SOURASHTRA COLLEGE, MADURAI – 625004
(An Autonomous Institution Re-accredited with 'B+' grade by NAAC)
BACHELOR OF COMPUTER APPLICATIONS (B.C.A)
SYLLABUS (Under CBCS based on OBE)
(with effect from 2021 – 2022)

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GRADUATE ATTRIBUTES

1. **(PA) Problem analysis**: An ability to use appropriate knowledge and skills to identify, formulate, analyze, and solve complex problems in order to reach substantiated conclusions

2. **(Inv.) Investigation**: An ability to conduct investigations of complex problems by methods that include appropriate experiments, analysis and interpretation of data and synthesis of information in order to reach valid conclusions.

3. **(Des.) Design:** An ability to design solutions for complex, components or processes that meet specified needs with appropriate attention to health and safety risks, applicable standards, and economic, environmental, cultural and societal considerations.

4. **(Tools) Use of tools**: An ability to create, select, apply, adapt, and extend appropriate techniques, resources, and modern tools to a range of activities, from simple to complex, with an understanding of the associated limitations.

5. **(Team) Individual and teamwork**: An ability to work effectively as a member and leader in teams, preferably in a multi–disciplinary setting.

6. **(Comm.) Communication skills**: An ability to communicate complex technical concepts within the profession and with society at large. Such ability includes reading, writing, speaking and listening, and the ability to comprehend and write effective reports and design documentation, and to give and effectively respond to clear instructions. .

7. **(Ethics) Ethics and equity**: An ability to apply professional ethics, accountability, and equity.

8. **(LL) Life–long learning**: An ability to identify and to address their own educational needs in a changing world in ways sufficient to maintain their competence and to allow them to contribute to the advancement of knowledge

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PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

B.C.A. Programme has been designed to prepare graduates for attaining the following specific outcomes:

PEO 1	An ability to apply knowledge of mathematics, computer science and management in practice.
PEO 2	An ability to apply knowledge of mathematics, computer science and management in practice.
PEO 3	The program prepares the young professional for a range of computer applications, computer organization, techniques of Computer Networking, Software Engineering, Web development, Database management and Advance Java
PEO 4	An ability to design a computing system to meet desired needs within realistic constraints such as safety, security and applicability in multidisciplinary teams with positive attitude.
PEO 5	An ability to communicate effectively. In order to enhance programming skills of the young IT professionals, the program has introduced the concept of project development in each language/technology learnt during semester.

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.

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PROGRAMME SPECIFIC OUTCOMES (PSOs)
On completion of **Bachelor of Computer Applications Programme (B.C.A.)**, the students are expected to

PSO 1	develop into professionally competent citizens by applying the scientific knowledge of Computer Science with the ability to think clearly, rationally and creatively to support in evolving solutions to the social/public/scientific issues with responsible democratic participation
PSO 2	enterprise resourcefulness to identify, plan, formulate, design and evaluate solutions for complex computing problems that address the specific needs with appropriate consideration for Societal, Cultural, Environmental and Industrial domains.
PSO 3	develop holistically to ignite the lateral thinking ability in problem solving, acquisition of new skills, open–minded and organized way of facing problems with self awareness and evolving analytical solutions
PSO 4	create and initiate innovations effectively and communicate efficiently with the computing community and society at large to bridge the gap between computing industry and academia
PSO 5	understand, assess and commit to professional and ethical principles, norms and responsibilities of the cyber world through Digital Literacy, and the ability for work efficacy as a part of a team and engage effectively with diverse stakeholders
PSO 6	to embark on new ventures and initiatives with critical thinking and desire for more continuous learning focusing on life skills.

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BACHELOR OF COMPUTER APPLICATIONS – II YEAR
COURSE STRUCTURE – III SEMESTER

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.	21UCAC31	**Part – III: Core – 5:** Object Oriented Programming using C++	5	3	25	75	100	4
4.	21UCACP3	**Part – III: Core – 6:** **Lab – III**: Object Oriented Programming using C++	5	3	40	60	100	4
5.	21UCAA31	**Part – III: Allied – 3:** Operations Research	4	3	25	75	100	4
6.	21UCASP1	**Part – IV: SBS – 3:** **Lab:** Office Automation	2	3	40	60	100	2
7.	21UCAN31	**Part – IV: NME – 1 :** Introduction to Information Technology	2	3	25	75	100	2
		TOTAL	30				700	22

COURSE STRUCTURE – IV SEMESTER

S. No.	Sub. 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.	21UCAC41	**Part – III: Core – 7:** Programming in Java	5	3	25	75	100	4
4.	21UCACP4	**Part – III: Core – 8:** **Lab – IV**: Java Programming	5	3	40	60	100	4
5.	21UCAA41	**Part – III: Allied – 4:** Numerical Methods	4	3	25	75	100	4
6.	21UCASP2	**Part – IV: SBS – 4:** **Lab:** Multimedia	2	3	40	60	100	2
7.	21UCAN41	**Part – IV: NME – 2:** Web Programming	2	3	25	75	100	2
8.		**Part – V:** Extension Activities	–	–	–	–	100	1
		TOTAL	30				800	23

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COURSE STRUCTURE – III SEMESTER

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.	21UCAC31	**Part – III: Core – 5:** Object Oriented Programming using C++	5	3	25	75	100	4
4.	21UCACP3	**Part – III: Core – 6: Lab – III**: Object Oriented Programming using C++	5	3	40	60	100	4
5.	21UCAA31	**Part – III: Allied – 3:** Operations Research	4	3	25	75	100	4
6.	21UCASP1	**Part – IV: SBS – 3: Lab:** Office Automation	2	3	40	60	100	2
7.	21UCAN31	**Part – IV: NME – 1 :** Introduction to Information Technology	2	3	25	75	100	2
		TOTAL	**30**				**700**	**22**

CA – Class Assessment (Internal)

SE – Summative Examination

SBS – Skill Based Subject

NME – Non –Major Elective

T – Theory

P – Practical

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COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
21UCAC31	**OBJECT ORIENTED PROGRAMMING USING C++**	**CORE – 5**	**5**	**–**	**4**

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
II	**III**	**25**	**75**	**100**

NATURE OF COURSE	Employability	✓	Skill Oriented		Entrepreneurship	

COURSE DESCRIPTION:
    This course facilitates the students with the comparative knowledge of structured oriented programming and object oriented programming paradigm. It also provides the object oriented programming features which supports modular programming.

COURSE OBJECTIVES:
- To introduce Object Oriented Programming concepts using C++ and improve their OOP Skill.
- To introduce the object oriented programming features – Encapsulation, Polymorphism and Inheritance.
- To develop programs for data file access using C++ streams.

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	recall Procedure–oriented programming and state the evolution of Object oriented programming	**Upto K3**
CO 2	identify basic concepts of OOP, benefits and its applications.	**Upto K3**
CO 3	interpret object oriented programs using classes and objects.	**Upto K3**
CO 4	demonstrate object oriented programs that can focus on reusability – Inheritance	**Upto K3**
CO 5	Apply, compile time polymorphism and runtime polymorphism with pointers and virtual functions and use File concepts	**Upto K3**

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

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OBJECT ORIENTED PROGRAMMING USING C++

UNIT – I:

Principles of object oriented programming(OOP)**:**Software evolution – OOP Paradigm – Basic concepts of OOP – Benefits of OOP – Object Oriented Languages – Applications of OOP. Introduction to C++: Tokens, Keywords, Identifiers, Variables, Operators, Manipulators, Expressions and Control Structures in C++.

UNIT – II:

Function in C++ – Main Function – Function Prototyping – Call by reference – Return by reference – Function Overloading – Friend and Virtual Functions.

UNIT – III:

Classes and objects–Constructors and Destructors – Operator overloading.

UNIT – IV:

Inheritance – Single inheritance – Multilevel inheritance – Multiple inheritance –Hierarchical inheritance– Hybrid inheritance. Pointers, Virtual Functions and Polymorphism– Managing I/O Operations.

UNIT – V:

Working with Files : Classes for File Stream Operations – Opening and Closing a File – End–of–file deletion – File pointers – Updating a File – Error Handling during File Operations–Command line Arguments.

TEXT BOOK:

E. Balagurusamy, *Object Oriented Programming With C++,* 4th Edition, Tata McGraw–Hill, New Delhi, 2008

Chapters: Unit – I: Chapter 1 – 3, **Unit – II:** Chapter 4, **Unit – III**: Chapter 5– 7,
Unit – IV: Chapters 8–10, **Unit – V:** Chapters 11.

REFERENCE BOOKS:

1. *Object–Oriented Programming With C++,* PoornachandraSarang, 2nd Edition, PHI Learning Private Limited, New Delhi, 2009
2. *Object–Oriented Programming Using C++,* Alok Kumar Jagadev, Amiya Kumar Rath And SatchidanandaDehuri, Prentice–Hall of India Private Limited, New Delhi, 2007
3. *Al Stevens, C++ Programming* , 7Th Edition, Wiley Dream Tech India Pvt Ltd , 2003
4. *Classical Data Structures* – D. Samanta, PHI, 2008

DIGITAL TOOLS:

1. https://www.geeksforgeeks.org/c–classes–and–objects/
2. https://www.programiz.com/cpp–programming/inheritance
3. https://www.programiz.com/cpp–programming/function

Mapping of CO with PSO

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3					
CO2		2	1			2
CO3	3					
CO4	2		2	3		1
CO5	2	2	2	3	2	1

3. Advanced Application   2. Intermediate Development   1. Introductory Level
COURSE DESIGNER: Prof. R. P. UMADEVI

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COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
21UCACP3	LAB : OBJECT ORIENTED PROGRAMMING USING C++	CORE – 6 LAB – III	–	5	4

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
II	III	40	60	100

NATURE OF COURSE	Employability		Skill Oriented	✓	Entrepreneurship	

COURSE DESCRIPTION:

This course facilitates the students' practical knowledge to write application programs using object oriented programming paradigm. It also provides the platform to use the object oriented programming features which supports modular programming.

COURSE OBJECTIVES:
- To introduce Object Oriented Programming concepts using C++ and improve their OOP Skill.
- To introduce the object oriented programming features – Encapsulation, Polymorphism and Inheritance.
- To develop programs for data file access using C++ streams.

LAB : OBJECT ORIENTED PROGRAMMING USING C++
Programs to be written using the following concepts

1. Simple Object oriented Programs
2. Inline and Friend functions
3. Arrays
4. Constructors (Copy, default and parameterized)
5. Static (Data member and Function)
6. Function Overloading
7. Operator Overloading
8. Types of Inheritance
9. Runtime polymorphism (Virtual Function)
10. Files

DIGITAL TOOLS:
1. https://www.geeksforgeeks.org/c–classes–and–objects/
2. https://www.programiz.com/cpp–programming/inheritance
3. https://www.programiz.com/cpp–programming/function

COURSE DESIGNER: Prof. R. P. UMADEVI

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COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
21UCAA31	OPERATIONS RESEARCH	ALLIED – 3	4	–	4

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
II	III	25	75	100

NATURE OF COURSE	Employability	✓	Skill Oriented		Entrepreneurship	

COURSE DESCRIPTION:
This course is designed to teach various concepts of Operation Research to the students.

COURSE OBJECTIVES:
- To Explain the brief history of Operation Research
- To Explain how to formulate the general Linear Programming Problem and solve by Graphical method.
- To Explain the algorithm and method to solve Simplex and Big – M method.
- To Explain the Hungarian algorithm and method to solve Assignment problems
- To Explain and Solve the various methods in Transportation problems.

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	state the history of Operation Research	Upto K3
CO 2	describe Linear Programming Problem and Solve by using Graphical method	Upto K3
CO 3	solve Simplex method and Big – M method	Upto K3
CO 4	demonstrate and solve Assignment problems and Travelling Salesman problem	Upto K3
CO 5	illustrate various methods in Transportation problem	Upto K3

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

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OPERATIONS RESEARCH

UNIT – I:
Introduction – Role of OR – Classification of models – Characteristics of a good model – Principles of Modelling – General methods for solving O.R. – Main phases of O.R. – Limitation

UNIT – II: FORMULATION AND GRAPHICAL SOLUTION
Introduction – Formulation of LPP – Basic assumptions – Graphical method of the Solution of a LPP – some more cases – Advantage of Linear Programming – Limitations of Linear Programming

UNIT – III: GENERAL LINEAR PROGRAMMING
General Linear Programming Problem – Definition – Canonical and Standard forms of LPP – Simplex method – Simplex Algorithm – Artificial Variables Technique – Big M Method(Example problems only)

UNIT – IV: TRANSPORTATION MODEL
Introduction – Mathematical Formulation of TP – Methods of finding IBFS – MODI method (Test for optimal solution) – Degeneracy in TP – Unbalanced TP

UNIT – V: ASSIGNMENT PROBLEM
Introduction – Mathematical formulation of an AP – Assignment Algorithm – Unbalanced AP – Maximization case in AP – Restrictions in Assignments – Travelling Salesman problem.

TEXT BOOKS: *Resource Management Techniques*
Author   : Prof. V. Sundaresan, K. S. Ganapathy Subramanian, K. Ganeshan
Publications   : A. R. Publications
Unit – 1 Section 1.1 – 1.9, Page no. 1.1 – 1.8
Unit – 2 Section 2.1 – 2.8, Page no. 2.1 – 2.41
Unit – 3 Section 3.1.1 – 3.1.4, 3.2 , 3.2.1, Page no. 3.1 – 3.42
Unit – 4 Section 7.1 – 7.5, Page no. 7.1 – 7.64
Unit – 5 Section 8.1 – 8.9, Page no, 8.1 – 8.49

REFERENCE BOOKS: (i) *Linear Programming Problem* , (ii) *Operation Research*
Author   : Arumugam and Isaac, Kanti and Swarup, Manmohan
Publications   : Prentice Hall, 2002, Harvard University Press, 2001.

Mapping of CO with PSO

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	1	2	2	1	1	1
CO2	1	2	2	1	1	2
CO3	1	2	2	1	1	2
CO4	1	2	2	1	1	1
CO5	1	2	2	1	1	1

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

COURSE DESIGNER: PROF .V. B. SHAKILA

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COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
21UCASP1	LAB: OFFICE AUTOMATION	SBS – 3 LAB	–	2	2

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
II	III	40	60	100

NATURE OF COURSE	Employability		Skill Oriented	✓	Entrepreneurship	

COURSE DESCRIPTION:
   This course helps to learn the basic practical knowledge of preparing Documentation, Worksheet and Power Point presentation.

COURSE OBJECTIVES:
   - To acquire knowledge on editor, spread sheet, slide preparation
   - To improve creative thinking in presentation software

LAB: OFFICE AUTOMATION
1. MS – WORD

1. Text Manipulation: Write a paragraph about your institution and Change the font size and type, Spellcheck, Aligning and justification of Text

2. Bio data: Prepare a Bio–data.

3. Find and Replace: Write a paragraph about yourself and do the following. Find and Replace–Use Numbering, Bullets, Footer and Headers.

4. Tables and manipulation: Creation, Insertion, Deletion (Columns and Rows). Create a mark sheet.

5. Mail Merge: Prepare an invitation to invite your friends to your birthday party. Prepare at least five letters.

2. MS – EXCEL

1. Data sorting–Ascending and Descending (both numbers and alphabets)

2. Mark list preparation for a student

3. Individual Pay Bill preparation.

4. Invoice Report preparation.

5. Drawing Graphs. Take your own table.

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3. MS – POWERPOINT

1. Create a slide show presentation for a seminar.

2. Preparation of Organization Charts

3. Create a slide show presentation to display percentage of marks in each semester for all students

    1. Use bar chart (X–axis: Semester, Y–axis: %marks).

    2. Use different presentation template different transition effect for each slide.

DIGITAL TOOLS:

1. https://ptgmedia.pearsoncmg.com/images/9780735623026/samplepages/9780735623026.pdf

2. https://www.dit.ie/media/ittraining/msoffice/MOAC_Excel_2016_Core.pdf

3. https://ptgmedia.pearsoncmg.com/images/9780735697799/samplepages/9780735697799.pdf

COURSE DESIGNER: Prof. R. P. UMADEVI

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COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
21UCAN31	INTRODUCTION TO INFORMATION TECHNOLOGY	NME – 1	2	–	2

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
II	III	25	75	100

NATURE OF COURSE	Employability	✓	Skill Oriented		Entrepreneurship	

COURSE DESCRIPTION:

To introduce the computer knowledge to the students and make familiar with operations, implementations and applications

COURSE OBJECTIVE:

To introduce I.T in various platform – knowledge about input and output devices – application program – operating systems and internet.

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 basic of Information Systems and its applications	Upto K3
CO 2	discuss CPU and Numbering system	Upto K3
CO 3	understand Input/Output devices and storage devices.	Upto K3
CO 4	know about software and operating systems	Upto K3
CO 5	apply and use internet and WWW.	Upto K3

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

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INTRODUCTION TO INFORMATION TECHNOLOGY

UNIT– I: INTRODUCTION

Information systems – software and data – IT in Business and Industry – IT in the Home and at Play – IT in Education and Training – IT in Entertainment and the Arts – IT in Science , Engineering and Mathematics – Computers in Hiding.

UNIT– II: THECOMPUTER SYSTEM AND CENTRAL PROCESSING UNIT

Types of Computers – Corporate and Department computers – Desktop and Personal computers – The Anatomy of computer – The Foundation of MODERN INFORMATION TECHNOLOGY; Binary numbers, Digital signals, Bits and Bytes – Central Processing unit – Memory.

UNIT– III: INPUT AND OUTPUT

I/O Devices – Keyboards – Inputting Text, Graphics – Pointing Devices – The FOUNDATION OF MODERN OUTPUTS : Pixels and Resolutions, Fonts, Color – Display Screens – Printers. SECONDARY STORAGE : The foundation of modern storage ; How data is stored, Storage characteristics – STORAGE MEDIA : Floppy Disk, Hard disk, Drivers, Optical disk – Backing up of data.

UNIT– IV: SOFTWARE

Introduction – User Interface – Application programs – OPERATING SYSTEMS: Introduction, Types, File management and Utilities – Major Software issues.

UNIT– V: INTERNET AND WORLD WIDE WEB

Introduction – The Web – Getting connected to the Web – Browsing the Web – Locating information on the Web – Web multimedia.

TEXT BOOKS:

Information Technology – The Breaking Wave By Dennis P.Curtain, Kim Foley, KunalSen, Cathlen Morin – Tata MCGraw Hill Publ.

CHAPTERS and SECTIONS

Unit I – Chap 2 (Except 2.1, 2.10,2.11) , **Unit II** – Chap 3 (Except 3.7 to 3.9)
Unit III – Chap 4 & 5 (Except 4.5,4.12 to 4.15 and 5.6, 5.8,5.9)
Unit IV – Chap 6 (Except 6.8,6.10,6.11) , **Unit V** – Chap 1 (Except 1.7)

DIGITAL TOOLS:

1. https://www.computerhope.com/issues/ch001732.htm
2. https://en.wikipedia.org/wiki/Central_processing_unit
3. https://www.techopedia.com/definition/7650/input–output–device–io–device

Mapping of CO with PSO

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3					
CO2		2	1			2
CO3	2					
CO4	2		2	3		1
CO5	2	2	2	3	2	1

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

COURSE DESIGNER: Prof. O. K. HARIHARAN

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SOURASHTRA COLLEGE, MADURAI – 625004
(An Autonomous Institution Re-accredited with 'B+' grade by NAAC)
BACHELOR OF COMPUTER APPLICATIONS (B.C.A)
SYLLABUS (Under CBCS based on OBE)
(with effect from 2021 – 2022)

COURSE STRUCTURE – IV SEMESTER

S. No.	Sub. 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.	21UCAC41	**Part – III: Core – 7:** Programming in Java	5	3	25	75	100	4
4.	21UCACP4	**Part – III: Core – 8:** **Lab – IV**: Java Programming	5	3	40	60	100	4
5.	21UCAA41	**Part – III: Allied – 4:** Numerical Methods	4	3	25	75	100	4
6.	21UCASP2	**Part – IV: SBS – 4:** **Lab:** Multimedia	2	3	40	60	100	2
7.	21UCAN41	**Part – IV: NME – 2:** Web Programming	2	3	25	75	100	2
8.		**Part – V:** Extension Activities	–	–	–	–	100	1
		TOTAL	30				800	23

CA   – **Class Assessment (Internal)**

SE   – **Summative Examination**

SBS   – **Skill Based Subject**

NME   – **Non –Major Elective**

T   – **Theory**

P   – **Practical**

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COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
21UCAC41	**PROGRAMMING IN JAVA**	**CORE – 7**	**5**	**–**	**4**

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
II	**IV**	**25**	**75**	**100**

NATURE OF COURSE	Employability	✓	Skill Oriented		Entrepreneurship	

COURSE DESCRIPTION:

This course facilitates the students with the comparative knowledge of procedure oriented programming and applet programming paradigm. It also provides the object oriented programming features which supports modular programming and applet programming features which support web based programming.

COURSE OBJECTIVES:

- To introduce Object oriented programming and Applet programming concepts using JAVA and improve their OOP and Applet programming Skills.
- To introduce Object oriented programming and java programming features– Encapsulation, Polymorphism, Inheritance, Multithreading, Exception handling, Interface, Package and Applets and Graphics.
- To develop programs for data file access using JAVA streams classes

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	outline the basic concepts of Object oriented programming and java evolution and features	**Upto K3**
CO 2	recognize the basic concepts of OOP, java features and its applications.	**Upto K3**
CO 3	illustrate object oriented programs using classes and objects and Applet and Graphics programs.	**Upto K3**
CO 4	apply object oriented programs ,multithreading, exception handling, interface, package and applet program that can focus on java features	**Upto K3**
CO 5	demonstrate compile time polymorphism and runtime polymorphism with overloading and interface and File concepts	**Upto K3**

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

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PROGRAMMING IN JAVA

UNIT – I:
Java Evolution: Java Features – How Java differs from C and C++ – Java and Internet – Java and World Wide Web – Web Browsers – Hardware and Software Requirements – Java Environment. **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 – Scope of Variables –Symbolic Constants – Type Casting.

UNIT – II:
Operators and Expressions: Arithmetic, Relational, Logical Operators – Increment and Decrement, Conditional, Bitwise Operators – Special Operators – Arithmetic Expressions – Evaluation of Expressions – Precedence of Arithmetic Operators – Mathematical Functions. **Decision Making and Branching:** Decision Making with If statement – Simple If Statement – If else Statement – Nesting If Else Statement – the ElseIf Ladder – The switch Statement – The?: operator. **Decision Making and Looping:** The while statement – The do statement – The for statement – Jumps in Loops. **Class, Objects and Methods:** Defining a Class – Fields and Methods Declaration – Creating Objects – Constructors – Methods Overloading – Static Members – Nesting of Methods – Inheritance – Overriding Methods – Final Variables and Methods – Final Classes –Finalizer Methods– Abstract Methods and Classes.

UNIT – III:
Arrays, Strings and Vectors: One–dimensional Arrays – creating an Array – Two dimensional Arrays –Strings – Vectors – Wrapper Classes – Enumerated Types. **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 – Hiding Classes – Static Import.

UNIT – IV:
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 – Implementing the Runnable Interface – **Managing Errors and Exceptions:** Types of Errors – Exceptions – Syntax of Exception Handling Code – Multiple Catch Statements – Using Finally Statement – Throwing our own Exceptions– **Applet Programming:** How Applets differ from Applications – Preparing to write Applets – Building Applet Code – Applet Life Cycle – Creating an executable Applet – Designing a WebPage – Applet Tag – Adding Applet to HTML file – Running the Applet.

UNIT – V:
Graphics Programming: The Graphics Class – Lines and Rectangles – Circles and Ellipses, Drawing Arcs – Drawing Polygons – Line Graphs – Using Control Loops in Applets – Drawing Bar Charts. **Managing Input/Output Files in Java:** Concept of Streams – Stream Classes – Byte Stream Classes – Character Stream Classes – Using Streams – Other Useful I/O Classes – Using the file Class – I/O Exceptions – Creation of Files – Reading / Writing Characters – Reading / Writing Bytes.

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TEXT BOOK:
Programming with Java, A Primer, 3e, E. Balagurusamy, TATA McGraw–Hill Company, 2008.(Chapters : 1 to 16)

UNIT I   : Chapters : 1,2,3,4
UNIT II   : Chapters : 5,6,7,8
UNIT III   : Chapters : 9,10,11
UNIT IV   : Chapters : 12,13,14
UNIT V   : Chapters : 15,16.1 to 16.12

REFERENCE BOOKS:
1. *Java and Object–Oriented Programming Paradigm,* Debasish Jana, Prentice–Hall of India Private Limited, New Delhi, 2008.
2. *JAVA2–The complete reference,* Herbert schildt, Tata Mcgraw–Hill publishing Company Ltd,New Delhi ,5th edition,2008

DIGITAL TOOLS:
1. www.tutorialspoint.com/java
2. http://www.w3schools.in/java–tutorial/
3. http://www.guru99.com/java–tutorial/
4. https://www.programiz.com/java–programming

Mapping of CO with PSO

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3					
CO2		2	1			2
CO3	3					
CO4	2		2	2		1
CO5	2	2	2	3	2	1

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

COURSE DESIGNER: Prof. O. K. HARIHARAN

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COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
21UCACP4	LAB : JAVA PROGRAMMING	CORE – 8 LAB – IV	–	5	4

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
II	IV	40	60	100

NATURE OF COURSE	Employability	☐	Skill Oriented	✓	Entrepreneurship	☐

COURSE DESCRIPTION:

This course facilitates the students' practical knowledge to write application programs using object oriented programming and applet programming paradigm. It also provides the platform to use the object oriented Programming features which supports modular programming and applet programming features which supports web based programming.

COURSE OBJECTIVES:

- To introduce Object Oriented Programming and Applet programming concepts using JAVA and improve their OOP and Applet programming Skill.
- To introduce object oriented programming and java features – Encapsulation, Polymorphism and Inheritance, Multithreading, Exceptional handling, Interface, Package and Applets.
- To develop programs for data file access using JAVA streams.

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LAB : JAVA PROGRAMMING
Programs to be written using the following concepts

1. To perform addition of complex numbers using class and objects.

2. To perform multiplication of matrices using class and objects.

3. To perform area and volume calculation using method overloading and overriding.

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 another list. 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. File – byte stream.

13. File – character stream.

14. Write an Applet illustrating sequence of events in an applet.

15. Write an Applet program to design a simple calculator.

16. Write an Interactive Applet program which will make the balls of various colours to move across the screen within the specified time limit. The number of balls and the time limit for ball animation should be obtained from the User when the applet starts.

DIGITAL TOOLS:
1. www.tutorialspoint.com/java
2. http://www.w3schools.in/java–tutorial/
3. http://www.guru99.com/java–tutorial/
4. https://www.programiz.com/java–programming

COURSE DESIGNER: Prof. O. K. HARIHARAN

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COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
21UCAA41	NUMERICAL METHODS	ALLIED – 4	4	–	4

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
II	IV	25	75	100

NATURE OF COURSE	Employability	✓	Skill Oriented		Entrepreneurship	

COURSE DESCRIPTION:

This course is designed to teach various methods involved in Numerical Methods by iteration process.

COURSE OBJECTIVES:

- To Explain the various methods in Trigonometry, Sine and Cosine functions by Iteration process.
- To Explain and solve the methods in Simulation equations.
- To Explain and solve the methods in Interpolation.
- To Explain and solve the methods in Numerical Differentiation and Integration
- To Explain an solve the methods in Differential equation

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 and solve different methods in Algebraic and Transcendental equations	Upto K3
CO 2	summarize and solve the various methods involved in Simulation equation	Upto K3
CO 3	demonstrate the different methods involved in Interpolation	Upto K3
CO 4	illustrate and solve the various methods in Numerical Differentiation and Integration	Upto K3
CO 5	discuss and solve the different methods in Differential Equation	Upto K3

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

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NUMERICAL METHODS

UNIT – I:
Algebraic and Transcendental equations : Errors in Numerical computation – Iteration methods – Bisection method – Regulafalsi method – Newton Raphson method.

UNIT – II:
Gauss Elimination method – calculation of inverse of matrix – Gauss Seidal method. Curve fitting method of least squares.

UNIT – III:
Newton's Interpolation formula – Central Differences Interpolation formula – Lagrange's Interpolation formula – Inverse Interpolation

UNIT – IV:
Numerical Differentiation: Newton's Forward and Backward Difference formula
Numerical Integration : Trapezoidal rule – Simpson's rule . Eigen values and Eigen vectors of a matrix.

UNIT – V:
Numerical Solution of Differential Equation : Euler's method – Taylor's Series method – Range Kutta method

TEXT BOOKS: *Numerical Methods*
Author : S. Arumugam and Thangapandi Isaac, A. Soma Sundaram
Publications : Scitech Publications, Chennai 2002
Unit –1 Page no. 3.1 – 3.5, **Unit – 2** Page no. 4.3 , 4.5 and 4.8,
Unit – 3 Page no. 7.3, 7.3 and 7.6, **Unit – 4** Page no. 8.1, 8.2, 8.5, 5.0 – 5.2,
Unit – 5 Page no, 10.1 – 10.4
REFERENCE BOOKS: *Numerical Methods*
Author : T. Veerarajan and J. Ramchandran 2nd edition
Publications : Tata MC raw Hill 2006..
DIGITAL TOOLS:
1. http://csw.uobaghdad.edu.iq/wp–content/uploads/sites/30/uploads/computer%20science/Lectures/2nd%20year/NUM%20ANALYSIS.pdf
2. https://byjus.com/maths/gauss–elimination–method/
3. https://nptel.ac.in/content/storage2/courses/122104018/node109.html
4. http://www.vbspu.ac.in/wp–content/uploads/2016/02/Differentiation–and–Integration.pdf
5. http://faculty.olin.edu/bstorey/Notes/DiffEq.pdf

Mapping of CO with PSO

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	1	2	2	1	1	2
CO2	1	2	2	1	1	2
CO3	1	2	2	1	1	2
CO4	1	2	2	1	1	2
CO5	1	2	2	1	1	2

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

COURSE DESIGNER: Prof. V. B. SHAKILA

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COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
21UCASP2	**LAB : MULTIMEDIA**	**SBS–4 LAB**	–	**2**	**2**

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
II	**IV**	**40**	**60**	**100**

NATURE OF COURSE	Employability		Skill Oriented	✓	Entrepreneurship	

COURSE DESCRIPTION:

This course is designed to acquire the knowledge of various multimedia software to develop the content for web pages and developing stand–alone projects.

COURSE OBJECTIVES:
- To learn about the basic drawing concepts
- To learn about Multimedia concept using various software.

LAB : MULTIMEDIA

MULTIMEDIA (Flash/Photoshop/Premier/3d Studio Max)

1. Creating a simple image.

2. Editing existing image's brightness, mode color and add and edit layer style.

3. Stitch and edit two images into single image. Use selection tools Lasso tool, Clone stamp.

4. Study about time line concepts. Insert text, image. Use scaling rotation alignment.

5. Study Masking concepts. Use audio in the movie.

6. Add buttons, menus, actions to the movie.

7. Export movie Use multiple scenes.

8. Insert text, image, sprite to the movie.

9. Add effects to the text (predefined and user defined)

DIGITAL TOOLS:
1. http://www.trendyflash.com/
2. https://www.adobe.com/in/products/animate.html
3. https://www.freephototool.com/
4. https://www.autodesk.eu/products/3ds–max/overview

COURSE DESIGNER: Prof. O. K. HARIHARAN

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COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
21UCAN41	WEB PROGRAMMING	NME – 2	2	–	2

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
II	IV	25	75	100

NATURE OF COURSE	Employability		Skill Oriented	✓	Entrepreneurship	

COURSE DESCRIPTION:

This course helps to provide the fundamental knowledge of Web Programming using HTML language which enhances the user to design Web Page.

COURSE OBJECTIVE:

To understand the concept of web page designing using tags

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	acquire knowledge about various HTML basic tags, Paragraph and Formatting tags.	Upto K3
CO 2	understand about Lists, marquee, ruler, break and data definition tags and apply in web programming.	Upto K3
CO 3	understand about Table building tags and its attributes and apply in Webpage creation.	Upto K3
CO 4	apply anchor, link, image and frame tags.	Upto K3
CO 5	understand and develop sample web application using Form tag, input tag and its components	Upto K3

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

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WEB PROGRAMMING

UNIT – I:
Overview of HTML–structure of a html program–HEAD tag–BODY tag–paragraph tag–formatting tag– (Bold–underline–italic–strike thru–superscript–subscript).

UNIT – II:
LISTS–Ordered list and unordered list–marquee tag–break tag–ruler tag–foot tag–data definition tag.

UNIT – III:
TABLES–TABLE building tags and attributes of table–table tag–table header tag–table row tag–table data tag–row span–column span.

UNIT – IV:
LINKS–linking pages using anchor tag–attributes of anchor tag–image tag and its attributes–frame tag.

UNIT – V:
FORMS – Formtag–input tag–types–text, radio button, check, password–sample webpage creation.

TEXT BOOKS:
HTML COMPLETE – BPB publications–2nd edition
Unit I : Chap 3
Unit II : Page No. 817 to 821,718,719,735,736, 746 to 748, 757,837 to 839 and 915 to 917
Unit III: Chap 7
Unit IV: Chap 5, Chap 8(Page No. 266 to 277), Chap 4 (Page No. 129 to 140)
Unit V : Chap 11

DIGITAL TOOLS:
1. **https://www.tutorialspoint.com/html/html_overview.htm**
2. **https://www.w3schools.com/html/html_lists.asp**
3. **https://developer.mozilla.org/en–US/docs/Learn/HTML/Tables/Basics**
4. **http://www–b.deis.unibo.it/courses/TW/DOCS/w3schools/html/html_links.asp.html**
5. **https://www.javatpoint.com/html–form**

Mapping of CO with PSO

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3					
CO2		3		2		1
COs		3	2		1	
CO4	2		3	2		1
CO5	3	2	1	3	2	1

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

COURSE DESIGNER: Prof. O. K. HARIHARAN

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