

SIR C.R.R.COLLEGE OF ENGINEERING, ELURU

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING COURSE HANDOUT OF OPERATING SYSTEMS First semester 2019 – 2020

DATE: 12-06-2019

Course No : **R1622055**
Course title : **OPERATING SYSTEMS**
Course coordinator : **N.PRASAD**
Team of instructors : **SINGLE INSTRUCTOR**

Course description :

This course examines operating system design concepts, data structures and algorithms, and computer organization basics. The topics to be covered include:

- Computer and operating system structures
- Process and thread management
- Process synchronization and communication
- Memory management
- Virtual memory
- File system
- Deadlocks
- I/O subsystem and device management

Scope and objectives :

This course is built on the student's background in Computer Organization covers some basic perspectives of Operating Systems also. Incorporates and anticipates the major developments in operating systems.

Prerequisite:

Students are expected to know and understand the fundamentals of computer organization as taught in an undergraduate course using a text such as Computer System Architecture by M. Morris Mano. Topics covered should include design and implementation of operating systems. Students are also expected to be able to program in both Java and C/C++ in a UNIX environment.

Syllabus :

III Year - I Semester

L	T	P	C
4	0	0	3

UNIT I

Introduction to Operating System Concept: Types of operating systems, operating systems concepts, operating systems services, Introduction to System call, System call types.

UNIT-II:

Process Management – Process concept, The process, Process State Diagram , Process control block, Process Scheduling- Scheduling Queues, Schedulers, Operations on Processes, Interprocess Communication, Threading Issues, Scheduling-Basic Concepts, Scheduling Criteria, Scheduling Algorithms.

UNIT-III:

Memory Management: Swapping, Contiguous Memory Allocation, Paging, structure of the Page Table, Segmentation

Virtual Memory Management: Virtual Memory, Demand Paging, Page-Replacement Algorithms, Thrashing

UNIT-IV:

Concurrency: Process Synchronization, The Critical- Section Problem, Synchronization Hardware, Semaphores, Classic Problems of Synchronization, Monitors, Synchronization examples

Principles of deadlock – System Model, Deadlock Characterization, Deadlock Prevention, Detection and Avoidance, Recovery form Deadlock

UNIT-V:

File system Interface- the concept of a file, Access Methods, Directory structure, File system mounting, file sharing, protection.

File System implementation- File system structure, allocation methods, free-space management

Mass-storage structure overview of Mass-storage structure, Disk scheduling, Device drivers,

UNIT VI:

Linux System: Components of LINUX, Interprocess Communication, Synchronization, Interrupt, Exception and System Call.

Android Software Platform: Android Architecture, Operating System Services, Android Runtime Application Development, Application Structure, Application Process management

OUTCOMES:

- Design various Scheduling algorithms.
- Apply the principles of concurrency.
- Design deadlock, prevention and avoidance algorithms.
- Compare and contrast various memory management schemes.
- Design and Implement a prototype file systems.
- Perform administrative tasks on Linux Servers

- Introduction to Android Operating System Internals

Required Textbook:

1. Operating System Concepts, Abraham Silberschatz, Peter Baer Galvin and Greg Gagne 9th Edition, John Wiley and Sons Inc., 2012.
2. Operating Systems – Internals and Design Principles, William Stallings, 7th Edition, Prentice Hall, 2011.
3. Operating Systems-S Halder, Alex A Aravind Pearson Education Second Edition 2016 .

Reference Books :

1. Modern Operating Systems, Andrew S. Tanenbaum, Second Edition, Addison Wesley, 2001.
2. Operating Systems: A Design-Oriented Approach, Charles Crowley, Tata Mc Graw Hill Education”, 1996.
3. Operating Systems: A Concept-Based Approach, D M Dhamdhare, Second Edition, Tata

Internal Assessment Details:

- Internal Test 1& 2 : 15 Marks
 Online Test 1 & 2 : 10 Marks
 Assignment-1 & 2 : 5 Marks
 Total : 30 Marks

Course plan:

Unit No	Description of the Chapter	Description of the Topics	Total no of periods (L+T)
1	Introduction to Operating System Concept	Types of operating systems, operating systems concepts, operating systems services, Introduction to System call, System call types.	7+3
2.	Process Management	Process concept, The process, Process State Diagram , Process control block, Process Scheduling- Scheduling Queues, Schedulers, Operations on Processes, Interprocess Communication, Threading Issues, Scheduling-Basic Concepts, Scheduling Criteria, Scheduling Algorithms.	12+4
3.	Memory Management	Swapping, Contiguous Memory Allocation, Paging, structure of the Page Table, Segmentation	10+2

		Virtual Memory Management: Virtual Memory, Demand Paging, Page-Replacement Algorithms, Thrashing	
4.	Concurrency, Principles of deadlock	Process Synchronization, The Critical- Section Problem, Synchronization Hardware, Semaphores, Classic Problems of Synchronization, Monitors, Synchronization Examples Principles of deadlock – System Model, Deadlock Characterization, Deadlock Prevention, Detection and Avoidance, Recovery form Deadlock	8+1
5.	File system Interface, File System implementation	File system Interface- the concept of a file, Access Methods, Directory structure, File system mounting, file sharing, protection. File System implementation- File system structure, allocation methods, free-space management Mass- storage structure overview of Mass- storage structure, Disk scheduling, Device drivers,	10+2
6.	Linux System, Android Software Platform.	Linux System: Components of LINUX, Interprocess Communication, Synchronization, Interrupt, Exception and System Call. Android Software Platform: Android Architecture, Operating System Services, Android Runtime Application Development, Application Structure, Application Process management	5+2

Total number of estimated periods

: 65 periods

Signature of the H.O.D

Signature of the Faculty

Date:

T1= Operating System Concepts, Abraham Silberschatz, Peter Baer Galvin and Greg Gagne.

T2= Modern Operating Systems, Andrew S. Tanenbaum, Second Edition, Addison Wesley.

Self learning topics:

UNIT	Self Learning Topic	Source
Unit-1	History of different operating systems	T1
Unit-2	Problems solving on CPU scheduling	T1, T2
Unit-3	Page Replacement Algorithms for FIFO, LRU and Optimal	T1, T2
Unit-4	How to detect deadlocks	T1
Unit-5	Different file structures	T1
Unit-6	Differences between UNIX and MS-DOS	T1

LECTURE PLAN

Sl.No	Topics to be covered	No. of Lecture	Teaching method	Program Outcomes
1.	Introduction to OS, Types of operating systems	2	BB	a,c
2.	operating systems concepts	2	BB	a,b,c
3.	operating systems services	1	BB	b,c,d
4.	Introduction to System call	2	BB	b,c,d
5.	System call types.	2	BB	b,c,d
6.	Process concept, Schedulers,	1	BB	b,c,d
7.	The process,	1	BB	b,c,d
8.	Process State Diagram , Process control block,	1	BB	b,c,d
9.	Scheduling Queues,	1	PPT with LCD	b,c,d
10.	Operations on Processes	1	BB	b,c,d
11.	Communication, Basic Concepts	1	BB	b,c,d
12.	Threading Issues, Scheduling	2	BB	b,c,d
13.	Scheduling Criteria	1	BB	b,c,d

14.	Interprocess Scheduling Algorithms	1	BB	b,c,d
15.	Swapping, Page Table, Segmentation	2	BB	b,c,d
16.	Contiguous Memory Allocation,	1	BB	b,c,d
17.	Paging, structure of the	1	BB	b,c,d
18.	Virtual Memory	1	BB	b,c,d
19.	Demand Paging, Page-Replacement	1	PPT with LCD	b,c,d
20.	, Algorithms	1	BB	b,c,d
21.	Thrashing	2	BB	b,c,d
22.	Process Synchronization	1	BB	b,c,d
23.	The Critical- Section Problem	1	BB	b,c,d
24.	Synchronization Hardware	1	BB	b,c,d
25.	Semaphores, Classic Problems of Synchronization	1	BB	b,c,d
26.	Monitors	1	BB	b,c,d
27.	Synchronization examples	1	BB	b,c,d
28.	System Model	1	BB	b,c,d
29.	Deadlock Characterization	1	BB	b,c,d
30.	Deadlock Prevention	2	BB	b,c,d
31.	Detection and Avoidance,	1	PPT with LCD	b,c,d
32.	Recovery form Deadlock	2		b,c,d
33.	the concept of a file	1	BB	b,c,d
34.	Access Methods	1	BB	b,c,d
35.	Directory structure	1	BB	b,c,d
36.	File system	1	BB	b,c,d

37.	Mounting, file sharing, protection.	1	BB	b,c,d
38.	File system structure	2	BB	b,c,d
39.	Allocation methods	2	BB	b,c,d
40.	free-space management	2	BB	b,c,d
41.	overview of storage structure, Disk scheduling, Device drivers	2	BB	b,c,d
42.	Components of LINUX	1	BB	b,c,d
43.	Interprocess Communication,	1	BB	b,c,d
44.	Synchronization, Interrupt,	2	BB	b,c,d
45.	Exception and System Call.	1	BB	b,c,d
46.	Android Architecture,	1	BB	b,c,d
47.	Operating System Services	1	BB	b,c,d
48.	Android Runtime Application Development,	2	BB	b,c,d
49.	Application Structure, Application Process management	2	BB	b,c,d