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 OBE
for the Candidates admitted from the year 2018-2019

SEM	SUBJECT CODE	COURSE	SUBJECT TITLE	Hours/ Week	CREDIT	INT. MARK	EXT. MARK	TOT. MARK
I	18U1LT01	Language-I	Tamil-I	6	3	25	75	100
	17U1LE01B	English-I	English-I	6	3	25	75	100
	18U1PHA01	Allied Course-I	Allied Physics-I	4	4	25	75	100
	18U2PHAP01		Allied Course –I (Practical)	2	-	-	-	-
	18U1MAC01	Core Course-I	Trigonometry &Classical Algebra	5	5	25	75	100
	18U1MAC02	Core Course-II	Calculus	5	4	25	75	100
	18U1VE01	Value Education	Manavalakkalai Yoga	2	2	25	75	100
			Library	-	-			
			Sports	-	-			
TOTAL				**30**	**21**	**150**	**450**	**600**
II	18U2LT02	Language-II	Tamil-II	6	3	25	75	100
	17U2LE02B	English-II	English-II	6	3	25	75	100
	18U2PHA02	Allied Course-I	Allied Physics-II	4	4	40	60	100
	18U2PHAP01		Allied Course –I (Practical)	2	2	25	75	100
	18U2MAC03	Core Course-III	Differential Equations and Laplace Transforms	4	4	25	75	100
	18U2MAC04	Core Course-IV	Vector Calculus& Fourier Series	4	4	25	75	100
	18U2ES01	Environmental Studies	Environmental Studies	4	4	25	75	100
			Library	-	-			
			Sports	-	-			
TOTAL				**30**	**24**	**190**	**510**	**700**

Sem	Code	Course	Title						
III	18U3LT03	Language-III	Tamil-III	6		3	25	75	100
	17U3LE03B	English-III	English-III	6		3	25	75	100
	18U3MAA07	Allied Course-II	Mathematical Statistics-I	4		4	25	75	100
	18U4MAAP02	Allied Course-II (Pra)	Allied Course-II (Pra)	2		-	-	-	-
	18U3MAC05	Core Course-V	Statics	4		4	25	75	100
	18U3MAC06	Core Course-VI	Discrete Mathematics	4		4	25	75	100
	18U3MAS01	Skill Based Elective-I	Mathematics for competitive Examinations –I	2		2	25	75	100
		NMEC-I		2		2			
			Library	-		0			
			Sports	-		0			
TOTAL				**30**	**22**		**150**	**450**	**600**
IV	18U4LT04	Language-IV	Tamil-IV	6		3	25	75	100
	17U4LE04B	English-IV	English-IV	6		3	25	75	100
	18U4MAA11	Allied Course-II	Mathematical Statistics-II	4		4	25	75	100
	18U4MAAP02	Allied Course-II (Pra)	Allied Course-II (Pra) Mathematical Statistics	2		2	40	60	100
	18U4MAC07	Core Course-VII	Dynamics	4		4	25	75	100
	18U4MAC08	Core Course-VIII	Analytical Geometry	4		4	25	75	100
	18U4MAS02	Skill Based Elective-II	Sci-Lab	2		2	25	75	100
		NMEC-II		2		2			
			Library	-		-			
			Sports	-		-			
TOTAL				**30**	**24**		**190**	**510**	**700**

	Course code								
V	18U5MAC09	Core Course-IX	Algebra	6		5	25	75	100
	18U5MAC10	Core Course-X	Real Analysis-I	6		5	25	75	100
	18U5MAC11	Core Course-XI	Complex Analysis-I	5		4	25	75	100
	18U5MAC12	Core Course-XII	Numerical Methods	5		4	25	75	100
	-	Major Elective Course-I	From Group-A and Group- B	6		4	25	75	100
	18U5MAS03	Skill Based Elective-III	Mathematics for competitive Examinations –II	2		2	25	75	100
			Library	-		-			
TOTAL				**30**	**24**		**150**	**450**	**600**
VI	18U6MAC13	Core Course-XIII	Linear Algebra	6		5	25	75	100
	18U6MAC14	Core Course-XIV	Real Analysis-II	6		5	25	75	100
	18U6MAC15	Core Course-XV	Complex Analysis-II	5		4	25	75	100
	18U6MAC16	Core Course-XVI	Graph Theory	5		4	25	75	100
	-	Major Elective Course-II	From Group-C	6		4	25	75	100
	18U6MAS04	Skill Based Elective-IV	Programming in C	2		2	25	75	100
	18U6EX01	Extension	-	-		1	-	-	-
			Library	-		-			
TOTAL				**30**	**25**		**150**	**450**	**600**
GRAND TOTAL				**180**	**140**		**980**	**2820**	**3800**

ELECTIVE SUBJECTS:

Subject	Subject Code
From Group A:	
Operations Research-I	18U5MAE01
Financial Mathematics	18U5MAE02
From Group B:	
Astronomy	18U5MAE03
Combinatorics	18U5MAE04
From Group C:	
Operations Research –II	18U6MAE05
Number Theory	18U6MAE06

SKILL BASED ELECTIVE COURSES:

Mathematics for competitive Examinations –I	18U3MAS01
SCI-Lab	18U4MAS02
Mathematics for competitive Examinations –II	18U5MAS03
Programming in C	18U6MAS04

SEMESTER I

Programme code	B.Sc	**Programme Title**	**Bachelor of Science (Mathematics)**	
Course Code	18U1MAC01	**Title**	**Batch**	2018-2021
		CORE I: TRIGONOMETRY	**Semester**	I
Hrs/Week	5	**& CLASSICAL ALGEBRA**	**Credits**	05

Course Outcomes (CO)

CO Number	CO Statement	Knowledge Level
CO1	To explain Trigonometric Expansions	K1, K2
CO2	To analyze the Hyperbolic and inverse Hyperbolic functions.	K4
CO3	To understand the concepts of Binomial series.	K2
CO4	To recollect the basics of theory of equations.	K1,K2, K5
CO5	To create new ideas about Reciprocal equations.	K3,K6

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**

Power point Presentations, Seminar ,Quiz, Assignment

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.

ONLINE SOURCES:

1. www.brightstorm.com

2. www.themathpage.com

Mapping with Programme Outcomes

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	S	M	S	S	M	L	M	L	M	L	S	L	L	L	S
CO2	S	L	S	M	M	L	L	M	M	L	M	L	L	L	S
CO3	S	M	L	S	S	L	M	L	S	L	S	L	L	L	S
CO4	S	M	S	S	S	M	S	M	S	L	S	M	M	L	S
CO5	L	L	S	M	S	M	L	S	M	M	L	L	L	L	S

S - Strong; M - Medium; L – Low

Programme code	B.Sc	**Programme Title**	Bachelor of Science (Mathematics)	
Course Code	18U1MAC02	**Title**	**Batch**	2018-2021
		CORE II: CALCULUS	**Semester**	I
Hrs/Week	5		**Credits**	04

Course Outcomes (CO)

CO Number	CO Statement	Knowledge Level
CO1	To recollect the basic differentiation formulas.	K1, K2
CO2	To understand the concept of differentiation and integration.	K1, K2
CO3	To analyze the relation between differentiation and integration.	K2, K4
CO4	To gain knowledge about reduction formula.	K1, K2
CO5	To apply the knowledge to Beta and Gamma Functions.	K3, K4

UNIT –I   **(15Hours)**

Successive Differentiation – n^{th} Derivatives- Leibnitz Theorem - problems.

UNIT – II   **(15Hours)**

Partial Differentiation – Partial derivative of Higher orders - Homogenous functions – problems.

Jacobians, Maxima & Minima of functions of two variables– problems.

UNIT – III   **(15Hours)**

Integration – Integration of rational function of the type   ,Integration of irrational

function of the type   - Integration by Partial fractions –Integration by parts.

UNIT – IV   **(15Hours)**

Reduction Formula-Bernoulli's formula – Reduction formula for

-Problems for all the above cases.

UNIT – V   **(15 Hours)**

Definite Integral-definition-properties. Beta and Gamma functions – Definition – properties –

problems – Relation between Beta and Gamma functions.

TOTAL : **75 Hours**

Power point Presentations, Seminar ,Quiz, Assignment

TEXT BOOK :

Dr.P.R.Vittal & V.Malini ,Calculus,Margham Publications ,2010.

REFERENCE BOOKS:

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

2. **N.P.Bali**, *Calculus*, Laxmi Publications, 2012.

3. **S. Narayanan, T.K.Mancavachagom Pillay**, *Calaulus* (Major) Volume I Differential calculus,

S.Viswananthan (Printers & Publishers) Pvt., Ltd., 2011.

4. **Shanti Narayan**, Revised by P. K. Mittal, *Integral Calculus*, S.Chand & Company Ltd, 2008.

ONLINE SOURCES:

1. www.brightstorm.com

2. www.themathpage.com

3. https://en.m.wikibooks.org

Mapping with Programme Outcomes

PO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	S	M	L	M	M	L	M	M	L	M	M	L	M	M	S
CO2	S	M	L	S	M	M	S	M	M	L	M	M	M	L	S
CO3	S	L	S	S	M	M	S	M	L	L	S	L	L	L	S
CO4	S	L	S	S	M	L	S	M	S	M	S	M	M	M	S
CO5	S	S	M	M	S	M	L	S	M	L	S	M	M	S	M

S - Strong; M - Medium; L – Low

SEMESTER II

Programme code	B.Sc	Programme Title	Bachelor of Science (Mathematics)	
Course Code	18U2MAC03	Title	Batch	2018-2021
		CORE III: DIFFERENTIAL EQUATIONS & LAPLACE TRANSFORMS	Semester	II
Hrs/Week	4		Credits	04

Course Outcomes (CO)

CO Number	CO Statement	Knowledge Level
CO1	To remember and recollect the differentiation formulas	K1, K2
CO2	To understand the concept of linear and non-linear homogenous problem.	K2, K3
CO3	To analyze the concept of PDE.	K4
CO4	To strengthen the ability to analyze Laplace Transforms.	K4, K5
CO5	To develop the methods to solve ODE and PDE using Laplace Transforms.	K2, K3

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.

TOTAL : **60 Hours**

Power point Presentations, Seminar ,Quiz, Assignment

TEXT BOOK :

S. Narayanan & T.K.Manicavachagom Pillay ,*Calculus, Vol. III* S. Viswanathan Printers

and Publishers Pvt. Ltd., Chennai ,Reprint 2015.

REFERENCE BOOKS:

1. **M.D. Raisinghania, Ordinary and Partial differential equations**, S.Chand & Co. Ltd, 1993.

2. **M.D. Raisinghania ,H.C.Saxena and H.K.Dass, Simplified Course in Differential Equations**,
   1997.

3. **S.Balachandra Rao and H.R.Anuradha, Differential Equations with Applications and
   Programs**.

4. **B.S.Grewal** , *Higher Engineering Mathematics*, Khanna Publishers 2014, 43rd Edition

ONLINE SOURCES:

1. www.themathpage.com
2. https://en.m.wikibooks.org
3. www.brightstorm.com

Mapping with Programme Outcomes

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	S	M	M	S	S	M	L	M	L	L	M	L	L	M	S
CO2	S	M	L	S	S	L	S	S	S	M	S	L	S	M	S
CO3	S	L	S	S	S	M	L	S	M	M	L	L	L	L	M
CO4	S	M	S	S	S	M	M	S	M	L	L	L	M	M	S
CO5	S	M	S	S	S	M	L	M	L	L	M	L	L	L	S

S - Strong; M - Medium; L – Low

Programme code	B.Sc	Programme Title	Bachelor of Science (Mathematics)	
Course Code	18U2MAC04	Title	Batch	2018-2021
		CORE IV: VECTOR CALCULUS AND FOURIER SERIES	Semester	II
Hrs/Week	4		Credits	04

Course Outcomes (CO)

CO Number	CO Statement	Knowledge Level
CO1	To understand the concept of directional derivative, gradient, divergence and curl	K1, K2
CO2	To gain the knowledge in vector integration.	K1, K2, K3
CO3	To apply the concepts of vector integration.	K3, K4
CO4	To gain knowledge about Fourier series.	K1, K2, K3
CO5	To analyze Half range Fourier series.	K4, K5

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 Fourier

expansion –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**

Power point Presentations, Seminar ,Quiz, Assignment

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 and
   Printers 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).

ONLINE SOURCES :

1. www.themathpage.com

2. https://en.m.wikibooks.org

3. www.brightstorm.com

Mapping with Programme Outcomes

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	S	M	L	S	S	M	M	M	M	L	S	M	L	L	S
CO2	S	M	S	S	S	M	S	S	L	M	L	S	M	S	S
CO3	M	M	S	S	S	S	S	L	M	L	L	S	M	L	S
CO4	S	M	S	S	S	S	M	M	M	L	S	S	M	L	S
CO5	M	M	S	S	S	S	M	L	L	L	S	M	S	S	S

S - Strong; M - Medium; L – Low

SEMESTER III

Programme code	B.Sc	Programme Title	Bachelor of Science (Mathematics)	
Course Code	18U3MAA07	**Title**	Batch	2018-2021
		ALLIED II: MATHEMATICAL STATISTICS - I	Semester	III
Hrs/Week	4		Credits	04

Course Outcomes (CO)

CO Number	CO Statement	Knowledge Level
CO1	To understand the concepts of discrete and continuous R.V.	K1, K2, K3
CO2	To apply the concepts of discrete and continuous R.V in various Distribution.	K3
CO3	To find the relation between Chi-Square distribution, 't' distribution and 'F' istribution.	K1, K2
CO4	To gain knowledge about Correlation and Regression.	K3, K5
CO5	To analyze the curve Fitting in Least square method.	K3, K4

Unit: I   **(12 Hours)**

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

Unit: II   **(12 Hours)**

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

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.

Unit: IV   **(12 Hours)**

Correlation and Regression – Correlation co-efficient and rank correlation – Regression Lines and regression co-efficient – properties.

Unit: V   **(12 Hours)**

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

TOTAL : **60 Hours**

Power point Presentations, Seminar ,Quiz, Assignment

TEXT BOOK:

S.C. Gupta and V.K Kapoor., "*Fundamentals of Mathematical Statistics",* Sultan Chand &Sons, (11th edition), Reprint 2019.

REFERENCE BOOK:

1. D.C Sancheti, and V.K Kapoor, "*Statistics*", Sultan Chand and Sons, (7th edition), 2005.
2. S.P.Gupta, "*Statistical Methods*", Sultan Chand and Sons, (44th edition), 2005.
3. J.N. Kapur and H.C. Saxena, "*Mathematical Statistics",* Sultan Chand and Sons, (20th edition), 2005.

ONLINE SOURCES:

1. https://ocw.mit.edu.

2. http://www.stat.math.ethz.ch/~geer/mathstat.pdf

3. https://nptel.ac.in

4. https://swayam.gov.in

Mapping with Programme Outcomes

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	S	M	L	S	S	M	M	M	M	L	S	M	M	M	S
CO2	M	M	S	S	S	M	S	L	L	L	M	L	M	M	S
CO3	S	M	S	S	S	S	L	M	L	L	S	M	M	M	S
CO4	S	M	M	S	S	L	L	M	L	L	M	M	M	L	S
CO5	M	M	S	S	S	S	S	L	L	L	M	M	M	L	S

S - Strong; M - Medium; L – Low

Programme code	B.Sc	Programme Title	Bachelor of Science (Mathematics)	
Course Code	18U3MAC05	Title	Batch	2018-2021
		CORE V: STATICS	Semester	III
Hrs/Week	4		Credits	04

Course Outcomes (CO)

CO Number	CO Statement	Knowledge Level
CO1	To recollect the basic concept of Newton's laws of motion.	K1, K2
CO2	To understand the concept of Couples, Friction and Centre of gravity.	K2, K3
CO3	To gain knowledge about types of friction	K1, K2, K3
CO4	To understand the concepts of Center of Gravity.	K1, K2
CO5	To analyze the relation between Sag and Span.	K4, K5

UNIT –I **(15 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 **(15 Hours)**

Couples- Definition of a couple- Moment of a couple-Theorems- Problems-Three forces acting on a rigid body-Problems

UNIT – III **(15 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   **(15 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.

TOTAL :   **75 Hours**

Power point Presentations, Seminar ,Quiz, Assignment

TEXT BOOK :

 M.K. Venkataraman, "*Statics***",** Agasthiar publications, 17th edition, 2014.

REFERENCE BOOKS:

1. **P.R. Vittal and V.Malini**, "*Statics"*, Margham Publications,2004.

2.**P.Duraipandiyan** , "**Mechanics",** S.Chand , 2012.

3. **S.Narayanan**, "**Statics",** S.Chand & Co,Chennai, 1986.

4. **W.F. Riley and L.D. Sturges,** *"Engineering Mechanics: Statics",* *Second Edition*, John Wiley and Sons, Inc., New York, 1996.

*5 .***F. P. Beer and E. R. Johnson**, "*Vector Mechanics for Engineers: Statics"*, Sixth Edition, McGraw-Hill,2014.

ONLINE SOURCES :

1.https://ocw.mit.edu.

2.https://nptel.ac.in

   3. https://swayam.gov.in

Mapping with Programme Outcomes

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	S	M	S	S	S	S	L	M	L	L	S	M	M	M	S
CO2	S	M	S	S	S	M	L	M	L	L	M	L	L	L	S
CO3	S	M	L	S	S	M	M	M	M	L	S	M	M	M	S
CO4	S	M	L	S	S	M	M	M	M	L	S	M	L	L	S
CO5	M	M	S	S	S	S	M	L	L	L	S	M	S	S	S

S - Strong; M - Medium; L – Low

Programme code	B.Sc	Programme Title	Bachelor of Science (Mathematics)	
Course Code	18U3MAC06	Title	Batch	2018-2021
		CORE VI : DISCRETE MATHEMATICS	Semester	III
Hrs/Week	4		Credits	04

Course Outcomes (CO)

CO Number	CO Statement	Knowledge Level
CO1	To gain the knowledge about predicates, quantifiers and logical words.	K1, K2
CO2	To develop the concept of Normal forms.	K4
CO3	To understand the theory of Peano axiom.	K2, K3
CO4	To analyze Semi groups and Monoids.	K4, K5
CO5	To apply the concept of Boolean Algebra.	K3, K4

UNIT I: **(15 Hours)**

Mathematical Logic – Statements and Notations – Connectives – Negation – Conjunction – Disjunction – statement Formulas and Truth Table – Conditional and Biconditional – Well formed Formulas – Tautologies.

UNIT II: **(15 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.

UNIT III : **(15 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

UNIT IV: **(15 Hours)**

Algebraic systems – Definition & Examples – Semi groups and monoids – definition and examples – homomorphism of semi groups & monoids – sub semi groups & sub monoids – Grammars – Formal Definitionof a Language – Notions of Syntax Analysis.

UNIT V: (15 Hours)

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 – sub algebra, Direct product and homomorphism – Boolean Functions – Boolean Forms and Free Boolean Algebras – Values of Boolean Expression and Boolean Functions .

TOTAL : **75 Hours**

Power point Presentations, Seminar ,Quiz, Assignment

TEXT BOOK :

J.P.Trembly, R. Manohar, *"Discrete mathematical structures with applications to computer science"*, Tata Mc Graw Hill, , 2013.

REFERENCE BOOKS :

1. Prof.V.Sundaresan, K.S.Ganapathy Subramaniyan, K.Ganesan,*"Discrete Mathematics",*Tata Mc Graw Hill, 2000.

2. L.Lovarz, J.Pelikan, K.Vexztergombi, "*Discrete Mathematics***",** Springer Int. Edition, 2002.

3. N.Chandrasekaran, M.Uma parvathi, "*Discrete Mathematics***"**, PHI Learning P. Ltd., 2010.

ONLINE SOURCES :

1. https://ocw.mit.edu.

2. https://nptel.ac.in

3. https://swayam.gov.in

Mapping with Programme Outcomes

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	S	M	L	S	S	M	M	M	M	L	S	M	L	L	S
CO2	S	L	S	M	M	L	L	M	M	L	M	L	L	L	S
CO3	S	M	S	S	S	M	S	S	L	M	L	S	M	S	S
CO4	S	M	S	S	S	S	M	M	M	L	S	S	M	L	S
CO5	M	M	S	S	S	S	S	L	L	L	M	M	M	L	S

S - Strong; M - Medium; L – Low

Programme code	B.Sc	Programme Title	Bachelor of Science (Mathematics)	
Course Code	18U3MAS01	**Title**	**Batch**	2018-2021
Hrs/Week	2	**SBEC I: MATHEMATICS FOR COMPETITIVE EXAMINATIONS -I**	**Semester**	III
			Credits	02

Course Outcomes (CO)

CO Number	CO Statement	Knowledge Level
CO1	To remember and recollect the basic ideas about numbers.	K1, K2, K3
CO2	To understand the concept of Square root, Cube root and Average.	K1, K2
CO3	To gain the knowledge about trains and Ages.	K3, K4
CO4	To strengthen the ability to analyze Profit & Loss.	K4, K5
CO5	To gain the experience inTime.	K2, K3

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**

Power point Presentations, Seminar ,Quiz, Assignment

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.

ONLINE SOURCES :

1. https://ocw.mit.edu.

2. https://nptel.ac.in
3. https://swayam.gov.in

Mapping with Programme Outcomes

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	S	M	L	S	S	S	M	S	S	L	S	L	M	S	S
CO2	S	M	M	S	S	L	M	S	S	S	S	L	M	M	S
CO3	S	L	S	S	S	S	S	S	M	L	S	L	S	M	S
CO4	S	M	S	S	M	S	L	S	M	L	S	L	S	S	S
CO5	S	M	S	S	S	M	S	S	L	M	L	S	M	S	S

S - Strong; M - Medium; L – Low

SEMESTER IV

Programme code	B.Sc	**Programme Title**	**Bachelor of Science (Mathematics)**	
Course Code	18U4MAA11	**Title**	**Batch**	2018-2021
		ALLIED II:	**Semester**	IV
Hrs/Week	4	**MATHEMATICAL STATISTICS - II**	**Credits**	04

Course Outcomes (CO)

CO Number	CO Statement	Knowledge Level
CO1	To understand the mathematical knowledge and solve the problems.	K1, K2
CO2	To evaluate the Estimation	K4, K5
CO3	To develop the concepts of Hypothesis	K2, K3
CO4	To gain the knowledge about Test of significance.	K3, K4
CO5	To impart the application of t, Chi square and F test.	K3

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.

UNIT-II: **(12 Hours)**

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

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.

UNIT-IV: **(12 Hours)**

Test 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.

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.

TOTAL :   **60 Hours**

Power point Presentations, Seminar ,Quiz, Assignment

TEXT BOOK:

S.C. Gupta and V.K Kapoor., "*Fundamentals of Mathematical Statistics",* Sultan Chand &Sons, (11th edition), Reprint 2019.

REFERENCE BOOKS:

1. S.P. Gupta "*Statistical Methods*", (41th edition), Sultan Chand & sons, 2011.
2. D.C.Sancheti and V.K Kapoor, "*Statistics*", 7th edition, S.Chand & Sons, 2011.

ONLINE SOURCES:

1. http://www.math.louisville.edu/~pksaho01/teaching/Math662TB-09S.pdf

2.https://swayam.gov.in

3. http://math.tut.fi/~ruohonen/S_1.pdf

Mapping with Programme Outcomes

PO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	S	M	M	S	S	L	M	S	S	S	S	L	M	M	S
CO2	S	M	S	S	M	S	L	S	M	L	S	L	S	S	S
CO3	S	M	S	S	S	M	S	S	L	M	L	S	M	S	S
CO4	M	M	S	S	S	S	S	L	L	L	M	M	M	L	S
CO5	S	M	S	S	S	S	M	M	M	L	L	L	M	M	M

S - Strong; M - Medium; L – Low

Programme code	B.Sc	Programme Title		Bachelor of Science (Mathematics)	
Course Code	18U4MAAP02	Title		Batch	2018-2021
Hrs/Week	4	ALLIED II: MATHEMATICAL STATISTICS – PRACTICAL		Semester	IV
				Credits	02

Course Outcomes (CO)

CO Number	CO Statement	Knowledge Level
CO1	To understand the concepts of measures in Skewness and Kurtosis.	K1, K2
CO2	To analyze the discrete and continuous distribution.	K3, K4
CO3	Togain knowledge about curve fitting.	K2, K3
CO4	To solve the problems of correlation coefficient.	K5
CO5	To impart attributes.	K2, K3

UNIT- I: **(12 + 12 Hrs)**

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

UNIT- II: **(12 + 12 Hrs)**

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

UNIT -III: **(12 + 12 Hrs)**

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: **(12 + 12 Hrs)**

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

UNIT -V: **(12 + 12 Hrs)**

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

TEXT BOOK:

D.C. Sancheti and V.K. Kapoor, "*Statistics*", 7th edition, S.Chand & Sons, 2011.

REFERENCE BOOKS:

S.P. Gupta,*"Statistical Methods",* (41st Edition), S. Chand & Sons, 2011.

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.

ONLINE SOURCES:

1. https://ocw.mit.edu.
2. https://nptel.ac.in
3. http://math.tut.fi/~ruohonen/S_1.pdf

Mapping with Programme Outcomes

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	S	M	S	S	M	L	M	L	M	L	S	L	L	L	S
CO2	M	M	S	S	S	S	S	L	L	L	M	M	M	L	S
CO3	S	M	S	S	S	M	S	S	L	M	L	S	M	S	S
CO4	S	M	L	S	S	S	S	M	S	L	S	M	M	M	M
CO5	S	M	S	S	S	M	S	S	L	M	L	S	M	S	S

S - Strong; M - Medium; L – Low

Programme code	B.Sc	Programme Title	Bachelor of Science (Mathematics)	
Course Code	18U4MAC07	Title	Batch	2018-2021
		CORE VII : DYNAMICS	Semester	IV
Hrs/Week	4		Credits	04

Course Outcomes (CO)

CO Number	CO Statement	Knowledge Level
CO1	To gain the knowledge about velocity and simple harmonic motion.	K2, K3
CO2	To understand the impulse and impulsive force concepts and terminology.	K1, K2
CO3	To apply the concept of projectile and central force.	K3, K4
CO4	To gain knowledge about central force and central orbit.	K2, K3
CO5	To determine the new techniques of Moment of Interia of simple bodies.	K4, K5

UNIT I **(15 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 **(15 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 **(15 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 (15 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 (15 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.

TOTAL : **75 Hours**

Power point Presentations, Seminar ,Quiz, Assignment

TEXT BOOKS :

M.K. Venkataraman, **"*Dynamics*",** Agasthiar Publication, 2015.

REFERENCE BOOKS :

1. **P.Duraipandian, "*Mechanics*",**S.Chand,2012.
2. **M.Ray, G.C.Sharma,** *"A Text book on Dynamics",* S.Chand & Co., Ltd., 2012.
3. **P.R. Vittal and V. Anantha narayanan,***"Dynamics",* Margham Publications, 2005.

ONLINE SOURCES :

1. https://ocw.mit.edu.

2. https://nptel.ac.in

Mapping with Programme Outcomes

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	S	M	L	S	S	L	S	S	S	M	S	L	S	M	S
CO2	S	M	M	S	S	M	L	M	L	L	M	L	L	M	S
CO3	S	S	M	M	S	M	L	S	M	L	S	M	M	S	M
CO4	S	M	S	S	S	M	L	M	L	L	M	L	L	L	S
CO5	S	M	S	S	S	M	M	S	M	L	L	L	M	M	S

S - Strong; M - Medium; L – Low

Programme code	B.Sc	Programme Title	Bachelor of Science (Mathematics)	
Course Code	18U4MAC08	Title	Batch	2018-2021
Hrs/Week	4	CORE VIII: ANALYTICAL GEOMETRY	Semester	IV
			Credits	04

Course Outcomes (CO)

CO Number	CO Statement	Knowledge Level
CO1	To gain knowledge about Conic in 2D.	K2, K3
CO2	To understand the concept of Straight lines in 3D.	K1, K2
CO3	To gain the knowledge about sphere.	K2, K3
CO4	To analyze the relation between Cone and Cylinder.	K4, K5
CO5	To develop the concepts of conicoides.	K4, K5

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-tangent plane 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-Right circular cone-Equation of a cylinder-Right circular cylinder.

UNIT V: **(15 Hours)**

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

TOTAL :   **75 Hours**

Power point Presentations, Seminar ,Quiz, Assignment

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.

ONLINE SOURCES :

1. https://m.barnesandnoble.com.
2. https://www.mathscard.co.uk
3. https://ocw.mit.edu.
4. https://nptel.ac.in

Mapping with Programme Outcomes

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	S	M	S	S	S	M	S	S	L	M	L	S	M	S	S
CO2	S	M	S	S	M	L	M	L	M	L	S	L	L	L	S
CO3	S	M	S	S	S	M	S	S	L	M	L	S	M	S	S
CO4	S	M	S	S	S	S	M	M	M	L	S	S	M	L	S
CO5	S	M	S	S	S	S	M	M	M	L	S	S	M	L	S

S - Strong; M - Medium; L – Low

Programme code	B.Sc	Programme Title	Bachelor of Science (Mathematics)	
Course Code	18U4MAS02	Title	Batch	2018-2021
		SBEC II: SCILAB	Semester	IV
Hrs/Week	2		Credits	02

Course Outcomes (CO)

CO Number	CO Statement	Knowledge Level
CO1	To gain knowledge about Scilab	K1, K2
CO2	To Solve the problems by Using Scilab Software.	K1, K2,K3
CO3	To understand the concepts of plots.	K1, K2
CO4	To forming the Equations.	K3, K4
CO5	To develop the graph based on Scilab	K4,K5, K6

UNIT-I: (6 Hours)

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

UNIT-II: (6 Hours)

Simple Calculations: Basic Arithmetic-Complex Numbers. Help in Scilab: The Help Command-The Help Window-Help on the Web.

UNIT-III: (6 Hours)

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

UNIT-IV: (6 Hours)

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

UNIT-V: (6 Hours)

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

TOTAL :   **30 Hours**

Power point Presentations, Seminar ,Quiz, Assignment

TEXT BOOK:

        Graeme Chandler, Stephen Roberts, "*Introduction to Scilab*", 2002.

REFERENCE BOOKS:

1. **M.Affouf,CreateSpace,** "*Scilab by Example*", Independent Publishing Platform, 2012.
2. **S.Chand , "*Scilab*"** (A Free software to MATLAB), Sep-2008.
3. **M.Affouf, "*Scilab by Example for Beginners and experience users*",** 5th edition, 2004.
4. **Philippe Roux, "*Fundamentals of Scilab from theory to practice*",** Scilab enterprices, 2007.

ONLINE SOURCES:

1. www.scilab.org
2. www.scilab.in
3. www.awitness.org>unifiedm>scilab
4. www.wiki.scilab.org
5. www.wiki.help.scilab.org

Mapping with Programme Outcomes

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	S	M	M	S	M	L	M	L	M	L	S	L	L	L	S
CO2	S	M	L	S	S	S	M	S	S	L	S	L	M	S	S
CO3	S	M	L	S	S	M	M	M	M	L	S	M	L	L	S
CO4	S	L	S	S	S	S	S	S	M	L	S	L	S	M	S
CO5	S	M	L	S	S	S	L	S	M	S	M	M	L	M	S

S - Strong; M - Medium; L – Low

SEMESTER – V

SUBJECT TITLE	ALGEBRA	CORE PAPER	IX
SUBJECT CODE	18U5MAC09	HOURS/WEEK	6
		TOTAL HOURS	90
SEMESTER	V	CREDIT	5

Course Outcomes (CO)

CO Number	CO Statement	Knowledge Level
CO1	To explain Group theory	K1, K2
CO2	To analyze the properties of groups.	K4
CO3	To understand the concepts of Homomorphism.	K2
CO4	To recollect the basics concepts of ring theory.	K1,K2, K5
CO5	To create new ideas about integral domain.	K3,K6

UNIT- I   **(18 Hours)**

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   **(18 Hours)**

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

UNIT – III   **(18 Hours)**

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   **(18 Hours)**

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   **(18 Hours)**

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

TEXT BOOK

I.N.Herstein,"*Topics in Algebra*",John Wiley,2011.

REFERENCE BOOKS

1.**A.R.Vasistha Krishna Prekasen Mandhir, "A first course in modern algebra"**, 2001.

2.**M.L.Santiago, "*Modern Algebra*",**Tata Mc Graw Hill, , 2000.

3.**K.Viswanatha Naik, "*Modern Algebra*",**Emerald Publishers, 2002.

4. **Dr.R.Balakrishnan & Dr.N.Ramabadran, "*A text Book of Modern Algebra*",** VikasPublishing House,1999.

ONLINE SOURCES :

1. https://math.stackexchange.com.
2. https://m.barnesandnoble.com.
3. https://ocw.mit.edu.
4. https://nptel.ac.in
5. https://swayam.gov.in

Mapping with Programme Outcomes

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	S	M	S	S	M	L	M	L	M	L	S	L	L	L	S
CO2	S	L	S	M	M	L	L	M	M	L	M	L	L	L	S
CO3	S	M	L	S	S	L	M	L	S	L	S	L	L	L	S
CO4	S	M	S	S	S	M	S	M	S	L	S	M	M	L	S
CO5	L	L	S	M	S	M	L	S	M	M	L	L	L	L	S

S - Strong; M - Medium; L – Low

SUBJECT TITLE	REAL ANALYSIS-I	CORE PAPER	X
SUBJECT CODE	18U5MAC10	HOURS/WEEK TOTAL HOURS	6 90
SEMESTER	V	CREDIT	5

Course Outcomes (CO)

CO Number	CO Statement	Knowledge Level
CO1	To remember and recollect the functions and sequences of real numbers	K1, K2
CO2	To understand the concept of sequences of real numbers.	K2, K3
CO3	To analyze the concept of convergence.	K4
CO4	To solve the limits and metric spaces.	K4, K5
CO5	To understand the concepts continuous functions on metric spaces.	K2, K3

UNIT- I   **(18 Hours)**

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.

Chapter -1: Sec:1.3-1.7 & Chapter -2 Sec:2.1-2.4

UNIT - II   **(18 Hours)**

Sequences of Real Numbers: Bounded sequences – Monotone sequences – Operations on convergent sequences – Operations on divergent sequences – Limit superior and limit inferior – Cauchy sequences. Chapter -2: Sec:2.5-2.10

UNIT - III   **(18 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.

Chapter -3: Sec:3.1-3.7

UNIT - IV   **(18 Hours)**

Limits and Metric Spaces: Limit of a function on the real line – Metric spaces – Limits in metric spaces.   Chapter -4: Sec:4.1-4.3

UNIT - V: **(18 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. Chapter -5: Sec:5.1-5.6

TEXT BOOKS

1. **Richard R. Goldberg,"*Methods of real analysis*",** Oxford & IBH Publishing Co.Pvt. Ltd., NewDelhi, 2011.

REFERENCE BOOKS

1. **Tom M.Apostol, "*Mathematical Analysis*"**, Second Edition,Narosa Publishing House,2002.
2. **H.L.Royden, "*Real Analysis*"**, Third Edition,Prentice-Hall of India,New Delhi,2009.
3. **D. Somasundaram and B. Choudhary,** "*A First Course in Mathematical Analysi"s*, Corrected edition, Narosa Publishing House,2002.

ONLINE SOURCES :

1. www.analysiswebnotes.com
2. www.freebookcentre.net
3. http://nptl.ac.in

<u>**Mapping with Programme Outcomes**</u>

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	S	M	M	S	S	M	L	M	L	L	M	L	L	M	S
CO2	S	M	L	S	S	L	S	S	S	M	S	L	S	M	S
CO3	S	L	S	S	S	M	L	S	M	M	L	L	L	L	M
CO4	S	M	S	S	S	M	M	S	M	L	L	L	M	M	S
CO5	S	M	S	S	S	M	L	M	L	L	M	L	L	L	S

S - Strong; M - Medium; L – Low

SUBJECT TITLE	COMPLEX ANALYSIS -I	CORE PAPER	XI
SUBJECT CODE	18U5MAC11	HOURS/WEEK	5
		TOTAL HOURS	75
SEMESTER	V	CREDIT	4

Course Outcomes (CO)

CO Number	CO Statement	Knowledge Level
CO1	To understand the concept of complex numbers and analytic functions.	K1, K2
CO2	To gain the knowledge in analytic functions.	K1, K2, K3
CO3	To apply the concepts of Bilinear transformations.	K3, K4
CO4	To gain knowledge about Power series.	K1, K2, K3
CO5	To analyze the elementary functions.	K4, K5

UNIT – I: **(15 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 1   :Sections 1.5 ,1.8,1.9 &   Chapter II : Sections 2.1-2.4

UNIT – II   **(15 Hours)**

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

Chapter 2 : Sections 2.5-2.9

UNIT – III   **(15 Hours)**

Bilinear Transformations: Introduction –Elementary Transformations-Bilinear Transformations-Cross Ratio-Fixed points of Bilinear transformations-Some Special Bilinear transformations.   Chapter 3 : Sections 3.0-3.5.

UNIT – IV   **(15 Hours)**

Power Series: Introduction –Sequences and series- Sequences and series of Functions-Power Series-Elementary Functions.   Chapter 4 : Sections 4.0-4.4.

UNIT – V (15 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 5 : Sections 5.0-5.7

TEXT BOOK

1. **S.Arumugan and A.Thangapandi Isaac and A.Somasundaram, "*ComplexAnalysis*"**, Scitech Publications (India) Pvt. Ltd., April 2012.

REFERENCE BOOKS:

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

2. **T.K.ManicavachagamPillai, Dr.S.P.Rajagopalan & Dr.R.Sattanathan, "*Complex Analysis*",** S.Viswanathan(Printers & Publishers),Pvt. Ltd.,2011.

3. **Lars V.Ahlfors,"*Complex Analysis*",**Third Edition**,** 2014.

4. **S.G.Venkatachalapathy, "*Complex Analysis*",** Margam publications,Chennai, 2013.

ONLINE SOURCES :

1. www.analysiswebnotes.com
2. www.freebookcentre.net

Mapping with Programme Outcomes

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	S	M	L	S	S	M	M	M	M	L	S	M	L	L	S
CO2	S	M	S	S	S	M	S	S	L	M	L	S	M	S	S
CO3	M	M	S	S	S	S	S	L	M	L	L	S	M	L	S
CO4	S	M	S	S	S	S	M	M	M	L	S	S	M	L	S
CO5	M	M	S	S	S	S	M	L	L	L	S	M	S	S	S

S - Strong; M - Medium; L – Low

SUBJECT TITLE	NUMERICAL METHODS	CORE PAPER	XII
SUBJECT CODE	18U5MAC12	HOURS/WEEK TOTAL HOURS	5 75
SEMESTER	V	CREDIT	4

Course Outcomes (CO)

CO Number	CO Statement	Knowledge Level
CO1	To recollect the basic concept of Newton's method	K1, K2
CO2	To understand the concept of difference method.	K2, K3
CO3	To gain knowledge about types numerical differentiation and integration.	K1, K2, K3
CO4	To understand the Linear system of equations.	K1, K2
CO5	To analyze the concepts of Runge kutta methods.	K4, K5

UNIT-I (15 Hours)

Method of successive approximation-The Method of false position-Newton Raphson Method-Generalized Newton's Method-Muller's Method. Chapter 2 (sec2.1 to 2.5 and 2.8)

UNIT-II (15 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 Interpolation formulae-Gauss's central difference formulae.

Chapter 3 (sec 3.3 ,3.5 to 3.7.1)

UNIT-III (15 Hours)

Numerical Differentiation--Numerical Integration-Trapezoidal rule-Simpson's 1/3 rule-Simpson's 3/8 rule-Boole's and Weddle's rule. Chapter 5 (sec 5.2(5.2.1),sec 5.4(5.4.1 to 5.4.4))

UNIT-IV (15Hours)

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. Chapter 6 (sec 6.3(6.3.1 to 6.3.3,(6.3.6, 6.3.7), sec 6.4)

UNIT-V   **(15 Hours)**

  Solution of Taylor's Series-Picard's Method of Successive approximations-Euler's Method-Runge Kutta Methods II order and III order.   Chapter 7(sec 7.2 to 7.5)

TEXT BOOK

1. **S. S. Sastry, "*Introductory Methods of Numerical Analysis*",** Prentice Hall of India Pvt. Ltd., New Delhi, 2003.
2. **P.Kandasamy, K.Thilgavathy, K.Gunavathi, "*Numerical Methods*",** 3rd Edition, 2012.

REFERENCE BOOKS

1. **E.Balagurusamy, "*Numerical Methods*",** Tata Mcgraw Hill Ltd., 1999.
2. **Richard L.Burden, J.Douglas Favies, "*Numerical Analysis*",** Nelson Education 2001**.**
3. **Arunkumar jalan, utpal sarkar, "*Numerical Methods*",** Universities press(India) private limited, 2015.

ONLINE SOURCES

1. https://ocw.mit.edu.
2. https://www.mathscard.co.uk

Mapping with Programme Outcomes

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	S	M	S	S	S	S	L	M	L	L	S	M	M	M	S
CO2	S	M	S	S	S	M	L	M	L	L	M	L	L	L	S
CO3	S	M	L	S	S	M	M	M	M	L	S	M	M	M	S
CO4	S	M	L	S	S	M	M	M	M	L	S	M	L	L	S
CO5	M	M	S	S	S	S	M	L	L	L	S	M	S	S	S

S - Strong; M - Medium; L – Low

SUBJECT TITLE	OPERATIONS RESEARCH-I	MAJOR ELECTIVE COURSE	I
SUBJECT CODE	18U5MAE01	HOURS/WEEK TOTAL HOURS	6 90
SEMESTER	V	CREDIT	4

Course Outcomes (CO)

CO Number	CO Statement	Knowledge Level
CO1	To remember and recollect the basic ideas about LPP problems.	K1, K2, K3
CO2	To understand the Big M method, two phase simplex method.	K1, K2
CO3	To gain the knowledge about Optimal solution.	K3, K4
CO4	To strengthen the ability to analyze Assignment problem.	K4, K5
CO5	To gain the concepts of two machines.	K2, K3

UNIT –I: **(18 Hours)**

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

Chapter 1, Chapter 2

UNIT – II: **(18 Hours)**

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

Chapter 3 (Sec 3.5)

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

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

Chapter 4 (Sec 4.1 – 4.7)

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

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

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

Chapter 6, Chapter 7

UNIT –V: (18 Hours)

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

Chapter 10

TEXT BOOK:

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

REFERENCE BOOKS:

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

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

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

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

ONLINE SOURCES :

1. www.analysiswebnotes.com

2. www.freebookcentre.net

Mapping with Programme Outcomes

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	S	M	L	S	S	S	M	S	S	L	S	L	M	S	S
CO2	S	M	M	S	S	L	M	S	S	S	S	L	M	M	S
CO3	S	L	S	S	S	S	S	S	M	L	S	L	S	M	S
CO4	S	M	S	S	M	S	L	S	M	L	S	L	S	S	S
CO5	S	M	S	S	S	M	S	S	L	M	L	S	M	S	S

S - Strong; M - Medium; L – Low

SUBJECT TITLE	FINANCIAL MATHEMATICS	MAJOR ELECTIVE COURSE	II
SUBJECT CODE	18U5MAE02	HOURS/WEEK TOTAL HOURS	6 90
SEMESTER	V	CREDIT	4

Course Outcomes (CO)

CO Number	CO Statement	Knowledge Level
CO1	To understand the concepts of probabilities	K1, K2
CO2	To evaluate the G. B. M method	K4, K5
CO3	To develop the concepts of Arbitage theorem.	K2, K3
CO4	To gain the knowledge about divided paying securities.	K3, K4
CO5	To impart the investments by expected utility.	K3

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.

ONLINE SOURCES:

1. http://www.stat.math.ethz.ch/~geer/mathstat.pdf

2.https://nptel.ac.in

3.https://swayam.gov.in

Mapping with Programme Outcomes

PO\CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	S	M	M	S	S	L	M	S	S	S	S	L	M	M	S
CO2	S	M	S	S	M	S	L	S	M	L	S	L	S	S	S
CO3	S	M	S	S	S	M	S	S	L	M	L	S	M	S	S
CO4	M	M	S	S	S	S	S	L	L	L	M	M	M	L	S
CO5	S	M	S	S	S	S	M	M	M	L	L	L	M	M	M

S - Strong; M - Medium; L – Low

SUBJECT TITLE	ASTRONOMY	Major Elective Course	III
SUBJECT CODE	18U5MAE03	HOURS/WEEK TOTAL HOURS	6 90
SEMESTER	V	CREDIT	4

Course Outcomes (CO)

CO Number	CO Statement	Knowledge Level
CO1	To understand the concepts of Celestial sphere	K1, K2
CO2	To evaluate Astronomical Refraction	K3, K4
CO3	To develop the concepts of Kepler's laws.	K2, K3
CO4	To gain the knowledge about Fixing the Ecliptic.	K4, K5
CO5	To impart Eclipses ,solar eclipses & Lunar eclipses	K3

Unit I   **(18 Hours)**

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

Unit II   **(18 Hours)**

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

Unit III   **(18 Hours)**

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

Unit IV   **(18 Hours)**

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

Unit V (18 Hours)

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

TEXT BOOK:

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

REFERENCE BOOKS:

1. **Dinah L. Moche, Astronomy: A self teaching guide, 2017**

2. **John.A.Read, 50 things to see with a small telescope, 2016**

ONLINE SOURCES:

1. http://www.stat.math.ethz.ch/~geer/mathstat.pdf

2.https://nptel.ac.in

3.https://swayam.gov.in

Mapping with Programme Outcomes

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	S	M	L	S	S	S	M	S	S	L	S	L	M	S	S
CO2	S	M	M	S	S	L	M	S	S	S	S	L	M	M	S
CO3	S	L	S	S	S	S	S	S	M	L	S	L	S	M	S
CO4	S	M	S	S	M	S	L	S	M	L	S	L	S	S	S
CO5	S	M	S	S	S	M	S	S	L	M	L	S	M	S	S

S - Strong; M - Medium; L – Low

SUBJECT TITLE	COMBINATORICS	Major Elective Course	V
SUBJECT CODE	18U5MAE04	HOURS/WEEK	6
		TOTAL HOURS	90
SEMESTER	V	CREDIT	4

Course Outcomes (CO)

CO Number	CO Statement	Knowledge Level
CO1	To recollect the basic concept of Recurrence Relation	K1, K2
CO2	To understand the concept of Permutation	K3, K4
CO3	To gain knowledge about Gala's optimal assignment problem.	K1, K3
CO4	To understand the Fibonacci type relation	K4, K2
CO5	To analyze the concepts of The inclusion and Exclusion principle	K2, K5

Unit I   **(18 Hours)**

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

Unit II   **(18 Hours)**

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

Unit III   **(18 Hours)**

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

Unit IV   **(18 Hours)**

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

Unit V   **(18 Hours)**

The inclusion – Exclusion principle – Rook polynomial.

TEXT BOOK:

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

REFERENCE BOOKS:

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

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

ONLINE SOURCES:

1. https://nptel.ac.in

2.https://swayam.gov.in

Mapping with Programme Outcomes

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	S	M	M	S	S	M	L	M	L	L	M	L	L	M	S
CO2	S	M	L	S	S	L	S	S	S	M	S	L	S	M	S
CO3	S	L	S	S	S	M	L	S	M	M	L	L	L	L	M
CO4	S	M	S	S	S	M	M	S	M	L	L	L	M	M	S
CO5	S	M	S	S	S	M	L	M	L	L	M	L	L	L	S

S - Strong; M - Medium; L – Low

SUBJECT TITLE	MATHEMATICS FOR COMPETITIVE EXAMINATION-II	SKILL BASED ELECTIVE	III
SUBJECT CODE	18U5MAS03	HOURS/WEEK	2
		TOTAL HOURS	30
SEMESTER	V	CREDIT	2

Course Outcomes (CO)

CO Number	CO Statement	Knowledge Level
CO1	To gain knowledge about problem interest	K1, K2
CO2	To Solve the problems by Using Log, calendar and clocks.	K1, K2,K3
CO3	To understand the concepts of permutations and combinations.	K1, K2
CO4	To forming the heights and distances problem.	K3, K4
CO5	To develop the graph by pie chart, tabulation.	K4,K5, K6

UNIT I: **(6 Hours)**

Simple & Compound interest, Area, Volume & Surface area

Chapter:21,22,24,25

UNIT II: **(6 Hours)**

Races and Games of skills, Logarithms, Calendar, Clocks

Chapter:26,23,27,28

UNIT III: **(6 Hours)**

Permutation & Combinations, Probability

Chapter:30,31

UNIT IV: **(6 Hours)**

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

Chapter:32,33,34

UNIT V: **(6 Hours)**

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

Chapter:35,36,37,38

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.

ONLINE SOURCES :

1.https://web.stanford.edu.

2.https://www.tcyonline.com

3.www.brightstorm.com

Mapping with Programme Outcomes

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	S	M	M	S	M	L	M	L	M	L	S	L	L	L	S
CO2	S	M	L	S	S	S	M	S	S	L	S	L	M	S	S
CO3	S	M	L	S	S	M	M	M	M	L	S	M	L	L	S
CO4	S	L	S	S	S	S	S	S	M	L	S	L	S	M	S
CO5	S	M	L	S	S	S	L	S	M	S	M	M	L	M	S

S - Strong; M - Medium; L – Low

SEMESTER VI

SUBJECT TITLE	LINEAR ALGEBRA	CORE PAPER	XIII
SUBJECT CODE	18U6MAC13	HOURS/WEEK	6
		TOTAL HOURS	90
SEMESTER	VI	CREDIT	5

Course Outcomes (CO)

CO Number	CO Statement	Knowledge Level
CO1	To explain vector spaces	K1, K2
CO2	To analyze the dimension of a vector space.	K4
CO3	To understand the concepts of Orthonormal.	K2
CO4	To recollect the basics concepts of linear transformation.	K1,K2, K5
CO5	To apply the basic concepts of transpose of the matrix.	K3,K6

Unit I: **(18 Hours)**

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

Unit II: **(18 Hours)**

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

Unit III: **(18 Hours)**

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

Unit IV: **(18 Hours)**

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

Unit V: (18 Hours)

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

TEXT BOOK:

1. **I.N.Herstein, "** *Topics in Algebra***",** 2nd edition, John Wiley, New York, 2011.

REFERENCE BOOKS:

1. **A.R.Vasistha Krishna Prekasen Mandhir,**"*A first course in modern algebra***"**, 9, Shivaji Road,Meerut(up) 1983.
2. **M.L.Santiago, "***Modern Algebra***",** Tata Mc Graw Hill, New Delhi, 1994.
3. **K.Viswanatha Naik, "***Modern Algebra***"**,Emerald Publishers,135,Anna salai,Chennai, 1988.
4. **Dr.R.Balakrishnan & Dr.N.Ramabadran, "A Text Book of Modern Algebra",** VikasPublishing House,New Delhi,1994.

ONLINE SOURCES :

1. https://wiki.ezvid.com.
2. https://www.goodreads.com

Mapping with Programme Outcomes

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	S	M	M	S	S	L	M	S	S	S	S	L	M	M	S
CO2	S	M	S	S	M	S	L	S	M	L	S	L	S	S	S
CO3	S	M	S	S	S	M	S	S	L	M	L	S	M	S	S
CO4	M	M	S	S	S	S	S	L	L	L	M	M	M	L	S
CO5	S	M	S	S	S	S	M	M	M	L	L	L	M	M	M

S - Strong; M - Medium; L – Low

SUBJECT TITLE	REAL ANALYSIS-II	CORE PAPER	XIV
SUBJECT CODE	18U6MAC14	HOURS/WEEK	6
		TOTAL HOURS	90
SEMESTER	VI	CREDIT	5

Course Outcomes (CO)

CO Number	CO Statement	Knowledge Level
CO1	To understand the concepts of metric spaces	K1, K2
CO2	To evaluate the Riemann integral	K4, K5
CO3	To develop the concepts of fundamental theorem of calculus.	K2, K3
CO4	To gain the knowledge about convergence series.	K3, K4
CO5	To impart the investments by expected utility.	K3

Unit I: (18 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.

Chapter 6**:** Sec(6.1 to 6.7)

Unit II: (18 Hours)

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

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

Unit III: (18 Hours)

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

Chapter 7 **:** Sec(7.5 to 7.8)

Unit IV: (18 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.

Chapter 9 **:** Sec(9.1 to 9.4)

Unit V: **(18 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.

Chapter 11 **:** Sec(11.1 to11.6)

TEXT BOOK:

1. **Richard R.Goldberg,** *"Methods Of Real Analysis"*, Oxford @ IBH Publishing Co. Pvt. Ltd. New Delhi, 1970.

REFERENCE BOOKS:

1. **Tom M.Apostol, "***Mathematical Analysis"*, Second Edition,Narosa Publishing House,2002.

2. **H.L.Royden, "***Real Analysis"*, Third Edition,Prentice-Hall of India,New Delhi,2009.

3. **D. Somasundaram and B. Choudhary**, "*A First Course in Mathematical Analysis"*, Corrected edition, Narosa Publishing House,2002.

4. **H.L.Royden, "***Real Analysis"*, Third Edition,Prentice-Hall of India,New Delhi,2009.

ONLINE SOURCES :

1. www.analysiswebnotes.com

2. www.freebookcentre.net

3. http://nptl.ac.in

Mapping with Programme Outcomes

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	S	M	M	S	S	L	M	S	S	S	S	L	M	M	S
CO2	S	M	S	S	M	S	L	S	M	L	S	L	S	S	S
CO3	S	M	S	S	S	M	S	S	L	M	L	S	M	S	S
CO4	M	M	S	S	S	S	S	L	L	L	M	M	M	L	S
CO5	S	M	S	S	S	S	M	M	M	L	L	L	M	M	M

S - Strong; M - Medium; L – Low

SUBJECT TITLE	COMPLEX ANALYSIS -II	CORE PAPER	XV
SUBJECT CODE	18U6MAC15	HOURS/WEEK	5
		TOTAL HOURS	75
SEMESTER	VI	CREDIT	4

Course Outcomes (CO)

CO Number	CO Statement	Knowledge Level
CO1	To recollect the basic concept of complex integration	K1, K2
CO2	To understand the concept of cauchy's theorem.	K2, K3
CO3	To gain knowledge about Taylors and Laurents series.	K1, K2, K3
CO4	To understand the concepts of laurents series.	K1, K2
CO5	To analyze the concepts of Residues.	K4, K5

UNIT- I: (15 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 : (15 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: (15 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: (15 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 : (15 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:

1. **P.Duraipandian, Laxmi Duraipandian and D.Muhilian, "*Complex Analysis*",**Emerald

    Publications, 2001**.**

REFERENCE BOOKS:

1. **P.Duraipandian, Laxmi Duraipandian and D.Muhilian, "*Complex Analysis*",** Emerald

    Publications, 2001**.**

2. **T.K.ManicavachagamPillai, Dr.S.P.Rajagopalan & Dr.R.Sattanathan, "*Complex Analysis*",** S.Viswanathan (Printers & Publishers), Pvt. Ltd., 2011.

3. **Lars V. Ahlfors, "*Complex Analysis*",** Third Edition**,** 2010.

4. **S.G.Venkatachalapathy, "*Complex Analysis*",** Margam publications, Chennai, 2011.

ONLINE SOURCES :

1. www.analysiswebnotes.com

2. www.freebookcentre.net

Mapping with Programme Outcomes

PO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	S	M	S	S	S	S	L	M	L	L	S	M	M	M	S
CO2	S	M	S	S	S	M	L	M	L	L	M	L	L	L	S
CO3	S	M	L	S	S	M	M	M	M	L	S	M	M	M	S
CO4	S	M	L	S	S	M	M	M	M	L	S	M	L	L	S
CO5	M	M	S	S	S	S	M	L	L	L	S	M	S	S	S

S - Strong; M - Medium; L – Low

SUBJECT TITLE	GRAPH THEORY	CORE PAPER	XVI
SUBJECT CODE	18U6MAC16	HOURS/WEEK TOTAL HOURS	5 75
SEMESTER	VI	CREDIT	4

Course Outcomes (CO)

CO Number	CO Statement	Knowledge Level
CO1	To remember and recollect the graphs and subgraphs	K1, K2
CO2	To understand the concept of operations on graphs.	K2, K3
CO3	To analyze the concept of Eulerian and Hamiltonian graphs.	K4
CO4	To solve the problems of Bipartite graphs	K4, K5
CO5	To understand the concepts of colour problem.	K2, K3

UNIT- I: (15 Hours)

Graphs And Subgraphs: Introduction-Definition and Examples-Degrees-Subgraphs-Isomorphism-Ramsey Numbers-Independent sets and Coverings-Intersection graphs and Line graphs.

Chapter : 2 (Sec 2.1 - 2.7)

UNIT –II: (15 Hours)

Matrices: Definition-Operations on Graphs.

Connectedness: Introduction-walks,Trails and Paths-Connectedness and components-Blocks-Connectivity.

Chapter : 2 (Sec 2.8, 2.9) Chapter: 4 (Sec 4.1 – 4.4)

UNIT –III: (15 Hours)

Eulerian And Hamiltonian Graphs: Introduction-Eulerian Graphs-Hamiltonian Graphs.

Trees: Introduction-Characterization of Trees-Centre of a Tree.

Chapter 5, Chapter 6.

UNIT –IV: (15 Hours)

Matchings: Introduction-Definition-Matchings in Bipartite Graphs.

Planarity: Introduction-Definition and properties- Characterization of planar graphs-Thickness,Crossing and outer planarity.

Chapter 7, Chapter 8.

UNIT –V: (15 Hours)

Colourability: Introduction-Chromatic Number and Chromatic Index-The Five Colour Theorem-Four colour Problem.

Directed Graphs: Introduction –Definition and Basic Properties-Paths and connections-Digraph and Matrices.

Chapter 9(Sec 9.0 – 9.3), Chapter 10 (Sec 10.0 – 10.3)

TEXT BOOK:

1. **S. Arumugam, S. Ramachandran, "*Invitation To Graph Theory",**Scitech Publications,Chennai,2001.

REFERENCE BOOKS:

1. **Narasingh Deo, " *Graph Theory with applications to Engineering and Computer Science",** Prentice Hall of India Pvt.Ltd, 2002.

2. **Frank Harary, " *Graph Theory",** Narosa Publishing House, Tenth reprint, 2001.

3. **Douglas B.West, "*Introduction to Graph Theory",** Prentice Hall of India (pvt.) limited, Second edition, 2011.

4. **Gary chartrand, Ping zhang, "*Introduction to Graph theory",** Mc Graw Hill Education, 2006.

ONLINE SOURCES:

1. www.tutorialspoint.com
2. www.ebooks.com

Mapping with Programme Outcomes

PO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	S	M	M	S	S	M	L	M	L	L	M	L	L	M	S
CO2	S	M	L	S	S	L	S	S	S	M	S	L	S	M	S
CO3	S	L	S	S	S	M	L	S	M	M	L	L	L	L	M
CO4	S	M	S	S	S	M	M	S	M	L	L	L	M	M	S
CO5	S	M	S	S	S	M	L	M	L	L	M	L	L	L	S

S - Strong; M - Medium; L – Low

.SUBJECT TITLE	OPERATIONS RESEARCH-II	MAJOR ELECTIVE COURSE	V
SUBJECT CODE	18U6MAE05	HOURS/WEEK	6
		TOTAL HOURS	90
SEMESTER	VI	CREDIT	4

Course Outcomes (CO)

CO Number	CO Statement	Knowledge Level
CO1	To remember and recollect the concepts of inventory models.	K1, K2, K3
CO2	To understand discrete and continuous type problem	K1, K2
CO3	To gain the knowledge about queuing models	K3, K4
CO4	To analyze PERT and CPM networks.	K4, K5
CO5	To gain the concepts of time cost optimization algorithm	K2, K3

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

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

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

Unit - II: **(18 Hours)**

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

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

Introduction - Definition of steady state, transient state and queue discipline, characteristics of a queuing model – Applications of queuing model – Little's formula – classification of queues – Poisson process – Properties of Poisson process. Models
(i) (M / M / I) : (/ FCFS)
(ii) (M / M / I) : (N / FCFS)
      (iii) (M / M /S) : (/ FCFS) – Problems.   Chapter 17

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

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

Chapter 21

Unit - V: **(18 Hours)**

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

Chapter 19: (Sec 19.1 – 19.6)

TEXT BOOK:

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

REFERENCE BOOKS:

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

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

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

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

ONLINE SOURCES :

   1.www.analysiswebnotes.com

   2.www.freebookcentre.net

Mapping with Programme Outcomes

PO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	S	M	L	S	S	L	S	S	S	M	S	L	S	M	S
CO2	S	L	S	S	S	M	L	S	M	M	L	L	L	L	M
CO3	S	M	S	S	S	M	M	S	M	L	L	L	M	M	S
CO4	S	M	S	S	S	M	L	M	L	L	M	L	L	L	S
CO5	S	M	S	S	S	M	M	S	M	L	L	L	M	M	S

S - Strong; M - Medium; L – Low

SUBJECT TITLE	NUMBER THEORY	MAJOR ELECTIVE COURSE	VI
SUBJECT CODE	18U6MAE06	HOURS/WEEK	6
		TOTAL HOURS	90
SEMESTER	VI	CREDIT	4

Course Outcomes (CO)

CO Number	CO Statement	Knowledge Level
CO1	To gain knowledge about division algorithm	K1, K2
CO2	To analyze the basic properties of congruence	K1, K2,K3
CO3	To understand the concepts of divisible theorem.	K1, K2
CO4	To forming gretest integer problem.	K3, K4
CO5	To solve the problem of Euler,s theorem	K4,K5, K6

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.

ONLINE SOURCES:

1. www.wiley.com/go/permissions

2. www.freebookcentre.net

3. http://nptl.ac.in

Mapping with Programme Outcomes

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	S	M	S	S	S	S	L	M	L	L	S	M	M	M	S
CO2	S	M	S	S	S	M	L	M	L	L	M	L	L	L	S
CO3	S	M	L	S	S	M	M	M	M	L	S	M	M	M	S
CO4	S	M	L	S	S	M	M	M	M	L	S	M	L	L	S
CO5	M	M	S	S	S	S	M	L	L	L	S	M	S	S	S

S - Strong; M - Medium; L – Low

SUBJECT TITLE	PROGRAMMING IN C	SKILL BASED ELECTIVE COURSE	IV
SUBJECT CODE	18U6MAS04	HOURS/WEEK	2
		TOTAL HOURS	30
SEMESTER	VI	CREDIT	2

Course Outcomes (CO)

CO Number	CO Statement	Knowledge Level
CO1	To understand the concepts of C-program	K1, K2
CO2	To evaluate the special operators	K4, K5
CO3	To develop the concepts of expressions	K2, K3
CO4	To gain the knowledge about if….. else statements.	K3, K4
CO5	To analyze the concepts of arrays.	K3

Unit-I: **(6 Hours)**

Basic Structure of C Program – Character set – Constants – Keywords and identifiers – Variables – Data types – Declaration of variables – Assigning values to variables – Defining symbolic constants.

Unit-II: **(6 Hours)**

Arithmetic operators – Relational operators – Logical operators – Assignment operators – Increment and decrement operators – Conditional operators – Special operators.

Unit-III: **(6 Hours)**

Arithmetic expressions – Evaluation of expressions – Type conversations in expressions – Reading and Writing character – Formatted input and output.

Unit-IV: **(6 Hours)**

Decision making with if statement – The if…. else statement – Nesting of if… else statement – The switch statement – The GOTO statement – The while statement – do while statement – for statement-Jumps in loops.

Unit-V: **(6 Hours)**

One dimensional arrays – Initialization of one dimensional array – 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 BOOK:

1. **E.Balagurusamy, "*Programming In C*",** Tata McGraw-Hill Publishing Company Limited, Year.

REFERENCE BOOKS:

1. Greg Perry and Dean Miller, "C Programming", Absolute Beginners, Third Edition, Year.

2. Byron Gottfried, "Programming With C"

3. Kernighan 78-B.W.Kernighan and D.M.Ritchie, the programming language,Practice-Hall: Englewood cliffs, NJ, 1978, 2nd Edition, 2005.

4. Kruse Robert L, "*Data Structure and Program Design in C*"

5. K.N.King, *"C Programming: A Modern Approach*"

ONLINE SOURCES:

- www.cppinstitute.org
- www.freshto fresh.com>c-basic-program
- https://www.programiz.com>c-programming

Mapping with Programme Outcomes

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	S	M	M	S	S	L	M	S	S	S	S	L	M	M	S
CO2	S	M	S	S	M	S	L	S	M	L	S	L	S	S	S
CO3	S	M	S	S	S	M	S	S	L	M	L	S	M	S	S
CO4	M	M	S	S	S	S	S	L	L	L	M	M	M	L	S
CO5	S	M	S	S	S	S	M	M	M	L	L	L	M	M	M

S - Strong; M - Medium; L – Low

QUESTION PAPER PATTERN - UG

Bloom's Taxonomy Based Assessment Pattern

K1-Remembering; **K2**- Understanding; **K3**- Applying; **K4**-Analyzing;
K5-Evaluating; **K6**-Creating.

Theory: 75 Marks

Test- I & II and ESE:

Knowledge Level	Section	Marks	Description	Total
K1,K2	A (Answer all)	20x01=20	MCQ/Define	
K3, K4	B (Either or pattern)	05x05=25	Short Answers	75
K5& K6	C (Answer 3out of5)	03x10=30	Descriptive/ Detailed	