PERIYAR UNIVERSITY

PERIYAR PALKALAI NAGAR

SALEM – 636 011

DEGREE OF BACHELOR OF

SCIENCE

CHOICE BASED CREDIT SYSTEM

SYLLABUS FOR B.Sc. MATHEMATICS

FOR THE STUDENTS ADMITTED FROM THE ACADEMIC YEAR 2012 – 2013 ONWARDS

1. OBJECTIVES OF THE COURSE

Mathematics is a key to success in the field of science and engineering. Today, the students need a thorough knowledge of fundamental basic principles, methods, results and a clear perception of the power of mathematical ideas and tools to use them effectively in modeling, interpreting and solving the real world problems. Mathematics plays an important role in the context of globalization of Indian economy, modern technology, and computer science and information technology. This syllabus is aimed at preparing the students to hope with the latest developments and compete with students from other universities and put them on the right track.

2. ELIGIBILITY FOR ADMISSION

A Pass in the Higher Secondary Examination of TamilNadu Higher Secondary Board or some other Board accepted by the Syndicate as equivalent thereto with Mathematics (other than Business mathematics) as one of the subjects.

3. DURATION OF THE COURSE

The course of study shall be based on semester pattern with internal assessment under Choice Based Credit System. The course shall consist of six semesters and a total period of three years with 140 credits. The course of study will comprise of the following subjects according to the syllabus and is given in the scheme of Examinations and books prescribed from time to time.

4. EXAMINATIONS

The theory of examination shall be of three hours duration for each paper at the end of each semester. The candidate failing in any subject(s) will be permitted to appear for each failed subject(s) in the subsequent examinations.

The practical examinations for UG course shall be conducted at the end of the even semesters only.

5. SCHEME OF EXAMINATIONS

The Scheme of examinations for different semesters shall be as follows:

B. Sc .Mathematics – Course Structure under Choice Based Credit System.
(Applicable to the candidates admitted from the year 2012 – 2013 onwards)

SEM	PART	COURSE CODE	COURSE TITILE	HOURS / WEEK				CREDIT	EXA HOURS	MARKS		
				Lect.	Tut.	Pra.	Total			INT	EXT	TOTAL
I	I	12UFTA01	Tamil Course –I	4	2	-	6	3	3	25	75	100
	II	12UFEN01	English Course –I	4	2	-	6	3	3	25	75	100
	III	12UMA01	Core Course I-Algebra &Trigonometry	4	2	-	6	5	3	25	75	100
			Allied I –Course I –Theory	5	-	-	5	4	3	25	75	100
			Allied I –Practical	-	-	2	2	-	*	-	-	-
		12UES01	Environmental Studies	1	-	-	1	-	*	-	-	-
	IV	12UVE01	Value Education	2	-	-	2	2	3	25	75	100
		12UMAS01	Skill Based Elective Course I	2	-	-	2	2	3	25	75	100
II	I	12UFTA02	Tamil Course II	4	2	-	6	3	3	25	75	100
	II	12UFEN02	English Course II	4	2	-	6	3	3	25	75	100
	III	12UMA02	Core Course II-Calculus	5	-	-	5	4	3	25	75	100
		12UMAE01	Elective course I-From Group	5	-	-	5	5	3	25	75	100
			Allied I - Course II-Theory	5	-	-	5	3	3	25	75	100
			Allied I -Practical	-	-	2	2	3	3	40	60	100
	IV	12UES01	Environmental studies -	1	-	-	1	2	3	25	75	100
III	I	12UFTA03	Tamil course III	4	2	-	6	3	3	25	75	100
	II	12UFEN03	English Course III	4	2	-	6	3	3	25	75	100
	III	12UMA03	Core Course III –Differential Equations & Laplace Transforms	4	-	-	4	4	3	25	75	100
		12UMA04	Core Course IV –Statics	5	-	-	5	4	3	25	75	100
			Allied II-Course I-Theory	5	-	-	5	3	3	25	75	100
			Allied II-Practical	-	-	2	2	**	-	-	-	-
	IV	12UNE01	Non Major Elective Course I	2	-	-	2	2	3	25	75	100
IV	I	12UFTA04	Tamil Course IV	4	2	-	6	3	3	25	75	100
	II	12UFEN04	English Course IV	4	2	-	6	3	3	25	75	100
	III	12UMA05	Core Course V-Dynamics	5	-	-	5	4	3	25	75	100
			Allied II Course II –Theory	4	-	-	4	3	3	25	75	100
			Allied II –Practical	-	-	3	3	3	3	40	60	100
	IV	12UMAS02	Skill Based Elective Course II	2	-	-	2	2	3	25	75	100
		12UMAS03	Skill Based Elective Course III	2	-	-	2	2	3	25	75	100
		12UNE02	Non Major Elective Course II	2	-	-	2	2	3	25	75	100
V	III	12UMA06	Core Course VI- Algebraic structures I	6	-	-	6	5	3	25	75	100
		12UMA07	Core Course VII-Real Analysis I	5	-	-	5	5	3	25	75	100
		12UMA08	Core Course VIII – Discrete Mathematics	5	-	-	5	5	3	25	75	100
		12 UMA09	Core Course IX – Numerical Analysis	5	-	-	5	5	3	25	75	100
		12UMAE02	Elective Course II – From Group B	5	-	-	5	5	3	25	75	100
	IV	12UMAS04	Skill Based Elective Course IV	2	-	-	2	2	3	25	75	100
		12UMAS05	Skill based Elective Course V	2	-	-	2	2	3	25	75	100
VI	III	12UMA10	Core Course X – Algebraic Structure II	5	-	-	6	5	3	25	75	100
		12UMA11	Core course XI – Real Analysis II	6	-	-	6	5	3	25	75	100

		12UMA12	Core Course XII – Complex Analysis	6	-	-	6	5	3	25	75	100
		12UMA13	Core Course XIII-Graph Theory	5	-	-	5	5	3	25	75	100
		12UMAE03	Elective Course III – From Group	5	-	-	5	5	3	25	75	100
	IV	12UMAS06	Skill Based Elective Course VI – Practical	2	-	-	2	2	3	40	60	100
	V		Extension Activates	-	-	-	-	1		-	-	-

***** - Examination at the end of Second Semester.

****** - Examination at the end of Fourth Semester

ALLIED SUBJECTS FOR B.Sc. MATHEMATICS

PHYSICS / CHEMISTRY / STATISTICS/ELECTRONICS/ACCOUNTANCY

Any two of the above subjects can be chosen as Allied subjects.

Subject	**Code**
Allied Physics – I	12 UPHA01
Allied Physics – II	12 UPHA02
Allied Physics – Practical	12 UPHAP01
Allied Chemistry – I	12 UCHA01
Allied Chemistry –II	12 UCHA02
Allied Chemistry – Practical	12 UCHAP01
Allied Statistics – I	12 USTA01
Allied Statistics – II	12 USTA02
Allied Statistics – Practical	12 USTAP01
Allied Electronics – I	
Allied Electronics - II	
Allied Electronics – Practical	
Allied Accountancy – I	
Allied Accountancy – II	
Allied Accountancy – Practical	

ALLIED MATHEMATICS FOR B.Sc. STATISTICS, PHYSICS, COMPUTER SCIENCE, ELECTRONICS, BIOINFORMATICS & BCA MAJOR STUDENTS

ALLIED MATHEMATICS – GROUP – I

1. **Paper I– Algebra, Calculus and Fourier series**
2. **Paper II – Differential Equation and Laplace Transforms**
3. **Paper III – Allied Mathematics – Praticals**

ALLIED MATHEMATICS GROUP – II

1. **Paper I – Discrete Mathematics**
2. **Paper II – Numerical Method**
3. **Paper III – Graph Theory**

ELECTIVE SUBJECTS:

Subject	**Subject code**
From Group A :	
Vector Analysis	U12MAE01
Financial Mathematics	U12MAE02
From Group B :	
Linear Programming	U12MAE03
Number Theory	U12MAE04
Combinatorics	U12MAE05
From Group C:	
Operations Research	U12MAE06
Astronomy	U12MAE07
Probability Theory	U12MAE08

SKILL BASED ELECTIVE COURSES:

Aptitude Examination - I	U12MAS01
Aptitude Examination – II	U12MAS02
Aptitude Examination -III	U12MAS03
Aptitude Examination – IV	U12MAS04
Programming in C	U12MAS05
C – Programming Practical	U12MASP06

NON - MAJOR ELECTIVE COURSES:

Non-Major Elective Course - I	
1. Competitive Examination – Paper – I	
2. Matrix Algebra	
3. Linear Programming	
Non-Major Elective Course - II	
1. Competitive Examination – Paper – II	
2. Numerical Methods	
3. Operations Research	

6. UNIFORMITY IN THE NUMBER OF UNITS IN EACH PAPER:

Each theory paper shall consist of five units. The Question paper shall consist of questions uniformly distributed among all the units.

For theory paper without practicals, **Max marks is 75.**

7. A. QUESTION PAPER PATTERN FOR ALL UG COURSES WITHOUT PRACTICAL:

Time: Three Hours Maximum Marks: 75

Part A: (10 x 2 = 20)

Answer ALL Questions
(Two Questions from Each Unit)

Part B: (5 x 5 = 25)

Answer ALL Questions
(One Question From Each Unit with internal choice)

Part C: (3 x 10 = 30)

Answer Any Three Questions out of Five Questions
(One Question from Each Unit)

B. SKILL BASED ELECTIVE COURSE – C PROGRAMMING – PRATICAL

QUESTION PATTERN

EXTERNAL MARK: 60
INTERNAL MARK: 40

RECORD WORK – 15

Part – A: (2X15 =30)
Answer any two out of Four Questions

Part – B: (1X5=15)
Answer any one out of two questions

Mark Allotment: 60 – External → **Practical - 45**, **Record - 15**
40 – Internal

C. ALLIED – MATHEMATICS PRATICAL (3x15 =45)

Answer any Three out of Five Questions

Mark Allotment: 60 – External → **Practical - 45**, **Record - 15**

8. PASSING MINIMUM:

The Candidates shall be declared to have passed the examination if the candidates secure not less than 30 marks in the University examination in each theory paper without practical.

9. CLASSIFICATION OF SUCCESSFUL CANDIDATES:

Candidates who secure not less than 60% of the aggregate marks in the whole examination shall be declared to have passed the examination in the First class .All other successful candidates shall be declared to have passed in the second class. Candidates who obtain 75% of the marks in the aggregate shall be deemed to have passed the examination in First Class with Distinction provided they pass all the examinations prescribed for the course at the first appearance. Candidates who pass all the examinations prescribed for the course in the first attempt and within a period of three academic years from the year of admission to the course only eligible for University Ranking.

10. COMMENCEMENT OF THIS REGULATION:

The CBCS regulations shall take effect from the academic year 2012-2013 ie, for the students who are admitted to the first year of the course during the academic year 2012-2013 and thereafter.

11. TRANSITARY PROVISION:

Candidates who were admitted to the UG course of study prior to 2012-2013 shall be permitted to appear for the examinations under those regulations for a period of three years ie, up to and inclusive of the examinations of April/May 2018.Thereafter they shall be permitted to appear for the examination only under the regulations then in force.

12. NOTE:

1. The Non Major Elective Course Papers Syllabus will be given at the end of this book.
2. This Paper should be handling and valued by Mathematics Department.
3. For University Practical Examination both Internal and External Examiners should be appointed from Mathematics Department.

FIRST SEMESTER

Core Paper I – Algebra and Trigonometry

Paper code: 12UMA01 **Max Marks: 75**

Unit I

Characteristic equation - Characteristic roots and Characteristic vectors – properties – problems - Cayley – Hamilton theorem (statement only) and its problems – Diagonalisation of Matrices – problems.

Unit II

Polynomial equations – Imaginary and Irrational roots – relation between roots and coefficients of equations – Symmetric functions of roots in terms of coefficients of third degree equation - problems.

Unit III

Sum of the powers of the roots of an equation – Newton's Theorem on the sum of the powers of the roots – Transformation of equations – Roots with sign changed – Roots multiplied by a given number – Reciprocal equations – problems.

Unit IV

To increase or decrease the roots of a given equation by a given quantity. Removal of terms - Square of the roots – Transformations in general – Descarte's rule of signs – problems.

Unit V

Expansions of sin $n\theta$,Cos $n\theta$ and Tan $n\theta$ – Expansions of $\sin^n\theta$, $\cos^n\theta$ -Expansions of $\sin\theta$, $\cos\theta$ and $\tan\theta$ in terms of θ – Hyperbolic and inverse hyperbolic functions and their properties – Logarithm of a complex number – General principal values – problems.

Text Books:-

S.No	Title of the Book	Author	Publishing Company	Year of Publication
1.	Algebra-Volume I	T.K.Manickavasagam Pillai and S. Narayanan.	Vijay Nicole Imprints Pvt, Ltd,#c-7,Nelson Manickam Road,Chennai-600029	2004
2.	Trigonometry	T.K.Manickavasagam Pillai and S. Narayanan	Vijay Nicole Imprints Pvt, Ltd,#c-7,Nelson Manickam Road, Chennai-600029	2004
3.	Algebra,calculus and Trigonometry	Dr.P.R.Vittal.	Margham publications,24,Rameswaram Road, T.Nager, Chennai-600017.	2000

Reference Books:-

S.No	Title of the Book	Author	Publishing Company	Year of Publication
1.	Trigonometry.	N.P.Bali.	Krishna Prakasan mandir,9, Shivaji Road,Meerut(UP)-250001	1994
2.	Algebra.	Burnside and Pantern.	Macmillan publishers,U.K.	1976

FIRST SEMESTER

Skill Based Elective Paper I – Aptitude Examination - I

Paper Code – 12UMAS01 **Max Marks: 75**

Unit I

Numbers, H.C.F. and L.C.M. of numbers , Decimal Fractions.

Unit II

Simplification , Square roots and Cube Roots , Average.

Unit III

Problems on numbers , problems on Ages.

Unit IV

Surds and Indices , Percentage , Profit and Loss.

Unit V

Ratio and Proportion , Partnership.

Text Books:-

S.No	Tiltle of the Book	Author	Publishing Company	Year of Publication
1.	Quantitative Aptitude for competitive Examination	R.S.Aggarwal.	S.Chand and company Ltd,152,Anna salai,Chennai.	2001
2.	Quantitative Aptitude and Reasoning	Praveen	PHI P.Ltd.	

SECOND SEMESTER

Core Paper II - Calculus

Paper code: 12UMA02 **Max Marks: 75**

Unit I

Curvature - Radius of curvature , Circle of curvature and Center of curvature in Cartesian co-ordinates and Polar co-ordinates - Evolutes and Envelopes – definition - Method of finding envelopes - Problems in all sections.

Unit II

Asymptotes:- Definition - Methods of finding asymptotes of plane algebraic curves – special cases – problems. Slope of the tangent in polar co-ordinates - Angle of intersection of two curves - Pedal equation of a curve – Problems.

Unit III

Integration - Bernoulli's formula - Reduction formula for $\int_0^{\pi/2} \sin^n x\, dx$, $\int_0^{\pi/2} \cos^n x\, dx$, $\int_0^{\pi/4} \tan^n x\, dx$, $\int \sec^n x\, dx$, $\int \operatorname{cosec}^n x\, dx$, $\int \cos^m x \sin^n x\, dx$, $\int \cot^n x\, dx$, $\int_0^{\infty} x^n e^{ax}\, dx$, $\int e^{-x} x^n\, dx$, $\int x^m (\log x)^n\, dx$ - Problems for all the above cases.

Unit IV

Beta and Gamma functions – Definition – properties – problems - relation between Beta and Gamma functions - Applications to evaluate the definite integrals.

Unit V

Fourier series - Definition – Fourier coefficients – Fourier series of periodic functions of period 2π - Even and Odd functions – Half Range series – problems.

Text Books:-

S.No	Tiltle of the Book	Author	Publishing Company	Year of Publication
1.	Calculus Volume. I	T.K.Manichava sagam Pillai and S.Narayanan	Vijay Nicole Imprints Pvt Ltd,#C-7,Nelson Chambers,115,Nelson Manickam Road,Chennai-600029	2004
2.	Calculus Volume. II	T.K.Manichava sagam Pillai and S.Narayanan	Vijay Nicole Imprints Pvt Ltd,#C-7,Nelson Chambers,115,Nelson Manickam Road,Chennai-600029	2004
3.	Calculus	Dr.P.R.Vittal.	Margham publications , 24,Rameswaram road, T.Nagar,Chennai 17.	2000

Reference Books:-

S.No	Tiltle of the Book	Author	Publishing Company	Year of Publication
1.	Calculus.	N.P.Bali.	Krishna prakasan Mandhir,9,Shivaji Road,Meerut.(UP)	1994
2.	Calculus	D.Sudha.	Emerald Publishers,135,Anna Salai,Chennai-600002	1988

FIRST YEAR

SECOND SEMESTER

Elective Paper I - Vector Analysis

Paper Code – 12UMAE01 **Max Marks :75**

Unit I

Vector differentiation: Limit of a vector function – continuity and derivative of vector function - Geometrical and Physical significance of vector differentiation - Partial derivative of vector function – gradient and directional derivative of scalar point functions – Equations of tangent plane and normal line to a level surface.

Unit II

Vector point function: Divergence and curl of a vector point function – solenoidal and irrational functions – physical interpretation of divergence and curl of a vector point function.

Unit III

Vector identities – Laplacian operator.

Unit IV

Integration of vector functions – Line , surface and volume intergrals.

Unit V

Guass - Divergence Theorem – Green'sTheorem – Stoke's Theorem (Statements only). Verification of theorems and simple problems using the theorems.

Text Books :-

S.No	Tiltle of the Book	Author	Publishing Company	Year of Publication
1.	Vector Analysis	P.Duraipandian and others	S.Viswanathan and co, 38, McnicalsRoad, Chetpet,Chennai 31.	1984
2.	Vector Analysis	Dr.P.R.Vittal	Margham publications, 24, Rameswaram Road, T.nagar, Chennai– 17.	1997
3.	Vector Analysis	T.K. Manickavasagam and others.	Vijay Nicole Imprints Pvt Ltd, # c-7 Nelson Chambers, 115, Nelson Manickam Road, Chennai – 29.	2004

Reference Books :-

S.No	Tiltle of the Book	Author	Publishing Company	Year of Publication
1.	Vector Calculus	K.Viswanathan & S. Selvaraj	Emerald Publishers, 135,Anna Salai Chennai-2.	1984
2.	Vector Calculus	J.N. Sharma & A.R. Vasishtha	Krishna Prakasan Mandhir,9,Shivaji Road, Meerut(UP).	
3.	Vector Algebra	M.D. Raisinghania and others.	S. Chand & Co,Ltd., Ram Nagar New Delhi 110055.	1999

SECOND SEMESTER

Elective Paper II – Financial Mathematics

Paper code: 12UMAE02 **Max Marks :75**

Unit I

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.

Unit II

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

Unit III

The Arbitage theorem – The multi period Binomial model – proof of the Arbitrage theorem - Black Scholes formula – properties of the Black Scholes option cost – Derivation of Black Scholes formula – simple problems.

Unit IV

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

Unit V

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 .

Text Books :-

S.No	Title of the Book	Author	Publishing Company	Year of Publication
1.	An Elementary Introduction to Mathematical Finance, 2nd Edition	Sheldon .M.Ross	Cambridge University press	2005

Reference Books:-

S.No	Title of the Book	Author	Publishing Company	Year of Publication
1.	A first course in probability	S.M.Ross	Englewood cliffs Prentice Hall-NJ	2002
2.	Options Market	J.Cox and M.Rubinstein	Englewood cliffs Prentice Hall-NJ	1985
3.	Theory of financial decision making	J.E.Ingersill	Lanjarn MD Rowerman of Little fields	1987

THIRD SEMESTER

Core Paper III – Differential Equations and Laplace Transforms

Paper Code : 12UMA03 **Max Marks :75**

Unit I

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

Second Order Differential equations with variable co-efficients – both homogeneous linear equations and homogeneous non – linear equations – Method of variation of parameters – simple problems.

Unit III

Partial Differential Equations – Formation of Partial Differential equations by eliminating arbitary costants and arbitary functions – complete,particular , singular and general integrals – solution of equations of standard types f (p,q) = 0 , f (x,p,q) = 0 , f (y,p,q)=0 , f (z,p,q) = 0and f_1 (x,p) = f_2 (y,q) – Clairaut's form – Lagrange's equation Pp+Qq=R.

Unit IV

Laplace Transforms – Definition – Laplace transform of standard functions – Elementary theorems – Laplace transform of periodic functions – problems.

Unit V

Inverse Laplace Transforms – Standard formulae – Elementary theorems – Applications to second order linear differential equations – Applications to simultaneous linear differential equations – problems.

Text Books:

S.No	Name of the Book	Author	Publishing Company	Year of Publications
1	Calculus	T.K.Manickavasagam pillai and S.Narayanan	Vijay Nicole Imprints Pvt Ltd # c- 7,Nelson Chambers ,115, Nelson Manickam Road, Chennai -600029	2004
2.	Differential Equations, Fourier series and Analytical solid geometry.	Dr. P. R. Vittal	Margham Publications ,24, Rameswaram Road, T.Nager, Chennai -600017	2000

Reference Books :

S.No	Name of the Book	Author	Publishing company	Year of Publications
1.	Ordinary & Partial differential Equations	M.D.Raisinghania	S.Chand & Co. Ltd.	1993
2.	Introduction to Partial Differential Equations	K.Sankar Rao	Prentice Hall India – New Delhi	1997

THIRD SEMESTER

Core Paper IV - Statics

Paper Code – 12UMA04 **Max Marks :75**

Unit I

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

Couples – Definition of a couple - Moment of a couple – Theorems – Problems - Three forces acting on rigid body -Coplanar forces – General conditions of equilibrium of coplanar forces acting on a rigid body - Problems.

Unit III

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

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 the arc of a circle – Sector of a circle – Quadrant of an ellipse – Solid and hollow sphere – Solid and hollow cone – Problems.

Unit V

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 Books :-

S.No	Tiltle of the Book	Author	Publishing Company	Year of Publication
1.	Mechanics	P.Duraipandian	Emerald Publishers, 135, Anna Salai, Chennai – 600002.	1984
2.	Statics	S.Narayanan	S.Chand & Co.Chennai.	1986

Reference Books :-

S.No	Tiltle of the Book	Author	Publishing Company	Year of Publication
1.	Statics	Dr.M.K. Venkataraman	Agasthiar Publication, 9A, Clives Building, 33, Nandhi Koil Street, Theppakulam(post), Trichy – 620002.	1994

FOURTH SEMESTER

Core Paper V - Dynamics

Paper Code – 12UMA05 **Max Marks :75**

Unit I

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

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

Two dimensional motion of a particle – Introduction – 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 flight on an inclined plane – Problems.

Unit IV

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

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 – Interchangeability of centre of suspension and centre of oscillation – Problems.

Text Books:-

S.No	Tiltle of the Book	Author	Publishing Company	Year of Publication
1.	Mechanics	P.Duraipandian	Emerald Publishers, 135, Anna Salai, Chennai – 600002.	1988
2.	Dynamics	S.Narayanan	S.Chand & Co.Chennai.	1986

Reference Books:-

S.No	Tiltle of the Book	Author	Publishing Company	Year of Publication
1.	Dynamics	Dr.M.K. Venkataraman	Agasthiar Publication, 9A, Clives Building, 33, Nandhi Koil Street, Theppakulam(post), Trichy – 620002.	1994

FOURTH SEMESTER

Skill Based Elective Paper II – Aptitude Examination - II

Paper Code: 12UMAS02 **Max Marks :75**

Unit I

Chain rule –Time and work.

Unit II

Time and Distance .

Unit III

Problems on Trains.

Unit IV

Boats and Streams.

Unit V

Alligation or Mixture.

Text Books:

S.No	Name of The Book.	Author	Publishing company	Year of Publication
1.	Quantitative Aptitude For Competitative Examinations.	R.S.Aggarwal	S.Chand and co Ltd,152,Annasalai,Chennai.	2001

FOURTH SEMESTER

Skill Based Elective Paper III – Aptitude Examination – III

Paper code : 12UMAS03 **Max Marks :75**

Unit I

Simple Interest.

Unit II

Compound Interest.

Unit III

Logarithms – Races And Games Of Skill.

Unit IV

Area.

Unit V

Volume and Surface Areas.

Text Book :

S.No	Name of the Book	Author	Publishing company	Year of Publication
!.	Quantitative Aptitude for competitative Examinations	R.S.Aggarwal	S.Chand and Co Ltd,152 ,Annasalai, Chennai.	2001

FIFTH SEMESTER

Core Paper VI – Algebraic Structures - I

Paper Code: 12UMA06 **Max Marks :75**

Unit I

Group – Definition – Examples – Some Preliminary lemmas – Problems – Subgroups – definition – lemmas – cosets – definition – theorems – Lagrange's Theorem – order of an element – Euler Theorem – Fermat Theorem.
(Sections 2.1 to 2.4).

Unit II

A Counting Principle – Normal Sub Groups – Definition – Properties – Problems – Quotient groups – Definitions – Lemma. (Sections 2.5 and 2.6).

Unit III

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

Unit IV

Ring – Definition – Examples – some special classes of Rings – Zero Divisor – Integral Domain - Field - Definition –Examples-Ideals – Quotient Rings – Maximal ideal.(sections 3.1 , 3.2 , 3.4 & 3.5).

Unit V

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 Books:-

S.NO	Title of the Book	Author	Publishing Company	Year of Publication
1.	Topics in Algebra	I.N.Herstein.	John Wiley, Newyork.	1975

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 Prekasan Mandhir, 9, Shivaji Road, Meerut(UP)	1983
2.	Modern Algebra	M.L.Santiago	Tata McGraw 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 and Dr.N.Ramabadran	Vikas Publishing House, NewDelhi	1994

FIFTH SEMESTER

Core Paper: VII – Real Analysis – I

Paper code: 12UMA07 **Max Marks: 75**

Unit I

Functions – Real Valued functions – Equivalence – Countablity – Real Numbers – Least upper bounds. (Sections 1.3 to 1.7)

Sequence of real numbers – Definition of sequence and subsequence – Limit of a sequence – Convergent sequences – Divergent Sequences. (Section 2.1 to 2.4)

Unit II

Bounded sequences – Monotonic sequences – operations on convergent sequences – operations on Divergent sequences – Limit superior and limit inferior – Cauchy sequences. (Section 2.5 to 2.10)

Unit III

Series of real numbers – convergence and divergence – series with non negative terms – alternating series – conditional convergence and absolute convergence – Rearrangement of series – Test for absolute convergence – series whose terms form a non increasing sequence. (Sections 3.1 to 3.7)

Unit IV

Limits and Metric spaces – limit of a function on the real line – metric spaces limits in metric spaces (sections 4.1 to 4.3)

Unit V

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. (Sections 5.1 to 5.6)

Text Books:-

S.No	Title of the Book	Author	Publishing Company	Year of Publication
1.	Methods of Real Analysis	Richard R. Goldberg .	Oxford &IBH Publishing Co.Pvt.Ltd.	1970

Reference Books:-

S.No	Title of the Book	Author	Publishing Company	Year of Publication
1.	A First course in Real Analysis .	Sterling K .Barberian.	Springer (India) Private Limited, New Delhi.	2004
2.	Mathematical Analysis	Tom M. Apostel	Narosa Publications, NewDelhi	2002
3.	Real Analysis	M.S.Rangachari	New Century Book House, chennai.	1996

FIFTH SEMESTER

Core Paper: VIII – Discrete Mathematics

Paper Code: 12UMA08 **Max Marks :75**

Unit I

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

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 tables - 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

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 .

Unit IV

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

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

Boolean Algebra: Definition and Examples – subalgebra , 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, NewDelhi	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

FIFTH SEMESTER

Core Paper: IX - Numerical Analysis

Paper Code : 12UMA09 **Max Marks :75**

Unit I

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

Unit II

Finite Differences – Forward Differences – Backward Differences – Symbolic relations and separation of symbols – Detection of Errors by use of difference tables – Differences of a polynomial – Newton's formulae for Interpolation – Central Difference Interpolation formulae – Gauss's central difference formulae – Stirling's formulae – Bessel's formulae – Everett's formulae.

Unit III

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

Unit IV

Solution of Linear systems – Direct Methods – Matrix Inversion method – Gaussian elimination method – Modification of the Gauss method to compute the inverse – Method of Factorization – Solution of Linear systems – Iterative methods – Jacobian's method – Gauss - Seidal Method.

Unit V

Solution of Taylor's series – Picard's method of successive approximations – Euler's method – Runge – Kutta methods – II order and III order.

Text Books:-

S.No	Title of the Book	Author	Publishing Company	Year of Publication
1.	Introductory Methods of Numerical analysis	S.S.Sastry	Prentice Hall of India Pvt Ltd, New Delhi	2000

Reference Books:-

S.No	Title of the Book	Author	Publishing Company	Year of Publication
1.	Numerical Methods	E.Balagurusamy	Tata Mc Graw Hill Publishing Company Ltd, NewDelhi	2002
2.	Engineering Numerical Methods	T.K.Manickavasagam and Narayanan	S.Viswanathan & Co, Chennai	1998

FIFTH SEMESTER

Elective Paper III – Operations Research - I

Paper Code: 12UMAE03 **Max Marks :75**

Unit I

Introduction - Definition of O.R. – Scope , phases and Limitations of O.R. – Linear Programming Problem – Definitions – Mathematical Formulation – Characteristic of a 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 , nonbasic variables – basic solutions – slack variables and optimal solution , simplex procedure of solving LPP – problems.

Unit II

Introduction – Big – M method – Definitions of Big – M method , surplus variables and artificial variables – Procedure of solving an LPP by Big – M method – Pseudo optimal solution – Problems – Two – Phase Simplex method – Procedure of solving an LPP by two – phase simplex method – problems.

Unit III

Introduction – Balanced and unbalanced T.P , Feasible solution – Basic feasible solution – Optimum solution – Degeneracy in a T.P. – Mathematical formulation – North – West Corner rule – Vogell's approximation method (unit penalty method) - Method of Matrix minima (Least cost Method) – problems – Algorithm of Optimality test (Modi Method) – Problems .

Unit IV

Assignment problem – Definition – Mathematical formulation of the Assignment problem – Test for optimality by using Hungarian method - Unbalanced Assignment problem – Degeneracy in Assignment problem - Maximization case in Assignment problem – Restrictions on Assignment problem – Variations in Assignment problem – problems .

Unit V

Introduction – Definition – Basic assumptions – 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.

Text Books:-

S.No	Title of the Book	Author	Publishing Company	Year of Publication
1.	Operations Research, Ninth Edition	P.K.Gupta, Man Mohan and Kanti Swarup	Sultan Chand and Sons, New Delhi	2001

Reference Books:-

S.No	Title of the Book	Author	Publishing Company	Year of Publication
1.	Operations Research, Second Edition	S.Kalavathy	Vikas Publishing House, New Delhi	2002
2.	Operations Research, Second Edition	P.K.Gupta and D.S.Hira	S.Chand & Co, NewDelhi	2004
3.	Operations Research	Hamdy Taha	Prentice Hall Publications, NewDelhi	1996
4.	Operations Research	Nita Hshah Ravi M. Gor Hardiksoni	PHI, P,Ltd,	2010

FIFTH SEMESTER

Elective Paper: IV – Number theory

Paper Code: 12UMAE04 **Max Marks: 75**

Unit I

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

Unit II

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

Unit III

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

Unit IV

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

Unit V

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

Text Books:-

S.No	Title of the Book	Author	Publishing Company	Year of Publication
1.	Elementary Number Theory	David M. Burton	Universal Book Stall	2001

Reference Books :-

S.No	Title of the Book	Author	Publishing Company	Year of Publication
1.	Number Theory	Kumaravelu and Suseela Kumaravelu	S.Kumaravelu, Muruga Bhavanam, Chidambara Nagar, Nagarkoil-2.	2002

FIFTH SEMESTER

Elective Paper V - Combinatorics

Paper Code: 12UMAE05 **Max Marks :75**

Unit I

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

Unit II

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

Unit III

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

Unit IV

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

Unit V

The inclusion – Exclusion principle - Rook polynomial.

Text Books :-

S.No	Title of the Book	Author	Publishing Company	Year of Publication
1.	A First Course in Combinatorial Mathematics	Jan Anderson	Oxford Applied Mathematics and Computing Science Series, UK	1974
2.	Combinatorics	V.K.Balakrishnan	Schuam Series	1996

FIFTH SEMESTER

Skill Based Elective Paper IV – Aptitude Examination – IV

Paper Code: 12UMAS04 **Max Marks :75**

Unit I

Calender and Clocks.

Unit II

Stocks and Shares.

Unit III

Permutations and Combinations - Probability.

Unit IV

True Discount and Banker's Discount.

Unit V

Heights and Distances – Odd Man Out and Series.

Text Book :

S.No	Name of the Book	Author	Publishing Company	Year of Publications
1.	Quantitative Aptitude for Competitative Examinations	R.S.Aggarwal	S.Chand Co Ltd,152,Annasalai,Chennai.	2001

Skill Based Elective Paper V – Programming in C

Paper Code: 12UMAS05 **Max Marks: 75**

Unit I

Basic Structure of C Programme – Character set – Constants – key words and identifiers – variables – data types – declaration of variables – assigning values to variables – Defining symbolic constants.

Unit II

Arithmetic operators – relational operators – logical operators – assignment operators – increment and decrement operators – conditional operators – special operators

.

Unit III

Arithmetic expressions – evaluation of expressions – type conversations in expressions – reading and writing character – formatted input and output.

Unit IV

Decision making with if statement – the if…. Else statement – nesting of if… else statement – the switch statement – the go to statement – the while statement – do while statement – for statement jumps in loops.

Unit V

One, two dimensional arrays - initializing – Two dimensional array – multi dimensional arrays – declaring and initializing string variables – reading string from terminal – writing strings on the screen – arithmetic operations on characters.

TREATEMENT AS IN "PROGRAMMING IN C" BY E. BALAGURUSAMY.

Note: This Paper should be handling and valued by Mathematics Department.

SIXTH SEMESTER

Core Paper X – Algebraic Structure II

Paper Code: 12UMA10 **Max Marks :75**

Unit I

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

Unit II

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

Unit III

Inner product spaces – Definition – Examples – Applications – Orthogonal complement of a sub space – Orthonormal & Orthonormal Basis - Gram Schmidt Orthogonalization process (Section 4.4) .

Unit IV

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

Unit V

Trace and Transpose – Definitions, Properties – Theorems – Determinants – Definitions – Properties – Theorems – Cramer's Rule – Problems.(Sections 6.8 and 6.9)

Text Books :-

S.No	Title of the Book	Author	Publishing Company	Year of Publication
1.	Topics in Algebra- 2nd Edition	I.N.Herstein	John Wiely, NewYork	1975

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 Prakasan Mandhir, 9, Shivaji Road, Meerut (UP)	1983
2.	Modern Algebra	Viswanatha Naik	Emerald Publishers, 135, Anna Salai, Chennai –2.	2001
3.	A Text Book of Modern Algebra	Dr.R.Balakrishnan and Dr.N.Ramabadran	Vikas Publishing Limited, NewDelhi	1984

SIXTH SEMESTER

Core Paper: XI – Real Analysis - II

Paper Code: 12UMA11 **Max Marks: 75**

Unit I

More about open sets – Connected sets – Bounded sets - Totally bounded sets – Complete metric spaces. (Sections 6.1 to 6.4)

Unit II

Compact metric spaces – Continuous functions on Compact Metric spaces – Continuity of the inverse functions – uniform continuity .(Section 6.5 – 6.8).

Unit III

Sets of measure zero- Definition of the Riemann integral – Existence of Riemann integrals – properties of Riemann integrals – derivatives (Section 7.1 to 7.5)

Unit IV

Roll's theorem – Law of Mean – Fundamental theorem of calculus – Improper integrals – Improper integrals (Continued) (Section 7.6 to7.10).

Unit V

Pointwise convergence of sequence of functions – uniform convergence of sequence of functions – consequences of uniform convergences – convergence and uniform convergence of series of functions (Section 9.1 to 9.4)

Text Books:-

S.No	Title of the Book	Author	Publishing Company	Year of Publication
1.	Methods of Real Analysis.	Richard R. Goldberg.	IBM Publishing New Delhi.	1970.

Reference Books:-

S.No	Title of the Book	Author	Publishing Company	Year of Publication
1.	A First course in Real Analysis .	Sterling K .Barberian.	Springer (India) Private Limited, New Delhi.	2004
2.	Mathematical Analysis	Tom M. Apostel	Narosa Publications, NewDelhi	2002
3.	Real Analysis	M.S.Rangachari	New Century Book House, Chennai.	1996

SIXTH SEMESTER

Core Paper XII – Complex Analysis

Paper Code: 12UMA12 ` **Max Marks :75**

Unit I

Functions of a complex variable – Limit of a function at a point – Theorems on limits – continuity – Derivatives – Cauchy – Riemann equations – Necessary and sufficient conditions – Analytic function – Examples - Harmonic Function – Properties – To find an analytic function whose real or imaginary part is given.- problems.

Unit II

Bilinear transformations - Definition - Properties – Invariance of cross ratio – Fixed points – problems – Special bilinear transformations - problems – Taylor's series – Laurent's series – problems.

Unit III

Simply connected domain – Cauchy's fundamental theorem – proof using Goursat's lemma – Cauchy's theorem for multiply connected domains – Cauchy's integral formula & Cauchy's formula for the first derivative – Morera's theorem - problems.

Unit IV

Cauchy's Inequality – Liouville's theorem - Fundamental Theorem of Algebra – Maximum modulus theorem – Singularities – Types of singularities – Isolated singularity – Removable Singularity - Pole - Essential singularity – Determination of the nature of singularity.

Unit V

Residue –Definition – Calculation of residues – Cauchy's residue theorem – Contour Integration - Integration around unit circle - Integration along the real axis – Jordan lemma (statement only) - Integration of functions with poles on the real axis - Problems.

Text Books:-

S.No	Title of the Book	Author	Publishing Company	Year of Publication
1.	Complex Analysis	P.Duraipandian & Laxmi Duraipandian, D.Muhilan	Emerald Publishers, 135, Anna Salai, Chennai – 600 002	1988

Reference Books:-

S.No	Title of the Book	Author	Publishing Company	Year of Publication
1.	Theory and Problems of complex analysis	Murray	Schuam Outline Series	1986
2.	Complex Variables and Applications	Ruel V Churchill	Mc Graw Hill International Book Company, Newyork.	1986
3	Complex Variable Theory and Application	Kasana	PHI P.Ltd.,	2010
4	Functions of a complex Variable	B.S.Tyagi	Krishna Prakasan Mandhir, 9, Shivaji Road, Meerut (UP)	1985
5	Functions of a complex Variable	J.N.Sharma	Krishna Prakasan Mandhir, 9, Shivaji Road, Meerut (UP)	1985
6	Functions of a complex Variable	M.L.Khanna	Jai Prakash Nath, Meerut (UP)	1986

SIXTH SEMESTER

Core Paper XIII – Graph theory

Paper Code: 12UMA13 **Max Marks :75**

Unit I

Introduction – Definition – Examples – Degrees – Definition – Theorem 1and corollary – Theorem 2and problems –sub graphs – definitions – Theorem – 1 - Operations on Graphs - definition – Theorem - 1 – problems.

Unit II

Introduction – Walks , Trails and paths – Definitions - Theorem – 1,2,3 - Connectedness and components –Definitions – Theorem – 1,2,3 - Definition – Distance – Theorem 1 – Definitions – Cut , Point , Bridge – Theorem 1,2,3,4 –Blocks – Definition – Theorem 1 – Connectivity – Definition – Theorem 1 - Definition.

Unit III

Introduction – Eulerian Graphs - definition – Lemmas 1 – Theorem – 1 - Konigsberg Bridge Problem – Corollary I and II – Definition – Theorem - Fleury's Algorithm – Hamiltonian Graphs – Definitions – Theorem 1,2,3 – Lemma – Definition (closure) - Theorem 1,2 – corollary – Theorem.

Unit IV

Introduction – Characterization of Trees – Theorem I – Corollary – Theorem 2 with corollary – Theorem 3 – Center of a Tree – Definition – Theorem.

Unit V

Introduction – Definition - Basic Properties – Definitions – Theorem 1 - Definitions – Theorem 2 - Definitions – Paths and connections – Definition - Theorem 1 - Definitions – Theorem 2 – Digraphs and Matrices – Definition– Theorem 1-Definition – Theorem 2 – Definition – Theorem 3 .

Text Books:-

S.No	Title of the Book	Author	Publishing Company	Year of Publication
1.	Invitation to Graph Theory	S.Arumugam, S.Ramachandran	Scitech Publications,Chennai	2001

Reference Books:-

S.No	Title of the Book	Author	Publishing Company	Year of Publication
1.	Basics of Graph Theory	K.R.Parthasarathy	TMH Publishing company	2001
2.	Graph theory	S.Kumaravelu and Suseela kumaravelu	SKV Printers	1996
3.	A first course in Graph theory	A.Chandran	Macmillan Publishers, Chennai	1997
4.	Graph Theory	G. Suresh Singh	PHI Private Limited.	2010

Elective Paper VI: Operations Research - II

Paper Code: 12UMAE06 **Max Marks : 75**

Unit - I

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 replacement and no shortages.
(iii) Uniform Rate of Demand instantaneous production with shortage - Book Works - problems.

Unit - II

Definitions - Newspaper boy problem - Discrete and continuous type cases – problems – Inventory model with one and two price break – problems.

Unit III

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.

Unit IV

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.

Unit V

Definition of project, direct and indirect cost, crashing and crashing cost, cost slope – crash duration – Time cost optimization algorithm – Resource allocation and scheduling – Problems.

Text Books :

S.No	Name of the Book	Author	Publishing Company	Year of Publication
1.	Operations Research 9th Edition	P.K.Gupta ,Manmohan and Kanti Swarup	Sultan Chand & Sons,Chennai.	2001

Reference Books :

S.No	Name of the Book	Author	Publishing Company	Year of Publication
1.	Operations Research 2nd Edition	S.Kalavathy	Publishing House Pvt Ltd,New Delhi	2002
2.	Operations Research 2nd Edition	P.K.Gupta and D.S.Hira	S.Chand &Co ,New Delhi.	1986
3.	Operations Research	Hamdy Taha	Prentice Hall India NewDelhi	2002

SIXTH SEMESTER

Elective Paper VII – Astronomy

Paper Code: 12UMAE07 **Max Marks : 75**

Unit I

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

Unit II

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

Unit III

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

Unit IV

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

Unit V

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

Text Books :-

S.No	Title of the Book	Author	Publishing Company	Year of Publication
1.	Astronomy	Kumaravelu and Susila Kumaravelu	S.Kumaravelu, Muruga Bhavanam, Chidambara Nagar, Nagarkoil-2.	1984

SIXTH SEMESTER

Elective Paper VIII – Probability Theory

Paper Code: 12UMAE08 **Max Marks:75**

Unit – I

Introduction – probability Axioms – conditional probability – Baye's theorem – independent events – problems.

Unit II

Random variable – probability distribution of a random variable – Discrete and continuous variables – problems .

Unit – III

Expected value – Functions of a random variable – Moment generating functions – problems .

Unit – IV

Two point distribution – Binomial distribution – Poisson distribution – Gamma distribution – Normal distribution – Chebychev's inequality – problems.

Unit – V

Regression model – one way analysis of variance – Two way analysis of variance – problems.

Text Books:-

S.No	Title of the Book	Author	Publishing Company	Year of Publication
1.	An Introduction to Probability Theory and Mathematical Statistics	V.K.Rokatgi	Wiley Eastern Publications, NewDelhi	1985

Reference Books:-

S.No	Title of the Book	Author	Publishing Company	Year of Publication
1.	Probability theory and Mathematical Statistics	Marek Fiseh	John Wiley and sons, NewYork	1956

SIXTH SEMESTER

Skill Based Elective Course VI

C- Programming – Practical

Paper Code: 12UMAP06 **Max Marks: 60**

Part – A

1. To find the Sum of N Numbers
2. To find the Largest of given 3 Numbers
3. To Solve a Quadratic equations
4. To find the Simple and compound interest
5. That reads an integer N and determine whether N is prime or not
6. To find the numbers in ascending and descending order.
7. To generate the Fibonacci Sequence
8. That reads an integer N and find the sum of

$$1+\frac{1}{1!}+\frac{1}{2!}+\frac{1}{3!}+\ldots\ldots..$$

9. To Find mean and standard deviation
10. For matrix addition and Subtraction

Part – B

11. To find the roots of the equation by Bisection Method
12. To find the integration of the function by Trapezoidal Rule
13. To find the integration of the function by Simpson's 1/3 rule
14. To solve the first order differential equation by Runge Kutta Method (II Order)
15. To Solve the first order differential equation by Euler's Methods

Note: For University Practical Examination both Internal and External Examiners should be appointed from Mathematics Department.

ALLIED MATHEMATICS

(For B.Sc. Physics , Statistics, Chemistry, Computer Science , Electronics, Bio – informatics and B.C.A Major Students admitted from the year 2012 - 2013 onwards)

FIRST SEMESTER / THIRD SEMESTER

Paper I – Algebra, Calculus and Fourier series

Paper Code – 12UMAA01 **Max Marks: - 75**

Unit I

Characteristic Equation – Eigen Values and Eigen Vectors – Cayley Hamilton Theorem (Statement only)

Unit II

Polynomial Equations – Imaginary and Irrational roots – Transformation of Equation – Descartes' rule of signs – Problems.

Unit III

Radius of Curvature in Cartesian and polar coordinates – Pedal Equation of a curve – Radius of curvature in P-R Coordinates.

Unit IV

Integral Calculus – Integration by Parts – Definite integrals and its properties – Reduction formula for $\int \cos^n x dx$, $\int \sin^n x dx$, $\int_0^{\Pi/2} \sin^n x dx$, $\int_0^{\Pi/2} \cos^n x dx$, $\int_0^{\infty} x^n e^{ax} dx$, $\int_0^{\infty} e^{-x} x^n dx$ – Problems.

Unit V

Fourier Series – Definition – To find the Fourier coefficients of periodic functions of period 2Π – even and odd functions – Half range series – problems.

Text Books:-

S.No	Title of the Book	Author	Publishing Company	Year of Publication
1.	Algebra Volume-I	T.K.Manickava sagam Pillai and S.Narayanan.	Vijay Nicole Imprints Pvt Ltd, # C-7 Nelson Chmbers. 115,Nelson Manickam Road, Chennai – 600029.	2004
2.	Algebra Calculus and Trigonometry	Dr.P.R.Vittal .	Margham Publications, 24, Rameswaram Road , T.Nager, Chennai - 600017.	2000

Reference Books:-

S.No	Title of the Book	Author	Publishing Company	Year of Publication
1.	Calculus	N.P. Bali	Krishna Prakasan Mandhir, 9, Shivaji Road, Meerut (UP).	1994.
2.	Calculus	D. Sudha	Emerald Publishers, 135, Anna Salai, Chennai – 600002.	1988

ALLIED MATHEMATICS

(For B.Sc. Statistics, Physics, Chemistry, Computer Science, Electronics and B.C.A. Major students admitted from the year 2012-2013 onwards)

SECOND SEMESTER / FOURTH SEMESTER

Paper II: Differential equations and Laplace Transforms

Paper Code – 12UMAA03 **Max Marks:75**

Unit I

Second order differential equation with constant coefficient - particular intergral of the type $e^{\alpha x}$, cosαx or sinαx , x^n , $e^{\alpha x}$ V where V is any function of cosax or sinax or x or x^2.

Unit II

Formation of partial differential equation by eliminating arbitrary constants and arbitrary functions – problems – definitions – complete, particular, singular and general integrals.

Unit III

Solutions of standard types of partial differential equations – clairauts's form.

Unit IV

Laplace transforms – definitions – Standard formula – Elementary theorems – problems.

Unit V

Inverse Laplace transforms – Standard formula – Elementary theorems – problems.

Text Books:-

S.No	Title of the Book	Author	Publishing Company	Year of Publication
1.	Differential Equations and Laplace Transforms	Dr.P.R.Vittal	Margham Publications, Chennai -600017.	2002
2.	Allied Mathematics	Dr.P.R.Vittal .	Margham Publications, 24, Rameswaram Road , T.Nager, Chennai - 600017.	2002
3.	Allied Mathematics	A.Singaravelu	Meenakshi Publishers,120,Pushpa Nagar, Medavakkam, Chennai – 601302.	2002

Reference Books:-

S.No	Title of the Book	Author	Publishing Company	Year of Publication
1.	Engineering Mathematics	Gunavathi & Thilkavathy	Emerald Publishers, 135,Anna Salai,Chennai – 600002.	1984
2.	Calculus	N.P.Bali.	Krishna Prakasam Mandir,9,Shivaji road,Meerut(UP).	1994

PAPER III - ALLIED MATHEMATICS – PRACTICAL

(For B.Sc. Statistics, Physics Chemistry, Computer science, Electronics and B.C.A. Major Students admitted from the year 2012 - 2013 onwards)

Unit I, Unit II, Unit III First Semester / Third Semester 2 hours /week
Unit IV, Unit V Second Semester / Fourth Semester- 2 hour / week.

Paper Code : 12UMAAP01 **Max Marks:60**

Unit I

Characteristic equation – Cayley Hamilton theorem – Problems

Unit II

n^{th} derivative – Leibnitz formula for n^{th} derivative – problems

Unit III

Partial differentiation – Partial derivatives of higher order – Homogeneous functions – Problems.

Unit IV

Scalar point function – gradient of scalar point functions – vector point functions – Divergence, curl of a vector point function – Solenoidal and irrotational vectors.

Unit V

Application of Laplace transforms to solve second order differential equations with constant coefficients.

Text Books :-

S.No	Title of the Book	Author	Publishing Company	Year of Publication
1.	Allied Mathematics	T.K.Manickava sagam Pillai and S.Narayanan.	S.Viswanathan and Co., Chennai	1992
2.	Allied Mathematics	Dr.P.R.Vittal .	Margham Publications, 24, Rameswaram Road , T.Nager, Chennai - 600017.	2002
3.	Allied Mathematics	A.Singaravelu	Meenakshi Traders, Chennai	2002

Reference Books :-

S.No	Title of the Book	Author	Publishing Company	Year of Publication
1.	Vector Calculus	K.Viswanathan and S.Selvaraj	Emerald Publishers, 135,Anna Salai,Chennai – 600002.	1984.
2.	Calculus	N.P.Bali.	Krishna Prakasam Mandir,9,Shivaji road,Meerut(UP).	1994

ALLIED MATHEMATICS

Paper I – Discrete Mathematics

FIRST SEMESTER / THIRD SEMESTER

Paper Code : 12UMAA10 **Max Marks : 75**

Unit I

Mathematical Logic : Statements and Notation – Connectives – Negation – Conjunction – Disjunction – Statement formulas and truth tables – conditional – biconditional – Well – formed Formulas – Tautologies – Equavalence & Duality – Normal Forms – DNF , CNF , PDNF , PCNF .

Unit II

The Theory of Inference for the Statement Calculus – Validity Using Truth Tables - Rules of Inference- Theory of predicate calculus – Valid formulae – Equivalences.

Unit III

Algebraic systems – Definition & Examples – semigroups and Monoids – Definition and examples – Homomorphism of semi groups & monoids - sub semigroups & submonoids. – Polish rotation – conversion of Infix to polish – Group codes – The communication model and basic notations of Error correction – Generation of codes by using parity checks – Error recovery in group codes.

Unit IV

Relations & Ordering – Relations – Properties of binary relation in a set – Functions - Definition & Introduction – composition of Functions – Inverse Function – Binary and n- array oprations – Hashing Functions – Natural numbers – Peano Axioms & mathematical induction – Cardinality

Unit V

Latices as partially ordered sets – Definition and example – some properties of Latices – sub Latices – Direct product and Homomorphism – Boolean Algebra – Definition and Example – sub algebra – Direct product and Homomorphism –Boolean Functions – Boolean forms and Free Boolean Algebra – Values of Boolean expression and Boolean Function.

Text Book:

S.No	Name of the Book	Author	Publishing company	Year of Publication
1.	Discrete Mathematical structures with Applications to Computer science	J.P.Trembley R. Manohar	Tata McGraw – Hill, NewDelhi.	2001

Reference Book:

S.No	Name of the Book	Author	Publishing Company	Year of Publication
1.	Discrete Mathematics	Prof.V.Sundaresan, K.S. Ganapathy Subramaniyam, K.Ganesan.	Tata Mc Graw Hill, New Delhi.	2000
2.	Discrete Mathematics	L.Lovarz, J.Pelikan, K.Vexztergombi.	Springer International Edition	2002

ALLIED MATHEMATICS

Paper II - Numerical Methods

For Unit I, Unit II, and Unit III – First Semester / Third Semester – 2 Hours / Week

For Unit IV and Unit V – Second Semester / Fourth Semester – 2 Hours / Week

Paper Code: 12UMAA11 **Max Marks: 75**

Unit I

Solution of Algebraic and Transcendental Equations – Introduction – Regula Falsi Method – Bisection Method – Iteration Method – Newton – Raphson Method – Problems.

Unit II

Calculus of Finite Differences – Introduction – Forward Differences – Backward Differences – Central Differences – Operators – Forward Differences – Backward Differences - Fundamental Theorem of Difference Calculus – Difference Operator Δ and E – Problems.

Unit III

Interpolation with equal intervals – Newton's Forward and Backward Interpolation Formula – Central Difference Interpolation Formula – Gauss's Forward and Backward Interpolation formula – Bessel's Formula – Stiring 's Formula .- Problems.

Unit IV

Numerical Differentiation and Numerical Integration – Derivatives using Newton's Forward – Newton's Backward – Striling 's Formula – Numerical Integration – General Quadrature Formula – Trapezoidal Rule – Simpson's 1/3 Rule – Simpson's 3/8 Rule –Problems .

Unit V

Numerical solutions of Ordinary Differential First and Second Order Equations – Introduction – Taylor's Series Method – Euler's Method – Modified Euler's Method – Runge Kutta Methods – Problems.

Note : The University Examination will be conducted at the end of even semester.

Text Books :

S.No	Name of the Book	Author	Publishing Company	Year of Publication
1.	Numerical Methods For Science And Engineering Computation	M.K.Jain, S.R.K.Iyenger & R.K.Jain.	New Age International Pvt .Ltd.	
2.	Numerical Methods	E.Balagurusamy	Tata McGraw Hill Publishing company Ltd,New Delhi	2002

Reference Books:

S.No	Name of The Book	Author	Publishing Company	Year of Publication
1.	Introductory Methods of Numerical Analysis	S.S. Sastry	Ptentice Hall of India Private Ltd ,New Delhi.	2000
2.	Engineering Numerical Methods	T.K.Manickavasagam and Narayanan	S.Viswanathan & Co, Chennai	1998

ALLIED MATHEMATICS

SECOND SEMESTER / FOURTH SEMESTER

Paper III – Graph Theory

Paper Code : 12UMAA12 **Max Marks :75**

Unit I

Graph – Definition 1.2 – Applications of Graph – 1.3 Finite and Infinite Graphs – 1.4. Incidence and Degree – 1.5. Isolated Vertex – Pendant Vertex – Null Graph.

Unit II

Isomorphism – 2.2 Sub graphs – 2.3 A Puzzle with mulicoloured – 2.4 Walks, paths and circuits – 2.5 Connected Graphs – Disconnected Graphs and components.

Unit III

2.6 Euler Graphs – 2.7 operations on Graphs – 2.8 More on Euler Graphs – 2.9 Hamiltonian and circuit – 2.10 The Travelling salesman problem.

Unit IV

Trees 3.2 Properties of Trees – 3.3 Pendent Vertices in a Tree – 3.4. Distance and centers in a Tree – 3.5 Rooted and Binary Trees.

Unit V

On Counting Trees – 3.7 Spanning Trees – 3.8 – Fundamental circuits – 3.9 finding all spanning Trees of a Graph.

Text Books:

S.No	Name of the Book	Author	Publishing Company	Year of Publication
1.	Graph Theory with applications to Engineering and computer science	Narasingh Deo	Ptentice Hall of India, New Delhi.	-

Reference Books :

S.No	Name of the Book	Author	Publishing Company	Year of Publication
1.	Graph Theory	Harary	Narosa publications,New Delhi	-
2.	A First look at Graph Theory	John Clark	Allied Publications Ltd, Madras.	-

NON MAJOR ELECTIVE COURSE I

1. Competitive Examination Paper - I

Paper Code: 12UMANE01 **Max Marks : 75**

Unit I

H.C.F. and L.C.M.

Unit II

Square Roots and Cube Roots – Averages.

Unit III

Problems on Numbers – Problems on Ages.

Unit IV

Surds and Indices – Profit and Loss.

Unit V

Partnership.

Text Books:

S.No	Name of the Book	Author	Ppublishing Company	Year Of Publication.
1.	Quantitative Aptitude For Competitative Examinations	R.S.Aggarwal	S.Chand Co Ltd ,152,Annasalai,Chennai.	2001

NON MAJOR ELECTIVE COURSE II

1. Competitive Examination Paper II

Paper Code: 12UMANE02 **Max Marks :75**

Unit I

Time and Work – Time and Distance

Unit II

Problems on trains – Boats and streams

Unit III

Simple and Compound interest – Area ,Volume and Surface Area.

Unit IV

Area Volume and Surface Area.

Unit V

Permutation and combination

Text Books:

S.No	Name of the Book	Author	Publishing Company	Year Of Publications
1.	Quantitative Aptitude for competitative Examinations	R.S.AggarWal	S.Chand Co Ltd ,152 ,Annasalai ,Chennai.	2001

NON MAJOR ELECTIVE COURSE I

2. Matrix Algebra

Paper Code : 12UMANE03 **Max Marks :75**

Unit I

Definition of Matrix – Addition ,Subtraction , Multiplication of Matrices .

Unit II

Transpose of a Matrix – Adjoint of a Matrix – Inverse of the Matrix.

Unit III

Symmetric , Skew symmetric , Hermitian and Skew Hermitian Matrix – Problems.

Unit IV

Rank of The Matrix – Definition – Finding Rank of the Matrix – Problems upto 3x3 Matrix.

Unit V

Cayley Hamilton Theorem (statement only) – Problems only.

Text Books :

S.No	Name of The Book	Author	Publishing Company	Year of Publications
1.	Allied Mathematics	Dr.P.R.Vittal	Margham Publications,Chennai -!7	2000

NON MAJOR ELECTIVE COURSE II

2. Numerical Methods

Paper Code : 12UMANE04 **Max Marks : 75**

Unit I

Solution of algebraic and Transcendental Equations – Bisection Method - Newton – Raphson Method.

Unit II

Finite difference – Definition – First difference – Higher differences – Difference tables – Expression of any value of y in terms of the initial value y_0 and differences.

Unit III

Newton Forward difference – Simple problems.

Unit IV

Newton Backward difference – Simple problems.

Unit V

Central differences – Properties of the operator D – simple problems.

Text Books :

S.No	Name of the Book	Author	Publishing Company	Year Of Publication
1.	Introductory methods of Numerical Analysis – 2nd Edition	S.S.Sastry	Prentice Hall of India Pvt Ltd,New Delhi	!990
2.	Numerical Methods in Science and Engineering – 2nd Edition (revised)	Dr.M.K.Venkataraman	The National Publishing Company,Chennai.	

NON MAJOR ELECTIVE COURSE I

3. Linear Programming

Paper Code: 12UMANE05 **Max Marks: 75**

Unit I

Definition of O.R. – Graphical Method .

Unit II

Simplex Method using Slack Surplus Variables.

Unit III

Transportation Problem – Definition – Finding only initial basic solution by using North –West corner Rule – Vogel's Approximation Method – Lowest cost entry Method.

Unit IV

Assignment Problem – Definition –Finding optimal solution by using Hungarian Method

Unit V

Sequencing Problem – Definition – N jobs to be operated on Two Machines – Problems.

Text Books:

S.No	Name of the Book	Author	Publishing Company	Year Of Publications
1.	Operations Research	P.K.Gupta,Man Mohan,Kanti Swarup-9^{th}Edition	Sultan Chand & Sons,New Delhi.	2001

NON MAJOR ELECTIVE COURSE II

3. Operations Research

Paper Code : 12UMANE06 **Max Marks :75**

Unit I

Inventory Models – Introduction – Definition of Inventory Models

Uniform Rate of demand,infinite rate of production and no shortages.

Unit II

Inventory Models – Probabilistic Type – News paper Boy Problem –Discrete case only - Problems.

Unit III

Queuing Theory – Definition – Model (M/M/1) : (∞/FCFS) – Problems.

Unit IV

Network – Definition of Network,Event ,Activity, Critical Path,Slack – Critical Path Method. – Problems.

Unit V

Network –Definition PERT ,Three time estimates – PERT Algorithm –Problems.

Text Books :

S.No	Name of the Book	Author	Publishing Company	Year Of Publications
1.	Operations Research	P.K.Gupta,ManMohan and KantiSwarup -9th Edition	Sultan Chand and sons,NewDelhi	2001