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| --- | --- | --- | --- | --- | --- | --- | --- |
| **Course Title** | **OPERATING SYSTEMS** | | | | | | |
| **Course Code** | **24AM4ESOPS** | **Credits** | **3** | **L-T-P** | **3-0-0** | | |
| **CIE** | **50 Marks** | **SEE** | **100 Marks (50% Weightage )** | | | | |
| **Contact Hours /Week** | **3** | **Total Lecture Hours** | | | **36** | | |
|  | | | | | | | |
| **UNIT – 1** | | | | | | | **7 Hrs** |
| **Introduction:** Types of Operating System, Operating System Concepts, System Calls, Operating System Structure.  **Processes and Threads:** The Process Model, Process Creation, Process Termination,  Process Hierarchies, Process States, Thread Usage, The Classical Thread Model, Implementing Threads in User Space, Implementing Threads in The Kernel. | | | | | | | |
| **UNIT – 2** | | | | | | **7 Hrs** | |
| **Inter-process Communication:** Race Conditions, Critical Regions, Mutual Exclusion with Busy Waiting, Semaphores, Mutexes, Monitors, Message Passing, Avoiding Locks, Read- Copy-Update.  **Pre-emptive, non-pre-emptive scheduling:** First come first serve, Shortest Job First, Round-Robin, Priority.  **Case study:** The Dining Philosophers Problem, The Readers and Writers Problem. | | | | | | | |
| **UNIT – 3** | | | | | | | **8 Hrs** |
| **Memory Management:** Memory management strategies, Background, Swapping, Contiguous memory allocation, Paging, Structure of page table, Segmentation.  **Virtual Memory Management:** Background, Demand paging, Copy-on-write, Page replacement, Allocation of frames; Thrashing. | | | | | | | |
| **UNIT – 4** | | | | | | | **8 Hrs** |
| **Deadlocks:** Resources, Introduction to Deadlocks, The Ostrich Algorithm, Deadlock Detection and Recovery, Deadlock Avoidance, Deadlock Prevention, Other Issues.  **Disk performance optimization:** Disk Hardware, Disk Formatting, Disk Arm Scheduling Algorithms, Error Handling. | | | | | | | |
| **UNIT – 5** | | | | | | **6 Hrs** | |
| **File System:** File concept, Access methods, Directory structure, File system mounting,  File sharing.  **Implementing File system**: File system structure, File system implementation, Directory implementation, Allocation methods, Free space management | | | | | | | |
| **Text Books:**   1. *Modern operating systems,* Tanenbaum, Andrew, 4th Edition, Pearson Education, 2015. 2. *Operating System Concepts,* Abraham Silberschatz*,* Peter Baer Galvin, Greg Gagne*, 9th Edition, Wiley India, 2013.* | | | | | | | |
| **Reference Books:**   1. *Operating Systems: Internals and Design Principles, William Stallings, 9th Edition, Pearson,2008.* 2. *Operating Systems: A Concept Based Approach, D.M Dhamdhere, 3rd Ed, McGraw- Hill, 2017.* | | | | | | | |

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| **Course Outcomes** | |
| CO1 | Apply the fundamental concepts of modern operating systems. |
| CO2 | Analyze and solve operating system issues, to improve system performance and reliability. |
| CO3 | Design solutions for scheduling real-time applications to meet real-world demands effectively. |

**CO – PO - PSO Mapping**

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|  | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| **CO1** | **3** |  |  |  |  |  |  |  |  |  |  |  | **3** |  |  |
| **CO2** |  | **3** |  |  |  |  |  |  |  |  |  |  | **3** |  |  |
| **CO3** |  |  | **2** |  |  |  |  |  |  |  |  |  | **3** |  |  |

**Massive Open Online Course (MOOC)**

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| --- | --- | --- | --- |
| **Sl.**  **No.** | **Course** | **Offered by** | **Course Link** |
| 1. | Operating System Fundamentals | NPTEL | <https://nptel.ac.in/courses/106105214> |
| 2. | Introduction to Operating Systems  Specialization | Coursera | https://in.coursera.org/specializations/codio- introduction-operating-systems |

**Semester End Examination (SEE) Question Paper Pattern:**

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| --- | --- | --- |
| UNIT # | Internal Choice / Mandatory | Unit Wise Marks Distribution |
| Unit 1 | Mandatory | One question to be asked for 20 marks |
| Unit 2 | Internal Choice | Two questions to be asked for 20 marks each |
| Unit 3 | Internal Choice | Two questions to be asked for 20 marks each |
| Unit 4 | Mandatory | One question to be asked for 20 marks |
| Unit 5 | Mandatory | One question to be asked for 20 marks |

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| --- | --- |
| **Bloom’s Level** | **Percentage of Questions to be included in SEE**  **Question Paper** |
| Remember / Understand | 20% |
| Apply / Analyze | 70% |
| Create / Evaluate | 10% |

**Assessment Pattern:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Category** | | | **Score Split up** | **Total** |
| **Continuous Internal Evaluation (CIE)** | **Theory** | CIE - 1 | 40M  (Best of Two) | **50M** |
| CIE – 2 |
| CIE - 3 |
| AAT/Quiz | 10M |
| **Semester End Examination (SEE)** | 100M (50% weightage) | | | **50M** |
| **Total** | | | | **100M** |