

Bachelor of Computer Applications

- **Sem.** : 4
- **Subject Code** : 05BC1402
- **Subject** : Operating System
- **Course Objectives** :
 1. To understand the overall structure and components of operating system.
 2. To analyze the key concept of process management and concurrency problem.
 3. To understand the working of main memory and virtual memory.
 4. To understand various scheduling policies used by operating system.
 5. To understand the management of files and I/O devices.
- **Prerequisites** : None

Unit No	Topics Covered	No of lectures required
1	Operating System Overview: Introduction, Operating System Objectives and functions, Evolution of Operating System, Major achievements, Characteristics of Modern Operating System, Functions of Kernel and shell	5
2	Process Management and Thread Management: Process Management: Process, Process States, Process Description, Process control Thread management: <u>Processes and Threads:</u> Multithreading, Thread Functionality, Process Vs. Threads, User level threads and kernel level threads	8
3	Concurrency & Deadlocks Concurrency : Key terms related to concurrency, <u>Principles of Concurrency:</u> Requirements of mutual exclusion, Semaphores	10

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	Deadlocks: Principles Of Deadlock, Deadlock Prevention, Deadlock avoidance, Deadlock Detection, <u>Dinning philosophers problem:</u> Solution using semaphores	
4	Memory Management & Virtual Memory: Memory Management: Requirements of memory management, Memory Partitioning, Simple Paging and Simple segmentation Virtual Memory: <u>Hardware and Control Structures:</u> Need of virtual memory, Virtual Memory paging, Virtual memory segmentation, Address translation in paging, Address translation in segmentation, Address translation in combined paging segmentation. <u>Operating System Software</u> : Replacement Policy	10
5	Scheduling: Types of processor scheduling, Scheduling algorithms	7
6	Input/ Output and Files <u>I/O Management and Disk Scheduling:</u> I/O Devices, Organization of I/O function, I/O buffering, Disk Scheduling, RAID File Management: Overview, File organization and access, File directories, File sharing, Record blocking, secondary storage management	8
7	Case Studies: LINUX / UNIX Operating System and Windows based operating systems	2

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Course Outcomes :

1. Demonstrate understanding of the concepts, structure and design of operating Systems
2. Demonstrate understanding of operating system design and its impact on application system design and performance
3. Able to apply different solutions for Memory Partitioning
4. Understand about interactions between user application, hardware and OS
5. Design program in Unix for file and directory management

Course Outcomes – Program Outcomes Mapping Table :

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	H	M			H				H		
CO2	H	H	M					H			
CO3	H	L			H						M
CO4			H		H				H		
CO5		H	H		M						H

Text Book :

1. Stalling W, "Operating Systems", 7th edition, Prentice Hall India

Reference Books :

1. Silberschatz, A., Peter B. Galvin and Greg Gagne, "Operating System Principles", Wiley-Indian Edition, 8th Ed., 2009
2. Tanenbaum A.S., "Modern Operating Systems", 4th Edition, PHI, 2001
3. Flynn I.M, "Understanding Operating Systems", Cengage India Publication
4. Bach M J, "The Design of UNIX Operating System", Prentice Hall India, 1993.

Web References :

1. <https://www.javatpoint.com/os-tutorial>
2. <https://www.geeksforgeeks.org/operating-systems/>

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- Syllabus Coverage from text /reference book & web/app reference:

Unit No	Chapter Numbers
1	2-2.1 ,2.2, 2.3,2.4
2	3- 3.1,3.2,3.3,3.4 4- 4.1
3	5-5.1,5.3 6-6.1,6.2,6.3,6.4,6.6
4	7-7.1,7.2,7.3,7.4 8-8.1,8.2
5	9-9.1,9.2
6	11-11.1,11.2,11.4,11.5,11.6 12-12.1,12.2,12.3,12.4,12.5,12.6

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PRACTICALS

1. Check the output of following commands:
 - Date, ls, who, cal, ps, wc, cat, uname, pwd, mkdir, rmdir, cd, cp, rm, mv, diff, chmod, grep, sed, head, tail, cut, paste, sort, find
2. Write shell script to accept numbers and perform addition, subtraction, multiplication and division.
3. Write shell script to accept the string and check whether the string is palindrome or not.
4. Write shell script to accept the number and check whether the no. is odd or even. Find length of no. and sum of digits in the number.
5. Write shell script to accept the string and replace it by another string.
6. Accept the filename and display the last modification time if file exists, otherwise display appropriate message.
7. Fetch the data from file and display data into another file in reverse order.
8. Write a script to find the global complete path for any file.
9. Write a script to broadcast a message to a specified user or a group of users logged on any terminal
10. Write a script to copy the file system from two directories to a new directory in such a way that only the latest file is copied in case there are common files in both the directories.
11. Write a script to compare identically named files in two different directories and if they are same, copy one of them in a third directory.
12. Write a script to delete zero sized files from a given directory (and all its sub-directories).
13. Write a script to display the directory in the descending order of the size of each file.
14. Write a script for generating a mark sheet after reading data from a file. File contains student roll no, name, marks of three subjects.
15. Write a script to make following file and directory management operations menu based:
 - Display current directory
 - List directory
 - Make directory
 - Change directory
 - Copy a file
 - Rename a file
 - Delete a file
 - Edit a file

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16. Write a script which reads a text file and output the following:

- Count of character, words and lines.
- File in reverse.
- Frequency of particular word in the file.
- Lower case letter in place of upper case letter.

17. Write a shell script to check whether the named user is currently logged in or not.

18. Write a Script for Simple Database Management System Operation. Database File Contains Following fields.

EMP_NO, EMP_NAME, EMP_ADDRESS, EMP_AGE, EMP_GENDER EMP_DESIGNATION
EMP_BASIC_SALARY

Provide Menu Driven Facility For

- VIEW RECORD BASED ON QUERY
- ADD RECORD
- DELETE RECORD
- MODIFY RECORD.
- COUNT TOTAL NUMBER OF RECORDS
- EXIT

19. Write a script to calculate gross salary for any number of employees Gross Salary = Basic + HRA + DA. HRA=10% and DA= 15%.

20. Write a script to display all words of a file in ascending order.

21. Write a script to display all lines of a file in ascending order.

22. Write a script to display the last modified file.

23. Write shell script to manage (add/update/view/delete) judge

Database with fields: Judge name, court name, city, cases_judged, total_judged

- Display no. of records
- Find judge with highest cases judged
- Calculate total cases of court "Adhmedabad"
- List all judge names

24. Write shell script for simple library management system.

Database with fields: Accno, Title, Author, Edition, Publisher

- View records based on query
- Add record
- Delete record
- Count total no. of records
- Exit

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25. Write a script for Simple Database Management System Operation.

Database File Contains Following Fields. Branch, College, City , total Seats ,Total Admitted Provide Menu Driven Facility For

- Display total seats available for given branch.
- Display colleges for given City and Branch
- Add record
- Modify record
- Exit

26. Write a script for Simple Database Management System Operation.

Database File Contains Following Fields. Enroll No., name, marks1, marks2, marks3 Marks are out of 100 and passing marks are 50 Provide Menu Driven Facility For

- Display List of failed students
- Display Student wise percentages
- Add record
- Modify record
- Exit

27. Write a shell script to create a menu driven program for Addition, Deletion or Search for a record of weather in file. The file should contain fields like City Name, date ,Temperature Perform operations:

Menu:

- Display Temperature for give date
- Add Records
- Delete Record
- Display Average temperature for given date
- Exit

28. Write shell script to manage student database with fields Student Roll No, Student Name, city, Semester, Division, Grade

- View database
- Insert record
- Change display of records in capital letters
- Find the no of student fail in a given Division

29. Write shell script to manage student database with fields Student Roll No, Student Name, city, Semester, Subject, Grade

- Update record
- Remove record



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- Find the no of student in a Semester
 - Find the no of student fail in a given Subject
30. Write a script to give result of following queries. Create a file named admissions. Text containing (enroll no, student Name, institute Number, institute Name, intake) fields. File contains more than one record for same institute number.
- Count number of students enrolled in a particular institute.
 - View list of students for given institute
 - Show the institute with maximum intake
31. Write a script for Simple Database Management System Operation.
Database File Contains Following Fields. SalesPerson, year, month, custid,salesamt
Provide Menu Driven Facility For
- Display total sales for given month
 - Display Sales person wise for given Month and commission percentage.
 - Add record
 - Modify record
 - Exit
32. Write a script for Simple Database Management System Operation.
Database File Contains Following Fields. Enroll No., name, marks1 ,marks2, marks3
Marks are out of 100 and passing marks are 50 Provide Menu Driven Facility For:
- Display List of failed students
 - Display Student wise percentages
 - Add record
 - Modify record
33. Create a script called lookup to manage(add/update/delete/view). the text file called "datafile". Each entry consists of fields separated by colons. The fields are: First name, last name, Phone number, Address, Birthdate, addr1, pincode
- Sort the datafile by Pincode, last names, firstname
 - Find the phone no of given name
 - Total no of records in database.
 - To replace Phone number 646 with 2644
 - Exit
34. Write shell script to manage Train database.
- Fields: Train No, Date, start city, end city, Class, total seat, booked seat.
 - Menu:

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- Display all Trains starting from given city
- Add Records
- Delete Record
- Display Number of seats available for given date and train
- Exit

35. Write Menu driven program for 

- Display all the words of file in ascending order.
- Remove all space from file 
- Display zero size files
-  Perform Find and replace operation