MANONMANIAM SUNDARANAR UNIVERISTY,
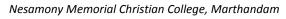TIRUNELVELI-12
SYLLABUS
UG - COURSES – AFFILIATED COLLEGES
Course Structure for B. Sc. Computer Science
(Choice Based Credit System)

(with effect from the academic year 2021-2022 onwards)

Part	Subject Status	Subject Title	Subject Code	Credit
Semester-VI				
III	CORE	OPERATING SYSTEM	CMCS61	4
III	CORE	SOFTWARE ENGINEERING AND TESTING	CMCS62	4
III	CORE	COMPUTER GRAPHICS AND VISUALIZATION	CMCS63	4
III	Major Practical - VIII	COMPUTER GRAPHICS LAB	CMCSP8	2
III	Major Practical - IX	My SQL Lab	CMCSP9	2
III	Major Elective - II	1. INTERNET OF THINGS(IOT) 2. INTRODUCTION TO DIGITAL IMAGE PROCESSING 3. NEURAL NETWORKS	CECS61/ CECS62/ CECS63	4
III	Project	DIGITAL IMAGE PROCESSING USING SCILAB	CMCS6P	6

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

OPERATING SYSTEM

COURSE OUTCOMES

On Successful completion of the course, the student will be able to

- CO1: To acquire the fundamental knowledge of the operating system architecture and components and to know the various operations performed by the operating system.
- CO2: Understand the basic working process of an operating system.
- CO3: Understand the importance of process and scheduling.
- CO4: To explain the issues in synchronization and memory management.
- CO5: To discuss about mass storage structures

UNIT I

Introduction: What Operating system do? – Computer System Organization – Computer System Architecture – Operating System Structures- Operating System Operation. System Structures: Operating System Services – System Calls – System Programs – Operating System Design and Implementation- Operation System Generation- System Boot.

UNIT II

Process Concept: Process Concept- Process Scheduling –Operation on Processes- Inter Process Communication- Example of IPC System – Communication in Client – Server system. Process Scheduling : Basic concept-Scheduling criteria- Scheduling algorithm-Thread scheduling- Multiple Processor Scheduling-Real Time CPU Scheduling-Operating system example- Algorithm evaluation.

UNIT III

Synchronization: Background - The Critical section problem-Peterson's solution - Semaphores – Classic problems of Synchronization. DeadLocks: System model- Deadlock Characterization- Methods for handling deadlocks- Deadlock Prevention- Deadlock Avoidance-Deadlock detection - Recovery from deadlock.

UNIT IV

Memory Management: Background – Swapping - Contiguous Memory allocation – Segmentation – paging. Virtual Memory Management : Background - Demand paging - Copy and Write-page replacement-Allocation of Frames - Thrashing.

UNIT V

File System: File Concept-Access Method-Directory and Disk Structure--File Sharing- Protection. Implementing File System: File System Structure - File System implementation- Directory implementation-Allocation Methods - Free Space

Management. Mass Storage Structure: Overview of Mass Storage Structure-Disk Structure - Disk Scheduling - Disk Management.

TEXT BOOK:
Operating System Concepts – Abraham Silberscartz, Peter Baer Galvin, and Greg Gange. Addision Wesley Publishing Company – Ninth Edition.

REFERENCE BOOKS:
1. Operating System: Internal and Design Principles – Fifth Edition, William Stalling ,PHI Learning Private Limited.
2. Understanding Operating Systems: Ida M.Flynn ,Ann MclverMcHoes.

SOFTWARE ENGINEERING AND TESTING

COURSE OUTCOMES
On Successful completion of the course, the student will be able to
- CO1: To define the fundamental knowledge of Software Engineering
- CO2: To classify the various testing methods.
- CO3: To analyze various software life cycle models
- CO4:To interpret User Interface design
- CO5:To select software project managements

UNIT-I
Introduction:- Evolution – From an Art form on Engineering Discipline: Evolution of an Art into an Engineering Discipline. – Software Development of Projects: Program versus Product - Emergence of Software Engineering: Early Computer Programming – High Level Language
Programming – Control Flow-based Design – Data Structure Oriented Design – Object Oriented Design. Software Life Cycle Models:- A few Basic Concepts – Waterfall Model and its Extension: Classical Waterfall Model – Iterative Waterfall Model – Prototyping Model – Evolutionary Model. – Rapid Application Development (RAD): Working of RAD. –Spiral Model.

UNIT-II
Software Project Management::- Responsibilities of a Software Project Manager-
Project Planning- Project Estimation Techniques-Risk Management. Requirements Analysis and Specification:- Requirements Gathering and Analysis – Software Requirements Specifications (SRS):Users of SRS Document – Characteristics of a Good SRS Document – Important Categories of Customer Requirements – Functional Requirements – How to Identify the Functional Requirements? – Organisation of the

SRS Document.

UNIT-III
Software Design:- Overview of the Design Process: Outcome of the Design Process – Classification of Design Activities. – How to Characterize a good Software Design? Function-Oriented Software Design:- Overview of SA/SD Methodology – Structured Analysis – Developing the DFD Model of a System: Context Diagram – Structured Design – Detailed Design.

UNIT-IV
User Interface Design:- Characteristics of a good User Interface - Basic Concepts – Types of User Interfaces – Fundamentals of Components based GUI Development: Window System. Coding and Testing:- Coding – Software Documentation – Testing: Basic Concepts and Terminologies – Testing Activities. – Unit Testing – Black-box Testing: Equivalence Class Partitioning – Boundary Value Analysis-White-box Testing.

UNIT-V
Software Reliability and Quality Management:- Software Reliability: Hardware versus Software Reliability. – Software Quality – Software Quality Management System – ISO 9000: What is ISO 9000 Certification? – ISO 9000 for Software Industry – Shortcomings of ISO 9000 Certification. – SEI Capability Maturity Model: Level 1 to Level 5. Software Maintenance:- Characteristics of SoftwareMaintenance: Characteristics of Software Evolution – Software Reverse Engineering.

Text Book
1. Fundamentals of Software Engineering Fifth Edition by Rajib Mall – PHI Learning Private Limited 2018.

Reference Books
1. Software Engineering 2nd Edition by K L James PHI.
2. Software Engineering 9th Edition by Ian Sommerville - Pearson Education Asia.

COMPUTER GRAPHICS AND VISUALIZATION

COURSE OUTCOMES
On Successful completion of the course, the student will be able to
- CO1: To understand the overview of the graphics visualization
- CO2: To acquire the fundamental knowledge of Computer Graphics and

Visualization.
- CO3: To understand the Algorithms in Computer Graphics
- CO4: To acquire the transformation technique in Graphics
- CO5: To understand the Interactive methods easily

Unit I
Overview of Graphics System: Video Display Devices – Input Devices - Hard Copy Devices – Graphics Software. Output Primitives: Points and Lines –Line drawing algorithms – DDA algorithm- Bresenham's line algorithm- Circle drawing algorithms: properties of circles – Midpoint Circle algorithm – Filled Area primitives.

Unit II 12
Attributes of Output Primitives: Line attributes – Curve attributes – Character attributes. Two- Dimensional Geometric Transformation: Basic Transformations – Matrix Representations and homogenous coordinates – Composite and other Transformations.

Unit III
Two-Dimensional Viewing: The viewing pipeline, Viewing co-ordinate reference frame – Window to view port co-ordinate transformation – Two-dimensional viewing function. Clipping Operations: Point clipping – Line clipping (only Cohen-Sutherland line clipping) – Polygon Clipping (only Sutherland-Hodgeman polygon clipping).

Unit-IV
Interactive Input Methods: Input of graphical data – Input functions – Three dimensional display methods.
Three Dimensional Geometric and Modeling Transformations: Translation - Rotation - Scaling

Unit-V
Three Dimensional Viewing: Viewing Pipeline, Projections. Visible-surface deduction methods: Back-face Detection - Depth buffer method. Color Models and Color Applications – RGB color model – YIQ color model – CMY color model – HSV color model.

Text Book:
1. Computer Graphics C version, Second Edition, Donald Hearn, M.Pauline Baker, Pearson Publications

Reference Books
1. Computer Graphics, Multimedia and Animation - Malay K. Pakhira – PHI.

2. Computer Graphics - Udit Agarwal - S. K. Kataria & Sons, 2009.
3. Express Learning - Computer Graphics and Multimedia-ITL Education Solution Ltd.
4. Computer Graphics-A programming Approach 2/e-Steven Harrington-Mc Graw Hill Education Private Limited.

Major Practical VIII
COMPUTER GRAPHICS LAB

COURSE OUTCOMES

On Successful completion of the course, the student will be able to

- CO1: To illustrate skills in programming computer graphics
- CO2: To apply multimedia concepts
- CO3:To compile the algorithms to draw line,circle etc
- CO4:To develop image using Scaling, Rotating and translation technique
- CO5: To demonstrate the image using random and bouncing balls

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. Write a program to draw a line using DDA algorithm
2. Write a program to draw a circle using Bresenham‟s algorithm.
3. Write a program to draw a line using Bresenham‟s algorithm.
4. Write a program to scale an image.
5. Write a program to rotate an image.
6. Write a program to translate an image.
7. Write a program for bouncing a ball and moving with sound effect.
8. Write a program to display as many balls in the frame in random position.
9. Write a program to display an image as tiled and cascaded according to the user‘s option.
10. Write a program so that it should first display the image as the size of applet then it should be reduced and again it should reduced and so on and finally the image should disappear

Practical IX
MySQL Lab

COURSE OUTCOMES

On Successful completion of the course, the student will be able to

- CO1: To illustrate skills in database
- CO2: To apply database concepts
- CO3:To create database and operate update, remove etc
- CO4:To develop various query functions
- CO5: To demonstrate the security by setting password and its previlages.

Nesamony Memorial Christian College, Marthandam

1. Create a college database with tables Course, Staff and Student details. Insert records into the tables using MySQL.
2. Write MySQLqueries toUpdate, Removeand Delete records in a stock table.
1. (Item no. , Item name, quantity, price, total)
2. Write MySQL queries to retrieve relevant information from a Employee table.
3. Create aStudent marks table using MySQL and apply aggregate functions.
4. Write MySQL queries to join two tables. (Inner Join, Outer Join)
5. Write MySQL statement to create a new user and set a password and privileges for an existing database .
6. Write MySQL statement to get name of the students containing exactly four characters anddetermine the age of each of the students .
7. Write MySQL statements for rollback, commit and save option

INTERNET OF THINGS

COURSE OUTCOMES

On Successful completion of the course, the student will be able to

- CO1:To define the fundamentals of IOT
- CO2: To outline about IOT working
- CO3: To discuss the Architecture of IOT
- CO4: To outline how IOT is used in Education and Agricultural level
- CO5 : To explain security in IOT

UNIT I:

Fundamentals of Internet of Things: Introduction − Characteristics of IoT − The Physical Design of IoT − Iot Architecture an Components − Logical design of IoT − Communication Models − IoT Communication API − IoT Architecture and Protocols − Introduction −Fog based Architecture of IoT − Near Field Communication − Wireless Sensor Networks − IoT Network protocol stack − IoT technology stack − Blue tooth − Zig Bee − and 6LowPAN.

UNIT II

Programming Framework for IoT: Interoperability − Programming Paradigm − Assembly − Introduction to Arduino Programming − Introduction to Python Programming − Introduction to Raspberry Pi . Virtualization: Introduction − Types − Virtualization and IoT − Embedded Virtualization.

UNIT III:

IoT Application Area: Introduction − Homes − Health care − Agriculture − Military applications − Politics − Constructions − Other application areas . Cloud an IoT :

Introduction – Cloud – IoT – Difference between cloud and IoT – Cloud IoT architecture –challenges.

UNIT IV:
Smart City using IoT: Introduction – Concept – The emergence – Dimensions and Components – Design strategies – Factors affecting automation – IoT applications in smart cities – Education – E- governance – Industry . IoT Use Cases: Industrial IoT Use Case – IoT and smart energy – Smart transportation – Smart health – Smart home – Smart Education system – Governance use case – Smart cities.

UNIT V:
Network Security for IoT and M2M communications: Introduction – Network Technologies for IoT and M2M – Security for IoT and M2M Technologies – Securities in IETF M2M network Technologies – Security in ETSI M2M Network Technologies – Other M2M standard Efforts.

Text Books:
1. Internet of Things – Principles, Paradigms and Applications of IoT by Dr.Kamlesh Lakhwani, Dr.Hemant Kumar Gianey, Joseph Kofi Wireko, Kamal Kant Hiran (BPB publication First Edition 2020)
2. Internet of Things(IoT) Systems and Applications By Jamil Y . Khan & Mehmet R.Yuce Jenny Stanford Publishing.

Reference Book
1. Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos, David Boyle, ―From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence", 1st Edition, Academic Press, 2014

INTRODUCTION TO DIGITAL IMAGE PROCESSING
COURSE OUTCOMES
On Successful completion of the course, the student will be able to
CO1: To define the fundamental knowledge of introduction to Digital Image Processing.
CO2: To explain the features present in Digital Image Processing.
CO3:To outline the enhancement of spatial domain
CO4:To analyze the color Image processing
CO5: To interpret the image using compression
Unit – I
Introduction & Fundamentals: Definition of Image and Digital Image Processing - Examples of Digital Image Processing - Fundamental Steps in Digital Image

Processing - Components of an Image Processing System - Visual Perception - Image Acquisition - A Simple Image Model - Zooming and Shrinking of Digital Image

Unit – II
Image Enhancement in Spatial Domain : Introduction - Mathematical Analysis of Enhancement in Spatial Domain - Basic Gray Level Transformation - Histogram Processing - Histogram Equalization - Histogram Matching - Image Enhancement using Arithmetic and Logical Operation - Basic Transformations - Basics of Spatial Filtering
Image Enhancement in Frequency Domain : One Dimensional Fourier Transform and its Inverse - Two Dimensional Fourier Transform and its Inverse - Basics of Filtering in Frequency Domain - Basic Frequency Domain Filters - Homomorphic Filtering.

Unit – III
Color Image Processing: Introduction - Advantages of Color Image Processing - Categories of Color Image Processing - Color Fundamentals - Primary Colors - Secondary Color - Primary and Secondary Colors for Pigments - Characteristics that are Used for Differentiating Different Colors - Color Models - Conversions between Color Models - Pseudo Color Image Processing - Color Transformation - Color Image Smoothing and Sharpening - Color Segmentation

Unit – IV
Image Compression: Introduction - Mathematical Analysis - Types of Data Redundancies - Image Compression Model - Compression Strategies.
Morphological Image Processing : Introduction - Basic Concept of Set Theory - Logic Operations Involving Binary Images - Dilation and Erosion - Opening and Closing

Unit – V
Features and Image Segmentation - Introduction - Classification of Features - Features of an Image - Attributes of Features - Process of Feature Extraction - Image Segmentation - Thresholding - Region Based Segmentation

Text Book:
1. Digital Image Processing - Abhishak Yadav and Poonam Yadav - University Science Press

Reference Books:
1. Digital Image Processing, S Jayaraman, S Esakkirajan, T Veerakumar, McGraw-Hill Education Pvt. Ltd., 2e, 2020

2. Digital Image Processing, 4e, Rafael C Gonzalez, Richard E Woods, Pearson, 2018
3. Digital Image Processing – Sridhar S – 2e – Oxford University Press, 2016

NEURAL NETWORKS

COURSE OUTCOMES

On Successful completion of the course, the student will be able to

CO1: To recall the Historical Development of Neural Networks.

CO2: To compare Basic neuron models: McCulloch-Pitts model and the generalized one, distance or similarity based neuron model, radial basis function model, etc

CO3: To discuss Basic neural network models: multilayer perception, distance or similarity based neural networks, associative memory and self-organizing feature map, radial basis function based multilayer perception, neural network decision trees, etc.

CO4: To evaluate Basic learning algorithms: the delta learning rule, the back propagation algorithm, self-organization learning

CO5:To discuss the Applications: pattern recognition, function approximation, information visualization, etc.

UNIT I

Introduction to Neural networks: Neural processing- Neural networks- an overview – the raise of neuro computing – introduction to artificial neural networks : introduction- artificial neural networks – historical development of neural networks – biological neural networks – comparison between the brain and the computer – artificial and biological neural networks – basic building blocks of artificial neural networks – artificial neural network terminologies.

UNIT II

Fundamental models of artificial neural networks: McCulloch-Pits neuron Model-Learning rules. Perceptron networks: Introduction –single layer perceptron –brief introduction to multi layer perceptron networks.

UNIT III

Feedback networks: Introduction- discrete Hopfield net-continuous Hopfield net-relation between BAM and Hopfield nets. Feed forward networks: introduction-back propagation networks.

UNIT IV

Kohonen self - organizing feature maps - counter propagation network: introduction-Full counter propagation network-Forward only propagation network.

UNIT V

Applications of Neural Networks: Applications of neural networks in Arts-Bioinformatics - Knowledge Extraction – Forecasting - Bankruptcy forecasting-Healthcare-Intrusion - Detection.

TEXT BOOK

1. Introduction to Neural Networks using MATLAB 6.0., S N Sivanandam S Sumathi S N Deepa , McGraw Hill, 2006.

REFERENCE BOOKS

1. Artificial neural Networks B.Yegnanarayana, Prentice Hall India, 2005.
2. Neural Networks Alogorithms, Applications and programming Techniques, James A Freeman David M Skapura, Pearson Education.
3. Neural Networks for Pattern Recognition, Christopher M. Bishop, Indian Edition, OXFORD University Press.

Project DIGITAL IMAGE PROCESSING USING SCILAB

COURSE OUTCOMES

On Successful completion of the course, the student will be able to

CO1: To get knowledge about the basic programs on Digital Image Processing

CO2: To acquire the knowledge from Thresholding Technique

CO3: To read the colour image and separate the planes

CO4: To perform the brightness of th image

CO5:To manipulate the contrast image.

1. Perform 2D Linear Convolution, Circular Convolution between two 2D matrices.
2. Perform Discrete Fourier Transform(DFT), Discrete Cosine Transform(DCT) of 4x4 gray scale image.
3. Perform Brightness enhancement, Contrast Manipulation, Image negative of an image.
4. Perform threshold operation on an image.
5. Perform Edge detection using different edge detectors.
6. Perform Dilation and Erosion operation.
7. Perform Opening and closing operations
8. Read a colour image and separate the image into red, blue and green planes.

Reference:

1. Scilab Textbook Companion for Digital Image Processing, S. Jayaraman, S. Esakkirajan And T. Veerakumar, 2016 (https://scilab.in/textbook_companion/generate_book/125)