**Integrated MCA I Semester 2**

**Subject Name:** Operating System **Subject Code:** IMCA13207

**Type of course:** Professional Core Course

**Prerequisite (if any):**

- Basic knowledge of Computer organization

**List of Courses where this course will be prerequisite:**

- All Programming languages

**Rationale:** It is imperative to know how Operating Systems allow applications to seamlessly and effectively use the hardware resources.

**Teaching and Examination Scheme:**

| TEACHING SCHEME | | | | Theory Marks | | Practical Marks | | Total |
|---|---|---|---|---|---|---|---|---|
| L | T | P | C | TEE | CAT | TEP | CAP | |
| 4 | 0 | 0 | 4 | 60 | 40 | - | - | 100 |

**CAT:** Continuous Assessment Theory comprised of CA1 and CA2 **CA1:** Continuous Assessment (assignments/projects/open book tests/closed book tests **CA2:** Sincerity in attending classes/class tests/ timely submissions of assignments/self-learning attitude/solving advanced problems **TEE:** Term End Examination **TEP:** Term End Practical Exam (Performance and viva on practical skills learned in course) **CAP:** Regular submission of Lab work/Quality of work submitted/Active participation in lab sessions/viva on practical skills learned in courses.

**Content:**

| Sr. No. | Content | Teaching Hrs. | Module Weightage |
|---|---|---|---|
| 1 | **Introduction to Operating Systems**<br>Overview, Operating System as User Computer interface, system calls, Operating system as Resource Manager, Evolution of Operating Systems, Information Protection and Security, Multiprocessor vs Multicore Operating Systems, | 08 | 13% |
| 2 | **Process Management**<br>**Process-** Overview, Process control block, Context Switching<br>**Scheduling-** Preemptive Vs. Non-preemptive scheduling, Scheduling Criteria, Scheduling algorithms - FCFS, Shortest Process Next, Shortest Remaining Time, Round Robin<br>**Threads**<br>Overview, Multithreaded Models, Threading Issues, Multicore programming | 18 | 30% |
| 3 | **Inter-process Communication-** Concept of Race condition, Critical Section and mutual exclusion, Mutex, Semaphores and **Deadlocks and starvation** Necessary condition for deadlock, deadlock detection & recovery, avoidance and prevention | 16 | 27% |
| 4 | **Memory Management**<br>Overview, Partitioning, Replacement Algorithms, Paging, Segmentation, Virtual Memory | 09 | 15% |
| 5 | **File System and I/O Management**<br>File System overview, File Structure, File Management Systems, Disk Management, Disk Scheduling,Evolution of I/O function, I/O Hardware, Application I/O interface | 09 | 15% |

**Suggested Specification table with Marks (Theory):**

| Distribution of Theory Marks | | | | | |
|---|---|---|---|---|---|
| **R Level** | **U Level** | **A Level** | **N Level** | **E Level** | **C Level** |
| 25 | 30 | 10 | 15 | 10 | 10 |

**Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)**

**Note:** This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

**Reference Books:**

| Sr. No. | Title of book /article | Author(s) | Publisher and details like ISBN | Year of publication | Publication Edition |
|---|---|---|---|---|---|
| 1 | Operating System Concepts | Abraham Silberschatz<br>Peter Baer Galvin<br>Greg Gagne | Wiley<br>ISBN: 978-1-118-06333-0 | 2013 | 9th Edition |
| 2 | Operating Systems<br>Internals and Design Principles | William Stallingd | Prentice Hall<br>ISBN: 978-0-13-230998-1 | 2012 | 7th Edition |
| 3 | Modern Operating Systems | Andrew Tanenbaum | Prentice Hall | 2015 | 4th Edition |

**Course Outcomes:**

| Sr. No. | CO Statement<br>After learning this subject, students will be able to | Marks % weightage |
|---|---|---|
| CO-1 | Identify the role of operating system in functioning of computer systems | 13% |
| CO-2 | Ability to understand, outline and compare various processes, threads and demonstrate process scheduling algorithms | 30% |
| CO-3 | Understand the deadlock management techniques and mutually exclusive Inter-process communication | 27% |
| CO-4 | Understand the concepts of memory management and demonstrate different techniques of memory management | 15% |
| CO-5 | Identify the structure and organization of files, understand input-output mechanism and its management. | 15% |

**Mapping with POs:**

| | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO 11 | PO 12 | PO 13 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO-1** | 3 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **CO-2** | 3 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **CO-3** | 3 | 1 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 |
| **CO-4** | 3 | 2 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **CO-5** | 3 | 2 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Rationale*** | | | | | | | | | | | | | |

**Rationale*: Explaining why it is matching this particular program outcome**
**List of Open learning website:**

- https://nptel.ac.in/courses/106105214