UNDERGRADUATE (UG) PROGRAMME OUTCOMES (POs)

Undergraduate (B.A., **B.Sc.,** B.Com., B.C.A., B.B.A., etc.,) is a 3 – year degree programme with 6 semesters consisting the following Programme Outcomes (POs) under various criteria including critical thinking, problem solving, effective communication, societal/ citizenship/ ethical credibility, sustainable growth and employable abilities.

PO 1	**Critical Thinking**: Intellectual exploration of knowledge towards actions in clear and rational manner by understanding the logical connections between ideas and decisions.
PO 2	**Problem Solving**: Understanding the task/ problem followed by planning and narrow execution strategy that effectively provides the solution.
PO 3	**Effective Communication**: Knowledge dissemination by oral and verbal mechanisms to the various components of our society.
PO 4	**Societal/ Citizenship/ Ethical Credibility**: Realization of various value systems/ moral dimensions and demonstrate the empathetic social concern as well as equity in all the decisions, executions and actions.
PO 5	**Environmental Concern and Sustainable Growth**: Understanding the emerging environmental challenges and provide the possible contribution in sustainable development that integrates environment, economy and employment.
PO 6	**Skill Development and Employable Abilities**: Adequate training in relevant skill sector and creating employable abilities among the under graduates.

PROGRAMME SPECIFIC OUTCOMES (PSOs)

On completion of **B.Sc. Mathematics** Programme, the students are expected to

PSO 1	Include critical thinking to carry out scientific investigation objectively without being biased with preconceived notions.
PSO 2	Equip the student with skills to analyze problems, formulate an hypothesis, evaluate and validate results, and draw reasonable conclusions thereof.
PSO 3	Prepare students for pursuing research or careers in industry in mathematical sciences and allied fields.
PSO 4	Imbibe effective scientific and/or technical communication in both oral and writing.
PSO 5	Continue to acquire relevant knowledge and skills appropriate to professional activities and demonstrate highest standards of ethical issues in mathematical sciences

B.Sc. MATHEMATICS – COURSE STRUCTURE

SEMESTER – I

S. No.	Subject Code	Subject Title	Hrs./ Week	Exam (Hrs.)	CA	SE	Total Marks	Credits
1.	21UACT11	**Part – I: Tamil –** கவிதையும் சிறுகதையும்	6	3	25	75	100	3
	21UACH11	**Hindi** – Hindi – I						
	21UACS11	**Sanskrit** – Sanskrit – I						
2.	21UACE11	**Part – II: English** – English for Enrichment – I	6	3	25	75	100	3
3.	21UMSC11	**Part – III: Core – 1:** Differential Calculus	4	3	25	75	100	4
4.	21UMSC12	**Part – III: Core – 2:** Theory of Equations	4	3	25	75	100	4
5.	21UMSS11	**Part – IV: SBS – 1:** Arithmetic Ability	2	3	25	75	100	2
6.	21UMSA11	**Part – III: Allied – 1:** Ancillary Mathematics – I	6	3	25	75	100	5
7.	21UACVE1	**Part – IV:** Value Education	2	3	25	75	100	2
TOTAL			**30**					**23**

SEMESTER – II

S. No.	Subject Code	Subject Title	Hrs./ Week	Exam (Hrs.)	CA	SE	Total Marks	Credits
1.	21UACT21	**Part – I: Tamil** – செய்யுளும் புதினமும்	6	3	25	75	100	3
	21UACH21	**Hindi** – Hindi – II						
	21UACS21	**Sanskrit** – Sanskrit – II						
2.	21UACE21	**Part – II: English** – English For Enrichment – II	6	3	25	75	100	3
3.	21UMSC21	**Part – III: Core – 3:** Integral Calculus	4	3	25	75	100	4
4.	21UMSC22	**Part – III: Core – 4:** Analytical Geometry of Three Dimensions	4	3	25	75	100	4
5.	21UMSS21	**Part – IV: SBS – 2:** Vector Calculus	2	3	25	75	100	2
6.	21UMSA21	**Part – III: Allied – 2:** Ancillary Mathematics – II	6	3	25	75	100	5
7.	21UACES1	**Part – IV:** Environmental Studies	2	3	25	75	100	2
TOTAL			**30**					**23**

SEMESTER – III

S. No.	Subject Code	Subject Title	Hrs./ Week	Exam (Hrs.)	CA	SE	Total Marks	Credits
1.	21UACT31	**Part – I: Tamil** – காப்பியமும் நாடகமும்	6	3	25	75	100	3
	21UACH31	**Hindi** – Hindi – III						
	21UACS31	**Sanskrit** – Sanskrit – III						
2.	21UACE31	**Part – II: English** – English For Enrichment – III	6	3	25	75	100	3
3.	21UMSC31	**Part – III: Core – 5:** Mechanics	5	3	25	75	100	5
4.	21UMSC32	**Part – III: Core – 6:** Numerical Analysis	5	3	25	75	100	5
5.	21UMSA31	**Part – III: Allied** – 3: Graph Theory And Laplace Transform	4	3	25	75	100	3
6.	21UMSSP1	**Part – IV: SBS** – 3: MS – Office – **Lab**	2	3	40	60	100	2
7.	21UMSN31	**Part – IV: NME – 1**: Fundamentalsof Mathematics – I	2	3	25	75	100	2
		TOTAL	**30**					**23**

SEMESTER – IV

S. No.	Subject Code	Subject Title	Hrs./ Week	Exam (Hrs.)	CA	SE	Total Marks	Credits
1.	21UACT41	**Part – I: Tamil** – சங்க இலக்கியமும் அற இலக்கியமும்	6	3	25	75	100	3
	21UACH41	**Hindi** – Hindi – IV						
	21UACS41	**Sanskrit** – Sanskrit – IV						
2.	21UACE41	**Part – II: English** – English For Enrichment – IV	6	3	25	75	100	3
3.	21UMSC41	**Part –III: Core – 7:** Differential Equations	5	3	25	75	100	5
4.	21UMSC42	**Part – III: Core – 8:** Sequence and Series	5	3	25	75	100	5
5.	21UMSA41	**Part – III: Allied – 4:** Programming in C – Theory	4	3	25	75	100	3
6.	21UMSSP2	**Part – III: SBS – 4:** Programming in C – **Lab**	2	3	40	60	100	2
7.	21UMSN41	**Part – IV: NME – II:** Fundamentals of Mathematics – II	2	3	25	75	100	2
8.		**PART –V:** Extension Activities	–	–	–	–	100	1
		TOTAL	**30**					**24**

SOURASHTRA COLLEGE, MADURAI – 625004

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B.Sc. MATHEMATICS – SYLLABUS

(Under CBCS based on OBE)(with effect from 2021 – 2022)

SEMESTER – V

S. No.	Subject Code	Subject Title	Hrs./ Week	Exam (Hrs.)	CA	SE	Total Marks	Credits
1.	21UMSC51	**Part – III: Core – 9:** Modern Algebra	6	3	25	75	100	5
2.	21UMSC52	**Part – III: Core – 10:** Real Analysis	6	3	25	75	100	5
3.	21UMSC53	**Part – III: Core – 11:** Object Oriented Programming in C++	4	3	25	75	100	3
4.	21UMSSP3	**Part – III: SBS – 5:** Object Oriented Programming in C++ – **LAB**	2	3	40	60	100	2
		Part – III: Elective – 1&2						
5.	21UMSE51	Statistics – I	6	3	25	75	100	5
6.	21UMSE52	Operations Research – I	6	3	25	75	100	5
7.	21UMSE53	Number Theory	6	3	25	75	100	5
8.	21UMSE54	Boolean algebra and Logic	6	3	25	75	100	5
9.	21USSY51	Soft Skills(Self – Study)	–	–	–	–	100	–
		TOTAL	**30**					**25**

***Two electives course to be chosen from FOUR Electives (5 to 8)**

SEMESTER – VI

S. No.	Subject Code	Subject Title	Hrs./ Week	Exam (Hrs.)	CA	SE	Total Marks	Credits
1.	21UMSC61	**Part – III: Core – 12:** Linear Algebra	6	3	25	75	100	5
2.	21UMSC62	**Part – III: Core – 13:** Complex Analysis	6	3	25	75	100	5
3.	21UMSC63	**Part – III: Core – 14:** Statistics – II	6	3	25	75	100	5
4.	21UMSC64	**Part – III: Core – 15:** Programming in Java Theory	4	3	25	75	100	3
5.	21UMSSP4	**Part – III:SBS – 6:** Programming in Java– **LAB**	2	3	40	60	100	2
		Part – III: Elective – 3						
6.	21UMSE61	Operations Research – II	6	3	25	75	100	5
7.	21UMSE62	Python Programming Theory	4	3	25	75	100	3
	21UMSEP1	Python Programming – **LAB**	2		40	60	100	2
8.	21UMSE63	Astronomy	6	3	25	75	100	5
9.	21UGKY61	General Knowledge (Self – Study)	–	–	–	–	100	–
		TOTAL	**30**					**25**

***One elective course to be chosen from THREE Electives (6 to 8)**

COURSE STRUCTURE – V SEMESTER

S. No.	Subject Code	Subject Title	Hrs./ Week	Exam (Hrs.)	CA	SE	Total Marks	Credits
1.	21UMSC51	**Part – III: Core – 9:** Modern Algebra	6	3	25	75	100	5
2.	21UMSC52	**Part – III: Core – 10:** Real Analysis	6	3	25	75	100	5
3.	21UMSC53	**Part – III: Core – 11:** Object Oriented Programming in C++	4	3	25	75	100	3
4.	21UMSSP3	**Part – III: SBS – 5:** Object Oriented Programming in C++ – **LAB**	2	3	40	60	100	2
	Part – III: Elective – 1& 2							
5.	21UMSE51	Statistics – I	6	3	25	75	100	5
6.	21UMSE52	Operations Research – I	6	3	25	75	100	5
7.	21UMSE53	Number Theory	6	3	25	75	100	5
8.	21UMSE54	Boolean algebra and Logic	6	3	25	75	100	5
9.	21USSY51	Soft Skills (Self – Study)	–	–	–	–	100	–
		TOTAL	**30**					**25**

***Two electives course to be chosen from FOUR Electives (5 to 8)**

CA – Class Assessment (Internal)

SE – Summative Examination

SBS – Skill Based Subject

T – Theory

P – Practical

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B.Sc. MATHEMATICS – SYLLABUS

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COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
21UMSC51	MODERN ALGEBRA	CORE – 9	6	–	5

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
III	V	25	75	100

NATURE OF COURSE	Employability	Skill Oriented	Entrepreneurship
	✓	✓	

COURSE DESCRIPTION:

Modern Algebra is a branch of Mathematics that deals with the study of algebraic structures that include groups, rings etc. Group Theory is one of the great simplifying and unifying ideas in Modern Mathematics.

COURSE OBJECTIVES:

The main aim of the course is to introduce the basic concepts from abstract algebra, especially the notion of group, rings etc. The course will help the students to prepare for further study in abstract algebra as well as familiarize with tools essential in many other areas of Mathematics.

COURSE OUTCOMES (COs):

After the completion of the course, the students will be able to

No.	Course Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CO1	learn about subgroups with examples, center, normalize, permutation groups, symmetric groups of order n.	Upto K3
CO2	discuss cyclic groups, order of an element, cosets and the proof of Lagrange's theorem.	Upto K3
CO3	deal with normal subgroups, quotient groups and homomorphisms.	Upto K3
CO4	gain knowledge about isomorphisms, rings, its definition and examples.	Upto K3
CO5	learn about the elementary properties of rings, isomorphisms and types of rings.	Upto K3

K1– KNOWLEDGE (REMEMBERING), K2–UNDERSTANDING, K3–APPLY

MODERN ALGEBRA

UNIT– I:
Definitions and examples – center – normalizer – Intersection and union of subgroups – Permutations – Cycles and Transpositions – Even and odd permutations – S_n and A_n.

UNIT– II:
Cyclic groups – order of an element – cosets and Lagrange's theorem.

UNIT– III:
Normal subgroups and quotient groups – Homomorphisms.

UNIT– IV:
Isomorphisms – rings – definition and examples.

UNIT– V:
Elementary properties of rings – isomorphism – types of rings.

TEXT BOOK:
Modern Algebra by Dr. S. Arumugam and A.T. Isaac– Scitech publications – Reprint July 2008.

UNIT – I: – CHAPTER 3, Sec 3.4 and 3.5
UNIT – II: – CHAPTER 3, 3.6 to 3.8
UNIT – III: – CHAPTER 3,3.9 and 3.11
UNIT – IV: – CHAPTER 3 and 4, 3.10 and 4.1
UNIT – V: – CHAPTER 4, 4.2 to 4.4.

REFERENCE BOOK:
A.R. Vasistha, ***Modern Algebra***, Krishna Publications, January 2015.

Mapping of CO with PSO

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	1	2	2	1	2
CO2	2	2	1	2	2
CO3	2	2	1	1	2
CO4	1	1	2	2	1
CO5	3	2	2	1	2

3. Advanced Application 2. Intermediate Development 1. Introductory Level

COURSE DESIGNER: Prof. G. R. SHYAMALA

COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
21UMSC52	REAL ANALYSIS	CORE – 10	6	–	5

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
III	V	25	75	100

NATURE OF COURSE	Employability	Skill Oriented	Entrepreneurship
	✓	✓	

COURSE DESCRIPTION:

The course is designed to explain various concepts used to learn Real analysis.

COURSE OBJECTIVES:

- To discuss the concepts of sets and function
- To introduce Metric spaces
- To explain complete metric space
- To introduce and define continuity and connectedness
- To discuss compactness.

COURSE OUTCOMES (COs):

After the completion of the course, the students will be able to

No.	Course Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CO 1	prove theorems using relevant concepts	**Upto K3**
CO 2	give examples and solve problems	**Upto K3**
CO 3	apply definition to prove theorem	**Upto K3**
CO 4	discuss continuity and connectedness	**Upto K3**
CO 5	derive results using various concept of compactness	**Upto K3**

K1– KNOWLEDGE (REMEMBERING), K2–UNDERSTANDING, K3–APPLY

REAL ANALYSIS

UNIT– I:
Sets and functions – countable sets – uncountable sets – Inequalities of Holders and Minkowski. (Page No. 1 – 16, Chapter 1– 1.0 to 1.4)

UNIT– II: Metric Spaces
Definitions and examples –bounded sets in a metric space – Open ball in a metric space – Open sets – Subspaces – Interior of a set – closed sets – closure – limit points – Dense sets.(Page No. 17 – 77, Chapter 2 – 2.1 to 2.10)

UNIT– III: Complete metric spaces
Introduction – Completeness – Baire's Category theorem. (Page No. 80 – 101, Chapter 3 – 3.0 to 3.2)

UNIT– IV: Continuity and Connectedness
Introduction – Continuity – Homeomorphism – uniform continuity. (Page No. 102 – 128, Chapter4 – 4.0 to 4.3) Introduction – Definitions and examples of connectedness – Connected subsets of R – Connectedness and continuity
(Page No. 139 – 150, Chapter 5 – 5.0 to 5.3)

UNIT– V: Compactness
Introduction – compact space – compact subset of R – equivalent characterization for compactness – Compactness and continuity. (Page No. 151 – 179, Chapter 6 – 6.0 to 6.4)

TEXT BOOK:
Modern Analysis by Arumugam Issac New Gamma Publishing House, June 2017.

UNIT – I: – (Page No. 01 – 16, Chapter 1, 1.0 to 1.4)
UNIT – II: – (Page No. 17 – 77, Chapter 2, 2.1 to 2.10)
UNIT – III: – (Page No. 80 – 101, Chapter 3, 3.0 to 3.2)
UNIT – IV: – (Page No. 102 – 128,Chapter 4, 4.0 to 4.3)
(Page No. 139 – 150, Chapter 5, 5.0 to 5.3)
UNIT – V: – (Page No. 151 – 179, Chapter 6, 6.0 to 6.4)

REFERENCE BOOK:
Real Analysis by N.P. Bali, Golden series, 2005

Mapping of CO with PSO

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	1	3	2	3	3
CO2	2	3	2	3	3
CO3	2	1	2	2	2
CO4	2	3	3	3	2
CO5	1	1	2	3	2

3. Advanced Application 2. Intermediate Development 1. Introductory Level

COURSE DESIGNER: Prof. M. K. ESWARLAL

COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
21UMSC53	OBJECT ORIENTED PROGRAMMING IN C++	CORE – 11	4	–	3

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
III	V	25	75	100

NATURE OF COURSE	Employability	Skill Oriented	Entrepreneurship
	✓	✓	

COURSE DESCRIPTION:

This course introduces the student to object oriented programming through a study of the concepts of program specification and design, algorithm development and coding and testing using a modern software development environment. Students learn how to write programs in an object oriented high level programming language. Topics covered include fundamentals of algorithms, problem solving, programming concepts, classes and methods, control structures, arrays and strings. Throughout the semester, problem solving skills will be stressed and applied to solving computing problems. Weakly laboratory experiments will provide hands – on experience in topics covered in this course.

COURSE OBJECTIVES:

To make the students

- Understand and use the basic programming constructs of C++.
- Manipulate various C++ data types, such as arrays, strings.
- Isolate and fix common errors in C++ programs.
- Use memory appropriately, including proper allocation/deallocation procedures.

COURSE OUTCOMES (COs):

After the completion of the course, the students will be able to

No.	Course Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CO 1	describe the procedural and object oriented paradigm with concepts of expressions and control structures	Upto K3
CO 2	understand the concepts of functions, classes and objects	Upto K3
CO 3	understand dynamic memory management techniques using constructors and destructors	Upto K3
CO 4	describe the concept of function overloading and type conversion	Upto K3
CO 5	classify inheritance with the understanding of early and late binding	Upto K3

K1– KNOWLEDGE (REMEMBERING), K2–UNDERSTANDING, K3–APPLY

OBJECT ORIENTED PROGRAMMING IN C++

UNIT– I:
Tokens, expressions and control structures

UNIT– II:
Functions in C++**,** classes and objects

UNIT– III:
Constructors and destructors

UNIT– IV:
Operator overloading and type conversion

UNIT– V:
Inheritance

TEXT BOOK:
Object Oriented Programming In C++ by E. Balagurusamy.

UNIT – I: – Chapter 3
UNIT – II: – Chapters 4, 5
UNIT – III: – Chapter 6 (Sections 6.2 – 6.11)
UNIT – IV: – Chapter 7 (Sections 7.2 – 7.8)
UNIT – V: – Chapter 8 (Sections 8.2 – 8.12)

REFERENCE BOOK:
C++ The Complete Reference – Herbert Schild TMH 1998
DIGITAL TOOL:
http://www.tutorialspoint.com/c++_algorithms

Mapping of CO with PSO

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	1	1	1	2	2
CO2	1	2	2	2	2
CO3	2	2	2	2	3
CO4	2	2	2	3	3
CO5	2	3	3	3	3

3. Advanced Application 2. Intermediate Development 1. Introductory Level

COURSE DESIGNER: Dr. T. R. DINAKARAN

COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
21UMSSP3	OBJECT ORIENTED PROGRAMMING IN C++ – LAB	SBS – 5 LAB	2	–	2

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
III	V	40	60	100

NATURE OF COURSE	Employability	Skill Oriented	Entrepreneurship
	✓	✓	

COURSE DESCRIPTION:

This course introduces the student to object oriented programming through a study of the concepts of program specification and design, algorithm development and coding and testing using a modern software development environment. Students learn how to write programs in an object oriented high level programming language. Topics covered include fundamentals of algorithms, problem solving, programming concepts, classes and methods, control structures, arrays and strings. Throughout the semester, problem solving skills will be stressed and applied to solving computing problems. Weakly laboratory experiments will provide hands – on experience in topics covered in this course.

COURSE OBJECTIVES:

To enable the students design and implement C++ programs for simple applications.

LIST OF PROGRAMMES:

1. Write a program to calculate Simple Interest and Compound Interest
2. Write a program for shopping list
3. Write a program to find the biggest number using class
4. Write a program to overload unary minus operator
5. Write a program to overload binary plus operator
6. Write a program to add two complex numbers using friend function
7. Write a program to add two time and hours.
8. Write a program to calculate EB charge
9. Write a program to calculate product of two complex numbers
10. Write a program for employee details
11. Write a program for bank transaction
12. Write a program for inheritances

COURSE DESIGNER: Dr. T. R. DINAKARAN

COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
21UMSE51	STATISTICS – I	ELECTIVE	6	–	5

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
III	V	25	75	100

NATURE OF COURSE	Employability	Skill Oriented	Entrepreneurship
	✓	✓	

COURSE DESCRIPTION:

Statistics is a most applicable subject of Mathematics which relates the concept of Mathematics to real life problems and decision theory.

COURSE OBJECTIVES:

To make the students understand basic theoretical and applied principles of statistics needed to enter the job force.

To make the students communicate key statistical concepts to non – statistician.

COURSE OUTCOMES (COs):

After the completion of the course, the students will be able to

No.	Course Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CO 1	recognise, describe and calculate the measure of the spread of data : mean, variance, s, d and range	Upto K3
CO 2	find the inter – relation between two or more phenomenon with the help of curve fitting	Upto K3
CO 3	find the inter – relation between two or more phenomenon with the help of correlation and regression	Upto K3
CO 4	make a bridge between elementary statistical tool and probability theory	Upto K3
CO 5	explain the mathematical expectation and moments and solve discrete and continuous random variables.	Upto K3

K1– KNOWLEDGE (REMEMBERING), K2–UNDERSTANDING, K3–APPLY

STATISTICS – I

UNIT– I:
Central tendencies – measures of dispersion – moment, skewness and kurtosis

UNIT– II:
Curve fitting (all types of curves)

UNIT– III:
Correlation and Regression

UNIT– IV:
Theory of probability– sample space – probability function – laws of Addition – Boole's inequality – law of multiplication – Baye's theorem – problems

UNIT– V:
Random variables – Distribution function and continuous random variable – probability density function – Mathematical expectation

TEXT BOOK:
Statistics by Dr. S. Arumugam, A.Thangapandi Issac Publishers: New Gamma Publishing house – July 2013.

UNIT – I: – Chapter 2, 3, 4
UNIT – II: – Chapter 5
UNIT – III: – Chapter 6
UNIT – IV: – Chapter 11
UNIT – V: – Chapter 12 (sections: 12.1,12.2, 12.3,12.4)

REFERENCE BOOK:
Mathematical Statistics by Dr. P.R. Vittal Margham Publications**.**

Mapping of CO with PSO

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	2	1	1	1	3
CO2	1	1	2	3	2
CO3	1	1	2	3	3
CO4	1	1	2	3	3
CO5	1	2	2	3	3

3. Advanced Application 2. Intermediate Development 1. Introductory Level

COURSE DESIGNER: Prof. E.B.BALARAMAN

COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
21UMSE52	OPERATIONS RESEARCH – I	ELECTIVE	6	–	5

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
III	V	25	75	100

NATURE OF COURSE	Employability	Skill Oriented	Entrepreneurship
	✓	✓	

COURSE DESCRIPTION:

This course is designed to teach various methods of solving the problems in operations research.

COURSE OBJECTIVES:

To make the students study about the LPP, Graphical Solution, Simplex Method, Big – M Method, Transportation Problem and Assignment Problem.

COURSE OUTCOMES (COs):

After the completion of the course, the students will be able to

No.	Course Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CO 1	know the historical development of OR, models in OR, scientific method, limitations and features in OR	Upto K3
CO 2	understand the mathematical formulation of LPP, solving the graphical solution and simplex method (simple problems).	Upto K3
CO 3	understand the Big – M method of a LPP, Two phase simplex method and duality problems.	Upto K3
CO 4	find an IBFS of transportation problem using various methods	Upto K3
CO 5	find the optimal solution by Hungarian method for solving Assignment problem.	Upto K3

K1– KNOWLEDGE (REMEMBERING), K2–UNDERSTANDING, K3–APPLY

OPERATIONS RESEARCH – I

UNIT– I:
Introduction – origin and development of OR – Nature and feature of OR –Scientific method – modeling in OR – limitations of OR models and decision making problem.

UNIT– II:
Introduction – Mathematical formulation of LPP – Graphical solution of a LPP – Solving the simplex method problems.

UNIT– III:
Charne's method of penalties – Two phase simplex method – Duality – Dual of the dual is primal.

UNIT– IV:
Transportation problem – formulation of the TP – finding an IBFS by using North West Corner Rule, Least Cost Entry Method – Vogel's Approximation Method – Degeneracy in TP – MODI method for solving optimum solution in TP,

UNIT– V:
Assignment problem – mathematical formulation of AP – Hungarian method for solving the optimum solution of an AP – maximization type of an AP.

TEXT BOOK:
Operations Research by Kantiswarup, P.K. Gupta and Manmohan14th edition, Sultan Chand and Sons, New Delhi.

REFERENCE BOOK:
Operations Research by Dr S. Arumugam Issac and others.

UNIT – I: – Page No: 25 to 33.
UNIT – II: – Page No: 39 to 45, 65 to 73, 79, 80, 81, 87 to 89 and 99 to 105.
UNIT – III: – Page No: 106 to 114, 129 to 134.
UNIT – IV: – Page No: 247, 253 to 275.
UNIT – V: – Page No: 295 to 310.

Mapping of CO with PSO

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	2	2	2	3	3
CO2	2	1	2	3	3
CO3	2	1	1	2	3
CO4	2	2	2	2	3
CO5	3	2	2	3	3

3. Advanced Application 2. Intermediate Development 1.Introductory Level

COURSE DESIGNER: Prof. K. N. GANESH BABU

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B.Sc. MATHEMATICS – SYLLABUS

(Under CBCS based on OBE)(with effect from 2021 – 2022)

COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
21UMSE53	NUMBER THEORY	ELECTIVE	6	–	5

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
III	V	25	75	100

NATURE OF COURSE	Employability	Skill Oriented	Entrepreneurship
	✓	✓	

COURSE DESCRIPTION:

Number Theory is a branch of pure Mathematics devoted to the study of the natural numbers and integers. It helps to discover interesting relationships between different sorts of numbers.

COURSE OBJECTIVES:

- To present a rigorous development of Number Theory using axioms, definitions, examples, theorems and their proofs.
- To provide a deep knowledge of number theory as this is one of the pillars of Mathematics.

COURSE OUTCOMES (COs):

After the completion of the course, the students will be able to

No.	Course Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CO 1	discuss the Divisibility of numbers, Prime and composite numbers, Euclid's theorem and Unique Factorisation theorem	**Upto K3**
CO 2	understand the theorem of Arithmetic, representation of an integer and Arithmetic functions	**Upto K3**
CO 3	know perfect numbers, Euclid's theorem, Euler's function and learn various theorems	**Upto K3**
CO 4	understand Greatest integer functions, Mobius function and Mobius Inversion Formula	**Upto K3**
CO 5	analyse Congruences, Residues, Residue classes, complete residue system, Reduced residue system, Linear congruence, Chinese Remainder theorem.	**Upto K3**

K1– KNOWLEDGE (REMEMBERING), K2–UNDERSTANDING, K3–APPLY

NUMBER THEORY

UNIT– I:
Divisibility, Common divisor, Greatest common divisor, Least common multiple, Prime and composite numbers, Euclid's theorem, Unique Factorisation theorem.

UNIT– II:
Theorem of Arithmetic, Positional representation of an integer, Divisors of an integer, Arithmetic functions.

UNIT– III:
Perfect numbers – Euclid's theorem – Euler's function – examples only.

UNIT– IV:
Greatest integer functions – Mobius function – Mobius Inversion Formula – examples only.

UNIT– V:
Congruences – Residues – Residue classes – Complete Residue system – Reduced Residue system – Linear congruence – Chinese Reminder Theorem.

TEXT BOOK:
Kumaravelu and Suseela Kumaravelu, ***Elements of Number Theory***, SKV Publications, 2002.

UNIT – I: – Chapter 3, Pg. No. 45 to 58, Chapter 4, Pg No.60 to 66
UNIT – II: – Chapter 4, Pg. No. 66 to 80
UNIT – III: – Chapter 4, Pg. No. 84 to 86, 93 to 106
UNIT – IV: – Chapter 4, Pg. No. 109 to 131
UNIT – V: – Chapter 6, Pg. No. 163 to 203.

REFERENCE BOOK:
V.K. Krishnan, ***Elementary Number Theory***, Universities Press, 2017.

Mapping of CO with PSO

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	1	1	2	2	2
CO2	1	2	1	2	1
CO3	2	2	1	2	2
CO4	2	2	2	1	2
CO5	1	2	2	2	2

3. Advanced Application 2. Intermediate Development 1. Introductory Level

COURSE DESIGNER: Prof. G. R. SHYAMALA

COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
21UMSE54	BOOLEAN ALGEBRA AND LOGIC	ELECTIVE	6	–	5

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
III	V	25	75	100

NATURE OF COURSE	Employability	Skill Oriented	Entrepreneurship
	✓	✓	

COURSE DESCRIPTION:

This course is designed to make the students understand what Boolean algebra is all about and how it differs from elementary algebra. The students will learn about the various laws and important theorems associated with Boolean algebra. Also it is designed to help the students understand different types of Logic gates.

COURSE OBJECTIVES:

- To introduce propositions and compound propositions, basic
- logical operations and constructing a truth table.
- To introduce algebra of propositions, conditional and Biconditional statements
- To introduce propositional functions and quantifies.
- To introduce basic definitions and basic theorems on Boolean Algebra
- To introduce logic gates and circuits**.**

COURSE OUTCOMES (COs):

After the completion of the course, the students will be able to

No.	Course Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CO 1	express the verbal sentence in symbolic form and determine the truth table of the statement.	Upto K3
CO 2	determine the validity of the argument.	Upto K3
CO 3	determine the truth value of the statement and to negate the statement.	Upto K3
CO 4	write the dual of the Boolean equation and finding the number of sub algebras.	Upto K3
CO 5	express the Boolean expression as a sum of product and finding fundamental product in Karnaugh map.	Upto K3

K1– KNOWLEDGE (REMEMBERING), K2–UNDERSTANDING, K3–APPLY

BOOLEAN ALGEBRA AND LOGIC

UNIT – I:
Introduction – Propositions and Compound Propositions – Basic Logical Operations – Propositions and Truth Tables – Tautologies and Contradictions.

UNIT – II:
Logical Equivalence – Algebra of Propositions – Conditional and Biconditional Statements – Arguments.

UNIT – III:
Propositional Functions, Quantifiers – Negation of Quantified Statements – Normal Forms.

UNIT – IV:
Introduction – Basic Definitions – Duality – Basic Theorems – Boolean Algebra as Lattices – Representation Theorem.

UNIT – V:
Sum – of – Products Form for Sets – Sum – of – Products Form for Boolean Algebra – Minimal Boolean Expressions – Logic Gates and Circuits – Truth Tables, Boolean Functions – Karnaugh Maps.

TEXT BOOK:
Discrete Mathematics by Seymour Lipschutz & Marc Lars Lipson – McGraw Hill Education.

UNIT – I: – Chapter 4 – 4.1, 4.2, 4.3, 4.4, 4.5
UNIT – II: – Chapter 4 – 4.6, 4.7, 4.8, 4.9, 4.10
UNIT – III: – Chapter 4 – 4.11, 4.12, 4.13
UNIT – IV: – Chapter 14 – 14.1, 14.2, 14.3, 14.4, 14.5, 14.6
UNIT – V: – Chapter 14 –14.7, 14.8, 14.9, 14.10, 14.11, 14.12

REFERENCE BOOK:
Discrete Mathematicsby Dr. M.K.Venkatraman, Dr. N. Sridharan & N. Chandrasekaran.

Mapping of CO with PSO

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	3	2	2
CO2	2	3	2	2	2
CO3	3	2	2	3	2
CO4	2	2	2	3	1
CO5	3	3	2	2	1

3. Advanced Application 2. Intermediate Development 1. Introductory Level

COURSE DESIGNER: Dr. S. K. KANCHANA

COURSE STRUCTURE – VI SEMESTER

S. No.	Subject Code	Subject Title	Hrs./ Week	Exam (Hrs.)	CA	SE	Total Marks	Credits
1.	21UMSC61	**Part – III: Core – 12:** Linear Algebra	6	3	25	75	100	5
2.	21UMSC62	**Part – III: Core – 13:** Complex Analysis	6	3	25	75	100	5
3.	21UMSC63	**Part – III: Core – 14:** Statistics – II	6	3	25	75	100	5
4.	21UMSC64	**Part – III: Core – 15:** Programming in Java Theory	4	3	25	75	100	3
5.	21UMSSP4	**Part – III: SBS – 6:** Programming in Java – **LAB**	2	3	40	60	100	2
	Part – III: Elective – 3							
6.	21UMSE61	Operations Research – II	6	3	25	75	100	5
7.	21UMSE62	Python Programming Theory	4	3	25	75	100	3
	21UMSEP1	Python Programming – **LAB**	2		40	60	100	2
8.	21UMSE63	Astronomy	6	3	25	75	100	5
9.	21UGKY61	General Knowledge (Self – Study)	–	–	–	–	100	–
		TOTAL	**30**					**25**

***One elective course to be chosen from THREE Electives (6 to 8)**

CA – Class Assessment (Internal)

SE – Summative Examination

SBS – Skill Based Subject

T – Theory

P – Practical

SOURASHTRA COLLEGE, MADURAI – 625004

(An Autonomous Institution Re-accredited with 'B+' grade by NAAC)

B.Sc. MATHEMATICS – SYLLABUS

(Under CBCS based on OBE)(with effect from 2021 – 2022)

COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
21UMSC61	LINEAR ALGEBRA	CORE – 12	6	–	5

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
III	VI	25	75	100

NATURE OF COURSE	Employability	Skill Oriented	Entrepreneurship
	✓	✓	

COURSE DESCRIPTION:

Linear algebra is a branch of mathematics that is concerned with mathematical structures closed under the operations of addition and scalar multiplication and that includes the study of vector spaces, lines and planes, and some mappings that are required to perform the linear transformations. It includes vectors, matrices and linear functions. It is the study of linear sets of equations and its transformation properties.

COURSE OBJECTIVES:

To enable the students

- study algebraic statements about vector addition, scalar multiplication
- demonstrate understanding of the concepts of vector space and subspace.
- demonstrate understanding of linear independence, span, and basis, inner products, norms, orthogonal vectors, linear independence.
- carry out matrix operations, including inverses and determinants and bilinear forms.
- acquire the knowledge of vector space and inner product space.

COURSE OUTCOMES (COs):

After the completion of the course, the students will be able to

No.	Course Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CO 1	explain the base concept of vector space and properties of vectors on the base and demonstrate understanding of the concepts of vector space and subspace.	Upto K3
CO 2	demonstrate understanding of linear independence, span, and basis and apply principles of matrix algebra to linear transformations.	Upto K3
CO 3	demonstrate understanding of inner products and associated norms	Upto K3
CO 4	carry out matrix operations, including inverses and determinants and determine eigenvalues and eigenvectors and solve eigenvalue problems.	Upto K3
CO 5	understand Bilinear forms – Matrix of a Bilinear form	Upto K3

K1– KNOWLEDGE (REMEMBERING), K2–UNDERSTANDING, K3–APPLY

LINEAR ALGEBRA

UNIT– I:
Vector spaces – Definition and examples – subspaces – Linear transformation – Fundamental theorem of Homomorphism.(CHAPTERS 5,5.0,5.1,5.2,5.3*)*

UNIT– II:
Span of a set – Linear independence – Basis and Dimension – Rank and Nullity – Matrix of a Linear transformations (CHAPTERS 5, 5.4, 5.5, 5.6, 5.7, 5.8)

UNIT– III:
Inner product space – Definition and examples – Orthogonality – orthogonal compliment.(CHAPTERS: 6, 6.0, 6.1, 6.2, 6.3)

UNIT– IV:
Matrices – Elementary Transformation – Invrtese – Rank – Test for consistency – Solving Linear Equations – Cayley's Hamilton's theorem – Eigen values and Eigen vectors(CHAPTERS: 7, 7.3, 7.4, 7.5, 7.6, 7.7, 7.8)

UNIT– V:
Bilinear forms – Matrix of a Bilinear form – Quadratic forms – Reduction to Quadratic forms.(CHAPTERS 8: 8.1, 8.2)

TEXT BOOK:
Modern Algebra by Dr.S. Arumugam and A.T. Isaac Publications: SCITECH, 2008

REFERENCE BOOK:
Algebra by A.R.Vasistha

UNIT – I: – CHAPTERS 5, 5.0, 5.1, 5.2, 5.3
UNIT – II: – CHAPTERS 5, 5.4, 5.5, 5.6, 5.7, 5.8
UNIT – III: – CHAPTERS 6, 6.0, 6.1, 6.2, 6.3
UNIT – IV: – CHAPTERS 7, 7.3, 7.4,7.5, 7.6, 7.7, 7.8
UNIT – V: – CHAPTERS 8, 8.1, 8.2

DIGITAL TOOLS:
1. https://eapps.austincc.edu/faculty/syllabus.php?id=250320
2. https://www.khanacademy.org/math/linear – algebra

Mapping of CO with PSO

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	1	2	2	3	3
CO2	2	2	3	2	3
CO3	2	2	2	3	2
CO4	3	2	3	2	2
CO5	1	3	2	2	3

3. Advanced Application 2. Intermediate Development 1. Introductory Level

COURSE DESIGNER: Dr. V. RAMAMANI

COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
21UMSC62	COMPLEX ANALYSIS	CORE – 13	6	–	5

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
III	VI	25	75	100

NATURE OF COURSE	Employability	Skill Oriented	Entrepreneurship
	✓	✓	

COURSE DESCRIPTION:

Complex analysis helps the students to learn about the fundamental concepts and theorems about complex plane, analytic functions, bilinear transformations, complex integration, power series expansions and calculus of residues.

COURSE OBJECTIVES:

To know about the complex valued function. To understand about the Cauchy – Riemann equations, analytic functions, Linear transformations. Explanation of various named theorems in the integration field will help to solve the complex variable problems. The concept of cauchy's residue theorem is more useful to evaluate the definite integrals in residues**.**

COURSE OUTCOMES (COs):

After the completion of the course, the students will be able to

No.	Course Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CO 1	explain the definition of C – R equations, analytic Functions, and harmonic functions.	**Upto K3**
CO 2	do problems based on linear transformations, fixed points, and some special cases of linear transformations.	**Upto K3**
CO 3	evaluate the problems based on complex integration by using cauchy's theorem, theorem of higher derivatives.	**Upto K3**
CO 4	explain the series expansion of analytic functions using Taylor's series,Laurent's series and to solve the problems based on the power series.	**Upto K3**
CO 5	understand the concepts of the residue of a function and are able to do problems based on Residues and evaluation of definite integrals.	**Upto K3**

K1– KNOWLEDGE (REMEMBERING), K2–UNDERSTANDING, K3–APPLY

COMPLEX ANALYSIS

UNIT – I:
Cauchy – Riemann Equations – Analytic functions – Harmonic Functions.

UNIT – I:
Elementary Transformation – Bilinear transformation – Cross ratio – fixed Points – Special bilinear transformation.

UNIT – III:
Cauchy's theorem – Cauchy's integral formula – Higher Derivates.

UNIT – IV:
Taylor's series – Laurent's series (Laurent's theorem Statement only) and Problems – Zeros of an analytic function – Singularities.

UNIT – V:
Residues – Cauchy's residue theorem – Evaluation of definite integrals (first two types only).

TEXT BOOK:
Complex Analysis by S. Arumugam, Isaac

UNIT – I:	–	Chap 2 (2.6,2.7,2.8)
UNIT – II:	–	Chap 3 (3.1,3.2,3.3,3.4,3.5)
UNIT – III:	–	Chap 6 (6.2,6.3,6.4)
UNIT – IV:	–	Chap 7 (7.1,7.2,7.3,7.4)
UNIT – V:	–	Chap 8 (8.1,8.2,8.3)

REFERENCE BOOK:
Complex Analysis by P. Duraipandian

Mapping of CO with PSO

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	1	2	2	2	3
CO2	2	1	2	2	2
CO3	1	3	2	3	2
CO4	2	3	2	2	2
CO5	1	2	2	2	3

3. Advanced Application 2. Intermediate Development 1. Introductory Level

COURSE DESIGNER: Prof. M.N. SAROJA

COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
21UMSC63	STATISTICS – II	CORE – 14	6	–	5

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
III	VI	25	75	100

NATURE OF COURSE	Employability	Skill Oriented	Entrepreneurship
	✓	✓	

COURSE DESCRIPTION:

Statistics is a most applicable subject of mathematics which applies the concept of mathematics to real life problems and decision making.

COURSE OBJECTIVES:

- To make the students understand basic theoretical and applied principles of statistics needed to enter the job force.
- To make them communicate key statistical concepts to non – statisticians.

COURSE OUTCOMES (COs):

After the completion of the course, the students will be able to

No.	Course Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CO 1	apply the statistical tools in real life problems with the help of attributes	Upto K3
CO 2	apply the statistical tools in real life problems with the help of index numbers	Upto K3
CO 3	apply the theoretical discrete distributions like binomial and poisson distribution and continuous distribution like normal distribution in thr relevant application area	Upto K3
CO 4	conduct and interpret the hypothesis test for a single population mean, variance,s,d,correlation.	Upto K3
CO 5	apply different testing tools like t – test,f – test and chi – square test to analyse the relevant real life problems	Upto K3

K1– KNOWLEDGE (REMEMBERING), K2–UNDERSTANDING, K3–APPLY

STATISTICS – II

UNIT– I:
Theory of attributes

UNIT– II:
Index numbers

UNIT– III:
Moment generating function – cumulants – theoretical distributions – Binomial, poisson, and normal distribution

UNIT– IV:
Test of significance of Large samples

UNIT– V:
Test of significance of small samples – t – test, F – test, chi – square test.

TEXT BOOK:
Statistics by Dr. S. Arumugam, A.Thangapandi Issac Publishers: New Gamma publishing House – July 2013.

UNIT – I: – Chapter 8
UNIT – II: – Chapter 9
UNIT – III: – Chapter 12 (sections 12.5 & 12.6)
UNIT – IV: – Chapter 14
UNIT – V: – Chapters 15 & 16

REFERENCE BOOK:
Mathematical Statistics by Dr. P.R. Vittal Margham Publications

Mapping of CO with PSO

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	1	1	1	1
CO2	2	3	1	1	1
CO3	2	1	3	1	1
CO4	2	2	1	3	3
CO5	1	1	2	3	3

3. Advanced Application 2. Intermediate Development 1. Introductory Level

COURSE DESIGNER: Prof. E.B. BALARAMAN

COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
21UMSC64	PROGRAMMING IN JAVA	CORE – 15	4	-	3

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
III	VI	25	75	100

NATURE OF COURSE	Employability	Skill Oriented	Entrepreneurship
	✓	✓	

COURSE DESCRIPTION:

This course is designed to make the students learn Java theory and write programs in Java.

COURSE OBJECTIVES:

To enable the students understand the concepts of operators, expression, loops, class, methods, arrays, strings, interfaces, packages, multi – threaded programming and applies the knowledge gained in writing programs.

COURSE OUTCOMES (COs):

After the completion of the course, the students will be able to

No.	Course Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CO 1	understand the concepts of constants, variables, data types, symbolic constants and type casting.	Upto K3
CO 2	gain knowledge about operators, expressions, decision making.	Upto K3
CO 3	understand class, objects, methods, arrays and strings.	Upto K3
CO 4	analyze interfaces and packages and create packages.	Upto K3
CO 5	gain knowledge about multithreaded programming and manages errors and exceptions.	Upto K3

K1– KNOWLEDGE (REMEMBERING), K2–UNDERSTANDING, K3–APPLY

PROGRAMMING IN JAVA

UNIT – I:

Overview of Java Language: Simple Java Program – Java Program Structure – Java Tokens – Java Statements – Implementing a Java Program – Java Virtual Machine – Command Line Arguments. Constants – Variables – Data types – Declaration of Variables – Giving Values to variables – Scope of Variables – Symbolic Constants – Type Casting.

UNIT – II:

Operators and Expressions: Arithmetic Operators – Relational Operators – Logical Operators – Assignment Operators – Increment and Decrement Operators – Conditional Operators – Bitwise Operators – Special Operators – Arithmetic Expressions – Evaluation of Expressions – Precedence of Arithmetic Operators – Operator Precedence And Associativity – Mathematical Functions. Decision Making and Branching: Decision Making with If statement – Simple. If Statement – If else Statement – Nesting If Else Statement – the Else If Ladder – The switch Statement – The?: operator. Decision Making and Looping: The while statement – The do statement – The for statement – Jumps in Loops.

UNIT – III:

Class, Objects and Methods: Defining a Class – Fields Declaration – Methods Declaration – Creating Objects – Accessing class members – Constructors – Methods Overloading – Static Members – Nesting of Methods – Inheritance. Arrays and Strings : One – dimensional Arrays – creating an Array – Two Dimensional Arrays – Strings.

UNIT – IV:

Interfaces: Multiple Inheritance: Defining Interfaces – Extending Interfaces – Implementing Interfaces – Accessing Interface Variables.

Packages: Java API Packages – Using system Packages – Naming Conventions – Creating Packages – Accessing a Package – Using a Package – Adding a class to a Package.

UNIT – V:

Multithreaded Programming: Creating Threads – Extending the Thread Class – Stopping and Blocking a Thread – Life Cycle of a Thread – Using Thread Methods – Thread Exceptions – Thread Priority. Managing Errors and Exceptions: Types of Errors – Exceptions – Syntax of Exception Handling Code – Multiple Catch Statements – Using Finally Statement – Throwing our own Exceptions – Using Exceptions for debugging.

TEXT BOOK:

Programming with Java, A Primer, 3e, E. Balagurusamy, TATA McGraw – Hill Company, 2008.

REFERENCE BOOK:

Getting inside Java (Beginner's Guide) by Premkumar

UNIT – I: – Chapters : 3, 4 **UNIT – IV:** – Chapters : 10, 11
UNIT – II: – Chapters : 5, 6, 7 **UNIT – V:** – Chapters : 12, 13
UNIT – III: – Chapters : 8, 9

Mapping of CO with PSO

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	1	2	1	1	1
CO2	2	1	3	2	1
CO3	1	2	2	2	1
CO4	1	1	2	3	3
CO5	1	1	2	3	3

3. Advanced Application 2. Intermediate Development 1. Introductory Level

COURSE DESIGNER: Prof. C.K. SIVAKUMAR

COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
21UMSSP4	PROGRAMMING IN JAVA LAB	SBS – 6 LAB	–	2	2

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
III	VI	40	60	100

NATURE OF COURSE	Employability	Skill Oriented	Entrepreneurship
	✓	✓	

COURSE OBJECTIVE:

To enable the students write programs in JAVA.

LIST OF PROGRAMS

Write programs in Java for the following

1. To perform addition of complex numbers using class and objects.
2. To perform multiplication of matrices using class and objects.
3. To perform volume calculation using method overloading.
4. Using command line arguments, test if the given string is palindrome or not.
5. Write a program to fill names into a list. Also, copy them in reverse order into anotherList. If the name contains any numeric value throw an exception "Invalid Name".
6. Using multilevel inheritance process student marks
7. Implement multiple inheritance for payroll processing
8. Create a package called "Arithmetic" that contains methods to deal with all Arithmetic operations. Also, write a program to use the package
9. Create two threads such that one of the thread print even no's and another prints Odd no's up to a given range.
10. Define an exception called "Marks Out of Bound" Exception, that is thrown if the Entered marks are greater than 100.
11. String manipulation using string methods (Use of any five string methods preferred)
12. Write a program in Java to grade the students using Switch statement
13. Write a program in Java to calculate the Simple interest and Compound Interest

COURSE DESIGNER: Prof. C.K. SIVAKUMAR

COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
21UMSE61	OPERATIONS RESEARCH – II	ELECTIVE	6	–	5

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
III	VI	25	75	100

NATURE OF COURSE	Employability	Skill Oriented	Entrepreneurship
	✓	✓	

COURSE DESCRIPTION:

The course is designed to explain various concepts and Methods used to learn Operations research II**.**

COURSE OBJECTIVES:

- To discuss the concepts of sequencing
- To introduce Games and strategies
- To explain inventory
- To introduce Queuing theory
- To discuss Network Scheduling.

COURSE OUTCOMES (COs):

After the completion of the course, the students will be able to

No.	Course Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CO 1	solve the problems based on sequencing	**Upto K3**
CO 2	understand the concepts of Game and strategies	**Upto K3**
CO 3	identify the suitable model in inventory	**Upto K3**
CO 4	describe the various models	**Upto K3**
CO 5	arrive conclusion based on PERT and CPM	**Upto K3**

K1– KNOWLEDGE (REMEMBERING), K2–UNDERSTANDING, K3–APPLY

OPERATIONS RESEARCH – II

UNIT– I: Sequencing problem

Introduction – Problems of sequencing – Basic terms used in Sequencing – Processing in Jobs through two Machines – optimum sequence algorithm – processing n Jobs through K machines – optimal sequence algorithm – processing 2 Jobs through K machines.
(page No.. 231– 243)

UNIT– II: Games and Strategies

Introduction – Two person Zero sum Games – some basic terms – the maximin and minimax principle – rule for saddle point – Games without saddle point – mixed strategies – Graphical solutions of 2 X m amd m X 2 games – Dominance property.
(page No.. 313 – 338)

UNIT– III: Inventory control

Introduction – the inventory decisions – cost associated with inventories – factors affecting inventory control – Economic order quantity (EOQ) – Deterministic inventory Problem (i) No shortages (ii) finite replacement (iii) with shortages.
(page No.. 365 – 381)

UNIT– IV: Queueing theory

Introduction – Queueing system – elements in queueing system – operating characteristics of queueing system – probability distribution in queueing system – classification of Queueing models – Transient and steady states – poisson queueing systems – model I (m/m/1) :(∞ / FIFO),model II (m/m/1) :(∞ /SIRO), model III (m/m/1) : (N/FIFO) and model IV (generalized models : Birth death process)
(pageNo.. 414 – 436)

UNIT– V: (Network scheduling by PERT and CPM)

Introduction – Network and basic components – logical sequencing – rules of network construction – Numbering the events – Critical path analysis – PERT problems
(pageNo.. 459 – 469)

TEXT BOOK:

Operations Research by Kanti Swarup, P.K. Gupta, Manmohan Sultan Chand sons, Eleventh edition 2003, NewDelhi.

UNIT – I: – Page No: 231 to 243. **UNIT – IV:** – Page No : 414 – 436
UNIT – II: – Page No: 313 – 338 **UNIT – V:** – Page No : 459 – 469
UNIT – III: – Page No: 365 – 381

REFERENCE BOOK:

Operations Research by Dr. S. Arumugam Issac

Mapping of CO with PSO

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	1	2	3	2	2
CO2	2	3	2	3	2
CO3	1	2	3	2	2
CO4	2	3	2	2	3
CO5	1	2	3	2	3

3. Advanced Application 2. Intermediate Development 1. Introductory Level

COURSE DESIGNER: Prof. M. K. ESWARLAL

COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
21UMSE62	PYTHON PROGRAMMING	ELECTIVE	4	–	3

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
III	VI	25	75	100

NATURE OF COURSE	Employability	Skill Oriented	Entrepreneurship
	✓	✓	

COURSE DESCRIPTION:

This course is designed to make the students acquire programming skills in core Python and basic principles of Python programming language.

COURSE OBJECTIVES:

- To introduce Python keyword and important function.
- To use operators and to translate mathematical formulae into equivalent Python expressions.
- To introduce Boolean operators, lists and to create tuples.
- To introduce decision making statements and loop control statements,
- To introduce syntax and basics of a functions and its uses.

COURSE OUTCOMES (COs):

After the completion of the course, the students will be able to

No.	Course Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CO 1	apply the python keywords and all the types of functions.	Upto K3
CO 2	use operators and expressions and able to change precedence and associativity of arithmetic operators.	Upto K3
CO 3	create lists and tuples and accessing elements of a list	Upto K3
CO 4	use the loop control statements and all types of functions.	Upto K3
CO 5	understand the syntax and basics of a function and its uses.	Upto K3

K1– KNOWLEDGE (REMEMBERING), K2–UNDERSTANDING, K3–APPLY

PYTHON PROGRAMMING

UNIT – I:

Introduction to Python – Values and types – Python keywords – Identifier/ Variable – The print ( ) function – The input ( ) function – The eval ( ) function – Commenting in Python.

UNIT – II:

Operators and Expressions – Arithmetic Operators – Operator Precedence and Associativity – Changing Precedence and Associativity of Arithmetic Operators – Translating Mathematical Formulae into Equivalent Python Expressions.

UNIT – III:

Lists – Creating Lists – Accessing Elements of a list – Negative List Indices – List Slicing – List Slicing with Step Size – Python Built – in functions for Lists – The List Operator – Introduction to Tuples – Creating Tuples – Inbuilt functions for Tuples – Indexing and Slicing – Operations on Tuples – Lists and Tuples – Sort the Tuples.

UNIT – IV:

Decision making statements – Conditional Expressions – Loop control statements – The white loop – The range ( ) function – The for loop – Nested loop – The break statement – The continue statement.

UNIT– V:

Functions – Introduction – Syntax and Basics of a function – Use of a function – Parameters and Arguments in a function –The Return Statement – Recursive functions – The String Operators – String Operations.

TEXT BOOK:

Problem Solving and Python Programming – Ashok Namdev Kamthane & Amit Ashok Kamthane – McGraw Hill Education 2018.

REFERENCE BOOK:

Problem Solving and Python Programming – P. Radha Ganesan – Chess Eductional Publishers**.**

UNIT – I: – Chapter 2 – 2.2, 2.6, 2.7, 2.8, 2.9, 2.12, 2.13, 2.14.
UNIT – II: – Chapter 3 – 3.2, 3.3, 3.4, 3.5, 3.6
UNIT – III: – Chapter 8 – 8.1 to 8.8, Chapter 10 – 10.1 (10.1.1 to 10.1.6)
UNIT – IV: – Chapter 4 – 4.7, 4.8 and Chapter 5 – Full Chapter
UNIT – V: – Chapter 6 – 6.1,6.2,6.3,6.4,6.6,6.7 and Chapter 7 – 7.7,7.8

Mapping of CO with PSO

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	3	2	3
CO2	2	3	2	3	2
CO3	3	2	2	3	2
CO4	3	2	3	2	2
CO5	3	3	2	3	2

3. Advanced Application 2. Intermediate Development 1. Introductory Level

COURSE DESIGNER: Dr. S.K. KANCHANA

COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
21UMSEP1	PYTHON PROGRAMMING LAB	ELECTIVE LAB	–	2	2

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
III	VI	40	60	100

NATURE OF COURSE	Employability	Skill Oriented	Entrepreneurship
	✓	✓	

COURSE DESCRIPTION:

This Course emphasizes the students to design, code, test and debug Python language programs.

COURSE OBJECTIVES:

This course is designed to make the students acquire programming skills in Python programming. Python Programming is intended for software engineers, system analysts, program managers and user support. The students will be able to build basic programs using fundamental programming constructs like variables, conditional logic, looping and functions.

LIST OF PROGRAMS

1. Write a Python program to compute addition of two numbers.
2. Write a Python program to calculate Area and Circumference of a Circle.
3. Write a Python program to calculate Simple Interest.
4. Write a Python program whether the year is leap or not.
5. Write a Python program to check whether the number is prime or not.
6. Write a Python program to print the Fibonacci series.
7. Write a Python program to check whether the number is Palindrome Number or not.
8. Write a Python program to calculate sum of the digits of a given number using function.
9. Write a Python program to calculate the factorial of a given number.
10. Write a Python program to check whether the number is Armstrong Number or not.
11. Write a Python program to operate on Lists using List Operators.
12. Write a Python program to implement Tuple Operations.

COURSE DESIGNER: Dr. S.K. KANCHANA

COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
21UMSE63	ASTRONOMY	ELECTIVE	6	-	5

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
III	VI	25	75	100

NATURE OF COURSE	Employability	Skill Oriented	Entrepreneurship
	☐	✓	☐

COURSE DESCRIPTION:

Astronomy is the study of everything in the universe beyond earth's atmosphere. This includes objects we can see with our own naked eye s like Sun, Earth, Stars etc.,

COURSE OBJECTIVES:

Students will investigate and derive the interrelationship between the Earth, Sun, and planets and predict seasons using diagrams.

COURSE OUTCOMES (COs):

After the completion of the course, the students will be able to

No.	Course Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CO 1	understand the concepts of spherical trigonometry by using formulas and Analogies	Upto K3
CO 2	apply the idea to represent different system of coordinates of Celestial sphere diagrammatically and study the changes in the coordinates of the Sun during the year.	Upto K3
CO 3	understand different zones of earth and duration of night and day at different zones.	Upto K3
CO 4	mathematically derive the expression for Dip of the horizon and twilight	Upto K3
CO 5	verify Kepler's law of motion and derive Kepler's law of motion from Newton's law of gravitation.	Upto K3

K1– KNOWLEDGE (REMEMBERING), K2–UNDERSTANDING, K3–APPLY

ASTRONOMY

UNIT– I:

Spherical trigonometry – definitions – Theorems –problems – sine,cosine, cotangent, supplemental cosine, four parts formulae – functions of half of an angle and sides – Delambre's and Napier's analogies and Napier's rule and worked examples. (Chapter I: Pages 1 to 26 and 33 to 36)

UNIT– II:

Celestial sphere – definitions – Four system of coordinates–conversion of coordinates– relation between right ascension and longitude of the sun–changes in the coordinates of thesun in the course of the year–longitude of the sun on any day–siderealtime–theorems and worked examples. (Chapter II: pages 47 to 70)

UNIT– III:

Zone of Earth–variations in the duration of the day and night during the year at different systems –duration of perpetual day in a place of longitude greater than 90–ώ and worked examples (Chapter III: pages 98 to 111 and 113 to 123)

UNIT– IV:

Dip of horizon – expression for dip – twilight – condition for twilight may last throughout night– the number of consecutive days having twilight throughout night –duration of shortest twilight and worked examples. (ChapterIII: pages 135 to 141 and 144 to 151)

UNIT– V:

Kepler's law –verification of first and second law – Newton's deductions from Kepler's law – derive Kepler's third law from Newton's law of gravitation – fix the position of the planet in its elliptic orbit. (ChapterVI: pages 191 to 203 and 211 to 213)

TEXT BOOK:

Astronomyby Prof. S. Kumaravelu and Prof. Susheela Kumaravelu
Revised and enlarged edition – 2005.

Mapping of CO with PSO

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	1	2	2	2	3
CO2	2	2	2	2	3
CO3	2	2	2	3	2
CO4	2	2	2	2	3
CO5	1	2	3	2	2

3. Advanced Application 2. Intermediate Development 1. Introductory Level

COURSE DESIGNER: Prof. E. B. BALARAMAN