CMR TECHNICAL CAMPUS

Kandlakoya(V), Medchal Road, Hyderabad

**Department of INFORMATION TECHNOLOGY**

**COURSE FILE**

**Sub: Operating System**

**Year :II year B.Tech–II st Sem**

**Contents of Course file**

* Department vision & mission
* List of PEOs,Pos, PSOs
* List of Cos (action verbs as per blooms)
* Syllabus copy and suggested or reference books
* Session plan/ lesson plan
* Session execution log
* Lecture notes
* Assignment Questions along with sample assignment
* Mid exam question papers along with sample answer scripts
* Scheme of evaluation
* Mapping of cos with pos and psos
* Attainment of cos, pos and psos
* University question papers or question bank.
* Power point presentations
* Websites or URLs e- Resources

**1. DEPARTMENT VISION & MISSION**

**Vision:**

To produce globally competent and industry ready graduates in Computer Science & Engineering by imparting quality education with a know-how of cutting edge technology and holistic personality.

**Mission:**

**M1**. To offer high quality education in Computer Science & Engineering in order to build core competence for the students by laying solid foundation in Applied Mathematics, and program framework with a focus on concept building.

**M2**. The department promotes excellence in teaching, research, and collaborative activities to prepare students for professional career or higher studies.

**M3**. Creating intellectual environment for developing logical skills and problem solving strategies, thus to develop, able and proficient computer engineer to compete in the current global scenario.

**2. LIST OF PEOs AND POs**

**2.1 Program Educational Objectives (PEO):**

**PEO 1:** Excel in professional career or higher education by acquiring knowledge in mathematical, computing and engineering principles.

**PEO 2:** To provide intellectual environment for analyzing and designing computing systems for technical problems socially and economically.

**PEO 3:** Exhibit professionalism, multidisciplinary teamwork and adapt to current trends by engaging in lifelong learning and practice their profession with legal and ethical responsibilities.

**2.1 .Program Outcomes (PO):**

* **PO1**. An ability to apply knowledge of computing, mathematics, science and engineering fundamentals appropriate to the discipline.
* **PO2**. An ability to analyze a problem, and identify and formulate the computing requirements appropriate to its solution.
* **PO3.** An ability to design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs with appropriate consideration for public health and safety, cultural, societal and environmental considerations.
* **PO4**. An ability to design and conduct experiments, as well as to analyze and interpret data.
* **PO5**. An ability to use current techniques, skills, and modern tools necessary for computing practice.
* **PO6** An ability to analyze the local and global impact of computing on individuals, organizations, and society.
* **PO7.** Knowledge of contemporary issues.
* **PO8.** An understanding of professional, ethical, legal, security and social issues and responsibilities.
* **PO9.** An ability to function effectively individually and on teams, including diverse and multidisciplinary, to accomplish a common goal.
* **PO10.** An ability to communicate effectively with a range of audiences.
* **PO11.** An understanding of engineering and management principles and apply these to one’s own work, as a member and leader in a team, to manage projects.
* **PO12.** Recognition of the need for and an ability to engage in continuing professional development.

**NBA Graduate Attributes**

**PO1 Engineering knowledge**

**PO2 Problem analysis**

**PO3 Design/development of solutions**

**PO4 Conduct investigations of complex problems**

**PO5 Modern tool usage**

**PO6 The engineer and society**

**PO7 Environment and sustainability**

**PO8 Ethics**

**PO9 Individual and team work**

**PO10 Communication**

**PO11 Project management and finance**

**PO12 Life-long learning**

|  |
| --- |
| * **Define** the operating System and functionlaities of modern Operating System.
* **Identify** solutions to solve synchronizationb problems and analyse various scheduling techniques.
* **Illustrate** how various computing are used by application software and is managed by system software
 |
| * **Determine** various techniques for handling primary and secondary memories.
* **Analyze** the techniques for handling deadlocks.
* **Produce** the various Access Strategies in Operating Systems.
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**3. COURSE OUTCOMES**

**4.SYLLABUS COPY**

**SYLLABUS - JNTU**

**UNIT - I:**

**Operating System Introduction:** Operating Systems Objectives and functions, Computer SystemArchitecture, OS Structure, OS Operations, Evolution of Operating Systems - Simple Batch, Multi programmed, time shared, Personal Computer, Parallel, Distributed Systems, Real-Time Systems, Special - Purpose Systems, Operating System services, user OS Interface, System Calls, Types of System Calls, System Programs, Opening System Design and Implementation, OS Structure, Virtual machines.

**UNIT - II:**

**Process and CPU Scheduling** - Process concepts - The Process, Process State, Process Control Block, Threads, Process Scheduling - Scheduling Queues, Schedulers, Context Switch, Preemptive Scheduling, Dispatcher, Scheduling Criteria, Scheduling algorithms, Multiple-Processor Scheduling, Real-Time Scheduling, Thread scheduling, Casse studies: Linux, Windows.

Process Coordination - Process Synchronization, The Critical section Problem, Peterson's solution, Synchronization Hardware, Semaphores, and Classic Problems of Synchronization, Monitors, Case Studies: Linux, Windows.

**UNIT - III:**

**Memory Management and Virtual Memory** - Logical & physical Address Space, Swapping, Contiguous Allocation, Paging, Structure of Page Table. Segmentation, Segmentation with Paging, Virtual Memory, Demand Paging, Performance of Demanding Paging, Page Replacement Page Replacement Algorithms, Allocation of Frames, Thrashing.

**UNIT - IV:**

**File System Interface** - The Concept of a File, Access methods, Directory Structure, File System Mounting, File Sharing, Protection, File System Implementation - File System Structure, File System Implementation, Allocation methods, Free-space Management, Directory Implementation, Efficiency and Performance.

**Mass Storage Structure** - Overview of Mass Storage Structure, Disk Structure, Disk  Attachment, Disk Scheduling, Disk Management, Swap space Management.

**UNIT - V:**

**Deadlocks** - System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection and Recovery from Deadlock.

**Protection** - System Protection, Goals of Protection, Principles of Protection, Domain of Protection, Access Matrix, Implementation of Access Matrix, Access Control, Revocation of Access Rights, Capability-Based Systems, Language-Based Protection.

**TEXT BOOKS:**

* Operating System Principles, Abraham Silberchatz, Peter B. Galvin, Greg Gagne 8th Edition, Wiley Student Edition.
* Operating systems - Internals and Design Principles, W. Stallings, 6th Edition, Pearson.

**REFERENCES BOOKS:**

* Modern Operating Systems, Andrew S Tanenbaum 3rd Edition  PHI.
* Operating Systems A concept - based Approach, 2nd Edition, D. M. Dhamdhere, TMH.
* Principles of Operating Systems, B. L. Stuart, Cengage learning, India Edition.
* Operating Systems, A. S. Godbole, 2nd Edition, TMH
* An Introduction to Operating Systems, P.C.P. Bhatt, PHI.
* Operating Systems, S, Haldar and A. A. Arvind, Pearson Education.
* Operating Systems, R. Elmasri, A. G. Carrick and D. Levine, Mc Graw Hill.
* Operating Systems in depth, T. W. Doeppner, Wiley

**5. SESSION PLAN/LESSON PLAN**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **S.NO** | **Topic (JNTU syllabus)** | **Sub-Topic** | **NO. OF LECTURES REQUIRED** | **Suggested Books** | **Remarks** |
| **I** |  | **UNIT - I** |  **9** |  |  |
| **1** | **Computer System& Operating System Overview** | Introduction to Operating System ,Objectives and Functions | L1 | T1,R1,R3 |  |
| **2** | Computer System Archietecture | L2 | T1,R3 |  |
| **3** | Operating Systems Structures  | L3 | T1,R3 |  |
| **4** | Operating System Operations | L4 | T1,R1,R3 |  |
| **5** | Evaluation of Operating Systems& Special Purpose systems | L5 | T1,R1 |  |
| **6** | Operating Services ,User Operating system services | L6 | T1,R1,R3 |  |
| **7** | System calls | L7 | T1,R3 |  |
| **8** | Implementation  | L8 | T1,R1,R3 |  |
| **9** |  | Virtual machines. | L9 | T1 | **Completion of Unit I** |
| **II** |  |  **UNIT - II** |  **15** |  |  |
| **10** | **Process Management** | Introduction:  | L10 | T1,R1 |  |
| **11** | Process Management | L11 | T1,R3 |  |
| **12** | Process concepts threads | L12,L13  | T1,R2 |  |
| **13** | Scheduling-criteria algorithms, their evaluation | L14,L15 | T1,R3 |  |
| **14** | Thread scheduling | L16 | T1,R1,R3 |  |
| **15** | Case studies UNIX, Linux, Windows | L17 | T1,R3 |  |
| **16** |  | Introduction to Concurrency | L18 | T1,R1 |  |
| **17** |  | Processsynchronization. | L19 | T1,R3 |  |
| **18** |  | The critical- section problem, Peterson’s Solution. | L20 | T1,R1 |  |
| **19** |  | Synchronization Hardware, semaphores, classic problems of synchronization | L21 | T1,R3 |  |
| **20** |  | Monitors, Synchronization examples  | L22,L23 | T1,R1,R3 |  |
| **21** |  | Atomic transactions. Case studies UNIX, Linux, Windows | L24 | T1,R1 | **Completion of Unit II** |
| **III** |  | **UNIT-III** | 13 |  |  |
| **22** | **Memory Management** | Introduction to Memory Management: | L25,L26 | T1,R3 |  |
| **23** | Swapping, contiguous memory allocation, paging | L27 | T1,R1 |  |
| **24** | Structure of the page table, segmentation. | L28, L29 | T1,R1,R3 |  |
| **25** | Virtual memory, demand paging | L30, L31 | T1,R3 |  |
| **26** | Page-Replacement, algorithms | L32 | T1,R3 |  |
| **27** | Allocation of frames | L33.L34,L35 | T1,R1 |  |
| **28** |  | Thrashing | **L36,37** |  | **Completion of Unit III** |
| **IV** |  | **UNIT - IV** | 11 |  |  |
| **29** | **File system Interface****Mass-storage****Structure** | Introduction to File system Interface: | L38 | T1,T2,R1 |  |
| **30** | The concept of a file, Access Methods | L39 | T1,R3 |  |
| **31** | Directory structure, File system mounting, file sharing, protection. | L40 | T1,R3 |  |
| **32** | File system structure, file system implementation | L41 | T1,R3 |  |
| **33** | Directory implementation, allocation methods | L42 | T1,R1,R3 |  |
| **34** | Free-space management, efficiency and performance | L43 | T1,R1,R3 |  |
| **35** |  | Case studies. UNIX, Linux, Windows | L44 | T1,R3 |  |
| **36** |  | Introduction to Mass-storage structure | L45 | T1,R1 |  |
| **37** |  | Overview of Mass-storage structure | L46 | T1,R1,R3 |  |
| **38** | Disk structure, disk attachment disk scheduling | L48 | T1,R1,R3 |  |
| **39** | Swap-space management, RAID structure | L49 | T1,R1,R3 | **Completion of Unit IV** |
| **V** |  | **UNIT - V** | 13 |  |  |
| **40** | **Dead Locks** | System Model, Deadlock Characterization,  | L50 | T1,R1 |  |
| **41** | Methods for Handling Deadlocks | L51 | T1,R1,R3 |  |
| **42** | Deadlock Prevention,  |  | T1,R1,R3 |  |
| **43** | Deadlock Avoidance.Deadlock Detection  |  | T1,R1,R3 |  |
|  **49** | Recovery from Deadlock | L52 | T1,R1 |  |
| **50** | **Protection****&****Security** | Introduction to Protection: | L53 | T1,R3 |  |
| **51** | Protection, Goals of Protection, Principles of Protection | L54 | T1,R3 |  |
| **52** | Domain of protection Access Matrix, Implementation of Access Matrix, Access control | L55 | T1,R3 |  |
| **53** | Revocation of Access Rights | L56 | T1,R3 |  |
| **54** | Capability- Based systems, Language – Based Protection | L57,L58 | T1,R1,R3 |  |
| **55** | The Security problem, program threats, system and network threats | L59 | T1,R1,R3 |  |
| **56** | Cryptography as a security tool, user authentication | L60 | T1,R3 |  |
| **57** | Implementing security defenses, firewalling to protect systems and networks | L61 | T1,R1 |  |
| **58** | Computer –security classifications, case studies UNIX, Linux, Windows | L62 | T1,R1,R3 | **Completion of Unit V** |
| **TOTAL : 62** |

**6. Session Execution Log:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S no** | **unit** | **Scheduled completed date** | **Completed date** | **Remarks** |
| **1** | **I** | **14-12-2017** | **30-02-2017** |  |
| **2** | **II** | **02-01-2018** | **25-01-2018** |  |
| **3** | **III** | **27-01-2018** | **14-02-2018** |  |
| **4** | **IV** | **16-02-2018** | **08-03-2018** |  |
| **5** | **V** | **09-03-2018** | **02-04-2018** |  |

**7.Assignment Questions along with sample assignment(Attached)**

**UNIT-1**

**SET-1**

1. State and explain various types of computer systems?

2.a) Define an operating system? State and explain the basic functions or services of an operating system?

 b) Explain the differences between multiprogramming and time-sharing

3. Explain how protection is provided for the hardware resources by the Operating Systems?

4. Describe the system components of an operating system and explain them briefly?

**SET-2**

1.Discuss the Operating System Structures?

2.Discuss about the following

a)Simple structures

b)Layered approach

c)Micro kernels

**3.Explain** briefly system calls with examples?

**4.Define** the essential properties of the following operating systems?

a)Batch

b)Interactive

c)Time sharing

d)Real time

e)Distributed

**SET-3**

1.a)**Explain** the architecture of an operating system?

b)**Draw** and explain the architecture of windows 2000 and traditional

UNIX?

2.Computer system architecture deals about how the component of a

computer system may be organized?

3.**Discuss** in detail about different architectures of a computer system?

4.a)**Discuss** the view of an operating system as a resource manager?

**SET-4**

**1.Distinguish** between multiprogramming, multitasking and

multiprocessing?

**2.Explain** how operating system services are provided by system calls?

**3.Describe** the functionalities listed below?

a)Batch programming

b)Virtual Memory

c)Time sharing

**4.Distinguish** between the client-server and peer-to-peer models of

distributed systems?

**UNIT-2**

**SET-1**

**1.Explain** the reasons for process termination?

**2.Discuss** the following process, program, process state, process control block, and process scheduling?

**3.Explain** the process state transition diagram with examples.

**4.Discuss** the attributes of the process. **Describe** the typical elements of

 process control block?

**SET-2**

**1.Explain** the principles of concurrency and the execution of concurrent

processes with a simple example?

**2.Describe** dining-philosophers problem? Device an algorithm to solve the

problem using semaphores?

**3.Explain** the infinite buffer producer/consumer problem for concurrent

processing which uses binary semaphores?

4.**Define** monitor? Distinguish between monitor and semaphore. **Explain** in detail a monitor with notify and broadcast functions using an example?

**SET-3**

1.Expalin about the following

CPU-I/O burst cycle

CPU schedule

Pre-emptive and non-preemptive scheduling

Dispatcher

2. Explain the concept of multi-threading? Discuss the following multi-

threading models.

3.Explain and Process Synchronization

4.Explain about Critical section Problem

**SET-4**

**1.Explain** the infinite buffer producer/consumer problem for concurrent

processing which uses binary semaphores?

2.**Define** monitor? Distinguish between monitor and semaphore. **Explain** in detail a monitor with notify and broadcast functions using an example?

3.Explain and Process Synchronization

4.Explain about Critical section Problem

**UNIT-3**

**SET-1**

1.Explain about Paging Concept?

2.Briefly Discuss about Virtual Memory

3.Discuss about Demand Paging

4.Define PageFault?and explain various Page Replacement algorithms?

**SET-2**

1.Briefly Discuss about Virtual Memory

2.Discuss about Demand Paging

3.Explain Briefly about Allocation of Frames

4.Explain about Thrashing technique

**SET-3**

1.Discuss about Demand Paging

2.Explain Briefly about Allocation of Frames

3.Explain about Thrashing technique

4.Explain about various Page Replacement techniques?

**UNIT-4**

**SET-1**

1.Explain various Access methods

2.Discuss about Directory Structure

3.Explain about File System Mounting

4.Expain about File Sharing

**SET-2**

1.Discuss about File System Structure

2.Explain about File System Implementation

3.Explain about various Allocation methods

4.Expain about File Sharing

**SET-3**

1.Explain about File System Mounting

2.Expain about File Sharing

3.Discuss about File System Structure

4.Explain about File System Implementation

**Unit-5**

**SET-1**

1.What is Meant by DeadLock

2.Expalin about the Characterstics of a deadlock

3.discuss about deadlock Prevention Method

4.briefly discussabout deadlock avoidance

**SET-2**

**1**.Discuss deadlock detection method in detail?

2.State and explain the methods involved in recovery from deadlocks?

3.Expalin about the Characterstics of a deadlock

4.Discuss about deadlock Prevention Method

**SET-3**

1.Discuss the various issues that need to be considered through the process

of revocation of access rights?

2.Explain various schemes to implement revocation for capabilities?

3.Explain how language-based protection scheme can be used for providing system protection at kernel level?

4.Explain relative merits of compiler-based enforcement based solely

**SET-4**

1.Discuss about domain of protection?

2.Why do you need to provide protection to the system? Explain how access matrix can be used for the purpose?

3.Discuss the access matrix implementation techniques?

4.Compare the various access matrix implementation techniques

**8.Mid exam question papers along with sample answer scripts(Attached)**



 **CMR TECHNICAL CAMPUS**

**Kandlakoya (v), Medchal Road, Hyderabad -501401**

 **III.B.TECH I-SEM-I MID EXAMINATIONS, AUG-2015 *Date: 27.08.2016***

**Subject: OS Branch: IT Time: 1hr Marks: 2X5=10 M**

**Answer Any Two Questions:**

1. Write briefly about **[CO1]**

1) Multiprogramming.

2) System calls

3) Objective services of OS

2. What are preemptive and non preemptive scheduling policies? Explain with Example in round robin scheduling? **[CO2]**

3. What is a semaphore, what are the types of semaphore? Explain implementation of a semaphore in readers/writers problem? **[CO2]**

4. Write short notes on Page Table & TLB Table Structure.**[CO4]**

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 **III.B.TECH I-SEM-II MID EXAMINATIONS, OCT-2015 *Date: 29.10.2016***

**Subject: OS Branch: IT Time: 1hr Marks: 2X5=10 M**

**Answer Any Two Questions:**

* What is fragmentation, explain about the internal fragmentation and external fragmentation with examples**?[CO4]**
* What is disc scheduling and explain about SSTF, and C-SCAN disc scheduling with examples?**[CO4]**
* Concider a system with five processes and three resources, at time T0 following snapshot is given**[CO5]**

Process MAX ALLOCATED TOTAL RESOURCES

 A B C A B C A B C

P0 7 5 3 0 1 0 10 5 7

P1 3 2 2 2 0 0

P2 4 0 2 3 0 2

P3 2 2 2 2 1 1

P4 4 3 3 2 0 2

 Find weather the system is in safesate or not, what is the safe sequence?

 4. a) Explain about indexed and linked file allocation strategies? **[CO4]**

 b) Explain about free space management methods with examples? **[CO4]**

**9.SCHEME OF EVALUTION**

 **MID-I**

1)Multiprogramming. 1**.5Marks**

2) System calls **1.5Marks**

3) Objective services of OS **2.0Marks**

 **Total 5 Marks**

2.Explain Preemptive and Nonpreemptive Techniques. 2**Marks**

Round Robin Scheduling Algorithm **3Marks**

 **Total 5 Marks**

3. Defination of Semaphore 1Mark

Types of semaphore 1.5Marks

Reader/Writer Problem 2.5Marks

 4 Page Table 2.5Marks

 TLB Structure 2.5Marks

 **Total 5 Marks**

**MID-II**

1. Fragmentation Definition  **2Marks**

Internal and external fragmentation **3Marks**

 **Total 5 Marks**

2. What is disc scheduling and **2Marks**

 explain about SSTF, and C-SCAN disc scheduling with examples? **3Marks**

 **Total 5 Marks**

 3. Find weather the system is in safesate or not, what is the safe sequence?

 **Total 5 Marks**

 4. a) Explain about indexed and linked file allocation strategies? **2.5Marks**

 b) Explain about free space management methods with examples?2.5

 **Total 5 Marks**

**11.MAPPING OF COs WITH POS AND PSOs**

**CORRELATION LEVELS CO-PO& PSO Matrix:**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **COURSE CO-PO&PSO-MATRIX** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** |
| **C402.1** | 3 | 2 | - | 2 | - | - | - | - | - | - | - | - | 3 | 1 |
| **C402.2** | 2 | 2 | 2 | - | - | - | - | - | - | - | - | - | 2 | - |
| **C402.3** | 1 | 3 | - | - | 2 | - | - | - | - | - | - | - | 2 | - |
| **C402.4** | 1 | - | 2 | - | - | - | - | - | - | - | 2 | - | 2 | 1 |
| **C402.5** | 1 | 2 | - | 3 | - | - | - | - | - | - | - | - | 2 | 1 |
| **C402.6** | 1 | 1 | - | 2 | 2 | - | - | - | - | - | 3 | 3 | 3 | 2 |
| **AVERAGE** | **2** | **2** | **1** | **1** | **1** | **0** | **0** | **0** | **0** | **0** | **1** | **1** | **2** | **1** |

**12. Attainment Of Cos, Pos And Psos**

**13.University Question Papers or Question Bank.**

**14. Power Point Presentations: Attached
15.WEBSITES OR URLS E- RESOURCES**

 [www.testingstandards.com](http://www.testingstandards.com/)

 [www.iist.com](http://www.iist.com/)

 [www.spinstitue.org](http://www.spinstitue.org/)

 [www.icspi.com](http://www.icspi.com/)

 www2.umassd.edu

 [www.goldpractices.com](http://www.goldpractices.com/)

 [www.ibm.com](http://www.ibm.com/)

 [www.extremeprogramming.org](http://www.extremeprogramming.org/)

 [www.codeproject.com](http://www.codeproject.com/)