SYLLABUS

MANONMANIAM SUNDARANAR UNIVERISTY, TIRUNELVELI-12

UG COURSES – AFFILIATED COLLEGES
B.Sc COMPUTER SCIENCE
(Choice Based Credit System)
(with effect from the academic year 2020-2021 onwards)

Semester-IV				
Part	**Subject Status**	**Subject Title**	**Subject Code**	**Credit**
3	Core	Data Structures	AMCS41	4
3	Core	Computer Architecture	AMCS42	4
3	Allied -IV	Machine Learning	AACS41	3
3	Major Practical - IV	Data Structures lab (Using open source tools – Java/C++)	AMCSP4	3
3	Skill Based II Common	Multimedia Applications	ASCS41	4
4	Non-Major Elective	Fundamentals Of Statistics - II	ANMA42	2
4	Non-Major Elective	Arimuga Tamil - II	ANTL41	2
3	Practical	Allied Practical - IV	AACSP4	2
4	Common	Computer for Digital Era	ACDE41	2
5	Part - V	Extension Activity (NCC, NSS, YRS, YWF)	A5EA41	1

Total Marks: 100   Internal Exam: 25 marks + External Exam: 75 marks

A. **Scheme for internal Assessment**:
   Maximum marks for written test: **20 marks**
   3 internal tests, each of **I hour** duration shall be conducted every semester.
   To the average of the **best two** written examinations must be added the marks scored in. The **assignment** for 5 marks.

   The break up for internal assessment shall be:
   Written test- 20 marks; Assignment -5 marks   Total - 25 marks

B. **Scheme of External Examination**
   3 hrs. examination at the end of the semester
   A – Part : 1 mark question two - from each unit
   B – Part : 5 marks question one - from each unit
   C – Part : 8 marks question one - from each unit

➢ **Conversion of Marks into Grade Points and Letter Grades**

S.No	Marks	Letter Grade	Grade point (GP)	Performance
1	90-100	O	10	Outstanding
2	80-89	A+	9	Excellent
3	70-79	A	8	Very Good
4	60-69	B+	7	Good
5	50-59	B	6	Above Average
6	40-49	C	5	Pass
7	0-39	RA	-	Reappear
8	0	AA	-	Absent

➢ **Cumulative Grade Point Average (CGPA)**

$$CGPA = \frac{\Sigma \, (GP \times C)}{\Sigma C}$$

- **GP** = Grade point, **C** = Credit
- CGPA is calculated only for Part-III courses
- CGPA for a semester is awarded on cumulative basis

➢ **Classification**
   a) First Class with Distinction   : CGPA $\geq$ 7.5*
   b) First Class   : CGPA $\geq$ 6.0
   c) Second Class   : CGPA $\geq$ 5.0 and $<$ 6.0
   d) Third Class   :   CGPA $<$ 5.0

Nesamony Memorial Christian College, Marthandam

DATA STRUCTURES

Objectives
- To understand the concepts of basic data structures such as stack, Queues and Linked list.
- To have general understanding of the network structures through trees and graph.
- To make the students to understand the basic algorithms for sorting.

Unit I
Basic Concepts:-
Algorithm specification – Data Abstraction – Performance Analysis. Arrays and Structures:- Arrays: Abstract data type – Polynomials – Sparse Matrices – Representation of Multidimensional Arrays.

Unit II
Stacks and Queues:-
Stacks – Queues – Evaluation of Expressions. Linked Lists:- Singly Linked Lists and Chains – Linked Stacks and Queues – Polynomials: Polynomial Representation – Adding Polynomials. Sparse Matrices: Sparse Matrix Representation. – Doubly Linked Lists.

Unit III
Trees:-
Introduction – Binary Trees – Binary Tree Traversals: Inorder Traversal – Preorder Traversal – Postorder Traversal. Heaps – Binary Search Trees Forests: Transforming a Forest into a Binary Tree.

Unit IV
Graphs: -
The Graph Abstract Data Type-Elementary Graph Operations – Minimum Cost Spanning Trees: Kruskal's Algorithm – Prim's Algorithm. – Sollin's algorithm Shortest Paths and Transitive Closure: Single Source/ All Destination: Nonnegative Edge Costs - All Pairs Shortest Paths.

Unit V
Sorting:-
Motivation – Insertion Sort – Quick Sort – Merge Sort: Recursive Merge Sort. – Heap Sort – External Sorting: Introduction – k-way Merging..Hashing:- Static Hashing: Hash Tables, Hash functions.

Text Book:
1. Fundamentals of Data Structures in C by Ellis Horowitz, Sartaj Sahni, Susan Anderson- Freed – Second Edition – Universities Press (India) Private Limited(2019).

Reference Books:
1. Data Structures Using C, Second Edition by Reema Thareja – Oxford University Press
2. Data Structures by Dr N Jeya Prakash – Anuradha Publications

COMPUTER ARCHITECTURE

Unit-I

Basic of Computer, Von Neumann Architecture, Generation of Computer, Classification of Computers, Instruction Execution. Register Transfer and Micro operations: Register Transfer, Bus and Memory Transfers, Three-State Bus Buffers, Memory Transfer, Micro-Operations, Register Transfer Micro- Operations, Arithmetic Micro-Operations, Logic Micro-Operations, Shift Micro- Operations.

Unit-II

Stack Organization, Register Stack, Memory Stack, Reverse Polish Notation. Instruction Formats, Three- Address Instructions, Two – Address Instructions, One - Address Instructions, Zero - Address Instructions, RISC Instructions, Addressing Modes. RISC & CISC and their characteristics.

Unit-III

Addition And Subtraction With Signed-Magnitude, Multiplication Algorithm, Booth Multiplication Algorithm, Array Multiplier, Division Algorithm, Hardware Algorithm, Divide Overflow, Floating-Point Arithmetic Operations, Decimal Arithmetic Operations, BCD Adder, BCD Subtraction.

Unit-IV

Modes Of Transfer, Priority Interrupt, DMA, Input-Output Processor (IOP), CPU-IOP Communication. Memory Organization: Memory Hierarchy, Main Memory, Auxiliary Memory, Cache Memory, Virtual Memory, Associative Memory.

Unit-V

Control memory – Address sequencing – Design of Control unit. Pipelining: Parallel Processing, Pipelining - Arithmetic Pipeline, Instruction Pipeline. Multiprocessors: Characteristics of Multiprocessors, Interconnection Structure: Time-Shared Common Bus, Multi-Port Memory, Crossbar Switch, Multistage Switching Network, Hypercube Interconnection.

Text Books:
1. "Computer System Architecture", M.Morris Mano.
2. "Computer System Architecture", John. P. Hayes.
3. "Computer Organization, C. Hamacher, Z. Vranesic, S.Zaky.
4. "Computer Architecture and parallel Processing ", Hwang K. Briggs.

Reference Books
1. 1.William Stallings, "Computer Organization and Architecture – Designing for Performance",William Stallings, Sixth Edition, Pearson Education, 2003.
2. 2.John P. Hayes, "Computer Architecture and Organization", Third Edition, McGraw Hill, 1998.

3. "Computer Architecture – A Quantitative Approach", John L. Hennessey and David A. Patterson,Morgan Kaufmann / Elsevier Publishers, Fourth Edition, 2007.
4. "Computer Systems Design and Architecture", V.P. Heuring, H.F. Jordan, Second Edition, Pearson Education, 2004.
5. Behrooz Parhami, "Computer Architecture", Oxford University Press, 2007.

MACHINE LEARNING TECHNIQUES

Objectives:
- To introduce students to the basic concepts and techniques of Machine Learning.
- To have a thorough understanding of the Supervised and Unsupervised learning techniques
- To study the various probability based learning techniques
- To understand graphical models of machine learning algorithms

UNIT I
INTRODUCTION –

Learning –Types of Machine Learning –Supervised Learning –The Brain and the Neuron –Design a Learning System –Perspectives and Issues in Machine Learning –Concept Learning Task –Concept Learning as Search –Finding a Maximally Specific Hypothesis –Version Spaces and the Candidate Elimination Algorithm –Linear Discriminants –Perceptron –Linear Separability –Linear Regression.

UNIT II
LINEAR MODELS :

Multi-layer Perceptron –Going Forwards –Going Backwards: Back Propagation Error –Multi-layer Perceptron in Practice –Examples of using the MLP –Overview –Deriving Back-Propagation –Radial Basis Functions and Splines – Concepts –RBF Network –Curse of Dimensionality –Interpolations and Basis Functions –Support Vector Machines

UNIT III
TREE AND PROBABILISTIC MODEL:

Learning with Trees –Decision Trees –Constructing Decision Trees – Classification and Regression Trees –Ensemble Learning –Boosting –Bagging – Different ways to Combine Classifiers –Probability and Learning –Data into Probabilities –Basic Statistics –Gaussian Mixture Models –Nearest Neighbor Methods –Unsupervised Learning –K means Algorithms –Vector Quantization – Self Organizing Feature Map

UNIT IV:
DIMENSIONALITY REDUCTION AND EVOLUTIONARY MODELS9

Dimensionality Reduction –Linear Discriminant Analysis –Principal Component Analysis –Factor Analysis –Independent Component Analysis –Locally Linear Embedding –Isomap –Least Squares Optimization –Evolutionary Learning – Genetic algorithms –Genetic Offspring: -Genetic Operators –Using Genetic Algorithms –Reinforcement Learning –Overview –Getting Lost Example –Markov Decision Process

UNIT V
GRAPHICAL MODELS9

Markov Chain Monte Carlo Methods –Sampling –Proposal Distribution – Markov Chain Monte Carlo –Graphical Models –Bayesian Networks –Markov Random Fields –Hidden Markov Models –Tracking Methods

TEXTBOOKS:
1. 1.Stephen Marsland, ―Machine Learning –An Algorithmic Perspective‖, Second Edition, Chapman and Hall/CRC Machine Learning and Pattern Recognition Series, 2014.
2. 2.Tom M Mitchell, ―Machine Learning‖, First Edition, McGraw Hill Education, 2013.

REFERENCE BOOKS:
1. 1.Peter Flach, ―Machine Learning: The Art and Science of Algorithms that Make Sense of Data‖, First Edition, Cambridge University Press, 2012.
2. Jason Bell, ―Machine learning –Hands on for Developers and Technical Professionals‖, First Edition, Wiley, 2014
3. Ethem Alpaydin, ―Introduction to Machine Learning 3e (Adaptive Computation and MachLearning Series)‖, Third Edition, MIT Press, 2014

FUNDAMENTALS OF STATISTICS II

Objectives:
- To know the concept of attributes.
- To study index numbers and simple problems.

Course Learning Outcomes: It enables the students to
- 1.realise the importance of curve fitting.
- calculate different types of index numbers.

UNIT – I
Theory of attributes – two attributes.

UNIT – II
Index number - weighted index number.

UNIT – III
Consumer Price index number - conversion of index number .

UNIT – IV
Time series - measurement of trends.

UNIT – V
Curve fitting – Straight line – Parabola - Exponential curve.

Text Book:
Dr. S. Arumugam, A.Thangapandi Issac- Statistics, New Gamma Publishing House, Palayamkottai (2016).

Books for Reference:
1. S. P. Gupta - Elementary Statistical Methods, Sultan Chand & Sons,2017).
2. T. Veerarajan Fundamentals of mathematical Statistics, Yes Dee Publishing Pvt.Ltd.Edition . (2017)

தமிழ்மொழியை அறியாத மாணவர்க்குரிய பாடத்திட்டம்
நான்காம் பருவம்
அறிமுகத்தமிழ் - தாள் 2

இவ்விரு தாள்களும் தமிழ் மொழியைப் பயிலாத மாணவர்களுக்குப் பொதுவிருப்பப்பாடத் தேர்வு முறைப்படி (Choice Based Credit System) துறைசாரா விருப்பப்பாடத் திட்டத்தின் அடிப்படையில் தமிழ் மொழியினைக் கற்கும்வகையில் எளிமையுடன் அமைக்கப்பட்டுள்ளது. பிறமொழியினைத் தாய்மொழியாகக் கொண்டு கல்வி கற்கும் மாணவருக்குத் தமிழ் மொழியினை அறிமுகப்படுத்தும் வகையில் தமிழ் எழுத்துக்கள் அறிமுகப்படுத்தப்பட்டுள்ளன. மாணவர்களின் எழுதும் திறனும், பேசும் திறனும் சிறப்பாக அமைய கையெழுத்துப் பயிற்சியும், வாய்மொழிப் பயிற்சியும் இன்றியமையாதனவாகக் கருதப்படுவதால், அப்பயிற்சி பெறும் வகையில் பாடங்கள் வகுக்கப்பட்டுள்ளன.மேலும் மாணவரின் அறிவு மேம்படும் வகையிலும் தமிழ்மொழியைக் கற்கத் தூண்டும் வகையிலும் மொழித்திறன் பயிற்சியும் அமைந்துள்ளது.

பொருளடக்கம்

    அலகு - 1 – செய்யுள் பகுதி
    அலகு - 2 – கதை வாசித்து கதை சொல்லல், விடைகூறல், எழுதுதல்
    அலகு - 3 – பொதுக்கட்டுரை
    அலகு - 4 – சொற்பொருள் அறிதல்
    அலகு - 5 – மொழித்திறன் பயிற்சி

இந்த பாடத்திட்டத்திற்னாக பாடங்கள் மற்றும் மாதிரி வினாக்கள் அடங்கிய கையேடு பல்கலைக்கழக இணையதளத்திலிருந்து பதிவிறக்கம் செய்து கொள்ளலாம்.

Multimedia Applications

Objective
- To know about the various Applications of Multimedia.

UNIT I
What is Multimedia : Definition – Where to use Multimedia - Delivering Multimedia . Text: About Fonts and Faces - Using Text in Multimedia - Computers and Text - Font Editing and Design Tools - Hypermedia and Hypertext.

UNIT II
Images: Plan Approach - Organize Tools - Configure Computer Workspace - Making Still Images - Color - Image File Format Sound: The Power of Sound - Digital Audio - Midi Audio - Midi vs. Digital Audio - Multimedia System Sounds - Audio File Formats -Vaughan's Law of Multimedia Minimums - Adding Sound to Multimedia Project.

UNIT III
Animation: The Power of Motion - Principles of Animation - Animation by Computer - Making Animations that Work. Video: Using Video – How Video Works and is Displayed - Digital Video Containers - Obtaining Video Clips - Shooting and Editing Video.

UNIT IV
Making Multimedia: The Stage of Multimedia Project - The Intangible Needs - The Hardware Needs - The Software Needs - Authoring Systems Needs. Multimedia Skills: The Team Planning and Costing: The Process of Making Multimedia - Scheduling - Estimating - RFPs and Bid Proposals.

UNIT V
Designing and Producing: Designing – Producing - Content and Talent: Acquiring Content - Ownership of Content Created for Project - Acquiring Talent Delivering: Testing – Preparing for Delivery - Delivering on CD-ROM - Delivering on DVD – Wrapping it Up – Delivering on World Wide Web.

TEXT BOOK
1. "Multimedia: Making It Work", 8th Edition - Tay Vaughan, Osborne/McGraw- Hill, 2001.

REFERENCE BOOK
1. "Multimedia Computing, Communication & Applications"- Ralf Steinmetz & Klara Nahrstedt, Pearson Education, 2012.
2. "Multimedia Technology and Applications" – David Hillman, Galgotia Publications Pvt Ltd (19 February 1998)

DATA STRUCTURES PRACTICAL LIST

<u>Objective:</u>

- To develop skills in implementing data structure algorithms

Each exercise should be completed within two hours.
It is compulsory to complete all the exercises given in the list in the stipulated time.

1. Search an element in a list using Binary Search.
2. Implementation of Stack- Push and Pop.
3. Implementation of Queue – Enqueue and Dequeue
4. Implementation of Binary Tree Traversals using recursion.
   a) Pre-order b) In-order c) Post-Order
5. Implementation of Breadth First Search algorithm.
6. Implementation of Depth First Search algorithm.
7. Implementation of Merge Sort
8. Implementation of Quick Sort

Allied Practical
PYTHON

Objectives:
>   To understand the concepts in python and develop programs

1. Write a menu driven program to convert the given temperature from Fahrenheit to Celsius and vice versa depending upon user‟s choice.
2. Write a menu-driven program, using user-defined functions to find the area of rectangle, square, circle and triangle by accepting suitable input parameters from user.
3. Write a program (WAP) to display the first n terms of Fibonacci series.
4. WAP to find factorial of the given number.
5. WAP to find sum of the following series for n terms: $1 - 2/2! + 3/3!$ --------- $n/n!$
6. WAP to calculate the sum and product of two compatible matrices.
7. WAP to explore String functions.
8. WAP to create and read a CSV file and display the file contents.
9. WAP to write the text "hello python" in an existing file.
10. WAP to set background color and draw a circle using turtle module

COMPUTERS FOR DIGITAL ERA

(For the IV Semester UG/ Integrated PG Students of Departments and Affiliated Colleges of Manonmaniam Sundaranar University with effect from the Academic Year 2017-18.)

Objectives:

1. To create the awareness about the digital India among the student community.
2. To make the student to understand the role of computer in the day to day living.
3. To create the awareness about the e-learning and security issues.

Unit I
FUNDAMENTALS OF COMPUTERS

The role of computers in the modern society – Types of Computers and their specifications – Server – Desk Top Computers - Lap Top – Tablet – Smart Phones - Block diagram of Digital Computer –Working Principle of Computer, I/O Devices – Central Processing Unit – Types of Memory - Display – Port – UPS – Setting up and Maintenance of Computer.

Unit II
TYPES OF SOFTWARE AND OFFICE AUTOMATION

Types of Software with examples – System Software – Application Software – Utility Software - Operating System – Basics on Windows – Introduction to Android –Application Software - Free Open source software – Database and its applications – Office Automation Software – applications of Microsoft Word – Microsoft Power Point – Microsoft Excel.

Unit III
INTERNET AND MOBILE APPLICATIONS

Introduction to computer networks – LAN – WAN – MAN – Wired and wireless network – Wi Fi Networks - Network Devices – Modem – Switch – Router – Broad Band – Leased Lines- Internet – WWW – URL- Browser – e-mail – SMS – MMS - Client Server Computing - Cloud – Public and Private cloud – Mobile Applications.

Unit IV
E – GOVERNANCE IN INDIA

E-Governance initiative by the Government – Digital India Platform – Agencies enabling Digital India - Electronic Payment and Receipt – Digital

Locker – e-district service – electronic signature service – Digital AIIMS – India BPO Scheme – Integrated Nutrient Managment – GIS – Mobile Seva App Store-GARV- Grameen Vidyutikaran

Unit V
E – LEARNING AND MOOC

E – Learning – Digital Library – E- Journals – Introduction to MOOC – Edex – Course era etc - SWAYAM – NPTEL – Cyber Security – Virus – Malware – Network Security - Hacking – Big Data – Data Analytics – Social Networks – Social Media Analytics- Introduction to IT Act.

> **10 Hours Practical Sessions are to be allotted for Computer & Mobile Applications**

Suggested List of Exercises:
1. Setting up of computers – Connecting I/O device, UPS, CPU, Printers, Mouse, Key Boards, Pen Drives, etc. (Mandatory)
2. Minor fault findings.
3. Preparing a word Document and saving, copying files, deleting files, renaming files, etc. (Mandatory)
4. Preparing slides – Animation – Slide Transition – Back Ground Changing – Word Art , etc. (Mandatory)
5. Preparing Mark Sheet with Excel - Calculating First Class, second class, etc. (Mandatory)
6. Browsing – Searching for documents – e-mail id creation - Useful mobile apps – downloading. (Mandatory)
7. Data/Wi-Fi Connectivity and Exchanging of Data.
8. Electronic Payment – Online Application Processing
9. Browsing for NPTEL/ SWAYAM Courses
10. Browsing the useful e-learning sites

Learning Outcomes:
At the end of the course the students will be able to:

1. apply the computing technology in their day to day life

2. create awareness regarding digital India initiatives to their surroundings

3. identify the areas where he can extend the digital computing for their benefits.

Text Book:

1. E- Materials of Manonmaniam Sundaranar University on "Computer for Digital Era", http://msuniv.ac.in

References:

1. Andrew S. Tanenbaum, Computer Networks, 4th Edition, Eastern Economy
   Edition, PHI Private Ltd, New Delhi, 2003.
2. Gautam Shroff, Enterprise Cloud Computing, Technology, Architecture, Applications, Cambridge University Press, First Edition, 2010.
3. Reza B'Far, Mobile Computing Principles, Cambridge University Press, First Edition, 2005.
4. Charles P Pfleeger, Shari Lawrence Pfleeger, Security in Computing, I Edition, Pearson Education, 2003.
5. https://swayam.gov.in
6. http://www.digitalindia.gov.in/content/social-media-analytics

Scheme of Examination	
Internal – 25 Marks	External – 75 Marks
Internal Break Up - 15 for Continuous Assessment Test (CAT) + 5 for Assignment + 5 for Seminar. 3 CATs (Two tests on Theory and one on Practical)are to be conducted	