Diploma in System Design (401) 135 Credits

Unit: Operating System Management **Exam Paper No.:** 5	**Guided Learning Hours:** 200 **Number of Credits:** 20
Prerequisites: Good knowledge of operating system terminology.	**Corequisites:** A pass or better in Certificate in Computer Fundamentals or equivalence.
Aim: In today's IT-centric business environment, the need for correctly specified, configured and managed computer systems is at the heart of business efficiency and security. Whether it is an in-house accounting and finance system in an SME or a corporate-wide data system in an international organisation, the role of operating systems administration is one that ensures integrity of the vital data upon which major business decisions are made. The theory and concepts related to operating system design are presented from both developer and user perspectives. Core concepts covered include process management, memory management, file systems, I/O system management including device drivers, process synchronisation and interprocess communication, processor scheduling, memory management, virtual memory, interrupt handling, device management, distributed systems, and multi-user concepts including protection and security. Process management discussions focus on threads, scheduling. Memory management topics include paging, segmentation and virtual memory.	
Required Materials: Recommended learning resources.	**Supplementary Materials:** Lecture notes and tutor extra reading recommendations.
Special Requirements: Learners are recommended to read and practice the abstract concepts behind Operating Systems Management outside class time.	

Intended Learning Outcomes:	**Assessment Criteria:**
1. The functions of memory manager, processor manager device manager and file manager.	1.1 Identify operating system components 1.2 Outline types of operating system 1.3 Analyse the history of the operating system 1.4 Describe computer hardware 1.5 Explain how operating system controls hardware
2. Investigating memory management in older systems; analysing how computer's memory storage and management was handled by the operating system.	2.1 Distinguish single vs multiple users 2.2 Define multiprogramming 2.3 Analyse first-fit and best-fit algorithms 2.4 Describe memory de-allocation 2.5 Design a simple assembly program 2.6 Explain why memory management is now different from earlier systems
3. Investigating memory management in new systems; analysing how computer's memory storage and management is handled by the operating system.	3.1 Describe disadvantages of early memory management schemes 3.2 Describe paged memory allocation 3.3 Define demand paging 3.4 Explain segment memory allocation 3.5 Describe virtual memory 3.6 Compare and contrast memory management in older and today's new systems
4. Understand how process manager performs job scheduling, process scheduling and interrupt management.	4.1 Outline processor terms 4.2 Distinguish job scheduling vs process scheduling 4.3 Analyse process scheduling algorithms 4.4 Define cache memory 4.5 Explain types of interrupts
5. Understand how a lack of Process Synchronization causes deadlock or starvation	5.1 Define deadlock 5.2 Outline cases of deadlocks 5.3 Describe strategies for handling deadlocks 5.4 Explain banker's algorithm

6. Single processor configuration, multiple process synchronisation and multiple process programming techniques.	6.1 Define parallel processing 6.2 Outline multi-processing configuration 6.3 Analyse process synchronisation mechanisms 6.4 Explain producers and consumers algorithm 6.5 Describe concurrent processing system
7. Magnetic tape, magnetic disk and optical disk storage device management at process and job levels.	7.1 Outline device driver characteristics 7.2 Describe sequential access storage 7.3 Describe random access storage 7.4 Explain components of I/O subsystems 7.5 Analyse communication between devices 7.6 Outline I/O request management 7.7 Describe I/O interrupt handling 7.8 Describe RAID levels
8. How users communicate with File Manager; writes name and other descriptive information.	8.1 Describe functions and responsibilities of file management 8.2 Explain file organisational format 8.3 Analyse storage medium allocation methods 8.4 Describe data compression techniques 8.5 Describe file management system levels
9. Network topologies, network types, access control techniques and transport protocol standards.	9.1 Distinguish network and distributed operating systems 9.2 Describe network topologies 9.3 Outline routing strategies 9.4 Contrast packet switching vs circuit switching 9.5 Analyse conflict resolution techniques 9.6 Distinguish OSI vs TCP/IP protocol standards 9.7 Analyse network operating features 9.8 Analyse network system performance measurement tools
10. Single user operating systems, network operating systems and distributed operating system.	10.1 Describe the history of Disk Operating System (DOS), how it works and the operational commands 10.2 Describe components of an operating system and how to evaluate and measure system performance 10.3 Describe the history of Windows, how it works and the operational commands 10.3 Explain the history of Unix, how it works and the operational commands
Methods of Evaluation: A 2½-hour essay written examination paper with 5 questions, each carrying 20 marks. Candidates are required to answer all questions. Candidates also undertake project/coursework in both Operating System Management, each with a weighting of 100%.	

Recommended Learning Resources: Operating System Management

Text Books	• Modern Operating Systems by Andrew S. Tanenbaum ISBN-10: 0136006639 • Operating Systems: Internals and Design Principles by William Stallings ISBN-10: 0273751506 • Network Operating Systems and LAN Management by Huang Jian Bian ISBN-10: 7115132917
Study Manuals 	BCE produced study packs
CD ROM 	Power-point slides
Software 	None