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 2017-2018

Under the TANSCHE

Sem	Subject Code	Part	Course	Subject Title	Hrs/ Week	Credit	Int. Mark	Ext. Mark	Total. Marks
I	17U1LT01	I	Language-I	Tamil-I	4	3	25	75	100
	17U1LE01	II	English-I	English-I	4	3	25	75	100
	17U1PHA01	III	Allied Course-I	Allied Physics-I	8(5+3)	4	25	75	100
	17U1MAC01	IV	Core Course-I	Trigonometry & Classical Algebra	5	5	25	75	100
	17U1MAC02	IV	Core Course-II	Calculus	5	5	25	75	100
		V	Value Education	Manavalakkalai Yoga	2	2	25	75	100
				Library	1				
				Sports	1				
TOTAL					**30**	**22**	**150**	**450**	**600**
II	17U2LT02	I	Language-II	Tamil-II	4	3	25	75	100
	17U2LE02	II	English-II	English-II	4	3	25	75	100
	17U2PHA02	III	Allied Course- I	Allied Physics-II	8(5+3)	4	40	60	100
	17U2PHAP01	III	Allied Course- I (Pra)	Allied Course –I (Practical)		3	25	75	100
	17U2MAC03	IV	Core Course-III	Differential Equations and Laplace Transforms	4	3	25	75	100
	17U2MAC04	IV	Core Course-IV	Vector Calculus& Fourier Series	4	3	25	75	100
	17U2ES01	VI	Environmental Studies	Environmental Studies	4	4	25	75	100
				Library	1				
				Sports	1				
TOTAL					**30**	**23**	**190**	**510**	**700**

	17U3LT03	I	Language-III	Tamil-III	4	3	25	75	100
	17U3LE03	II	English-III	English-III	4	3	25	75	100
	17U3MAA09	III	Allied Course-II	Mathematical Statistics-I	6	5	25	75	100
		III	Allied Course- II (Pra)	Allied Course-II (Pra)	2	-	25	-	-
III	17U3MAC05	IV	Core Course-V	Statics	5	5	25	75	100
	17U3MAC06	IV	Core Course-VI	Discrete Mathematics	5	4	25	75	100
		VII	Non Major Elective Course-I	Fundamentals of Computer& Communications	2	2	25	75	100
				Library	1				
				Sports	1				
TOTAL					**30**	**22**	**150**	**450**	**600**
	17U4LT04	I	Language-IV	Tamil-IV	4	3	25	75	100
	17U4LE04	II	English-IV	English-IV	4	3	25	75	100
	17U4MAA15	III	Allied Course-II	Mathematical Statistics-II	4	3	25	75	100
	17U4MAAP02	III	Allied Course- II (Pra)	Allied Course-II (Pra) Mathematical Statistics	4	4	40	60	100
IV	17U4MAC07	IV	Core Course-VII	Dynamics	5	5	25	75	100
	17U4MAC08	IV	Core Course-VIII	Analytical Geometry	5	4	25	75	100
		VII	Non Major Elective Course-II	HTML and web design	2	2	25	75	100
				Library	1				
				Sports	1				
TOTAL					**30**	**24**	**190**	**510**	**700**

V	17U5MAC09	IV	Core Course-IX	Algebra-I	6	5	25	75	100
	17U5MAC10	IV	Core Course-X	Real Analysis-I	6	5	25	75	100
	17U5MAC11	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
	17U5MAS01	V	Skill Based Elective-I	Mathematics for competitive Examinations –I	3	2	25	75	100
	17U5MAS02	V	Skill Based Elective-II	Sci-Lab	3	2	25	75	100
TOTAL					**30**	**24**	**150**	**450**	**600**
VI	17U6MAC12	IV	Core Course-XII	Algebra-II	6	5	25	75	100
	17U6MAC13	IV	Core Course-XIII	Real Analysis-II	6	5	25	75	100
	17U6MAC14	IV	Core Course-XIII	Complex Analysis-II	6	5	25	75	100
	-	IV	Major Elective Course-I	Major Elective Course-I From Group-C	6	5	25	75	100
	17U6MAS03	V	Skill Based Elective-III	Mathematics for competitive Examinations – II	3	2	25	75	100
	17U6MAS04	V	Skill Based Elective-IV	Programming in C	3	2	25	75	100
	17U6EX01		Extension	-	-	1	-	-	-
TOTAL					**30**	**25**	**150**	**450**	**600**
GRAND TOTAL					**180**	**140**	**980**	**2820**	**3800**

ELECTIVE COURSES:

Subject	Subject Code
From Group A	
Numerical Methods	17U5MAE01
Financial Mathematics	17U5MAE02
From Group B	
Stochastic Process	17U5MAE03
Mathematical Modelling	17U5MAE04
From Group C	
Operations Research	17U6MAE05
Number Theory	17U6MAE06

SKILL BASED ELECTIVE COURSES:

Mathematics for competitive Examinations –I	17U5MAS01
SCI-Lab	17U5MAS02
Mathematics for competitive Examinations –II	17U6MAS03
Programming in C	17U6MAS04

Programme code	B.Sc	**Programme Title**	**Bachelor of Science (Mathematics)**	
Course Code	17U1MAC01	**Title**		
		CORE I: TRIGONOMETRY	**Semester**	I
Hrs/Week	5	**& CLASSICAL ALGEBRA**	**Credits**	05

Subject Description : This course presents the idea of Trigonometry & Classical Algebra.

Goals: To enable the students to learn about the fundamental ideas of Hyperbolic functions**,** Theory of Equations.

Objectives: On successful completion of this course the students should have gained knowledge about Expansions, Binomial Series and Theory of Equations.

Unit I (15Hours)

Expansions – Expansions for $\sin n\,\theta$ and $\cos n\,\theta$ – Expansion for $\tan n\theta$ – Expansion for $\cos^n \theta$ and $\sin^n \theta$ in terms of multiple angles of θ – Expansions of $\sin \theta$ and $\cos \theta$ in ascending powers of θ - Expansion of $\tan \theta$.

Unit II (15Hours)

Hyperbolic functions - Inverse hyperbolic functions. Logarithm of complex Numbers: Definition –Real and imaginary part of $\log (x + iy)$ – logarithm of negative real numbers.

UNIT III (15Hours)

Binomial Series – Binomial theorem for a Positive integral index – Binomial theorem for a rational index – Summation of Binomial Series – Exponential Series – Standard results – Problems.

UNIT IV (15Hours)

Theory of Equations: An equation of the form – Fundamental theorem in the theory of equations- Relation between the roots and Coefficients of an equation- Imaginary and irrational roots- Symmetric functions of the roots of an equation in terms of its coefficients.

UNIT V (15Hours)

Reciprocal equation – Transformation of equations – Multiplication of roots by m – Diminishing the roots of an equation– Removal of a term – Descarte's rule of signs – Problems.

TOTAL : **75 Hours**

TEXT BOOK:

1. *P.R.Vittal and V.Malini*, **Algebra and Trigonometry**, **Margham Publications, 2014**

REFERENCE BOOKS :

1. P. R. Vittal , *Allied Mathematics ,* **Third Edition, Margham Publications, (2017)**

2. N.P. Bali , *Algebra ,* **Laxmi publications.**

3. T.K. Manickavasagam Pillai & S. Narayanan , *Algebra ,* **Vijay Nicole Imprints Pvt Ltd., 2004.**

4. S. Narayanan &T.K. Manicavachagom Pillay, *Trigonometry ,* **S.Viswanathan (Printers &Publishers) Pvt Ltd., - 2011.**

Programme code	B.Sc	Programme Title	Bachelor of Science (Mathematics)	
Course Code	17U1MAC02	Title		
		CORE II: CALCULUS	Semester	I
Hrs/Week	5		Credits	05

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.

Programme code	B.Sc	Programme Title	Bachelor of Science (Mathematics)	
Course Code	17U2MAC03	Title		
		CORE III: DIFFERENTIAL EQUATIONS & LAPLACE TRANSFORMS	Semester	II
Hrs/Week	5		Credits	05

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.

Programme code	B.Sc	**Programme Title**	**Bachelor of Science (Mathematics)**	
Course Code	17U2MAC04	**Title**		
Hrs/Week	4	**CORE IV: VECTORCALCULUS AND FOURIER SERIES**	**Semester**	II
			Credits	04

Subject Description : This course presents the idea of Vector Calculus and Fourier Series. **Goals:** To enable the students to learn about the fundamental ideas of Scalar and vector fields,Integration of vectors and Fourier Series.

Objectives: On successful completion of this course the students should have gained knowledgeabout Scalar and vector fields, Integration of vectors and Fourier Series.

UNIT I   **(12 Hours)**

Scalar and vector fields –Differentiation of vectors – Gradient of a scalar point function –Divergence and Curl

of a vector point functions

UNIT II   **(12 Hours)**
Integration of vectors : line integral – surface integral –Volume integral.

UNIT III   (12 Hours)
Integration of vectors : Gauss divergence theorem- Stoke's theorem -Green's theorem in plane–(Statements only) -

verification of the theorems.

UNIT IV   **(12 Hours)**
Fourier series : Introduction –Periodic function –Euler's formulae –Conditions for Fourierexpansion –Problems

–Functions having points of discontinuity: Definition –Problems.

UNIT V   **(12 Hours)**
Fourier series : Fourier series for Even and Odd functions– Half range fourier series–Problems.

TOTAL :   **60 Hours**

TEXT BOOK :

1. **P.Duraipandian, Laxmi Duraipandian** ,*Vector Analysis*, Emerald Publishers, Chennai 2014

2. **Dr. S. Sreenadh**, **S.Ranganatham, Dr.M.V.S.S.N.Prasad, Dr.V.Ramesh Babu ,** Fourier series and integral transforms,S.chand & Company Pvt.Ltd. First Edition 2014, Reprint 2016. (Unit IV& V)

REFERENCE BOOKS:

1. **S .Narayanan, T.K.Manichavasagam pillai, Calculus, Vol I, S.Viswanathan pvt Limited**,2015.

2. Paul c.Matthews, Vector calculus, Springer science and business media pvt limited 2000.

3. T.K. Manichavasagam Pillai and S.Narayanan, Trigonometry - Viswanathan Publishers andPrinters Pvt. Ltd ,1997.

4. 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	17U3MAC05	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-II– 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	17U3MAC06	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	17U4MAC07	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

Programmecode	B.Sc	**Programme Title**	**Bachelor of Science (Mathematics)**	
Course Code	**17U4MAC08**	**Title**		
		CORE VIII: ANALYTICAL GEOMETRY	**Semester**	IV
Hrs/Week	4		**Credits**	04

Subject Description : This course presents the idea of Analytical Geometry.

Goals: To enable the students to learn about the fundamental ideas of Analytical Geometry**. Objectives:** On successful completion of this course the students should have gained knowledgeabout Analytical geometry of 2D, 3D, Sphere, cone, cylinder and conicoids.

UNIT I: **(15 Hours)**

Analytical geometry of 2D: polar coordinates - Equation of a conic – chord - tangent-normal-simple problems.

UNIT II: **(15 Hours)**

Analytical Geometry 3D: straight lines- shortest distance (S.D) between skew lines-simple problems.

UNIT III: **(15 Hours)**

Sphere: standard equation of a sphere-results based on the properties of a sphere-tangentplane to a sphere- equation of a circle through two spheres.

UNIT IV: **(15 Hours)**

Cone and cylinder: Cone whose vertex is at the origin- Envelope cone of a sphere-Rightcircular cone-Equation of a cylinder-Right circular cylinder.

UNIT V: **(15 Hours)**

Conicoides: Nature of a conicoide- Standard equation of central conicoid –enveloping conetangent plane-condition for tangency –Director Sphere.

TOTAL :   **75 Hours**

TEXT BOOKS:

1. **T.K.Manicavachagom pillay and T.Natarajan "A Text Book of *Analytical Geometry 2D*",** Visvanathan Publications, 2007.

2. **T.K.Manicavachagom Pillay and T.Natarajan "A Text Book of *Analytical Geometry 3D*",** Visvanathan Publications, 2007.

3. **P. Durai Pandian & Laxmi Duraipandian , D.Muhilan "*Analytical Geometry 3D*",** Emerald Publishers,2003.

REFERENCE BOOKS:

1. **N.P. Bali, "*Solid Geometry*",** Laxmi Publications (P) Ltd., 2004..

2. **M.L. Khanna, "*Solid Geometry*",** Jainath & Co Publishers, Meerut,2008.

3.**P.K.Jain, Khalil Ahmed, "*Text book Of Analytical Geometry of Two Dimensions*",** Wiley Eastern Limited, 2005.

SUBJECT TITLE	**ALGEBRA I**	CORE PAPER	IX
SUBJECT CODE	**17U5MAC09**	**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 Books:

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	17U5MAC10	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	17U5MAC11	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	**17U6MAC12**	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	17U6MAC13	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	17U6MAC14	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	NUMERICAL METHODS	CORE ELECTIVE:I
SUBJECT CODE	17U5MAE01	HOURS/WEEK:5
SEMESTER	V	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	FINANCIAL MATHEMATICS	MAJOR ELECTIVE COURSE	II
SUBJECT CODE	17U5MAE02	HOURS/WEEK	6
		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.

Programme code	B.Sc	**Programme Title**		Bachelor of Science (Mathematics)	
Course Code	17U5MAE03	**Title**			
		MAJOR ELECTIVE: STOCHASTIC PROCESSES		**Semester**	V
Hrs/Week	6			**Credits**	06

Subject Description : This course presents the idea of Stochastic Process.
Goals: To enable the students to learn about the fundamental ideas of Stationary Process**.**
Objectives: On successful completion of this course the students should have gained knowledge about probability and distribution function,concept Stochastic Process, Markov chains ,Poisson Process, Birth and death Process and queuing theory.

UNIT I: (12 Hours)

Generating function - Laplace transforms – Laplace transforms of a probability distribution function - Difference equations – Differential difference equations – Matrix analysis. Chapter 1 – Sec 1.1, 1.2, 1.3, Appendix A 1, 2, 3, 4.

UNIT II : (12 Hours)

Stochastic Process - Notion – Specification – Stationary Process - Markov Chains – Definition and examples – Higher transition probabilities. Chapter 2 – Sec 2.1, 2.2, 2.3 & Chapter 3 – Sec 3.1, 3.2.

UNIT III : (12 Hours)

Classification of states and chains – Determination of higher transition probabilities – Stability of Markov system – Limiting behaviour. Chapter 3 – Sec 3.4, 3.5, 3.6.

UNIT IV: (12 Hours)

Poisson Process and related distributions – Generalization of Poisson Process – Birth and death process. Chapter 4 – Sec 4.1, 4.2, 4.3, 4.4

UNIT V: (12 Hours)

Stochastic Process in queuing and reliability – queuing systems – M/M/1 models – Birth and death process in queuing theory – Multi channel models – Bulk Queues. Chapter 10 – Sec 10.1, 10.2, 10.3, 10.4, 10.5

TEXT BOOK:

J.Medhi, Stochastic Processes,

Chapters 1,2,3 (Omitting 3.6,3.7,3.8), Chapter 4 (Omitting 4.5 and 4.6) and Chapter 10 (Omitting

10.6,10.7).

REFERENCES :
1. First Course in Stochastic Processes by Samuel Karlin.
2. Stochastic Processes by Srinivasan and Metha (TATA McGraw Hill).
3. Elements of Applied Stochastic Processes by V.Narayan.

Programmecode	B.Sc	Programme Title		Bachelor of Science (Mathematics)	
Course Code	17U5MAE04	**Title**			
		MAJOR ELECTIVE: MATHEMATICAL MODELLING		Semester	V
Hrs/Week	6			Credits	06

Subject Description : This course presents the idea of mathematical models.

Goals: To enable the students to learn about the fundamental ideas of of mathematical modelling**.**

Objectives: On successful completion of this course the students should have gained knowledge about the mathematical models through ode and difference equations, mathematical models in real lifeproblems.

UNIT I: **(12 Hours)**

Mathematical Modelling through Ordinary Differential Equations of First order : Linear Growth and Decay Models – Non-Linear Growth and Decay Models – Compartment Models – Dynamic problems – Geometrical problems. Chap 2, Sec 2.1 – 2.6

UNIT II: **(12 Hours)**

Mathematical Modelling through Systems of Ordinary Differential Equations of First Order : Population Dynamics – Epidemics – Compartment Models – Economics – Medicine, Arms Race, Battles and International Trade – Dynamics. Chap 3, Sec 3.1 – 3.6

UNIT III: **(12 Hours)**

Mathematical Modelling through Ordinary Differential Equations of Second Order : Planetary Motions – Circular Motion and Motion of Satellites – Mathematical Modelling through Linear Differential Equations of Second Order – Miscellaneous Mathematical Models. Chap 4, Sec 4.1 – 4.4

UNIT IV: **(12 Hours)**

Mathematical Modelling through Difference Equations : Simple Models – Basic Theory of Linear Difference Equations with Constant Coefficients – Economics and Finance – Population Dynamics and Genetics – Probability Theory. Chap 5, Sec 5.1 – 5.5

UNIT V: **(12 Hours)**

Mathematical Modelling through Graphs : Solutions that can be Modelled Through Graphs – Mathematical Modelling in Terms of Directed Graphs, Signed Graphs, Weighted Digraphs and Unoriented Graphs. Chap 7, Sec 7.1 – 7.5

TEXT BOOK:

J.N. Kapur, Mathematical Modelling, Wiley Eastern Limited, New Delhi, 1988.

REFERENCE BOOK:

J.N. Kapur, Mathematical Models in biology and Medicine, EWP, New Delhi, 1985

Subject Title	OPERATIONS RESEARCH	Major Elective Course – V
Subject Code	17U6MAE05	Hours / Week - 6
Semester	VI	Credit - 5

Subject description: This course provides knowledge about LPP, Transportation and Sequencing problems.

Goals: To enable the students to understand the concepts of LPP, Transportation and Sequencing problems.

Objective: On successful completion of course the students should have concrete knowledge about the abstract thinking like LPP, Transportation and Sequencing problems.

Unit I [12 Hours]

Introduction - Definition of O.R. – Scope of O.R. – Linear Programming Problem – Definitions – Mathematical Formulation – Graphical Method – Simplex Method - Big M Method - Problems

Unit II [12 Hours]

Transportation problem –Introduction – North West Corner Rule – Least Cost Method – Vogel's Approximation Method – MODI Method – Problems. Assignment Problem – Definition – Hungarian Assignment Problem – Balanced and Unbalanced Assignment Problem - Maximization case in Assignment problem

Unit III [12 Hours]

Sequencing Problem – Definition – Basic assumptions – n jobs to be operated on two machines – problems – n jobs to be operated on three machines – problems.

Inventory Model – Definition – Costs associated with Inventory – 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.

Unit IV [12 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.

Unit V [12 Hours]

Introduction – Definition of network, event, activity, optimistic time, pessimistic time, the most likely time, critical path, total float and free float – Critical Path Method (CPM) – Project Evaluation Review Technique (PERT) – difference between CPM and PERT – 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	2015

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

SUBJECT TITLE	NUMBER THEORY	MAJOR ELECTIVE COURSE	VI
SUBJECT CODE	17U6MAE06	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	17U3MAA09	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	17U4MAA15	HOURS/WEEK TOTAL HOURS	6 60
SEMESTER	IV	CREDIT	5

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	17U4MAAP02	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 EXAMINATIONS -I	SKILL BASED ELECTIVE	I
SUBJECT CODE	17U5MAS01	HOURS/WEEK TOTAL HOURS	3
SEMESTER	V	CREDIT	2

Unit I   **(6 Hours)**

Numbers, HCF&LCM of numbers, Decimal fractions

Unit II   **(6 Hours)**

Simplification Square root, Cube root, Average

Unit III   **(6 Hours)**

Problem on Numbers and Ages , Problems on Trains.

Unit IV   **(6 Hours)**

Profit & Loss, Ratio & Proportion, Chain Rule, Boats & Streams

Unit V   **(6 Hours)**

Time & Work, Pipes & Cistern, Time & Distance.

TOTAL :   **30 Hours**

TEXT BOOK:

   R.S.Aggarwal, "*Quantitative Aptitude*", S. Chand & Co.Ltd., 2017.

REFERENCE BOOKS:

1. **R.S. Aggarwal, "A Modern Approach to Logical Reasoning",** S.Chand & Company Ltd., 2011.
2. **Sandip Jana, "*Mathematics for competitive examinations*",** Academic Publishers, 2011.
3. **Kiran Prakasan,** "*Quantitative Aptitude for Competitive Examinations*", S.Chand and Company private Limited, 2008.

Programmecode	B.Sc	**Programme Title**	**Bachelor of Science (Mathematics)**	
Course Code	**17U5MAS02**	**Title**		
		SCILAB	**Semester**	V
Hrs/Week	**3**		**Credits**	02

Subject description: This course provides knowledge about solving mathematical problems by using computer software.

Goals: To enable the students to understand the concepts of mathematical functions, High-level programming languages. Also 2 and 3 dimensional graphs.

Objective: On successful completion of course the students should have concrete knowledge about the abstract thinking like Mathematical functions, 2 and 3 dimensional graphs and Programs in High-level Programming Languages .

Unit I (6hrs)

Introduction-Learning Scilab-Further References-Starting Scilab-Typing Commands.

Unit II (6 hrs)

Simple Calculations: Basic Arithmetic-Complex Numbers.

Help in Scilab: The Help Command-The Help Window-Help on the Web.

Unit III (6 hrs)

Adding a Line- Hints for Good Graph-Plot Data as points-Choose a good Scale.

Unit IV (6 hrs)

Solving Equations-Matrices and Vectors-Creating Matrices-Systems of Equations-Polynomials.

Unit V (6 hrs)

Graphs-Function Plotting – Component Arithmetic- Printing Graphs-Graphs in Reports-Advanced Graphics.

Text Book:

Introduction to Scilab, Graeme Chandler, Stephen Roberts, August 7,2002

SUBJECT TITLE	MATHEMATICS FOR COMPETITIVE EXAMINATIONS -II	SKILL BASED ELECTIVE	III
SUBJECT CODE	17U6MAS03	HOURS/WEEK TOTAL HOURS	3
SEMESTER	VI	CREDIT	2

Course Objective

1. To enable the students to give the lot of objectives type questions, with their solutions by short cut methods.

2. A separate exercise on data-sufficiency-type questions had given in each topic with ezplanatory solutions.

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:

R.S.Aggarwal, "*Quantitative Aptitude*", S. Chand & Co.Ltd., 2017.

REFERENCE BOOKS:

1.R.S. Aggarwal, "A Modern Approach to Logical Reasoning", S.Chand & Company Ltd., New Delhi, 2011.

2.Sandip Jana, "*Mathematics for competitive examinations*", Academic Publishers, 2011.

3.Kiran Prakasan, "*Quantitative Aptitude for Competitive Examinations*", S.Chand and Company private Limited, New Delhi, 2008.

Programme code	B.Sc	Programme Title	Bachelor of Science (Mathematics)	
Course Code	17U6MAS04	Title **PROGRAMMING IN C**	Semester	VI
Hrs/Week	3		Credits	02

Unit I   (6 hrs)

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   (6 hrs)

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

Unit III   (6 hrs)

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

Unit IV   (6 hrs)

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. 36

Unit V   (6 hrs)

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.

TEXT BOOKS:

"Programming in c" by E. Balagurusamy.

REFERENCE BOOKS:

"Let us C" by Yashwant Kanetkar