PSG College of Arts & Science

An Epitome of Quality Learning

Since 1947

B.Sc. MATHEMATICS

2015 - 2018

BSc Mathematics
Scheme of Examination
For students admitted from 2014-15 & onwards

CODE NO.	SUBJECT	EXAM DURA-TION (Hrs)	Max. Marks			Credit Points
			CA	CE	Total	
First Semester						
	Part-I					
14LAU01 12LAU01 14LAU01	Tamil –I OR Hindi-I OR French –I	3	25	75	100	3
	Part-II					
14EU01	Communicative English -I Interpersonal Communication	3	25	75	100	3
	Part –III					
14MAU01	Calculus	3	25	75	100	4
14MAU02	Classical Algebra and Trigonometry	3	25	75	100	4
14MAU03	Accountancy-I (Allied – CO)	3	25	75	100	5
Second Semester						
	Part- I					
14LAU02 12LAU02 14LAU02	Tamil- II OR Hindi – II OR French –II	3	25	75	100	3
	Part- II					
14EU02	Communicative English-II Academic Communication	3	25	75	100	3
	Part-III					
14MAU04	Differential Equations and Laplace Transforms	3	25	75	100	4
14MAU05	Analytical Geometry of 3D and Vector Calculus	3	25	75	100	4
14MAU06	Accountancy-II (Allied -CO)	3	25	75	100	5
	Part –IV					
14VEU01	Value Education	-	100	-	100	2

Cont …

CODE NO.	SUBJECT	EXAM DURA-TION (Hrs)	Max. Marks			Credit Points
			CA	CE	Total	
Third Semester						
	Part- I					
14LAU03 12LAU03 14LAU03	Tamil-III OR Hindi-III OR French-III	3	25	75	100	3
	Part- II					
14EU03	Communicative English III-English for Career	3	25	75	100	3
	Part –III					
14MAU07	Partial Differential Equations and Fourier Transform	3	25	75	100	4
14MAU08	Mechanics-I (Statics)	3	25	75	100	4
14MAU09	Mathematical Statistics-I (Allied -ST)	3	25	75	100	5
	Part- IV					
14ESU01	Environmental Studies	-	100	-	100	2
Fourth Semester						
	Part –I					
14LAU04 12LAU04 14LAU04	Tamil-IV OR Hindi-IV OR French-IV	3	25	75	100	3
	Part –II					
14EU04	Communicative English-IV English Language Through Literature and Newspapers	3	25	75	100	3
	Part- III					
14MAU10	Mechanics-II (Dynamics)	3	25	75	100	4
14MAU11	Numerical Methods	3	25	75	100	4
14MAU12	Mathematical Statistics-II (Allied-ST)	3	25	75	100	5
	Part- IV					
14SBU01	**Skill Based Subject** : Internet Security	--	100	--	100	2

CODE NO.	SUBJECT	EXAM DURA-TION (Hrs)	Max. Marks			Credit Points
			CA	CE	Total	
Fifth Semester						
	Part –III					
14MAU13	Algebra-I	3	25	75	100	5
14MAU14	Real Analysis	3	25	75	100	6
14MAU15	Operations Research	3	25	75	100	5
14MAU16	Elective-I (Theory)	3	25	75	100	2
14MAU17	Elective-I (Practical)	3	40	60	100	2
14MAU18	Project Work & Viva	-	40	60	100	5
	Part – IV					
14NME01	**Non-Major Elective (1) :** EDC	-	100	-	100	2
14NME02	**Non-Major Elective (2) :** General Awareness (On-line Test)	1 ½	-	100	100	2
Sixth Semester						
	Part III					
14MAU19	Algebra-II	3	25	75	100	5
14MAU20	Complex Analysis	3	25	75	100	6
14MAU21	Astronomy	3	25	75	100	5
14MAU22	Graph Theory	3	25	75	100	5
14MAU23	Elective-II (Theory)	3	25	75	100	2
14MAU24	Elective-II (Practical)	3	40	60	100	2
					Total Credits	**136**

	PART-V		Credits
1.	**Extension Activity** : NSS / NCC / Sports / Department Activity	I – VI semesters	2
2.	**Competence Enhancement** : Add-on Course / Women's Studies / Extra paper	I – VI semesters	2
		Grand Total	**140**

- **Students can opt any one EDC of Cluster -II offered by the College at UG level, other than the course offered by their own department.**

- **Apart from Part-V, students are also permitted to appear for any extra paper (s) which is /are not offered by their own departments. 2 credits will be allotted for each extra paper. On passing an extra paper, the student will earn 2 extra credits.**

ALLIED & EDC Offered by the Department

ALLIED :

14STU03 / 14PHU03 / 14CHU02	Mathematics –I (For BSc Statistics, Physics & Chemistry)
14STU06 / 14PHU06 / 14CHU05	Mathematics –II (For BSc Statistics, Physics & Chemistry)
14NDU12 / 14BCV08	Mathematics (For BSc Nutrition and Dietetics, Biochemistry)
14COU03/ 14CSU01B	Mathematics (For B.Com and B.Com (CS))
14ELU02	Mathematics –I (For BSc Electronics)
14ELU04	Mathematics –II (For BSc Electronics)

EDC :

14EDCMAU Mathematics (Cluster -II)

List of Electives

1. Advanced Differential Equations
2. Elements of Number Theory
3. Programming in C (Theory & Practical)
4. Internet and Java (Theory & Practical)

14MAU01 **Calculus**

Unit I

Total Differential Coefficient: Implicit functions - Maxima and Minima of functions two variables - Lagrange's method of Undetermined Multipliers.

Unit II

Envelopes, Curvature of Plane Curves: Envelope, Curvature, Radius of Curvature (Cartesian formula, parametric form) - Centre of Curvature - Evolutes and Involutes.

Unit III

Integral Calculus: Properties of Definite Integrals - Reduction Formula - Bernoulli's Formula.

Unit IV

Multiple Integrals: Evaluation of Double and Triple Integral.

Unit V

Improper Integrals: Beta and Gamma Functions – Definition-Recurrence formula - Properties of Beta and Gamma functions - Applications of Gamma Functions to Multiple Integrals.

Text Book:

1.**"Calculus"** Volume I (Differential Calculus) by **S. Narayanan & T.K. Manicavachagam Pillai.** Revised Edition 2011 (For Units I & II)

2.**"Calculus"** Volume II (Integral Calculus) by **S. Narayanan & T.K. Manicavachagam Pillai.** Revised Edition 2011 (For Units III, IV & V)

Unit I : Chapter 8 : Sections 1.3 to 1.5, 4 & 5
Unit II : Chapter 10 : Sections 1.1 to 1.4, 2.1 to 2.5
Unit III : Chapter 1 : Sections 11, 13.1 to 13.10, 14.1 & 15.1
Unit IV : Chapter 5 : Sections 2.1, 2.2 & 4
Unit V : Chapter 7 : Sections 2.1 to 2.3, 3 to 6

14MAU02 Classical Algebra and Trigonometry

Unit I

Convergency and Divergency of Series: Sets - Sequences - Limit of a sequence -Upper and Lower bounds of an Aggregate - Bounded sequences - Upper and Lower Limits of sequences - Cauchy's General principle of convergence – Monotonic sequences- Infinite series – Convergent - Divergent series - Some General theorems on Infinite series – Series of positive terms - Comparison Test – Cauchy's Condensation Test.

Unit II

D'Alemberts Ratio Test: Cauchy's Root Test - Raabe's Test - Absolutely Convergent series - Uniform Convergence - Geometrical Interpretation - Test for uniform Convergence of a series - Weierstrass's M - Test for uniform Convergence.

Unit III

Theory of Equations: Roots of an Equation - Relation between roots and coefficients – Symmetric functions of roots – Sum of powers of roots of an equation – Reciprocal Equation.

Unit IV

Trigonometry: Expansions of sin nθ, cos nθ, tan nθ (formation of equations omitted). Expansions of $\sin^n\theta$, $\cos^n\theta$ in terms of functions of multiples of θ – Expansions of sinθ, cosθ in a series of ascending powers of θ – Evaluation of Limits of Expressions – Hyperbolic functions.

Unit V

Logarithms of Complex Quantities: To find Logarithm of x + iy – General value of Logarithm of x +iy. **Summation of Trigonometrical Series:** Method of differences – Sum of series of n angles in A.P. – Sum of cosines of n angles in A.P. – Summation of series by using complex quantities – Gregory's series.

Text Book:

1) "**Algebra**" **Volume-I by T.K.Manicavachagam Pillai, T. Natarajan and K.S. Ganapathy**, Revised Edition 2011 (For Units I, II & III)
2) "**Trigonometry**" **by S.Narayanan and T.K. Manicavachagom Pillai**, Revised Edition 2007 (For Units IV & V)

Unit I : Chapter 2: Sections 4 to 15
Unit II : Chapter 2: Sections 16 to 26.2
Unit III : Chapter 6: Sections 1 to 13 & 16
Unit IV : Chapters 3 & 4 - Full
Unit V : Chapter 5: Section 5 & Chapter6: Sections 1to 3.1

14ECU03/14MAU03 ACCOUNTANCY - I/ACCOUNTANCY (ALLIED)
14STU10 Semester -I/III

(For B.A Economics , BSc Mathematics , BSc Statistics)

Learning objective: To learn the Principles and Practices of Accountancy.

	Hours
UNIT I Accounting Concepts and Conventions	(EC) 14
Accounting Definition – Objectives - Uses and Limitations -Principles Concepts and Conventions – Journal – Ledger- Trial Balance.	(MA) 8 (ST) 12
UNIT II Subsidiary Books	(EC) 14
Purchase Book - Sales Book - Purchase Returns Book - Sales Returns Book - Bills Payable Book - Bills Receivable Book- Cash Book- Double Column, Triple Column Cash Book – Petty Cash Book.	(MA)10 (ST) 12
UNIT III Bank Reconciliation Statement and Rectification of Errors	(EC) 14
Bank Reconciliation Statement – Debit Balance - Over Draft Balance, Rectification of Errors - Suspense Account.	(MA)10 (ST) 12
UNIT IV Final Accounts	(EC) 15
Final Accounts of Sole Trading Concerns – Trading Account – Profit and Loss Account – Balance Sheet – Adjustment Entries.	(MA)10 (ST) 12
UNIT V Average Due Date and Account Current	(EC) 15
Average Due Date - Account Current –Various Methods of Calculation of Interest – Red Ink Entry.	(MA)10 (ST) 12

Distribution of Marks: 80% Problems and 20% Theory .

Text Book

1. Grewal .T.S, "Introduction to Accountancy" ,S.Chand and Co.Ltd, New Delhi .

Reference Books

1. Gupta R.L and Radhaswany.M, "Advanced Accountancy", Sultan chand and Son's, New Delhi.
2. Jain.S.P, Narang.K.L, "Advanced Accountancy", Kalayani Publishers, New Delhi .

14MAU04 Differential Equations and Laplace Transforms

Unit I

Exact Differential Equations – **Equations of the First order but of Higher degree** – Solvable for p, for x, for y – Clairaut's Form – Equations that do not contain x explicitly. Equations that do not contain y explicitly.

Unit II

Linear Equations with constants coefficients – Particular Integral for x^m, $e^{ax}v$, xsinx, xcosx – Linear Equations with variable coefficients – Equations Reducible to the linear equations – **Variations of parameters.**

Unit III

Simultaneous Differential Equations – Simultaneous Equations of the first order and first degree – Methods for solving dx/P =dy/Q = dz/R – Simultaneous linear differential equations with constant coefficients – Simultaneous Equations with variable coefficients.

Unit IV

The Laplace Transform – Laplace transform of periodic functions – Some General Theorems – Evaluation of definite Integral using Laplace Transform – Initial and Final value theorems.

Unit V

The Laplace Transform-The Inverse Laplace Transform – Application of Laplace Transform – Solutions of Linear Ordinary Differential Equations with constant coefficients – Simultaneous Equations.

Text Book:

"**Differential Equations And Its Applications**" by **S.Narayanan and T.K.Manicavachagam Pillai,** S.Viswanathan Publishers.

Unit I : Chapter 1 : Sections 6.1 to 6.4
Chapter 4 : Full
Unit II : Chapter 5 : Sections 1 to 6.
Chapter 8 : Section 4.
Unit III : Chapter 6 : Full
Unit IV : Chapter 9 : Sections 1 to 5.
Unit V : Chapter 9 : Sections 6 to 9.

14MAU05 Analytical Geometry of 3-D and Vector Calculus

Unit I

The Sphere: Definition - The equation of a sphere when the centre and radius are given - Finding centre and radius - The length of the tangent from the point to the sphere- The plane section of a sphere is a circle - Equation of a circle on a sphere- intersection of two spheres is a circle - The equation of the tangent plane to the sphere at point.

Unit II

Cone, Cylinder and Central Quadrics: The equation of a surface - Cone- Intersection of a straight line and a quadric cone - Tangent plane and normal - Condition for the plane to touch the quadric cone - The angle between the lines in which the plane cuts the cone.

Unit III

Cone, Cylinder and Central Quadrics: Cylinder - Central quadrics - The intersection of a line and a quadric - Tangents and tangent planes - The condition for the plane to touch the conecoid.

Unit IV

Differentiation of Vectors: Gradient, Divergence and Curl.

Unit V

Integration of Vectors: The line integral - Surface integral - Green's Theorem in the plane - Gauss Divergence Theorem - Stoke' s Theorem.

Text Book:

1.**"A text book of Analytical Geometry"-Part II Three Dimension** by **T.K. Manicavachagam Pillay and T. Natarajan.** S.Viswanathan PVT Ltd, Chennai. 2007 (For Units I, II & III)

2.**"Mathematics"-Volume IV** by **P. Kandasamy and K.Thilagavathi** S.Chand & Company Ltd, New Delhi. 2005 (Units IV & V)

Unit I : Chapter 4 : Full
Unit II : Chapter 5 : Sections 1to 6
Unit III : Chapter 5 : Sections 8 to12
Unit IV : Chapters 1 and 2 (pages 1-23)
Unit V : Chapters 3 (pages 24 - 92)

14ECU06/14MAU06 **ACCOUNTANCY - II (ALLIED)** **Semester -II**

(For B.A Economics , BSc Mathematics)

Learning Objective: To Learn Accounting Practices in Special Categories

	Hours
UNIT I Consignment Accounts	14 (EC)
Accounting Entries in the Books of Consignor - Consignee – Valuation of Closing Stock – Cost Price Method – Invoice Price Method.	8 (MA)
UNIT II Joint Venture Accounts	14 (EC)
Accounts Maintained by one Co-Venturer – By all Venturers Memorandum Joint Venture Account -Separate Set of Books.	10 (MA)
UNIT III Accounts of Non- Trading Concerns	14 (EC)
Receipts and Payments Account – Income and Expenditure Account Balance Sheet.	10 (MA)
UNIT IV Depreciation	15 (EC)
Meaning – Objectives - Causes – Straight Line Method – Diminishing Balance Method- Annuity Method – Sinking Fund Method.	10 (MA)
UNIT V Hire Purchase and Royalty Accounts	15 (EC)
Hire Purchase Accounts – Default and Repossession (Excluding Hire Purchase Trading Account) Royalty Accounts – Minimum Rent Account – Short Working Account (Excluding Sub Lease)	10 (MA)

Distribution of Marks : 80% Problems and 20% Theory.

Text Book

1. Grewal .T.S, “Introduction to Accountancy”, S.Chand and Co.Ltd, New Delhi .

Reference Books

1. Gupta R.L and Radhaswany.M, “Advanced Accountancy”, Sultan chand and Son’s, New Delhi.
2. Jain.S.P, Narang.K.L, “Advanced Accountancy”, Kalayani Publishers, New Delhi .

14MAU07 Partial Differential Equations and Fourier Transform

Unit I

Partial differential Equation : Introduction – derivation of partial differential equation by elimination of arbitrary constant and arbitrary function – Different integrals of Partial differential Equation – Solution of Partial differential Equation in some simple cases – Standard types of first order Equations – Standard1,standard2, standard3,standed4 (Clariauts form)

Unit II

Equation Reducible to the Standard Form : Lagrange's Equation – Charpit's method – Standard1, Standard2, Standard3 and Standard4.

Unit III

Fourier Series : Introduction – Fourier series expansion f(x) in $[C,C+2\pi]$ – Fourier series of even and odd function – Half range Fourier series – Change of Interval.

Unit IV

Fourier Transform : Definition – Fourier integral theorem – inversion theorem for complex Fourier transform – convolution theorem – parseval's identity – Infinite Fourier cosine and sine transform

Unit V

Applications of Fourier Transform : Boundary value problems –Boundary value problems using sine and cosine transform –Finite Fourier transform – Finite Fourier sine and cosine transform and their inversion formula – Finite Fourier sine and cosine transform of derivatives

Text Book

1) **Calculus – Volume III** by **S.Narayanan and T.K. Manicavachagam pillay S.Viswanathan** printers and publishers pvt.Ltd -2011 (unit I, II & III)

2) **Mathematics Volume IV** by **P.kandasamy and K.Thilagavathi** (unit IV, V)

Unit I : Chapter 4 : Section 2.1 to 5.4
Unit II : Chapter 4 : Section 5.5 to 7.1
Unit III : Chapter 6 : Section 1 to 6
Unit IV : Page No : 196 to 226
Unit V : Page No : 228 to 255

14MAU08 **Mechanics-I (Statics)**

Unit I

Introduction: Scope and divisions of the Subject - Force - Types of force –Equilibrium - Equilibrium of two forces. **Forces Acting at a Point:** Definitions -Parallelogram of forces - Analytical expression for the resultant of two forces acting at a point - Triangle of forces - Perpendicular triangle of forces - converse of the triangle of forces - The polygon of forces - Lami's theorem - An extended form of the parallelogram law of forces - Resolution of a force - Components of a force along two given directions -Theorem on resolved parts - Resultant of any number of forces acting at a point - resultant of any number of coplanar forces acting at a point.

Unit II

Parallel Forces and Moments: Introduction - Resultants of two like parallel forces and two unlike & unequal parallel forces acting on rigid body - Resultant of a number of parallel forces acting on a rigid body - Conditions of equilibrium of three coplanar parallel forces - Centre of two parallel forces - Moment of a force - Sign of the moment-Unit of moment - Varignon's theorem of moments - Generalized theorem of moments.

Unit III

Couples: Couples - Equilibrium of two couples - Equivalence of two couples - Couples in parallel planes - Resultant of coplanar couples - Resultant of a couple and force - Theorems.

Unit IV

Coplanar Forces: Introduction - Reduction to any number of coplanar forces -Conditions for a system of forces to reduce to a single force or to a couple - Alternative conditions for a system of forces to reduce to a single force or to a couple - Conditions of equilibrium of a system of coplanar forces - Second form of the conditions of equilibrium -Third form of the conditions of equilibrium.

Unit V

Centre of Gravity: Centre of like parallel forces - Centre of mass - Centre of gravity - Distinction between centre of gravity and centre of mass - The centre of gravity of a body is unique - Centre of gravity by integration - C.G. of a compound body - C.G of a remainder.

Text Book:

"Statics" by **M.K.Venkataraman**. Fifth edition, Agasthiar Book Depot. 1987.

Unit I : Chapter 1 : Sections 1 to 5
Chapter 2 : Sections 1 to 15 (pages: 1-43)
Unit II : Chapter 3 : Sections 1 to 13 (Pages: 52-67)
Unit III : Chapter 4 : Sections 1 to 10 (Pages: 84-97)
Unit IV : Chapter 6 : Sections 1 to 12 (Pages: 143-178)
Unit V : Chapter 8 : Sections 1 to 5, 18 to 20 (Pages : 270-274, 296-303)

14MAU09 MATHEMATICAL STATISTICS – I Semester: III
for BSc Mathematics

Objective : To impart the knowledge of Statistical methods and probability distributions for the students.

UNIT – I **Hours: 12**

Elementary Probability Space – Event, Statistical Probability – Axiomatic approach to Probability – Generalized Addition Theorem. Independent Events – Conditional Probability – Multiplication Theorem – Baye's Theorem – Simple Problems.

UNIT – II **Hours: 12**

Random Variables – Discrete and Continuous Random Variables – Distribution function of Random Variables – Probability Function – Mathematical Expectation.

UNIT – III **Hours: 12**

Moments of random variables – Moment generating function – Covariance, Conditional and Marginal distributions and Conditional Expectations with regard to bivariate distribution – Simple Problems.

UNIT – IV **Hours: 12**

Binomial, Poisson, Normal, Probability distributions – Simple Problems.

UNIT – V **Hours: 12**

Statement of t, Chi-square and F distributions and their Properties – Simple Linear Correlation and Regression.

REFERENCE BOOKS:

1. Gupta S.G. & Kapoor V.K. - Fundamentals of Mathematical Statistics
2. Hoel - Introduction to Mathematical Statistics
3. Hogg & Craig - Introduction to Mathematical Statistics
4. Ramaswamy M.M - Theory and application of Statistics

14MAU10 Mechanics - II (Dynamics)

Unit I

Kinematics: Speed-Displacement-Velocity- Parallelogram law-Resolution of velocities-Components of a velocity along two given directions-Triangle of velocities-Polygon of velocities-Resultant of several simultaneous coplanar velocities of a particle-Relative velocity-Angular velocity- Angular velocity of a particle moving along a circle with uniform speed.

Unit II

The Laws of Motion: Introduction-Momentum-Newton's laws of motion-Composition of forces-Absolute units of forces-Weight-Gravitational units of force-Distinction between mass and weight-Conservation of linear momentum- Explanation of the third law of motion-Work-Units of work-Work done in stretching an elastic string-Power-Energy-Kinetic energy-The principle of work-energy-Potential energy-The principle of conservation of energy-Verification of the principle of energy in the case of a freely falling body.

Unit III

Projectiles: Definitions-Two fundamental principles-Path of a projectile-Characteristics of the motion of a projectiles-Velocity of the projectile in magnitude and direction at the end of time-Range on an inclined plane.

Unit IV

Impulsive Forces: Impulse-Impulsive force-Impact of two bodies-Loss of kinetic energy in impact. **Collision of Elastic Bodies:** Introduction-Definitions-Fundamental laws of impact-Impact of a smooth sphere on a fixed smooth plane-Direct and Oblique impacts of two smooth spheres-Loss of kinetic energy due to direct and oblique impacts of two smooth spheres.

Unit V

Moment of Inertia: Definition-The theorem of parallel axes-The theorem of perpendicular axes-Moments of inertia in some particular cases-Dr.Routh's Rule.

Text Book:

"Dynamics" by **M.K.Venkataraman**. Sixth edition, Agasthiar Book Depot. 1994.

Unit I : Chapter 3 : Sections 3.1 to 3.123 (Pages : 14-36)
Unit II : Chapter4 : Sections 4.1 to 4.12, 4.24 to 4.36 (Pages: 70 - 79, 96 - 105)
Unit III : Chapter6 : Sections 6.1 to 6.15 (Pages : 127-160)
Unit IV : Chapter 7 : Sections 7.1 to 7.4
Chapter 8 : Sections 8.1 to 8.8 (Pages : 182-184, 195-224)
Unit V : Chapter 12 : Sections 12.1 to 12.5 (Pages: 367-383)

14MAU11 Numerical Methods

Unit I

The solution of Numerical Algebraic and Transcendental Equations:
Introduction-The Bisection method – The iteration method –The method of false position – Newton-Raphson method.

Unit II

Simultaneous Linear Algebraic Equations: Direct Methods- Gauss Elimination Method – Gauss-Jordan Method- Computation of the inverse of a matrix using Gauss's Elimination Method – Method of Triangularisation – Indirect Methods – Gauss-Seidal Method – Gauss-Jacobi Method.

Unit III

Finite Differences: Finite Differences – Higher Differences – Difference Table – Backward Differences – Central Differences - Properties of the operator Δ - The operator E –Relation between the operator E, Δ, ∇, δ, μ.
Interpolation: Newton's Forward Difference- Newton Backward Difference
Interpolation With Unequal Interval : Lagrange's Interpolation formula – Inverse Lagrange's Interpolation formula.

Unit IV

Numerical Differentiation and Integration: Newton's Forward Difference formula to compute the derivatives - Newton Backward Difference formula to compute the derivatives.
Numerical Integration: The Trapezoidal Rule- Simpson's 1/3 Rule – Simpson's 3/8 Rule – Romberg's method.

Unit V

Numerical Solution of Ordinary Differential Equations: Taylor's series- Taylor series method for Higher order differential equations- Euler's Method-
Runge-kutta method of second and fourth order.

Text Book:

"Numerical Methods in Science and Engineering" by **Dr. M.K.Venkataraman**
Fifth Edition, The National Publishing Company.1999.
Unit I : Chapter 3 : Sections 3.1 to 3.5
Unit II : Chapter 4 : Sections 4.1 to 4.4, 4.6, 4.7
Unit III: Chapter 5 : Sections 5.1 to 5.8, 5.10, 5.14 to 5.18
Chapter 6 : Sections 6.1 to 6.4
Chapter 8 : Sections 8.4, 8.9
Unit IV: Chapter 9 : Sections 9.1 to 9.3, 9.7 to 9.10
Unit V : Chapter 11 : Sections 11.6 to 11.8, 11.10, 11.13 to 11.16

14MAU12 MATHEMATICAL STATISTICS – II Semester:IV
for BSc Mathematics

Objective : To impart the knowledge of Statistical concepts such as sampling, estimation hypothesis and test of significance for the students.

UNIT – I **Hours: 12**

Concept of Sampling – Concept of Simple, Stratified random sampling and Systematic sampling – Curve fitting and Principle of least square – Fitting of Straight line and quadratic polynomial – Fitting of exponential curves - Simple Problems.

UNIT – II **Hours: 12**

Parametric estimation – Consistency and Unbiasedness of estimate -Crammer Rao Inequality – Efficiency and Sufficiency – Rao Blackwell theorem.

UNIT – III **Hours: 10**

Methods of estimation – Method of Maximum Likelihood - Method of Moments and Method of Minimum Variance - Statement and Properties of these estimates obtained by these methods.

UNIT – IV **Hours: 12**

Concept of Testing of hypothesis - statistical hypothesis – simple and composite hypothesis – Null and Alternative hypothesis – Type I and Type II errors – critical regions – Power of a Test (concept only).

UNIT – V **Hours: 14**

Test of significance – asymptotic and exact tests – based on normal, t, chi – square and F distributions with regard to mean, variance, standard deviation, correlation, regression co-efficient – Simple Problems. Chi-square test– Pearson's test of goodness of fit – Independence of Attributes - Contingency table – Simple problems.

REFERENCE :

1. Gupta and Kapoor V.K. - Fundamentals of Mathematical Statistics
2. Ramaswamy M.M. - Theory and application of Statistics
3. Craig and Hogg - Introduction to Mathematical Statistics

14MAU13 **Algebra I**

Unit I

Mappings and Groups: Mapping – onto – mapping – one - to - one mapping - Examples - Groups - Definition and Examples - Basic properties – Subgroups.

Unit II

Normal and Quotient Groups: A counting principle - Normal subgroups and Quotient groups – Homomorphism.

Unit III

Automorphisms and Permutation: Automorphisms - Cayley's Theorem – Permutation Groups.

Unit IV

Ring Theory: Rings - Definition and Examples - Basic properties – Special classes of rings- Homomorphism - Ideals and quotient rings.

Unit V

Maximal Ideals and Euclidean Rings: More ideals and quotient rings - The Field of Quotients of an Integral Domain - Euclidean Rings.

Text Book:

"Topics in Algebra" by **I. N. Herstien.** Second edition, Wiley Eastern Ltd. 2002.

Unit I : Chapter 1: Section 1.2
Chapter 2: Sections 2.1 to 2.4
Unit II : Chapter 2: Sections 2.5 to 2.7
Unit III : Chapter 2: Sections 2.8 to 2.10
Unit IV : Chapter 3: Sections 3.1 to 3.4
Unit V : Chapter 3: Sections 3.5 to 3.7

14MAU14 **Real Analysis**

Unit I
Basic Topology: Finite - Countable and Uncountable sets - Metric spaces.

Unit II
Basic Topology: Compact sets - Perfect sets – Connected sets.

Unit III
Numerical Sequences and Series: Convergent Sequences – subsequences – Cauchy sequences - Upper & Lower Limits – Some special sequences – Series – series of non negative terms – The number " e " – The root and Ratio tests – Power series – Summation by parts.

Unit IV
Continuity : Limits of functions – Continuous Functions – Continuity and Compactness – Continuity and Connectedness – Discontinuities.

Unit V
Differentiation: The derivative of a real function – Mean Value theorems – The continuity of derivatives- L' Hospital's rule – Derivatives of Higher order – Taylor's Theorem.

Text Book :

"Principles of Mathematical Analysis" by **Walter Rudin.** Third edition, McGraw Hill Book Company. 2013.

Unit I : Chapter 2 : Sections 2.1 to 2.30
Unit II : Chapter 2 : Sections 2.31 to 2.47
Unit III : Chapter 3 : Sections 3.1 to 3.44
Unit IV : Chapter 4 : Sections 4.1 to 4.27
Unit V : Chapter 5 : Sections 5.1 to 5.15

14MAU15 Operations Research

Unit I

General LPP: Simplex Method - Concept of Duality - Primal and Dual Problems.

Unit II

Transportation Problems: North West Corner Rule – Matrix Minimum Method – Vogel's Approximation Method – MODI Method. **Assignment Problems:** Mathematical Formulation – Assignment Algorithm (Hungarian Method) – Unbalanced Assignment Problems.

Unit III

Games and Strategies: Introduction – Two Person Zero Sum Games – The Maximin and Minimax Principle – Games Without Saddle Points – Mixed Strategies – Graphical Solution of 2xn and mx2 Games – Dominance Property.

Unit IV

Network Scheduling by CPM and PERT: Introduction – Network and Basic Components – Rules of Network Construction – Time Calculation in Network – Critical Method – PERT Calculation.

Unit V

Queuing Theory: Introduction – Queuing Systems – Characteristics of Queuing Systems – Symbols and Notations - Poisson Process and Exponent Distribution – Classification of Queues – Definition of Transient and Steady States – Poisson Queues – The M/M/I Queuing Systems – Model I (M/M/I) : (∞ / FIFO) – Model II (M/M/I) : (∞ /SIRO) – Model III (M/M/I) : (N/FIFO).

Text Book:

"Operations Research" by **Kantiswarup, P.K. Gupta and Manmohan,** Sultan Chand & Sons.13th Edition 2007.

Unit I : Chapter 2 : Sections 2.1 to 2.6
Chapter 3 : Sections 3.1, 3.3, 3.5
Chapter 4 : Sections 4.1 to 4.6
Unit II : Chapter 6 : Sections 6.1 to 6.9
Chapter 7 : Sections 7.1 to 7.3
Unit III : Chapter 9 : Sections 9.1 to 9.7
Unit IV : Chapter 21 : Sections 21.1 to 21.7
Unit V : Chapter 17 : Sections 17.1 to 17.7, 17.8.1

14EDCMAU **Mathematics**

(UG Programs – Cluster-II)

Unit I

Indices : Law of multiplication – Law of division – Law of power of power –Illustrations .

Unit II

Logarithms : Definition of log – rules of logarithms – Characteristics and mantissa – Illustrations.

Unit III

Ratio and Proportion : Rules of ratio – Properties of proportion – Illustrations.

Unit IV

Equations : Simple equations – Linear equations –Quadratic equations – Simultaneous linear equations in two unknowns – Illustrations.

Unit V

Mathematics of Finance : Simple interest – Compound interest – Annuity – Illustrations.

Text book:

Quantitative Aptitude (Mathematics) By Prof. H . R.Vyas and Prof. J.b. Shah

14MAU19 **Algebra-II**

Unit I

Matrices : Introduction - Symmetric and Skew symmetric – Hermitian and Skew Hermitian matrices - Orthogonal and unitary matrices -

Unit II

Vector Spaces : Elementary basic concepts – Linearly independence and bases.

Unit III

Inner Product Spaces : Dual spaces - Inner product spaces - Norm-Orthonormal basis- Gram - Schmidt orthogonalization process.

Unit IV

Row Rank of a Matrix: Rank of a matrix - Characteristic roots and characteristic vectors of a square matrix- Cayley - Hamilton theorem

Unit V

Linear Transformation : Algebra of linear transformations – Characteristic roots – Matrices.

Text books:

1.“A Text Book of Modern Algebra” by **K. Balakrishanan and M. Ramabhadran.** Second revised edition, Vikas Publishing House.(For Unit I and unit IV)

2.“Topics in Algebra” by **I.N. Herstein.** Second edition, Wiley Eastern Ltd. 2002. (For Units II, III and V)

Unit I : Chapter 1: Full
Unit II : Chapter 4: Sections 4.1, 4.2
Unit III : Chapter 4: Sections 4.3, 4.4
Unit IV : Chapter 2: Sections 2.8, 2.9
Chapter 3: Section 3.9
Unit V : Chapter 6: Sections 6.1 to 6.3

14MAU20 **Complex Analysis**

Unit I

Analytic Functions: Limit and continuity- Differentiability- Necessary and Sufficient condition for f(z) to be analytic – Method of constructing an Analytic function- Polar form of Cauchy- Riemann Equations.

Unit II

Conformal Mappings: Mapping or Transformation – Jacobian of a transformation – Conformal Mapping - Necessary and Sufficient Conditions for Conformal mappings- Superficial magnifications- The circle- Inverse points with respect to a circle- Some elementary transformations.

Unit III

Complex Integration: Introduction - Some basic Definitions- Complex line integral – Reduction of Complex Integrals to Real Integrals – Some Properties of Complex Integrals - An estimation of a Complex Integral - Line integrals as functions of arcs- Cauchy's fundamental theorem [only first proof] - Cauchy's integral formula-Poisson's Integral Formula of a circles - Derivative of an analytic function – Higher –order derivatives – Morera's theorem.

Unit IV

Complex Integration: Indefinite integrals or primitives – Cauchy's inequality – Liouville's theorem – Expansions of Analytic functions as power series: Taylors & Laurent's theorems– The Zeros of an Analytic function – Types of singularities – Theorem on poles and other singularities – solved examples – Maximum modulus principle – The excess number of Zeros over the number of poles of the meromorpic functions – Rouche's theorem– Fundamental Theorem of algebra.

Unit V

Calculus of Residues: Residue at a simple pole - Residue at a pole of order greater than unity - Residue at infinity – Cauchy's Residue theorem – Evaluation of definite integrals - Integration round the unit circle – Evaluation of the integral $\int f(x)\,dx$ – Jordan's inequality- Jordan's lemma - Evaluation of the integrals of the form $\int P(x)/Q(x) \sin mx\,dx$ – case of the poles on the real axis.

Text book:

"Functions of a Complex Variables" by **J.N. Sharma.** Thirty Eight Edition, Krishna Prakasan Media PVT, Meerut. 2002

Unit I : Chapter 2: Sections 2.1 to 2.7
Unit II : Chapter 4: Sections 4.1 to 4.9
Unit III : Chapter 6: Sections 6.1 to 6.8, 6.11 to 6.15.
Unit IV : Chapter 6: Sections 6.16 to 6.23, 6.27 to 6.29 & 6.32
Unit V : Chapter 7: Sections 7.1 to 7.11

14MAU21 **Astronomy**

Unit I

Astronomical Definitions: Astronomical Formula (Without Proof). **Celestial Sphere:** Diurnal Motion- Celestial Coordinates- Sidereal Time- Morning and Evening Stars- Circum Polar Star- Dip of Horizon- Twilight.

Unit II

Zones of Earth: Variation of Length of Day. **Refraction:** Tangent and Cassini's Formula.

Unit III

Geocentric Parallax. Heliocentric Parallax. Aberration: Parsec- Light year.

Unit IV

Kepler's Laws: Kepler's Laws (Statement only)- Three Anomalies. Equation of Time.

Unit V

The Moon: Phases. **Solar and Lunar Eclipses:** Ocurances.

Text book:

"Astronomy for Degree Classes" by S.Kumaravelu & Mrs. Susheela Kumaravelu(1999).

Unit I : Chapter 1 : Sections 1.1 to 1.37
Chapter 2 : Sections 2.39 to 2.86
Chapter 3 : Sections 5 and 6
Unit II : Chapter 3 : Section 1
Chapter 4 : Sections 4.117 to 4.134
Unit III : Chapters 5 : Sections 5.135 to 5.145
Chapter 8 : Sections 8.190 to 8.194
Chapter 9 : Sections 9.195 to 9.203
Unit IV : Chapters 6 : Sections 6.146 to 6.165
Chapter 7 : Section 1
Unit V : Chapters 12 : Sections 12.229 to 12.255
Chapter 13 : Sections 13.256 to 13.284

14MAU22 **Graph Theory**

Unit I

Introduction : Definition – Finite and Infinite graphs – Incidence and Degree- Isolated vertex – Pendant vertex and Null graph. **Paths and Circuits :** Isomorphism – Sub graphs – Walks – Paths and Circuits – Connected Graphs – Disconnected graphs – Euler graphs.

Unit II

Trees and Fundamental Circuits : Trees – Some Properties of Trees – Pendant Vertices in a tree- Distances and Centers in a tree – Rooted and Binary trees – Spanning trees.

Unit III

Planar and Dual Graphs : Combinational Vs Geometric Graphs- Planar Graph – Kuratowskii's Graphs – Different Representation of a Planar Graph- Detection of Planarity.

Unit IV

Matrix Representation of Graph : Incidence Matrix – Sub Matrices of A(G)- Circuit Matrix – Fundamental Circuit Matrix and Rank of B – Path matrix- Adjacency Matrix.

Unit V

Directed Graph : Definition- Some Types of Digraphs – Digraphs and Binary relations – Directed path and Connectedness – Matrices A, B&C of Digraphs- Adjacency Matrix of Digraph.

Text Book :

"Graph Theory with Applications to Engineering and Computer Science" by **Narasingh Deo.** Prentice-Hall of India Pvt Ltd, New Delhi. 1994.

Unit I : Chapter 1 : Sections 1.1 to 1.5
Chapter 2 : Sections 2.1, 2.2, 2.4 to 2.6
Unit II : Chapter 3 : Sections 3.1 to 3.5, 3.7
Unit III : Chapter 5 : Sections 5.1 to 5.5
Unit IV : Chapter7 : Sections 7.1 to 7.4 , 7.8, 7.9
Unit V : Chapter 9 : Sections 9.1 to 9.4, 9.8, 9.9

Elective

Advanced Differential Equations

Unit I

Linear Differential Equation of Higher Order: Euler-Cauchy equation-Existence and Uniqueness theory-Wronskian-Non-homogeneous equations-Solution by variation of parameter.

Unit II

Linear Differential Equation of Higher Order: Higher order linear differential equations-Higher order homogeneous equations with constant coefficients-Higher order non-homogeneous equations.

Unit III

System of Differential Equations: Introduction-Vectors, Matrices, Eigen values-Introductory example-Basic concepts and theory-Homogeneous systems with constant coefficients, phase plane, critical points.

Unit IV

Series Solution of Differential Equations: Power series method-Theory of the power series method-Legendre's equations-Legendre's polynomials.

Unit V

Series Solution of Differential Equations: Frobenius method-Bessel's equation-Bessel's function -Bessel's function of second kind.

Text Book:

"Advanced Engineering Mathematics" by **Erwin Kreyszig.** 8th edition, John Wiley & Sons Inc. New York, 2006.

Unit I : Chapter 2: Sections 2.6, 2.7, 2.8, 2.10
Unit II : Chapter 2: Sections 2.13, 2.14, 2.15
Unit III : Chapter 3: Sections 3.0, 3.1, 3.2, 3.3
Unit IV : Chapter 4: Sections 4.1, 4.2, 4.3
Unit V : Chapter 4: Sections 4.4, 4.5, 4.6

Elective
Elements of Number Theory

Unit I

Natural Numbers: Peano's axioms – Mathematical induction – Addition and Multiplication –Order relation- Principle of well ordering – Divisibility: Associates – Division Algorithm – GCD – Euclidian algorithm – LCM.

Unit II

Prime and Composite Numbers: Coprimes – Sieve of Eratosthenes – Euclid's Theorem – Unique Factorization – Number of divisors – Sum of divisors - Symbols $d(n),\sigma(n)$ – Arithmetic functions – Perfect Numbers – Euclid's Theorem on Perfect Numbers – Amicable numbers – Euler function $\Phi(n)$ – Greatest Integer function – Mobious function $\mu(n)$ – Inversion formula and its converse – Fibonacci numbers – Generating function- Lucas number.

Unit III

Distribution of Primes: General Discussion – Fermat's Conjecture – Gold Bach's Conjecture – Merserse numbers – Gap Theorem – Infinitude of Primes- **Congruence:** Definition – residue classes – Complete and least residue systems – Reduced residue system – Casting out 9 – Magic numbers – Divisibility tests – Linear Congruence – Solution of Congruence – Chinese reminder theorem.

Unit IV

Theorem of Fermat's and Wilson: Little Fermat's Theorem – Euler's extension – Inverse modulo – Wilson's Theorem and Its Converse – Lagrange's Theorem - Wolstenholme theorem.

Unit V

Sum of Squares: Pythagorean triples – Solutions of $x^2+y^2=z^2$ - Generating Pairs – solutions of $x^2+2y^2=z^2$ - Fermat's Last Theorem – Sum of two Squares – Representable numbers – Solutions of $x^2+y^2=n$ - Geometric meaning – Sum of Three or more squares – Euler's Identity – Euler's Theorem and Lagrange's theorem on sum of squares – Positive squares – Representation – as sum of positive squares.

Text Book :

"Elements of Number Theory" by **S.Kumaravelu & Mrs. Susheela Kumaravelu,** First Edition, SKV Publication. 2002.

Unit I : Chapter 1 and Chapter 3
Unit II : Chapter 4
Unit III : Chapter 5 and Chapter 6
Unit IV : Chapter 7
Unit V : Chapter 12

Elective
Programming in C (Theory)

Unit I

Overview of C: Constants, Variables and Data types - Character set - C Tokens - Keywords and Identifiers – Constants - Variables - Data types - Declaration of variables - Assigning values to variables - Defining symbolic constants.

Unit II

Operators and Expressions: Arithmetic of operators - Relational operators - Logical Operators - Assignment Operators - Increment and Decrement operators - Conditional Operators - Bitwise Operators - Special operators - Arithmetic expressions - Evaluation of expressions - Precedence of arithmetic operators - Type conversions in expressions - Operator precedence and Associativity - Mathematical functions.

Unit III

Managing input and Output operators: Reading a character - Writing a character formatted input - Formatted output. **Decision making and branching:** Decision making with If statement –Simple IF statement-The IF–ELSE statement - Nesting of IF-ELSE statement - The Switch statement - The GOTO statement.

Unit IV

Decision Making and Looping: The WHILE Statement -DO Statement - FOR Statement - Jumps in Loops. **Arrays:** One Dimensional Array - Two Dimensional Arrays - Initializing Two Dimensional Arrays –Multi-Dimensional Arrays.

Unit V

User - Defined Functions: Need for User - Defined Functions - A Multi Function Program - The Form of C Functions - Return Values and Their Types - Calling a Function - Category of Functions -No Arguments and No Return Values. **Pointers:** Understanding Pointers - Accessing the Address of the Variables - Declaring and Initializing Pointers - Accessing a Variable through its Pointer. **File Management in C:** Defining and Opening a File - Closing a File - Input / Output Operations on Files.

Text Book:

"Programming in ANSI C" by **E. Balaguruswamy.** Second Edition, Tata McGraw Hill, 1992

Unit I : Chapter 1 & Chapter 2
Unit II : Chapter 3
Unit III : Chapter 4 & Chapter 5
Unit IV : Chapter 6 & Chapter 7
Unit V : Chapter 9 : Sections 9.1 to 9.8 Chapter 11: Sections 11.1 to 11.5 and
Chapter 12 : Sections 12.1 to 12.4

Elective

Programming in C (Practical)

List of Programs:

1. Program to Find the Palindrome of a Given Sentence.
2. Program to Accept Any Two Numbers and Print all Prime Numbers in Between them.
3. Program to Find the Ascending and Descending Order of the Given Set of Numbers Using Bubble Sorting Method.
4. Program to Find the Determinant of a Matrix.
5. Write a Menu Driven Program to Implement Queue to Perform
   (a) Insertion
   (b) Deletion
   (c) Modification
   (d) Listing of Elements Using Pointers.
6. Program to Find the Product of Two Matrices.
7. Program to Find the Mean and Standard Deviation of n Numbers.
8. Program to Find the Single Integration by Simpson's Rule.
9. Program to Solve ODE Using Second Order Runge-Kutta Method.
10. Program to Copy the Content of One File to Another File.
11. Program to Find Factorial of a Positive Integer and ncr.
12. Program to Solve Non-Linear Equations by Newton-Raphson Method.

Elective
Internet and Java (Theory)

Unit I

Introduction to Internet: Resources of Internet – Hardware and Software requirements of Internet – Internet service providers (ISP) - Internet addressing – Mail – Web- URL's and schemes, host names and port numbers – Using Browser- Hypertext and HTML.

Unit II

OOP concepts – Features of Java- Java environment – Comparing java with C++ - Introduction to Java language – Types – Operators.

Unit III

Flow control: Branching –Looping. **Classes:** Object References- Method Declaration- Method Calling- this- Constructors – Method Overloading. **Inheritance:** Method Overriding – Dynamic Method Dispatch – Final – Finalize – Static – Abstract – Packages and Interfaces.

Unit IV

String Handling – Exception Handling – Threads and Synchronization – Utilities.

Unit V

Inputs/Outputs – Networking – Applet – Abstract windows tool kit (AWT).

Text Book:

1.**"The Internet – Complete Reference"** by **Harlay Hahn.** Second edition, TATA McGraw Hill. 1996 (For Units I)

2.**"Java Handbook"** by **Patric Naughton.** TATA McGraw Hill. 1996 (For Units II, III, IV & V)

Unit I : Chapters 1 to 7 , 9 to 11
Unit II : Chapters 1 to 5
Unit III : Chapters 6 to 8
Unit IV : Chapters 9 to 12
Unit V : Chapters 13 to 16

Elective
Internet and Java (Practical)

1. Write a Program that will Accept Command Line Arguments and Print the Same.

2. Write a Program to Display the Months of Year. The Months of the Year Should be held on an Array.

3. Write a Program that has Overload Methods.

4. Write a Program to Sort the Elements of an Array in Ascending Order.

5. Create a Class Called Numeral that Accepts an Array of Ten Numbers. Create a Subclass Called Numplay Which has a Menu as Follows
   (a) Display the Numbers
   (b) Sum of the Numbers
   (c) Average of the Numbers
   (d) Minimum of the Numbers.

6. Create an Applet to Obtain the List of Fonts Available With the Current Java Working Environment.

7. Write a Frame Application that has a Edit Menu. This Menu Contains Cut, Copy and Paste as Menu Item and does Similar Activities. Include a Text Area into Which Text can be Entered and the Cut, Copy and Paste Activities can be Demonstrated.

8. Create Desktop Pane, Add it to a Frame and Display Two Internal Frames in it. Internal Frames should have Different Layers.

9. Create an Interface Called Variable Test, Which Contains a Method Disp( ) and Two Variables x, y Which are Integers and Whose Value is Set as 10 and 20. Create a Class Called Varlnt Test Which Implements this Interface. This Disp( ) Method should Display a Message, " Inside Interface-Variable Test and Method Disp".

10. Create Two Threads One of the Threads has to Print Even Numbers and Another should Print Odd Numbers.

11. Write a Program to Display the Course Name, Fees and the Duration Using a String Tokenzier Class.