: Functions**

2.1 Basic concepts of functions

2.2 The graph of a function and parametric form

2.3 One to one and inverse functions

2.4 Characterising Functions

2.5 The Straight Line

2.6 The Circle

2.7 Some common engineering functions

**3: Polynomials, inequalities and partial fractions**

3.1 Solving linear equations

3.2 Solving quadratic equations

3.3 Solving polynomial equations

3.4 Solving simultaneous linear equations

3.5 Solving inequalities

3.6 Partial fractions

**4: Trigonometry**

4.1 Right Angled Triangles

4.2 Trigonometric Functions

4.3 Trigonometric Identities

4.4 Applying Trigonometry to Triangles

4.5 Applying Trigonometry to Waves

**5: Functions and Modelling**

5.1 The Modelling Cycle and Functions

5.2 Quadratic Functions and Modelling

5.3 Oscillating Functions and Modelling

5.4 Inverse Square Functions and Modelling

**6: Logarithms and exponentials**

6.1 The exponential Function

6.2 The hyperbolic function

6.3 Logarithms

6.4 The logarithm function

6.5 Log-linear graphs

6.6 Modelling Exercises

**7: Matrices**

7.1 Introduction to matrices

7.2 Matrix multiplication

7.3 Determinants

7.4 The inverse of a matrix

**8: Using matrices and determinants to solve equations**

8.1 Cramer's rule for solving simultaneous equations

8.2 Solving simultaneous equations using the inverse matrix

8.3 Gauss elimination

**9: Vectors**

9.1 Basic concepts of vectors

9.2 Cartesian components of vectors

9.3 The Scalar Product

9.4 The Vector product

13.5 Integration by Substitution and by Partial Fractions

13.6 Integration of Trigonometric Functions

**14: Applications of Integration I**

14.1 Integration of the Limit of a Sum

14.2 Mean Value and RMS Value

14.3 Volumes of Solids of Revolution

14.4 Lengths of Curves and Areas of Surfaces of Revolution

14.5 Integration by Substitution and using Partial Fractions

**15: Applications of integration II**

15.1 Integrals involving vectors

15.2 Calculating centres of mass

15.3 Moment of inertia

**16: Sequences and series**

16.1 Sequences and series

16.2 Infinite series

16.3 The binomial series

16.4 Power series

16.5 Maclaurin and Taylor series

**17: Conic sections**

17.1 Conic sections (circle, ellipse, parabola and hyperbola)

17.2 Polar co-ordinates

17.3 Parametric curves

**18: Functions of several variables**

18.1 Functions of several variables

18.2 Partial derivatives

18.3 Stationary points

18.4 Errors and percentage change

**19: Differential equations**

19.1 Modelling with differential equations

19.2 First Order Ordinary Differential Equations

19.3 Second Order Ordinary Differential Equations

19.4 Applications of Differential Equations

**20: The Laplace transform**

20.1 Causal functions

20.2 The transform and its inverse

20.3 Further Laplace transforms

20.4 Solving differential equations

20.5 The convolution theorem

20.6 Transfer functions

**21: z-Transforms**

21.1 The z-Transform

21.2 Basics of z-Transform Theory

21.3 z-Transforms and Difference Equations

21.4 Engineering Applications of z-Transforms

21.5 Sampled Functions

**22. Eigenvalues and Eigenvectors**

22.1 Basic Concepts

22.2 Applications of Eigenvalues and Eigenvectors

22.3 Repeated Eigenvalues and Symmetric Matrices

22.4 Numerical determination of Eigenvalues and Eigenvectors

**23: Fourier Series**

23.1 Periodic Functions

23.2 Representation of Periodic Functions by Fourier Series

23.3 Even and Odd Functions

34.1 Projectiles

34.2 Forces in more than one dimension

34.3 Resisted Motion

**35: Sets and Probability**

35.1 Sets

35.2 Elementary Probability

35.3 Addition and Multiplication Laws of Probability

35.4 Total Probability and Bayes' Theorem

**36: Descriptive Statistics**

36.1 Describing Data

36.2 Exploring Data

**37: Discrete Probability Distributions**

37.1 Discrete Probability Distributions

37.2 The Binomial Distribution

37.3 The Poisson Distribution

37.4 The Hypergeometric Distribution

**38: Continuous Probability Distributions**

38.1 Continuous probability distributions

38.2 The uniform distribution

38.3 The Exponential Distribution

**39. The normal distribution**

39.1 The random distribution

39.2 The normal approximation to the binomial distribution

39.3 Sums and differences of random variables

**40: Sampling Distributions and Estimation**

40.1 Sampling Distributions and Estimation

40.2 Introduction to Confidence Intervals

49.1 Students' Guide

**50: Tutor's Guide**

50.1 Tutor's Guide