Programme/Class: **Diploma**	Year: **Second**	Semester: **Third**
Subject: **Computer Science**		
Course Code: B070301T	Course Title: **Operating System**	

Course outcomes:
After the completion of the course the students will be able:
1. Understand role, responsibilities, features, and design of operating system.
2. Analyze memory management schemes and process scheduling algorithms.
3. Apply process synchronization techniques to formulate solution for critical section problems.
4. Illustrate concept of disk scheduling.
5. Evaluate process deadlock handling techniques.

Credits: **4**	**Core Compulsory**
Max. Marks: **25+75**	Min. Passing Marks:

Total No. of Lectures-Tutorials-Practical (in hours per week): **4-0-0**

Unit	Topic	No. of Lectures
I	**Introduction** Operating system and functions, Classification of Operating systems: Batch, Interactive, Time sharing, Real Time System, Multiprocessor Systems, Multiuser Systems, Multithreaded Systems, Operating System Structure, System Components, Operating System Services, Kernels, Monolithic and Microkernel Systems.	7
II	**Process Management** Process Concept, Process States, Process Synchronization, Critical Section, Mutual Exclusion, Classical Synchronization Problems, Process Scheduling, Process States, Process Transitions, Scheduling Algorithms Interprocess Communication, Threads and their management, Security Issues.	8
III	**CPU Scheduling** Scheduling Concepts, Techniques of Scheduling, Preemptive and Non-Preemptive Scheduling: First-Come-First-Serve, Shortest Request Next, Highest Response Ration Next, Round Robin, Least Complete Next, Shortest Time to Go, Long, Medium, Short Scheduling, Priority Scheduling. Deadlock: System model, Deadlock characterization, Prevention, Avoidance and detection, Recovery from deadlock.	8
IV	**Memory Management** Memory allocation, Relocation, Protection, Sharing, Paging, Segmentation, Virtual Memory, Demand Paging, Page Replacement Algorithms, Thrashing.	7
V	**I/O Management and Disk Scheduling** I/O devices, and I/O subsystems, I/O buffering, Disk storage and disk scheduling, RAID.	8

VI	**File System:** File concept, File organization and access mechanism, File directories, and File sharing, File system implementation issues, File system protection and security.	7
VII	**Shell introduction and Shell Scripting:** What is shell and various type of shell, Various editors present in linux, Different modes of operation in vi editor,	7
VIII	What is shell script, Writing and executing the shell script, Shell variable (user defined and system variables) System calls, Using system calls, Pipes and Filters, Decision making in Shell Scripts (If else, switch), Loops in shell, Functions, Utility programs (cut, paste, join, tr , uniq utilities), Pattern matching utility (grep)	8

Suggested Readings:
1. Andrew S. Tanenbaum and Herbert Bos,"Modern Operating Systems," Fourth Edition, Pearson, 2014.
2. Abraham Silberschatz, Greg Gagne, and Peter B. Galvin, "Operating System Concepts," Tenth Edition, Wiley, 2018.
3. William Stallings, "Operating Systems: Internals and Design Principles," Seventh Edition, Prentice Hall, 2011.
4. Dhanjay Dhamdhere, "Operating Systems," First Edition, McGraw-Hill, 2008
5. Milan Milankovic "Operating systems, Concepts and Design" McGraw Hill

This course can be opted as an elective by the students of following subjects:
B. Sc in Engineering and BCA

Suggested Continuous Evaluation Methods:
1. **Assessment Type: Class Tests (Max. Marks 14)**

   Suggested Usage:
   Include all types of questions-essay, short answer, objective; Design to test all levels of domain; Exam Blue Print be prepared to ensure inclusion of all types & levels of questions and proper sampling of content; Marking Criteria made known to students; Teacher should provide written feedback selectively and discuss answers in the class; Only Role/Code numbers , not names be written to avoid bias in marking; Display of model answer copies.

   After Completion of Unit I and Unit II, a first class test of max. marks of 7 shall be conducted.
   After Completion of Unit III and IV, a second class test of max. marks of 7 shall be conducted.
   If any student does not appear in any one or both class test, a makeup test shall be conducted of max. marks of 5 instead of total 14 marks.

2. **Assessment Type: Quizzes/ Objective Tests / Recognition Type (such as MCQs; True or False; Matching; Classifying) /Recall Type -Filling Blanks; One word / Phrase**

Programme/Class: **Diploma**	Year: **Second**	Semester: **Third**
Subject: Computer Science		
Course Code: B070302P	Course Title: Operating Systems Lab	

Course outcomes:

Ability to:
1. Use of Linux operating system and able to write shell programs.
2. Simulate and demonstrate the concepts of operating systems.

Credits: **2**	Max. Marks: **25+75**	Min. Passing Marks:
Total No. of Lectures-Tutorials-Practical (in hours per week): **0-0-4**		

Suggested Readings:
1. Sumitabh Das, "Your Unix/Linux: The Ultimate Guide," McGraw Hill, 2012.
2. Richard Blum and Christine Bresnahan, "Linux Command Line and Shell Scripting Bible," Wiley, 2015.
3. Stroustrup, Bjarne, Programming: Principles and Practice Using C++, Addison Wesley, USA, 2014, 2nd ed.
4. E Balagurusamy, Object Oriented Programming with C++, McGraw Hill Education (India) Pvt. Ltd., India, 2013, 6th ed.

Lab on Operating Systems

Note: Following exercises can be performed using Linux or Unix

1. Usage of following commands:
   ls, pwd, tty, cat, who, who am I, rm, mkdir, rmdir, touch, cd.

2. Usage of following commands:
   cal, cat(append), cat(concatenate), mv, cp, man, date.

3. Usage of following
   commands: chmod, grep, tput
   (clear, highlight), bc.

4. Write a shell script to check if the number entered at the command line is prime or not.
5. Write a shell script to modify "cal" command to display calendars of the specified months.
6. Write a shell script to modify "cal" command to display calendars of the specified range of months.
7. Write a shell script to accept a login name. If not a valid login name display message – "Entered login name is invalid".
8. Write a shell script to display date in the mm/dd/yy format.
9. Write a shell script to display on the screen sorted output of "who" command along with the total number of users .
10. Write a shell script to display the multiplication table any number,

11. Write a shell script to compare two files and if found equal asks the user to delete the duplicate file.
12. Write a shell script to check whether the file have all the permissions or not.
13. Simulate FCFS CPU scheduling algorithm in C++.
14. Simulate SJF CPU scheduling algorithm in C++.
15. Simulate Priority CPU scheduling algorithm in C++.
16. Simulate Round Robin CPU scheduling algorithm in C++.
17. Simulate FIFO page replacement algorithm in C++.
18. Simulate LRU page replacement algorithm in C++.