

301: OPERATING SYSTEMS

No. of Credits: 5(3L+2T+0L)

Objectives

- To provide an understanding of the major operating system components
- To provide coverage of basic computer system organization

Learning Outcome

- Explain the objectives and functions of modern operating systems
- Describe how operating systems have evolved over time from primitive batch systems to sophisticated multi-user systems
- Analyze the tradeoffs inherent in operating system design Describe the functions of a contemporary operating system with respect to convenience, efficiency, and the ability to evolve

Prerequisite

- There are no prerequisites. However, students should have basic knowledge of working on an operating system

References books

1. Silberschultz, Abraham and Galvin, Peter Raer. Operating system Concepts, 5th Edition
 2. Milan Milenkovic Operating system Concepts and Design TATA McGraw Hill 2nd Edition
 3. Tanenbaum A.S. Modern Operating System Prentice Hall 2nd Edition.
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UNIT I

What is an operating system(OS)?, History of OS, Simple Batch Systems, Multiprogrammed Batched Systems, Time-Sharing Systems, Personal Computer Systems, Distributed Systems and Real –Time Systems, Operating System Structures- Command Interpreter System, Operating System Services, System Calls, System Programs.

UNIT II

Process Management

Process Concept, Process control Block, Process Scheduling, CPU Scheduling – Basic Concepts, scheduling Algorithms – FIFO, RR, SJF, Multi-level, Multi-level feedback.

UNIT III

Storage Management

Basic Concepts, Logical and Physical Address Space , Swapping, Contiguous Allocation, Paging, Segmentation, Virtual Memory – Demand Paging, Page Replacement, Page Replacement Algorithms, Allocation of Frames, Thrashing and Demand Segmentation.

UNIT IV

Interprocess communication and Synchronization

Need, Mutual Exclusion, Semaphore definition, Busy- wait implementation, characteristics of Semaphore. Queuing implementation of semaphore, Producer consumer problem. Critical region and conditional critical region.

UNIT V

Deadlock

Conditions to occurs the deadlock, Reusable and consumable resources, deadlock prevention, Deadlock Avoidance, resource request, resource release, detection and recovery,

UNIT VI

File System

File Concept, Access Methods, Directory Structure, Protection, File system Structure, Allocation Methods, Free-Space Management.

UNIT VII

I/O Systems

Overview of I/O systems, I/O interface, Secondary storage structure – Disk Structure, Disk Scheduling.

Case Study:- UNIX, LINUX,WINDOWS Operating system and overview of ANDROID Operating System.

Course Number : 302

Course Title : Software Engineering

No. of Credits : 5 (3L+2T+0L)

Objectives:

To introduce the current methodologies involved in the development and maintenance of Software over its entire life cycle.

Learning Outcomes:

At the end of this course, student should be able to

- a) Develop SRS as per any of the existing standards;
- b) Know various Function and Object oriented modelling & design techniques;
- c) Know various testing techniques;
- d) Know different Software Development Life Cycle models;
- e) Know the concepts of Software Project Management; and
- f) Know the concept of software maintenance

Pre-requisites:

Preliminary knowledge of computer, their operations and applications.

Reference Books:

1. SOFTWARE ENGINEERING A PRACTITIONERS APPROACH seventh edition BY Roger S. Pressman McGraw Hill International Edition.
2. Software Engineering by Sommerville, Pearson Education, 7th edition
3. Software Engineering by K.K. Aggarwal & Yogesh Singh, New Age International Publishers.

UNIT-I : Software Engineering Concepts:

Software Development Models: Program vs Software, Definition of Software Engineering, importance, principles of software engineering, Difference between software engineering and software programming.

Software Project Management Concepts: Planning, Execution, Monitoring, Control of Software Projects, Software Metrics, Application of PERT and GANTT charts.

Software Engineering Fundamentals: Software Configuration Management, Software Maintenance, Software Quality Assurance.

UNIT-II : Software process and Feasibility study:

Software Development Life Cycle :General software development life cycle, Comparison between waterfall , prototyping and spiral model, Comparative study of incremental model and RAD model, Component based development, Fourth generation techniques.

Feasibility study: Need of Feasibility study, types of Feasibility.

Cost Benefit Analysis: Why Cost Benefit analysis? Cost Benefit analysis process.

UNIT-III : Requirement Engineering:

What is Requirement Engineering? Types of requirements, Requirement elicitation techniques- Traditional Methods and Modern Methods, Verification and Validation Process.

UNIT-IV : Development of SRS

Characteristics of SRS: Completeness, Unambiguity, Inconsistency, IEEE SRS.

Function Oriented Modeling: DFD, ERD, Structure Chart, SRS, Data Dictionaries.

Object Oriented Modeling: UML Introduction, Use Case Diagrams, Class Diagrams.

UNIT-V: Design and Testing:

Function Oriented Design: Constructing solution to problem, Identifying components and their interaction, Visualizing the solution, Characteristics of a good function oriented design (Coupling, Cohesion etc.).

Object Oriented Design: Identification & Specification problem domain static objects, Working out the application logic objects, Identification of necessary utility objects, Methodology of identification of objects, Case Study.

Testing Techniques: Different testing techniques with examples.

Development and Execution of test cases: Debugging, Testing tools & Environments, Types of test cases and test plans.

UNIT-VI: Software Quality Concepts:

Quality Concepts- What is Quality, Quality Control, Quality Assurance, Cost of Quality

Software Quality Assurance, Software Reviews,

Formal Technical Reviews- The Review Meeting, Review Reporting and Record Keeping, Review Guidelines, Formal Approaches to SQA, Statistical Quality Assurance, Software Reliability, SQA Plan.

UNIT-VII: Software Maintenance

What is software maintenance? Problems during software maintenance.

Categories of Software Maintenance: Corrective maintenance, Adaptive maintenance, Perfective maintenance, and preventive maintenance.

Potential Solutions to Maintenance: Budget and efforts reallocation, Complete Replacement, maintenance of existing system.

Maintenance Process and Models: maintenance processes, Fix Model, Iterative Enhancement Model, Reuse Oriented Model, Boehm Model, and Taute's Models.

Course Number : 303

Course Title : Data Structures

No. of Credits: 5 (3L+2T+0L)

Objective: The syllabus covers study of Data structures concepts with implementation in a C language. The Arrays, Stacks, Queues, Linked list & tree, with their applications are taught.

Learning Outcome : At the end of this course, student should be able Understand the most basic aspects of data structures including Stacks, Queue, Linked list & tree.

Pre-requisites : C Programming

Reference Books :

1. Data Structures Using C -Rajni Jindal (Umesh Publications)
 2. Data structure through C- Yashwant Kanitkar (BPB Publications)
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Unit I: Concepts of Data structure

Concept of Data and variable, Type of Data, Atomic Data, Non-atomic Data, structures, memory allocation for structure, Abstract data type (ADT)

Unit II: Arrays

Array Definition, Array Operations, Applications of Array, Multi-dimensional arrays.

Unit III: Linked List

Linked List Definition, Memory representation of Linked List, linked list operations (inserting a node, deleting a node), Applications of Linked List, Types of Linked List: Simple, Double Linked List & Circular Linked List.

Unit IV: Stack

Concept of Stack, Stack Operations, Array implementation of Stack, Linked List implementation of Stack, Applications of Stack.

Unit V: Queues

Concept of queue, Queue Operation, Array implementation of queue, Linked List Implementation of Queue, Applications of Queue.

Unit VI: Searching and Sorting

Searching algorithms: Simple search, binary search.

Sorting algorithms: Bubble Sort, insertion sort, selection sort, quick sort.

Unit VII: Introduction to Trees

Concept of Tree, Binary Tree, Tree Traversal, Breadth First Traversal, Depth First Traversal

Course Number:304

Course Title: Mathematics

No. of Credit-4 (2L+2T+0L)

Objectives:

To gain a fundamental knowledge of the basic mathematics concepts which can be described or applied in real life phenomena? The digital computer is basically finite structure and many of its properties can be understood and interpreted within framework of finite mathematical systems.

Prerequisite: Students are XII th passed with mathematics ,they will understanding application of mathematics in computer science.

Learning Outcomes:

On successful completion of the course students will be:

- 1 .Students can able to write algorithm.
- 2.They understood how algorithm works in computer.

Textbooks/References:

1. Discrete Mathematics Schaum's outlines II Edition Tata McGrew-Hill Publishing company Ltd.
 - 3.Discrete Mathematics and its Applications VI Edition Kenneth Rosen, Tata McGrew-Hill Publishing company
 - 4.Discrete Mathematics Structures RM.Somasundaram Prentice-Hall of India
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UNIT I SET THEORY

Introduction, Sets elements, Universal set and empty set, Veen diagrams, set operations, algebra of sets and duality, Finite sets, Counting Principle, classes of sets, power sets ,Partitions (6L)

UNIT I I RELATIONS

Introduction, product Sets ,Relations, Pictorial Representation of Relations, Composition of Relations, Types of Relations ,closure Properties ,Equivalence Relations, Partial Ordering Relations ,n-ary Relations(6L)

UNIT III FUNCTIONS

Introduction, Functions, types of relations, Invertible functions, Mathematical Induction.(6L)

UNIT IV LOGIC

Introduction, Propositions and Compound Propositions ,basic Logical operations, Properties and Truth tables, Tautology and Contradictions(6L)

UNIT V : BOOLEAN ALGEBRA

Introduction, Basic Definitions, Duality, Boolean Algebra, Sum of Products Form for Sets, Sum of Products Form for Boolean Algebra, Minimal Boolean Expressions, Logic Gates and Circuit (10L)

UNIT VI PROPERTIES OF THE INTEGERS

Introduction ,order and Inequalities ,Absolute Value ,Division Algorithm, Divisibility, Primes, Greatest Common Divisor, Euclidean Algorithm, Fundamental Theorem of Arithmetic's(10L)

UNIT VII MATRIX ALGEBRA

Definition of Matrix, Types of Matrices ,Matrices Associated with a Given Matrix, Sub Matrix, Equality of Matrices ,Addition and Subtraction of matrices, Multiplication of Matrices.(5L)

Course Number : 305

Course Title : Lab on Data Structures

No. of Credits : 2 (0L+0T+4L)

1. Write a program to implement stack using array.
2. Write a program to implement stack using linked list.
3. Write a program to implement queue using array.
4. Write a program to implement queue using linked list.
5. Write a program that convert infix expression into postfix form.
6. Write a program to sort following data using Bubble Sort
6, 5, 4, 7, 12, 11, 9, 10, 8, 2
7. Write a program to search whether 17 is present or not from the given list using binary search technique 9,
11, 17, 20, 25, 30, 33
8. Write a program to convert decimal to binary using stack.
9. Write a program to implement insertion, deletion, and searching and count number of items present in a singly
linked list.
10. Write a program to check whether a string is a Palindrome or not using stack.
11. Write a program to convert an infix expression into prefix format.
12. Write a program to count number of leaf nodes and total number of nodes in a tree.
13. Write a program to arrange following data in ascending order using Quick Sort technique 89, 22, 55,
8, 7, 12, 57, 29, 65, 34
14. Write a program to traverse a tree in pre-order format.
15. Write a program to delete any node form Binary Search Tree.
16. Write a program that illustrates the working of Selection Sort.
17. Write a program that illustrates the working of insertion Sort.
18. Write a program to implement insertion, deletion and count number of items present in a Queue.
19. Write a program to implement any-2 operation of Doubly Linked List.
20. Write a program to implement multiplication of two 3X3 matrices.

Course Name: Minor Project-II

No. of Credits: 2(L: 0, T:2, P:4)

Objective: The objective of this course is to develop skills to solve a problem which requires more efforts than laboratory experiment; this also demands that students has to work in a group and distribute work to solve problem. Finally student document work as dissertation and evaluated it by panel of examiner. Examiner expected to evaluate on their work by testing the functionality of project and content of dissertation along with judging contribution of individual.

Course Title 307 : Environmental Studies

No. of Credits: 2 (2L+0T+0L)

Objectives : To Understand and the nature and function of the natural environment affecting society.

Books Recommended:

- Agrawal K.C.:Environmental Biology:Nidhi Publishers Ltd(2001)
- Bharucha Erach: The Biodiversity of India: Mapin Publishing Pvt. Ltd.
- Jadhav H and Bhosale V.M.: Environmental Protection and Laws: Himalaya Publishing House.
- Miller T.G. Jr.: Environmental Science: Wadsworth Publishing Co.

Syllabus:

Unit 1: The multidisciplinary nature of environment studies:

Definition, scope and importance-need of public awareness.

Unit 2: Natural Resources:

a. Renewable and non-renewable resources:

i) Forest resources: Use and over- exploitation, deforestation. Case studies. Timber extraction, mining, dams and their effects on forest and tribal people.

b. Water resources: Use and over-utilization of surface and groundwater, floods, droughts, conflicts over water, dams- benefit and Problems.

c. Mineral Resources: Use and exploitation 'environmental effects of extracting and using mineral resources, case studies.

d. Food resources: World food problems, changes caused by agriculture. Fertilizer-pesticide problems, water logging, salinity, case studies.

- e. **Energy resources:** Growing energy needs, renewable and non-renewable energy resources, use of alternative energy sources.
- f. **Land resources:** Land as resources, land degradation, man induced landslides, desertification. Role of individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles

Unit 3: Ecosystem:

Concept of ecosystem, structure and function of an ecosystem, producers, consumers and decomposers .Energy flow in the ecosystem, Ecological succession, food chains, food webs and ecological pyramids, introduction, types, characteristics features structure and function of the following ecosystem, forest ecosystem ,grassland ecosystem, Desert ecosystem, Aquatic ecosystems, ponds, stream, lakes, rivers, estuaries.

Unit 4: Biodiversity and its conservations:

Introduction, Definition: genetic, species and ecosystem diversity, Biogeographically classification of India, value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option vales, India as a mega diversity nation, Hot-Spots of biodiversity, Threats to biodiversity: habitat loss, poaching of wildlife, Man wildlife conflicts, Endangered and endemic species of India, Conservation of biodiversity: In situ and Ex-situ conservation of biodiversity.

Unit 5: Environmental Pollution:

Definition- Causes, effects and control measures of:-Air pollution, water pollution, soil pollution, marine pollution, noise pollution, thermal pollution, and nuclear hazards .Soil waste management: cause, effects and control measures of urban and industrial waste. Role of an individual in prevention of pollution. Pollution case studies. Disaster management: floods, earthquakes, cyclone and landslide.

Unit 6: Social issues and Environment:

From unsustainable to sustainable development, urban/problems related to energy, water conservation, rain water harvesting, watershed management, Resettlement and rehabilitation of people; its problems and concerns Case Studies, Environment ethics: Issues and possible solutions ,wasteland reclamation, Consumerism and waste products, Environment protection Act,

Air(presentation and Control of Pollution)Act. Water (Prevention and Control of Pollution) Act. Wildlife Protection Act. Forest Conservation Act. Issues involved in enforcement of environmental legislation. Public awareness.

Unit 7: Human Population and the Environment:

Population growth, variation among nations, population explosion-Family Welfare Programme. Environment and Human health.

Human Rights Value Education. HIV/AIDS Women and Child Welfare.

Role of Information Technology in Environment and human health.

Case Studies.

Field Work:

Visit to a local area to “document environmental asset-
river/forest/grassland/hill/mountain.

Visit to the local polluted site-Urban/Rural/Industrial/Agriculture study of common plants, insects, birds.

Study of simple ecosystem-pond, river, hill slopes, etc. (Field work equal to 5 lecture hours)