UNIVERSITY OF MADRAS

Chepauk, Chennai 600 005

[Est. 1857, State University, NAAC 'A' Grade, CGPA 3.32, NIRF 2019 Rank: 20]

Website: www.unom.ac.in, Tel. 044-2539 9561

Undergraduate Programme in Mathematics

(With effect from the Academic Year 2020-21)

FEBRUARY 2020

Note: The Board of Studies is designed Learning Outcomes Based Curriculum Framework of B.Sc. Mathematics Programme prescribed by UGC

Content

1. PREAMBLE

The curriculum of B.Sc. Mathematics is structured in a way that the students acquire in-depth knowledge to perceive the principles of the core. Basics in Algebra, Calculus , Analytical Geometry , Differential Equations and Transform Techniques are covered exclusively to prepare the students to proceed to the next level of Higher Mathematics of Linear Algebra, Real and Complex Analysis, Mechanics. A list of varied electives namely, Operations Research, Graph Theory, Number Theory, Programming Language 'C', Mathematical Modelling, Programming with Python are furnished to bridge between the Main and Applied Mathematics. The comprehensive curriculum design yields an excellent career opportunity in Research, Education, Public and Private Sectors, Business sectors, Banking, IT Industries and in every domain of contemporaries.

2. PROGRAM LEARNING OUTCOMES

The comprehensive course outline enables the students to enhance Computational skills and Mathematical reasoning. The program develops the ability to think critically, logically and analytically thereby preparing the students to enhanced career opportunities in Industries, Commerce, Education and Research.

a. NATURE AND EXTENT OF BACHELOR'S DEGREE PROGRAMME

Mathematics is the culmination of in-depth of knowledge of Algebra, Calculus, Differential equations and several other branches of Mathematics. This also leads to selected areas like Computer science and Statistics. Mathematics is a diverse discipline that deals with data, measurement and observations from science, with inference, deduction and proof and with mathematical models of natural phenomena of human behaviour and of social systems.

b. AIMS OF BACHELOR'S DEGREE PROGRAMME IN MATHEMATICS

The overall aim of B.Sc. Mathematics is to

- **develop broad and balanced knowledge and understanding of definitions, concepts, principles and theorems.**
- **enhance the ability of learners to apply the knowledge and skills acquired by them during the programme to solve specific theoretical and applied problems in mathematics.**
- **provide students/learners sufficient knowledge and skills enabling them to undertake further studies in mathematics and its allied areas on multiple disciplines concerned with mathematics.**

c. GRADUATE ATTRIBUTES IN MATHEMATICS

The graduate attributes in mathematics are mentioned in the expected course learning outcomes of each course which provides critical thinking, analytical reasoning, problem solving and research related skills etc,.

3. COURSE STRUCTURE

FIRST SEMESTER

Course Content	Name of the Course	Ins. Hrs	Credits	Int. Marks	Ext.Marks	Total
Part - I	Language Paper -I	4	3	25	75	100
Part - II	English Paper -I	4	3	25	75	100
Part - III	BMA-CSC01: Algebra@	5	4	25	75	100
	BMA-CSC02: Differential Calculus@	4	4	25	75	100
	Allied Paper- I	9	5	25	75	100
Part - IV	Basic Tamil/Adv. Tamil/NME –I*	2	2	25	75	100
	Soft Skills -I	2	3	50	50	100

SECOND SEMESTER

Course Content	Name of the Course	Ins. Hrs	Credits	Int. Marks	Ext.Marks	Total
Part - I	Language Paper -II	5	3	25	75	100
Part - II	English Paper -II	5	3	25	75	100
Part - III	BMA-CSC03: Trigonometry@	4	4	25	75	100
	BMA-CSC04: Integral Calculus and Vector Analysis@	5	4	25	75	100
	Allied Paper- II	9	5	25	75	100
Part - IV	Basic Tamil/Adv. Tamil/NME-II*	1	2	25	75	100
	Soft Skills -II	1	3	50	50	100

***NME: CHOOSE ANY ONE OF THE PAPER FROM THE OTHER DEPARTMENT**

THIRD SEMESTER

Course Content	Name of the Course	Ins. Hrs	Credits	Int. Marks	Ext. Marks	Total
Part - I	Language Paper -III	5	3	25	75	100
Part - II	English Paper -III	5	3	25	75	100
Part - III	BMA-CSC05: Analytical Geometry@	5	4	25	75	100
	BMA-CSC06: Differential Equations@	4	4	25	75	100
	Allied Paper- III	9	5	25	75	100
Part - IV	Environmental Studies	1	Examination will be held in the IV Sem.			
	Soft Skills -III	1	3	50	50	100

FOURTH SEMESTER

Course Content	Name of the Course	Ins. Hrs	Credits	Int. Marks	Ext.Marks	Total
Part - I	Language Paper -IV	5	3	25	75	100
Part - II	English Paper -IV	5	3	25	75	100
Part - III	BMA-CSC07: Transform Techniques@	4	4	25	75	100
	BMA-CSC08: Statics@	5	4	25	75	100
	Allied Paper- IV	9	5	25	75	100
Part - IV	Environmental Studies	1	2	25	75	100
	Soft Skills -IV	1	3	50	50	100

FIFTH SEMESTER

Course Content	Name of the Course	Ins. Hrs	Credits	Int. Marks	Ext.Marks	Total
Part - III	BMA-CSC09: Algebraic Structures-I@	6	4	25	75	100
	BMA-CSC10: Real Analysis-I@	6	4	25	75	100
	BMA-CSC11: Dynamics@	6	4	25	75	100
	BMA-CSC12: Discrete Mathematics@	6	4	25	75	100
	Elective Paper -I: Choose any one from Group-A	6	5	25	75	100
Part - IV	Value Education		2	25	75	100

SIXTH SEMESTER

Course Content	Name of the Course	Ins. Hrs	Credits	Int. Marks	Ext.Marks	Total
Part - III	BMA-CSC13: Algebraic Structures-II@	6	4	25	75	100
	BMA-CSC14: Real Analysis-II@	6	4	25	75	100
	BMA-CSC15: Complex Analysis@	6	4	25	75	100
	Elective Paper -II: Choose any one from Group-B	6	5	25	75	100
	Elective Paper -III: Choose any one from Group-B	6	5	25	75	100
Part - V	Extension Activity		1			

@ Common to B.Sc. Mathematics with Computer Applications.

LIST OF ALLIED SUBJECTS:

BPS-CSA01	Allied Physics – I (Theory)
BCY-CSA1A	Allied Chemistry – I (Theory)
BMA-CSA01	Calculus of finite differences and Numerical Analysis –I@
BMA-CSA02	Mathematical Statistics – I@
	Financial Accounting - I
BPS-CSA02	Allied Physics – II (Theory) (pre-requisite Physics – I).
BPS-CSAP1	Allied Physics I & II (Practical)
BCY-CSA2A	Allied Chemistry – II (Theory) (pre-requisite Chemistry – I)
BCY-CSAP1	Allied Chemistry – I & II (Practical)
BMA-CSA03	Calculus of finite differences and Numerical Analysis -II (pre-requisite Calculus of finite differences and Numerical Analysis -I)@
BMA-CSA04	Mathematical Statistics II - (pre requisite Mathematical Statistics- I)@
	Financial Accounting - II (prerequisite Financial Accounting - I)
	Cost Accounting
	Management Accounting.

@ Common to B.Sc. Mathematics with Computer Applications.

LIST OF ELECTIVE SUBJECTS

GROUP – A

BMA-DSEA1	PROGRAMMING LANGUAGE 'C' WITH PRACTICALS
BMA-DSEA2	PROGRAMMING LANGUAGE PYTHON WITH PRACTICALS
BMA-DSEA3	MATHEMATICAL MODELING
BMA-DSEA4	NUMERICAL METHODS

GROUP - B

BMA-DSEB1	ELEMENTARY NUMBER THEORY
BMA-DSEB2	GRAPH THEORY
BMA-DSEB3	OPERATIONS RESEARCH
BMA-DSEB4	SPECIAL FUNCTIONS
BMA-DSEB5	APPLIED STATISTICS

The following distribution of marks for Computer related subjects which have both theory and practical (syllabus combined both theory and practical in each paper together) in B.Sc. Mathematics be followed:

PAPER	INTERNAL	EXTERNAL	TOTAL
Theory	25	75	100
Practical	40	60	100

Finally, theory marks (100) be reduced to 60% and practical marks (100) be reduced to 40%.

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UNIVERSITY OF MADRAS

B.Sc. DEGREE COURSE IN MATHEMATICS

SYLLABUS WITH EFFECT FROM 2020-2021

BMA-CSC01

CORE-I: ALGEBRA

(Common to B.Sc. Maths with Computer Applications)

Inst.Hrs : 5 **YEAR: I**

Credits : 4 **SEMESTER: I**

Learning Outcomes:

Students will acquire

- Basic ideas on Theory of Equations, Matrices and Theory of Numbers.
- Knowledge to solve theoretical and applied problems.

UNIT I

Theory of Equations :Polynomial equations with Imaginary and irrational roots- Relation between roots and coefficients- Symmetric functions of roots in terms of coefficients.
Chapter 6 : Section 9 to 12.

UNIT II

Reciprocal equations - Standard form-Increase or Decrease the roots of the given equation - Removal of terms Approximate solutions of roots of polynomials by Horner's method.
Chapter 6: section 16, 16.1, 16.2, 17, 30.

UNIT III

Summation of Series : Binomial- Exponential -Logarithmic series (Theorems without proof):
Chapter 3: Section 10, Chapter 4: Section 3, 3.1, 3.5, 3.6, 3.7 (omit 3.4)

UNIT IV

Symmetric- Skew Symmetric- Hermitian- Skew Hermitian- Orthogonal Matrices- Eigen values & Eigen Vectors- Similar matrices- Cayley - Hamilton Theorem.
Chapter 2: Section 6.1 to 6.3, 9.1, 9.2, 16, 16.1, 16.2, 16.3.

UNIT V

Prime number and Composite number - Divisors of a given number N- Euler's function (without proof) - Integral part of a real number - congruences.
Chapter 5: Section 1 to 13.

Contents and treatment as in

1. Algebra, Volume I by T. K. ManicavachagamPillay,T.Natarajan, K.S.Ganapathy, Viswanathan Publication 2007 - Unit – 1 and 2.
2. Algebra, Volume II by T. K. ManicavachagomPillay ,T.Natarajan ,K.S.Ganapathy, Viswanathan Publication 2008 - Unit – 3, 4 and 5.

Reference:-

1. Algebra by S. Arumugam (New Gama publishing house, Palayamkottai).
2. Algebra and Trigonometry, Volume I and II by P.R.Vittal, V.Malini (Margham Publishers).

e-Resources:

1. http://mathworld.wolfram.com
2. http://www.themathpage.com/

UNIVERSITY OF MADRAS

B.Sc. DEGREE COURSE IN MATHEMATICS
SYLLABUS WITH EFFECT FROM 2020-2021

BMA-CSC02

CORE-II: DIFFERENTIAL CALCULUS
(Common to B.Sc. Maths with Computer Applications)

Inst.Hrs : 4 **YEAR: I**
Credits : 4 **SEMESTER: I**

Learning outcomes:
Students will acquire Knowledge about

- The basics of differentiation and its applications.
- The notion of curvature, evolutes, involutes and polar co-ordinates.

UNIT I

Successive differentiation - n^{th} derivative- standard results – Trigonometrical transformation – formation of equations using derivatives - Leibnitz's theorem and its applications

Chapter 3 section 1.1 to 1.6, 2.1 and 2.2

UNIT II

Total differential of a function – special cases – implicit functions - partial derivatives of a function of two functions - Maxima and Minima of functions of two variables- Lagrange's method of undetermined multipliers.

Chapter 8 : Section 1.3 to 1.5 and 1.7, Section 4, 4.1 and 5.

UNIT III

Envelopes – method of finding envelopes – Curvature- circle, radius and centre of curvature- Cartesian formula for radius of curvature – coordinates of the centre of curvature – evolute-and involute - radius of curvature and centre of curvature in polar coordinates – p-r equation

Chapter 10 Section 1.1 to 1.4 and Section 2.1 to 2.7

UNIT IV

Polar coordinates - angle between the radius vector and the tangent – slope of the tangent in the polar coordinates – the angle of intersection of two curves in polar coordinates- polar sub tangent and polar sub normal – the length of arc in polar coordinates.

Chapter 9 Section 4.1 to 4.6

UNIT V

Definition-Asymptotes parallel to the axes – special cases – another method for finding asymptotes - asymptotes by inspection – intersection of a curve with an asymptote.

Chapter 11 - Section 1 to 7.

Content and treatment as in

"Calculus", Volume - 1 by S. Narayanan and T.K. Manicavachagompillay - S.Viswanathan publishers – 2006

Reference:-

1.Calculus , Dr. P.R. Vittal&Dr. V. Malini, Margham Publications, Chennai.
2.Calculus by Thomas and Fenny, Pearson Publication.
3.Calculus by Stewart
4. Calculus , Dr. P.R. Vittal&Dr. V. Malini, Margham Publications, Chennai.

e-Resources:

1. http://www.themathpage.com/
2. http://mathworld.wolfram.com
3. http://www.univie.ac.at/future.media/moe/galerie.html
4. http://www.analyzemath.com/calculus

UNIVERSITY OF MADRAS
B.Sc. DEGREE COURSE IN MATHEMATICS
SYLLABUS WITH EFFECT FROM 2020-2021

BMA-CSC03

CORE-III: TRIGONOMETRY
(Common to B.Sc. Maths with Computer Applications)

Inst.Hrs : 4 **YEAR: I**
Credits : 4 **SEMESTER: II**

Learning outcomes:

Students will acquire Knowledge

- About the expansions of Trigonometric Functions, Hyperbolic Functions and sum of Trigonometric Series.

UNIT I

Expansions of powers of $\sin\theta$, $\cos\theta$ - Expansions of $\cos^n\theta$, $\sin^n\theta$,$\cos^m\theta\sin^n\theta$
Chapter 2, Section 2.1, 2.1.1, 2.1.2,2.1.3

UNIT II

Expansions of $\sin n\theta$, $\cos n\theta$, $\tan n\theta$ - Expansions of $\tan(\theta_1+\theta_2+\ldots\ldots..+\theta_n)$ - Expansions of sin x, Cosx, tanx in terms of x-Sum of roots of trigonometric equations – Formation of equation with trigonometric roots. Chapter 3, Section 3.1 to 3.6

UNIT III

Hyperbolic functions-Relation between circular and hyperbolic functions - Formulas in hyperbolic functions – Inverse hyperbolic functions Chapter 4, Section 4.1 to 4.7 .

UNIT IV

Inverse function of exponential functions – Values of Log (u+iv) - Complex index.
Chapter 5, Section 5.1 to 5.3

UNIT V

Sums of Trigonometric series – Applications of binomial, exponential, , logarithmic and Gregory's series - Difference method. Chapter 6, Section 6.1 to 6.6.3

Content and treatment as in

Trigonometry by P. Duraipandian and KayalalPachaiyappa, Muhil Publishers.

Reference:-

1.Trigonometry, Calculus , Dr. P.R. Vittal , Margham Publications, Chennai.
2.Trigonometry by T.K. Manickavachagam Pillay.S.Viswanathan (Printers and Publishers) Pvt.Ltd.

e-Resources:

1. http://mathworld.wolfram.com
2. http://ocw.mit.edu/courses/mathematics/

UNIVERSITY OF MADRAS
B.Sc. DEGREE COURSE IN MATHEMATICS
SYLLABUS WITH EFFECT FROM 2020-2021

BMA-CSC04

CORE-IV: INTEGRAL CALCULUS AND VECTOR ANALYSIS
(Common to B.Sc. Maths with Computer Applications)

Inst.Hrs : 5 **YEAR: I**
Credits : 4 **SEMESTER: II**

Learning outcomes:

Students will acquire Knowledge about

- Integration and its geometrical applications, double, triple integrals and improper integrals.
- Vector differentiation and Vector integration.

UNIT I

Reduction formulae– Types, $\int x^n e^{ax} dx$, $\int x^n cosaxdx$, $\int x^n sinaxdx$, $\int cos^n xdx$, $\int sin^n xdx$, $\int sin^m xcos^n xdx$, $\int tan^n xdx$,$\int cot^n xdx$,$\int sec^n xdx$,$\int cosec^n xdx$, $\int x^n (\log x)^m dx$- Bernoulli's formula.

Chapter 1 Section 13, 13.1 to 13.10,14,15.1.

UNIT II

Multiple Integrals- definition of the double integrals- evaluation of the double integrals- double integrals in polar coordinates – triple integrals – applications of multiple integrals – volumes of solids of revolution – areas of curved surfaces – change of variables – Jacobians.

Chapter 5 Section 1, 2.1, 2.2, 3.1, 4, 6.1, 6.2, 6.3, 7
Chapter 6 Section 1.1, 1.2, 2.1 to 2.4.

UNIT III

Beta and Gamma functions - infinite integral – definitions – recurrence formula of Γ functions - properties of β-functions - relation between β and Γ functions.
Chapter 7 Sections 1.1 to 1.4 , 2.1, 2.3, 3, 4, 5.

UNIT IV

Introduction - directional derivative- Gradient- divergence- curl- Laplacian Differential Operator.
Chapter 2 Sections 2.1 - 2.13.

UNIT V

Line, surface and volume integrals - Integral Theorems - Gauss, Greens and Stokes (Without proof) – Problems.

Chapter 3 Sections 3.1 to 3.6 and Chapter 4 Sections 4.1 to 4.5.

Content and treatment as in

1. "Calculus", Vol- II by S. Narayanan and T.K. Manicavachagampillay - S. Viswanathanpublishers– 2007 for Unit 1 , Unit 2 , Unit 3.
2. "Vector Analysis" by P.Duraipandian and KayalalPachaiyappa, S.ChandFor Unit 4, Unit 5.

Reference:-

1. Integral Calculus and differential equations : Dipak Chatterjee (TATA McGraw Hill Publishing companyLtd.).
2. Vector Algebra and Analysis by Narayanan and T.K.Manickvachagam Pillay S .Viswanathan Publishers.
3. Vector Analysis: Murray Spiegel (Schaum Publishing Company, NewYork).

e-Resources:

1. http://mathworld.wolfram.com.
2. http://www.sosmath.com.

UNIVERSITY OF MADRAS

B.Sc. DEGREE COURSE IN MATHEMATICS
SYLLABUS WITH EFFECT FROM 2020-2021

BMA-CSC05

CORE-V: ANALYTICAL GEOMETRY
(Common to B.Sc. Maths with Computer Applications)

Inst.Hrs : 5 **YEAR: II**
Credits : 4 **SEMESTER: III**

Learning outcomes:

Students will acquire Knowledge

- To analyze characteristics and properties of two and three dimensional geometric shapes.
- To develop mathematical arguments about geometric relationships.
- In Geometry and its applications in real world.

UNIT I

Chord of contact – polar and pole,- conjugate points and conjugate lines – chord with (x_1, y_1) as its midpoint – diameters – conjugate diameters of an ellipse.- semi diameters- conjugate diameters of hyperbola
Chapter 7: Sections 7.1 to 7.3 , Chapter – 8 Section 8.1 to 8.5.

UNIT II

Polar coordinates: General polar equation of straight line – Polar equation of a circle on A_1A_2 as diameter, Equation of a straight line, circle, conic – Equation of chord, tangent, normal. Equations of the asymptotes of a hyperbola.
Chapter 10 : Sec 10.1 to 10.8.

UNIT III

Introduction – System of Planes - Length of the perpendicular – Orthogonal projection.
Chapter 2 Sec 2.1 to 2.10.

UNIT IV

Representation of line – angle between a line and a plane- co-planar lines- shortest distance 2 skew lines- Length of the perpendicular- intersection of three planes
Chapter 3 :Sec 3.1 to 3.8.

UNIT V

Equation of a sphere - general equation - section of a sphere by a plane - equation of the circle - tangent plane - angle of intersection of two spheres- condition for the orthogonality - radical plane.
Chapter 6 : Sec 6.1 to 6.8.

Contents and treatment as in

1. Analytical Geometry of 2D by P.Durai Pandian- Muhil publishers for Unit – 1 and 2
2. Analytical Solid Geometry of 3D by Shanthi Narayan and Dr.P.K. Mittal-S.Chand& Co. Pvt.Ltd.- for Unit – 3 to 5

Reference :

1. Analytical Geometry of Two Dimension by T. K. Manikavachakam Pillai and S. Narayanan.S.Viswanathan (Printers and Publishers) Pvt. Ltd.
2. Analytical Geometry of Three Dimension by T. K. Manikavachakam Pillai and S. Narayanan.S.Viswanathan (Printers and Publishers) Pvt. Ltd.

e-Resources:

1. http://mathworld.wolfram.com.
2. http://www.univie.ac.at/future.media/moe/galerie.html

UNIVERSITY OF MADRAS

B.Sc. DEGREE COURSE IN MATHEMATICS

SYLLABUS WITH EFFECT FROM 2020-2021

BMA-CSC06

CORE-VI: DIFFERENTIAL EQUATIONS

(Common to B.Sc. Maths with Computer Applications)

Inst.Hrs : 4 **YEAR: II**

Credits : 4 **SEMESTER: III**

Learning outcomes:

Students will acquire knowledge

- About the methods of solving Ordinary and Partial Differential Equations.
- To introduce Differential Equation as a powerful tool in solving problems in Science.

UNIT I

Ordinary Differential Equations:Variable separable-Homogeneous Equation-Non-Homogeneous Equations of first degree in x and y-Linear Equation-Bernoulli's Equation-Exact differential equations.

Chapter 2: Section 1 to 6.

UNIT II

Equation of first order but not of higher degree: Equation solvable for dy/dx- Equation solvable for y-Equation solvable for x- Clairauts form-Linear Equations with constant coefficients-Particular integrals e^{ax}, sinax, cosax, x^m, Ve^{ax} where V is sinax or cosax or x^m .

Chapter 4: Section 1, 2.1, 2.2, 3.1.

Chapter 5: Section 4.

UNIT III

Simultaneous linear differential equations- Linear Equations of the Second Order -Complete solution in terms of a known integrals- Reduction to the Normal form- Change of the Independent Variable - Method of Variation of Parameters.

Chapter 6: Section- 6

Chapter 8:Section- 1,2,3,4.

UNIT IV

Partial differential equation: Formation of PDE by Eliminating arbitrary constants and arbitrary functions-complete integral-singular integral-General integral- Lagrange's Linear Equations Pp+Qq=R.

Chapter 12: Section- 1, 2, 3.1, 3.2, 4.

UNIT V

Special methods - Standard forms - Charpit's Methods - Related problems

Chapter 12: Section-5.1, 5.2, 5.3, 5.4, 6.

Contents and treatment as in

"Differential Equations and its applications", by S.Narayanan, T.K.Manikavachagam Pillay –- S.Viswanathan (Printers and Publishers) Pvt. Ltd(2006).

Reference:

1.Mathematics for B.Sc-Branch-I Volume –III by P.Kandasamy ,K.Thilagavathy

S.Chand Publications.

2.Differential equations with applications and historical notes by George F.Simmons,

2nd Ed,TataMcgraw Hill Publications .

3. Differential Equations by ShepleyL.Ross, 3 rdEd ,JohnWiely and sons 1984.

4 .Differential Equations by N.P.Bali,Laxmi Publications Ltd,New Delhi-2004.

5. Ordinary and Partial differential Equation by Dr.M.D.Raisinghania ,S.Chand.

e-Resources:

1.http://mathworld.wolfram.com
2. http://www.analyzemath.com/calculus/Differential_Equations/applications. html

UNIVERSITY OF MADRAS
B.Sc. DEGREE COURSE IN MATHEMATICS
SYLLABUS WITH EFFECT FROM 2020-2021

BMA-CSC07

CORE-VII: TRANSFORM TECHNIQUES
(Common to B.Sc. Maths with Computer Applications)

Inst.Hrs : 4 **YEAR: II**
Credits : 4 **SEMESTER: IV**

Learning outcomes:

Students will acquire knowledge

- About Laplace Transforms and its inverse
- To apply Laplace transform in solving Ordinary Differential Equations with constant coefficients, simultaneous Ordinary Differential Equations.
- To solve problems in Fourier series and Fourier transforms.

UNIT I: The Laplace Transforms-Definitions-Sufficient conditions for the existence of the Laplace transform(without proof)-Laplace transform of periodic functions-some general theorems-evaluation of integrals using Laplace transform-Problems.

Chapter 5: Section-1 to 5.

UNIT II:The inverse Laplace Transforms- Applications of Laplace Transforms to ordinary differential equations with constant co-efficients and variable co-efficients, simultaneous equations and equations involving integrals-Problems.

Chapter 5: Section-6 to 12.

UNIT III: Fourier series- Expansion of periodic functions of period 2π- Expansion of even and odd functions, Half range Fourier series-Change of intervals –Problems.

Chapter 6: Section-1 to 6.

UNIT IV: Fourier Transform- Infinite Fourier Transform(Complex form) – Properties of Fourier Transform – Fourier cosine and Fourier sine Tranform – Properties – Parseval's identity – Convolution theorem - Problems.

Chapter 6: Section-8 to 15.

UNIT V: Z Transforms: Definitionof Z-Transform and its properties - Z-Transforms of some basic functions- Examples and simple problems

Chapter 7: Sections -7.1 to 7.3.

Contents and treatment as in

1. "Calculus-Volume III" – S.Narayananand T.K.ManicavachagamPillai. (Ananda Book Depot)(**for Units I to IV**)
2. "Engineering Mathematics for Semester III- Third Edition – T.Veerarajan (Tata McGraw-Hill Publishing Company Ltd, New Delhi) **(for Unit-V**)

Reference Books

1. Engineering Mathematics Volume III – P.Kandasamy and others (S.Chand and Co.)
2. Advanced Engineering Mathematics- Stanley Grossman and William R.Devit.

Engineering Mathematics III-A.Singaravelu, Meenakshi Agency, Chenani, 2008

e-Resources:

1. http://mathworld.wolfram.com.
2. http://www.sosmath.com.

UNIVERSITY OF MADRAS

B.Sc. DEGREE COURSE IN MATHEMATICS

SYLLABUS WITH EFFECT FROM 2020-2021

BMA-CSC08

CORE-VIII: STATICS

(Common to B.Sc. Maths with Computer Applications)

Inst.Hrs : 5 **YEAR: II**

Credits : 4 **SEMESTER: IV**

Learning outcomes:

Students will acquire knowledge about

- Particles or body in rest under the given forces.
- Forces, equilibrium of a particle and centre of mass of various bodies.

UNIT I

Force- Newtons laws of motion - resultant of two forces on a particle- Equilibrium of a particle
Chapter 2 - Section 2 .1 , 2.2 , Chapter 3 - Section 3.1.

UNIT II

Forces on a rigid body – moment of a force – general motion of a rigid body- equivalent systems of forces – parallel forces – forces along the sides of a triangle – couples
Chapter 4 - Section 4 .1 to 4.6.

UNIT III

Resultant of several coplanar forces**-** equation of the line of action of the resultant- Equilibrium of a rigid body under three coplanar forces – Reduction of coplanar forces into a force and a couple.-problems involving frictional forces
Chapter 4 - Section 4.7 to 4.9,
Chapter 5 - Section 5.1, 5.2.

UNIT IV

Centre of mass – finding mass centre – a hanging body in equilibrium
Chapter 6 - Section 6.1 to 6.3.

UNIT V

Hanging strings- equilibrium of a uniform homogeneous string – suspension bridge
Chapter 9 - Section 9.1, 9.2.

Contents and treatment as in

"Mechanics" by P. Duraipandian ,LaxmiDuraipandian , MuthamizhJayapragasham, S. Chand and Co limited 2008 .

Reference:

1. Dynamics – K. ViswanathaNaik and M. S. Kasi, Emerald Publishers.
2. Dynamics – A. V. Dharmapadam, S. Viswanathan Publishers.
3. Mechanics – Walter Grenier.

e-Resources:

1. https://www.wikipedia.org/
2. https://physics.info

UNIVERSITY OF MADRAS
B.Sc. DEGREE COURSE IN MATHEMATICS
SYLLABUS WITH EFFECT FROM 2020-2021

BMA-CSC09

CORE-IX: ALGEBRAIC STRUCTURES-I
(Common to B.Sc. Maths with Computer Applications)

Inst.Hrs : 6 **YEAR: III**
Credits : 4 **SEMESTER: V**

Learning outcomes:

Students will acquire knowledge about the concepts of Sets, Groups and Rings.

UNIT I
Introduction to groups- Subgroups- cyclic groups and properties of cyclic groups- Lagrange's Theorem- A counting principle.
Chapter 2 Section 2.4 and 2.5.

UNIT II
Normal subgroups and Quotient group- Homomorphism- Automorphism.
Chapter 2 Section 2.6 to 2.8.

UNIT III
Cayley's Theorem- Permutation groups.
Chapter 2 Section 2.9 and 2.10.

UNIT IV
Definition and examples of ring- Some special classes of rings- homomorphism of rings- Ideals and quotient rings- More ideals and quotient rings.
Chapter 3 Section 3.1 to 3.5.

UNIT V
The field of quotients of an integral domain- Euclidean Rings- The particular Euclidean ring.
Section 3.6to 3.8.

Contents and treatment as in
"Topics in Algebra" – I. N. Herstein, Wiley Eastern Ltd.

Reference:
1.Modern Algebra by M.L.Santiago, McGraw Hill Education India pvt Ltd.
2.Modern Algebra by S. Arumugam and others, New Gamma publishing House, Palayamkottai.
3.Modern Algebra by Visvanathan Nayak, Emerald Publishers, Reprint 1992.

e-Resources:
1. https://nptel.ac.in
2. http://garsia.math.yorku.ca/~sdenton/algstruct.

UNIVERSITY OF MADRAS

B.Sc. DEGREE COURSE IN MATHEMATICS

SYLLABUS WITH EFFECT FROM 2020-2021

BMA-CSC10

CORE-X: REAL ANALYSIS-I

(Common to B.Sc. Maths with Computer Applications)

Inst.Hrs : 6 **YEAR: III**

Credits : 4 **SEMESTER: V**

Learning outcomes:

Students will acquire knowledge to

- Apply Mathematical concepts and Principles to perform numerical and symbolic computations.
- Understand and perform simple proofs.
- Know how abstract ideas and rigorous methods in Mathematical Analysis can be applied to practical problems.

UNIT I

Sets and Functions:Sets and elements- Operations on sets- functions- real valued functions- equivalence- countability - real numbers- least upper bounds.

Chapter 1 Section 1. 1 to 1.7

UNIT II

Sequences of Real Numbers:Definition of a sequence and subsequence- limit of a sequence- convergent sequences- divergent sequences- bounded sequences- monotone sequences-

Chapter 2 Section 2.1 to 2.6

UNIT III

Operations on convergent sequences- operations on divergent sequences- limit superior and limit inferior- Cauchy sequences.

Chapter 2 Section 2.7 to 2.10

UNIT IV

Series of Real Numbers: Convergence and divergence- series with non-negative terms- alternating series- conditional convergence and absolute convergence- tests for absolute convergence- series whose terms form a non-increasing sequence- the class l^2

Chapter 3 Section 3.1 to 3.4, 3.6, 3.7 and 3.10

UNIT V

Limits and Metric Spaces:Limit of a function on a real line-. Metric spaces - Limits in metric spaces.

Continuous Functions on Metric Spaces: Function continuous at a point on the real line- Reformulation- Function continuous on a metric space.

Chapter 4 Section 4.1 to 4.3 Chapter 5 Section 5.1-5.3

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SYLLABUS WITH EFFECT FROM 2020-2021

Contents and Treatment as in

"Methods of Real Analysis" : Richard R. Goldberg (Oxford and IBH Publishing Co.).

Reference:

1. Principles of Mathematical Analysis by Walter Rudin,TataMcGrawHill.
2. Mathematical Analysis Tom M Apostol, Narosa Publishing House.

e-Resources:

1. https://mathcs.org/analysis/reals/numseq/sequence.html.
2. http://www-groups.mcs.st-andrews.ac.uk/~john/analysis/index.html
3. http://www.phengkimving.com.

UNIVERSITY OF MADRAS

B.Sc. DEGREE COURSE IN MATHEMATICS

SYLLABUS WITH EFFECT FROM 2020-2021

BMA-CSC11

CORE-XI: DYNAMICS

(Common to B.Sc. Maths with Computer Applications)

Inst.Hrs : 6 **YEAR: III**

Credits : 4 **SEMESTER: V**

Learning outcomes:

Students will acquire knowledge of

- The motion of bodies under the influence of forces.
- Rectilinear motion of particles, Projectiles, Impact and Moment of Inertia of Particles.

UNIT I

Kinematics -Basic units – velocity – acceleration- coplanar motion.

Chapter 1 - Section 1.1 to 1.4.

UNIT II Work, Energy and power – work – conservative field of force – power – Rectilinear motion under varying Force: Simple harmonic motion (S.H.M.) – S.H.M. along a horizontal line- S.H.M. along a vertical line

Chapter 11 - Section 11.1to 11.3, Chapter 12 - Section 12.1 to 12.3

UNIT III

Projectiles -Forces on a projectile- projectile projected on an inclined plane.

Impact: Impulsive force - impact of sphere - impact of two smooth spheres – impact of a smooth sphere on a plane – oblique impact of two smooth spheres

Chapter 13 - Section 13.1,13.2, Chapter 14 - Section 14.1, 14.5

UNIT IV

Circular motion – Conical pendulum – simple pendulum – central orbits -general orbits - central orbits- conic as centered orbit.

Chapter 15 - Section 15.1, 15.2, 15.6

Chapter 16 - Section 16.1 to 16.3

UNIT V

Moment of inertia, Perpendicular and parallel axes theorem.

Chapter 17 -Section 17.1, 17.1.1

Contents and treatment as in

"Mechanics" – P. Duraipandian, LaxmiDuraipandian ,MuthamizhJayapragasham, S. Chand and Co limited 2008 .

Reference :

1. Dynamics – K. ViswanathaNaik and M. S. Kasi, Emerald Publishers.
2. Dynamics – A. V. Dharmapadam, S. Viswanathan Publishers.
3. Mechanics – Walter Grenier

e-Resources:

1. https://nptel.ac.in
2. https://www.wikipedia.org

UNIVERSITY OF MADRAS

B.Sc. DEGREE COURSE IN MATHEMATICS
SYLLABUS WITH EFFECT FROM 2020-2021

BMA-CSC12

CORE-XII: DISCRETE MATHEMATICS
(Common to B.Sc. Maths with Computer Applications)

Inst.Hrs : 6 **YEAR: III**
Credits : 4 **SEMESTER: V**

Learning outcomes:
Students will acquire knowledge

- To apply tools and ideas in Mathematics for solving Applied Problems.
- To Evaluate Boolean functions and to express a logic sentence in terms of predicates, quantifiers, and logical connectives.

UNIT I

Integers:Set, some basic properties of integers, Mathematical induction, divisibility of integers, representation of positive integers
Chapter 1 - Sections 1.1 to 1.5

UNIT II

Boolean algebra &Applications: Boolean algebra, two element Boolean algebra, Disjunctive normal form, Conjunctive normal form
Chapter 5 - Sections 5.1 to 5.4

UNIT III

Application, Simplication of circuits, Designing of switching circuits, Logical Gates and Combinatorial circuits.
Chapter 5 - Section 5.5, 5.6

UNIT IV

Recurrence relations and Generating functions: Sequence and recurrence relation, Solving recurrence relations by iteration method, Modeling of counting problems by recurrence relations, Linear (difference equations) recurrence relations with constant coefficients, Generating functions, Sum and product of two generating functions, Useful generating functions, Combinatorial problems.
Chapter 6 - Section 6.1 to 6.6

UNIT V

Proportional logic and Predicate logic: Proportional logic, Adequate system of connectivies, Translation of sentences in a Natural Language into Statement Formula, Logical validity of arguments, Predicate Logic, Negation of a statement obtained by qualification of a predicate, Logical operations on predicates or quantified predicates, Symbolization of sentences by using predicates, Quantifiers and connectives, Logical validity of arguments.
Chapter 8 - Sections 8.1, 8.5 to 8.8 (Omit Section 8.2 to 8.4)

UNIVERSITY OF MADRAS
B.Sc. DEGREE COURSE IN MATHEMATICS
SYLLABUS WITH EFFECT FROM 2020-2021

Contents and treatment as in

"Introduction to Discrete Mathematics", 2nd edition, 2002 by M. K. Sen and B. C. Chakraborty, Books and Allied Private Ltd., Kolkata.

Reference:-

1. Discrete mathematics for computer scientists and mathematicians by J. L. Mertt,AbrahamKendel and T. P. Baker prentice-hall, India.
2. Discrete mathematics for computer scientists by John Truss-Addison Wesley.
3. Elements of Discrete Mathematics, C. L. Liu, New York Mcgraw-Hill, 1977.

e-Resources:

1. https://brilliant.org/wiki/discrete-mathematics/.
2. https://www.tutorialspoint.com/discrete_mathematics/.

UNIVERSITY OF MADRAS

B.Sc. DEGREE COURSE IN MATHEMATICS
SYLLABUS WITH EFFECT FROM 2020-2021

BMA-CSC13

CORE-XIII: ALGEBRAIC STRUCTURES-II

(Common to B.Sc. Maths with Computer Applications)

Inst.Hrs : 6 **YEAR: III**
Credits : 4 **SEMESTER: VI**

Learning outcomes:

Students will acquire knowledge about the Vector Spaces, Dual spaces, Inner product spaces and linear transformations.

UNIT I
Vector spaces. Elementary basic concepts- linear independence and bases Chapter 4 Section 4.1 and 4.2.

UNIT II
Dual spaces
Chapter 4 Section 4.3.

UNIT III
Inner product spaces.
Chapter 4 Section 4.4.

UNIT IV
Algebra of linear transformations- characteristic roots.
Chapter 6 Section 6.1 and 6.2.

UNIT V
Matrices- canonical forms- triangular forms.
Chapter 6 Section 6.3 and 6.4.

Content and Treatment as in
"Topics in Algebra" – I. N. Herstein-Wiley Eastern Ltd.

Reference:

1. University Algebra – N. S. Gopalakrishnan – New Age International Publications, Wiley Eastern Ltd.
2. First course in Algebra – John B. Fraleigh, Addison Wesley.
3. Text Book of Algebra – R. Balakrishna and N. Ramabadran, Vikas publishing Co.
4. Algebra – S. Arumugam, New Gamma publishing house, Palayamkottai.

e-Resources:

1. https://nptel.ac.in.
2. http://ebooks.lpude.in.linearalgebra.

UNIVERSITY OF MADRAS
B.Sc. DEGREE COURSE IN MATHEMATICS
SYLLABUS WITH EFFECT FROM 2020-2021

BMA-CSC14

CORE-XIV: REAL ANALYSIS-II
(Common to B.Sc. Maths with Computer Applications)

Inst.Hrs : 6 **YEAR: III**
Credits : 4 **SEMESTER: VI**

Learning outcomes:
Students will acquire knowledge about

- The Real Numbers and the Analytic Properties of Real- Valued Functions.
- The Analytic concepts of Connectedness, Compactness, Completeness And Calculus.

UNIT I
Continuous Functions on Metric Spaces: Open sets- closed sets- Discontinuous function on R^1. Connectedness, Completeness and Compactness :More about open sets- Connected sets. Chapter 5 Section 5.4 to 5.6
Chapter 6 Section 6.1 and 6.2

UNIT II
Bounded sets and totally bounded sets: Complete metric spaces- compact metric spaces, continuous functions on a compact metric space, continuity of inverse functions, uniform continuity.
Chapter 6 Section 6.3 to 6.8

UNIT III
Calculus:Sets of measure zero, definition of the Riemann integral, existence of the Riemann integral- properties of Riemann integral.
Chapter 7 Section 7.1 to 7.4

UNIT IV
Derivatives- Rolle's theorem, Law of mean, Fundamental theorems of calculus.
Chapter 7 Section 7.5 to 7.8

UNIT V
Taylor's theorem- Pointwise convergence of sequences of functions, uniform convergence of sequences of functions.
Chapter 8 Section 8.5 Chapter 9 Section 9.1 and 9.2

Content and Treatment as in
"Methods of Real Analysis"- Richard R. Goldberg (Oxford and IBH Publishing Co)

Reference:-

1. Principles of Mathematical Analysis by Walter Rudin,TataMcGrawHill.
2. Mathematical Analysis Tom M Apostal,Narosa Publishing House.

e-Resources:

1. https://nptel.ac.in.
2. https://mathonline.wikidot.com.
3. https://en.wikipedia.org/wiki/Metric_space.

UNIVERSITY OF MADRAS

B.Sc. DEGREE COURSE IN MATHEMATICS

SYLLABUS WITH EFFECT FROM 2020-2021

BMA-CSC15

CORE-XV: COMPLEX ANALYSIS

(Common to B.Sc. Maths with Computer Applications)

Inst.Hrs : 6 **YEAR: III**

Credits : 4 **SEMESTER: VI**

Learning outcomes:

Students will acquire knowledge about the basic ideas of analysis of Complex Functions in solving Complex Variables.

UNIT I

Analytic Functions:Functions of a Complex Variable – Limit- Theorems on Limits – Continuuous functions- Differentiability – Cauchy – Riemann equations – Analytic functions-Harmonic functions – Conformal mapping.

Chapter 1 – sec 2.1 to 2.9.

UNIT II

Bilinear Transformations:Elementary transformations – Bilinear transformations – Cross ratio-Fixed Points of Bilinear Transformations – Mapping by Elementary Functions - The Mapping $w = z^2$, z^n, n is a positive integer,$w = e^z$, sin z, cos z.

Chapter 3 – sec 3.1 to 3.4 , Chapter 5 – sec 5.1 to 5.5

UNIT III

Complex Integration – definite integral – Cauchy's Theorem – Cauchy's integral formula – Higher derivatives. Chapter 6 – sec 6.1 to 6.4

UNIT IV

Series expansions – Taylor's series – Laurent's Series – Zeroes of analytic functions-Singularities. Chapter 7 – 7.1 to 7.4

UNIT V

Residues – Cauchy's Residue Theorem – Evaluation of definite integrals.

Chapter 8 – 8.1 to 8.3.

Content and treatment as in

"Complex Analysis" byDr.S.Arumugam,Thangapandi Isaac, Dr.A.Somasundaram, SciTech publications(India) Pvt Ltd,2002.

Reference:

1. Complex variables and Applications (Sixth Edition) by James Ward Brown and RuelV.Churchill, Mc.Grawhill Inc.
2. Complex Analysis by P.Duraipandian,KayalakPachaiyappa,S.Chand& Co Pvt.Ltd.
3. Complex Analysis ,T.K.Manickavachagom Pillay, S.Viswanathan Publishers Pvt. Ltd.

e-Resources:

1. http://ebooks.lpude.in.complexanalysis.
2. https://nptel.ac.in.

UNIVERSITY OF MADRAS

B.Sc. DEGREE COURSE IN MATHEMATICS

SYLLABUS WITH EFFECT FROM 2020-2021

BMA-CSC01

CORE-I: ALGEBRA

(Common to B.Sc. Maths with Computer Applications)

Inst.Hrs : 5 **YEAR: I**

Credits : 4 **SEMESTER: I**

Learning Outcomes:

Students will acquire

- Basic ideas on Theory of Equations, Matrices and Theory of Numbers.
- Knowledge to solve theoretical and applied problems.

UNIT I

Theory of Equations :Polynomial equations with Imaginary and irrational roots- Relation between roots and coefficients- Symmetric functions of roots in terms of coefficients.
Chapter 6 : Section 9 to 12.

UNIT II

Reciprocal equations - Standard form-Increase or Decrease the roots of the given equation - Removal of terms Approximate solutions of roots of polynomials by Horner's method.
Chapter 6: section 16, 16.1, 16.2, 17, 30.

UNIT III

Summation of Series : Binomial- Exponential -Logarithmic series (Theorems without proof):
Chapter 3: Section 10, Chapter 4: Section 3, 3.1, 3.5, 3.6, 3.7 (omit 3.4)

UNIT IV

Symmetric- Skew Symmetric- Hermitian- Skew Hermitian- Orthogonal Matrices- Eigen values & Eigen Vectors- Similar matrices- Cayley - Hamilton Theorem.
Chapter 2: Section 6.1 to 6.3, 9.1, 9.2, 16, 16.1, 16.2, 16.3.

UNIT V

Prime number and Composite number - Divisors of a given number N- Euler's function (without proof) - Integral part of a real number - congruences.
Chapter 5: Section 1 to 13.

Contents and treatment as in

1. Algebra, Volume I by T. K. ManicavachagamPillay,T.Natarajan, K.S.Ganapathy, Viswanathan Publication 2007 - Unit – 1 and 2.
2. Algebra, Volume II by T. K. ManicavachagomPillay ,T.Natarajan ,K.S.Ganapathy, Viswanathan Publication 2008 - Unit – 3, 4 and 5.

Reference:-

1. Algebra by S. Arumugam (New Gama publishing house, Palayamkottai).
2. Algebra and Trigonometry, Volume I and II by P.R.Vittal, V.Malini (Margham Publishers).

e-Resources:

1. http://mathworld.wolfram.com
2. http://www.themathpage.com/

UNIVERSITY OF MADRAS

B.Sc. DEGREE COURSE IN MATHEMATICS
SYLLABUS WITH EFFECT FROM 2020-2021

BMA-CSC02

CORE-II: DIFFERENTIAL CALCULUS
(Common to B.Sc. Maths with Computer Applications)

Inst.Hrs : 4 **YEAR: I**
Credits : 4 **SEMESTER: I**

Learning outcomes:
Students will acquire Knowledge about

- The basics of differentiation and its applications.
- The notion of curvature, evolutes, involutes and polar co-ordinates.

UNIT I

Successive differentiation - n^{th} derivative- standard results – Trigonometrical transformation – formation of equations using derivatives - Leibnitz's theorem and its applications

Chapter 3 section 1.1 to 1.6, 2.1 and 2.2

UNIT II

Total differential of a function – special cases – implicit functions - partial derivatives of a function of two functions - Maxima and Minima of functions of two variables- Lagrange's method of undetermined multipliers.

Chapter 8 : Section 1.3 to 1.5 and 1.7, Section 4, 4.1 and 5.

UNIT III

Envelopes – method of finding envelopes – Curvature- circle, radius and centre of curvature- Cartesian formula for radius of curvature – coordinates of the centre of curvature – evolute-and involute - radius of curvature and centre of curvature in polar coordinates – p-r equation

Chapter 10 Section 1.1 to 1.4 and Section 2.1 to 2.7

UNIT IV

Polar coordinates - angle between the radius vector and the tangent – slope of the tangent in the polar coordinates – the angle of intersection of two curves in polar coordinates- polar sub tangent and polar sub normal – the length of arc in polar coordinates.

Chapter 9 Section 4.1 to 4.6

UNIT V

Definition-Asymptotes parallel to the axes – special cases – another method for finding asymptotes - asymptotes by inspection – intersection of a curve with an asymptote.

Chapter 11 - Section 1 to 7.

Content and treatment as in

"Calculus", Volume - 1 by S. Narayanan and T.K. Manicavachagompillay - S.Viswanathan publishers – 2006

Reference:-

1.Calculus , Dr. P.R. Vittal&Dr. V. Malini, Margham Publications, Chennai.
2.Calculus by Thomas and Fenny, Pearson Publication.
3.Calculus by Stewart
4. Calculus , Dr. P.R. Vittal&Dr. V. Malini, Margham Publications, Chennai.

e-Resources:

1. http://www.themathpage.com/
2. http://mathworld.wolfram.com
3. http://www.univie.ac.at/future.media/moe/galerie.html
4. http://www.analyzemath.com/calculus

UNIVERSITY OF MADRAS
B.Sc. DEGREE COURSE IN MATHEMATICS
SYLLABUS WITH EFFECT FROM 2020-2021

BMA-CSC03

CORE-III: TRIGONOMETRY
(Common to B.Sc. Maths with Computer Applications)

Inst.Hrs : 4 **YEAR: I**
Credits : 4 **SEMESTER: II**

Learning outcomes:

Students will acquire Knowledge

- About the expansions of Trigonometric Functions, Hyperbolic Functions and sum of Trigonometric Series.

UNIT I

Expansions of powers of $\sin\theta$, $\cos\theta$ - Expansions of $\cos^n\theta$, $\sin^n\theta$,$\cos^m\theta\sin^n\theta$
Chapter 2, Section 2.1, 2.1.1, 2.1.2,2.1.3

UNIT II

Expansions of $\sin n\theta$, $\cos n\theta$, $\tan n\theta$ - Expansions of $\tan(\theta_1+\theta_2+\ldots\ldots..+\theta_n)$ - Expansions of sin x, Cosx, tanx in terms of x-Sum of roots of trigonometric equations – Formation of equation with trigonometric roots. Chapter 3, Section 3.1 to 3.6

UNIT III

Hyperbolic functions-Relation between circular and hyperbolic functions - Formulas in hyperbolic functions – Inverse hyperbolic functions Chapter 4, Section 4.1 to 4.7 .

UNIT IV

Inverse function of exponential functions – Values of Log (u+iv) - Complex index.
Chapter 5, Section 5.1 to 5.3

UNIT V

Sums of Trigonometric series – Applications of binomial, exponential, , logarithmic and Gregory's series - Difference method. Chapter 6, Section 6.1 to 6.6.3

Content and treatment as in

Trigonometry by P. Duraipandian and KayalalPachaiyappa, Muhil Publishers.

Reference:-

1.Trigonometry, Calculus , Dr. P.R. Vittal , Margham Publications, Chennai.
2.Trigonometry by T.K. Manickavachagam Pillay.S.Viswanathan (Printers and Publishers) Pvt.Ltd.

e-Resources:

1. http://mathworld.wolfram.com
2. http://ocw.mit.edu/courses/mathematics/

UNIVERSITY OF MADRAS
B.Sc. DEGREE COURSE IN MATHEMATICS
SYLLABUS WITH EFFECT FROM 2020-2021

BMA-CSC04

CORE-IV: INTEGRAL CALCULUS AND VECTOR ANALYSIS
(Common to B.Sc. Maths with Computer Applications)

Inst.Hrs : 5 **YEAR: I**
Credits : 4 **SEMESTER: II**

Learning outcomes:

Students will acquire Knowledge about

- Integration and its geometrical applications, double, triple integrals and improper integrals.
- Vector differentiation and Vector integration.

UNIT I

Reduction formulae– Types, $\int x^n e^{ax} dx$, $\int x^n cosaxdx$, $\int x^n sinaxdx$, $\int cos^n xdx$, $\int sin^n xdx$, $\int sin^m xcos^n xdx$, $\int tan^n xdx$,$\int cot^n xdx$,$\int sec^n xdx$,$\int cosec^n xdx$, $\int x^n (\log x)^m dx$- Bernoulli's formula.

Chapter 1 Section 13, 13.1 to 13.10,14,15.1.

UNIT II

Multiple Integrals- definition of the double integrals- evaluation of the double integrals- double integrals in polar coordinates – triple integrals – applications of multiple integrals – volumes of solids of revolution – areas of curved surfaces – change of variables – Jacobians.

Chapter 5 Section 1, 2.1, 2.2, 3.1, 4, 6.1, 6.2, 6.3, 7
Chapter 6 Section 1.1, 1.2, 2.1 to 2.4.

UNIT III

Beta and Gamma functions - infinite integral – definitions – recurrence formula of Γ functions - properties of β-functions - relation between β and Γ functions.
Chapter 7 Sections 1.1 to 1.4 , 2.1, 2.3, 3, 4, 5.

UNIT IV

Introduction - directional derivative- Gradient- divergence- curl- Laplacian Differential Operator.
Chapter 2 Sections 2.1 - 2.13.

UNIT V

Line, surface and volume integrals - Integral Theorems - Gauss, Greens and Stokes (Without proof) – Problems.

Chapter 3 Sections 3.1 to 3.6 and Chapter 4 Sections 4.1 to 4.5.

Content and treatment as in

1. "Calculus", Vol- II by S. Narayanan and T.K. Manicavachagampillay - S. Viswanathanpublishers– 2007 for Unit 1 , Unit 2 , Unit 3.
2. "Vector Analysis" by P.Duraipandian and KayalalPachaiyappa, S.ChandFor Unit 4, Unit 5.

Reference:-

1. Integral Calculus and differential equations : Dipak Chatterjee (TATA McGraw Hill Publishing companyLtd.).
2. Vector Algebra and Analysis by Narayanan and T.K.Manickvachagam Pillay S .Viswanathan Publishers.
3. Vector Analysis: Murray Spiegel (Schaum Publishing Company, NewYork).

e-Resources:

1. http://mathworld.wolfram.com.
2. http://www.sosmath.com.

UNIVERSITY OF MADRAS

B.Sc. DEGREE COURSE IN MATHEMATICS
SYLLABUS WITH EFFECT FROM 2020-2021

BMA-CSC05

CORE-V: ANALYTICAL GEOMETRY
(Common to B.Sc. Maths with Computer Applications)

Inst.Hrs : 5 **YEAR: II**
Credits : 4 **SEMESTER: III**

Learning outcomes:

Students will acquire Knowledge

- To analyze characteristics and properties of two and three dimensional geometric shapes.
- To develop mathematical arguments about geometric relationships.
- In Geometry and its applications in real world.

UNIT I

Chord of contact – polar and pole,- conjugate points and conjugate lines – chord with (x_1, y_1) as its midpoint – diameters – conjugate diameters of an ellipse.- semi diameters- conjugate diameters of hyperbola
Chapter 7: Sections 7.1 to 7.3 , Chapter – 8 Section 8.1 to 8.5.

UNIT II

Polar coordinates: General polar equation of straight line – Polar equation of a circle on A_1A_2 as diameter, Equation of a straight line, circle, conic – Equation of chord, tangent, normal. Equations of the asymptotes of a hyperbola.
Chapter 10 : Sec 10.1 to 10.8.

UNIT III

Introduction – System of Planes - Length of the perpendicular – Orthogonal projection.
Chapter 2 Sec 2.1 to 2.10.

UNIT IV

Representation of line – angle between a line and a plane- co-planar lines- shortest distance 2 skew lines- Length of the perpendicular- intersection of three planes
Chapter 3 :Sec 3.1 to 3.8.

UNIT V

Equation of a sphere - general equation - section of a sphere by a plane - equation of the circle - tangent plane - angle of intersection of two spheres- condition for the orthogonality - radical plane.
Chapter 6 : Sec 6.1 to 6.8.

Contents and treatment as in

1. Analytical Geometry of 2D by P.Durai Pandian- Muhil publishers for Unit – 1 and 2
2. Analytical Solid Geometry of 3D by Shanthi Narayan and Dr.P.K. Mittal-S.Chand& Co. Pvt.Ltd.- for Unit – 3 to 5

Reference :

1. Analytical Geometry of Two Dimension by T. K. Manikavachakam Pillai and S. Narayanan.S.Viswanathan (Printers and Publishers) Pvt. Ltd.
2. Analytical Geometry of Three Dimension by T. K. Manikavachakam Pillai and S. Narayanan.S.Viswanathan (Printers and Publishers) Pvt. Ltd.

e-Resources:

1. http://mathworld.wolfram.com.
2. http://www.univie.ac.at/future.media/moe/galerie.html

UNIVERSITY OF MADRAS

B.Sc. DEGREE COURSE IN MATHEMATICS

SYLLABUS WITH EFFECT FROM 2020-2021

BMA-CSC06

CORE-VI: DIFFERENTIAL EQUATIONS

(Common to B.Sc. Maths with Computer Applications)

Inst.Hrs : 4 **YEAR: II**

Credits : 4 **SEMESTER: III**

Learning outcomes:

Students will acquire knowledge

- About the methods of solving Ordinary and Partial Differential Equations.
- To introduce Differential Equation as a powerful tool in solving problems in Science.

UNIT I

Ordinary Differential Equations:Variable separable-Homogeneous Equation-Non-Homogeneous Equations of first degree in x and y-Linear Equation-Bernoulli's Equation-Exact differential equations.

Chapter 2: Section 1 to 6.

UNIT II

Equation of first order but not of higher degree: Equation solvable for dy/dx- Equation solvable for y-Equation solvable for x- Clairauts form-Linear Equations with constant coefficients-Particular integrals e^{ax}, sinax, cosax, x^m, Ve^{ax} where V is sinax or cosax or x^m .

Chapter 4: Section 1, 2.1, 2.2, 3.1.

Chapter 5: Section 4.

UNIT III

Simultaneous linear differential equations- Linear Equations of the Second Order -Complete solution in terms of a known integrals- Reduction to the Normal form- Change of the Independent Variable - Method of Variation of Parameters.

Chapter 6: Section- 6

Chapter 8:Section- 1,2,3,4.

UNIT IV

Partial differential equation: Formation of PDE by Eliminating arbitrary constants and arbitrary functions-complete integral-singular integral-General integral- Lagrange's Linear Equations Pp+Qq=R.

Chapter 12: Section- 1, 2, 3.1, 3.2, 4.

UNIT V

Special methods - Standard forms - Charpit's Methods - Related problems

Chapter 12: Section-5.1, 5.2, 5.3, 5.4, 6.

Contents and treatment as in

"Differential Equations and its applications", by S.Narayanan, T.K.Manikavachagam Pillay –- S.Viswanathan (Printers and Publishers) Pvt. Ltd(2006).

Reference:

1.Mathematics for B.Sc-Branch-I Volume –III by P.Kandasamy ,K.Thilagavathy

S.Chand Publications.

2.Differential equations with applications and historical notes by George F.Simmons,

2nd Ed,TataMcgraw Hill Publications .

3. Differential Equations by ShepleyL.Ross, 3 rdEd ,JohnWiely and sons 1984.

4 .Differential Equations by N.P.Bali,Laxmi Publications Ltd,New Delhi-2004.

5. Ordinary and Partial differential Equation by Dr.M.D.Raisinghania ,S.Chand.

e-Resources:

1.http://mathworld.wolfram.com
2. http://www.analyzemath.com/calculus/Differential_Equations/applications. html

UNIVERSITY OF MADRAS
B.Sc. DEGREE COURSE IN MATHEMATICS
SYLLABUS WITH EFFECT FROM 2020-2021

BMA-CSC07

CORE-VII: TRANSFORM TECHNIQUES
(Common to B.Sc. Maths with Computer Applications)

Inst.Hrs : 4 **YEAR: II**
Credits : 4 **SEMESTER: IV**

Learning outcomes:

Students will acquire knowledge

- About Laplace Transforms and its inverse
- To apply Laplace transform in solving Ordinary Differential Equations with constant coefficients, simultaneous Ordinary Differential Equations.
- To solve problems in Fourier series and Fourier transforms.

UNIT I: The Laplace Transforms-Definitions-Sufficient conditions for the existence of the Laplace transform(without proof)-Laplace transform of periodic functions-some general theorems-evaluation of integrals using Laplace transform-Problems.

Chapter 5: Section-1 to 5.

UNIT II:The inverse Laplace Transforms- Applications of Laplace Transforms to ordinary differential equations with constant co-efficients and variable co-efficients, simultaneous equations and equations involving integrals-Problems.

Chapter 5: Section-6 to 12.

UNIT III: Fourier series- Expansion of periodic functions of period 2π- Expansion of even and odd functions, Half range Fourier series-Change of intervals –Problems.

Chapter 6: Section-1 to 6.

UNIT IV: Fourier Transform- Infinite Fourier Transform(Complex form) – Properties of Fourier Transform – Fourier cosine and Fourier sine Tranform – Properties – Parseval's identity – Convolution theorem - Problems.

Chapter 6: Section-8 to 15.

UNIT V: Z Transforms: Definitionof Z-Transform and its properties - Z-Transforms of some basic functions- Examples and simple problems

Chapter 7: Sections -7.1 to 7.3.

Contents and treatment as in

1. "Calculus-Volume III" – S.Narayananand T.K.ManicavachagamPillai. (Ananda Book Depot)(**for Units I to IV**)
2. "Engineering Mathematics for Semester III- Third Edition – T.Veerarajan (Tata McGraw-Hill Publishing Company Ltd, New Delhi) **(for Unit-V**)

Reference Books

1. Engineering Mathematics Volume III – P.Kandasamy and others (S.Chand and Co.)
2. Advanced Engineering Mathematics- Stanley Grossman and William R.Devit.

Engineering Mathematics III-A.Singaravelu, Meenakshi Agency, Chenani, 2008

e-Resources:

1. http://mathworld.wolfram.com.
2. http://www.sosmath.com.

UNIVERSITY OF MADRAS

B.Sc. DEGREE COURSE IN MATHEMATICS

SYLLABUS WITH EFFECT FROM 2020-2021

BMA-CSC08

CORE-VIII: STATICS

(Common to B.Sc. Maths with Computer Applications)

Inst.Hrs : 5 **YEAR: II**

Credits : 4 **SEMESTER: IV**

Learning outcomes:

Students will acquire knowledge about

- Particles or body in rest under the given forces.
- Forces, equilibrium of a particle and centre of mass of various bodies.

UNIT I

Force- Newtons laws of motion - resultant of two forces on a particle- Equilibrium of a particle
Chapter 2 - Section 2 .1 , 2.2 , Chapter 3 - Section 3.1.

UNIT II

Forces on a rigid body – moment of a force – general motion of a rigid body- equivalent systems of forces – parallel forces – forces along the sides of a triangle – couples
Chapter 4 - Section 4 .1 to 4.6.

UNIT III

Resultant of several coplanar forces**-** equation of the line of action of the resultant- Equilibrium of a rigid body under three coplanar forces – Reduction of coplanar forces into a force and a couple.-problems involving frictional forces
Chapter 4 - Section 4.7 to 4.9,
Chapter 5 - Section 5.1, 5.2.

UNIT IV

Centre of mass – finding mass centre – a hanging body in equilibrium
Chapter 6 - Section 6.1 to 6.3.

UNIT V

Hanging strings- equilibrium of a uniform homogeneous string – suspension bridge
Chapter 9 - Section 9.1, 9.2.

Contents and treatment as in

"Mechanics" by P. Duraipandian ,LaxmiDuraipandian , MuthamizhJayapragasham, S. Chand and Co limited 2008 .

Reference:

1. Dynamics – K. ViswanathaNaik and M. S. Kasi, Emerald Publishers.
2. Dynamics – A. V. Dharmapadam, S. Viswanathan Publishers.
3. Mechanics – Walter Grenier.

e-Resources:

1. https://www.wikipedia.org/
2. https://physics.info

UNIVERSITY OF MADRAS
B.Sc. DEGREE COURSE IN MATHEMATICS
SYLLABUS WITH EFFECT FROM 2020-2021

BMA-CSC09

CORE-IX: ALGEBRAIC STRUCTURES-I
(Common to B.Sc. Maths with Computer Applications)

Inst.Hrs : 6 **YEAR: III**
Credits : 4 **SEMESTER: V**

Learning outcomes:

Students will acquire knowledge about the concepts of Sets, Groups and Rings.

UNIT I
Introduction to groups- Subgroups- cyclic groups and properties of cyclic groups- Lagrange's Theorem- A counting principle.
Chapter 2 Section 2.4 and 2.5.

UNIT II
Normal subgroups and Quotient group- Homomorphism- Automorphism.
Chapter 2 Section 2.6 to 2.8.

UNIT III
Cayley's Theorem- Permutation groups.
Chapter 2 Section 2.9 and 2.10.

UNIT IV
Definition and examples of ring- Some special classes of rings- homomorphism of rings- Ideals and quotient rings- More ideals and quotient rings.
Chapter 3 Section 3.1 to 3.5.

UNIT V
The field of quotients of an integral domain- Euclidean Rings- The particular Euclidean ring.
Section 3.6to 3.8.

Contents and treatment as in
"Topics in Algebra" – I. N. Herstein, Wiley Eastern Ltd.

Reference:
1.Modern Algebra by M.L.Santiago, McGraw Hill Education India pvt Ltd.
2.Modern Algebra by S. Arumugam and others, New Gamma publishing House, Palayamkottai.
3.Modern Algebra by Visvanathan Nayak, Emerald Publishers, Reprint 1992.

e-Resources:
1. https://nptel.ac.in
2. http://garsia.math.yorku.ca/~sdenton/algstruct.

UNIVERSITY OF MADRAS

B.Sc. DEGREE COURSE IN MATHEMATICS

SYLLABUS WITH EFFECT FROM 2020-2021

BMA-CSC10

CORE-X: REAL ANALYSIS-I

(Common to B.Sc. Maths with Computer Applications)

Inst.Hrs : 6 **YEAR: III**

Credits : 4 **SEMESTER: V**

Learning outcomes:

Students will acquire knowledge to

- Apply Mathematical concepts and Principles to perform numerical and symbolic computations.
- Understand and perform simple proofs.
- Know how abstract ideas and rigorous methods in Mathematical Analysis can be applied to practical problems.

UNIT I

Sets and Functions:Sets and elements- Operations on sets- functions- real valued functions- equivalence- countability - real numbers- least upper bounds.

Chapter 1 Section 1. 1 to 1.7

UNIT II

Sequences of Real Numbers:Definition of a sequence and subsequence- limit of a sequence- convergent sequences- divergent sequences- bounded sequences- monotone sequences-

Chapter 2 Section 2.1 to 2.6

UNIT III

Operations on convergent sequences- operations on divergent sequences- limit superior and limit inferior- Cauchy sequences.

Chapter 2 Section 2.7 to 2.10

UNIT IV

Series of Real Numbers: Convergence and divergence- series with non-negative terms- alternating series- conditional convergence and absolute convergence- tests for absolute convergence- series whose terms form a non-increasing sequence- the class l^2

Chapter 3 Section 3.1 to 3.4, 3.6, 3.7 and 3.10

UNIT V

Limits and Metric Spaces:Limit of a function on a real line-. Metric spaces - Limits in metric spaces.

Continuous Functions on Metric Spaces: Function continuous at a point on the real line- Reformulation- Function continuous on a metric space.

Chapter 4 Section 4.1 to 4.3 Chapter 5 Section 5.1-5.3

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SYLLABUS WITH EFFECT FROM 2020-2021

Contents and Treatment as in

"Methods of Real Analysis" : Richard R. Goldberg (Oxford and IBH Publishing Co.).

Reference:

1. Principles of Mathematical Analysis by Walter Rudin,TataMcGrawHill.
2. Mathematical Analysis Tom M Apostol, Narosa Publishing House.

e-Resources:

1. https://mathcs.org/analysis/reals/numseq/sequence.html.
2. http://www-groups.mcs.st-andrews.ac.uk/~john/analysis/index.html
3. http://www.phengkimving.com.

UNIVERSITY OF MADRAS

B.Sc. DEGREE COURSE IN MATHEMATICS

SYLLABUS WITH EFFECT FROM 2020-2021

BMA-CSC11

CORE-XI: DYNAMICS

(Common to B.Sc. Maths with Computer Applications)

Inst.Hrs : 6 **YEAR: III**

Credits : 4 **SEMESTER: V**

Learning outcomes:

Students will acquire knowledge of

- The motion of bodies under the influence of forces.
- Rectilinear motion of particles, Projectiles, Impact and Moment of Inertia of Particles.

UNIT I

Kinematics -Basic units – velocity – acceleration- coplanar motion.

Chapter 1 - Section 1.1 to 1.4.

UNIT II Work, Energy and power – work – conservative field of force – power – Rectilinear motion under varying Force: Simple harmonic motion (S.H.M.) – S.H.M. along a horizontal line- S.H.M. along a vertical line

Chapter 11 - Section 11.1to 11.3, Chapter 12 - Section 12.1 to 12.3

UNIT III

Projectiles -Forces on a projectile- projectile projected on an inclined plane.

Impact: Impulsive force - impact of sphere - impact of two smooth spheres – impact of a smooth sphere on a plane – oblique impact of two smooth spheres

Chapter 13 - Section 13.1,13.2, Chapter 14 - Section 14.1, 14.5

UNIT IV

Circular motion – Conical pendulum – simple pendulum – central orbits -general orbits - central orbits- conic as centered orbit.

Chapter 15 - Section 15.1, 15.2, 15.6

Chapter 16 - Section 16.1 to 16.3

UNIT V

Moment of inertia, Perpendicular and parallel axes theorem.

Chapter 17 -Section 17.1, 17.1.1

Contents and treatment as in

"Mechanics" – P. Duraipandian, LaxmiDuraipandian ,MuthamizhJayapragasham, S. Chand and Co limited 2008 .

Reference :

1. Dynamics – K. ViswanathaNaik and M. S. Kasi, Emerald Publishers.
2. Dynamics – A. V. Dharmapadam, S. Viswanathan Publishers.
3. Mechanics – Walter Grenier

e-Resources:

1. https://nptel.ac.in
2. https://www.wikipedia.org

UNIVERSITY OF MADRAS

B.Sc. DEGREE COURSE IN MATHEMATICS
SYLLABUS WITH EFFECT FROM 2020-2021

BMA-CSC12

CORE-XII: DISCRETE MATHEMATICS
(Common to B.Sc. Maths with Computer Applications)

Inst.Hrs : 6 **YEAR: III**
Credits : 4 **SEMESTER: V**

Learning outcomes:
Students will acquire knowledge

- To apply tools and ideas in Mathematics for solving Applied Problems.
- To Evaluate Boolean functions and to express a logic sentence in terms of predicates, quantifiers, and logical connectives.

UNIT I

Integers:Set, some basic properties of integers, Mathematical induction, divisibility of integers, representation of positive integers
Chapter 1 - Sections 1.1 to 1.5

UNIT II

Boolean algebra &Applications: Boolean algebra, two element Boolean algebra, Disjunctive normal form, Conjunctive normal form
Chapter 5 - Sections 5.1 to 5.4

UNIT III

Application, Simplication of circuits, Designing of switching circuits, Logical Gates and Combinatorial circuits.
Chapter 5 - Section 5.5, 5.6

UNIT IV

Recurrence relations and Generating functions: Sequence and recurrence relation, Solving recurrence relations by iteration method, Modeling of counting problems by recurrence relations, Linear (difference equations) recurrence relations with constant coefficients, Generating functions, Sum and product of two generating functions, Useful generating functions, Combinatorial problems.
Chapter 6 - Section 6.1 to 6.6

UNIT V

Proportional logic and Predicate logic: Proportional logic, Adequate system of connectivies, Translation of sentences in a Natural Language into Statement Formula, Logical validity of arguments, Predicate Logic, Negation of a statement obtained by qualification of a predicate, Logical operations on predicates or quantified predicates, Symbolization of sentences by using predicates, Quantifiers and connectives, Logical validity of arguments.
Chapter 8 - Sections 8.1, 8.5 to 8.8 (Omit Section 8.2 to 8.4)

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B.Sc. DEGREE COURSE IN MATHEMATICS
SYLLABUS WITH EFFECT FROM 2020-2021

Contents and treatment as in

"Introduction to Discrete Mathematics", 2nd edition, 2002 by M. K. Sen and B. C. Chakraborty, Books and Allied Private Ltd., Kolkata.

Reference:-

1. Discrete mathematics for computer scientists and mathematicians by J. L. Mertt,AbrahamKendel and T. P. Baker prentice-hall, India.
2. Discrete mathematics for computer scientists by John Truss-Addison Wesley.
3. Elements of Discrete Mathematics, C. L. Liu, New York Mcgraw-Hill, 1977.

e-Resources:

1. https://brilliant.org/wiki/discrete-mathematics/.
2. https://www.tutorialspoint.com/discrete_mathematics/.

UNIVERSITY OF MADRAS

B.Sc. DEGREE COURSE IN MATHEMATICS
SYLLABUS WITH EFFECT FROM 2020-2021

BMA-CSC13

CORE-XIII: ALGEBRAIC STRUCTURES-II

(Common to B.Sc. Maths with Computer Applications)

Inst.Hrs : 6 **YEAR: III**
Credits : 4 **SEMESTER: VI**

Learning outcomes:

Students will acquire knowledge about the Vector Spaces, Dual spaces, Inner product spaces and linear transformations.

UNIT I
Vector spaces. Elementary basic concepts- linear independence and bases Chapter 4 Section 4.1 and 4.2.

UNIT II
Dual spaces
Chapter 4 Section 4.3.

UNIT III
Inner product spaces.
Chapter 4 Section 4.4.

UNIT IV
Algebra of linear transformations- characteristic roots.
Chapter 6 Section 6.1 and 6.2.

UNIT V
Matrices- canonical forms- triangular forms.
Chapter 6 Section 6.3 and 6.4.

Content and Treatment as in
"Topics in Algebra" – I. N. Herstein-Wiley Eastern Ltd.

Reference:

1. University Algebra – N. S. Gopalakrishnan – New Age International Publications, Wiley Eastern Ltd.
2. First course in Algebra – John B. Fraleigh, Addison Wesley.
3. Text Book of Algebra – R. Balakrishna and N. Ramabadran, Vikas publishing Co.
4. Algebra – S. Arumugam, New Gamma publishing house, Palayamkottai.

e-Resources:

1. https://nptel.ac.in.
2. http://ebooks.lpude.in.linearalgebra.

UNIVERSITY OF MADRAS
B.Sc. DEGREE COURSE IN MATHEMATICS
SYLLABUS WITH EFFECT FROM 2020-2021

BMA-CSC14

CORE-XIV: REAL ANALYSIS-II
(Common to B.Sc. Maths with Computer Applications)

Inst.Hrs : 6 **YEAR: III**
Credits : 4 **SEMESTER: VI**

Learning outcomes:
Students will acquire knowledge about

- The Real Numbers and the Analytic Properties of Real- Valued Functions.
- The Analytic concepts of Connectedness, Compactness, Completeness And Calculus.

UNIT I
Continuous Functions on Metric Spaces: Open sets- closed sets- Discontinuous function on R^1. Connectedness, Completeness and Compactness :More about open sets- Connected sets. Chapter 5 Section 5.4 to 5.6
Chapter 6 Section 6.1 and 6.2

UNIT II
Bounded sets and totally bounded sets: Complete metric spaces- compact metric spaces, continuous functions on a compact metric space, continuity of inverse functions, uniform continuity.
Chapter 6 Section 6.3 to 6.8

UNIT III
Calculus:Sets of measure zero, definition of the Riemann integral, existence of the Riemann integral- properties of Riemann integral.
Chapter 7 Section 7.1 to 7.4

UNIT IV
Derivatives- Rolle's theorem, Law of mean, Fundamental theorems of calculus.
Chapter 7 Section 7.5 to 7.8

UNIT V
Taylor's theorem- Pointwise convergence of sequences of functions, uniform convergence of sequences of functions.
Chapter 8 Section 8.5 Chapter 9 Section 9.1 and 9.2

Content and Treatment as in
"Methods of Real Analysis"- Richard R. Goldberg (Oxford and IBH Publishing Co)

Reference:-

1. Principles of Mathematical Analysis by Walter Rudin,TataMcGrawHill.
2. Mathematical Analysis Tom M Apostal,Narosa Publishing House.

e-Resources:

1. https://nptel.ac.in.
2. https://mathonline.wikidot.com.
3. https://en.wikipedia.org/wiki/Metric_space.

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B.Sc. DEGREE COURSE IN MATHEMATICS

SYLLABUS WITH EFFECT FROM 2020-2021

BMA-CSC15

CORE-XV: COMPLEX ANALYSIS

(Common to B.Sc. Maths with Computer Applications)

Inst.Hrs : 6 **YEAR: III**

Credits : 4 **SEMESTER: VI**

Learning outcomes:

Students will acquire knowledge about the basic ideas of analysis of Complex Functions in solving Complex Variables.

UNIT I

Analytic Functions:Functions of a Complex Variable – Limit- Theorems on Limits – Continuuous functions- Differentiability – Cauchy – Riemann equations – Analytic functions-Harmonic functions – Conformal mapping.

Chapter 1 – sec 2.1 to 2.9.

UNIT II

Bilinear Transformations:Elementary transformations – Bilinear transformations – Cross ratio-Fixed Points of Bilinear Transformations – Mapping by Elementary Functions - The Mapping $w = z^2$, z^n, n is a positive integer,$w = e^z$, sin z, cos z.

Chapter 3 – sec 3.1 to 3.4 , Chapter 5 – sec 5.1 to 5.5

UNIT III

Complex Integration – definite integral – Cauchy's Theorem – Cauchy's integral formula – Higher derivatives. Chapter 6 – sec 6.1 to 6.4

UNIT IV

Series expansions – Taylor's series – Laurent's Series – Zeroes of analytic functions-Singularities. Chapter 7 – 7.1 to 7.4

UNIT V

Residues – Cauchy's Residue Theorem – Evaluation of definite integrals.

Chapter 8 – 8.1 to 8.3.

Content and treatment as in

"Complex Analysis" byDr.S.Arumugam,Thangapandi Isaac, Dr.A.Somasundaram, SciTech publications(India) Pvt Ltd,2002.

Reference:

1. Complex variables and Applications (Sixth Edition) by James Ward Brown and RuelV.Churchill, Mc.Grawhill Inc.
2. Complex Analysis by P.Duraipandian,KayalakPachaiyappa,S.Chand& Co Pvt.Ltd.
3. Complex Analysis ,T.K.Manickavachagom Pillay, S.Viswanathan Publishers Pvt. Ltd.

e-Resources:

1. http://ebooks.lpude.in.complexanalysis.
2. https://nptel.ac.in.