



SRI MANAKULA VINAYAGAR ENGINEERING COLLEGE

(An Autonomous Institution)

(Approved by AICTE, New Delhi & Affiliated to Pondicherry University)
(Accredited by NBA-AICTE, New Delhi, ISO 9001:2000 Certified Institution &
Accredited by NAAC with "A" Grade)

Madagadipet, Puducherry - 605 107



School of Arts and Science

Department of Computational Studies

Minutes of Board of Studies Meeting for B.Sc. CS

The Second meeting of Board of Studies for the course B.Sc. Computer Science in the Department of Computational Studies was held on 09.04.2021 at 02:00 P.M in the Department of Computational Studies, School of Arts and Science, Sri Manakula Vinayagar Engineering College and also through online with the Head of the Department in the Chair.

The following members were present for the Second Meeting of Board of Studies.

S. No.	Name of the Member with Designation and official Address	Responsibility in the BoS
1	Mr. M. SHANMUGAM, M.Sc., M.Phil., M.E., SET, (Ph.D) Assoc. Prof. and Head, Department of Computational Studies, School of Arts and Science, SMVEC	Chairman
2	Dr. R. RAMKUMAR MCA, M.Phil, M.Tech, Ph.D Associate Prof and Head, School of Computer Science, VET Institute of Arts and Science, Thindal, Erode. Email:ramkumar2006@gmail.com Mobile: 9600966086	University Nominee
3	Dr. V. J. CHAKRAVARTHY, MCA, M.Phil, Ph.D, Professor, PG Department of Computer Science, The New College (Autonomous), Chennai. Email:chakkuckm1808@gmail.com Mobile: 9884161687	Subject Expert (Academic Council Nominee)
4	Dr. S. MANJU PRIYA, M.Sc., M.Phil., Ph.D., SET, Professor, Department of Computer Science, Karpaga Academy of Higher Education, Coimbatore. Email:smanjupr@gmail.com Mobile: 9600553725	Subject Expert (Academic Council Nominee)
5	Mr. C. VIMAL RAJ, B.Tech., Systems Architect, TCS, Chennai. Email:vimal06vishwa@gmail.com Mobile: 9952578333	Industry Expert
6	Dr. P. AURCHANA, M.C.A., M.Tech., Ph.D. Associate Professor, Department of MCA, SMVEC. Email: aurchanamca@smvec.ac.in Mobile: 7603855239	Internal member
7	Mr. R. RAMAKRISHNAN, M.C.A., M.Phil., M.Tech., (Ph.D) Associate Professor, Dept. of MCA, SMVEC, E-mail:ramakrishnanmca@smvec.ac.in Mobile:9843797091	Internal member
8	Mr. P. KRISHNAMOORTHY, M.Sc., M.Phil., B.Ed. Assistant Professor, Department of Mathematics, School of Arts and Science, SMVEC krishnamat14@gmail.com Cell: 9750028056	Internal member

Agenda of the Meeting

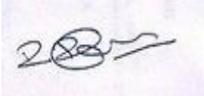
- 2.1) Confirmation of minutes of 1st meeting of Board of Studies and modifications made.
- 2.2) To discuss about the Regulations 2020 (R-2020) of B.Sc. Computer Science
- 2.3) Discussion about the Vision and Mission of the Department of Computational Studies.
- 2.4) To discuss and approve the Academic Calendar for the Odd semester (2021 – 2021).
- 2.5) Discussion about the Curriculum Structure of B.Sc. Computer Science.
- 2.6) To discuss and approve the Syllabi of III and IV semesters for the B.Sc. Computer Science and the students admitted in the Academic Year 2020-21. (First Year).
- 2.7) To discuss about the uniqueness of the Curriculum (R-2020).
- 2.8) To discuss and approve Evaluation Systems.
- 2.9) To discuss about the Innovative Teaching / Practices Methodology adopted to handle the emerging / Advanced Technological concept courses.
- 2.10) To discuss about the Panel of examiners and to approve for the Academic Council.
- 2.11) Any other item with the permission of chair.

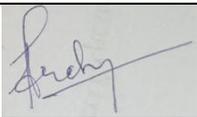
Minutes of the Meeting

Mr. M. Shanmugam, Chairman, BoS opened the meeting by welcoming and introducing the external members, to the internal members and the meeting thereafter deliberated on agenda items that had been approved by the Chairman.

Item:1	<p>Chairman, BoS, appraised the minutes of 1st meeting of BoS, its implementation and then it is confirmed with the approval for the incorporation of minor revisions needed as mentioned below.</p> <ol style="list-style-type: none">a) C++ and Data Structures must be separated.b) Fundamentals of Computing can be included with Problem Solving using C subject.c) Include Number systems in Digital subject.d) Exclude Sorting and Searching Techniques in Programming in C Lab, because it is studied in C++ Lab also.e) Study about ICs and Johnson and Ring counters can be included in Digital Lab.f) Basic Operating System concepts can be included in Operating System subject. <p>The above corrections are approved by BoS members and the details are given in Annexure- I.</p>
Item:2	Regulation 2020 (R-2020) has been verified and approved.
Item:3	The Vision, Mission of Department of Computational Studies are revised, have been presented in the 2nd meeting of BoS. It was approved by BoS members and given in Annexure- II.
Item:4	The Academic Calendar for the Odd Semester of Academic year 2020-21(given in Annexure-III) were discussed and approved.
Item:5	<p>Curriculum Structure was discussed and recommended to Academic Council. The following modifications are recommended by the BoS Experts.</p> <ol style="list-style-type: none">a) In Discipline Specific Elective subjects, it is recommended to include “Client / Server Technology”, “Data Mining”, “R Programming”, “Hadoop for Data Science” and “MATLAB for Data Visualization” subjects.b) Change the title of “Computer Networks” subject in Semester-V as “Network Technologies”.c) In VI semester, instead of “Web Technology” subject, include “.Net Technology”, because “Web Programming” is in EEC-1. <p>The above corrections have been made in the curriculum and the details are given in Annexure- IV.</p>

Item:6	<p>Syllabus for Semester-III and Semester – IV were discussed and recommended to Academic Council.</p> <p>The following modifications are recommended by the BoS Experts.</p> <p>a) In Programming in C++ subject in Semeter-II, Eliminate the unit-I and shift the first 6 topics in the unit-II to Unit-I. Move the “Pointers” topic to Unit-IV. Recommended to remove all the Stream concepts except I/O stream. Move I/O stream topic to Unit-V.</p> <p>b) In Semester-V, “Network Technologies” subject, include some wireless technologies topics.</p> <p>The above corrections have been made in the curriculum and the details are given in Annexure- V.</p>
Item:7	<p>The uniqueness of the curriculum was discussed and accepted by BoS Members. Employability Enhancement Course for Semester-I to Semester-II are listed below:</p> <p>Semester-I => Web Programming Semester-II => Java Programming Semester-III => Python Programming Semester-IV => Mobile Application Development / RDBMS Semester-V => ARDUINO / IOT Semester-VI => Data Science / Machine Learning</p>
Item:8	<p>Evaluation system was discussed and accepted by BoS experts.</p>
Item:9	<p>Discussed about Innovative Teaching / Practices Methodology adopted to handle the emerging / advanced technologies and experts have appreciated it.</p>
Item:10	<p>Panel of Examiners also was discussed and recommended to Academic Council.</p>
Item:11	<p>Discussion of the Opportunities for B. Sc. Computer Science.</p>

S. No.	Name of the Member with Designation and official Address	Responsibility in the BoS	Signature
1	Mr. M. SHANMUGAM, M.Sc., M.Phil., M.E., SET, (Ph.D) Assoc. Prof. and Head, Department of Computational Studies, School of Arts and Science, SMVEC	Chairman	
2	Dr. R. RAMKUMAR MCA, M.Phil, M.Tech, Ph.D Associate Prof and Head, School of Computer Science, VET Institute of Arts and Science, Thindal, Erode. Email:ramkumar2006@gmail.com Mobile: 9600966086	University Nominee	
3	Dr. V. J. CHAKRAVARTHY, MCA, M.Phil, Ph.D, Professor, PG Department of Computer Science, The New College (Autonomous), Chennai. Email:chakkuckm1808@gmail.com Mobile: 9884161687	Subject Expert (Academic Council Nominee)	
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6	Dr. P. AURCHANA, M.C.A., M.Tech., Ph.D. Associate Professor, Department of MCA, SMVEC. Email: aurchanamca@smvec.ac.in Mobile: 7603855239	Internal member	
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8	Mr. P. KRISHNAMOORTHY, M.Sc., M.Phil., B.Ed. Assistant Professor, Department of Mathematics, School of Arts and Science, SMVEC krishnamat14@gmail.com Cell: 9750028056	Internal member	

The meeting was concluded at 4:00 PM with vote of thanks by **Mr. M. Shanmugam**, Head of the Department, Department of Computational Studies.

Mr. M. Shanmugam,
HOD / Dept. of Computational Studies,
Chairman-BoS (B.Sc.CS)

Dean SAS
[Dr. S. Muthulakshmi]

Dean Academics
[Dr. S. Anbumalar]

Director cum Principal
[Dr. V.S.K. Venkatachalapathy]

Annexure – I

(a. C++ and Data Structures have been separated as individual subjects)

A20CPT203	PROGRAMMING IN C++	L	T	P	C
		4	0	0	4

Course Objectives

- Define Encapsulation, Inheritance and Polymorphism.
- Solve the problem with object oriented approach.
- Analyze the problem statement and build object oriented system model.
- Describe the characters and behavior of the objects that comprise a system.
- Explain function overloading, operator overloading and virtual functions.

Course Outcomes

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

CO1 – To learn programming from real world examples.

CO2 – To understand Object oriented approach for finding Solutions.

CO3 – To create computer based solutions to various real-world problems using C++.

CO4 – To learn various concepts of object oriented approach towards problem solving.

CO5 – Develop the applications using object oriented programming with C++.

UNIT I INTRODUCTION TO C++ AND BASICS OF OOP (12 Hrs)

Basic components of a C++ - Program and program structure - Compiling and Executing C++ Program - Basic Concepts of Object-Oriented Programming: Benefits of OOP – Object Oriented Languages – Applications of OOP.

UNIT II PRINCIPLES OF OBJECT ORIENTED PROGRAMMING (12 Hrs)

Classes objects - data members - member functions –Access Specifiers- this Pointer - Friends - Friend Functions - Friend Classes - Friend Scope - Static Functions - Constructors and Destructors - Static variables and Functions in class - Operator Overloading in C++ - Overloading Unary Operators - Overloading binary operators.

UNIT III INHERITANCE (12 Hrs)

Inheritance in C++ - Types of Inheritance - Multiple Inheritance. Virtual Functions - Polymorphism - Abstract classes. Real time examples in OOPS.

UNIT IV POINTERS, EXCEPTION HANDLING AND FILES (12 Hrs)

Pointers - Objects and Pointers - Exception Handling: Exception – Basics – Exception Handling Mechanism – Throwing Mechanism – Catching Mechanism – Re-throwing Exception. Standard input and output operations: C++ I/Ostream hierarchy - File input and output: Reading a File - Managing I/O Streams - Opening a File – Different Methods - Checking for Failure with File Commands - Checking the I/O Status Flags - Dealing with Binary Files - Useful Functions.

UNIT V TEMPLATES (12 Hrs)

Class templates: Implementing a class template - Implementing class template member functions - Using a class template - Function templates - Implementing function templates - Using template functions.

Text Books

1. E. Balagurusamy, "Object Oriented Programming with C++", McGraw Hill, 7th Edition, 2018.
2. Herbert Schildt, "C++ - The Complete Reference", McGraw Hill Education, 4th Edition, 2017.

Reference Books

1. Herbert Schildt, "C++ - From the Ground Up", McGraw Hill Education, 2nd Edition, 2010.
2. Thomas L. Floyd, "Electronic Devices", 9th Edition, Pearson Education, 2012.
3. Stanley B. Lippman, Stanley Lippman, Barbara Moo, "C++ Primer", Addison-Wesley Professional, 5th Edition 2012.

Web Resources

1. <https://www.tutorialspoint.com/cplusplus/index.htm>
2. <http://www.cplusplus.com/doc/tutorial/>
3. <https://www.w3schools.com/cpp/>
4. <https://www.javatpoint.com/cpp-tutorial>
5. <https://www.geeksforgeeks.org/cpp-tutorial/>

(b. Fundamentals of Computing can be included with Problem Solving using C subject.)

A20CPT101	PROBLEM SOLVING USING C (Common to B.Sc.CS and B.C.A.)	L	T	P	C	Hrs
		4	0	0	4	60

Course Objectives

- To understand the Fundamentals of Computers and introduction to C language.
- To study the basic terminologies of C language and arrays
- To understand the Functions, Structures and Unions.
- To understand the concepts of Pointers.
- To study about File Management Operations in C.

Course Outcomes

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

CO1 - Develop simple applications in C using basic constructs.

CO2 - Incorporating the use of sequential, selection and repetition control structures into a program.

CO3 - Develop simple programs using functions, structures and unions.

CO4 - Design and develop programs using Pointers.

CO5 - Understand the File management Operations and Pre-processor Directives.

UNIT I INTRODUCTION TO C

(12 Hrs)

Fundamentals of Computer: Computer Definition – Block Diagram of Computer – Types of Computer – Characteristics of Computer – Applications of Computer.

C programming: Overview of C – Constants – Compiling a C Program - Variables and Data Types - Technical Difference between Keywords and Identifiers -Types of C Qualifiers and format specifiers - Operators and Expressions - Operators Precedence -Type conversion - Input-Output Statements.

UNIT II DECISION MAKING

(12 Hrs)

Decision making and branching - Relational operators – Logical operators - if – if else - if else if – nested if, Switch-case.

UNIT III LOOPING AND ARRAYS

(12 Hrs)

Looping: while - do while – for – break – continue - nested loop. Arrays: One Dimensional Arrays-Two-Dimensional Arrays-Multi-Dimensional Array-Dynamic arrays-Character Arrays and String-Sorting - Searching.

UNIT IV FUNCTIONS, POINTERS

(12 Hrs)

Functions: Introduction - Definition – Declaration – Categories of Functions - Nesting of Functions, Recursive functions - Passing Arrays to Functions - Strings – String library function. Pointers: Introduction - Declaring Pointer Variables - Initialization of Pointer Variables - Accessing the address of a variable - Accessing a variable through Pointer - Chain of Pointers - Pointer Expressions - Pointers and arrays – Pointers and functions – Call by Reference - Pointers and character strings - Array of Pointers - Pointers and Structures.

UNIT V STRUCTURES AND UNIONS, FILE MANAGEMENT

(12 Hrs)

User defined data types: Introduction – Structure: definition - declaration - Arrays of Structures – Nested structures – Passing structures to functions – Union - Enumeration and Typedef. Introduction to File Handling in C, Input and Output operations on a file – Error Handling - Random access to files – Command Line Arguments. Introduction to Pre-Processor – Macro substitution directives – File inclusion directives – Conditional Compilation Directives – Miscellaneous directives.

Text Books

1. Balagurusamy. E, "Programming in ANSI C", Tata McGraw Hill, 8th Edition, 2019.
2. Byron S Gottfried and Jitendar Kumar Chhabra, "Programming with C", Tata McGraw Hill Publishing Company, 4th Edition, New Delhi, 2015.
3. Herbert Schildt, "C: The Complete Reference", McGraw Hill, 4th Edition, 2014.
4. Yashwant Kanetkar, "Let us C", BPB Publications, 16th Edition, 2017.
5. Archana Kumar, "Computer Basics with Office Automation", Dream tech Press – Wiley Publisher, 2019.
6. ReemaThareja, "Fundamentals of Computing & C Programming" Oxford University Press, 2012.

Reference Books

1. Ashok N Kamthane, "Computer Programming", Pearson education, 2rd Impression, 2012.
2. VikasVerma, "A Workbook on C ", Cengage Learning, 2rd Edition, 2012.
3. Dr. P. Rizwan Ahmed, "Office Automation", Margham Publications, 2016.
4. P.Visu, R.Srinivasan and S.Koteeswaran, "Fundamentals of Computing and Programming", 4th Edition, Sri Krishna Publications, 2012.
5. PradipDev, ManasGhoush, "Programming in C", 2rd Edition, Oxford University Press, 2011.

Web References

1. <https://www.programiz.com/c-programming>
2. <https://www.geeksforgeeks.org/c-language-set-1-introduction/>
3. <https://www.tutorialspoint.com/cprogramming>
4. <https://www.assignment2do.wordpress.com/.../solution-programming-in-ansi-c>
5. <https://nptel.ac.in/courses/106/104/106104128/>
6. <https://www.coursera.org/courses?query=c%20programming>
7. <https://www.udemy.com/course/c-programming-for-beginners-/>

(c. Include Number systems in Digital subject)

		L	T	P	C	Hrs
A20CPT102	DIGITAL LOGIC AND COMPUTER ORGANIZATION (Common to B.Sc.CS and B.C.A.)	4	0	0	4	60

Course Objectives:

- To understand the basic concepts of Digital design and number systems.
- To expose with the Combinational circuits
- To expose with the Sequential circuits
- To study the fundamentals of Computer systems.
- To be familiar with the memory organization and CPU in a computer systems.

Course Outcomes:

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

CO1 – Explain the concepts of Digital design and number systems.

CO2 – design the digital system using combinational system design.

CO3 – design the digital system using Sequential system design.

CO4 – Explain fundamentals of Computer systems.

CO5 – Explain memory organization and CPU in computer systems.

UNIT I INTRODUCTION TO DIGITAL DESIGN (12 Hrs)

Data Representation - Data Types - Number Systems - Complements - Arithmetic Operations - Representations - Fixed Point, Floating Point - Error detection codes - Binary Codes- Logic Gates - Boolean Algebra - Map Simplification-Karnaugh maps: SOP and POS forms -QuineMcClusky method

UNIT II COMBINATIONAL CIRCUIT DESIGN (12 Hrs)

Combinational Circuits, Half adder - full adder - code converters - combinational circuit design - Multiplexers and Demultiplexers – encoders – decoders - Combinational design using Mux and Demux.

UNIT III SEQUENTIAL CIRCUIT DESIGN (12 Hrs)

Sequential Circuit Design, Flip flops (RS, Clocked RS, D, JK, JK Master Slave, T) - Counters - Shift registers and their types - Counters: Synchronous and Asynchronous counters.

UNIT IV COMPUTER ORGANIZATION (12 Hrs)

Instruction Codes - Computer Registers - Computer Instructions - Timing And Control - Instruction Cycle - Memory Reference Instructions - I/O And Interrupt – Machine Language – Assembly Language - Assembler -. Peripheral Devices - Input-Output Interface - Asynchronous Data Transfer - Modes Of Transfer - Priority Interrupt - DMA - IOP - Serial Communication

UNIT V MEMORY ORGANIZATION AND CPU (12 Hrs)

Memory Hierarchy - Main Memory - Auxiliary Memory - Associative Memory - Cache Memory - Virtual Memory - Memory Management Hardware - CPU: General Register Organization - Control Word - Stack Organization - Instruction Format - Addressing Modes - Data Transfer And Manipulation - Program Control.

Text Books

1. Morris Mano M, "Digital Logic and Computer Design", Pearson Education, 4th Edition, 2014
2. Carl Hamacher, ZvonkoVranesic, SafwatZaky, "Computer Organization", 5 th Edition, McGraw Hill, 2002.
3. V.Rajaraman, T. Radhakrishnan, "Digital Logic and Computer Design", PHI Learning, 2006.

Reference Books

1. B Ram, Computer Fundamentals: Architecture and Organization (TWO COLOUR EDITION), New Age International (P) Ltd Publishers, 6th Edition 2020.
2. FLOYD, Digital Fundamentals, PEARSON INDIA, 11th Edition.
3. Alan B. Marcovitz, "Introduction to Logic design", Tata McgrawHill, 2nd Edition, 2005.

Web References

1. <https://www.sanfoundry.com/best-reference-books-computer-organization-architecture/>
2. <http://www.cuc.ucc.ie/CS1101/David%20Tarnoff.pdf>
3. https://www.tutorialspoint.com/computer_logical_organization/index.htm

(d. Exclude Sorting and Searching Techniques in Programming in C Lab, because it is studied in C++ Lab also)

A20CPL101	PROGRAMMING IN C LAB (Common to B.Sc.CS and B.C.A.)	L	T	P	C	Hrs
		0	0	4	2	60

Course Objectives

- To practice the fundamental programming methodologies in the C programming language.
- To apply logical skills for problem solving using control structures and arrays.
- To design, implement, test and debug programs that use different data types, variables, strings, arrays, pointers and structures.
- To design modular programming and provide recursive solution to problems.
- To understand the miscellaneous aspects of C and comprehension of file operations.

Course Outcomes

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

- CO1** – Apply and practice logical formulations to solve simple problems leading to specific applications.
- CO2** – Develop C programs for simple applications making use of basic constructs, arrays and strings.
- CO3** – Develop C programs involving functions, recursion, pointers, and structures.
- CO4** – Design applications using sequential and random access file processing.
- CO5** – Build solutions for online coding challenges.

List of Exercises

1. Simple programming exercises to familiarize the basic C language constructs.
2. Develop programs using identifiers and operators.
3. Develop programs using decision-making and looping constructs.
4. Develop programs using functions as mathematical functions.
5. Develop programs with user defined functions – includes parameter passing.
6. Develop program for one dimensional and two dimensional arrays.
7. Develop program to illustrate pointers.
8. Develop program with arrays and pointers.
9. Develop program for dynamic memory allocation.
10. Develop programs for file operations.

Reference Books

1. Zed A Shaw, "Learn C the Hard Way: Practical Exercises on the Computational Subjects You Keep Avoiding (Like C)", Addison Wesley, 2016.
2. Anita Goel and Ajay Mittal, "Computer Fundamentals and programming in C", 1st Edition, Pearson Education, 2011.
3. Yashwanth Kanethkar, "Let us C", 13th Edition, BPB Publications, 2008.
4. Maureen Sprankle, Jim Hubbard, "Problem Solving and Programming Concepts", 9th Edition, Pearson, 2011.

Web References

1. <https://alison.com/course/introduction-to-c-programming>
2. <https://www.geeksforgeeks.org/c-programming-language/>
3. http://cad-lab.github.io/cadlab_data/files/1993_prog_in_c.pdf
4. <https://www.tenouk.com/clabworksheet/clabworksheet.html>

(e. Study about ICs and Johnson and Ring counters can be included in Digital Lab)

A20CPL102	DIGITAL LAB (Common to B.Sc.CS and B.C.A.)	L	T	P	C	Hrs
		0	0	4	2	60

Course Objectives

- To acquire knowledge about basic logic gates.
- To develop the skills in writing assembly programs.
- To develop the skill for error corrections in the micro level.
- To expose with the Combinational circuits.
- To expose with the Sequential circuits.

Course Outcomes

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

- CO1** – Acquire knowledge about basic logic gates.
- CO2** – Develop the skills in writing assembly programs.
- CO3** – Develop the skill for error corrections in the micro level.
- CO4** – Design Combinational Logic Circuits.
- CO5** – Design Sequential Logic Circuits.

List of Exercises

1. Study of Integrated Circuits and their working Logics.
2. Verification of Boolean Theorems using Digital Logic Gates.
3. Design and Implementation of Combinational Circuits using Basic Gates Code Converters.
4. Design and Implementation of 4-Bit Binary Adder / Subtractor using Basic Gates and MSI Devices
5. Design and Implementation of Parity Generator / Checker using Basic Gates and MSI Devices.
6. Design and Implementation of Magnitude Comparator.
7. Design and Implementation of Application using Multiplexers /Demultiplexers.
8. Design and Implementation of Shift Registers.
9. Design and Implementation of Synchronous and Asynchronous Counters.
10. Design and Implementation of **Johnson and Ring Counters**.

Reference Books

1. Albert Paul Malvino, Donald P Leach, Digital principles and applications, TMH, 2007.
2. Hayes J. P., "Computer Architecture & Organisation", McGraw Hill,
3. Hamacher, "Computer Organisation and System Software", EXCEL BOOKS.
4. Ghosh&Pal, Computer Organization & Architecture (TMH WBUT Series), TMH.

Web References

1. [www.geeksforgeeks.org › computer-organization-and-architecture](http://www.geeksforgeeks.org/computer-organization-and-architecture)
2. [www.javatpoint.com › computer-organization-and-architecture-tutorial](http://www.javatpoint.com/computer-organization-and-architecture-tutorial)
3. [www.geeksforgeeks.org › digital-electronics-logic-design-tutorials](http://www.geeksforgeeks.org/digital-electronics-logic-design-tutorials)

(f. Basic Operating System concepts can be included in Operating System subject)

	L	T	P	C	Hrs
A20CPT407	4	0	0	4	60

Course Objectives

- To grasp a fundamental understanding of operating systems and processes
- To learn the concepts of CPU scheduling and deadlock
- To understand synchronization and memory management concepts in OS
- Understand the concepts of file systems and secondary storage structure
- To learn the features of commercial operating systems

Course Outcomes

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

CO1 – Define the concepts of operating systems operations, processes and threads.

CO2 – Apply the concepts of CPU scheduling and deadlock techniques

CO3 – Simulate the principles of memory management

CO4 – Identify appropriate file system and disk organizations for a variety of computing scenario

CO5 – Examine the features of various open source operating systems

UNIT I INTRODUCTION AND PROCESS MANAGEMENT

(12Hrs)

Operating system structure – Operating system operations – Process management – Memory management – Storage management – Protection and Security – System structures: Operating system services – System calls – Types of system calls – System programs. Process scheduling – Operations on processes – Inter-process communication.

UNIT II CPU SCHEDULING AND DEADLOCK

(12Hrs)

Overview of threads – Multithreading models – Threading issues – Basic concepts of process scheduling – Scheduling criteria – Scheduling algorithms – Multiple processor scheduling, Dead Lock: Characterization – Prevention Detection – Avoidance and Recovery.

UNIT III CONCURRENT PROCESSES AND MEMORY MANAGEMENT

(12Hrs)

Process synchronization: The Critical Section Problem – Peterson's solution – Synchronization Hardware – Semaphores – Classic problems of Synchronization – Monitors. Memory Management: Swapping – Contiguous memory allocation – Paging – Structure of the Page Table – Segmentation, Demand Paging – Page Replacement – Allocation of Frames – Thrashing.

UNIT IV FILE SYSTEMS AND SECONDARY STORAGE STRUCTURE

(12Hrs)

File Concept – Access Methods – Directory structure – File system mounting – File sharing – Protection – File system structure – File system implementation – Directory Implementation – Allocation methods – Free-space management. Disk structure – Disk Scheduling – Disk Management – Swap-Space management.

UNIT V CASE STUDY

(12Hrs)

LINUX System: Basic Concepts – System administration – Requirements for Linux System Administrator – Setting up a LINUX multifunction server – Domain Name System – Setting up local network services. Virtualization: Basic concepts – Setting Up Xen– VMware on LINUX Host and adding guest OS. Comparison of LINUX and MICROSOFT Windows operating system concepts.

Text Books

1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, "Operating System Concepts", John Wiley & Sons Ninth Edition, 2017.
2. Andrew S. Tanenbaum, "Modern Operating Systems", Prentice Hall of India, 3rd Edition, 2015.
3. Gary Nutt, "Operating Systems - A Modern Perspective", Pearson Education, Second Edition, 2013.

Reference Books

1. William Stallings, "Operating System", Prentice Hall of India, 6th Edition, 2015.
2. Thomas Anderson and Michael Dahlin, "Operating Systems principles and practice", Wiley, 2nd Edition, 2014.
3. Harvey M. Deitel, "Operating Systems", Pearson Education, Third Edition, 2013.
4. Silberschatz, Galvin, "Operating System Concepts", Wiley, Student Edition, 2006.
5. William Stallings, "Operating System: Internals and design Principles", Old Edition (7), Pearson Education India.

Web References

1. <https://nptel.ac.in/courses/106108101/>
2. <http://www.tcyonline.com/tests/operating-system-concepts>
3. <http://www.galvin.info/history-of-operating-system-concepts-textbook>
4. https://www.cse.iitb.ac.in/~mythili/teaching/cs347_autumn2016/index.html
5. <https://www.cse.iitk.ac.in/pages/CS330.html>

(Annexure – II)

DEPARTMENT OF COMPUTATIONAL STUDIES

VISION AND MISSION

Vision:

To come up with successfully as a high-quality human capital in Computer Science and related areas for the sustainable growth of the IT industry needs of the country.

Mission:

M1: Innovative Skills:

Ensuring deeper understanding of fundamentals and acquiring innovative skills within core areas of Computer Science.

M2: Motivated Graduates:

Producing highly skilled and motivated graduates with the ability of problem solving individually and in teams.

M3: Ethical Responsibilities:

Providing a deep awareness of our ethical responsibilities to our profession and to the society.

April 2021

Date	Day	Schedule	Working day/ Holiday
1	Thu	Submission of CAT-III question papers / Submission of student assessment record	80
2	Fri	Good Friday	Holiday
3	Sat	Syllabus completion	81
4	Sun		Holiday
5	Mon	CAT-III starts	82
6	Tue		83
7	Wed		84
8	Thu		85
9	Fri	BOS-(Dept. of Chemistry, Computational Studies, Comm. & Mgt. - BBA, Dept. of Media studies - Viscom)	86
10	Sat	CAT-III ends/BOS-Dept of Media Studies, Journalism & Mass Communication	87
11	Sun		Holiday
12	Mon	Departmentwise QCM-3/BOS (Dept. of Physics, English)	88
13	Tue	Submission of CAT-III mark registers	89
14	Wed	Tamil New Year / Dr. Ambedkar Jayanthi	Holiday
15	Thu	Model practical exams	70
16	Fri	Model practical exams	71
17	Sat	Model practical exams	72
18	Sun		Holiday
19	Mon	End semester practical exams	73
20	Tue	End semester practical exams	74
21	Wed	Academic audit	75
22	Thu		76
23	Fri		77
24	Sat		78
25	Sun		Holiday
26	Mon	Model exam starts	79
27	Tue		80
28	Wed		81
29	Thu		82
30	Fri	Model exam ends / Last working day	83

Total number of working days : 03

Total number of holiday : 05

அக்டோபர் வாரத்தில் சாதாரண விடுமுறைகளையும், அக்டோபர் முழுவதும் செப்டம்பர்மாதம் உலகின் கவனத்தை உள் பிடி திருப்ப முடியும். - ஜார்ஜ்வால்ட்டர்சுக்கர்வொர்

❖ **Supplementary Examinations**

Supplementary examination is an additional examination conducted within a month of time after declaring the results. In order to complete the program within 3 years, only the student with maximum of two arrears will be permitted to appear for supplementary examination.

Benefits

- ❖ More number of students will receive the degree within the stipulated time
- ❖ The industries prefers to recruit students having nil arrears. If the supplementary examinations are conducted, then more number of students will be eligible for the recruitment.

❖ **Photo copy of answer book**

After the publication of the result, photocopy of the answer books shall be provided to the student on request with stipulated fee fixed by the College from time to time

Punctuality in Attendance

The students are requested to keep up punctuality in attending the college. The late comers will be losing their attendance and in turn the internal marks. Hence all the students are requested to attend the college in time. A student shall be permitted to appear for the End Semester Examination at the end of the semester only if he / she secures not less than 75% of overall attendance.

Repeating the Course

A student who secures overall attendance which is less than 60% has to repeat the course with the approval, when it is next offered.

Tutor Ward System

In the tutor ward system, 30 students are allotted to a tutor who will be taking care of these students. The students are requested to utilize the facility.

The internal marks will be provided fully based on the continuous assessment tests (CAT 1 to 3 and Model examinations)

Marks Distribution of Continuous Assessment Marks (CAM) and End Semester Examination Marks (ESM)

Scheme for Continuous Assessment Test

S. No	Course Type	Continuous Assessment components							Total Marks		
		Test Marks	Average of marks for project test/ viva for each experiment	Average of marks for experiment report for each experiment	Model Exam Report	Assignment	Review - 1	Review - 2		Review - 3	Attendance
1.	Theory	15	-	-	-	5	-	-	-	5	25
2.	Practical	-	10	15	15	-	-	-	-	10	50
3.	Project work	-	-	-	-	-	10	10	20	-	40

Question Paper Pattern

Question paper pattern for CAT and ESE will be based on the patterns shown in Table (a) and (b)

Table (a) Question Paper pattern for CAT / Model exam

Test Type	2 Marks	5 Marks	10 Marks	Total Marks
CAT 1 to 3	5	4	2 (open choice)	50
Model exam	End semester Examination Question Pattern			75

Table (b) Question paper patterns for End semester Examination (ESE)

2 Marks	5 Marks	10 Marks	Total Marks
10	5 (one question from each unit)	3 (out of 5) (open choice)	75

March 2021

Date	Day	Schedule	Working day/ Holiday
1	Mon	Submission of student assessment record	33
2	Tue		34
3	Wed		35
4	Thu		36
5	Fri		37
6	Sat		38
7	Sun		Holiday
8	Mon		39
9	Tue		40
10	Wed	Submission of CAT-II question papers	41
11	Thu		42
12	Fri	Departmentwise QCM - 2	43
13	Sat		44
14	Sun		Holiday
15	Mon	CAT - II starts	45
16	Tue		46
17	Wed		47
18	Thu		48
19	Fri		49
20	Sat	CAT - II ends	50
21	Sun		Holiday
22	Mon		51
23	Tue		52
24	Wed	Submission of CAT-II Mark registers / 17 th IQAC meeting	53
25	Thu		54
26	Fri		55
27	Sat		56
28	Sun		Holiday
29	Mon		57
30	Tue	BOS (Dept of Commerce & Management-BCom)	58
31	Wed	BOS (Dept of Mathematics, Commerce & Management-BCom/CS)	59

Total number of working days : 27

Total number of holiday : 04

உலகை வெல்வதற்கு, உலகை தெரிந்து கொள்வது முக்கியமல்ல, உண்மை அறிந்து கொள்வதுதான் முக்கியம் . . .

December 2020

Date	Day	Schedule	Working day/ Holiday
1	Tue		
2	Wed		
3	Thu		
4	Fri		
5	Sat		
6	Sun		Holiday
7	Mon	Online class starts	1
8	Tue		2
9	Wed		3
10	Thu		4
11	Fri		5
12	Sat		Holiday
13	Sun		Holiday
14	Mon		6
15	Tue		7
16	Wed		8
17	Thu		9
18	Fri		10
19	Sat		Holiday
20	Sun		Holiday
21	Mon		11
22	Tue		12
23	Wed	17 th IQAC meeting	13
24	Thu		14
25	Fri		15
26	Sat		Holiday
27	Sun		Holiday
28	Mon		16
29	Tue		17
30	Wed		18
31	Thu		19
Total number of working days : 19 Total number of holiday : 06			
❖ வெற்றியடைபவர்த் உண்மைத் தகவல், வேறு பாராளுமன்றத் தகவல் முற்பாயது - ப்ளாஓ			

Placement and Training Division

The placement cell functions round the clock throughout the year to establish contact with reputed multinational companies, well established industrial organizations and plays an important role in locating various job opportunities and placing large number of the students every year at these organizations.

Activities of the Training Division

- ✦ Arranges trainings for personality and interpersonal skill development.
- ✦ Assists the students to get in-plant training
- ✦ Arranges industrial visits
- ✦ Creates awareness on the opportunities open for higher studies.
- ✦ Arranges coaching classes for GATE, GRE, TOFEL, IELTS, IAS, IES etc.

Placement Record

Details of Placed Students : 2020 - 21

Academic Year	Students Placed	1 Kaar	9	12 Makoleet	3
2012-13	75%	2 TCS(Ninja and Digital)	210	13 O2Saver	4
2013-14	85%	3 Hexaware	15	14 OPPO Mobiles	3
2014-15	95%	4 Yellow Messenger	4	15 Infosys	1
2015-16	95%	5 Unisys	1	16 Sutherland	56
2016-17	93%	6 EmbedUr	1		
2017-18	95%	7 Virtusa	3		
2018-19	95%	8 ZOHO	8		
2019-20	95%	9 CTS	101		
		10 Milekel Engineering	1		
		11 Mantec Electronic	1	Total	*421

Wi-Fi Campus

* till 31st January 2021

Our campus has been enabled by high speed uninterrupted Wi-Fi connectivity. The Computer Centre is open till 8.00 p.m. on all the working days except on the dates of University examinations.

Library Working Hours

- 8.30 a.m. to 8.30 p.m. (On all the working days)
- 8.30 a.m. to 10.00 p.m. (During the examination days)

Women Cell

For the benefit of the girl students, a Women Cell has been constituted in the college. The girl students may approach the Chairperson / members for assistance.

Grievance Redressal Cell

There is a Grievance Redressal Cell under the Chairmanship of the Director of the institution. Students are requested to approach the Chairman / members to redress their grievances. Mail ID : grievance@smv.ac.in

Gold Medals and Top Ten Ranks

Your seniors were sincere, hard working and got the Gold medals of the Pondicherry University and the top ten ranks in all the branches. The details of the University Goldmedals and Top Ten Ranks won by the students are given below.

🏆 Indicates the Gold medal and University First Rank.

The Management awards 3 sovereigns of gold to the 1st rank holder, 2 sovereigns to the 2nd rank holder, 1 sovereign to the 3rd rank holder, 4th and 5th rank holders shall receive a cash award of Rs. 10,000/- (Rupees ten thousand) each and 6th to 10th rank holders shall receive a cash award of Rs. 5,000/- (Rupees five thousand) each.

Name of the Course	Year		
	2017	2018	2019
B.Tech EEE	2, 4, 6, 7	🏆	🏆 2,3,4,6,7,8,9,10
B.Tech ECE	2,3,4,5,6,7,8,9,10		🏆 3,4,5,6,7,9,10
B.Tech CSE	🏆 2, 3, 4, 10		🏆 2,4,6,7,8,10
B.Tech IT	🏆 2,3,4,5,6,7,8,9,10		🏆 2,3,5,6,8
B.Tech ICE	🏆 2,3,4,5,6,7,8,9,10	🏆	🏆 2,3,4,5,6,7,8,9,10
B.Tech Mech	🏆 4, 5, 7, 9, 10		3,7,8,10
B.Tech Civil	2, 3, 10		2,3,4,6,7,10
MCA	3,4,7,9,10		🏆 1,6,7,8,9,10,11
MBA	🏆 3,4,6,7,8		🏆 2,3,4,5,7,8,10
M.Tech CSE	🏆 2, 3, 4, 5, 7, 8, 9		🏆 7
M.Tech ECE	2, 3, 6, 7, 8, 9		2,3,4,5
M.Tech PED	🏆		🏆 2,3
M.Tech NW	🏆 2, 3, 4, 5, 7, 8, 9		🏆 2,3
M.Tech(VLSI)	🏆		🏆 2,3,4
M.Tech(MF)	🏆 2		🏆

Important points for the kind attention of the Parents

Dear Parent

The I semester classes commence on 7th December 2020. The students have to complete a lot of work within a short period. Hence the parents are kindly requested not to permit their wards to avail frequent leave during this semester period for the following reasons.

It is compulsory for all the students to complete Six Certificate Courses, Nine Skill Development Courses and Eight Mandatory Courses along with their Academic Courses. These courses will enhance the students to upgrade their required skills to cope up with the Industry.

Marks in the continuous assessment test decide the major part of the continuous assessment marks. So, availing leave for the continuous assessment test must be avoided at any cost as this would seriously affect the assessment marks.

Practicals are very important not only to score more marks but also it will help to understand the theory part of the subject, hence advice your ward not to cut the practical classes.

Please spare your valuable time to talk to your son/daughter every day and try to understand what he/she is doing in respect of his/her studies. Kindly extend all your support to your son/daughter which will help them to come out successfully. For any assistance from our side you may always feel free to contact the respective HOD / DEAN any time during the working hours.

(Annexure – IV)

DISCIPLINE SPECIFIC ELECTIVE COURSES

DISCIPLINE SPECIFIC ELECTIVES										
S. No.	Course Code	Course Title	Category	Periods			Credits	Max. Marks		
				L	T	P		CAM	ESM	Total
Discipline Specific Electives (DSE - I) - offered in Third Semester										
1	A20CPE301	Software Management	DSE	3	0	0	3	25	75	100
2	A20CPE302	Object Oriented Analysis and Design	DSE	3	0	0	3	25	75	100
3	A20CPE303	Client / Server Technology	DSE	3	0	0	3	25	75	100
4	A20CPE304	Data Mining	DSE	3	0	0	3	25	75	100
Discipline Specific Electives (DSE - II) - offered in Fourth Semester										
1	A20CPE404	Hadoop for Data Science	DSE	3	0	0	3	25	75	100
2	A20CPE405	Data Science using R	DSE	3	0	0	3	25	75	100
3	A20CPE406	Data Visualization using MATLAB	DSE	3	0	0	3	25	75	100
Discipline Specific Electives (DSE - III) - offered in Fifth Semester										
1	A20CPE507	Information Security	DSE	3	0	0	3	25	75	100
2	A20CPE508	Network Security	DSE	3	0	0	3	25	75	100
3	A20CPE509	Ethical Hacking	DSE	3	0	0	3	25	75	100
Discipline Specific Electives (DSE - IV) - offered in Sixth Semester										
1	A20CPE610	IT Assessment and Risk Analysis	DSE	3	0	0	3	25	75	100
2	A20CPE611	Intrusion Detection System and Prevention	DSE	3	0	0	3	25	75	100
3	A20CPE612	Introduction to Data Science and Machine Learning	DSE	3	0	0	3	25	75	100

SEMESTER – V

S. No	Course Code	Course Title	Category	Periods			Credits	Max. Marks		
				L	T	P		CAM	ESM	Total
Theory										
1	A20CPT512	Python Programming	DSC	3	1	0	4	25	75	100
2	A20CPT513	Network Technologies	DSC	3	1	0	4	25	75	100
3	A20CPT514	Artificial Intelligence	DSC	3	1	0	4	25	75	100
4	A20CPE5XX	Discipline Specific Elective-III	DSE	3	0	0	3	25	75	100
Practical										
5	A20CPL509	Python and Network	DSC	0	0	4	2	50	50	100
6	A20CPP501	Mini Project	DSC	0	0	4	2	50	50	100
Skill Enhancement Course										
7	A20CPS505	In-Plant training / Internship	SEC	0	0	4	2	100	0	100
Employment Enhancement Course										
8	A20CPC505	ARDUINO/IOT	EEC	0	0	4	0	100	0	100
							21	400	400	800

SEMESTER – VI

S. No	Course Code	Course Title	Category	Periods			Credits	Max. Marks		
				L	T	P		CAM	ESM	Total
Theory										
1	A20CPT615	.Net Technology	DSC	3	1	0	4	25	75	100
2	A20CPT616	Programming with PHP	DSC	3	1	0	4	25	75	100
3	A20CPT617	Cloud Computing	DSC	3	1	0	4	25	75	100
4	A20CPE6XX	Discipline Specific Elective-IV	DSE	3	0	0	3	25	75	100
Practical										
5	A20CPP602	Project Work & Viva-voce	DSC	0	0	10	5	40	60	100
Skill Enhancement Course										
6	A20CPS505	Research Methodology	SEC	0	0	4	2	100	0	100
Employment Enhancement Course										
7	A20CPC606	Data Science / Machine Learning	EEC	0	0	4	0	100	0	100
							22	340	360	700

(Annexure – V)

A20CPT203

PROGRAMMING IN C++

L	T	P	C
4	0	0	4

Course Objectives

- Define Encapsulation, Inheritance and Polymorphism.
- Solve the problem with object oriented approach.
- Analyze the problem statement and build object oriented system model.
- Describe the characters and behavior of the objects that comprise a system.
- Explain function overloading, operator overloading and virtual functions.

Course Outcomes

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

CO1 – To learn programming from real world examples.

CO2 – To understand Object oriented approach for finding Solutions.

CO3 – To create computer based solutions to various real-world problems using C++.

CO4 – To learn various concepts of object oriented approach towards problem solving.

CO5 – Develop the applications using object oriented programming with C++.

UNIT I INTRODUCTION TO C++ AND BASICS OF OOP

(12 Hrs)

Basic components of a C++ - Program and program structure - Compiling and Executing C++ Program - Basic Concepts of Object-Oriented Programming: Benefits of OOP – Object Oriented Languages – Applications of OOP.

UNIT II PRINCIPLES OF OBJECT ORIENTED PROGRAMMING

(12 Hrs)

Classes objects - data members - member functions –Access Specifiers- this Pointer - Friends - Friend Functions - Friend Classes - Friend Scope - Static Functions - Constructors and Destructors - Static variables and Functions in class - Operator Overloading in C++ - Overloading Unary Operators - Overloading binary operators.

UNIT III INHERITANCE

(12 Hrs)

Inheritance in C++ - Types of Inheritance - Multiple Inheritance. Virtual Functions - Polymorphism - Abstract classes. Real time examples in OOPS.

UNIT IV POINTERS, EXCEPTION HANDLING AND FILES

(12 Hrs)

Pointers - Objects and Pointers - Exception Handling: Exception – Basics – Exception Handling Mechanism – Throwing Mechanism – Catching Mechanism – Re-throwing Exception. Standard input and output operations: C++ Iostream hierarchy - File input and output: Reading a File - Managing I/O Streams - Opening a File – Different Methods - Checking for Failure with File Commands - Checking the I/O Status Flags - Dealing with Binary Files - Useful Functions.

UNIT V TEMPLATES

(12 Hrs)

Class templates: Implementing a class template - Implementing class template member functions - Using a class template - Function templates - Implementing function templates - Using template functions.

Text Books

1. E. Balagurusamy, "Object Oriented Programming with C++", McGraw Hill, 7th Edition, 2018.
2. Herbert Schildt, "C++ - The Complete Reference", McGraw Hill Education, 4th Edition, 2017.

Reference Books

1. Herbert Schildt, "C++ - From the Ground Up", McGraw Hill Education, 2nd Edition, 2010.
2. Thomas L. Floyd, "Electronic Devices", 9th Edition, Pearson Education, 2012.
3. Stanley B. Lippman, Stanley Lippman, Barbara Moo, "C++ Primer", Addison-Wesley Professional, 5th Edition 2012.

Web Resources

1. <https://www.tutorialspoint.com/cplusplus/index.htm>
2. <http://www.cplusplus.com/doc/tutorial/>
3. <https://www.w3schools.com/cpp/>
4. <https://www.javatpoint.com/cpp-tutorial>
5. <https://www.geeksforgeeks.org/cpp-tutorial/>

A20CPT513

COMPUTER TECHNOLOGIES

L	T	P	C	Hrs
3	1	0	4	60

Course Objectives

- To understand the basic concepts of Data Communications.
- To understand the functionalities and components involved in the physical layer.
- To learn the basic concepts of data link layer services and network layer communication protocols
- To understand various load characteristics and network traffic conditions, decide the transport protocols to be used.
- To analyze and compare the different protocols available in the application layer.

Course Outcomes

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

CO1 - Analyze the network components and network standards.

CO2 - Determine the Physical layer functionalities, Transmission modes and media.

CO3 - Analyze the Error correction and detection techniques and determine the proper usage of IP address, subnet mask and default gateway in a routed network.

CO4 - Describe, analyze and compare different protocols in transport layer.

CO5 - Analyze the functional working of different protocols of application layer.

UNIT I DATA COMMUNICATIONS

(12Hrs)

Overview of Data Communications – Networks and its types – Network topologies. Transmission technologies: Signal Transmission – Digital signaling – Analog Signaling. Networks Models: Protocol Layering – OSI reference model – TCP/IP Protocol suite.

UNIT II PHYSICAL LAYER

(12Hrs)

Physical layer functionalities – Analog to digital conversion using PCM, Transmission Modes: Parallel–Serial. Transmission Media: Guided and unguided media. Switching: Introduction. Circuit Switching and Packet switching Networks.

UNIT III DATA LINK LAYER AND NETWORK LAYER

(12Hrs)

Data link layer services – Error Detection and Correction – Sliding window protocols – Network devices. Network layer functionality. Routing Algorithms: The Optimality Principle – Shortest path algorithm, Distance vector routing – Classful Addressing – Subnetting – Network layer protocols: IPV4, IPV6.

UNIT IV TRANSPORT LAYER

(12Hrs)

The Transport Services - Connection management – Transport layer Congestion Control – Transport Layer Protocols: User Datagram Protocol (UDP) – Transmission Control Protocol (TCP).

UNIT V WIRELESS TECHNOLOGIES

(12Hrs)

Wireless Technologies: Wi-fi, Bluetooth, Li-fi, Cellular Internet: 3G, 4G, 5G, Wireless Home Automation: ZigBee and Z-Wave.

Text Books

1. Behrouz A. Forouzan, Data Communications and Networking, Fifth Edition TMH, 2013.
2. Tanenbaum, A.S. and David J. Wetherall “Computer Networks”, 5th ed., Prentice Hall, 2011
3. James F. Kurose and Keith W. Ross, “Computer Networking: A Top-Down Approach: International Edition”, Pearson Education, Sixth edition, 2013.

Reference Books

1. Larry L. Peterson and Bruce S. Davie, "Computer Networks- A system approach", 5th edition, Elsevier, 2012.
2. Stallings, W., "Data and Computer Communications", 10th Ed., Prentice Hall Int. Ed., 2013.
3. DayanandAmbawade, Deven Shah, "Advanced Compter Networks", Dreamtech Press, 1st edition, 2011.
4. PallapamanviV , "Data Communications and Computer Networks", PHI, 4th edition, 2014.
5. Andre S.Tanenbaum, "Computer Networks", Pearson Publication, 4th Edition, 2018.

Web References

1. <https://www.geeksforgeeks.org/last-minute-notes-computer-network/>
2. <https://lecturenotes.in>
3. <https://www.cse.iitk.ac.in/users/dheeraj/cs425/>
4. <https://nptel.ac.in/courses/106/105/106105183/>
5. <https://nptel.ac.in/courses/106/105/106105081/>



SRI MANAKULA VINAYAGAR ENGINEERING COLLEGE

(An Autonomous Institution)

(Approved by AICTE, New Delhi and Affiliated to Pondicherry University)
(Accredited by NBA-AICTE, New Delhi and Accredited by NAAC with "A" Grade)
Madagadipet, Puducherry



SCHOOL OF ARTS AND SCIENCE

BACHELOR OF SCIENCE IN COMPUTER SCIENCE

**ACADEMIC REGULATIONS 2020
(R-2020)
CURRICULUM AND SYLLABI**

COLLEGE VISION AND MISSION

Vision

To be globally recognized for excellence in quality education, innovation and research for the transformation of lives to serve the society.

Mission

M1: Quality Education:

To provide comprehensive academic system that amalgamates the cutting edge technologies with best practices.

M2: Research and Innovation:

To foster value based research and innovation in collaboration with industries and institutions globally for creating intellectuals with new avenues.

M3: Employability and Entrepreneurship:

To inculcate the employability and entrepreneurial skills through value and skill based training.

M4: Ethical Values:

To instill deep sense of human values by blending societal righteousness with academic professionalism for the growth of society.

DEPARTMENT OF COMPUTATIONAL STUDIES

VISION AND MISSION

Vision:

To come up with successfully as a high-quality human capital in Computer Science and related areas for the sustainable growth of the IT industry needs of the country.

Mission:

M1: Innovative Skills:

Ensuring deeper understanding of fundamentals and acquiring innovative skills within core areas of Computer Science.

M2: Motivated Graduates:

Producing highly skilled and motivated graduates with the ability of problem solving individually and in teams.

M3: Ethical Responsibilities:

Providing a deep awareness of our ethical responsibilities to our profession and to the society.



STRUCTURE FOR UNDERGRADUATE PROGRAMME

S. No	Course Category	Breakdown of Credits
1	Language Modern Indian Language (MIL)	6
2	English (ENG)	6
3	Discipline Specific Core Courses (DSC)	85
4	Discipline Specific Elective Courses (DSE)	12
5	Inter-Disciplinary Courses (IDC)	12
6	Skill Enhancement Courses (SEC)	12
7	Employability Enhancement Courses (EEC*)	-
8	Ability Enhancement Compulsory Courses (AECC)	4
9	Open Elective (OE)	4
10	Extension Activity (EA)	1
Total		142

SCHEME OF CREDIT DISTRIBUTION – SUMMARY

S. No	Course Category	Credits per Semester						Total Credits
		I	II	III	IV	V	VI	
1	Language Modern Indian Language (MIL)	3	3	-	-	-	-	6
2	English (ENG)	3	3	-	-	-	-	6
3	Discipline Specific Core Courses (DSC)	12	12	12	16	16	17	85
4	Discipline Specific Elective Courses (DSE)	-	-	3	3	3	3	12
5	Inter-Disciplinary Courses (IDC)	4	4	4	-	-	-	12
6	Skill Enhancement Courses (SEC)	2	2	2	2	2	2	12
7	Employability Enhancement Courses (EEC*)	-	-	-	-	-	-	-
8	Ability Enhancement Compulsory Courses (AECC)	2	2	-	-	-	-	4
9	Open Elective (OE)	-	-	2	2	-	-	4
10	Extension Activity (EA)	-	1	-	-	-	-	1
Total		26	27	23	23	21	22	142

* EEC will not be included for the computation of "Total of Credits" as well as "CGPA"




SEMESTER – I										
S. No	Course Code	Course Title	Category	Periods			Credits	Max. Marks		
				L	T	P		CAM	ESM	Total
Theory										
1	A20TAT101	Language - I	MIL	3	0	0	3	25	75	100
2	A20GET101	General English – I	ENG	3	0	0	3	25	75	100
3	A20CPT101	Problem Solving using C	DSC	4	0	0	4	25	75	100
4	A20CPT102	Digital Logic and Computer Organization	DSC	4	0	0	4	25	75	100
5	A20CPD101	Computational Mathematics	IDC	3	1	0	4	25	75	100
Ability Enhancement Compulsory Course										
6	A20AET101	Environmental Studies	AECC	2	0	0	2	100	0	100
Practical										
7	A20CPL101	Programming in C Lab	DSC	0	0	4	2	50	50	100
8	A20CPL102	Digital Lab	DSC	0	0	4	2	50	50	100
Skill Enhancement Course										
9	A20SEL101	Communication Skill	SEC	0	0	4	2	100	0	100
Employment Enhancement Course										
10	A20CPC101	Web Programming – HTML /CSS/Javascript	EEC	0	0	4	0	100	0	100
							26	525	475	1000

SEMESTER – II

S. No.	Course Code	Course Title	Category	Periods			Credits	Max. Marks		
				L	T	P		CAM	ESM	Total
Theory										
1	A20TAT202	Language-II	MIL	3	0	0	3	25	75	100
2	A20GET202	General English-II	ENG	3	0	0	3	25	75	100
3	A20CPT203	Programming in C++	DSC	4	0	0	4	25	75	100
4	A20CPT204	Data Structures and Algorithms	DSC	4	0	0	4	25	75	100
5	A20CPD202	Discrete Mathematics	IDC	3	1	0	4	25	75	100
Ability Enhancement Compulsory Course										
6	A20AET202	Public Administration	AECC	2	0	0	2	100	0	100
Practical										
7	A20CPL203	Programming in C++ Lab	DSC	0	0	4	2	50	50	100
8	A20CPL204	Data Structures Lab	DSC	0	0	4	2	50	50	100
Skill Enhancement Course										
9	A20CPS202	Quantitative Aptitude and Logical Reasoning – I	SEC	0	0	4	2	100	0	100
Extension Activities										
10	A20EAL201	National Service Scheme	EA	0	0	2	1	100	0	100
Employment Enhancement Course										
11	A20CPC202	Java Programming	EEC	0	0	4	0	100	0	100
							27	625	475	1100

SEMESTER – III

S. No	Course Code	Course Title	Category	Periods			Credits	Max. Marks		
				L	T	P		CAM	ESM	Total
Theory										
1	A20CPT305	Java Programming	DSC	4	0	0	4	25	75	100
2	A20CPT306	Microprocessors and Assembly Language Programming	DSC	4	0	0	4	25	75	100
3	A20CPE3XX	Discipline Specific Elective – I	DSE	3	0	0	3	25	75	100
4	A20CPD303	Numerical Methods	IDC	3	1	0	4	25	75	100
5	A20XXO3XX	Open Elective – I	OE	2	0	0	2	25	75	100
Practical										
6	A20CPL305	Java Programming Lab	DSC	0	0	4	2	50	50	100
7	A20CPL306	Microprocessors Lab	DSC	0	0	4	2	50	50	100
Skill Enhancement Course										
8	A20CPS303	MS-Excel	SEC	0	0	4	2	100	0	100
Employment Enhancement Course										
9	A20CPC303	Python Programming	EEC	0	0	4	0	100	0	100
							23	425	475	900

SEMESTER – IV

S. No	Course Code	Course Title	Category	Periods			Credits	Max. Marks		
				L	T	P		CAM	ESM	Total
Theory										
1	A20CPT407	Operating Systems	DSC	4	0	0	4	25	75	100
2	A20CPT408	Database Management Systems	DSC	4	0	0	4	25	75	100
3	A20CPT409	Computer Graphics and Multimedia	DSC	4	0	0	4	25	75	100
4	A20CPE4XX	Discipline Specific Elective- II	DSE	3	0	0	3	25	75	100
5	A20XXO4XX	Open Elective – II	OE	2	0	0	2	25	75	100
Practical										
6	A20CPL407	Operating Systems Lab	DSC	0	0	4	2	50	50	100
7	A20CPL408	DBMS Lab	DSC	0	0	4	2	50	50	100
Skill Enhancement Course										
8	A20CPS404	Android App Development	SEC	0	0	4	2	100	0	100
Employment Enhancement Course										
9	A20CPC404	Mobile Application Development / RDBMS	EEC	0	0	4	0	100	0	100
							23	425	475	900

SEMESTER – V

S. No	Course Code	Course Title	Category	Periods			Credits	Max. Marks		
				L	T	P		CAM	ESM	Total
Theory										
1	A20CPT512	Python Programming	DSC	3	1	0	4	25	75	100
2	A20CPT513	Network Technologies	DSC	3	1	0	4	25	75	100
3	A20CPT514	Artificial Intelligence	DSC	3	1	0	4	25	75	100
4	A20CPE5XX	Discipline Specific Elective-III	DSE	3	0	0	3	25	75	100
Practical										
5	A20CPL509	Python and Network Programming Lab	DSC	0	0	4	2	50	50	100
6	A20CPP501	Mini Project (C#/JAVA/PYTHON)	DSC	0	0	4	2	50	50	100
Skill Enhancement Course										
7	A20CPS505	In-Plant training / Internship	SEC	0	0	4	2	100	0	100
Employment Enhancement Course										
8	A20CPC505	ARDUINO / IOT	EEC	0	0	4	0	100	0	100
							21	400	400	800

SEMESTER – VI

S. No	Course Code	Course Title	Category	Periods			Credits	Max. Marks		
				L	T	P		CAM	ESM	Total
Theory										
1	A20CPT615	.Net Technology	DSC	3	1	0	4	25	75	100
2	A20CPT616	Programming with PHP	DSC	3	1	0	4	25	75	100
3	A20CPT617	Cloud Computing	DSC	3	1	0	4	25	75	100
4	A20CPE6XX	Discipline Specific Elective-IV	DSE	3	0	0	3	25	75	100
Practical										
5	A20CPP602	Project Work & Viva-voce	DSC	0	0	10	5	40	60	100
Skill Enhancement Course										
6	A20CPS505	Research Methodology	SEC	0	0	4	2	100	0	100
Employment Enhancement Course										
7	A20CPC606	Data Science / MachineLearning	EEC	0	0	4	0	100	0	100
							22	340	360	700

**Discipline Specific Electives are to be selected from the list given in Annexure I*

*** Open electives are to be selected from the list given in Annexure II*

Annexure – I

DISCIPLINE SPECIFIC ELECTIVE COURSES

DISCIPLINE SPECIFIC ELECTIVES										
S. No.	Course Code	Course Title	Category	Periods			Credits	Max. Marks		
				L	T	P		CAM	ESM	Total
Discipline Specific Electives (DSE - I) - offered in Third Semester										
1	A20CPE301	Software Management	DSE	3	0	0	3	25	75	100
2	A20CPE302	Object Oriented Analysis and Design	DSE	3	0	0	3	25	75	100
3	A20CPE303	Client / Server Technology	DSE	3	0	0	3	25	75	100
4	A20CPE304	Data Mining	DSE	3	0	0	3	25	75	100
Discipline Specific Electives (DSE - II) - offered in Fourth Semester										
1	A20CPE404	Hadoop for Data Science	DSE	3	0	0	3	25	75	100
2	A20CPE405	Data Science using R	DSE	3	0	0	3	25	75	100
3	A20CPE406	Data Visualization using MATLAB	DSE	3	0	0	3	25	75	100
Discipline Specific Electives (DSE - III) - offered in Fifth Semester										
1	A20CPE507	Information Security	DSE	3	0	0	3	25	75	100
2	A20CPE508	Network Security	DSE	3	0	0	3	25	75	100
3	A20CPE509	Ethical Hacking	DSE	3	0	0	3	25	75	100
Discipline Specific Electives (DSE - IV) - offered in Sixth Semester										
1	A20CPE610	IT Assessment and Risk Analysis	DSE	3	0	0	3	25	75	100
2	A20CPE611	Intrusion Detection System and Prevention	DSE	3	0	0	3	25	75	100
3	A20CPE612	Introduction to Data Science and Machine Learning	DSE	3	0	0	3	25	75	100

Annexure – II

OPEN ELECTIVE COURSES

COMPLETE LIST OF OPEN ELECTIVES OFFERED BY ALL THE DEPARTMENTS

Open Elective – I (Offered in Semester III)				
S. No	Course Code	Course Title	Offering Department	Permitted Departments
1	A20CHO301	Water Analysis (Practical)	Chemistry	Computational Studies, Mathematics, Physics
2	A20CHO302	Food Analysis (Practical)	Chemistry	Computational Studies, Mathematics, Physics
3	A20CHO303	Molecules of Life (Practical)	Chemistry	Computational Studies, Mathematics, Physics
4	A20CMO304	Fundamentals of Accounting and Finance	Commerce and Management	Chemistry, Computational Studies, English, Media Studies, Mathematics, Physics
5	A20CMO305	Fundamentals of Management	Commerce and Management	Chemistry, Computational Studies, English, Media Studies, Mathematics, Physics
6	A20CMO306	Fundamentals of Marketing	Commerce and Management	Chemistry, Computational Studies, English, Media Studies, Mathematics, Physics
7	A20CMO307	Essential Legal Knowledge	Commerce and Management	Chemistry, Computational Studies, English, Media Studies, Mathematics, Physics
8	A20CPO308	Programming in C	Computational Studies	Commerce and Management, Mathematics, Media Studies
9	A20CPO309	Digital Logic Fundamentals	Computational Studies	Mathematics, Physics
10	A20CPO310	Data Structures	Computational Studies	Mathematics
11	A20CPO311	Programming in Python	Computational Studies	Commerce and Management, Mathematics, Media Studies
12	A20CPO312	Office Automation Tools	Computational Studies	Chemistry, Commerce and Management, English, Mathematics, Media Studies, Physics
13	A20ENO313	Interpersonal Skills	English	Chemistry, Commerce and Management, Computational Studies, Media Studies, Mathematics, Physics
14	A20ENO314	Fine-tune your English	English	Chemistry, Commerce and Management, Computational Studies, Media Studies, Mathematics, Physics




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15	A20ENO315	Conversational Skills	English	Chemistry, Commerce and Management, Computational Studies, Media Studies, Mathematics, Physics
16	A20MAO316	Quantitative Aptitude – I	Mathematics	Chemistry, Commerce and Management, Computational Studies, Physics
17	A20MAO317	Operation Research	Mathematics	Chemistry, Commerce and Management, Computational Studies, Physics
18	A20MAO318	Statistical Methods	Mathematics	Chemistry, Commerce and Management, Computational Studies, Physics
19	A20JMO319	Graphic Design	Media Studies	Chemistry, Commerce and Management, Computational Studies, English, Mathematics, Physics
20	A20JMO320	Role of social media	Media Studies	Chemistry, Commerce and Management, Computational Studies, English, Mathematics, Physics
21	A20VCO321	Event Management	Media Studies	Chemistry, Commerce and Management, Computational Studies, English, Mathematics, Physics
22	A20VCO322	Online Journalism	Media Studies	Chemistry, Commerce and Management, Computational Studies, English, Mathematics, Physics
23	A20PHO323	Geo Physics	Physics	Chemistry, Mathematics and Computer Science
24	A20PHO324	Physics of Material and Devices	Physics	Chemistry, Mathematics and Computer Science
25	A20PHO325	Statistical Physics	Physics	Chemistry, Mathematics and Computer Science




Open Elective – II (Offered in Semester IV)

S. No	Course Code	Course Title	Offering Department	Permitted Departments
1	A20CHO401	C++ Programming and its Application to Chemistry	Chemistry	Computational Studies, Mathematics, Physics
2	A20CHO402	Instrumental Methods of Analysis	Chemistry	Computational Studies, Mathematics, Physics
3	A20CHO403	Computational Chemistry Practical	Chemistry	Computational Studies, Mathematics, Physics
4	A20CMO404	Practical Banking	Commerce and Management	Chemistry, Computational Studies, English, Media Studies, Mathematics, Physics.
5	A20CMO405	Essential Insurance Knowledge	Commerce and Management	Chemistry, Computational Studies, English, Media Studies, Mathematics, Physics
6	A20CMO406	Income Tax Computation and Filing	Commerce and Management	Chemistry, Computational Studies, English, Media Studies, Mathematics, Physics
7	A20CMO407	Mutual Fund Investment	Commerce and Management	Chemistry, Computational Studies, English, Media Studies, Mathematics, Physics
8	A20CAO408	Database Management Systems	Computational Studies	Commerce and Management, Media Studies, Mathematics
9	A20CAO409	Web Development	Computational Studies	Commerce and Management, Media Studies, Mathematics
10	A20CAO410	Software Engineering	Computational Studies	Commerce and Management, Media Studies, Mathematics
11	A20CAO411	Computer Graphics and Multimedia	Computational Studies	Media Studies, Mathematics
12	A20CAO412	Introduction to Data Science using Python	Computational Studies	Chemistry, Commerce and Management, English, Media Studies, Mathematics, Physics
13	A20ENO413	Functional Writing in English	English	Chemistry, Commerce and Management, Computational Studies, Media Studies, Mathematics, Physics
14	A20ENO414	Creative Writing	English	Chemistry, Commerce and Management, Computational Studies, Media Studies, Mathematics, Physics
15	A20ENO415	English for Competitive Exam	English	Chemistry, Commerce and Management, Computational Studies, Media Studies, Mathematics, Physics
16	A20MAO416	Discrete mathematics	Mathematics	Chemistry, Computational Studies, Physics

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17	A20MAO417	Quantitative Aptitude – II	Mathematics	Chemistry, Commerce and Management, Computational Studies, Physics
18	A20VCO418	Video Editing	Media Studies	Chemistry, Commerce and Management, Computational Studies, English, Mathematics, Physics
19	A20VCO419	Writing for media	Media Studies	Chemistry, Commerce and Management, Computational Studies, English, Mathematics, Physics
20	A20JMO420	Media and Politics	Media Studies	Chemistry, Commerce and Management, Computational Studies, English, Mathematics, Physics
21	A20JMO421	Basics of NewsReporting	Media Studies	Chemistry, Commerce and Management, Computational Studies, English, Mathematics, Physics
22	A20PHO422	C++ Programming and its Application to Physics	Physics	Chemistry, Computational Studies, Mathematics
23	A20PHO423	Communication electronics	Physics	Chemistry, Computational Studies, Mathematics
24	A20PHO424	Digital Electronics	Physics	Chemistry, Computational Studies, Mathematics




மொழித்தாள்
தமிழ் - I

(B.A., B.Sc., B.Com., B.B.A. & B.C.A., பாடப்பிரிவுகளுக்கும்மான பொதுத்தாள்)

A20TAT101

L T P C Hrs
3 0 0 3 45

பாடத்திட்டத்தின் நோக்கம்

- இரண்டாயிரம் ஆண்டுகால தமிழின் தொன்மையையும் வரலாற்றையும் அதன் விழுமியங்களையும் பண்பாட்டையும் எடுத்துரைப்பதாக இப்பாடத்திட்டம் அமைக்கப்பட்டுள்ளது.
- தமிழ் இலக்கியம் உள்ளடக்கத்திலும், வடிவத்திலும் பெற்ற மாற்றங்கள், அதன் சிந்தனைகள், அடையாளங்கள் ஆகியவற்றை காலந் தோறும் எழுதப்பட்ட இலக்கியங்களின் வழியாகக் கவனத்திற்கு இப்பாடத்திட்டம் அமைக்கப்பட்டுள்ளது.
- மொழியின் கட்டமைப்பை புரிந்துகொள்வதற்கு ஏதுவாக பாடத்திட்டம் வடிவமைக்கப்பட்டுள்ளது.
- வாழ்வியல் சிந்தனைகள், ஒழுக்கவியல் கோட்பாடுகள், சமத்துவம், சூழலியல் எனப் பல கருகளை மாணவர்களுக்கு எடுத்துரைக்கும் விதத்தில் இப்பாடத்திட்டம் உருவாக்கப்பட்டுள்ளது.
- சிந்தனை ஆற்றலைப் பெருக்குவதற்குத் தாய்மொழியின் பங்களிப்பினை உணர்த்த இப்பாடத்திட்டம் அமைக்கப்பட்டுள்ளது.

பாடத்திட்டத்தின் வெளிப்பாடுகள்

- CO1- இலக்கியங்கள் காட்டும் வாழ்வியல் நெறிமுறைகளைப் பேணிநடத்தல்.
CO2 - நமது எண்ணத்தை வெளிப்படுத்தும் கருவியாகத் தாய்மொழியைப் பயன்படுத்துதல்.
CO3 - தகவல் தொடர்புக்குத் தாய்மொழியின் முக்கியத்துவத்தை உணர்தல்.
CO4 - தாய்மொழியின் சிறப்பை அறிதல்.
CO5 - இலக்கிய இன்பங்களை நுகரும் திறன்களை வளர்த்தல்.

அலகு-1

(9 Hrs)

இக்காலக் கவிதைகள்-1

- | | | |
|--------------------|---|----------------------------------|
| 1. பாரதியார் | - | கண்ணன் என் சேவகன் |
| 2. பாரதிதாசன் | - | தமிழ்ப்பேறு |
| 3. அய்யூல் ரகுமான் | - | அவதாரம் |
| 4. மீரா | - | கனவுகள் + கற்பனைகள் = காகிதங்கள் |
| 5. து.நரசிம்மன் | - | மன்னித்துவிடு மகனே |

அலகு-2

(9 Hrs)

இக்காலக் கவிதைகள்-2

- | | | |
|----------------------|---|--------------------------------|
| 1.ராஜா சந்திரசேகர் | - | கைவிடப்பட்ட குழந்தை |
| 2. அனார் | - | மேலும் சில இரத்தக் குழிப்புகள் |
| 3. சுகிர்தராணி | - | அம்மா |
| 4. நா.முத்துக்குமார் | - | தூர் |

அலகு-3

(9 Hrs)

சிறுநிலக்கியங்கள்

- | | | |
|-------------------------|---|---------------------------------------|
| 1. கலிங்கத்துப் பரணி | - | வொருதடக்கை வாள் எங்கே... (பாடல்-485) |
| 2. அழகர்கிள்ளைவிடு தூது | - | இதமாய் மனிதருடனே... (பாடல்-45) |
| 3. நந்திக் கலம்பகம் | - | அம்பொன்று வில்லொடிதெல்... (பாடல்-77) |
| 4. முக்சுபுற் பள்ளு | - | பாயும் மருதஞ் செழிக்கவே... (பாடல்-47) |
| 5. குற்றாலக் குறவஞ்சி | - | ஓடக் காண்பதுமே... (பாடல்-9) |

காப்பியங்கள்

மணிமேகலை-உலகறவி புக்க காதை- 'மாசுஇல் வால்ஒளி! - இந்நாள் போலும் இளங்கொடி கெடுத்தனை'. (28-அடிகள்)

அலகு-4

(9 Hrs)

தமிழ் இலக்கிய வரலாறு

1. சிற்றிலக்கியம்- தோற்றமும் வளர்ச்சியும்
2. புதுக்கவிதை- தோற்றமும் வளர்ச்சியும்
3. சிறுகதை -தோற்றமும் வளர்ச்சியும்
4. புதினம் -தோற்றமும் வளர்ச்சியும்
5. உரைநடை - தோற்றமும் வளர்ச்சியும்

அலகு 5

(9 Hrs)

மொழிப்பயிற்சி

1. கலைச்சொல்லாக்கம்
2. அகரவரிசைப்படுத்துதல்
3. மரபுத்தொடர்/பழமொழி
4. கலை விமர்சனம்
5. நேர்காணல்

உரைநடைப் பகுதி

1. உ.வே.சாமிநாதையர் - சிவதருமோத்திரச் சுவடி பெற்ற வரலாறு.
2. தஞ்சாவூர் - சுஜாவின் கோபம்.
3. இரா. பச்சியப்பன் - மாடல்ல மன்றையவை.

பார்வை நூல்கள்

1. கைலாசபதி, சு., தமிழ் நாவல் இலக்கியம், குமரன் பதிப்பகம், வடபழனி, 1968.
2. சுந்தரராஜன், பே.கோ. சிவபாதசுந்தரம். சோ., தமிழில் சிறுகதை வரலாறும் வளர்ச்சியும், க்ரியா, சென்னை, 1989.
3. பாரந்தாமனார், அ.கி., நல்ல தமிழ் எழுத வேண்டுமா, பாரி நிலையம், சென்னை, 1998.
4. பாக்கியமேரி, வகைமை நோக்கில் தமிழ் இலக்கிய வரலாறு, என்.சி.எச். பதிப்பகம், சென்னை, 2011.
5. வல்லிக்கண்ணன், புதுக்கவிதையின் தோற்றமும் வளர்ச்சியும், அன்னம், சிவகங்கை, 1992.

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1. சக்திவேல், சு., தமிழ் மொழி வரலாறு, மாணிக்கவாசகர் பதிப்பகம், சிதம்பரம், 1988.
2. சிறிபி பாலசுப்ரமணியம் மற்றும் நீலபத்மநாபன், புதிய தமிழ் இலக்கிய வரலாறு, தொகுதி-1, 2, 3, சாகித்திய அகாடமி, புதுவடல்லை, 2013.
3. பாரதியார், பாரதியார் கவிதைகள், குமரன் பதிப்பகம், சென்னை, 2011.

இணையத்தளங்கள் :

- <http://www.tamilkodal.com>
<http://www.languageelab.com>
<http://www.tamilweb.com>




	GENERAL ENGLISH I	L	T	P	C	Hrs
A20GET101	(Common to B.A., B.Sc. and B.C.A.)	3	0	0	3	45

Course Objectives

- To recognize the rhythms, metrics and other musical aspects of poetry.
- To read a variety of texts critically and proficiently.
- To enable the students to enjoy the flair of literature through the work of great writer.
- To make the students to know the functions of basic grammar and frame sentences without grammatical error.
- To enable them understanding the intrinsic nuances of writing in English language.

Course Outcomes

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

- CO1** – Comprehend and discuss the various facets of selected poems.
CO2 – Analyze and interpret texts written in English.
CO3 – Read drama with graduate-level interpretive and analytical proficiency.
CO4 – Improve the fluency and formation of grammatically correct sentence.
CO5 – Enhance the writing skills for specific purposes.

UNIT I POETRY**(9Hrs)**

1. John Milton: On His Blindness
2. William Wordsworth: Daffodils
3. Percy Bysshe Shelly: Ozymandias
4. Emily Dickinson: Because I could not stop for Death
5. Sarojini Naidu: The Queen's Rival

UNIT II PROSE**(9Hrs)**

1. Francis Bacon: Of Love
2. Charles Lamb: A Dissertation upon Roast Pig

UNIT III DRAMA**(9Hrs)**

1. Oscar Wilde: Lady Windermere's Fan

UNIT IV GRAMMAR**(9Hrs)**

1. Parts of Speech
2. Tenses
3. Subject-Verb Agreement

UNIT V COMPOSITION**(9Hrs)**

1. Essay Writing
2. Email

Text Books

1. James Barrett, "Brookside Musings: A Selection of Poems and Short Stories: Board of Editors", Orient Longman Limited, 2009.
2. Wilde Oscar, "Lady Windermere's Fan. Published in The Importance of Being Earnest and Other Plays", London:Penguin, 1940.
3. Wren & Martin, "High School English Grammar & Composition". Blackie ELT Books, 2017.




Reference Books

1. Lalitha Natarajan and SasikalaNatesan, "English for Excellence: Poetry", Anuradha Publications, 2015.
2. Charles Lamb, "Selected Prose", Penguin Classics. United Kingdom, 2013.
3. Usha Mahadevan, "Sunbeams: Empower with English", Emerald Publishers, Chennai. 2016.

Web References

1. <https://www.englishcharity.com/of-love-by-francis-bacon-explanation/>
2. https://www.poetry-archive.com/n/the_queens_rival.html
3. <https://www.gradesaver.com/lady-windermere-fan/study-guide/summary-act-i>



A20CPT101	PROBLEM SOLVING USING C (Common to B.Sc.CS and B.C.A.)	L	T	P	C	Hrs
		4	0	0	4	60

Course Objectives

- To understand the Fundamentals of Computers and introduction to C language.
- To study the basic terminologies of C language and arrays
- To understand the Functions, Structures and Unions.
- To understand the concepts of Pointers.
- To study about File Management Operations in C.

Course Outcomes

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

CO1 - Develop simple applications in C using basic constructs.

CO2 - Incorporating the use of sequential, selection and repetition control structures into a program.

CO3 - Develop simple programs using functions, structures and unions.

CO4 - Design and develop programs using Pointers.

CO5- Understand the File management Operations and Pre-processor Directives.

UNIT I INTRODUCTION TO C

(12 Hrs)

Fundamentals of Computer: Computer Definition – Block Diagram of Computer – Types of Computer – Characteristics of Computer – Applications of Computer.

C programming: Overview of C – Constants – Compiling a C Program - Variables and Data Types - Technical Difference between Keywords and Identifiers -Types of C Qualifiers and format specifiers - Operators and Expressions - Operators Precedence -Type conversion - Input-Output Statements.

UNIT II DECISION MAKING

(12 Hrs)

Decision making and branching - Relational operators – Logical operators - if – if else - if else if – nested if, Switch-case.

UNIT III LOOPING AND ARRAYS

(12 Hrs)

Looping: while - do while – for – break – continue - nested loop. Arrays: One Dimensional Arrays-Two-Dimensional Arrays-Multi-Dimensional Array-Dynamic arrays-Character Arrays and String-Sorting - Searching.

UNIT IV FUNCTIONS, POINTERS

(12 Hrs)

Functions: Introduction - Definition – Declaration – Categories of Functions - Nesting of Functions, Recursive functions - Passing Arrays to Functions - Strings – String library function. Pointers: Introduction - Declaring Pointer Variables - Initialization of Pointer Variables - Accessing the address of a variable - Accessing a variable through Pointer - Chain of Pointers - Pointer Expressions - Pointers and arrays – Pointers and functions – Call by Reference - Pointers and character strings - Array of Pointers - Pointers and Structures.

UNIT V STRUCTURES AND UNIONS, FILE MANAGEMENT**(12 Hrs)**

User defined data types: Introduction – Structure: definition - declaration - Arrays of Structures – Nested structures – Passing structures to functions – Union - Enumeration and Typedef. Introduction to File Handling in C, Input and Output operations on a file – Error Handling - Random access to files – Command Line Arguments. Introduction to Pre-Processor – Macro substitution directives – File inclusion directives – Conditional Compilation Directives – Miscellaneous directives.

Text Books

1. Balagurusamy. E, "Programming in ANSI C", Tata McGraw Hill, 8th Edition, 2019.
2. Byron S Gottfried and Jitendar Kumar Chhabra, "Programming with C", Tata McGraw Hill Publishing Company, 4th Edition, New Delhi, 2015.
3. Herbert Schildt, "C: The Complete Reference", McGraw Hill, 4th Edition, 2014.
4. Yashwant Kanetkar, "Let us C", BPB Publications, 16th Edition, 2017.
5. Archana Kumar, "Computer Basics with Office Automation", Dream tech Press – Wiley Publisher, 2019.
6. ReemaThareja, "Fundamentals of Computing & C Programming" Oxford University Press, 2012.

Reference Books

1. Ashok N Kamthane, "Computer Programming", Pearson education, 2rd Impression, 2012.
2. VikasVerma, "A Workbook on C ", Cengage Learning, 2rd Edition, 2012.
3. Dr. P. Rizwan Ahmed, "Office Automation", Margham Publications, 2016.
4. P.Visu, R.Srinivasan and S.Koteeswaran, "Fundamentals of Computing and Programming", 4th Edition, Sri Krishna Publications, 2012.
5. PradipDev, ManasGhoush, "Programming in C", 2rd Edition, Oxford University Press, 2011.

Web References

1. <https://www.programiz.com/c-programming>
2. <https://www.geeksforgeeks.org/c-language-set-1-introduction/>
3. <https://www.tutorialspoint.com/cprogramming>
4. <https://www.assignment2do.wordpress.com/.../solution-programming-in-ansi-c>
5. <https://nptel.ac.in/courses/106/104/106104128/>
6. <https://www.coursera.org/courses?query=c%20programming>
7. <https://www.udemy.com/course/c-programming-for-beginners-/>

	L	T	P	C	Hrs
A20CPT102					
DIGITAL LOGIC AND COMPUTER ORGANIZATION					
(Common to B.Sc.CS and B.C.A.)	4	0	0	4	60

Course Objectives:

- To understand the basic concepts of Digital design and number systems.
- To expose with the Combinational circuits
- To expose with the Sequential circuits
- To study the fundamentals of Computer systems.
- To be familiar with the memory organization and CPU in a computer systems.

Course Outcomes:

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

CO1 – Explain the concepts of Digital design and number systems.

CO2 – design the digital system using combinational system design.

CO3 – design the digital system using Sequential system design.

CO4 – Explain fundamentals of Computer systems.

CO5 – Explain memory organization and CPU in computer systems.

UNIT I INTRODUCTION TO DIGITAL DESIGN**(12 Hrs)**

Data Representation - Data Types - Number Systems - Complements - Arithmetic Operations - Representations - Fixed Point, Floating Point - Error detection codes - Binary Codes- Logic Gates - Boolean Algebra - Map Simplification – Karnaugh maps: SOP and POS forms - QuineMcClusky method

UNIT II COMBINATIONAL CIRCUIT DESIGN**(12 Hrs)**

Combinational Circuits, Half adder - full adder - code converters - combinational circuit design - Multiplexers and Demultiplexers – encoders – decoders - Combinational design using Mux and Demux.

UNIT III SEQUENTIAL CIRCUIT DESIGN**(12 Hrs)**

Sequential Circuit Design, Flip flops (RS, Clocked RS, D, JK, JK Master Slave, T) - Counters - Shift registers and their types - Counters: Synchronous and Asynchronous counters.

UNIT IV COMPUTER ORGANIZATION**(12 Hrs)**

Instruction Codes - Computer Registers - Computer Instructions - Timing And Control - Instruction Cycle - Memory Reference Instructions - I/O And Interrupt – Machine Language – Assembly Language - Assembler -. Peripheral Devices - Input-Output Interface - Asynchronous Data Transfer - Modes Of Transfer - Priority Interrupt - DMA - IOP - Serial Communication

UNIT V MEMORY ORGANIZATION AND CPU**(12 Hrs)**

Memory Hierarchy - Main Memory - Auxiliary Memory - Associative Memory - Cache Memory - Virtual Memory - Memory Management Hardware - CPU: General Register Organization - Control Word - Stack Organization - Instruction Format - Addressing Modes - Data Transfer And Manipulation - Program Control.

Text Books

1. Morris Mano M, "Digital Logic and Computer Design", Pearson Education, 4th Edition, 2014
2. Carl Hamacher, ZvonkoVranesic, SafwatZaky, "Computer Organization", 5th Edition, McGraw Hill, 2002.
3. V.Rajaraman, T. Radhakrishnan, "Digital Logic and Computer Design", PHI Learning, 2006.

Reference Books

1. B Ram, Computer Fundamentals: Architecture and Organization (TWO COLOUR EDITION), New Age International (P) Ltd Publishers, 6th Edition 2020.
2. FLOYD, Digital Fundamentals, PEARSON INDIA, 11th Edition.
3. Alan B.Marcovitz, "Introduction to Logic design", Tata McgrawHill, 2rd Edition, 2005.

Web References

1. <https://www.sanfoundry.com/best-reference-books-computer-organization-architecture/>
2. <http://www.cuc.ucc.ie/CS1101/David%20Tarnoff.pdf>
3. https://www.tutorialspoint.com/computer_logical_organization/index.htm



A20CPD101**COMPUTATIONAL MATHEMATICS
(Common to B.Sc.CS and B.C.A.)**

L	T	P	C	Hrs
3	1	0	4	60

Course objectives

- To develop the use of matrix algebra techniques for practical applications.
- To introduce effective mathematical tools for the solutions of differential equations that model physical processes.
- To acquaint the student with mathematical tools needed in evaluating multiple integrals and their usage.
- To learn the different concepts of topics in Probability.
- To learn the different concepts of topics in statistics.

Course Outcomes

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

CO1 – Acquire the knowledge about matrices and able to compute Eigen values and Eigen.

CO2 – Analyze and solve Differential Equations.

CO3 – Understand the use of Integrals and able to apply it.

CO4 – Understand the use probability.

CO5 – Understand the use Statistics.

UNIT I MATRICES**(12 Hrs)**

Rank of a Matrix - Consistency of system of equations. Eigen values and Eigen vectors of a real matrix - Characteristic equation - Properties of Eigen values and Eigenvectors. Cayley-Hamilton Theorem - Diagonalization of matrices - Reduction of a quadratic form to canonical form by orthogonal transformation - Nature of quadratic forms.

UNIT II DIFFERENTIAL EQUATIONS**(12 Hrs)**

Linear differential equations of higher order - with constant coefficients, the operator D, Euler's linear equation of higher order with variable coefficients, simultaneous linear differential equations, solution by variation of parameters method

UNIT III INTEGRALS AND APPLICATIONS**(12 Hrs)**

Double integrals and Triple Integrals. Applications: Areas by double integration and volumes by triple integration.

UNIT IV PROBABILITY**(12 Hrs)**

Discrete Random variable: Introduction Random variables and their event spaces The probability Mass function. Distribution functions Special discrete distributions: The Bernoulli PMF. Bernoulli Poisson, continuous random variable normal distribution.

UNIT V STATISTICS**(12 Hrs)**

Measures of central tendency Arithmetic mean, Median, Mode, Geometric mean, Harmonic mean. Skewness and Kurtosis - Simple correlation Karl Pearson's coefficient. of correlation Rank correlation Regression lines of regression properties of regression coefficient.

Text Books

1. M.K. Venkataraman, Engineering Mathematics (First Year), 2nd Edition, The National Publishing Company, Madras, 2001.
2. M.K. Venkataraman, Engineering Mathematics (Third Year-Part A), The National Publishing Company, Madras, 2001.
3. T. Veerarajan, —Probability, statistics and Random Processes, || Tata Mc.Graw-Hill Publishing Company Ltd., 3rd Edition, 2008.

Reference Books

1. N.P. Bali and Manish Goyal, A Text Book of Engineering Mathematics, Lakshmi Publications, New Delhi, 2007.
2. Grewal B.S., Higher Engineering Mathematics, Khanna Publishers, New Delhi, 41st Edition, 2011.
3. Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008
4. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010.
5. Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons, New Delhi.

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1. <https://www.youtube.com/watch?v=xyAuNHPsq-g>
2. https://link.springer.com/chapter/10.1007/978-1-4757-2024-2_1
3. <https://ncert.nic.in/ncerts/l/lemh203.pdf>
4. <https://users.math.msu.edu/users/gnagy/teaching/ode.pdf>
5. https://www.stat.pitt.edu/stoffer/tsa4/intro_prob.pdf
6. <https://www.math.arizona.edu/~jwatkins/statbook.pdf>
7. <http://www.utstat.toronto.edu/mikeevans/jeffrosenthal/book.pdf>
8. https://homepage.divms.uiowa.edu/~rdecook/stat2020/notes/ch3_pt1.pdf



A20AET101	ENVIRONMENTAL STUDIES	L	T	P	C	Hrs
	(Common for all B.A., B.Sc., B.Com., B.B.A, B.C. A.)	2	0	0	2	20

Course Objectives

- To gain knowledge on the importance of natural resources and energy.
- To know the structure and function of an ecosystem
- To imbibe an aesthetic value with respect to biodiversity, understand the threats and its conservation and appreciate the concept of interdependence
- To know the causes of types of pollution and disaster management
- To observe and discover the surrounding environment through field work.

Course Outcomes

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

CO1 – Understand about the various resources

CO2 – Learn about the biodiversity

CO3 – Learn the different types of pollution and to prevent the pollution

CO4 – Know about the pollution Act

CO5 – Observe various environmental issues in surroundings

UNIT I INTRODUCTION TO ENVIRONMENTAL SCIENCES: NATURAL RESOURCES (6 Hrs)

Environmental Sciences - Relevance - Significance - Public awareness - Forest resources - Water resources - Mineral resources - Food resources - conflicts over resource sharing - Exploitation - Land use pattern - Environmental impact - fertilizer - Pesticide Problems - case studies.

UNIT II ECOSYSTEM, BIODIVERSITY AND ITS CONSERVATION (6 Hrs)

Ecosystem - concept - structure and function - producers, consumers and decomposers - Food chain - Food web - Ecological pyramids - Energy flow - Forest, Grassland, desert and aquatic ecosystem. Biodiversity - Definition - genetic, species and ecosystem diversity - Values and uses of biodiversity - biodiversity at global, national (India) and local levels - Hotspots, threats to biodiversity - conservation of biodiversity –Insitu&Exsitu.

UNIT III ENVIRONMENTAL POLLUTION AND MANAGEMENT (6 Hrs)

Environmental Pollution - Causes - Effects and control measures of Air, Water, Marine, soil, solid waste, Thermal, Nuclear pollution and Disaster Management - Floods, Earth quake, Cyclone and Landslides. Role of individuals in prevention of pollution - pollution case studies.

UNIT IV SOCIAL ISSUES - HUMAN POPULATION (6 Hrs)

Urban issues - Energy - water conservation - Environmental Ethics - Global warming - Resettlement and Rehabilitation issues - Environmental legislations - Environmental production Act. 1986 - Air, Water, Wildlife and forest conservation Act - Population growth and Explosion - Human rights and Value Education - Environmental Health - HIV/AIDS - Role of IT in Environment and Human Health - Women and child welfare - Public awareness - Case studies.

UNIT V FIELD WORK (6 Hrs)

Visit to a local area / local polluted site / local simple ecosystem - Report submission REFERENCES

Text Books

1. Bharucha Erach, "Textbook of Environmental Studies for Undergraduate Courses", Telangana, India: Orient Black Swan, 2nd Edition, 2013,
2. BasuMahua, Savarimuthu Xavier, "SJ Fundamentals of Environmental Studies". Cambridge, United Kingdom: Cambridge University Press , 2017.
3. Agarwal, K.C "Environmental Biology", Nidi Publ. Ltd. Bikaner, 2001 .

Reference Books

1. Kumarasam.K., A. Alagappa Moses AND M.Vasanthy, "Environmental studies", Bharathidasan university pub, 1, trichy2004.
2. Rajamannar, "Environmental studies", EVR College PUB, Trichy2004
3. Kalavathy, S. (ED.) , "Environmental Studies", Bishop Heber College PUB., Trichy 2004.

Web References

1. <https://www.youtube.com/watch?v=78prsPYm98g>
2. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2792934/>
3. <https://www.frontiersin.org/articles/505570>



A20CPL101	PROGRAMMING IN C LAB (Common to B.Sc.CS and B.C.A.)	L	T	P	C	Hrs
		0	0	4	2	60

Course Objectives

- To practice the fundamental programming methodologies in the C programming language.
- To apply logical skills for problem solving using control structures and arrays.
- To design, implement, test and debug programs that use different data types, variables, strings, arrays, pointers and structures.
- To design modular programming and provide recursive solution to problems.
- To understand the miscellaneous aspects of C and comprehension of file operations.

Course Outcomes

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

CO1 – Apply and practice logical formulations to solve simple problems leading to specific applications.

CO2 – Develop C programs for simple applications making use of basic constructs, arrays and strings.

CO3 – Develop C programs involving functions, recursion, pointers, and structures.

CO4 – Design applications using sequential and random access file processing.

CO5 – Build solutions for online coding challenges.

List of Exercises

1. Simple programming exercises to familiarize the basic C language constructs.
2. Develop programs using identifiers and operators.
3. Develop programs using decision-making and looping constructs.
4. Develop programs using functions as mathematical functions.
5. Develop programs with user defined functions – includes parameter passing.
6. Develop program for one dimensional and two dimensional arrays.
7. Develop program to illustrate pointers.
8. Develop program with arrays and pointers.
9. Develop program for dynamic memory allocation.
10. Develop programs for file operations.

Reference Books

1. Zed A Shaw, "Learn C the Hard Way: Practical Exercises on the Computational Subjects You Keep Avoiding (Like C)", Addison Wesley, 2016.
2. Anita Goel and Ajay Mittal, "Computer Fundamentals and programming in C", 1st Edition, Pearson Education, 2011.
3. Yashwanth Kanethkar, "Let us C", 13th Edition, BPB Publications, 2008.
4. Maureen Sprankle, Jim Hubbard, "Problem Solving and Programming Concepts," 9th Edition, Pearson, 2011.

Web References

1. <https://alison.com/course/introduction-to-c-programming>
2. <https://www.geeksforgeeks.org/c-programming-language/>
3. http://cad-lab.github.io/cadlab_data/files/1993_prog_in_c.pdf
4. <https://www.tenouk.com/clabworksheet/clabworksheet.html>
5. <https://fresh2refresh.com/c-programming/>
6. <http://www.skiet.org/downloads/cprogrammingquestion.pdf>

A20CPL102	DIGITAL LAB (Common to B.Sc.CS and B.C.A.)	L	T	P	C	Hrs
		0	0	4	2	60

Course Objectives

- To acquire knowledge about basic logic gates.
- To develop the skills in writing assembly programs.
- To develop the skill for error corrections in the micro level.
- To expose with the Combinational circuits.
- To expose with the Sequential circuits.

Course Outcomes

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

- CO1** – Acquire knowledge about basic logic gates.
CO2 – Develop the skills in writing assembly programs.
CO3 – Develop the skill for error corrections in the micro level.
CO4 – Design Combinational Logic Circuits.
CO5 – Design Sequential Logic Circuits.

List of Exercises

1. Study of Integrated Circuits and their working Logics.
2. Verification of Boolean Theorems using Digital Logic Gates.
3. Design and Implementation of Combinational Circuits using Basic Gates Code Converters.
4. Design and Implementation of 4-Bit Binary Adder / Subtractor using Basic Gates and MSI Devices
5. Design and Implementation of Parity Generator / Checker using Basic Gates and MSI Devices.
6. Design and Implementation of Magnitude Comparator.
7. Design and Implementation of Application using Multiplexers /Demultiplexers.
8. Design and Implementation of Shift Registers.
9. Design and Implementation of Synchronous and Asynchronous Counters.
10. Design and Implementation of Johnson and Ring Counters.

Reference Books

1. Albert Paul Malvino, Donald P Leach, Digital principles and applications, TMH, 2007.
2. Hayes J. P., "Computer Architecture & Organisation", McGraw Hill,
3. Hamacher, "Computer Organisation and System Software", EXCEL BOOKS.
4. Ghosh&Pal, Computer Organization & Architecture (TMH WBUT Series), TMH.

Web References

1. [www.geeksforgeeks.org › computer-organization-and-architecture](http://www.geeksforgeeks.org/computer-organization-and-architecture)
2. [www.javatpoint.com › computer-organization-and-architecture-tutorial](http://www.javatpoint.com/computer-organization-and-architecture-tutorial)
3. [www.geeksforgeeks.org › digital-electronics-logic-design-tutorials](http://www.geeksforgeeks.org/digital-electronics-logic-design-tutorials)

A20SEL101	COMMUNICATION SKILLS LAB (Common to all B.A., B.Sc., B.Com., B.B.A., B.C.A.)	L	T	P	C	Hrs
		0	0	2	2	30

Course Objectives

- To improve the students' speed in reading.
- To decode the correspondence between sound and spelling in English.
- To train students to organize, revise and edit ideas to write clearly and effectively.
- To enhance the sense of social responsibility and accountability of the students.
- To expound the significance of time and stress management.

Course Outcomes

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

CO1 – Understand the pattern to communicate effectively.

CO2 – Impart Speaking skills with confidence.

CO3 – Use writing strategies to improve their drafting skills and comprehending of articles.

CO4 – Demonstrate leadership qualities to Participate in Group Discussion and Interview efficiently.

CO5 – Expertise in Managerial skills.

UNIT I COMMUNICATION SKILLS SPEAKING**(6 Hrs)**

Aspects of speaking - Process and techniques of effective speech – Presentations - topic to be given to students for short speech.

UNIT II SELF - MANAGEMENT SKILLS**(6 Hrs)**

Time Management - Stress management – Perseverance – Resilience - Mind mapping
–Self- confidence

UNIT III COMMUNICATION SKILL - READING**(6 Hrs)**

Phonics – Self-Introduction – Vocabulary – Comprehension - skimming and scanning.

UNIT IV SOCIAL SKILLS**(6 Hrs)**

Negotiation and Persuasion – Leadership – Teamwork – Problem solving – Empathy – Decision making.

UNIT V COMMUNICATION SKILL - WRITING**(6 Hrs)**

Descriptive – Narrative – Persuasive – Expository – Picture composition

Text Books

1. Syamala, V, " Effective English Communication for you", Chennai: Emerald Publishers, 2002
2. Balasubramanian, T, " A Textbook of English Phonetics for Indian Students", New Delhi: Trinity Press 1981
3. Sardana, C.K., " The Challenge of Public Relations", New Delhi: Har- Anand Publications, 1995.

Reference Books

1. Morley, David and Philip Neilson, editors”, The Cambridge Companion to Creative Writing”, Cambridge: 2012.
2. Eastwood, John,”Oxford Grammar”, Oxford University Press, 1999.
3. Prasad, Hari Mohan,” A Handbook of Spotting Errors:” McGraw Hill Education, 2010.
4. Murphy, John J, “Pulling Together: 10 Rules for High-Performance Teamwork”, Simple Truths, 2016.

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1. www.softwaretestinghelp.com › how-to-crack-the-gd
2. www.businessballs.com › communication-skills › prese...
3. www.teachingenglish.org.uk › article › public-speaking...
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மொழித்தாள்
தமிழ் - II
(B.A., B.Sc., B.Com., B.B.A., & B.C.A. பாடப்பிரிவுகளுக்கான பொதுத்தாள்)

A20TAT202

L T P C Hrs
3 0 0 3 45

பாடத்திட்டத்தின் நோக்கம்

- இரண்டாயிரம் ஆண்டுகால தமிழின் தொன்மையையும் வரலாற்றையும் அதன் விழுமியங்களையும் பண்பாட்டையும் எடுத்துரைப்பதாக இப்பாடத்திட்டம் அமைக்கப்பட்டுள்ளது.
- தமிழ் இலக்கியம் உள்ளடக்கத்திலும், வடிவத்திலும் பெற்ற மாற்றங்கள், அதன் சிந்தனைகள், அடையாளங்கள் ஆகியவற்றை காலந் தோறும் எழுதப்பட்ட இலக்கியங்களின் வழியாகக் கூறுவதற்கு இப்பாடத்திட்டம் அமைக்கப்பட்டுள்ளது.
- மொழியின் கட்டமைப்பை புரிந்துகொள்வதற்கு ஏதுவாக பாடத்திட்டம் வடிவமைக்கப்பட்டுள்ளது.
- வாழ்வியல் சிந்தனைகள், ஒழுக்கவியல் கோட்பாடுகள், சமத்துவம், சூழலியல் எனப் பல கூறுகளை மாணவர்களுக்கு எடுத்துரைக்கும் விதத்தில் இப்பாடத்திட்டம் உருவாக்கப்பட்டுள்ளது.
- சிந்தனை ஆற்றலைப் பெருக்குவதற்குத் தாய்மொழியின் பங்களிப்பினை உணர்த்த இப்பாடத்திட்டம் அமைக்கப்பட்டுள்ளது.

பாடத்திட்டத்தின் வெளிப்பாடுகள்

- CO1 - இலக்கியங்கள் காட்டும் வாழ்வியல் நெறிமுறைகளைப் பேணிநடத்தல்.
CO2 - நமது எண்ணத்தை வெளிப்படுத்தும் கருவியாகத் தாய்மொழியைப் பயன்படுத்துதல்.
CO3 - தகவல் தொடர்புக்குத் தாய்மொழியின் முக்கியத்துவத்தை உணர்தல்.
CO4 - தாய்மொழியின் சிறப்பை அறிதல்.
CO5 - இலக்கிய இன்பங்களை நுகரும் திறன்களை வளர்த்தல்.

அலகு-1

(9 Hrs)

1. எட்டுத்தொகை: 1. குறுந்தொகை (படல்-130) 2. நற்றிணை (படல்-27) 3. அகநானூறு (படல்-86).
2. பத்துப்பாட்டு: சிறுபாணாற்றுப்படை (அடிகள்-126-143).
3. பதினெண் கீழ்க்கணக்கு: திருக்குறள்- வெகுளாமை (அதிகாரம்-31), காதல் சிறப்புரைத்தல் (அதிகாரம்-113).

அலகு-2

(9 Hrs)

1. எட்டுத்தொகை: 1. ஐங்குறுநூறு (படல்-203), 2. கலித்தொகை- பாலைத்திணை (படல்-9), 3. புறநானூறு (படல்-235).
2. பத்துப்பாட்டு- முல்லைப்பாட்டு (6-21).
3. பதினெண் கீழ்க்கணக்கு :
 1. நாலடியார் - நல்லார் எனத்தான் (221) .
 2. திரிகடுகம்- கோலஞ்சி வாழும் குடியும் (33).
 3. இனியவை நாற்பது- குழவி தளர்நடை (14).
 4. கார் நாற்பது- நலமிகு கார்த்திகை (26).
 5. களவழி நாற்பது-கவளங்கொள் யானை (14).

அலகு-3

(9 Hrs)

சைவம்- பன்னிரு திருமுறைகள்

1. திருஞானசம்பந்தர் - வேயுறு தோளியங்கள் (இரண்டாம் திருமுறை).
2. திருநாவுக்கரசர் - மனமெனும் தோணி (நான்காம் திருமுறை).
3. சுந்தரர் - ஏழிசையாய் இசைப்பயனாய் (ஏழாம் திருமுறை).
4. மாணிக்கவாசகர் - ஆதியும் அந்தமும் இல்லா (திருவெம்பாவை).
5. திருமூலர் - அன்பு சிவம் இரண்டு (திருமந்திரம்).

வைணவம் - நாலாயிரத் திவ்வியப் பிரபந்தம்

1. பேயாழ்வார் - திருக்கண்டேன் பொன்மேனி....
2. பெரியாழ்வார் - கருங்கண் தோகை மயிற் பீலி....
3. தொண்டரடிப்பொடிஆழ்வார் - பச்சைமாமலை போல்....
4. ஆண்டாள் - கருப்பூரம் நாறுமோ? கமலப்பு....
5. திருமங்கையாழ்வார் - வாடினேன் வாடி வருந்தினேன்....




இஸ்லாமியம்

சீறாப்பராணம்- பாடல் நின்ற பிணை மானுக்குப்...5 பாடல்கள் (பாடல் எண்கள் 61-65).

கிருத்துவம்

இரட்சணய யாதீகம்- கடைதிறப்புப் படலம் -5 பாடல்கள் (பாடல் எண்கள்: 3,9,10,15,16).

அலகு - 4

(9 Hrs)

தமிழ் இலக்கிய வரலாறு

1. சங்க இலக்கியங்கள் 2. நீதி இலக்கியங்கள் 3. பக்தி இலக்கியங்கள் 4. காப்பியங்கள்.

அலகு-5

(9 Hrs)

சிறுகதைகள்

1. புதுமைபித்தன்	-	அகலிகை
2. நா. பிச்சமூர்த்தி	-	வேப்பமரம்
3. அகிலன்	-	ஒரு வேளைச்சோறு
4. ஜி.நாகராஜன்	-	பச்சக் குதிரை
5. கி.ராஜநாராயணன்	-	கதவு
6. சா.கந்தசாமி	-	தக்கையின் மீது நான்கு கண்கள்
7. ஆண்டவர் பிரியதர்ஷினி	-	மாத்திரை
8. வண்ணதாசன்	-	ஒரு உல்லாசப் பயணம்
9. சு. தமிழ்ச்செல்வன்	-	வெயிலோடு போய்
10. பாரததேவி	-	மாப்பிள்ளை விருந்து

பார்வை நூல்கள் :

1. அரசு, வீ., இருபதாம் நூற்றாண்டு சிறுகதைகள் நூறு, அடையாளம் பதிப்பகம், திருச்சி, 2013.
2. அருணாச்சலம், பா., பக்தி இலக்கியங்கள், பாரி நிலையம், சென்னை, 2010.
3. தமிழண்ணல், புதிய நோக்கில் தமிழ் இலக்கிய வரலாறு, மீனாட்சி புத்தக நிலையம், மதுரை, 2000.
4. பாக்கியமேரி, வகைமை நோக்கில் தமிழ் இலக்கிய வரலாறு, என்.சி.பி.எச். பதிப்பகம், சென்னை, 2011.
5. பசுபதி, மா. வே., செம்மொழித் தமிழ் இலக்கண இலக்கியங்கள், தமிழ்ப் பல்கலைக்கழகம், 2010 .

உரைநடை நூல்கள் :

1. அன்பு, பா., மா.வொ.சி யின் ஒரு இலக்கிய நூல்கள் ஒரு மதிப்பீடு, உலக தமிழ் ஆராய்ச்சி நிறுவனம், சென்னை, 1983.
2. பிள்ளை, கே.கே., தமிழக வரலாறும் மக்களும் பண்பாடும், உலக தமிழ் ஆராய்ச்சி நிறுவனம், சென்னை, 2000.
3. ஜெயமோகன், நவீன இலக்கிய அறிமுகம், உயிர்மெய் பதிப்பகம், சென்னை, 1995.

இணையத்தளங்கள் :

<http://www.tamilkodal.com>
<http://www.languagelab.com>
<http://www.tamilweb.com>




A20GET202	GENERAL ENGLISH- II (Common to all B.A., B.C.A., B.Sc.)	L	T	P	C	Hrs
		3	0	0	3	45

Course Objectives

- To recognize poetry from a variety of cultures, languages and historic periods
- To develop the intensive study of language by critical reading
- To identify the various genres and analyze the works of writers in English
- To expand the basic understanding of targeted grammatical structures
- To understand the conventions of writing in English

Course Outcomes

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

CO1 – Understand and appreciate poetry as a literary art form.

CO2 – Comprehend and recognize relationship between ideas, events and facts.

CO3 – Learn to explore characters and their conflicts, dilemmas and extend their response to stories.

CO4 – Apply grammatical structures meaningfully and appropriately in oral and written form.

CO5 – Write effectively and coherently.

UNIT I POETRY**(9 Hrs)**

1. Lord Byron: She Walks in Beauty
2. Robert Frost: Stopping by Woods on a Snowy Evening
3. Nissim Ezekiel: Night of the Scorpion
4. Rabindranath Tagore: Where the Mind is Without Fear

UNIT II PROSE**(9 Hrs)**

1. Ernest Hemingway-A Day's Wait
2. Anton Chekhov: The Lottery Ticket

UNIT III FICTION**(9 Hrs)**

1. Jane Austen - Pride and Prejudice

UNIT IV GRAMMAR**(9 Hrs)**

1. Voice – Conditionals - Coherence

UNIT V COMPOSITION**(9 Hrs)**

1. Letter Writing
2. Report Writing

Text Books

1. Wisdom and Experience: An Anthology for Degree Classes. Board of Editors”, Orient Longman Limited, 2007
2. “The Approach to Life: A Selection of English Prose”, Orient Longman Limited, 2009.
3. “Brookside Musings: A Selection of Poems and Short Stories: Board of Editors”, Orient, Longman Limited, 2009.

Reference Books

1. Lalitha Natarajan and Sasikala Natesan, ”English for Excellence: Poetry”, Anuradha Publications Literary Pursuits: Board of Editors, Orient Longman Limited, 2015.
2. S.C. Gupta, “English Grammar & Composition”, Arihant, 2014
3. Rabindranath Tagore, Where the mind is without fear “,London : The India Society,1912.
4. Raymond Murphy and Surai Pongtongcharoen, “English Grammar in Use”, Cambridge University, 1985.

Web References

1. <https://poets.org/poem/she-walks-beauty>
2. <https://www.poetryfoundation.org/poems/46467/the-flea>
3. <https://www.classicshorts.com/stories/lottery.html>
4. <http://short-storylovers.blogspot.com/2012/07/thief-by-ruskin-bond.html>
5. <http://www.gutenberg.org/files/1342/1342-h/1342-h.htm>



A20CPT203**PROGRAMMING IN C++**

L	T	P	C	Hrs
4	0	0	4	60

Course Objectives

- Define Encapsulation, Inheritance and Polymorphism.
- Solve the problem with object oriented approach.
- Analyze the problem statement and build object oriented system model.
- Describe the characters and behavior of the objects that comprise a system.
- Explain function overloading, operator overloading and virtual functions.

Course Outcomes

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

CO1 – To learn programming from real world examples.

CO2 – To understand Object oriented approach for finding Solutions.

CO3 – To create computer based solutions to various real-world problems using C++.

CO4 – To learn various concepts of object oriented approach towards problem solving.

CO5 – Develop the applications using object oriented programming with C++.

UNIT I INTRODUCTION TO C++ AND BASICS OF OOPS**(12 Hrs)**

Basic components of a C++ - Program and program structure - Compiling and Executing C++ Program - Basic Concepts of Object-Oriented Programming: Benefits of OOP – Object Oriented Languages – Applications of OOP.

UNIT II PRINCIPLES OF OBJECT ORIENTED PROGRAMMING**(12 Hrs)**

Classes objects - data members - member functions –Access Specifiers- this Pointer - Friends - Friend Functions - Friend Classes - Friend Scope - Static Functions - Constructors and Destructors - Static variables and Functions in class - Operator Overloading in C++ - Overloading Unary Operators - Overloading binary operators.

UNIT III INHERITANCE**(12 Hrs)**

Inheritance in C++ - Types of Inheritance - Multiple Inheritance. Virtual Functions - Polymorphism - Abstract classes. Real time examples in OOPS.

UNIT IV POINTERS, EXCEPTION HANDLING AND FILES**(12 Hrs)**

Pointers - Objects and Pointers - Exception Handling: Exception – Basics – Exception Handling Mechanism – Throwing Mechanism – Catching Mechanism – Re-throwing Exception. Standard input and output operations: C++ I/Ostream hierarchy - File input and output: Reading a File - Managing I/O Streams - Opening a File – Different Methods - Checking for Failure with File Commands - Checking the I/O Status Flags - Dealing with Binary Files - Useful Functions.

UNIT V TEMPLATES**(12 Hrs)**

Class templates: Implementing a class template - Implementing class template member functions - Using a class template - Function templates - Implementing function templates - Using template functions.

Text Books

1. E. Balagurusamy, "Object Oriented Programming with C++", McGraw Hill, 7th Edition, 2018.
2. Herbert Schildt, "C++ - The Complete Reference", McGraw Hill Education, 4th Edition, 2017.

Reference Books

1. Herbert Schildt, "C++ - From the Ground Up", McGraw Hill Education, 2nd Edition, 2010.
2. Thomas L. Floyd, "Electronic Devices", 9th Edition, Pearson Education, 2012.
3. Stanley B. Lippman, Stanley Lippman, Barbara Moo, "C++ Primer", Addison-Wesley Professional, 5th Edition 2012.

Web Resources

1. <https://www.tutorialspoint.com/cplusplus/index.htm>
2. <http://www.cplusplus.com/doc/tutorial/>
3. <https://www.w3schools.com/cpp/>
4. <https://www.javatpoint.com/cpp-tutorial>
5. <https://www.geeksforgeeks.org/cpp-tutorial/>



A20CPT204	DATA STRUCTURES AND ALGORITHMS (Common to B.Sc. CS and B.C.A.)	L	T	P	C	Hrs
		4	0	0	4	60

Course Objectives

- To introduce the primary data structures and algorithms for their associated operations.
- To understand the applications of data structures.
- To learn the implementation issues of the data structures introduced.
- To understand the concepts of searching and sorting Techniques.
- To understand the basic concepts of stack, queue, List, Trees and Graphs

Course Outcomes

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

CO1 – Analyze algorithms based on time and space complexity.

CO2 – Implement and Apply linear data structures to solve simple problems.

CO3 – Represent and Apply Non-linear data structures to solve complex problems.

CO4 – Use Divide and conquer method to solve various problems.

CO5 – Use Greedy techniques to solve real time problem.

UNIT I DATA STRUCTURE AND ALGORITHM

(12 Hrs)

Types of data structures – Abstract Data Type (ADT) – Analysis of algorithm – Time and space complexity – Recurrence relation – Asymptotic Notation. Sorting – Searching.

UNIT II LIST AND ADT

(12 Hrs)

Static and dynamic Representation – Types – Single Linked List - Doubly Linked List – Circular Linked List – Operations and Applications.

UNIT III STACKADT

(12 Hrs)

Static and Dynamic Representation – Operations – Applications- Balancing Parenthesis – Evaluation of Arithmetic Expression- Infix to Postfix conversion. Queue ADT: Static and dynamic Representation – Linear queue – circular queue.

UNIT IV TREE ADT

(12 Hrs)

Representation – Types – Binary Tree – Threaded Binary Tree -Binary Search Tree – Operation and Application. Graph: Representation – Types – Graph Traversal – Depth First Search – Breadth First Search – Application – Minimum cost spanning tree – Topological Sorting.

UNIT V ALGORITHM DESIGN TECHNIQUES

(12 Hrs)

Divide and Conquer – General method – Finding Minimum Maximum – Greedy Method: General Method– knapsack problem – Single source shortest path – Dijkstra's: Job sequencing.

Text Books

1. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C++", 4th Edition, Pearson Education, 2013.
2. E. Horowitz, S. Sahni and S. Rajasekaran, "Computer Algorithms/C++", 2nd Edition, The Orient Blackswan, 2019.
3. A Puntambekar, "Data Structures", Third Revised Edition, Technical Publications Pune, 2008.

Reference Books

1. ReemaThareja, "Data Structures Using C", 1st Edition, Oxford University Press, 2017.
2. Gilles Brassard, "Fundamentals of Algorithms", Pearson Education, 2015.
3. Alfred V. Aho, John E. Hopcroft, Jeffrey D. Ullman, "Data Structures and Algorithms", Pearson Education, Reprint, 2006.
4. Ellis Horowitz, Sartaj Sahni, Susan Anderson-Freed, "Fundamentals of Data Structures in C", 2nd Edition, University Press, 2008.

Web References

1. <https://www.geeksforgeeks.org/>
2. <http://opendatastructures.org/>
3. <https://nptel.ac.in/courses/106/106/106106127>



A20CPD202**DISCRETE MATHEMATICS**

L	T	P	C	Hrs
3	1	0	4	60

Course Objectives

- To understand the concepts of Logical operations and Propositions.
- To familiarize the concept of set theory and their relations.
- To understand the basic concepts of functions.
- To familiarize the applications of algebraic structures.
- To understand the concepts and significance of Graph theory.

Course Outcomes

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

CO1 – Acquire the knowledge about the concepts needed to test the logic of a program.

CO2 – Understand to identifying the sets and relations.

CO3 – Understand to identifying the functions and algorithm.

CO4 – Apply the concept of algebraic and groups.

CO5 – Understand the basic concepts of graph theory and colorings.

UNIT I PROPOSITIONAL CALCULUS**(12 Hrs)**

Propositional calculus: Propositions and compound propositions, connectives, Logical operations - Propositions and Truth tables, Tautologies and contradictions, Logical equivalence - Algebra of proposition - conditional and Bi-conditional statements – Quantifiers - Negation of quantifier statements.

UNIT II SET THEORY**(12 Hrs)**

Set Theory: Sets Basic concepts notation inclusion and equality of sets - Power set, set operations – Relations - composition of relations, Equivalence relations, partial order relation - n-array relations.

UNIT III FUNCTIONS**(12 Hrs)**

Functions: one-to-one, onto and invertible functions - Mathematical functions, Exponential and Logarithmic functions - Recursively Defined functions - Algorithms and Functions - complexity of Algorithms.

UNIT IV ALGEBRAIC SYSTEMS**(12 Hrs)**

Algebraic systems - Examples and General properties - semi-groups and Monoids - Definitions and Examples - Groups: Definition and examples – Cosets and Lagrange's theorem -Normal subgroups - Group homomorphism.

UNIT V GRAPH THEORY**(12 Hrs)**

Graph Theory: Graphs and multi-graphs sub-graph - Isomorphic and Homeomorphic Graphs - Paths connectivity - The Bridges of Konigsberg, Traversable multigraphs Labeled and weight graphs - complete regular and Bipartite graphs - Tree graphs - planar graphs, Graph colorings, Representation of graph in Computer memory.

Text Books

1. Venkatraman M K, Sridharan N and Chandrasekaran N, Discrete Mathematics, The National Publishing Company, 2000.
2. J.P. Tremblay and R. Manohar Discrete mathematical structures with applications to Computer Science Mc.Graw Hill Book Company, New York, 1975.
3. Rosen, K.H., "Discrete Mathematics and its Applications", 7th Edition, Tata McGraw Hill Pub. Co. Ltd., NewDelhi, Special Indian Edition,2011.
4. Tremblay, J.P. and Manohar. R, "Discrete Mathematical Structures with Applications to Computer Science",TataMcGraw Hill Pub. Co. Ltd, New Delhi, 30th Reprint, 2011.
5. Kenneth H. Rosen, "Discrete Mathematics and its Applications", 5th Edition, Tata McGraw - Hill Publishing Company, Pvt. Ltd., New Delhi, 2003.

Reference Books

1. Grimaldi.R .P."Discrete and Combinatorial Mathematics: An Applied Introduction",4th Edition, PearsonEducation Asia, Delhi, 2007.
2. Lipschutz. S and Mark Lipson, "Discrete Mathematics", Schaum'sOutlines, Tata McGraw Hill Pub.Co. Ltd.,New Delhi, 3rd Edition, 2010.
3. Koshy. T, "Discrete Mathematics with Applications "Elsevier Publications, 2006.
4. C.L. Liu, "Elements of Discrete Mathematics", 3rd Edition, Tata McGraw - Hill Education Pvt. Ltd., 2008.
5. Kenneth H. Rosen," Discrete Mathematics and Its Applications, Published September 9th 2002 by McGraw-Hill Science/Engineering/Math (first published April 1st 2000).

Web References

1. <https://nptel.ac.in/courses/111/107/111107058/>
2. <https://nptel.ac.in/courses/111/104/111104026/>
3. <https://nptel.ac.in/courses/106/106/106106183/>
4. <http://www.math-cs.gordon.edu/courses/mat230/notes/graphs.pdf>
5. <https://www.cs.utexas.edu/~isil/cs311h/lecture-graph1b-6up.pdf>



A20AET202	PUBLIC ADMINISTRATION	L	T	P	C	Hrs
		2	0	0	2	30

(Compulsory Course designed as per the directions issued by Government of India, MHRD, Department of Higher Education (Central University Bureau)

F.No.19-6.2014-Desk U Dated 19-05-2014)

Course Objectives

- To introduce the elements of public administration
- To help the students obtain a suitable conceptual perspective of public administration
- To introduce them the growth of institution devices to meet the need of changing times
- To instill and emphasize the need of ethical seriousness in contemporary Indian Public Administration

Course Outcomes

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

- CO1** – Understand the concepts and evolution of Public Administration.
CO2 – Be aware of what is happening in the Public Administration in the country.
CO3 – Explain the Territory Administration in the State and the Centre.
CO4 – Appreciate emerging issues in Indian Public Administration.

UNIT I INTRODUCTION TO PUBLIC ADMINISTRATION

(7 Hrs)

Meaning, nature and Scope of Public Administration and its relationship with other disciplines- Evolution of Public Administration as a discipline – Woodrow Wilson, Henry Fayol , Max Weber and others - Evolution of Public Administration in India – Arthashastra – Colonial Administration upto 1947

UNIT II PUBLIC ADMINISTRATION IN INDIA

(8 Hrs)

Enactment of Indian Constitution - Union Government – The Cabinet – Central Secretariat -- All India Services – Training of Civil Servants – UPSC – NitiAyog – Statutory Bodies: The Central Vigilance Commission – CBI - National Human Rights Commission – National Women’s Commission –CAG

UNIT III STATE AND UNION TERRITORY ADMINISTRATION

(8 Hrs)

Differential Administrative systems in Union Territories compared to States Organization of Secretariat: -Position of Chief Secretary, Functions and Structure of Departments, Directorates – Ministry of Home Affairs supervision of Union Territory Administration – Position of Lt.Governor in UT – Government of Union Territories Act 1963 – Changing trend in UT Administration in Puducherry and Andaman and Nicobar Island

UNIT IV EMERGING ISSUES IN INDIAN PUBLIC ADMINISTRATION

(7 Hrs)

Changing Role of District Collector – Civil Servants – Politicians relationship – Citizens Charter - Public Grievance Redressal mechanisms — The RTI Act 2005 – Social Auditing and Decentralization – Public Private partnership.




Text Books

1. Avasthi and Maheswari, "Public Administration", Lakshmi Narain Agarwal, 1st Edition, 2016.
2. Ramesh K.Arora, "Indian Public Administration: Institutions and Issues", New Age International Publishers, 3rd Edition, 2012.
3. RumkiBasu, "Public Administration: Concept and Theories", Sterling, 1st Edition, 2013.

Reference Books

1. Siuli Sarkar, "Public Administration in India", Prentice Hall of India, 2nd Edition, 2018.
2. M. Laxmikanth, "Public Administration", McGraw Hill Education, 1st Edition, 2011.
3. R.B.Jain, "Public Administration in India, 21st Century Challenges for Good Governance", Deep and DeepPublications, 2002.

Web References

1. <http://cic.gov.in/>
2. <http://www.mha.nic.in/>
3. <http://rti.gov.in/>
4. <http://www.cvc.nic.in/>



A20CPL203**PROGRAMMING IN C++ LAB**

L	T	P	C	Hrs
0	0	4	2	60

Course Objectives

- To introduce the concepts of Basic Object Oriented concepts and Programming Basics.
- To gain insight into the Functions and Array usages using C++.
- To understand in depth about the Classes and Objects.
- To study the Operator overloading and Inheritance concepts.
- To acquaint the Files and Exception Handling concepts.

Course Outcomes

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

CO1 – Understand the Object Oriented concepts.

CO2 – Understand the Functions and Arrays.

CO3 – Construct the Classes and Objects.

CO4 – Explain the Operator overloading and Inheritance concepts.

CO5 – Describe Files and Exception Handling Methods.

List of Exercises

Write C++ Programs for the followings:

1. Class Declarations, Definition, and Accessing Class Members.
2. Constructor, parameterized constructor and copy constructors.
3. Friend Function and Friend Class.
4. Function Overloading and Constructor Overloading.
5. Operator Overloading.
6. Inheritances.
7. Virtual Classes and Abstract Classes.
8. Exception Handling.
9. IOStream, IStream, Ostream classes and their usages.
10. FileStream Operations.
11. Template Based Program to Sort the Given List of Elements.

Reference Books

1. Herbert Schildt, "C++ - From the Ground Up", McGraw Hill Education, 2nd Edition, 2010.
2. Stanley B. Lippman, Stanley Lippman, Barbara Moo, "C++ Primer", Addison-Wesley Professional, 5th Edition 2012.

Web Resources

1. <https://www.tutorialspoint.com/cplusplus/index.htm>
2. <http://www.cplusplus.com/doc/tutorial/>
3. <https://www.w3schools.com/cpp/>
4. <https://www.javatpoint.com/cpp-tutorial>
5. <https://www.geeksforgeeks.org/cpp-tutorial/>

A20CPL204	DATA STRUCTURES LAB	L	T	P	C	Hrs
	(Common to B.Sc. CS and B.C.A.)	0	0	4	2	60

Course Objectives

- To learn the basic concepts of Data Structures.
- To learn about the concepts of Searching and Sorting.
- To study about the linear and non-linear Data Structures.
- To study about the linear and non-linear Data Structures.
- To learn about the concepts of ADT including List, stack and Queues.

Course Outcomes

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

CO1 – Analyze the algorithm's / program's efficiency in terms of time and space complexity.

CO2 – Solve the given problem by identifying the appropriate Data Structure.

CO3 – Solve problems in linear and non-linear Data Structures.

CO4 – Develop programs using various searching methods.

CO5 – Solve the problems using Linked List.

List of Exercises

1. Write a C program to implement recursive and non-recursive i) Linear search ii) Binary Search.
2. Write a C program to implement i) Bubble sort ii) Selection sort iii) Insertion sort iv) Shell sort v) Heap sort.
3. Write a C program to implement the following using an array. a) Stack ADT b) Queue ADT
4. Write a C program to implement list ADT to perform following operations.
 - a) Insert an element into a list.
 - b) Delete an element from list
 - c) Search for a key element in list
 - d) Count number of nodes in list.
5. Write a C program to implement the following using a singly linked list. a) Stack ADT b) Queue ADT.
6. Write a C program to implement the dequeue (double ended queue) ADT using a doubly linked list and an array.
7. Write a C program to perform the following operations:
 - a) Insert an element into a binary search tree.
 - b) Delete an element from a binary search tree.
 - c) Search for a key element in a binary search tree.
8. Write a C program that use recursive functions to traverse the given binary tree in
 - a) Preorder
 - b) Inorder and
 - c) Postorder.
9. Write a C program to perform the AVL tree operations.
10. Write a C program to implement Graph Traversal Techniques.



Reference Books

1. Ellis Horowitz, SartajSahni, "Fundamentals of Data Structures", Illustrated Edition, Computer Science Press, 2018
2. Rohit Khurana, "Data structures using C", 1st Edition, Vikas Publishing, 2014.
3. S.K.Srivastava, Deepali Srivastava, "Data Structures through C in Depth" BPB Publications in the year 2011.

Web References

1. https://www.tutorialspoint.com/data_structures_algorithms/
2. <https://www.w3schools.in/data-structures-tutorial/intro/>
3. <https://nptel.ac.in/courses/106103069/>
4. https://swayam.gov.in/nd1_noc20_cs70/preview



B. Sc. Computer Science



A20EAL201	NATIONAL SERVICE SCHEME	L	T	P	C	Hrs
	(Common to all B.A., B.Sc., B.Com., B.B.A., B.C.A.)	0	0	2	1	30

Course Objectives

- To introduce about various activities carried out by national service scheme.
- To gain life skills through community service.
- To gain awareness about various service activities performed in higher educational institutions.
- To give exposure about the use of technology to uplift the living standards of rural community.
- To induce the feeling of oneness through harmony of self and society.

Course Outcomes

After the end of the course, the students will able to

CO1 – Recognize the importance of national service in community development.

CO2 – Convert existing skills into socially relevant life skills.

CO3 – Differentiate various schemes provided by the government for the social development.

CO4 – Identify the relevant technology to solve the problems of rural community.

CO5 – Associate the importance harmony of nation with long term development.

UNIT I INTRODUCTION TO NATIONAL SERVICE SCHEME

(6 Hrs)

History and objectives, NSS symbol, Regular activities, Special camping activities, Village adaptation programme, Days of National and International Importance, Hierarchy of NSS unit in college. Social survey method and Data Analysis. NSS awards and recognition. Importance of Awareness about Environment, Health, Safety, Gender issues, Government schemes for social development and inclusion policy etc.,

UNIT II LIFE SKILLS AND SERVICE LEARNING OF VOLUNTEER

(6 Hrs)

Communication and rapport building, problem solving, critical thinking, effective communication skills, decisionmaking, creative thinking, interpersonal relationship skills, self- awareness building skills, empathy, coping with stress and coping with emotions. Understanding the concept and application of core skills in social work practice, Team work, Leadership, Event organizing, resource planning and management, time management, gender equality, understanding rural community and channelizing the power of youth.

UNIT III EXTENSION ACTIVITIES FOR HIGHER EDUCATIONAL INSTITUTIONS

(6 Hrs)

Objective and functions of Red Ribbon Club, Swatchh Bharath Abhiyan, Unnat Bharat Abhiyan, Jal Shakthi Abhiyan, Road Safety Club, Environmental club and Electoral literacy club.

UNIT IV USE OF TECHNOLOGY IN SOLVING ISSUES OF RURAL INDIA

(6 Hrs)

Understanding community issues, economic development through technological development. Selection of appropriate technology, Understanding issues in agriculture, fishing, artisans, domestic animals, health and environment.

UNIT V NATIONAL INTEGRATION AND COMMUNAL HARMONY

(6 Hrs)

The role of Youth organizations in national integration, NGOs, Diversity of Indian Nation, Importance of National integration communal harmony for the development of nation, Indian Constitution, Building Ethical human Relationships, Universal Human Values, Harmony of self and Harmony of nation.

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Reference Books

1. Joseph, Siby K and Mahodaya Bharat (Ed.), "Essays on Conflict Resolution", Institute of Gandhian Studies, Wardha, 2007.
2. Barman Prateeti and Goswami Triveni (Ed.), "Document on Peace Education", Akansha Publishing House, New Delhi, 2009
3. Sharma Anand and G. Davi, "Gandhian Way, Academic Foundation", New Delhi Myers Social Psychology. New Delhi: Tata Mc.Graw Hill, 2007.
4. Taylor E. Shelly et.al, "Social Psychology", 12th Edition New Delhi, Pearson Prentice Hall Singh, 2006.
5. Madhu, "Understanding Life Skills, background paper prepared for education for all: The leap to equality, Government of India report", New Delhi, 2003.
6. Sandhan "Life Skills Education, Training Module, Society for education and development", 2005.
7. Jaipur. Radakrishnan Nair and Sunitha Rajan, "Life Skill Education: Evidences form the field", RGNIDYD publication, Sriperumbudur, 2012.
8. National Service Scheme Manual (Revised), Government of India, Ministry of Youth Affairs and Sports, New Delhi.
9. M. B. Dishad, "National Service Scheme in India: A Case study of Karnataka", Trust Publications, 2001.

Web References

1. <http://www.thebetterindia.com/140/national-service-scheme-nss/>
2. <http://en.wikipedia.org/wiki/national-service-scheme> 19=<http://nss.nic.in/adminstruct>
3. <http://nss.nic.in/propexpan>
4. <http://nss.nic.in>
5. <http://socialworknss.org/about.html>



B. Sc. Computer Science



A20CPT305	JAVA PROGRAMMING	L	T	P	C	Hrs
		4	0	0	4	60

Course Objectives

- To gain and explore the knowledge of java programming.
- To know the principles of Inheritances, Packages and Interfaces.
- To get familiarized to generic programming, Multithreading concepts.
- To gain and explore the advanced concepts in Java.
- To explore database connectivity

Course Outcomes

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

- CO1** – Write a maintainable java program for a given algorithm and implement the same.
CO2 – Demonstrate the use of inheritance, interface and package in relevant applications.
CO3 – Create java applications using exception handling, thread and generic programming.
CO4 – Build java distributed applications using Collections and IO streams.
CO5 – Exemplify simple graphical user interfaces using GUI components and database programs.

UNIT I INTRODUCTION TO JAVA PROGRAMMING (12Hrs)

The History and Evolution of Java – Byte code – Java buzzwords – Data types – Variables – Arrays – operators – Control statements – Type conversion and casting. Concepts of classes and objects: Basic Concepts of OOPs – constructors – static keyword – Final with data – Access control – This key word – Garbage collection – Nested classes and inner classes – String class

UNIT II INHERITANCE, PACKAGES AND INTERFACES (12 Hrs)

Inheritance: Basic concepts – Forms of inheritance – Super key word – method overriding – Abstract classes – Dynamic method dispatch – The Object class. Packages: Defining – Creating and Accessing – importing packages. Interfaces: Defining – Implementing – Applying – Variables and extending interfaces

UNIT III EXCEPTION HANDLING AND MULTITHREADING (12Hrs)

Concepts of Exception handling – Types of exceptions – Creating own exception – Concepts of Multithreading – creating multiple threads – Synchronization – Inter thread communication. Enumeration: Autoboxing – Generics.

UNIT IV COLLECTIONS AND I/OSTREAM (12Hrs)

Collections: List – Vector – Stack – Queue – Dequeue – Set – Sorted Set. Input / Output Basics – Streams – Byte streams and Character streams – Reading and Writing Console – Reading and Writing Files.

UNIT V EVENT DRIVEN PROGRAMMING AND JDBC (12Hrs)

Events – Delegation event model – Event handling – Adapter classes. AWT: Concepts of components – Font class – Color class and Graphics. Introduction to Swing: Layout management - Swing Components. Java Database Connectivity. Develop real time applications.

Text Books

1. Herbert Schildt, "Java: The Complete Reference", TMH Publishing Company Ltd, 11th Edition, 2018.
2. Sagayaraj, Denis, Karthik, Gajalakshmi, "JAVA Programming for core and advanced learners", Universities Press Private Limited, 2018.
3. Herbert Schildt, "The Complete Reference JAVA 2", TMH, Seventh Edition, 2006.




Reference Books

1. H.M.Dietel and P.J.Dietel, "Java How to Program", 11th Edition, PearsonEducation/PHI, 2017.
2. Nageshvarrao, "Core Java and Integrated Approach", 1st Edition, Dreamtech, 2016.
3. Cay S. Horstmann, Gary cornell, "Core Java Volume –I Fundamentals", Prentice Hall,9th Edition, 2013.
4. P.J. Dietel and H.M Dietel, "Java for Programmers", Pearson Education, 9th Edition, 2011.
5. Cay.S.Horstmann and Gary Cornell, "Core Java 2", Pearson Education, 8th Edition,2008.

Web References

1. <http://www.ibm.com/developerworks/java/>
2. <http://docs.oracle.com/javase/tutorial/rmi/>.
3. IBM's tutorials on Swings, AWT controls andJDBC.
4. <https://www.edureka.co/blog>
5. <https://www.geeksforgeeks.org>



B. Sc. Computer Science



A20CPT306	MICROPROCESSORS AND ASSEMBLY LANGUAGE PROGRAMMING	L	T	P	C	Hrs
		4	0	0	4	60

Course Objectives

- To understand and learn the architecture and assembly language program of 8085.
- To understand and learn the architecture and assembly language program of 8086.
- To explore the interfacing the peripherals and other chips to 8085
- To understand the interfacing the peripherals and other chips to 8086

Course Outcomes

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

- CO1** – Explain the basic architecture of 8085 microprocessors.
CO2 – Articulate the knowledge of Communication based Interfacing with 8085.
CO3 – Summarize the interfacing of various program based peripherals to 8085.
CO4 – Illustrate the architecture of the 8086 microprocessors.
CO5 – Summarize the interfacing of various peripherals with 8086.

UNIT I INTEL 8085 MICROPROCESSORS (12Hrs)

Introduction – Need for Microprocessor – Evolution – 8085 Architecture – Pin diagram - Timing Diagram – Addressing Modes – Instruction Formats – Instruction Set.

UNIT II COMMUNICATION BASED INTERFACING TO 8085 (12Hrs)

Parallel Communication Interface (8255) – Serial Communication interface (8251) – D/A and A/D Interface.

UNIT III PROGRAM BASED INTERFACING TO 8085 (12Hrs)

Programmable Timer Controller (8254) – Keyboard/display controller (8279) – Programmable Interrupt Controller (8259) – DMA controller (8237).

UNIT IV INTEL 8086 MICROPROCESSORS (12Hrs)

Introduction to 8086 Microprocessor – 8086 Architecture – Pin diagram – Addressing Modes – Instruction Format – Instruction Set – Interrupts – Assembler Directives – Assembly Language Programming.

UNIT V INTERFACING 8086 MICROPROCESSORS (12Hrs)

D/A and A/D Interface – Stepper Motor interfacing - Serial communication standards, serial data transfer schemes, 8251 USART architecture and interfacing.

Text Books

1. Ramesh S. Gaonkar, "Microprocessor - Architecture, Programming and Applications with 8085", Penram International Publications, Sixth Edition, 2013.
2. Krishna Kant, "Microprocessors and Microcontrollers – Architectures, Programming and system Design 8085, 8086, 8051, 8096", PHI, 2014.
3. Yu-Cheng Liu, Glenn A.Gibson, "Microcomputer Systems: The 8086 / 8088 Family Architecture, Programming and Design", Prentice Hall of India, Second Edition, 2015.

Reference Books

1. Douglas V.Hall, "Microprocessors and Interfacing, Programming and Hardware", TMH2012.
2. A.K. Mukhopadhyay, "Textbook on Microprocessor-based Laboratory Experiments and Projects", I.K.International Pulications, ISBN: 9789380578040, 3rd Edition, 2010.
3. A.P.Godse, D.A.Godse, "Microprocessors and Microcontrollers system", Technical Publications, Pune, 2nd Edition, 2015.

Web References

1. https://swayam.gov.in/nd1_noc20_ee42/microprocessors-and-microcontrollers/
2. <https://www.classcentral.com/course/swayam>
3. <https://freevideolectures.com/course/3018/microprocessors>
4. <https://www.arduino.cc/>



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A20CPD303**NUMERICAL METHODS**

L	T	P	C	Hrs
3	1	0	4	60

Course Objectives

- To know the solution of algebraic and transcendental equations.
- To learn the techniques of solving simultaneous equations.
- To introduce the numerical techniques of differentiation and integration.
- To solve ordinary differential equations by using numerical methods.
- To know the solution of partial differential equations by using numerical methods.

Course Outcomes

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

CO 1 – Use of Numerical techniques to solve algebraic and transcendental equations.

CO 2 – Find the solution of simultaneous equations.

CO 3 – Apply the knowledge of differentiation and integration by using numerical methods.

CO 4 – Solve the ordinary differential equations by using various methods.

CO 5 – Solve the partial differential equations by numerical methods.

UNIT I SOLUTION OF ALGEBRAIC AND TRANSCENDENTAL EQUATIONS AND EIGEN VALUE PROBLEMS

(12Hrs)

Bisection method – Method of false position – Newton Raphson method – Eigen value and Eigen vector by power method.

UNIT II LINEAR SIMULTANEOUS EQUATIONS

(12 Hrs)

Solution of linear simultaneous equations and matrix inversion – Gauss elimination method – Gauss Jordan method – Iterative methods of Gauss Jacobi and Gauss Seidel.

UNIT III INTERPOLATION

(12 Hrs)

Interpolation: Finite Differences – Relation between operators – Interpolation by Newton's forward and backward difference formula for equal intervals – Newton's divided difference method and Lagrange's method for unequal intervals – Differentiation based on finite differences – Integrations by Trapezoidal and Simpson's rules.

UNIT IV SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS

(12 Hrs)

Single step methods – Taylor series method – Picard's method – Euler and Improved Euler methods – RungeKutta method of fourth order only.

UNIT V SOLUTION OF PARTIAL DIFFERENTIAL EQUATIONS

(12 Hrs)

Solution of Laplace and Poisson equations – Leibmann's iterative method – Diffusion equation: Bender-Schmitt method and Crank-Nicholson implicit difference method – Wave equation: Explicit difference method

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Text Books

1. Rajesh Kumar Gupta, "Numerical Methods, Fundamentals and its applications", Cambridge University Press, April 2019.
2. M.K. Jain, R.K. Jain, S.R.K. Iyengar, "Numerical Methods for Scientific and Engineering computation", Published by New Age International Pvt. Ltd., (Seventh Edition) 2019.
3. B.S. Grewal, "Numerical Methods in Engineering and Science", Mercury learning and Information, Kindle Edition, 2018.

Reference Books

1. Timo Heister, Leo G. Rebholz, FeiXue, "Numerical Analysisan Introduction", Publisher De Gruyter, 2019.
2. K. SankaraRao, "Numerical Methods for Scientists and Engineers", 3rd Edition, PHI Learning Pvt.Ltd, New Delhi, 2018.
3. P. Siva Ramakrishna Das, "Numerical Analysis", Kindle Edition, 2016.
4. Steven C. Chapra, Raymond P. Canale, "Numerical Methods for Engineers" McGraw – Hill Higher Education, 2010.
5. C. Xavier, "C Language And Numerical Methods", New Age International, 2007.

Web References

1. <http://nptel.ac.in/courses/111107063>
2. <http://nptel.ac.in/courses/122102009>
3. <http://nptel.ac.in/courses/111/107/111107105>
4. <http://www.math.iitb.ac.in/~baskar/book.pdf>
5. <https://www.math.ust.hk/~machas/numerical-methods.pdf>



A20CPL305	JAVA PROGRAMMING LAB	L	T	P	C	Hrs
		0	0	4	2	30

Course Objectives

- To acquire programming skill in core java.
- To learn how to design java program and applications.
- To acquire object oriented skills in java.
- To develop the skill of designing applications.
- To explore database connectivity.

Course Outcomes

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

CO1 – Apply and practice logical formulations to solve simple problems leading to specific applications.

CO2 – Demonstrate the use of inheritance, interface and package in relevant applications.

CO3 – Create java applications using exception handling multithread.

CO4 – Build java distributed applications using Collections and IOstreams.

CO5 – Develop simple database programs.

List of Exercises

1. Develop simple programs using java technologies and testing tools.
2. Develop a java program that implements class and object.
3. Write a java program to demonstrate inheritance.
4. Develop a simple program to illustrate the use of Multithreads.
5. Implement simple applications using Collections.
6. Develop a simple application and use JDBC to connect to a back-end database.
7. Create a student application with Add, Edit, Delete, Show functions using JDBC.
8. Create a Bill Application to store sales details using JDBC.
9. Create java applications using Exception Handling for error handling.
10. Develop a java program that implements the Packages.

Reference Books

1. Sagayaraj, Denis, Karthik, Gajalakshmi, "JAVA Programming for core and advanced learners", Universities Press Private Limited, 2018.
2. Paul Deitel Harvey Deitel, "JAVA How to program (Early Objects)", 19th Edition, 2011
3. Cay.S.Horstmann and Gary Cornell, "Core Java 2", Vol 2, Advanced Features, Pearson Education, Seventh Edition, 2010.
4. Herbert Schildt, "The Complete Reference JAVA 2", TMH, Seventh Edition, 2006.
5. E. Balaguruswamy, "Programming with Java", TMH, 2nd Edition, 2005.

Web References

1. <http://www.ibm.com/developerworks/java/>
2. <http://docs.oracle.com/javase/tutorial/rmi/>.
3. IBM's tutorials on Swings, AWT controls and JDBC.
4. <https://www.edureka.co/blog>
5. <https://www.geeksforgeeks.org>

A20CPL306**MICROPROCESSORS LAB**

L	T	P	C	Hrs
0	0	4	2	30

Course Objectives

- To write assembly language programs using 8085 trainer kit.
- To be familiar with the interfacing 8085 with various devices.
- To be familiar with MASM-8086.
- To write basic assembly language programs using 8051 trainer kit.
- To be familiar with the interfacing 8086 with various devices.

Course Outcomes

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

CO1 – Demonstrate simple programs with 8085.

CO2 – Implement the interfacing with 8085.

CO3 – Implement assembly language program using 8086 MASM.

CO4 – Execute the interfacing with 8086.

List of Exercises

1. 8 bit addition using 8085.
2. 8 bit subtraction using 8085.
3. 8 bit multiplication using 8085.
4. 8 bit division using 8085.
5. Searching operation using 8085.
6. 16 bit addition using 8085.
7. 16 bit subtraction using 8085.
8. 16 bit multiplication using 8085.
9. 16 bit division using 8085.
10. Code conversions using 8085.
11. DAC and ADC interfacing using 8085.
12. 16 bit addition and subtraction using 8086.
13. 16 bit multiplication and division using 8086.
14. Interfacing stepper motor with 8086.
15. Interfacing ADC and DAC with 8086.

Reference Books

1. Krishna Kant, "Microprocessors and Microcontrollers – Architectures, Programming and System Design 8085, 8086, 8051, 8096", PHI, 2014.
2. Ramesh S.Gaonkar, "Microprocessor Architecture, Programming and Applications with the 8085", Penram International publishing, 2013.
3. A.K. Ray, K.M. Bhurchandi, "Advanced Microprocessor and Peripherals", Tata McGraw-hill, Second edition, 2010.

Web References

1. <https://nptel.ac.in/courses/108/103/108103157/>
2. <https://www.geeksforgeeks.org/microprocessor-tutorials/>
3. https://swayam.gov.in/nd1_noc20_ee42/microprocessors-and-microcontrollers/
4. <https://www.classcentral.com/course/swayam>
5. <https://freevideolectures.com/course/3018/microprocessors>

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A20CPT407**OPERATING SYSTEMS**

L	T	P	C	Hrs
4	0	0	4	60

Course Objectives

- To grasp a fundamental understanding of Operating Systems and processes.
- To learn the concepts of CPU scheduling and deadlock.
- To understand synchronization and memory management concepts in Operating System.
- Understand the concepts of file systems and secondary storage structure.
- To learn the features of commercial Operating Systems.

Course Outcomes

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

CO1 – Define the concepts of operating systems operations, processes and threads.

CO2 – Apply the concepts of CPU scheduling and deadlock techniques.

CO3 – Simulate the principles of memory management.

CO4 – Identify appropriate file system and disk organizations for a variety of computing scenario.

CO5 – Examine the features of I/O based Linux Operating System.

UNIT I INTRODUCTION AND PROCESS MANAGEMENT**(12Hrs)**

Operating system structure – Operating system operations – Process management – Memory management – Storage management – Protection and Security – System structures: Operating system services – System calls – Types of system calls – System programs. Process scheduling – Operations on processes – Inter-process communication.

UNIT II CPU SCHEDULING AND DEADLOCK**(12Hrs)**

Overview of threads – Multithreading models – Threading issues – Basic concepts of process scheduling – Scheduling criteria – Scheduling algorithms – Multiple processor scheduling, Dead Lock: Characterization – Prevention Detection – Avoidance and Recovery.

UNIT III CONCURRENT PROCESSES AND MEMORY MANAGEMENT**(12Hrs)**

Process synchronization: The Critical Section Problem – Peterson's solution – Synchronization Hardware – Semaphores – Classic problems of Synchronization – Monitors. Memory Management: Swapping – Contiguous memory allocation – Paging – Structure of the Page Table – Segmentation, Demand Paging – Page Replacement – Allocation of Frames – Thrashing.

UNIT IV FILE SYSTEMS AND SECONDARY STORAGE STRUCTURE**(12Hrs)**

File Concept – Access Methods – Directory structure – File system mounting – File sharing – Protection – File system structure – File system implementation – Directory Implementation – Allocation methods – Free-space management. Disk structure – Disk Scheduling – Disk Management – Swap-Space management.

UNIT V I/O BASED LINUX**(12Hrs)**

LINUX System: Basic Concepts – System administration – Requirements for Linux System Administrator – Setting up a LINUX multifunction server – Domain Name System – Setting up local network services.

Text Books

1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, "Operating System Concepts", John Wiley & Sons Ninth Edition, 2017.
2. Andrew S. Tanenbaum, "Modern Operating Systems", Prentice Hall of India, 3rd Edition, 2015.
3. Gary Nutt, "Operating Systems - A Modern Perspective", Pearson Education, Second Edition, 2013.

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Reference Books

1. William Stallings, "Operating System", Prentice Hall of India, 6th Edition, 2015.
2. Thomas Anderson and Michael Dahlin, "Operating Systems principles and practice", Wiley, 2nd Edition, 2014.
3. Harvey M. Deitel, "Operating Systems", Pearson Education, Third Edition, 2013.
4. Silberschatz, Galvin, "Operating System Concepts", Wiley, Student Edition, 2006.
5. William Stallings, "Operating System: Internals and design Principles", New Edition (7), Pearson Education India.

Web References

1. <https://nptel.ac.in/courses/106108101/>
2. <http://www.tcyonline.com/tests/operating-system-concepts>
3. <http://www.galvin.info/history-of-operating-system-concepts-textbook>
4. https://www.cse.iitb.ac.in/~mythili/teaching/cs347_autumn2016/index.html
5. <https://www.cse.iitk.ac.in/pages/CS330.html>



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A20CPT408	DATABASE MANAGEMENT SYSTEMS	L	T	P	C	Hrs
		4	0	0	4	60

Course Objectives

- To learn about Database Structure and Data Models.
- To study SQL Commands for storing and retrieving data into the database.
- To study the Relational database system design
- To understand the concept of Transactions
- To understand the concept of Concurrency Control and Recovery System

Course Outcomes

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

CO1 – Design conceptual data model using Entity Relationship Diagram.

CO2 – Design conceptual and logical database models for an application.

CO3 – Normalize relational database design of an application.

CO4 – Explain the need for Indexing, Hashing in database.

CO5 – Understand the strategies for Transactions and Management.

UNIT I INTRODUCTION

(12Hrs)

Database System Application – Purpose of Database Systems – View of Data – Database Languages – Relational Database – Database Design – System Structure – Database Architecture. Database Design and E-R Model: Overview of the Design Process – The E-R Model – Constraints – E-R Diagrams- E-R Design Issues – Extended E-R features – Reduction to Relational Schemas – Other aspects of Database Design.

UNIT II RELATIONAL MODEL

(12Hrs)

Structure of Relational Database – Fundamental Relational Algebra Operations – Extended Relational Algebra Operations – Modification of the Database. Structured Query Language: Introduction – Basic Structure of SQL Queries – Set Operations – Additional Basic Operations – Aggregate Functions – Null Values – Nested Sub queries – Views – Join Expression.

UNIT III RELATIONAL DATABASE DESIGN

(12Hrs)

Features of Good Relational Designs – 1NF – 2NF – 3NF and 4NF with Examples. Atomic Domains and first Normal form – Decomposition using Functional Dependencies – Functional Dependency Theory – Algorithm for Decomposition – Decomposition using Multivalued Dependencies.

UNIT IV INDEXING - HASHING AND TRANSACTION MANAGEMENT

(12Hrs)

Basic Concepts – Ordered Indices – B+ Tree Index Files – B-Tree Files – Multiples – Key Access – Static Hashing – Dynamic Hashing – Comparison of Ordered Indexing and Hashing – Bitmap Indices.

UNIT V TRANSACTION MANAGEMENT

(12Hrs)

Transaction Management: Transaction concept – Storage Structure – Transaction Atomicity and Durability – Transaction Isolation and Atomicity – Serializability – Recoverability – Transaction Isolation Levels – Implementation of Isolation Levels.

Text Books

1. Abraham Silberschatz, Henry F Korth, S Sudharshan, "Database System Concepts", McGraw-Hill, 7th Edition, 2019.
2. RamezElmasri and ShamkantNavathe, Durvasula V L N Somayajulu, Shyam K Gupta, "Fundamentals of Database Systems", Pearson Education, 2018.
3. Hector Garcia-Molina, Jeffrey D. Ullman, Jennifer Widom, "Database Systems The Complete Book" Prentice Hall, 2nd Edition, 2014.

Reference Books

1. Raghu Ramakrishna, Johannes Gehrke, "Database Management Systems", McGraw Hill, 3rd Edition, 2014.
2. G.K.Gupta, "Database Management Systems", Tata McGraw Hill, 2011.
3. Date CJ, Kannan A, Swamynathan S, "An Introduction to Database System", Pearson Education, 8th Edition, 2006.
4. Paul Beynon-Davies, "Database Systems", Palgrave Macmillan, 3rd Edition, 2003.
5. Mukesh Chandra Negi, "Fundamentals of Database Management Systems", BPB Publications, 2019.

Web References

1. https://docs.oracle.com/cd/E11882_01/server.112/e41084/toc.htm MySQL Online Documentation
2. <http://dev.mysql.com/doc/>
3. <http://www.rjspm.com/PDF/BCA-428%20Oracle.pdf>
4. <https://nptel.ac.in/courses/106/106/106106095/>
5. <https://www.tutorialspoint.com/dbms/index.htm>



		L	T	P	C	Hrs
A20CPT409	COMPUTER GRAPHICS AND MULTIMEDIA	4	0	0	4	60

Course Objectives

- To grasp the fundamental Computer Graphics concepts.
- To learn the concepts of Output Primitives.
- To understand the 2D and 3D transformation methods.
- Understand the concepts of Basic Multimedia.
- To learn different productions of Multimedia.

Course Outcomes

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

CO1 – Define the concepts of Computer Graphics.

CO2 – Apply the concepts of Output Primitives.

CO3 – Simulate the 2D and 3D transformation methods.

CO4 – Identify the Basic Multimedia concepts.

CO5 – Examine the different productions of Multimedia.

UNIT I INTRODUCTION TO COMPUTER GRAPHICS**(12Hrs)**

Introduction to computer graphics: Brief Survey of Computer Graphics – Graphics Systems: Video Display Devices – Types – Raster-Scan Systems and Random-Scan Systems – Input Devices – Hard-Copy Devices – Graphics Software.

UNIT II OUTPUT PRIMITIVES AND THEIR ATTRIBUTES**(12Hrs)**

Line-Drawing (DDA and Bresenham's) Algorithms – Circle-Generating (Midpoint) Algorithm – Ellipse-Generating (Midpoint) Algorithms- Area-Filling (Boundary-Fill and Flood-Fill) Algorithms - Line Attributes - Color and Grayscale Levels – Character Attributes.

UNIT III 2D AND 3D TRANSFORMATIONS**(12Hrs)**

Basic Transformations - Matrix Representations and Homogeneous Coordinates – Composite Transformations - Other Transformations. Three-Dimensional Display Methods: Parallel and Perspective Projections – Depth Cueing – Three-Dimensional Transformations: Translation – Rotation - Scaling - Other Transformations.

UNIT IV INTRODUCTION TO MULTIMEDIA**(12Hrs)**

Key elements of multimedia: text, audio, video, graphics, animation - Hardware and software requirements for multimedia - Applications of multimedia. Basic design concepts - User interface design - Hypermedia authoring concepts.

UNIT V MULTIMEDIA PRODUCTIONS**(12Hrs)**

Introduction to animation - Basic audio and video integration techniques - Animation effects - Production process of animation. Process of multimedia production - Various file formats of text, audio, video, graphics and animation - File compression techniques - Creating web based multimedia.

Text Books

1. D. Hearn and M.P. Baker, "Computer Graphics", Pearson Education, Prentice Hall, 2nd Edition, 19th Reprint, 2005.
2. Andreas Holzinger, "Multimedia Basics -Volume 1", Firewall Media, 2018.

Reference Books

1. W.M. Newman and R.F. Sproull , "Principles of Interactive Computer Graphics", Tata McGraw-Hill, 2nd Edition, 1997.
2. D.P. Mukherjee, "Fundamentals of Computer Graphics and Multimedia" , Prentice-Hall of India Pvt. Ltd., 1st Edition, 1997.
3. Ze-Nian Li, Mark S. Drew, "Fundamentals of Multimedia", Pearson Prentice Hall, 2004.

Web References

1. <https://nptel.ac.in/courses/106108101/>
2. <http://www.tcyonline.com/tests/operating-system-concepts>
3. <http://www.galvin.info/history-of-operating-system-concepts-textbook>
4. https://www.cse.iitb.ac.in/~mythili/teaching/cs347_autumn2016/index.html
5. <https://www.cse.iitk.ac.in/pages/CS330.html>



A20CPL407**OPERATING SYSTEMS LAB**

L	T	P	C	Hrs
0	0	4	2	30

Course Objectives

- To learn basic UNIX / LINUX commands
- To develop programs in Linux environment using system calls.
- To implement the CPU scheduling algorithms.
- To implement Deadlock handling algorithm.
- To develop solutions for synchronization problems using semaphores

Course Outcomes

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

- CO1** – Understand the basic commands for UNIX / Linux.
CO2 – Develop simple shell programs.
CO3 – Implement different Scheduling Algorithms.
CO4 – Apply the basic concepts of Deadlock Handling procedures.
CO5 – Simulate Critical Section problem using Semaphore.

List of Exercises

1. Study of basic UNIX / Linux commands
2. Shell Programming - I
 - (a) To Write a Shell program to count the number of words in a file.
 - (b) To Write a Shell program to calculate the factorial of a given number.
 - (c) To write a Shell program to generate Fibonacci series.
 - (d) Write a Shell Program to wish the user based on the login time.
3. Shell Programming - II
 - (a) Loops
 - (b) Patterns
 - (c) Expansions
 - (d) Substitutions
4. Programs using the following system calls of UNIX/Linux operating system: fork, exec, getpid, exit, wait, close, stat, open dir, read dir.
5. To write a program to simulate cat command.
6. To write a program to simulate head and tail commands.
7. Simulate UNIX commands like ls, grep.
8. Process Scheduling- FCFS, SJF, Priority and Round robin.
9. Implementation of Banker's algorithm.
10. Producer and Consumer problem using semaphores.

Reference Books

1. William Stallings, "Operating System", Pearson Education, Sixth edition, 2015.
2. Andrew S. Tanenbaum, Modern Operating Systems, 3rd edition Prentice Hall of India Pvt. Ltd, 2015.
3. Harvey M. Deitel, "Operating Systems", Pearson Education Pvt, Third Edition, 2013
4. William Stallings, "Operating System: Internals and design Principles", Old Edition(7), Pearson Education, 2013.
5. Silberschatz, Galvin, "Operating System Concepts", Wiley, Student Edition, 2006.

Web References

1. <https://www.geeksforgeeks.org>
2. <http://avanthioslab.blogspot.com/2016/08/file-organization-techniques.html>
3. <https://www.programming9.com/programs/c-programs/285-page-replacement-programs-in-c>



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A20CPL408**DBMS LAB**

L	T	P	C	Hrs
0	0	4	2	30

Course Objectives

- To learn and understand DDL & DML
- To learn and understand DCL.
- To implement Basic SQL commands.
- To execute PL/SQL programs.
- To develop GUI applications in any platform.

Course Outcomes

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

CO1 – Implement DDL and DML commands.

CO2 – Implement DCL commands.

CO3 – Analyze PL/SQL programs.

CO4 – Understand PL/SQL programs.

CO5 – Develop GUI applications in their known platform.

List of Exercises

1. Create Table using Data Definition Language (DDL).
2. Modify Table using Data Manipulation Language (DML).
3. Store and Retrieve data through Data Control Language (DCL).
4. Implement Constraints and Built-in functions in various tables.
5. Perform Joins and Group-by functions.
6. Implement Simple Programs in PL/SQL.
7. Create PL/SQL programs using functions.
8. Create PL/SQL programs using procedures.
9. Create PL/SQL programs using triggers.
10. Developing GUI applications.
 - Student Information System.
 - Inventory Management.
 - Payroll Processing.

Reference Books

1. Ramez Elmasri, Durvasul VLN Somyazulu, Shamkant B Navathe, Shyam K Gupta, Fundamentals of Database Systems, Pearson Education, 7th Edition, 2016.
2. Raghuram Ramakrishna, Johannes Gehrke, Database Management Systems, McGraw Hill, 3rd Edition, 2014.
3. Abraham Silberschatz, Henry F Korth, S Sudharshan, Database System Concepts", McGraw-Hill Indian Edition, 7th Edition, 2013.
4. Kuhn, "RMAN Recipes for Oracle Database", Apress, 2nd Edition, 2013.
5. Date CJ, Kannan A, Swamynathan S, An Introduction to Database System, Pearson Education, 8th Edition, 2006.

Web References

1. https://docs.oracle.com/cd/E11882_01/server.112/e41084/toc.htm MySQL Online Documentation
2. <http://dev.mysql.com/doc/>
3. <http://www.rjspm.com/PDF/BCA-428%20Oracle.pdf>

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