VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN [AUTONOMOUS]

ELAYAMPALAYAM, TIRUCHENGODE -637 205.

DEPARTMENT OF MATHEMATICS

B.Sc. – MATHEMATICS

COURSE PATTERN AND SCHEME OF EXAMINATIONS UNDER CBCS

for the Candidates admitted from the year 2016-2017

SEM	SUBJECT CODE	PART	COURSE	SUBJECT TITLE	Hrs/Week	CREDIT	INT. MARK	EXT. MARK	TOT. MARK
I	14U1LT01	I	Language-I	Tamil-I	6	3	25	75	100
	14U1LE01	II	English-I	English-I	6	3	25	75	100
	14U1PHA01	III	Allied Course-I	Allied Physics- I	6 (4+2)	4	25	75	100
	14U1MAC01	IV	Core Course-I	Classical Algebra	5	4	25	75	100
	14U1MAC02	IV	Core Course-II	Calculus	5	4	25	75	100
	14U1VE01		Value Education	Manavalakkalai Yoga	2	2	25	75	100
TOTAL					**30**	**20**	**150**	**450**	**600**
II	14U2LT02	I	Language-II	Tamil-II	6	3	25	75	100
	14U2LE02	II	English-II	English-II	6	3	25	75	100
	14U2PHA02	III	Allied Course-I	Allied Physics- II	6(4+2)	4	40	60	100
	14U2PHAP01	III	Allied Course-I (Pra)	Allied Course –I (Practical)		3	25	75	100
	14U2MAC03	IV	CoreCourse-III	Differential Equations and Laplace Transforms	5	4	25	75	100
	14U2MAC04	IV	Core Course-IV	Trigonometry,Vector Calculus & Fourier Series	5	4	25	75	100
	14U2ES01	VI	Environmental Studies	Environmental Studies	2	2	25	75	100
TOTAL					**30**	**23**	**190**	**510**	**700**

III	14U3LT03	I	Language-III	Tamil-III	6	5	25	75	100
	14U3LE03	II	English-III	English-III	6	5	25	75	100
	14U3MAA09	III	Allied Course-II	Mathematical Statistics-I	6	5	25	75	100
	-	III	Allied Course-II (Pra)	Allied Course-II (Pra)	-	-	-	-	-
	14U3MAC05	IV	Core Course-V	Statics	5	5	25	75	100
	14U3MAC06	IV	Core Course-VI	Discrete Mathematics	4	4	25	75	100
		VII	Non Major Elective Course-I	Fundamentals of Computer&Communications	2	2	25	75	100
TOTAL					30	25	150	450	600
IV	14U4LT04	I	Language-IV	Tamil-IV	6	3	25	75	100
	14U4LE04	II	English-IV	English-IV	6	3	25	75	100
	14U4MAA15	III	Allied Course-II	Mathematical Statistics-II	4	3	25	75	100
	14U4MAAP02	III	Allied Course-II (Pra)	Allied Course-II (Pra) Mathematical Statistics	2	4	40	60	100
	14U4MAC07	IV	Core Course-VII	Dynamics	5	5	25	75	100
	14U4MAC08	IV	Core Course-VIII	Numerical Methods	5	4	25	75	100
		VII	Non Major Elective Course-II	HTML and web design	2	2	25	75	100
TOTAL					30	28	190	510	700

V	14U5MAC09	IV	Core Course- IX	Algebra-I	6	5	25	75	100
	14U5MAC10	IV	Core Course- X	Real Analysis-I	6	5	25	75	100
	14U5MAC11	IV	Core Course- XI	Complex Analysis-I	6	5	25	75	100
	–	IV	Major Elective Course-I	Major Elective Course-I From Group-A	6	5	25	75	100
	14U5MAS01	V	Skill Based Elective-I	Mathematics for competitive Examinations –I	3	2	25	75	100
	14U5MAS02	V	Skill Based Elective-II	Mathematics for competitive Examinations –II	3	2	25	75	100
TOTAL					**30**	**24**	**150**	**450**	**600**
VI	14U6MAC12	IV	Core Course-XII	Algebra-II	6	5	25	75	100
	14U6MAC13	IV	Core Course-XIII	Real Analysis-II	6	5	25	75	100
	14U6MAC14	IV	Core Course-XIV	Complex Analysis-II	5	5	25	75	100
	–	IV	Major Elective Course-I	Major Elective Course-I From Group-C	5	5	25	75	100
	14U6MAS03	V	Skill Based Elective-V	Mathematics for competitive Examinations –III	3	2	25	75	100
	14U6MAS04	V	Skill Based Elective-VI	Mathematics for competitive Examinations –IV	3	2	25	75	100
	14U6EX01		Extension	-	-	1	-	-	-
TOTAL					**30**	**25**	**150**	**450**	**600**
GRAND TOTAL					**180**	**145**	**980**	**2820**	**3800**

ELECTIVE SUBJECTS:

Subject	Subject Code
From Group A	
Operations Research I	14U5MAE01
Financial Mathematics	14U5MAE02
From Group B	
Astronomy	14U5MAE03
Combinatorics	14U5MAE04
From Group C	
Operations Research II	14U5MAE05
Number Theory	14U5MAE06

SKILL BASED ELECTIVE COURSES:

Mathematics for competitiveExaminations –I	14U5MAS01
Mathematics for competitive Examinations –II	14U5MAS02
Mathematics for competitiveExaminations –III	14U5MAS03
Mathematics for competitiveExaminations –IV	14U5MAS04

SUBJECT TITLE	CLASSICAL ALGEBRA	CORE PAPER	I
SUBJECT CODE	14U1MAC01	HOURS/WEEK TOTAL HOURS	5 50
SEMESTER	I	CREDIT	4

Subject description: This course focuses on the convergence and divergence of different types of series, also discusses the standard methods of solving both polynomial and transcendental type equations.

Goal: To enable the students to learn about the convergence and divergence of the series and to find the roots for the different types of the equation.

Objectives: On successful completion of this course the students should gain knowledge about the convergence of series and solving equations.

UNIT I (10Hrs)

Characteristic equation – Characteristic roots and Characteristic vectors – Problems - Cayley Hamilton theorem (Statement only) and its problems - Diagonalisation of matrices – Problems.
(CHAPTER 5 : Page no: 5.50-5.85)

UNIT II (10Hrs)

Binomial Series – Positive integral index – Statement (without proof) – Summation of Binomial Series and approximation – Exponential Series – Standard results – Summation and coefficient of x^n – Problems only.
(CHAPTER 2 : Page no: 2.1-2.21:: CHAPTER 3 : Page no:3.1-3.23)

UNIT – III (10Hrs)

Theory of equation: Roots of an equation – Relations connecting the roots and coefficients – Imaginary and irrational roots – Symmetric functions of the roots in terms of Coefficients - Problems.
(CHAPTER 6 : Page no: 6.1-6.30)

UNIT – IV (10Hrs)

Reciprocal equation – Transformation of equations – To increase or decrease the roots of an equation – Removal of a term – Descarte's rule of signs – Problems.
(CHAPTER 6 : Page no: 6.30-6.60)

UNIT – V (10Hrs)

Multiple roots Rolls theorem – Position of real roots of $f(x) = 0$ – Newton's method of approximation to a root – Horner's method – Problems.
(CHAPTER 6 : Page no: 6.61-6.69)

Text book:

1. P, R. Vittal , *Allied Mathematics ,* Margham Publications, 2002

2. T.K. Manickavasagam Pillai & S. Narayanan , *Algebra ,* Vijay Nicole Imprints Pvt Ltd., - 2004(For UNIT V:page no:355-358)

Reference Books

1. P. Kandasamy and K. Thilagavathy , *Mathematics for B.Sc Branch I – Vol.*   S. Chand & Sons - 2004
2. N.P. Bali , *Algebra ,* Laxmi publications.

SUBJECT TITLE	CALCULUS	CORE PAPER	II
SUBJECT CODE	14U1MAC02	HOURS/WEEK TOTAL HOURS	5 40
SEMESTER	I	CREDIT	4

Subject description:
This course presents the idea of curvatures, integration of different types of functions, its geometrical applications, double, triple integrals and improper integrals.
Goal:
To enable the students to learn and gain knowledge about curvatures, integrations and its geometrical applications.
Objectives:
On successful completion of course the students should have gain about the evolutes and envelopes, different types of integrations, its geometrical application, proper and improper integration.

UNIT –I (10Hrs)
   Successive Differentiation – n^{th} Derivatives ,Leibnitz Theorem& problems.

UNIT – II (10Hrs)
   Partial Differentiation – Partial derivative of Higher orders- Homogenous functions – problems. Jacobians , Maxima & Minima of functions of two variables– problems.

UNIT – III (10Hrs)
   Integration – Integration of rational function of the type $\dfrac{lx+m}{ax^2+bx+c}$,Integration of irrational function of the type $\dfrac{lx+m}{\sqrt{ax^2+bx+c}}$ - Integration by Partial fractions –Integration by parts.

UNIT – IV (10Hrs)
   Reduction Formula-Bernoulli's formula – Reduction formula for

$$\int_0^{\frac{\pi}{2}}\sin^n\,xdx,\;\int_0^{\frac{\pi}{2}}\cos^n\,xdx,\;\int_0^{\frac{\pi}{4}}\tan^n xdx,\;\int\sec^n\,xdx,\;\int\cos ec^n\,xdx,\;\int\cos^m x\sin^n xdx,\;\int\cot^n xdx,\;\int x^n e^{ax}dx,$$

$\int e^{-x}x^n dx,\int x^m(\log x)^n\,dx$ -Problems for all the above cases.

UNIT – V (10 Hrs)
    Definite Integral-definition-properties.Beta and Gamma functions – Definition – properties – problems – Relation between Beta and Gamma functions

TEXT BOOK :

   Dr.P.R.Vittal & V.Malini ,Calculus,Margham Publications ,2000 Unit -

I: Chapter 1: Page No:1.1-1.25, Chapter 2: Page No:2.1-2.17

Unit –II: Chapter 3: Section1:Page No:3.1-3.30, Section3:Page No:3.46-3.62

Unit –III: Chapter 10: Page No:10.1-10.4, Page No:10.23-10.32, Page No:10.38-10.45

Unit –IV:Chapter 11: Page No:11.1-11.32

Unit –V:Chapter 12; Page No:12.1-12.6,   Chapter 13:Page No:13.1-13.31

REFERENCE BOOKS:

   1. T.K.M.Pillai, S. Narayanan ,Calculus Volume I&II ,2002 .

   2.   N.P.Bali Calculus.

SUBJECT TITLE	DIFFERENTIAL EQUATIONS & LAPLACE TRANSFORMS	CORE PAPER	III
SUBJECT CODE	14U2MAC03	HOURS/WEEK TOTAL HOURS	6 60
SEMESTER	II	CREDIT	4

Subject Description : This course presents the idea of Ordinary differential equations and partial differential equations.

Goals: To enable the students to learn about Second order differential equation and Laplace transforms.
Objectives: On successful completion of this course the students should have gained knowledge about Formation of PDE and Inverse Laplace transforms.

Unit I   **[12 Hours]**
Ordinary Differential Equations – First order but not of the first degree – Equations solvable for p, x and y – Clairaut's form – Second Order Differential Equations with Constant Co-efficients – Particular Integrals of the form $e^{\alpha x}$ V where V is of the form x, x^2, sinax, cosax, xsinax and xcosax.

Unit II   **[12 Hours]**
Second Order Differential Equations with Variable Co-efficients – both linear homogeneous equations and non-linear homogeneous equations – Method of Variation of Parameters – Simple Problems.

Unit III   **[12 Hours]**
Partial Differential Equations – Formation of Partial Differential Equations by eliminating arbitrary constants and arbitrary functions – Complete, Particular, Singular and General Integrals – Solution of equations of standard types $f(p,q) = 0$, $f(z,p,q) = 0$ and $f_1(x,p) = f_2(y,q)$ – Clairaut's form- Charpit's method – Lagrange's equation $Pp+Qq = R$.

Unit IV   **[12 Hours]**
Laplace Transforms – Definition – Laplace transform of standard formulae – Elementary theorems – Laplace transform of periodic functions – Problems.

Unit V   **[12 Hours]**
Inverse Laplace Transforms – Standard formulae - Elementary theorems – Applications to second order linear differential equations - Applications to simultaneous linear differential equations - Problems.
Treatment as in:
Dr. P.R.Vittal, Allied Mathematics, Margham Publicatons, 2002.
Unit I : Chapter- 22 Page No: 22.1-22.17 & Chapter- 23
Unit II: Chapter- 24
Unit III : Chapter- 26
Unit IV : Chapter- 27 Page No : 27.1-27.23
Unit V : Chapter- 27 Page No : 27.23-27.62

References:
   1. T.K. Manickavasagam pillai and S. Narayanan, Calculus, Vijay Nicole Imprints PVT Ltd, 2004.

SUBJECT TITLE	TRIGONOMETRY VECTOR CALCULUS AND FOURIER SERIES	CORE PAPER	IV
SUBJECT CODE	14U2MAC04	HOURS/WEEK TOTAL HOURS	5 50
SEMESTER	II	CREDIT	5

Subject Description : This course presents the idea of series and Logarithm.
Goals: To enable the students to learn about the scalar and vector fields.
Objectives: On successful completion of this course the students should have gained knowledge about Integration of vectors and Fourier series

Unit I: **(10Hrs)**
Expansion in Series – Expansion of $\cos^n \theta$, $\sin^n \theta$, in terms of cosines and sines of multiples of θ – Expansions of $\cos n\theta$ and $\sin n\theta$ in powers of sines and cosines – Expansion of $\sin \theta$, $\cos \theta$ and $\tan \theta$ in powers of θ – hyperbolic functions and inverse hyperbolic functions.
(CHAPTER 14 : Page no: 14.1-14.60)

Unit II: **(10Hrs)**
Logarithm of complex Numbers: Definition –Real and imaginary part of $\log (x + iy)$ – logarithm of negative real numbers-Gregory's Series – Euler's series.
(CHAPTER 14 : Page no: 14.61-14.85)

Unit III: **(10Hrs)**
Scalar and vector fields –Differentiation of vectors – Gradient, Divergence and Curl.
(CHAPTER 28 : Page no: 1-53)

Unit IV: **(10Hrs)**
Integration of vectors : line integral – surface integral –Volume integral – Gauss divergence theorem- Stoke's theorem -Green's theorem in the plane– (Statements only) - verification of the theorems.
(CHAPTER 28 : Page no:54-142)

Unit V: **(10Hrs)**
Fourier series : Definition-Fourier coefficients –Fourier series of periodicity 2π ,odd and even functions – half range series.(CHAPTER 21 : Page no: 21.1-21.59)

Treatment as in
1. P.R.Vital, Allied Mathematics, Margham Publications,2002.

References:
1. P. Duraipandian, Laxmiduraipandian - Vector Analysis (Revised Edition-Reprint 2005) Emerald Publishers.
2. T.K. Manichavasagam Pillai and S.Narayanan, Trigonometry - Viswanathan Publishers and Printers Pvt.Ltd ,1997.
3.Kandasamy. P, Thilagavathi. K " Mathematics for B.Sc. Branch I", Volume I, II and IV, S.Chand and Company Ltd, New Delhi, 2004. (for Unit I).

SUBJECT TITLE	STATICS	CORE PAPER	V
SUBJECT CODE	14U3MAC05	HOURS/WEEK TOTAL HOURS	5 50
SEMESTER	III	CREDIT	4

Subject Description : This course presents the idea of forces and law of frictions
Goals: To enable the students to learn about couple ,forces and catenary.
Objectives: On successful completion of this course the students should have gained knowledge about centre of gravity and forces.

UNIT –I   **[8 Hours]**
         Introduction-Force-Definition-Parallelogram law of forces- Triangular law of forces-Lami's theorem problems-Like and Unlike parallel forces-Problems-Moments-Definition-Varigon's theorem-Problems.

UNIT-II   **[7 Hours]**
         Couples- Definition of a couple- Moment of a couple-Theorems- Problems-Three forces acting on a rigid body-Problems

UNIT – III   **[10 Hours]**
         Introduction-Friction –Definition-Coefficient of friction-Limiting friction-Angle of friction and Cone of friction-Laws of Friction-Equilibrium of a particle on a rough inclined plane under any force-Problems.

Unit IV   **[15 Hours]**
         Definition-Centre of gravity of uniform bodies like thin rod-Thin parallelogram –Circular ring and Circular lamina-Triangular lamina-Trapezium lamina-Systems of three uniform rods forming a triangle-Method of integration for an arc of a circle-Sector of a circle-Quadrant of an ellipse-Solid and hollow sphere-Solid and hollow cone-Problems

UNIT V   **[10 Hours]**
         Common catenary –Definition-Sag and Span-Intrinsic parametric Cartesian equations of a catenary-Properties-Suspension bridge –Approximation to a shape of a catenary - Problems

Text Book :

STATICS by Dr. M.K . Venkataraman published by Agasthiar publications, 9A, Clives Building , 33 Nandhi Koil

Street, Trichy -1994

UNIT-I – Chapter1,2,3: Page 1 to 82

UNIT-I I– Chapter 4,5,: Page 84 to 142

UNIT-III– Chapter 7: Page 206 to 268

UNIT-IV – Chapter 8: Page 270 to 325

UNIT-V – Chapter 11: Page 375 to 399

References:
1.P.Duraipandiyan , Mechanics published by Emerald Publishers 135,Anna Salai ,Chennai-1984
2. S.Narayanan, Statics published by S.Chand & Co.Chennai- 1986

SUBJECT TITLE	**DISCRETE MATHEMATICS**	CORE PAPER	VI
SUBJECT CODE	**14U3MAC06**	HOURS/WEEK TOTAL HOURS	5 50
SEMESTER	**III**	CREDIT	4

Subject Description : This course presents the idea of mathematical logic and Algebraic systems

Goals: To enable the students to learn about negations , conjunction and groups.

Objectives: On successful completion of this course the students should have gained knowledge about logic

notations and semi groups

Unit I: **[10 Hours]**

Mathematical Logic – Statements and Notations – Connectives – Negation – Conjunction – Disjunction – statement Formulas and Truth Table – Conditional and Biconditional – Well formed Formulas – Tautologies. (sections 1.1, 1.2.1 – 1.2.4, 1.2.6 – 1.2.8).

Unit II: **[10 Hours]**

Normal Forms – Disjunctive Normal Forms – Conjunctive Normal Forms – Principal Disjunctive Normal Forms – Principal Conjunctive Normal Forms – Ordering and Uniqueness of Normal Forms. The Theory of inference for the statement calculus – validity using truth table – Rules of Inference – Consistency of Premises and indirect method of proof. (Sections 1.3.1. – 1.3.5, 1.4.1 – 1.4.3,)

Unit III :   **[10 Hours]**

Relations & ordering – Relations – Properties of binary relation in a set – Functions – Definition & Introduction – Composition of Functions – Inverse function – Binary and n-array operations – Hashing Functions – Natural numbers – Peano Axioms & Mathematical Induction – Cardinality.(sections 2.3.1, 2.3.2, 2.4.1, 2.4.2, 2.4.3, 2.4.4, 2.4.6, 2.5.1, 2.5.2).

Unit IV: **[10 Hours]**

Algebraic systems – Definition & Examples – Semi groups and monoids – definition and examples – homomorphism of semi groups & monoids – sub semi groups & sub monoids – Grammars – Formal Definition of a Language – Notions of Syntax Analysis. (sections 3.1.1, 3.1.2, 3.2.1, 3.2.2, 3.2.3, 3.3, 3.3.2, 3.3.3).

Unit V: **[10 Hours]**

Lattices as partially ordered sets: Definition and Examples – some properties of Lattices – Lattices as Algebraic systems – sub Lattices – Direct product and homonophism.

Boolean Algebra: Definition and Examples – subalagebra, Direct product and homomorphism – Boolean Functions – Boolean Forms and Free Boolean Algebras – Values of Boolean Expression and Boolean Functions (sections 4.1.1, 4.1.2, 4.1.3, 4.1.4, 4.2.1, 4.2.2, 4.3.1, 4.3.2).

Text Books :

S.No.	Title of the book	Author	Publishing Company	Year of Publication
1.	Discrete mathematical structures with applications to computer science	J.P.Trembly, R.Manohar	Tata Mc Graw Hill, New Delhi.	2001

Reference Books :

S.No.	Title of the book	Author	Publishing Company	Year of Publication
1.	Discrete Mathematics	Prof.V.Sundaresan, K.S.Ganapathy Subramaniyan, K.Ganesan	Tata Mc Graw Hill, New Delhi	2000
2.	Discrete Mathematics	L.Lovarz, J.Pelikan, K.Vexztergombi	Springer International Edition	2002
3.	Discrete Mathematics	N.Chandrasekaran M.Uma parvathi	PHI Learning P. Ltd.	2010

SUBJECT TITLE	DYNAMICS		CORE PAPER	VII
SUBJECT CODE	14U4MAC07		HOURS/WEEK TOTAL HOURS	4 40
SEMESTER	IV		CREDIT	5

Subject Description : This course presents the idea of velocity and acceleration

Goals: To enable the students to learn about central force and simple harmonic motion

Objectives: On successful completion of this course the students should have gained knowledge about velocity ,acceleration and center of gravity.

Unit I [7 Hours]

Introduction – Definition – Velocity – Resultant velocity – Components of velocity and acceleration in cartesian coordinates – Tangents and Normal components of velocity and acceleration - Radial and Transverse components of velocity and acceleration – Motion of a particle along a straight line under uniform acceleration – Problems – Simple Harmonic Motion – Definition - Equations of S.H.M – Properties of S.H.M. – Composition of two S.H.Ms. – Problems.

Unit II [7 Hours]

Introduction – Impulse and Impulsive force – Definitions – Principle of conservation of linear momentum – Newton's experimental law – Direct and oblique impact of two smooth spheres – Change in kinetic energy and impulse imparted due to collision – Impact of sphere on a fixed plane - Problems.

Unit III [6 Hours]

Projectile – Trajectory -Horizontal range - Velocity of projection - Angle of projection – The path of a projectile is a parabola – Range and time of flight on a horizontal plane –Range and time of flighton an inclined plane – Problems.

Unit IV [5 Hours]

Definition – Central force – Central orbit - Areal velocity – Differential equation of the central orbit in polar co-ordinates – p-r equation of the central orbit – Given the central orbit to find the law of force – Given the law of central force to find the orbit - Problems.

Unit V [5 Hours]

Moment of Interia of simple bodies – Parallel and Perpendicular axes theorems – Motion of a rigid body about a fixed horizontal axis – Kinetic Energy of rotation – Moment of momentum – Period of oscillation of a compound pendulum – Simple equivalent Pendulum - Problems.

Text Books :-
1. Mechanics P.Duraipandian Emerald Publishers, 135, Anna Salai, Chennai – 600002. 1988
2. Dynamics S.Narayanan S.Chand & Co.Chennai. 1986
UNIT-I – Chapter 1: Sections 1.6 to 1.11& Chapter 5:Sections 5.1
UNIT-I I– Chapter 12: Sections 12.1 to 12.9
UNIT-I II– Chapter 13: Sections 13.1 to 13.7
UNIT-IV – Chapter 15: Sections 15.1 to 15.6
UNIT-V – Chapter 16: Sections 16.1 to 16.3 & Chapter 17: Sections 17.1 to 17.3

SUBJECT TITLE	NUMERICAL METHODS	CORE PAPER:VIII
SUBJECT CODE	14U4MAC08	HOURS/WEEK:5
SEMESTER	IV	CREDIT:4

Subject Description : This course presents the idea of Numerical differentiation and Integeration.

Goals: To enable the students to learn about the fundamental ideas of forward and backward formulas.

Objectives: On successful completion of this course the students should have gained knowledge about numerical derivations

UNIT-I: [10 Hours]

Method of successive approximation-The Method of false position-Newton Raphson Method-Generalized Newton's Method-Muller's Method.

UNIT-II: [10 Hours]

Finite Differences-Forward Differences and Backward Differences-Symbolic relations and Separation of symbols-differences of a polynomial-Newton's formulae for Interpolation-Central difference Interpolationformulae-Gauss's central difference formulae.

UNIT-III: [10 Hours]

Numerical Differentiation--Numerical Integration-Trapezoidal rule-Simpson's 1/3 rule-Simpson's 3/8 rule-Boole's and Weddle's rule.

UNIT-IV: [10 Hours]

Solution of linear system-Direct Methods-Matrix Inversion Method-Gaussian Elimination Method-Gauss Jordan Method--Method of factorization-Solution of linear System-Iterative methods-Jacobian's Method –Gauss Seidal Method.

UNIT-V: [10 Hours]

Solution of Taylor's Series-Picard's Method of Successive approximations-Euler's Method-Runge Kutta Methods II order and III order.

TEXT BOOK

Introductory Methods of Numerical Analysis.S.S Sastry,Prentice Hall of India Pvt.Ltd,New Delhi 2000.

Unit I-Chapter 2 (sec2.1 to 2.5 and 2.8)

Unit II-Chapter 3 (sec 3.3 ,3.5 to 3.7.1)

Unit III-Chapter 5(sec 5.2(5.2.1),sec 5.4(5.4.1 to 5.4.4))

Unit IV-Chapter 6(sec 6.3(6.3.1 to 6.3.3,(6.3.6, 6.3.7), sec 6.4)

Unit V-Chapter 7(sec 7.2 to 7.5)

SUBJECT TITLE	ALGEBRA I	CORE PAPER	IX
SUBJECT CODE	14U5MAC09	HOURS/WEEK TOTAL HOURS	6 60
SEMESTER	V	CREDIT	5

Subject description: This course provides knowledge about sets, mappings, different types of groups and rings.

Goals: To enable the students to understand the concepts of sets, groups and rings. Also the mappings on sets, groups and rings.

Objective: On successful completion of course the students should have concrete knowledge about the abstract thinking like sets, groups and rings by proving theorems.

Unit I (12hrs)

Group – Definition – Examples – Addition Modulo n – Multiplication Modulo n – Symmetric Group – Some Preliminary lemmas – Problems –Order of an element – Properties (Sections 2.1 – 2.3)

Unit II (12 hrs)

Cyclic Groups – Sub Groups – Definition – Examples – Properties – Coset – Lagrange's Theorem – Normal Subgroups – Quotient groups – Properties – Problems(Sections 2.4 – 2.6)

Unit III (12hrs)

Homomorphism – Definition – Examples – Lemmas – Kernal of a homomorphism – Fundamental theorem – Automorphism – Definition – Inner Automorphism - Lemmas - Examples – Cayley's Theorem – Permutation Groups. (Sections 2.7 – 2.9 excluding application 1 & 2, 2.10)

Unit IV (12hrs)

Ring – Definition – Examples – Some special classes of Rings – Zero Divisor – Integral Domain – Field – Definition – Examples – Homomorphism -Ideals – Quotient Rings – Maximal ideal.(Sections 3.1 – 3.5)

Unit V (12 hrs)

The Field of Quotient of an Integral Domain – Euclidean Rings – Definition – Principal ideal Ring – Greatest Common divisor – Properties – Unique Factorization theorem . (Sections 3.6 & 3.7)

Text Book:

S.NO	Title of the BooK	Author	Publishing C ompany	Year of Publicatiion
1	Topics in Algebra	I.N.Herstein	John Wiley, New York	1975

Reference Books:

S.No	Title of the Book	Author	Publishing C ompany	Year of Publicatiion
1	A first course in modern algebra	A.R.Vasistha	Krishna Prekasen Mandhir, 9, Shivaji Road,Meerut(up)	1983
2	Modern Algebra	M.L.Santiago	Tata Mc Graw Hill ,New Delhi.	1994
3	Modern Algebra	K.Viswanatha Naik	Emerald Publishers,135,Anna salai,chennai.	1988
4	A text Book of Modern Algebra	Dr.R.Balakrishnan	VikasPublishing House,New Delhi.	1994

SUBJECT TITLE	REAL ANALYSIS-I	CORE PAPER	X
SUBJECT CODE	14U5MAC10	HOURS/WEEK TOTAL HOURS	6 60
SEMESTER	V	CREDIT	5

Subject description: This course provides knowledge about Functions, sequences of real numbers, limits and Metric spaces.

Goals: To enable the students to understand the concepts of Functions, sequences of real number, limits and Metric spaces.

Objective: On successful completion of course the students should have concrete knowledge about the abstract thinking like Functions, sequences of real number, limits and Metric spaces.

Unit I: **[12Hours]**

Functions:

Functions – Real valued functions – Equivalence – Countability – Real numbers – Least upper bounds.Sequences of Real Numbers:

Definition of sequence and subsequence – Limit of a sequence – Convergent sequences – Divergent sequences.

Unit II: **[12 Hours]**

Sequences of Real Numbers:

Bounded sequences – Monotone sequences – Operations on convergent sequences – Operations on divergent sequences – Limit superior and limit inferior – Cauchy sequences

Unit III: **[12 Hours]**

Series of Real numbers:Convergence and divergence – Series with nonnegative terms – Alternating Series – Conditional convergence and absolute convergence – Rearrangements of series – Tests for absolute convergence – Series whose terms form a non increasing sequence.

Unit IV: **[12 Hours]**

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

Unit V: **12 Hours]**

Continuous functions on Metric Spaces:

Functions continuous at a point on the real line – Reformulation – Functions continuous on a metric space – Open sets – Closed sets – Discontinuous functions on R^1.

Text Book:

1. Methods of real analysis, Richard R.Goldberg, Oxford&IBH Publishing Co.Pvt Ltd, NewDelhi. (1970).

Unit – I – Chapter -1: Sec:1.3-1.7 & Chapter -2 Sec:2.1-2.4 (Page: 7-32)

Unit – II – Chapter -2: Sec:2.5-2.10 (Page: 34-46

Unit – III – Chapter -3: Sec:3.1-3.7 (Page: 67-85)

Unit – IV – Chapter -4: Sec:4.1-4.3 (Page: 98-108)

Unit – V – Chapter -5: Sec:5.1-5.6 (Page: 113-12

SUBJECT TITLE	COMPLEX ANALYSIS -I	CORE PAPER	XI
SUBJECT CODE	14U5MAC11	HOURS/WEEK	6
SEMESTER	V	CREDIT	5

Subject description: This course provides knowledge about complex numbers, Analytic functions, Bilinear transformations and power series.

Goals: To enable the students to understand the concepts of Analytic functions, Bilinear transformations and power series.

Objective: On successful completion of course the students should have concrete knowledge about the abstract thinking like Analytic functions, Bilinear transformations and power series.

UNIT:I (12 Hours)

Complex Numbers: Geometrical Representation of Complex Numbers-Regions in the complex plane-The Extended Complex plane.**Analytic Functions**: Introduction-Functions of a complex Variable-Limits-Theorems On Limit-Continuous Functions -Theorems –Examples.

Chapter I :Sections 1.5 ,1.8,1.9 & Chapter II : Sections 2.1-2.4

UNIT:II (12 Hours)

Analytic Functions: Differentiability –The Cauchy –Riemann Equations –Analytic Functions – Harmonic Functions –Conjugate harmonic Functions-Conformal Mapping-Theorems –Examples.

Chapter II : Sections 2.5-2.9

UNIT:III (12 Hours)

Bilinear Transformations : Introduction –Elementary Transformations-Bilinear Transformations-Cross Ratio-Fixed points of Bilinear transformations-Some Special Bilinear transformations.

Chapter III : Sections 3.0-3.5.

UNIT:IV (12 Hours)

Power Series: Introduction –Sequences and series- Sequences and series of Functions-Power Series-Elementary Functions.

Chapter IV : Sections 4.0-4.4.

UNIT:V (12 Hours)

Mapping By Elementary Functions : Introduction-The Mapping $W =z^2$,$W = z^{1/2}$,
$w=z^n$,where n is a positive integer, $w = e^z$, $w =Sinz$, $w= Cosz$, $w=Coshz$,$w=1/2(z+1/z)$.

Chapter V : Sections 5.0-5.7

Text Book:

S.Arumugan and A.Thangapandi Isaac and A.Somasundaram ,**Complex Analysis** ,Scitech Publications (India) Pvt .Ltd April 2012.

Reference Book:

P.Duraipandian and Laxmi Duraipandian and D.Muhilian,**Complex Analysis,**Emerald Publications 2001**.**

SUBJECT TITLE	ALGEBRA II	CORE PAPER	XII
SUBJECT CODE	14U6MAC12	HOURS/WEEK	6
		TOTAL HOURS	60
SEMESTER	VI	CREDIT	5

Subject description:
This course provides knowledge about vector spaces and linear transformations.
Goals:
It enables the students to understand the concept of direct sums, dual spaces and linear transformations.
Objective:
On successful completion of course the students should have concrete knowledge about the linear independence dual spaces and linear transformations.

Unit I   **(12 hrs)**

Vector Spaces – Definition – Simple Properties – Examples – Homomorphism – Sub space – Quotient spaces – Internal direct sum – External direct sum(Section 4.1)

Unit II   **(12 hrs)**

Linear Independence – Dimension of a Vector space – Bases - Dimension of Quotient spaces - Dual spaces (Section 4.2 – 4.3)

Unit III   **(12 hrs)**

Inner Product spaces – Definition – Examples – Applications – Orthogonal Complement of a Subspace – Orthonormal & Orthonormal Basis – Gram Schmidt Orthogonalization process (Section 4.4)

Unit IV   **(12 hrs)**

Linear Transformation –The Algebra of linear transformations – Characteristic roots – Matrices – Canonical forms – Triangular forms(Sections 6.1 – 6.4)

Unit V   **(12 hrs)**

Nilpotent Transformations – Definitions – Lemma – Theorems – Trace and Transpose – Definition –Properties – Theorems.(Sections 6.5 & 6.8)

Text Books:

S.NO	Title of the BooK	Author	Publishing Company	Year of Publicatiion
1	Topics in Algebra - 2 edition	I.N.Herstein	John Wiley, New York	2011

Reference Books:

S.NO	Title of the BooK	Author	Publishing Company	Year of Publication
1	A first course in modern algebra	A.R.Vasistha	Krishna Prekasen Mandhir, 9, Shivaji Road,Meerut(up)	1983
2	Modern Algebra	K.Viswanatha Naik	Emerald Publishers,135,Anna salai,chennai.	2001
3	A text Book of Modern Algebra	Dr.R.Balakrishnan & Dr.N.Ramabadran	VikasPublishing House,New Delhi.	1984

Subject title	REAL ANALYSIS-II	Core course-XIII
Subject code	14U6MAC13	Hours/Week-6
Semester	VI	Credit-5

Subject description:

This course provides knowledge about continuous functions, Uniform continuity, Derivatives and Pointwise convergence of sequences.

Goals:

It enables the students to understand the concept of continuous functions, Uniform continuity, Derivatives and Pointwise convergence of sequences .

Objective:

On successful completion of course the students should have concrete knowledge about continuous functions, Uniform continuity ,Derivatives and Pointwise convergence of sequences.

Unit I [12 Hours]

More about open sets- Connected sets-Bounded sets and totally bounded sets- Complete metric spaces-Compact metric spaces-Continuous functions on compact metric spaces-Continuity of the inverse function.

Unit II [12 Hours]

Uniform continuity – Sets of measure zero-Definition of the Riemann integral-Existence of the Riemann integral-Properties of the Riemann integral.

Unit III [12 Hours]

Derivatives-Rolle's theorem-The law of the mean-Fundamental theorems of calculus.

Unit IV [12 Hours]

Pointwise convergence of sequences of functions-Uniform convergence of sequences of functions-Consequences of uniform convergence-convergence and uniform convergence of series of functions.

Unit V [12 Hours]

Length of open sets and closed sets- Inner and outer measure, measurable sets- Properties of measurable sets- Measurable functions- Definition and existence of the lebesgue integral for bounded functions.

Text Book:

1. Richard R.Goldberg, *METHODS OF REAL ANALYSIS*, Oxford @ IBH Publishing Co. Pvt. Ltd. New Delhi(1970).

Unit I   - Chapter 6   **:** Sec(6.1 to 6.7)

Unit II - Chapter 6,7 **:** Sec(6.8 to 7.4)

Unit III - Chapter 7   **:** Sec(7.5 to 7.8)

Unit IV - Chapter 9   **:** Sec(9.1 to 9.4)

Unit V - Chapter 11 **:** Sec(11.1 to11.6)

SUBJECT TITLE	COMPLEX ANALYSIS -II	CORE PAPER	XIV
SUBJECT CODE	14U6MAC14	HOURS/WEEK	6
SEMESTER	VI	CREDIT	5

Subject Description: This course provides the knowledge about complex functions with some fundamental theorems. Singularity and residues in complex functions, integrations of complex functions and meromorphic functions

Goal: To enable the students to learn complex number system, complex function and complex integration.

Objectives: On successful completion of this course the students should gained knowledge

about the complex functions and its nature.

 UNIT:I **(12 Hours)**

 Complex Integration: Introduction –Simple rectifiable oriented Curves-Integration of Complex Fuctions-Simple integrals using definition-Definite integrals-Interior and exterior of a closed curve-Simply –connected region-Cauchy's fundamental theorem-Goursat's lemma- Cauchy's theorem Using Goursat's lemma –Extension to Cauchy's fundamental theorem.

Chapter VIII :Sections 8.1 to 8.7

UNIT:II **(12 Hours)**

 Complex Integration : Integral along an arc joining two points- Cauchy's integral formula and formulas for derivatives-Cauchy's formula for first derivative- Cauchy's formula for n th derivative-Morera's theorem-Zeros of a function-Cauchy's inequality-Liouville's theorem-Fundamental theorem of Algebra-Maximum modulus theorem-Gauss' Mean value theorem-Poission's integral –Theorems and problems.

Chapter VIII :Sections 8.8 to 8.11

UNIT:III **(12 Hours)**

 Taylor's series and Laurent's series: Taylor's series theorem and Problems - Zeros of an analytic

function-Theorems and examples - Laurent's series theorem and Problems.

Singularities : Singular point or Singularity –Isolated Singularities-Removable Singularities-Pole-Essential Singularities-Examples

Chapter IX :Sections 9.1 to 9.3 and 9.5 to 9.9

UNIT:IV **(12 Hours)**

Taylor's series and Laurent's series :–Behaviour of a function at an isolated Singularity –Theorems-Weierstrass theorem-Determination of the nature of Singularities-Examples.

Meromorphic Functions : Definition and theorems-Principle of argument theorem-Rouche's theorem-Fundamental theorem of Algebra-Hurwitz's theorem-Functions meromorphic in the extended plane-Theorem and Examples.

Chapter IX : Sections 9.10 to 9.13 and Chapter XI : Sections 11.1 to 11.3

UNIT:V **(12 Hours)**

Residues : Definition-Examples-Calculation of residues –Examples-Cauchy Residue Theorem-Problems-Real

definite integrals Type I, Type II **,**Type III **,**Type IV-Problems.

Chapter X : Sections 10.1 to 10.4

Text Book: S.Arumugan and A.Thangapandi Isaac and A.Somasundaram ,**Complex Analysis** ,Scitech Publications (India) Pvt .Ltd April 2012.

Reference Book: P.Duraipandian and Laxmi Duraipandian and D.Muhilian,**Complex Analysis,**Emerald Publications 2001**.**

SUBJECT TITLE	OPERATIONS RESEARCH-I	MAJOR ELECTIVE COURSE	I
		HOURS/WEEK	**6**
SUBJECT CODE	**14U5MAE01**	**TOTAL HOURS**	**90**
SEMESTER	**V**	**CREDIT**	**4**

UNIT –I: **(18 Hours)**

Introduction - Definition of O.R. – Scope of O.R. – Linear Programming Problem – Definitions – Mathematical Formulation – characteristic of LPP- Matrix form of LPP - Graphical Method – Definitions of bounded , unbounded and Optimal solutions – Procedure of solving LPP by graphical method – Problems- Simplex Technique- Definitions of basic, non-basic Variables – Basic solutions – Slack Variables and Optimal Solutions, Simplex Procedure of Solving LPP - Problems.

Chapter 1, Chapter 2

UNIT – II: **(18 Hours)**

Introduction- Big M method-definitions of Big M method-,surplus variables and Artificial variables-Procedure of solving an LPP by Big M method – Psuedo optimal solution – Problems - Two phase simplex method – Procedure of solving an LPP by Two phase simplex method – Problems.

Chapter 3 (Sec 3.5)

UNIT - III: **(18 Hours)**

Duality in Linear Programming: Concept of duality – Formulation of Primal - Dual pairs – Duality Theorems – Complementary slackness theorem – Duality and simplex method – Dual simplex method – Dual simplex algorithm – Problems.

Chapter 4 (Sec 4.1 – 4.7)

UNIT- IV: **(18 Hours)**

Introduction-Balanced and Unbalanced T.P, Feasible solution – Basic Feasible solution – Optimum solution – Degeneracy in T.P – Mathematical Formulation – North West Corner rule – Vogel's approximation Method (Unit penalty method) – Method of matrix minima (Least cost method) - Problems-Algorithm of optimality test (MODI Method) – Problems.

Assignment problem – Definition – Mathematical formulation of the Assignment problem – Test for optimality by using Hungarian method – Unbalanced Assignment problem- Degeneracy in Assignment problem – Variations in Assignment Problem – Problems.

Chapter 6, Chapter 7

UNIT –V: **(18 Hours)**

Introduction – Definition – Basic Assumption – n jobs to be operated on two machines – Problems – n jobs to be operated on three machines – Problems – n jobs to be operated on m machines – Problems – two jobs to be operated on m machines (Graphical method) – Problems .

Chapter 10

TEXT BOOK:

1. P.K. Gupta, Man Mohan and Kanti Swarup, "*Operations Research*", Sultan Chand and Sons, New Delhi, Ninth Edition, 2015.

REFERENCE BOOKS:

1. S.Kalavathy, "*Operations Research*", Second Edition, Vikas Publishing House, New Delhi, 2002.

2. P.K.Gupta and D.S.Hira, "*Operations Research*", S.Chand & Co, NewDelhi, Second Edition, 2004.

3. Hamdy Taha, "*Operations Research*", Prentice Hall Publications, NewDelhi, 1996.

4. Nita Hshah Ravi M. Gor Hardiksoni, "*Operations Research*", PHI, P.Ltd., 2010.

SUBJECT TITLE	**FINANCIAL MATHEMATICS**	**MAJOR ELECTIVE COURSE**	**II**
		HOURS/WEEK	**6**
SUBJECT CODE	**14U5MAE02**	**TOTAL HOURS**	**90**
SEMESTER	**V**	**CREDIT**	**4**

Unit I   **(18 Hours)**

Probability – Probabilities and Events – Conditional probability – Random Variables and Expected Values – Covariance and correlation – Continuous Random variables - Normal Random Variables – Properties of Normal Random Variables – The central limit Theorem – Simple Problems.   Chapter : 1, Chapter : 2

Unit II   **(18 Hours)**

Geometric Brownian Motion – G.B.M. as a limit of simple models – Brownian Motion – Simple problems -Interest rates – Present value analysis – Rate of returns – Continuously varying interest rates – An example of option pricing – other examples of pricing via arbitrage.

Chapter: 3 (Section 3.3), Chapter: 4, Chapter: 5

Unit III   **(18 Hours)**

The Arbitage theorem – The multi period Binomial model – Proof of the Arbitrage theorem – The Black Scholes formula – Properties of the Black schools option cost – Derivation of Black Scholes formula – simple problems.

Chapter : 6, Chapter: 7 (Sections: 7.1, 7.2, 7.3. 7.5.1)

Unit IV   **(18 Hours)**

Additional results on options – Call option on Divided paying Securities – Pricing American put options – Adding Jumps to Geometric Brownian Motion – Estimating the Volatility Parameter – simple problems.

Chapter :8 (Sections: 8.1 to 8.5)

Unit V   **(18 Hours)**

Valuing by Expected Utility – Limitation of Arbitrage pricing – valuing Investments by Expected utility – The portfolio selection problem – Value at risk and conditional value at risk -The Capital assets pricing model – Mean variance analysis of risk- Neutral priced Call options – Rates of return – Single period and Geometric Brownian Motion – simple problems.

Chapter : 9

TEXT BOOK:

1. Sheldon M.Ross, An Elementary Introduction to Mathematical Finance, 2nd Edition, Cambridge University Press, 2005.

REFERENCE BOOKS:

1. McCutcheon,John.J;Scott,William   F.London: Heinemann , "An   Introduction   to   the Mathematics of Finance",1986.

2. Ingersoll,Jonathan   E.Rowman   &   Littlefield,   "Theory   of   Financial   decision   making", 1987.

SUBJECT TITLE	ASTRONOMY	Major Elective Course	III
SUBJECT CODE	14U5MAE03	HOURS/WEEK TOTAL HOURS	6 90
SEMESTER	V	CREDIT	4

Unit I (18 Hours)

Standard formulae in Spherical Trigonmerty – Statements only – Celestial sphere – Celestial co-ordinates and their conversions – Diumal motion – Problems connected with Diumal Motion – Zones of Earth – Dip – Twilght – Problems.

Unit II (18 Hours)

Astronomical Refraction – Tangent and Cassini's formulae – Geocentric parallax – Helicentric parallax – problems.

Unit III (18 Hours)

Kepler's laws of planetary motion – Newton's deductions from Kepler's Laws – Equation of Time – Seasons - Calender – Conversion of time - problems.

Unit IV (18 Hours)

Fixing the Ecliptic – Fixing the position of the First point of Aries (Flamsteed's method) – The Moon – Differednt phases – Mentonic cycle – Tides – problems.

Unit V (18 Hours)

Eclipses – solar eclipses – Lunar eclipses – General description of solar system and Stellar universe – problems.

TEXT BOOK:

1. Kumaravelu and Susila Kumaravelu, Astronomy, Muruga Bhavanam, Chidambara Nagar, Nagarkoil-2,2009.

REFERENCE BOOKS:

1. Dinah L. Moche, Astronomy: A self teaching guide, 2017
2. John.A.Read, 50 things to see with a small telescope, 2016

SUBJECT TITLE	COMBINATORICS	Major Elective Course	IV
SUBJECT CODE	14U5MAE04	HOURS/WEEK TOTAL HOURS	6 90
SEMESTER	V	CREDIT	4

Unit I   **(18 Hours)**

Introduction to Basic ideas – General formula for f(n,k) – Recurrence Relation – boundary condition – Fibonacci sequence - generating function.

Unit II   **(18 Hours)**

Permutation – Ordered selection – unordered selection – further remarks on Binomial theorem.

Unit III   **(18 Hours)**

Passing within a set - Pairing between set and optimal assignment problem – Gala's optimal assignment problem.

Unit IV   **(18 Hours)**

Fibonacci type relation – using generating function - Miscellaneous method – Counting simple electrical networks.

Unit V   **(18 Hours)**

The inclusion – Exclusion principle – Rook polynomial.

TEXT BOOK:

   1. Jan Anderson, A First Course in Combinatorial Mathematics, Oxford Applied Mathematics and Computing Science Series, UK, 1974.

REFERENCE BOOKS:

   1. V.K.Balakrishnan, Combinatorics, Schuam Series, 1996

   2. Marshall hall Jr, Combinatorial theory, John wiley & sons , 2 nd edition.

SUBJECT TITLE	OPERATIONS RESEARCH-II	MAJOR ELECTIVE COURSE	V
SUBJECT CODE	14U6MAE05	HOURS/WEEK	6
		TOTAL HOURS	90
SEMESTER	VI	CREDIT	4

UNIT- I: (18 Hours)

Introduction - Definition of Inventory models-Type of Inventory models : (i) Uniform Rate of Demand,Infinite Rate of production and No shortages.(ii) Uniform Rate of Demand,Finite Rate of production and No shortages.(iii) Uniform Rate of Demand instantaneous production with shortage-Book Works-Problems.

Definitions-News Paper Boy Problem-Discrete and Continuous type cases-Problems-Inventory Model with one and two price break-Problems.   Chapter: 18

Unit - II: (18 Hours)

Games and Strategies: Introduction – Two – Person Zero – Sum games – The Maximin – Minimax Principle – Games Without saddle points – Mixed Strategies – Solution of 2 X 2 Rectangular games – Graphical method – Problems.   Chapter 9: (Sec 9.1 – 9.6)

Unit - III : (18 Hours)

Introduction - Definition of steady state, transient state and queue discipline, characteristics of a queuing model – Applications of queuing model – Little's formula – classification of queues – Poisson process – Properties of Poisson process. Models

(i) (M / M / I) : (/ FCFS)

(ii) (M / M / I) : (N / FCFS)

   (iii) (M / M /S) : (/ FCFS) – Problems.   Chapter 17

Unit - IV: (18 Hours)

Introduction – Definition of network, event, activity, optimistic time, pessimistic time, the most likely time, critical path, total float and free float – Difference between Slack and Float-Phases of Critical Path in a PERT Network – difference between CPM and PERT – Problems.

   Chapter 21

Unit - V: (18 Hours)

Replacement Problems and System Reliability: Introduction – Replacement of Equipment or Asset that Deteriorates gradually – Replacement of equipment that fails suddenly – Recruitment and promotion problem – Equipment renewable problem – Reliability and system failure rates – Problems.

   Chapter 19: (Sec 19.1 – 19.6)

TEXT BOOK:

   1.P.K. Gupta, Man Mohan and Kanti Swarup, "*Operations Research*", Sultan Chand and Sons, New Delhi, Ninth Edition, 2015.

REFERENCE BOOKS:

   1.S.Kalavathy, "*Operations Research*", Second Edition, Vikas Publishing House, New Delhi, 2002.
   2.P.K.Gupta and D.S.Hira, "*Operations Research*", S.Chand & Co, NewDelhi, Second Edition, 2004.
   3.Hamdy Taha, "*Operations Research*", Prentice Hall Publications, NewDelhi, 1996.
   4.Nita Hshah Ravi M. Gor Hardiksoni, "*Operations Research*", PHI, P.Ltd., 2010.

SUBJECT TITLE	NUMBER THEORY	MAJOR ELECTIVE COURSE	VI
SUBJECT CODE	14U6MAE06	HOURS/WEEK	6
		TOTAL HOURS	90
SEMESTER	VI	CREDIT	4

Unit I   **(18 Hours)**

The Division Algorithm – The g.c.d – The Euclidean Algorithm – The Diophantine Equation $ax+by = c$.

Unit II   **(18 Hours)**

The Fundamental theorem of arithmetic, The sieve of Eratesthenes – The Goldbach conjecture – basic properties of congruence.

Unit III   **(18 Hours)**

Special Divisibility tests – Linear congruences – The Little Fermat's theorem – Wilson's theorem.

Unit IV   **(18 Hours)**

The functions μ and σ – The Mobius inversion formula – The greatest integer function.

Unit V   **(18 Hours)**

Euler's Phi – function – Euler's theorem – Some properties of the Phi – function.

TEXT BOOK:

1.David M. Burton, "*Elementary Number Theory*", Universal Book Stall, 2010.

REFERENCE BOOKS:

1. K. Ireland and M.Rosen, *A Classical Introduction to Modern Number Theory*, Springer Verlag, New York, 1972.
2. T.M. Apostol, *Introduction to Analytic Number Theory*, Narosa Publication, House, Chennai, 1980.
3. *Elementary Number Theory*, Seventh Edition, MC Graw-Hill Companies, 2015.
4. Ivan Niven and H.S. Zuckerman,*An Introduction to the Theory of Numbers*, 3rd edition, Wiley Eastern Ltd, New Delhi, 1989.

SUBJECT TITLE	MATHEMATICAL STATISTICS - I	ALLIED PAPER	IX
SUBJECT CODE	14U3MAA09	HOURS/WEEK TOTAL HOURS	6 60
SEMESTER	III	CREDIT	5

Unit: I [12 Hours]

Random Variable – Discrete and Continuous – Distribution function – Marginal and Conditional Distributions – Mathematical Expectation – Moment Generating function – characteristic function – Tchebychev's inequality.

Chapter 5 (Sections 5.1 to 5.4.1 & 5.5 to 5.5.5) & Chapter 6 (Sections 6.1 to 6.7 & 6.10 to 6.13)

Unit: II [12 Hours]

Theoretical standard distributions – Binomial, Poisson Rectangular and Normal Distributions – Derivations, properties and Applications – Simple problems.

Chapter 7 (Sections 7.0 to 7.3.10 & 7.4.3) Chapter 8 (Sections 8.1 to 8.2.15)

Unit: III [12 Hours]

Exact sampling distributions – Chi- Square distribution, 't' distribution and 'F' distribution – Derivation of Mean, Variance, M.G.F and characteristic function – Relationship between 't', Chi- Square and F distributions.

Chapter 13 (Sections 13.1 to 13.9.1), Chapter 14 (Sections 14.1 to 14.5.11)

Unit: IV [12 Hours]

Correlation and Regression – Correlation co-efficient and rank correlation – Regression Lines and regression co-efficient – properties – partial and multiple correlation co-efficient of 3 variables only – Simple problems.

Chapter 10 (Sections 10.1 to 10.7.8 & 10.11 & 10.18)

Unit: V [12 Hours]

Curve fitting – Method of Least Squares – Fitting of Second Degree Parabola – Fitting of power curve and Exponential curve - Simple problems.

Chapter 9 (Sections 9.1 to 9.4)

Text Book:

1. Gupta, S.C and Kapoor, V.K(2004). Fundamentals of Mathematical Statistics (11th edition), Sultan Chand &Sons. New Delhi.

Reference Book

Sancheti, D.C and Kapoor V.K (2005), Statistics (7th edition), Sultan Chand and Sons, New Delhi.

SUBJECT TITLE	**MATHEMATICAL STATISTICS - II**	**ALLIED PAPER**	**XV**
SUBJECT CODE	**14U4MAA15**	**HOURS/WEEK** **TOTAL HOURS**	**6** **60**
SEMESTER	**IV**	**CREDIT**	

UNIT-I [12 Hours]

Theory of Estimation - Parameter space , estimator, concept of point and interval estimation.- Unbiasedness, Consistency, Efficiency, and MVU estimator and sufficiency. - Neyman factorization theorem- Cramer Rao inequality – Rao - Blackwell theorem.

Chapter 17 (Sec 17.1, 17.2.1 to 17.2.4, 17.3,17.5)

UNIT-II [12 Hours]

Methods of estimation: Maximum Likelihood, Moments, and Minimum Chi-Square –properties of these estimators (simple problems).

Chapter 17 (Sec 17.6.1 to 17.6.3)

UNIT-III [12 Hours]

Sampling theory : Introduction – Population, sample – Parameter and Statistic – Standard Error - Tests of Significance – Null and Alternative Hypothesis – Type I and Type II Errors –Critical region and Level of significance – Procedure of Testing of Hypothesis- Power of a Test – Neyman Pearson Lemma – Simple problems.

Chapter 14 (Sec 14.1 to 14.5), Chapter 18 (Sec 18.2.7,18.4.1 & 18.5)

UNIT-IV [12 Hours]

Tests of significance for Large sample - Tests with respect to Proportion, Difference of Proportion, mean, difference of means, standard deviation and difference of standard deviations – simple problems.

Chapter 14 (Sec 14.7.1, 14.7.2, 14.8.1 to 14.8.5)

UNIT – V [12 Hours]

Test of significance for Small sample - t test with regard to mean, means, correlation coefficients – Chi square test - F test based on variances.

Chapter 16 (Sec 16.3.1 to 16.3.4, 16.6.1) Chapter 15 (Sec 15.6.1 to 15.6.3)

Text Book:

1. Gupta, S.C & Kapoor, V.K (2001). Fundamentals mathematical Statistics (11th Edition), Sultan Chand & Sons, New Delhi.

Reference Books:

1. S.P. Gupta, (2011), Statistical Methods (41st Edition), Sultan Chand & Sons, New Delhi.

2. Sancheti, D.C and Kapoor V.K (2005), Statistics (7th edition), Sultan Chand and Sons, New Delhi

SUBJECT TITLE	MATHEMATICAL STATISTICS – PRACTICAL	ALLIED PRACTICAL	II
SUBJECT CODE	14U4MAAP02	HOURS/WEEK TOTAL HOURS	2
SEMESTER	IV	CREDIT	4

UNIT I

Computation of Measures of Location and Dispersion (continuous only) – Measures of Skewness and Kurtosis.

UNIT II

Fitting of Binomial, Poisson and Normal distributions – Tests of goodness of fit.

UNIT III

Curve fitting – Fitting of a straight line, Second degree parabola, Power and Exponential curves of the form $y=ae^{bx}$, $y=ab^x$ and $y=ax^b$.

UNIT IV

Computation of correlation co-efficient – Rank correlation co-efficient – Regression lines.

UNIT V

Asymptotic and exact tests with regard to mean, proportions, variance and correlation co-efficient - Test for Independence of attributes.

Reference Books:

1. S.P. Gupta, (2011), Statistical Methods (41st Edition), Sultan Chand & Sons, New Delhi.

NOTE:

Total		**:**	**100 mark**
Written Practical		**:**	**60 marks**
Continuous Internal Assessment			
(Including Practical Record)		**:**	**40 marks**

5 questions are to be set without omitting any unit. All questions carry equal marks.

Any 3 questions are to be answered in 3 hours duration.

SUBJECT TITLE	MATHEMATICS FOR COMPETITIVE EXAMINATION-I	SKILL BASED ELECTIVE COURSE	I
SUBJECT CODE	14U5MAS01	HOUR/WEEK	3
SEMESTER	V	CREDIT	2

UNIT I

Numbers, HCF&LCM of numbers, Decimal fractions (6 Hours)

UNIT II

Simplification Square root, Cube root, Average (6 Hours)

UNIT III

Problem on Numbers and Ages , Problems on Trains. (6 Hours)

UNIT IV

Profit & Loss, Ratio & Proportion, Chain Rule, Boats & Streams (6 Hours)

UNIT V

Time & Work, Pipes & Cistern, Time & Distance. (6 Hours)

Text Book:

Quantitative Aptitude - R.S.Aggarwal-Sultan Chand Co.Ltd-2017

SUBJECT TITLE	MATHEMATICS FOR COMPETITIVE EXAMINATION-II	SKILL BASED ELECTIVE COURSE	III
SUBJECT CODE	14U5MAS02	HOUR/WEEK	3
SEMESTER	V	Credit	2

UNIT I (6 Hours)

Simple & Compound interest, Area, Volume, & Surface area

UNIT II (6 Hours)

Races and Games of skills, Logarithms, Calendar, Clocks

UNIT III (6 Hours)

Permutation & Combinations, Probability

UNIT IV (6 Hours)

True discount and Banker's discount, Heights & Distances.

UNIT V (6 Hours)

 Odd man out, series, Tabulation, Bar Graph, Pie- Chart

Text Book:

Quantitative Aptitude-R.S.Aggarwal-Sultan Chand Co.Ltd-2011

SUBJECT TITLE	MATHEMATICS FOR COMPETITIVE EXAMINATIONS-III	SKILL BASED ELECTIVE COURSE	III
SUBJECT CODE	14U6MAS03	**HOUR/WEEK**	2
SEMESTER	VI	**CREDIT**	2

UNIT I **[6 Hours]**

Pipes and Cisterns – Times and Distance.

UNIT II **[6 Hours]**

Problems on Trains – Boats and Streams.

UNIT III **[6 Hours]**

Alligation or Mixture.

UNIT IV **[6 Hours]**

Simple Interest.

UNIT V **[6 Hours]**

Compound Interest.

Text Book:

Quantitative Aptitude-R.S. Aggarwal, Sultan Chand.

Unit I : Section-1(16&17), Page No.(371-404)

Unit II : Section-1(18&19), Page No.(405-434)

Unit-III: Section-1(20), Page No.(435-444)

Unit IV: Section-1(21), Page No.(445-465)

Unit V : Section-1(22), Page No.(466-486).

SUBJECT TITLE	MATHEMATICS FOR COMPETITIVE EXAMINATIONS-IV	SKILL BASED ELECTIVE COURSE	IV
SUBJECT CODE	14U6MAS04	HOURS/WEEK	2
SEMESTER	VI	CREDIT	2

UNIT I [6 Hours]

Logarithms

UNIT II [6 Hours]

Area – Volume and Surface Area

UNIT III [6 Hours]

Races and Games of Skill

UNIT IV [6 Hours]

Calendar and Clocks

UNIT V [6 Hours]

Stocks and Shares

Text Book:

Quantitative Aptitude – R.S.Aggarwal, Sultan Chand

Unit I   : Section – 1 (23) ,   Page No.(487-498)

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