DEPARTMENT - COMPUTER SCIENCE

**Course Pack
FOR
DATA STRUCTURES AND OPERATING SYSTEMS-CSC231**

CSC231 - DATA STRUCTURES AND OPERATING SYSTEMS

Total Teaching Hours For Semester : 60   **Total Teaching Hours For Semester : 4**

Max Marks : 100   **Credits : 04**

Course Objectives/Course Description:

Data Structures Data structures give knowledge on the data storage techniques, accessing techniques and also specify the various operations performed on the data. The course deals with the data handling done by the computer. Data Structure and nbsp;is considered and nbsp;as one of the and nbsp;fundamental paper towards a and nbsp;more comprehensive understanding of programming and application development. and nbsp;Student is expected to work towards a sound theoretical understanding of Data Structures.**Operatign System**The course provides the fundamental knowledge of the operating system architecture and and nbsp;components and to know the various operations performed by the operating system. To acquire the concepts of the operating system definitions, its functionalities like job scheduling, time management, memory management and file handling. It also specifies various operating systems and their multitasking behavior.and nbsp;

Learning Outcome

Data Structuresand bull; and nbsp; and nbsp; and nbsp; and nbsp; and nbsp; and nbsp; and nbsp; Understandthe need forData Structures when building applicationand bull; and nbsp; and nbsp; and nbsp; and nbsp; and nbsp; and nbsp; and nbsp; Abilityto calculate andmeasure efficiency ofcodeand bull; and nbsp; and nbsp; and nbsp; and nbsp; and nbsp; and nbsp; and nbsp; Improve programming skillsOperating systemand bull; and nbsp; and nbsp; and nbsp; and nbsp; and nbsp; and nbsp; and nbsp; Understandthe basic working process ofan operating system.and bull; and nbsp; and nbsp; and nbsp; and nbsp; and nbsp; and nbsp; and nbsp; Understand the importance of process and scheduling.and bull; and nbsp; and nbsp; and nbsp; and nbsp; and nbsp; and nbsp; and nbsp; Understandthe issues in synchronization and memory and nbsp;management. and nbsp;

Unit-1   **Teaching Hours:5**

Analysis of Algorithms
Introduction - What to Count and Consider, Rates of Growth, Sequential Search Analysis.
Arrays- Introduction, Array Operations, Merging Arrays, 2D Arrays, Matrix and nbsp; and nbsp;
Operations.

Self Learning: Arrays-Introduction, Matrix operations

Unit-2   **Teaching Hours:7**

Searching and Sorting
and nbsp;Introduction, Linear Search, Bubble Sort, Binary Search, Insertion Sort, Selection Sort.and nbsp;

Unit-3   **Teaching Hours:7**

Linked List
Introduction, Pointers, Insertion, Deletion, Searching, Double and nbsp; Linked List Representations.and nbsp;

Unit-4   **Teaching Hours:6**

Stack and Queue
and nbsp;Introduction, Stack Operations using Pointers, Infix to Prefix, Queue operations using array.

Unit-5   **Teaching Hours:5**

Binary Trees

Introduction, Binary Trees, Properties of Binary Trees, Binary Tree Representations, Binary Tree Traversals.

Unit-6   **Teaching Hours:5**

Introduction and System Structures

Operating and nbsp; system and nbsp; definition, and nbsp; computer and nbsp; system and nbsp; organization, and nbsp; and and nbsp; architecture, and nbsp; structure and nbsp; and operations, process, memory and storage management.

Unit-7   **Teaching Hours:8**

Process Management

Process concepts, scheduling and operations on processes. Process Scheduling: Basic concepts, scheduling criteria, scheduling algorithms, Synchronization: Background, critical section problems

Unit-8   **Teaching Hours:5**

Deadlock

Deadlock System model, deadlock characterization, methods for handling deadlock, deadlock prevention, avoidance and detection.

Unit-9   **Teaching Hours:6**

Memory Management

Memory Management Strategies: Background, swapping, Memory allocation, Paging, Structure of the page table.

Unit-10   **Teaching Hours:6**

File System

File system and nbsp; structure, and nbsp; directory and nbsp; structure, and nbsp; allocation and nbsp; methods and nbsp; and and nbsp; free-space management. Disk structure, and nbsp; disk scheduling and management.

Text Books And Reference Books:

[1] Yashwant Kanetkar,*Data Structures Through C,* BPB Publication, 2010.[2] A. Silberschatz, P.B.Galvin and G. Gagne, *Operating System Concepts,* 8th Edition, NewDelhi: Wiley India, 2011.and nbsp;

Essential Reading / Recommended Reading:

[1] Horowitz Sahni Anderson-Freed, and nbsp;*Fundamental of Data StructuresinC,* Universities Press,Reprint 2009.[2] Seymour Lipschultz:*Data Structures,* Schau mseries TMH, 2010.[3] Stalling William, *Operating Systems:Internals and Design Principles*, 7th Edition, Prentice Hall, 2011.[4] Dietelet al*,Operating Systems, and nbsp;* 3rd and nbsp;Edition, Pearson Education,2004. and nbsp;[5] A.S. Tanenbaum, *Modern OperatingSystems*, 3rdEdition, Prentice Hall, 2007.and nbsp;

Evaluation Pattern

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Course Plan

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Class Name : 2CMS   **Subject Name : DATA STRUCTURES AND**

OPERATING SYSTEMS

Subject Code : CSC231   **Teacher Name : SIVAKUMAR.R**

Planned Date	No of Hours	Unit	Heading	Details	Method	Reading/Ref
31/10/2017 04/11/2017	1.00	Unit-6	Introduction and System Structures	Operating system definition, computer system organization	Lecture PPT Presentation	A. Silberschatz, P.B. Galvin and G. Gagne, Operating System Concepts, 8th Edition, NewDelhi: Wiley India, 2011 Stalling William, Operating Systems: Internals and Design Principles, 7th Edition, Prentice Hall, 2011
06/11/2017 11/11/2017	2.00	Unit-6	Introduction and System Structures	computer system architecture, structure and operations	Lecture PPT Presentation	A. Silberschatz, P.B. Galvin and G. Gagne, Operating System Concepts, 8th Edition, NewDelhi: Wiley India, 2011 Stalling William, Operating Systems: Internals and Design Principles, 7th Edition, Prentice Hall, 2011
13/11/2017	2.00	Unit-6	Introduction and	process, memory and	Lecture PPT	A. Silberschatz, P.B. Galvin and G. Gagne,

18/11/2017			System Structures	storage management	Presentation Video Lecture	Operating System Concepts, 8th Edition, NewDelhi: Wiley India, 2011 Stalling William, Operating Systems: Internals and Design Principles, 7th Edition, Prentice Hall, 2011
20/11/2017 25/11/2017	2.00	Unit-7	Process Management	Process concepts, scheduling and operations on processes.	Lecture PPT Presentation	A. Silberschatz, P.B. Galvin and G. Gagne, Operating System Concepts, 8th Edition, NewDelhi: Wiley India, 2011
27/11/2017 02/12/2017	2.00	Unit-7	Process Management	Process Scheduling: Basic concepts, scheduling criteria, scheduling algorithms	Lecture PPT Presentation	A. Silberschatz, P.B. Galvin and G. Gagne, Operating System Concepts, 8th Edition, NewDelhi: Wiley India, 2011 A.S. Tanenbaum, Modern Operating Systems, 3rd Edition, Prentice Hall, 2007
04/12/2017 09/12/2017	2.00	Unit-7	Process Management	scheduling algorithms, Synchronization: Background	Lecture PPT Presentation Problem solving	A. Silberschatz, P.B. Galvin and G. Gagne, Operating System Concepts, 8th Edition, NewDelhi: Wiley India, 2011
11/12/2017 16/12/2017	2.00	Unit-7	Process Management	critical section problems	Lecture PPT Presentation Case study	A. Silberschatz, P.B. Galvin and G. Gagne, Operating System Concepts, 8th Edition, NewDelhi: Wiley India, 2011 A.S. Tanenbaum, Modern Operating Systems, 3rd Edition, Prentice Hall, 2007
18/12/2017 23/12/2017	2.00	Unit-8	Deadlock	Deadlock System model, deadlock characterization	Lecture PPT Presentation	A. Silberschatz, P.B. Galvin and G. Gagne, Operating System Concepts, 8th Edition, NewDelhi: Wiley India, 2011
25/12/2017 30/12/2017	1.00			CHRISTMAS HOLIDAY	CHRISTMAS HOLIDAY	CHRISTMAS HOLIDAY
01/01/2018 06/01/2018	2.00	Unit-8	Deadlock	methods for handling deadlock, deadlock prevention	Lecture PPT Presentation	A. Silberschatz, P.B. Galvin and G. Gagne, Operating System Concepts, 8th Edition, NewDelhi: Wiley India, 2011
08/01/2018 13/01/2018	2.00	Unit-8	Deadlock	avoidance and detection Unit-9 Memory Management Strategies: Background	Lecture PPT Presentation Problem solving	A. Silberschatz, P.B. Galvin and G. Gagne, Operating System Concepts, 8th Edition, NewDelhi: Wiley India, 2011
15/01/2018 20/01/2018	1.00			MID SEMESTER EXAMINATIONS	MID SEMESTER EXAMINATIONS	MID SEMESTER EXAMINATIONS
22/01/2018 27/01/2018	2.00	Unit-9	Memory Management	Swapping, Memory allocation	Lecture PPT Presentation	A. Silberschatz, P.B. Galvin and G. Gagne, Operating System Concepts, 8th Edition, NewDelhi: Wiley India, 2011 Dietel et al, Operating Systems, 3rd Edition, Pearson Education,2004
29/01/2018 03/02/2018	2.00	Unit-9	Memory Management	Paging	Lecture PPT Presentation Problem solving	A. Silberschatz, P.B. Galvin and G. Gagne, Operating System Concepts, 8th Edition, NewDelhi: Wiley India, 2011 Dietel et al, Operating Systems, 3rd Edition, Pearson Education,2004
05/02/2018 10/02/2018	2.00	Unit-9	Memory Management	Structure of the page table Unit-10 File system structure	Lecture PPT Presentation	A. Silberschatz, P.B. Galvin and G. Gagne, Operating System Concepts, 8th Edition, NewDelhi: Wiley India, 2011
12/02/2018 17/02/2018	2.00	Unit-10	File System	directory structure, allocation methods	Lecture PPT Presentation	A. Silberschatz, P.B. Galvin and G. Gagne, Operating System Concepts, 8th Edition, NewDelhi: Wiley India, 2011 Dietel et al, Operating Systems, 3rd Edition, Pearson Education,2004
19/02/2018 24/02/2018	2.00	Unit-10	File System	free-space management, Disk structure	Lecture PPT Presentation Video Lecture	A. Silberschatz, P.B. Galvin and G. Gagne, Operating System Concepts, 8th Edition, NewDelhi: Wiley India, 2011 Dietel et al, Operating Systems, 3rd Edition, Pearson Education,2004
26/02/2018 03/03/2018	1.00	Unit-10	File System	disk scheduling and management	Lecture PPT Presentation Assignment	A. Silberschatz, P.B. Galvin and G. Gagne, Operating System Concepts, 8th Edition, NewDelhi: Wiley India, 2011

CIA 1

Component/Task 1

CIA Details
Objective Type Test

CIA Details will display form 10/11/2017

Learning Objective
Assignment Learning Objectives: To enable the students to understand the concepts of Computer system organization, architecture, Operating System structure, operations, process, memory and storage management.**Assessment Strategies aligned to LO:** Multiple Choice Questions**Technology Tools used along with their Purpose:**Moodle / Kahoot

Evaluation Rubrics

Assessment Metrics:(Based on Bloom's Taxonomy Level of Understanding and Remembering)
Maximum No. of Questions : 25 (each question carries 1 mark)Excellent: 25 MarksGood: 20 Marks
Satisfactory: 15 Marks

CIA 3

Component/Task 1

1. Assignment Information

Course Number/Name: CSC231 / Data Structures and Operating Systems	**Domain:** Computer Science	**Topic being dealt in the Assignment:** Process Scheduling in LINUX Operating System
Audience: 2nd Semester B.Sc. CMS Students	**Assignment Instructor**: Dr.R.Sivakumar	**Instructor Email:** sivakumar.r@christuniversity.in

Submission Date: 05/03/18**Grade**: 20 Marks (Marks will be converted to 10 Marks)**Type**: Writing

Assignment**Page Limit:** Maximum 8 pages **Assignment Description**(1) **Process Scheduling in LINUX Operating System.**

- Detailed study on Process Scheduling algorithms in Linux OS should be done.
- Process Scheduling with respect to Batch process, Time sharing process & Real time process.

CIA Details will display form 10/11/2017

Learning Objective
Assignment Learning Objectives:

- Understand the scheduling algorithms used in LINUX Operating System.
- Able to understand the process scheduling criteria to be considered for different type of processes
- Implement various process scheduling algorithms for batch, time sharing and real time process.

 Assessment Strategies aligned to LO:

Category	Description	Bloom's Level
Proficient	Exceeded beyond-mastered the skill and able to perform beyond the goal to set new goals	R,U,A,AP,E,C
Competent	Reached the goal-met the expectation/standard	R,U,A,AP
Beginner	Started towards the goal-started acquiring skill and marching towards the goal	R,U
Need to improve	Insufficient progress-Not near to the goal of the topic	R

R=Remembering, U=Understanding, A=Analyzing, AP=Applying, E=Evaluating, C=Create
Technology Tools used along with their Purpose: Google Classroom / Moodle

Criteria	Max. Marks	Proficient (20 Marks)	Competent (15 Marks)	Beginner (10 Marks)	Need to Improve (5 Marks)
Overview of Linux OS	4	**(4 marks)** The student is able to present the overview of Linux OS very clearly	**(3 marks)** The student is able to present the overview of Linux OS almost clearly	**(2 marks)** The student is able to present the overview of Linux OS with little difficulty	**(1 mark)** The student is not able to present clearly the overview of Linux OS

Process scheduling criteria	4	**(4 marks)** Ability to explain all the Process scheduling criteria in detail	**(3 marks)** Ability to explain few of the Process scheduling criteria	**(2 marks)** Lack of ability to list all the Process scheduling criteria	**(1 mark)** Unable to list all the Process scheduling criteria
Process types	4	**(4 marks)** Able to express all the process types considering all the aspects	**(3 marks)** Able to express some of the process types considering all the aspects	**(2 marks)** Able to express some of the process types but the related aspects are not considered	**(1 mark)** Not able to clearly express the process types and its aspects
Linux OS scheduling algorithms	4	**(4 marks)** Ability to list all the scheduling algorithms with respect to the batch, time sharing and real time systems	**(3 marks)** Ability to list few scheduling algorithms with respect to the batch, time sharing and real time systems	**(2 marks)** Ability to list few scheduling algorithms but the types of processes are not considered	**(1 mark)** Lack of ability to list scheduling algorithms and no clear idea about the process types
Examples & Figures	4	**(4 marks)** Excellent usage of examples and figures and highly relevant to the content	**(3 marks)** Good usage of examples and figures but not highly relevant to the content	**(2 marks)** Limited usage of examples and figures and not highly relevant to the content	**(1 mark)** Unable to use any suitable examples and figures

Course Plan

Class Name : 2CMS

Subject Name : DATA STRUCTURES AND OPERATING SYSTEMS

Subject Code : CSC231

Teacher Name : DEEPTHI.DAS

Planned Date	No of Hours	Unit	Heading	Details	Method	Reading/Ref
02/11/2017 04/11/2017	1.00	Unit-1	Analysis of Algorithms	Analysis of algorithms-Introduction,what to count and consider,Rates of growth, Sequential Search analysis	Chalk and Board and Discussion and execution of programs	Yashwant Kanetkar, Data Structures Through C, BPB Publication, 2010.
06/11/2017 11/11/2017	2.00	Unit-1	Analysis of Algorithms	Introduction, Array Operations,	Chalk and Board and Discussion and execution of programs	Horowitz Sahni Anderson-Freed, Fundamental of Data Structures in C, Universities Press, Reprint 2009. Seymour Lipschultz: Data Structures, Schaum series TMH, 2010.
13/11/2017 18/11/2017	2.00	Unit-1	Analysis of Algorithms	Array Operations	Chalk and Board and Discussion and execution of programs	
20/11/2017 25/11/2017	2.00	Unit-2	Searching and Sorting	Introduction, Linear Search, Bubble Sort, Binary Search,	Chalk and Board and Discussion and execution of programs	
27/11/2017 02/12/2017	2.00	Unit-2	Searching and Sorting	Insertion Sort, Selection Sort	Chalk and Board and Discussion and execution of programs	
04/12/2017 09/12/2017	2.00	Unit-3	Linked List	Introduction, Pointers,Memory management functions	Chalk and Board and Discussion and execution of programs	
11/12/2017 16/12/2017	2.00	Unit-3	Linked List	searching,Insertion	Chalk and Board and Discussion and execution of programs	
18/12/2017 23/12/2017	2.00	Unit-3	Linked List	Insertion	Chalk and Board and Discussion and execution of programs	
01/01/2018 06/01/2018	2.00	Unit-3	Linked List	Deletion	Chalk and Board and Discussion and execution of programs	
08/01/2018 13/01/2018	2.00	Unit-3	Linked List	Deletion	Chalk and Board and	

					Discussion and execution of programs	
15/01/2018 20/01/2018				Mid semester exam		
22/01/2018 27/01/2018	2.00	Unit-3	Linked List	Double Linked List Representations.	Chalk and Board and Discussion and execution of programs	
29/01/2018 03/02/2018	2.00	Unit-3	Linked List	Linked list application programs	Chalk and Board and Discussion and execution of programs	
05/02/2018 10/02/2018	2.00	Unit-4	Stack and Queue	Introduction, Stack Operations using Pointers,	Chalk and Board and Discussion and execution of programs	
12/02/2018 17/02/2018	2.00	Unit-4	Stack and Queue	Applications of stack-Infix to Prefix,	Chalk and Board and Discussion and execution of programs	
19/02/2018 24/02/2018	2.00	Unit-4	Stack and Queue	Recursion, queue introduction	Chalk and Board and Discussion and execution of programs	
26/02/2018 03/03/2018	2.00	Unit-4	Stack and Queue	queue operations	Chalk and Board and Discussion and execution of programs	
05/03/2018 10/03/2018	2.00	Unit-5	Binary Trees	Introduction, Binary Trees, Properties of Binary Trees,	Chalk and Board and Discussion and execution of programs	
12/03/2018 17/03/2018	2.00	Unit-5	Binary Trees	Binary Tree Representations, Binary Tree Traversals.	Chalk and Board and Discussion and execution of programs	
19/03/2018 24/03/2018	2.00	Unit-5	Binary Trees	revision	Chalk and Board and Discussion and execution of programs	

CIA 1

Component/Task 1

CIA Details

(1) Write a note on (a) two dimensional arrays.(5)   (b) merging of arrays(5)(2) Write any one C program to illustrate the concept of two dimensional arrays(10)

CIA Details will display form 13/11/2017

Learning Objective

Assignment Learning Objectives: To read and understand the concept of two dimensional arrays and to learn to write programs to implement 2D arrays. Assessment Strategies aligned to LO: Assessment is based on the complexity and relevance of the program written by the students Technology Tools used along with their Purpose: Soft copy has to be uploaded in LMS. Any C compiler can be used to execute the program.

Evaluation Rubrics

Organization	Writing shows high degree of attention to logic and reasoning of points High focus on the topic.	Writing is coherent and logically organized with transitions used between ideas and paragraphs to create coherence.	Writing is coherent and logically organized. Some points are not relevant to the topic	Writing lacks logical Organization and most of the points are not related with topic
Level of Content	Content indicates synthesis of ideas, in depth analysis and evidences. Originality of ideas	Content indicates original thinking and develops ideas with sufficient and firm evidence.	Content indicates thinking and reasoning with originality of few ideas.	Shows some thinking and reasoning but most ideas are not clear The content is not completely relevant to the topic

Grammar/style	Assignment is free of spelling errors, punctuation, and grammatical errors; Creative use of sentence structure and coordination	Assignment has few spelling errors, punctuation, and grammatical errors but ideas are clear. Sentence variety used effectively.	Many spelling and, punctuation errors, and grammar mistakes.	More spelling errors.Mostly in elementary form with little or no variety in sentence structure.
Format	Meets all format for assignment. . All margins, spacing and indentations are correct Neatly written and correctly and professionally organized.	Meets format for assignment. margins, spacing, and indentations are correct Neatly written and correctly organized	Meets format for assignment. Generally correct margins, spacing, and indentations; Neatly written.	Fails to follow format for Assignment. Incorrect margins, spacing and indentation; Not legible and neat.

CIA 3

Component/Task 1

Learning Objective

Assignment Learning Objectives: To understand the applications of data structures and to implement it Assessment Strategies aligned to LO:Assessment is based on the compleity and correctness of the program Technology Tools used along with their Purpose:Any C compiler

Evaluation Rubrics

	2 or 1	**3**	**4**	**5**
Delivery	• Completed less than 70% of the requirements. • Not delivered on time	• Completed between 70-80% of the requirements. • Delivered on time	• Completed between 80-90% of the requirements. • Delivered on time,	• Completed between 90-100% of the requirements. • Delivered on time,
Coding Standards	• No name, date, or assignment title included • Poor use of white space (indentation, blank lines). • Disorganized • Poor use of variables	• Includes name, date, and assignment title. • White space makes program fairly easy to read. • Organized work. • Good use of variables	• Includes name, date, and assignment title. • Good use of white space. • Organized work. • Good use of variables	• Includes name, date, and assignment title. • Excellent use of white space. • Creatively organized work. • Excellent use of Variables
Documentation	• No documentati	• Basic documentation has been completed	• Clearly documented including descriptions	• Clearly and effectively

	on included.	including descriptions of all variables. • Purpose is noted for each function.	of all variables. • Specific purpose is noted for each function and control structure.	documented including descriptions of all variables. • Specific purpose is noted for each function, control structure, input requirements, and output results.
Runtime	• Does not execute due to errors. • User prompts are misleading or non-existent.	• Executes without errors. • User prompts contain little information, poor design.	• Executes without errors. • User prompts are understandable, minimum use of symbols or spacing in output.	• Executes without errors excellent user prompts, good use of symbols, spacing in output.
Efficiency	• A difficult and inefficient solution.	• A logical solution that is easy to follow but it is not the most efficient.	• Solution is efficient and easy to follow	• Solution is efficient, easy to understand, and maintain.