From
The Registrar

To
The Principals of all Colleges
offering First Degree Programme under CBCS system.

Sir,

Sub:- Printing error in the Syllabus of Complementary Course in Mathematics for Career-related First Degree Programmes in Computer Science, Chemistry and Industrial Chemistry and Physics and Computer Application under CBCS system, revised w.e.f 2019 admissions - correction - reg

Ref:- Minutes of the Additional meeting of the Board of Studies in Mathematics (Pass) dated 19.08.2019

With reference to the above, I am to inform you that certain typographical errors has been occurred while printing the Syllabus of Complementary Course in Mathematics offered to career-related First Degree Programmes in Computer Science, Chemistry and Industrial Chemistry and Physics and Computer Application under CBCS system, revised w.e.f 2019 admissions.

1. The following are the prescribed texts in the Syllabus of MM 1131.10 Complementary Course in Mathematics offered to career-related First Degree Programmes in Computer Science.


Prescribed Text for the Course and the concerned sections of the topics are mentioned in the corrected syllabus (corrected syllabus are available in the University website)
2. Instructional hours per week and number of credits of MM 1131.7 and MM 1231.7 for Chemistry and Industrial Chemistry of the Semester I and II and MM 1131.6, MM 1231.6, MM 1331.6 and MM 1431.6 for Physics and Computer Application of the Semester I-IV, are wrongly typed as 4 hours and 3 credits instead of 5 hours and 4 credit.

Instructional hours for each module in the syllabus of MM 1131.7 and MM 1231.7 are to be changed as follows.

- Module I – 18 hours
- Module II – 24 hours
- Module III – 24 hours
- Module IV – 24 hours

The above matter may be brought to the notice of all concerned.

Yours faithfully

Sd/-

Deputy Registrar (Acad-II)
For Registrar
Syllabus for the Complementary course in Mathematics for the First Degree Programme in Chemistry and Industrial Chemistry

UNIVERSITY OF KERALA

Semester I

MATHEMATICS I
(Calculus, Complex Numbers and Vector Algebra)
Code: MM1131.7

Instructional hours per week: 5 No. of Credits: 4

MODULE 1
Differentiation and its Applications 18 Hours
Differentiation (a review) - Leibnitz theorem - Special points of a function - Curvature - Theorems of Differentiation - Mean Value Theorem - Rolle’s Theorem.

*The topics in this module can be found in Chapter 2, sections 2.1 of Text [1].*

*More exercises related to the topics in this module can be found in Chapter 2 and Chapter 3 of Reference [1].*

MODULE 2
Integration and its Applications 24 Hours
Integration by parts - Reduction formulae - Infinite and Improper Integrals - Plane polar coordinates - Integral inequalities - Applications of Integration (Mean Value of function, Length of Curve, Surface Area of revolution, Volume of revolution.)

*The topics in this module can be found in Chapter 2, sections 2.2.8 to 2.2.13 of Text [1].*

*More exercises related to the topics in this module can be found in Chapter 4, Chapter 5 and Chapter 7 of Reference [1].*

MODULE 3
Complex Numbers 24 Hours
de Moivress Theorem - Trigonometric identities - Finding the nth roots of unity - Solving polynomial equations - Complex logarithms and complex powers - Applications to differentiation and integration - Hyperbolic functions - Inverses of hyperbolic functions - Calculus of hyperbolic functions.

*The topics in this module can be found in Chapter 3, sections 3.4 to 3.7 of Text [1].*

*More exercises related to the topics in this module can be found in Chapter 6 of Reference [1] and Chapter 13 of Reference [3].*

MODULE 4
Vector Algebra 24 Hours
Scalar Triple Product - Vector triple product - Equations of lines, planes and spheres - Using vectors to find distances - Reciprocal vectors

*The topics in this module can be found in Chapter 7, sections 7.6 to 7.9 of Text [1].

*More exercises related to the topics in this module can be found in Chapter 11 of Reference [1] and Chapter 6 of Reference [2].*
Text


References


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Syllabus for the Complementary course in Mathematics for the First Degree Programme in Chemistry and Industrial Chemistry

UNIVERSITY OF KERALA

Semester II

MATHEMATICS II
(Parial Differentiation, Vector Differentiation, Infinite Series and Multiple Integrals)
Code: MM1231.7

Instructional hours per week: 5  No. of Credits: 4

MODULE 1
Partial Differerentiation  18 Hours

The total differential and total derivative - Exact and inexact differentials - Theorems of partial differentiation - The chain rule - Change of variables - Taylors theorem for many-variable functions - Stationary values of many-variable functions - Stationary values under constraints.

The topics in this module can be found in Chapter 5, sections 5.1 to 5.9 of Text [1].

More exercises related to the topics in this module can be found in Chapter 13 of Reference [1].

MODULE 2
Vector Calculus - Differentiation  24 Hours

Differentiation of vectors - Differentiation of composite vector expressions - Differential of a vector - Integration of vectors - Space curves - Vector functions of several arguments - Surfaces - Scalar and vector fields - Vector operators - Gradient of a scalar field - Divergence of a vector field - Curl of a vector field - Vector operator formulae - Vector operators acting on sums and products - Combinations of grad, div and curl - Cylindrical and spherical polar coordinates - Cylindrical polar coordinates - Spherical polar coordinates.

The topics in this module can be found in Chapter 10, sections 10.1 to 10.9 of Text [1].

More exercises related to the topics in this module can be found in Chapter 3 of Reference [3].

MODULE 3
Infinite Series  24 Hours


The topics in this module can be found in Chapter 4, sections 4.1 to 4.6 of Text [1].

More exercises related to the topics in this module can be found in Chapter 9 of Reference [1] and Chapter 1 of Reference [2].
MODULE 4

Multiple Integrals

Double integrals - Triple integrals - Applications of multiple integrals - Areas and volumes only (Masses, centres of mass and centroids - Pappus theorems - Moments of inertia - Mean values of functions are excluded) - Change of variables in multiple integrals - Change of variables in double integrals- Evaluation of some special infinite integrals - Change of variables in triple integrals - General properties of Jacobians.

The topics in this module can be found in Chapter 6, sections 6.1 to 6.4 of Text [1].

More exercises related to the topics in this module can be found in Chapter 14 of Reference [1] and Chapter 6 of Reference [2].

Text


References


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Syllabus for the Complementary course in Mathematics for the First Degree Programme in Chemistry and Industrial Chemistry

UNIVERSITY OF KERALA

Semester III

MATHEMATICS III
(Theory of Matrices, Vector Integration, Special Functions and Theory of Equations)
Code: MM1331.7

Instructional hours per week: 5 No. of Credits: 4

MODULE 1
Theory of Matrices 24 Hours

The topics in this module can be found in Chapter 3 of Text [2].

More exercises related to the topics in this module can be found in Chapter 7 and 8 of Reference [3].

This topics can be referred in Reference [4].

MODULE 2
Vector Calculus - Integration 24 Hours
Evaluating Line integrals - Physical examples of line integrals - Line integrals with respect to a scalar - Connectivity of regions - Greens theorem in a plane - Conservative fields and potentials - Surface integrals - Evaluating surface integrals - Vector areas of surfaces - Physical examples of surface integrals - Volume integrals - Volumes of three-dimensional regions - Integral forms for grad, div and curl - Greens theorems (without proof) - Other related integral theorems - Physical applications of the divergence theorem - Stokes theorem and related theorems (without proof) - Related integral theorems - Physical Applications.

The topics in this module can be found in Chapter 11 of Text [1].

More exercises related to the topics in this module can be found in Chapter 3 of Reference [2].

MODULE 3
Special Functions 18 Hours
The Factorial Function - Definition of the Gamma Function - Recursion Relation - The Gamma Function of Negative Numbers - Some Important Formulas Involving Gamma Functions - Beta Functions - Beta Functions in Terms of Gamma Functions.

The topics in this module can be found in Chapter 11 of Text [3].

More exercises related to the topics in this module can be found in Chapter 13 of Text [2].
MODULE 4

Theory of Equations 24 Hours

Polynomial Equations - Fundamental Theorem of Algebra (without Proof) - Applications of the fundamental theorem to equations having one or more complex roots, rational roots or multiple roots - Reciprocal equations - Method of finding its roots - Cardano’s method for solving cubic equations - Ferrari’s Method for solving quartic equations - Descarte’s rule of signs.

The topics in this module can be found in Text [3].

More exercises related to the topics in this module can be found in Reference [4].

Text


3 Bernard and Child Higher Algebra, Macmillan.

References


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Syllabus for the Complementary course in Mathematics for the First Degree Programme in Chemistry and Industrial Chemistry

UNIVERSITY OF KERALA

Semester IV

MATHEMATICS IV
(Abstract Algebra, Laplace Transforms, Fourier Series and Differential Equations)
Code: MM1431.7

Instructional hours per week: 5  
No. of Credits: 4

MODULE 1
Abstract Algebra 24 Hours
Groups - definition and Examples - Elementary properties - Finite Groups and Subgroups - Cyclic Groups - Elementary Properties
Rings - definition and Examples (Finite and Infinite) - Integral Domains and Field - definition and examples (Finite and Infinite)

*The topics in this module can be found in Text [1].*

*More exercises related to the topics in this module can be found in Reference [1].*

MODULE 2
Laplace Transforms and its Applications 24 Hours
Laplace transforms - Elementary Functions - Inverse Transform - Partial Fraction Expansion - Laplace transforms of derivatives - Dirac Delta Function (excluded) - Other Properties - Translation - Derivative of a Transform - Integration of Transforms - Limits of Integration - Unit Step Function - Convolution (Faltung) Theorem - Inverse Laplace transforms.

*The topics in this module can be found in Chapter 15, sections 15.8 to 15.12 of Text [2].*

*More exercises related to the topics in this module can be found in Reference [2].*

MODULE 3
Fourier Series and Fourier Transforms 18 Hours
Introduction - Simple Harmonic Motion and Wave Motion - Periodic Functions - Applications of Fourier Series - Average Value of a Function - Fourier Coefficients - Dirichlet Conditions - Complex Form of Fourier Series - Other Intervals - Even and Odd Functions - Parsevals Theorem - Fourier Transforms.

*The topics in this module can be found in Chapter 7 of Text [3].*

*More exercises related to the topics in this module can be found in Chapter 11 of Reference [2].*

MODULE 4
Differential Equations 24 Hours
First Order Ordinary Differential Equations - Exact ODEs. Integrating Factors - Linear ODEs - Bernoulli Equation - Orthogonal Trajectories - Homogeneous Linear ODEs with Constant Coefficients - Euler-Cauchy Equations, Nonhomogeneous ODEs.

*The topics in this module can be found in Chapter 1 and 2, sections 1.4, 1.5, 1.6, 2.2, 2.5 and 2.7 of Text [4].*

*More exercises related to the topics in this module can be found in Chapter 8 of Text [3] and Reference [2].*
Text

1 John B Fraleigh *A first course in Abstract Algebra*, Narosa Publications.


References

1 D A R Wallace *Groups, Rings and Fields*, Springer.

Syllabus for the Complementary course in Mathematics for the First
Degree Programme in Physics and Computer Application

UNIVERSITY OF KERALA

Semester I

MATHEMATICS I
(Calculus, Infinite Series and Vector Algebra)
Code: MM1131.6

Instructional hours per week: 5 No. of Credits: 4

MODULE 1
Differentiation and its Applications
18 Hours
Differentiation (a review) - Leibnitz theorem - Special points of a function - Curvature - Theorems of
Differentiation - Mean Value Theorem - Rolle’s Theorem.

The topics in this module can be found in Chapter 2, sections 2.1 of Text [1].

More exercises related to the topics in this module can be found in Chapter 2 and Chapter 3 of
Reference [1].

MODULE 2
Integration and its Applications
24 Hours
Integration by parts - Reduction formulae - Infinite and Improper Integrals - Plane polar coordinates
- Integral inequalities - Applications of Integration (Mean Value of function, Length of Curve, Surface
Area of revolution, Volume of revolution.)

The topics in this module can be found in Chapter 2, sections 2.2.8 to 2.2.13 of Text [1].

More exercises related to the topics in this module can be found in Chapter 4, Chapter 5 and Chapter
7 of Reference [1].

MODULE 3
Infinite Series
24 Hours
Summation of series - Arithmetic series - Geometric series - Arithmetico-geometric series - The differ-
ence method - Series involving natural numbers - Transformation of series - Convergence of infinite
series - Absolute and conditional convergence - Convergence of a series containing only real positive
terms - Alternating series test - Operations with series - Power series - Convergence of power series -
Operations with power series - Taylor series - Taylors theorem (Proof of these theorems excluded) -
Approximation errors in Taylor series - Standard Maclaurin series.

The topics in this module can be found in Chapter 4, sections 4.1 to 4.6 of Text [1].

More exercises related to the topics in this module can be found in Chapter 9 of Reference [1]
and Chapter 1 of Reference [2].

MODULE 4
Vector Algebra
24 Hours
Scalar Triple Product - Vector triple product - Equations of lines, planes and spheres - Using vectors
to find distances - Reciprocal vectors

The topics in this module can be found in Chapter 7, sections 7.6 to 7.9 of Text [1].

More exercises related to the topics in this module can be found in Chapter 11 of Reference [1]
and Chapter 6 of Reference [2].
Text


References


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Syllabus for the Complementary course in Mathematics for the First Degree Programme in Physics and Computer Application

UNIVERSITY OF KERALA

Semester II

MATHEMATICS II
(Parial Differentiation, Vector Differentiation, Complex Numbers and Multiple Integrals)
Code: MM1231.6

Instructional hours per week: 5 No. of Credits: 4

MODULE 1
Partial Differentiation

The total differential and total derivative - Exact and inexact differentials - Theorems of partial differentiation - The chain rule - Change of variables - Taylors theorem for many-variable functions - Stationary values of many-variable functions - Stationary values under constraints.

The topics in this module can be found in Chapter 5, sections 5.1 to 5.9 of Text [1].

More exercises related to the topics in this module can be found in Chapter 13 of Reference [1].

MODULE 2
Vector Calculus - Differentiation

Differentiation of vectors - Differentiation of composite vector expressions - Differential of a vector - Integration of vectors - Space curves - Vector functions of several arguments - Surfaces - Scalar and vector fields - Vector operators - Gradient of a scalar field - Divergence of a vector field - Curl of a vector field - Vector operator formulae - Vector operators acting on sums and products - Combinations of grad, div and curl - Cylindrical and spherical polar coordinates - Cylindrical polar coordinates - Spherical polar coordinates.

The topics in this module can be found in Chapter 10, sections 10.1 to 10.9 of Text [1].

More exercises related to the topics in this module can be found in Chapter 3 of Reference [3].

MODULE 3
Complex Numbers

de Moivress Theorem - Trigonometric identities - Finding the nth roots of unity - Solving polynomial equations - Complex logarithms and complex powers - Applications to differentiation and integration - Hyperbolic functions - Inverses of hyperbolic functions - Calculus of hyperbolic functions.

The topics in this module can be found in Chapter 3, sections 3.4 to 3.7 of Text [1].

More exercises related to the topics in this module can be found in Chapter 6 of Reference [1] and Chapter 13 of Reference [4].

MODULE 4
Multiple Integrals

Double integrals - Triple integrals - Applications of multiple integrals - Areas and volumes only (Masses, centres of mass and centroids - Pappus theorems - Moments of inertia - Mean values of functions are excluded) - Change of variables in multiple integrals - Change of variables in double
integrals - Evaluation of some special infinite integrals - Change of variables in triple integrals - General properties of Jacobians.

The topics in this module can be found in Chapter 6, sections 6.1 to 6.4 of Text [1].

More exercises related to the topics in this module can be found in Chapter 14 of Reference [1] and Chapter 6 of Reference [2].

Text


References


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Syllabus for the Complementary course in Mathematics for the First Degree Programme in Physics and Computer Application

UNIVERSITY OF KERALA

Semester III

MATHEMATICS III
(Theory of Matrices, Vector Integration, Differential Equations and Fourier Series)
Code: MM1331.6

Instructional hours per week: 5  No. of Credits: 4

MODULE 1
Theory of Matrices  24 Hours

*The topics in this module can be found in Chapter 3 of Text [2]*.

*More exercises related to the topics in this module can be found in Chapter 7 and 8 of Text [3]. This topics can be referred in Reference [4]*.

MODULE 2
Vector Calculus - Integration  24 Hours
Evaluating Line integrals - Physical examples of line integrals - Line integrals with respect to a scalar - Connectivity of regions - Green's theorem in a plane - Conservative fields and potentials - Surface integrals - Evaluating surface integrals - Vector areas of surfaces - Physical examples of surface integrals - Volume integrals - Volumes of three-dimensional regions - Integral forms for grad, div and curl - Green's theorems (without proof) - Other related integral theorems - Physical applications of the divergence theorem - Stokes theorem and related theorems (without proof) - Related integral theorems - Physical Applications.

*The topics in this module can be found in Chapter 11 of Text [1].*

*More exercises related to the topics in this module can be found in Chapter 3 of Text [2].*

MODULE 3
Differential Equations  24 Hours
First Order Ordinary Differential Equations - Exact ODEs. Integrating Factors - Linear ODEs - Bernoulli Equation - Orthogonal Trajectories - Homogeneous Linear ODEs with Constant Coefficients - Euler-Cauchy Equations, Nonhomogeneous ODEs.

*The topics in this module can be found in Chapter 1 and 2, sections 1.4, 1.5, 1.6, 2.2, 2.5 and 2.7 of Text [3].*

*More exercises related to the topics in this module can be found in Chapter 8 of Text [2] and Reference [2]*
MODULE 4
Fourier Series and Fourier Transforms 18 Hours

Introduction - Simple Harmonic Motion and Wave Motion - Periodic Functions - Applications of Fourier Series - Average Value of a Function - Fourier Coefficients - Dirichlet Conditions - Complex Form of Fourier Series - Other Intervals - Even and Odd Functions - Parsevals Theorem - Fourier Transforms.

The topics in this module can be found in Chapter 7 of Text [2].

More exercises related to the topics in this module can be found in Chapter 11 of Text [3].

Text


References


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Syllabus for the Complementary course in Mathematics for the First Degree Programme in Physics and Computer Application

UNIVERSITY OF KERALA

Semester IV

MATHEMATICS IV
(Abstract Algebra, Laplace Transforms, Special Functions and Functions of A Complex Variable)
Code: MM1431.6

Instructional hours per week: 5 No. of Credits: 4

MODULE 1
Abstract Algebra 24 Hours
Groups - definition and Examples - Elementary properties - Finite Groups and Subgroups - Cyclic Groups - Elementary Properties
Rings - definition and Examples (Finite and Infinite) - Integral Domain and Field - definition and examples (Finite and Infinite)

_The topics in this module can be found in Text [1]._

_More exercises related to the topics in this module can be found in Reference [1]._

MODULE 2
Laplace Transforms and its Applications 24 Hours
Laplace transforms - Elementary Functions - Inverse Transform - Partial Fraction Expansion - Laplace transforms of derivatives - Dirac Delta Function (excluded) - Other Properties - Translation - Derivative of a Transform - Integration of Transforms - Limits of IntegrationUnit Step Function - Convolution (Faltungs) Theorem - Inverse Laplace transforms.

_The topics in this module can be found in Chapter 15, sections 15.8 to 15.12 of Text [2]._

_More exercises related to the topics in this module can be found in Reference [2]._

MODULE 3
Special Functions 18 Hours
The Factorial Function - Definition of the Gamma Function - Recursion Relation - The Gamma Function of Negative Numbers - Some Important Formulas Involving Gamma Functions - Beta Functions - Beta Functions in Terms of Gamma Functions.

_The topics in this module can be found in Chapter 11 of Text [3]._

_More exercises related to the topics in this module can be found in chapter 13 of Text [2]._

MODULE 4
Functions of A Complex Variable 24 Hours

_The topics in this module can be found in Chapter 14, sections 1 to 8 of Text [3]._

_More exercises related to the topics in this module can be found in Chapter 14, 15 and 16 of Reference [2]_
Text

1  John B Fraleigh  *A first course in Abstract Algebra*, Narosa Publications.


References

1  D A R Wallace  *Groups, Rings and Fields*, Springer.


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Syllabus for the Complementary course in Mathematics for the First Degree
Programme in Computer Science

UNIVERSITY OF KERALA

Semester I

MATHEMATICS I
Calculus and Number Theory
Code: MM1131.10

Instructional hours per week: 4
No. of Credits: 3

MODULE 1
Differentiation and its Applications
18 Hours

Differentiation: Hyperbolic and inverse hyperbolic functions.
Applications: nth - derivative of - polynomials, exponential, sine, cosine and their product, Leibnitz Theorem (Without Proof) and its application

The topics in this module can be found in Chapter 6, sections 6.7 and 6.8 of Text [1] and Chapter 4, sections 4.1 and 4.2 of Text [2].

MODULE 2
Integration and its Applications
18 Hours

Definite and Indefinite Integrals: Integration techniques - substitution, rational functions with degree of numerator less than and greater than or equal to the degree of denominator, partial fraction and integration by parts.
Applications: Area of a curve, area between two curves, length of a plane curve, area of a surface of revolution and volume of revolution. (volume by cylindrical shells, volume by slicing are excluded)

The topics in this module can be found in Chapter 4, sections 4.1, 4.2, 4.3 and 4.5 and Chapter 5, sections 5.1, 5.4 and 5.5 of Text [1].

MODULE 3
Ordinary Differential Equations
18 Hours


The topics in this module can be found in Chapter 5, sections 5.2, 5.3, 5.7 and 5.8 and Chapter 7, section 7.2 of Text [3].

MODULE 4
Number Theory
18 Hours

Numbers: Euclid’s Algorithm - GCD of 2 natural numbers, Divisors of a given natural number, Highest power of a prime.
Congruences: Euler’s function $\phi(n)$ and its properties(without proof of theorems), Fermat’s and Wilson’s Theorems, Euler’s extension of Fermat’s theorem( Only Statements) and its applications to find the remainder when divisible by a given number.

The topics in this module can be found in Chapter 3, sections A and B and Chapter 9, sections B and C of Text [4].
Text


References


REMARK

* Exercise and problems should be solved and graphed using a Computer Algebra System (CAS).

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Syllabus for the Complementary course in Mathematics for the First Degree programme in Computer Science

UNIVERSITY OF KERALA

Semester II

MATHEMATICS II
Discrete Mathematics
Code: MM1231.10

Instructional hours per week: 4
No. of Credits: 3

MODULE 1

Mathematical Logic
18 Hours

**Proposition and Connectives**: Conditional and Biconditional Equivalence of Propositions, Tautology and Contradictions, Duality Theorem and its properties, Algebra of Proposition.

**Normal Form**: Principal Disjunctive, Principal Conjunctive Normal Forms and its applications using with and without truth tables


*The topics in this module can be found in Chapter 1 of Text [1].*

**MODULE 2**

Predicate Logic
18 Hours

**Quantifiers**: Essential and Universal quantifier, Free and Bound Variables.

**Rules of Specifications**: Rule US, ES, UG, EG. Using these, convert a given statement into symbolic notation. Derivation from Premises using truth table and without using truth table.

*The topics in this module can be found in the continuation of Chapter 1 of Text [1].*

**MODULE 3**

Set Theory
18 Hours

**Partition of Set**: POSET - HASSE diagrams for partial ordering - lub, glb.
**Lattices**: Definition and Examples, principle of duality, Properties - Idem Potency, commutatively, associativity, absorption(sub lattices excluded).
**Group Theory**: Definition, Examples, Order of a Group and its elements.
*The topics in this module can be found in Chapter 2 and Chapter 5 of Text [1].*

**MODULE 4**

Coding Theory and Combinatorics
18 Hours

**Coding Theory**: Group Code, Encoders and Decoders, Hamming Codes - Hamming distance, decoding and encoding function - correction and detection of errors in Group Codes - parity check matrix and its properties.

**Combinatorics**: Recurrence relations of degree k with constant coefficients (Homogeneous and Non-homogeneous) and its solutions (Nonhomogeneous including Polynomial, Trigonometric $\sin(ax)$ or $\cos(ax)$ exponential - excluding their product combinations)- Generating function Method of is also included.

*The topics in this module can be found in Chapter 6 of Text [1].*

**Text**

References


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