



ALVA'S INSTITUTE OF ENGINEERING & TECHNOLOGY

(Unit of Alva's Education Foundation (R), Moodbidri)

Shobhavana Campus, MIJAR-574225, Moodbidri, D.K., Karnataka, Affiliated to VTU, Belagavi

Approved by AICTE New Delhi. Recognized by Govt. of Karnataka.

Accredited with 'A+' grade by NAAC & NBA (ECE & CSE)

Computer Science and Engineering

A.Y 2023-24

Course Name : Operating systems

Subject Code: BCS303

Sem/Class: III A,B & C

Faculty Details

Name	:	Mrs. Vidya ,Mr.H Harshavardhan
Qualification	:	B.E,M.Tech
Department	:	CSE
PhoneNumber	:	9535617836,9844132396
EmailID	:	vidya@aiet.org.in, harshavardhan@aiet.org.in
SpecimenSignature	:	



ALVA'S INSTITUTE OF ENGINEERING & TECHNOLOGY

(A Unit of Alva's Education Foundation)

Shobhavanna Campus, Mijar-574225, Moodbidri, D.K.

Affiliated to VTU Belagavi and Approved by AICTE, New Delhi

(Accredited by NAAC with A+ Grade)

CALENDAR OF EVENTS (ODD SEMESTER 2023-24) BE & MBA

VISION

"Transformative education by pursuing excellence in Engineering and Management through enhancing skills to meet the evolving needs of the community"

MISSION

- To bestow quality technical education to imbibe knowledge, creativity and ethos to students community.
- To inculcate the best engineering practices through transformative education.
- To develop a knowledgeable individual for a dynamic industrial scenario.
- To inculcate research, entrepreneurial skills and human values in order to cater the needs of the society.

Week	Month	Days							Activities
		Mon	Tue	Wed	Thu	Fri	Sat	Sun	
1	SEP					15	16	17	11 : Commencement of VII Semester
2		18	19	20	21	22	23	24	15 : Commencement of I Semester
3		25	26	27	28	29	30		25-30 : Student Mentoring 28 : Eid Milad 28 - 30 : Technical Talk/Club and Social Activity
6	OCT							1	2 : Gandhi Jayanthi
7		2	3	4	5	6	7	8	14 : Mahalaya Amavasya
8		9	10	11	12	13	14	15	23 : Ayudhapooja
9		16	17	18	19	20	21	22	24 : Vijayadasami
10		23	24	25	26	27	28	29	25, 26, 27 - : 1 st IA for VII Sem
11		30	31						30-31 : Student Mentoring 28 - 31 : Technical Talk/Club and Social Activity
12	NOV			1	2	3	4	5	1 : Kannada Rajyothsav
13		6	7	8	9	10	11	12	14 : Halipadyami
14		13	14	15	16	17	18	19	15 : Commencement of III Semester
15		20	21	22	23	24	25	26	9, 10, 11 - : 1 st IA for I Sem
16		27	28	29	30				29-30 : Student Mentoring 24-30 Technical Talk/Club / Social Activity 25 : Commencement of V Semester
17	DEC					1	2	3	1 : Commencement of III Semester MBA
18		4	5	6	7	8	9	10	1, 2, 4 : 2 nd IA for VII Sem
19		11	12	13	14	15	16	17	12 : Industry Tour for III Sem MBA
20		18	19	20	21	22	23	24	25 : Christmas
01		25	26	27	28	29	30	31	26, 27, 28 : 1 st IA for III Sem & V Sem 26-30 : Student Mentoring 28 - 30 : Technical Talk/Club / Social Activity
22	JAN-2024	1	2	3	4	5	6	7	1, 2, 3 : 2 nd IA for I Sem & 3 rd IA for VII Sem
23		8	9	10	11	12	13	14	10, 11, 12 : 1 st IA for III Sem MBA
24		15	16	17	18	19	20	21	14 : Makar Sankranti
25		22	23	24	25	26	27	28	26 : Republic Day
26		29	30	31					27, 29, 30 : 2 nd IA for III Sem & V Sem 6 : Last Working Day of I and VII Semester 30-31 : Student Mentoring 28 - 31 : Technical Talk/Club / Social Activity
28	FEB-2024				1	2	3	4	15, 16, 17 : 3 rd IA for III Sem
29		5	6	7	8	9	10	11	20 : Last Working Day of III Semester
30		12	13	14	15	16	17	18	21, 22, 24 : 2 nd IA for III Sem MBA
31		19	20	21	22	23	24	25	28-29 : Student Mentoring
32		26	27	28	29				28 - 29 : Technical Talk/Club / Social Activity
33	MAR-2024					1	2	3	2, 4, 5 : 3 rd IA for V Sem
34		4	5	6	7	8	9		8 : Maha Shivaratri 9 : Last Working Day of V Semester



Alva's Institute of Engineering & Technology

Shobhavana Campus, Mijar, Moodbidri, D.K - 574225

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

ACADEMIC CALENDAR (2023-2024)-ODD

Sl.No	Departmental Activities	Dates
1.	Commencement of Classes for VII Semester BE	11 th Septmeber, 2023
2.	Commencement of Classes for I Semester BE	15 th September, 2023
3.	Technical Workshop On "Flutter and NodeJS"	26 th September, 2023
4.	Technical Workshop On "3D Modelling and Game Development"	3 rd October 2023
5.	Technical Workshop On "Cyber Securithy and Ethical Hacking"	16 th -17 th October 2023
6.	LA Test -1 for VII SEM B.E	25 th -27 th October, 2023
7.	Project Work Phase-I evaluation	30 th -15 th November, 2023
8.	LA Test -1 for I SEM B.E	9 th -11 th November ,2023
9.	Commencement of Classes for III Semester BE	15 th November, 2023
10.	Commencement of Classes for V Semester BE	25 th November, 2023
11.	Technical Workshop On "Cyber Security"	27 th November, 2023
12.	LA Test -2 for VII SEM B,E	1 st -4 th December, 2023
13.	Technical Workshop On "Web Scarping"	2 nd December, 2023
14.	Technical Talk On Text Analytics And Natural Language Processing"	22 nd December, 2023
15.	Technical Workshop On "Power of Generative AI in Software Development Life Cycle"	26 th December, 2023
16.	LA Test -1 for III SEM & V B.E	26 th -28 th December, 2023
17.	LA Test -1 for I SEM B.E	1 st -3 rd January ,2024
18.	LA Test -3 for VII SEM B.E	1 st -3 rd January ,2024
19.	Last working day for I & VII SEMESTER B.E	6 th January, 2024
20.	LA Test -2 for VII SEM & V SEM B.E	27 th -30 th January, 2024
21.	Last working day for I & VII SEMESTER B.E	6 th January, 2024
22.	LA Test -3 for III SEM B.E	15 th -17 th February, 2024
23.	Forum Activity: "Kaliyona Computer" Rural Computer Education Camp	20 th -21 st February, 2024
24.	LA Test -3 for V SEM B.E	2 nd -3 rd March, 2024
25.	Last working day for III SEMESTER B.E	9 th March, 2024
26.	Last working day for V SEMESTER B.E	16 th March, 2024

Approved by HOD CSE(IQAC Chairman)

INDIVIDUAL TIMETABLE

w.e.f: 15/11/2023

AY		Name of the Faculty						Faculty Initial			
2023-24		Mrs. Vidya						VD			
TIME DAY	09.00 To 09.50	09.50 To 10.40	10.40 To 11.00	11.00 To 11.50	11.50 To 12.40	12.40 To 01.40	01.40 To 02.30	02.30 To 03.20	03.30 To 5.00		
MON	OS III CSE A	←----- OS LAB III C -----→ VD + HH				L U N C H B R E A K	←- PROJECT LAB VII B -→				
TUE	OS III CSE A		E A	OS III CSE C			Soft Skill V A	OS III CSE A			
WED		OS III CSE C					←- PROJECT LAB VII A -→				
THU	OS III CSE C	←----- CN LAB V B -----→ VD + PK					←----- OS LAB III A -----→ VD + HH				
FRI	OS III CSE A		E A	OS III CSE C			←----- OS LAB III B -----→ HH + VD				
SAT			K								

Allocation of Courses

Course Code	Course Initial	Couse Title	Class
18CSP77	PRJ	Project Work Phase - 1	VII SEM CSE A, B, C
BCS303	OS	Operating Systems	III SEM CSE A and C
BCS303	OS	Operating Systems LAB	III SEM CSE A, B, C
ICS52	CN	Computer Networks LAB	V SEM CSE B

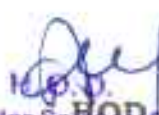
WORK LOAD UNITS

THROERY	LABS	OTHERS	TOTAL
8 * 2 = 16	4 * 3 = 12	8 * 1/2 = 04	32

ADDITIONAL RESPONSIBILITIES

1. VTU Non-Credit Activity Coordinator (CSE Departmental Level)
2. Project Coordinator (CSE Departmental Level)
3. NBA Criteria 2 Coordinator (CSE Departmental Level)
4. NAAC Criteria 1 Coordinator (CSE Departmental Level)
5. Project LAB In-charge (CSE Departmental Level)


Timetable Coordinator


HOD
Dept. Of Computer Science & Engineering
Alva's Institute of Engn. & Technol.
Mijar, MOODBIDRI - 574 225



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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

TIMETABLE

w.e.f: 15/11/2023

Academic Year		Scheme	Semester		Section		Class Coordinator		Room No
2022-23		2022	III		A		Mr. Abhijith L Kotian		101
TIME	09.00 To 09.50	09.50 To 10.40	10.40 To 11.00	11.00 To 11.50	11.50 To 12.40	12.40 To 01.40	01.40 To 02.30	02.30 To 03.20	03.30 To 5.00
DAY									
MON	OS	DDCO	T	MCS	DSA	L U N C H B R E A K	←OOPs with JAVA LAB, DM+GG→		
TUE	OS	←-DSA LAB, DK+HH→					MCS	JAVA	OS
WED	MCS	DDCO	E	DSA	APT		←- DDCO LAB, ALK+KBV →		
THU	JAVA	DDCO	B	MCS	APT		←- OS LAB, VD+HH-→		
FRI	OS	← DAE LAB, ALK+SKR →					DSA	JAVA	SCR / DT
SAT	JAVA	DDCO	A	DSA	MCS				

Allocation of Courses

Course Code	Course Initial	Course Title	Name of the Faculty	Faculty Initial
BCS301	MCS	Mathematics for Computer Science	Mrs. Rashmi R	RR
BCS302	DDCO	Digital Design and Computer Organization	Mr. Abhijith L Kotian	ALK
BCS302	DDCOL	Digital Design and Computer Organization LAB	Mr. Abhijith L Kotian	ALK
BCS303	OS	Operating Systems	Mrs. Vidya	VD
BCS303	OSL	Operating Systems LAB	Mrs. Vidya	VD
BCS304	DSA	Data Structures and Applications	Mrs. Deepika Kamath	DK
BCSL305	DSAL	Data Structures and Applications LAB	Mrs. Deepika Kamath	DK
BCS306A	JAVA	OOPs With JAVA	Mrs. Deeksha M	DM
BCS306A	JAVALL	OOPs With JAVA LAB	Mrs. Deeksha M	DM
BSCK307	SCR/DT	Social Connect and Responsibility/Design Thinking	Mr. Giridhar Gowda	GG
BCS358A	DAEL	Data Analytics with Excel LAB	Mr. Abhijith L Kotian	ALK
	APT	Aptitude	Dr. Aslam Nandyal	AN

Timetable Coordinator

H.O.D.

Dean Academics

Principal

TIMETABLE

w.e.f: 15/11/2023

Academic Year		Scheme		Semester		Section		Class Coordinator		Room No
2022-23		2022		III		C		Mr. Kiran B V		104
TIME	09.00 To 09.50	09.50 To 10.40	10.40 To 11.00	11.00 To 11.50	11.50 To 12.40	12.40 To 01.40	01.40 To 02.30	02.30 To 03.20	03.30 To 5.00	
DAY										
MON	DDCO	←----- OS LAB, VD + HH -----→					L U N C H B R E A K	MCS	DSA	APT
TUE	MCS	JAVA	T E A K	OS	APT	←- DDCO LAB, KBV+ ALK -→				
WED	JAVA	OS		DSA	MCS	OOPs with JAVA LAB, GG+ DM				
THU	OS	←----- DSA LAB, HH + DK -----→						MCS	DDCO	DSA
FRI	DSA	JAVA	R E A K	OS	DDCO	←- DAE LAB, SKR+ALK -→				
SAT	MCS	JAVA		DDCO	SCR / DT					

Allocation of Courses

Course Code	Course Initial	Couse Title	Name of the Faculty	Faculty Initial
BCS301	MCS	Mathematics for Computer Science	Mrs. Kavitha B.	KB
BCS302	DDCO	Digital Design and Computer Organization	Mr. Kiran B V	KBV
BCS302	DDCOL	Digital Design and Computer Organization LAB	Mr. Kiran B V	KBV
BCS303	OS	Operating Systems	Mrs. Vidya	VD
BCS303	OSL	Operating Systems LAB	Mrs. Vidya	VD
BCS304	DSA	Data Structures and Applications	Mr. H Harshavardhan	HH
BCSL305	DSAL	Data Structures and Applications LAB	Mr. H Harshavardhan	HH
BCS306A	JAVA	OOPs With JAVA	Mr. Giridhar Gowda	GG
BCS306A	JAVAL	OOPs With JAVA LAB	Mr. Giridhar Gowda	GG
BSCK307	SCR/DT	Social Connect and Responsibility/Design Thinking	Mr. Abhijith L Kotian	ALK
BCS358A	DAEL	Data Analytics with Excel LAB	Mr.Senthil Kumar R	SKR
	APT	Aptitude	Mr. Rizawan N Shaikh	RNS

Timetable Coordinator

Dept. Of Computer Science & Engineering

Alva's Institute of Engg. & Technology

Mijar, MOODBIDRI - 574 225

Dean Academics

Principal

Alva's Institute of Engg. & Technology

Mijar, MOODBIDRI - 574 225

OPERATING SYSTEMS		Semester	3
Course Code	BCS303	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	3:0:2:0	SEE Marks	50
Total Hours of Pedagogy	40 hours Theory + 20 hours practicals	Total Marks	100
Credits	04	Exam Hours	3
Examination nature (SEE)	Theory		
Course objectives: • To Demonstrate the need for OS and different types of OS • To discuss suitable techniques for management of different resources • To demonstrate different APIs/Commands related to processor, memory, storage and file system management.			
Teaching-Learning Process (General Instructions) Teachers can use the following strategies to accelerate the attainment of the various course outcomes. 1. Lecturer methods (L) need not to be only traditional lecture method, but alternative effective teaching methods could be adopted to attain the outcomes. 2. Use of Video/Animation to explain functioning of various concepts. 3. Encourage collaborative (Group Learning) Learning in the class. 4. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop design thinking skills such as the ability to design, evaluate, generalize, and analyze information rather than simply recall it. 5. Role play for process scheduling. 6. Demonstrate the installation of any one Linux OS on VMware/Virtual Box			
MODULE-1		8 Hours	
Introduction to operating systems, System structures: What operating systems do; Computer System organization; Computer System architecture; Operating System structure; Operating System operations; Process management; Memory management; Storage management; Protection and Security; Distributed system; Special-purpose systems; Computing environments.			
Operating System Services: User - Operating System interface; System calls; Types of system calls; System programs; Operating system design and implementation; Operating System structure; Virtual machines; Operating System debugging, Operating System generation; System boot.			
Textbook 1: Chapter – 1 (1.1-1.12), 2 (2.2-2.11)			
MODULE-2		8 Hours	
Process Management: Process concept; Process scheduling; Operations on processes; Inter process communication			
Multi-threaded Programming: Overview; Multithreading models; Thread Libraries; Threading issues.			
Process Scheduling: Basic concepts; Scheduling Criteria; Scheduling Algorithms; Thread scheduling; Multiple-processor scheduling.			
Textbook 1: Chapter – 3 (3.1-3.4), 4 (4.1-4.4), 5 (5.1 -5.5)			
MODULE-3		8 Hours	

Process Synchronization: Synchronization: The critical section problem; Peterson's solution; Synchronization hardware; Semaphores; Classical problems of synchronization; Deadlocks: System model; Deadlock characterization; Methods for handling deadlocks; Deadlock prevention; Deadlock avoidance; Deadlock detection and recovery from deadlock. Textbook 1: Chapter – 6 (6.1-6.6), 7 (7.1 -7.7)	
MODULE-4	8 Hours
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. Textbook 1: Chapter -8 (8.1-8.6), 9 (9.1-9.6)	
MODULE-5	8 Hours
File System, Implementation of File System: File system: File concept; Access methods; Directory and Disk structure; File system mounting; File sharing; Implementing File system: File system structure; File system implementation; Directory implementation; Allocation methods; Free space management. Secondary Storage Structure, Protection: Mass storage structures; Disk structure; Disk attachment; Disk scheduling; Disk management; Protection: Goals of protection, Principles of protection, Domain of protection, Access matrix. Textbook 1: Chapter – 10 (10.1-10.5), 11 (11.1-11.5), 12 (12.1-12.5), 14 (14.1-14.4)	

PRACTICAL COMPONENT OF IPCC (May cover all / major modules)

SLN O	Experiments
1	Develop a c program to implement the Process system calls (fork (), exec(), wait(), create process, terminate process)
2	Simulate the following CPU scheduling algorithms to find turnaround time and waiting time a) FCFS b) SJF c) Round Robin d) Priority.
3	Develop a C program to simulate producer-consumer problem using semaphores.
4	Develop a C program which demonstrates interprocess communication between a reader process and a writer process. Use mkfifo, open, read, write and close APIs in your program.
5	Develop a C program to simulate Bankers Algorithm for DeadLock Avoidance.
6	Develop a C program to simulate the following contiguous memory allocation Techniques: a) Worst fit b) Best fit c) First fit.
7	Develop a C program to simulate page replacement algorithms: a) FIFO b) LRU
8	Simulate following File Organization Techniques a) Single level directory b) Two level directory
9	Develop a C program to simulate the Linked file allocation strategies.
10	Develop a C program to simulate SCAN disk scheduling algorithm.

Course outcomes (Course Skill Set):

At the end of the course, the student will be able to:

CO 1. Explain the structure and functionality of operating system

CO 2. Apply appropriate CPU scheduling algorithms for the given problem.

CO 3. Analyse the various techniques for process synchronization and deadlock handling.

CO 4. Apply the various techniques for memory management

CO 5. Explain file and secondary storage management strategies.

CO 6. Describe the need for information protection mechanisms

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

CIE for the theory component of the IPCC (maximum marks 50)

- IPCC means practical portion integrated with the theory of the course.
- CIE marks for the theory component are **25 marks** and that for the practical component is **25 marks**.
- 25 marks for the theory component are split into **15 marks** for two Internal Assessment Tests (Two Tests, each of 15 Marks with 01-hour duration, are to be conducted) and **10 marks** for other assessment methods

mentioned in 22OB4.2. The first test at the end of 40-50% coverage of the syllabus and the second test after covering 85-90% of the syllabus.

- Scaled-down marks of the sum of two tests and other assessment methods will be CIE marks for the theory component of IPCC (that is for **25 marks**).
- The student has to secure 40% of 25 marks to qualify in the CIE of the theory component of IPCC.

CIE for the practical component of the IPCC

- **15 marks** for the conduction of the experiment and preparation of laboratory record, and **10 marks** for the test to be conducted after the completion of all the laboratory sessions.
- On completion of every experiment/program in the laboratory, the students shall be evaluated including viva-voce and marks shall be awarded on the same day.
- The CIE marks awarded in the case of the Practical component shall be based on the continuous evaluation of the laboratory report. Each experiment report can be evaluated for 10 marks. Marks of all experiments' write-ups are added and scaled down to **15 marks**.
- The laboratory test (**duration 02/03 hours**) after completion of all the experiments shall be conducted for 50 marks and scaled down to **10 marks**.
- Scaled-down marks of write-up evaluations and tests added will be CIE marks for the laboratory component of IPCC for **25 marks**.
- The student has to secure 40% of 25 marks to qualify in the CIE of the practical component of the IPCC.

SEE for IPCC

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the course (**duration 03 hours**)

1. The question paper will have ten questions. Each question is set for 20 marks.
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.
3. The students have to answer 5 full questions, selecting one full question from each module.
4. Marks scored by the student shall be proportionally scaled down to 50 Marks

The theory portion of the IPCC shall be for both CIE and SEE, whereas the practical portion will have a CIE component only. Questions mentioned in the SEE paper may include questions from the practical component.

Suggested Learning Resources:

Textbooks

1. Abraham Silberschatz, Peter Baer Galvin, Greg Gagne, Operating System Principles 8th edition, Wiley-India, 2015

Reference Books

1. Ann McHoes Ida M Fylnn, Understanding Operating System, Cengage Learning, 6th Edition
2. D.M Dhamdhare, Operating Systems: A Concept Based Approach 3rd Ed, McGraw- Hill, 2013.
3. P.C.P. Bhatt, An Introduction to Operating Systems: Concepts and Practice 4th Edition, PHI(EEE), 2014.
4. William Stallings Operating Systems: Internals and Design Principles, 6th Edition, Pearson.

Web links and Video Lectures (e-Resources):

1. <https://youtu.be/mXw9ruZaxzQ>

2. <https://youtu.be/vBURTi97EkA>
3. https://www.youtube.com/watch?v=783KAB-tuE4&list=PLIemF3uozcAKTgsCIj82voMK3TMR0YE_f
4. <https://www.youtube.com/watch?v=3-ITLMMeeXY&list=PL3pGy4HtqwD0n7bQfHjPnsWzkeRn6mkO>

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

- Assessment Methods
 - Case Study on Unix Based Systems (10 Marks)
 - Lab Assessment (25 Marks)

SEMESTER - III

Course Code: **BCS303**

Course Name: **OPERATING SYSTEMS**

Course Teacher: **Mrs. Vidya and Mr. H. Harshavardhan**

Course Outcomes: After studying this course, students will be able to,

CO Numbers	Course Outcomes	Blooms Level	Target Level
BCS303.1	Relate the fundamentals of OS, operating system structures, operating system services.	L2(Understand)	2
BCS303.2	Apply appropriate process scheduling concepts, algorithms, and multithreaded programming techniques for the given problem.	L3(Apply)	2
BCS303.3	Apply the various techniques for process synchronization and deadlock handling.	L3(Apply)	2
BCS303.4	Apply the various techniques for memory management.	L3(Apply)	2
BCS303.5	Explain and develop a program on file, secondary storage management strategies, and information protection mechanisms.	L2(Understand) and L3(Apply)	2

CO-PO/PSO Mapping Matrix:

CO Numbers	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BCS303.1	2	1							1			2	2	2	2
BCS303.2	2	2	2	2	1				2			2	2	2	2
BCS303.3	2	2	2	2	1				2			2	2	2	2
BCS303.4	2	2	2	2	1				2			2	2	2	2
BCS303.5	2	2	2	2	1				2			2	2	2	2
AVG.	2	1.8	2	2	1				1.8			2	2	2	2

CO	POs	Level	Justification
BCS303.1	PO1	2	The student should be able to moderately relate the fundamentals of Operating Systems and process
	PO2	1	The student have basic knowledge to identify the basic process management concepts and issues.
	PO9	1	Function effectively as an individual and as a member or leader to understand the concept of OS and process management.
	PO12	2	It engages students in the process of lifelong learning.
	PSO1	2	This will develop the professional skills of a student.
	PSO2	2	Students will have the ability to solve real world problems on operating system



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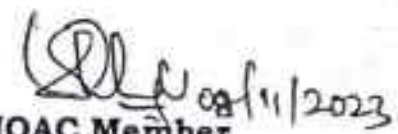
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Accredited by NAAC with 'A+' & NBA (ECE & CSE)

	PSO3	2	This will develop a moderate level skills needed to pursue carrier in IT Sector
BCS303.2	PO1	2	The student should be able to moderately apply the techniques of processing scheduling and multithreaded programming.
	PO2	2	The student will be able to analyze and formulate various scheduling techniques for the given problem.
	PO3	2	The students will be able to implement the scheduling algorithms and multithreaded programming.
	PO4	2	The students will be able to interpret and apply the information regarding process scheduling and multithreaded programming.
	PO5	1	Students will be able to implement process scheduling will contribute to modern tool usage in moderate level
	PO9	2	Implementation of Process scheduling concepts and various process scheduling algorithm will contribute to individual and team work in moderate level
	PO12	2	It engages students in the process of lifelong learning.
	PSO1	2	This will enhance the professional skills of a student.
	PSO2	2	This will moderately improve the ability of students to solve real world problems.
	PSO3	2	This will develop a moderate level skills needed to pursue carrier in IT Sector
BCS303.3	PO1	2	The student should be able to moderately apply the concepts of process synchronization and deadlock.
	PO2	2	The student should be able to analyse the process synchronization and deadlock techniques.
	PO3	2	The students will be able to implement the process synchronization and deadlock techniques.
	PO4	2	The students will be able to interpret and understand the deadlock situation.
	PO5	1	Students will be able to implement appropriate algorithms for process synchronization and deadlock technique using modern tools.
	PO9	2	Students will be able to apply appropriate algorithms for deadlock and memory management.
	PO12	2	It engages students in the process of life long learning.
	PSO1	2	This will improve the professional skills of a student.
	PSO2	2	This will moderately improve the ability of students to solve real world problems.
	PSO3	2	This will develop basic level skills needed to pursue carrier in IT Sector
BCS303.4	PO1	2	The student should be able to moderately understand the fundamentals of virtual memory.
	PO2	2	The student should be able to understand the various techniques of handling virtual memory.
	PO3	2	implementation of virtual memory and to understand the concept of virtual memory.
	PO4	2	The student will be learning about different memory

			management strategies and the differences between them.
	PO5	1	The different virtual machines using VMWARE, DOS-BOX will be studied by the students.
	PO9	2	Knowledge of different types of virtual machines will contribute to individual and team work in moderate level
	PSO1	2	This will develop the professional skills of a student.
	PSO2	2	This will improve the ability of students to solve real world problems.
	PSO3	2	This will develop basic level skills needed to pursue carrier in IT Sector
BCS303.5	PO1	2	The student should be able to moderately understand the concepts file,secondary storage management strategies and information protection mechanisms
	PO2	2	Student will be able to analyse file,secondary storage management strategies and information protection mechanisms
	PO3	2	Student will be able to develop programs file system
	PO4	2	Student will be able to moderately interpret file, secondary storage management strategies and information protection mechanisms
	PO5	1	Student will be able to implement various disk scheduling algorithms and files using modern tool in moderate level
	PO9	2	Students will be able to apply appropriate algorithms for files and secondary storage structure and protection
	PO12	2	It engages students in the process of lifelong learning.
	PSO1	2	This will improve the professional skills of a student.
	PSO2	2	This will improve the ability of students to solve real world problems.
	PSO3	2	This will develop basic level skills needed to pursue carrier in IT Sector


 Course Teacher
 Signature with date 07/11/23


 IQAC Member
 Signature with date 08/11/2023


 IQAC Chairman
 Signature with date



ALVA'S INSTITUTE OF ENGINEERING & TECHNOLOGY

(Unit of Alva's Education Foundation (R), Moodbidri)

Shobhavana Campus, MIJAR-574225, Moodbidri, D.K., Karnataka

Affiliated to VTU, Belagavi & Approved by AICTE New Delhi. Recognized by Govt. of Karnataka.

Accredited by NAAC with 'A+' & NBA (ECE & CSE)

OPERATING SYSTEMS SEMESTER - III A, B and C Sections AY 2023-24ODD

Course Code-BCS303

Faculty Name: Mrs.Vidya and Mr.H. Harshavardhan

Content beyond the syllabus

- 1.Demonstration of installation of any one Linux OS on VMware/Virtual Box
- 2.Case Study on Unix-Based Systems
- 3.Implementation of process synchronization, deadlocks, and memory management techniques
- 4.Lab Assessment using virtual lab
- 5.Web links and Video Lectures (e-Resources):

1. <https://youtu.be/mXw9ruZaxzQ> 15.09.2023 14.09.2023 MKV-
TEMPLATE for IPCC (26.04.2022) Annexure-III 5

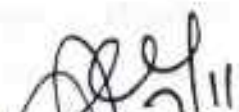
2. <https://youtu.be/vBURTt97Eka>

3. https://www.youtube.com/watch?v=783KABtuE4&list=PLIemF3uozcAKTgsClj82voMK3TMR0YE_f

4. <https://www.youtube.com/watch?v=3-ITLMMecXY&list=PL3pGy4HtqwD0n7bQfHjPnsWzkeRn6mkO>


Course Coordinator


Signature of IQAC Member (Module)


Signature of IQAC Chairman (HOD)

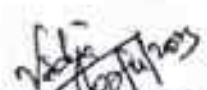
OPERATING SYSTEMS
SEMESTER - III A ,B and C Sections
AY 2023-24ODD

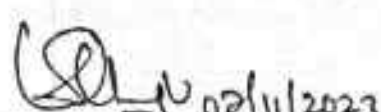
Course Code-BCS303

Faculty Name: Mrs.Vidya and Mr.H. Harshavardhan

Modes of content delivery

Module No	Modes of content delivery
I	Lecture through black board/presentation and demonstration, Activity based learning
II	Lecture through black board/presentation and demonstration, problem based learning
III	Lecture through black board/presentation and demonstration, problem based learning
IV	Lecture through black board/presentation and demonstration, practical based learning
V	Lecture through black board/presentation and demonstration, practical based learning


Course Coordinator


Signature of IQAC Member (Module)


Signature of IQAC Chairman (HOD)

**ALVA'S INSTITUTE OF ENGINEERING & TECHNOLOGY**

(Unit of Alva's Education Foundation (R), Moodbidri)

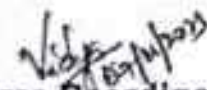
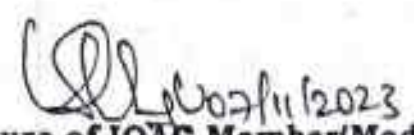
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**OPERATING SYSTEMS
SEMESTER - III A ,B and C Sections
AY 2023-24ODD****Course Code-BCS303****Faculty Name: Mrs.Vidya and Mr.H. Harshavardhan****Modes of delivery for content beyond the syllabus**

Topic or Module Name	Modes of content delivery
Demonstration of installation of any one Linux OS on VMware/Virtual Box	Lecture through demonstration
Case Study on Unix-Based Systems	Activity Based Learning
Implementation of process synchronization, deadlocks, and memory management techniques	- practical based learning - problem based learning
Lab Assessment using virtual lab	practical based learning
Web links and Video Lectures	E-Resources


Course Coordinator
Signature of IQAC Member (Module)
Signature of IQAC Chairman (HOD)



ALVA'S INSTITUTE OF ENGINEERING & TECHNOLOGY

Shobhavana Campus, Mijar, Moodbidri, D.K

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

(Accredited by NBA, New Delhi 2019-2025 / Accredited by NAAC with A+)

Course Plan

Course Code		BCS303	Course Name:		OPERATING SYSTEMS	
Sem	III		A.Y		2023-2024	
Course Teachers:			Mrs.Vidya and Mr.H. Harshavardhan			
Teaching Department			Computer Science and Engineering		L-T-P :	3:0:2
Total Hours		60				
Course Outcomes						
BCS303.1		Relate the fundamentals of OS, operating system structures, operating system services.				
BCS303.2		Apply appropriate process scheduling concepts, algorithms, and multithreaded programming techniques for the given problem.				
BCS303.3		Apply the various techniques for process synchronization and deadlock handling.				
BCS303.4		Apply the various techniques for memory management.				
BCS303.5		Explain and develop a program on file, secondary storage management strategies, and information protection mechanisms.				
Modes of Content Delivery for Content Beyond the Syllabus						
1.Demonstration of installation of any one Linux OS on VMware/Virtual Box						
2.Case Study on Unix Based Systems						
3.Implementation of process synchronization, deadlocks and memory management techniques						
4.Lab Assessment using virtual lab						
5.Web links and Video Lectures (e-Resources):						
1. https://youtu.be/mXw9ruZaxzQ 15.09.2023 14.09.2023 MKV-TEMPLATE for IPCC (26.04.2022) Annexure-III 5						
2. https://youtu.be/vBURt97EkA 3.						
https://www.youtube.com/watch?v=783KABtuE4&list=PLIemF3uozcAKTgsCIj82voMK3TMR0YE_f 4. https://www.youtube.com/watch?v=3-						



ALVA'S INSTITUTE OF ENGINEERING & TECHNOLOGY
Shobhavana Campus, Mijar, Moodbidri, D.K
DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

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Assignment Deadlines:05-01-2024 & 15-01-2024

Course Evaluation

IA1(20)	IA2(20)	IA3(20)	Avg	Assignment	Total CIE(50)	SEE(50)	Total Marks(100)
30	30	30	15	10	50	50	100
10	10		10	15			

Vijay
20/11/2023
Course Coordinator

[Signature]
Signature of Module Coordinator

[Signature]
Signature of IQAC Chairman(HoD)

Student List
III SEM -CSE-A- Section

SL.NO	USN	NAME
1.	4AL22CS001	ABHISHEK B
2.	4AL22CS002	ABHISHEK GOWDA G R
3.	4AL22CS003	ABHISHEK R ALLAPUR
4.	4AL22CS004	ADHYA H SHETTY
5.	4AL22CS005	ADVITH V SUVARNA
6.	4AL22CS006	AKHIFA SHEIK
7.	4AL22CS007	AKHILESH H R
8.	4AL22CS008	AKSHAY REVANASIDDAPPA BANGARI
9.	4AL22CS009	ALAN C RAJU
10.	4AL22CS010	AMITH GOWDA H M
11.	4AL22CS011	AMRUTHA M
12.	4AL22CS012	ANSIL KUMAR
13.	4AL22CS013	ANUSH
14.	4AL22CS014	ANUSHA K N
15.	4AL22CS015	APOORVA
16.	4AL22CS016	APOORVA
17.	4AL22CS017	ARUN
18.	4AL22CS018	ARVIND KUMAR OJHA
19.	4AL22CS019	ASHRITHA
20.	4AL22CS020	AYESHATUL HAFEEZA
21.	4AL22CS021	B B NAIK
22.	4AL22CS022	BASAVARAJ
23.	4AL22CS023	BHARATH H D
24.	4AL22CS024	BHARATH M
25.	4AL22CS025	BHOOMIKA R
26.	4AL22CS026	BRIJESH S K
27.	4AL22CS027	CHARAN KUMAR V
28.	4AL22CS028	CHARISHMA G
29.	4AL22CS029	CHETHAN D B
30.	4AL22CS030	CHETHAN KUMAR
31.	4AL22CS031	CHETHAN L R
32.	4AL22CS032	CHINMAY GOWDA H V
33.	4AL22CS033	CHIRASHRI
34.	4AL22CS034	DARSHAN B
35.	4AL22CS035	DEEPAK
36.	4AL22CS036	DEEPIKA N
37.	4AL22CS037	DEVIKA S A
38.	4AL22CS038	DIANARAJ SHRISHAIL BIRADAR
39.	4AL22CS039	DISHA M
40.	4AL22CS040	DIVYA
41.	4AL22CS041	DIYA RAI
42.	4AL22CS042	ELLURI CHAITANYA SRINIVAS

43.	4AL22CS043	FAIZA
44.	4AL22CS044	GAGAN
45.	4AL22CS045	GAJENDRA A
46.	4AL22CS046	GAYATRI M BALIGAR
47.	4AL22CS047	GLANIL TAURO
48.	4AL22CS048	GOURI KARABASAPPA BANAKAR
49.	4AL22CS049	GOWDA MIILEE MADANKUMAR
50.	4AL22CS050	GRISHMA PRASHANT BHANDARE
51.	4AL22CS051	H I AKSHAY
52.	4AL22CS052	H L RAKSHA
53.	4AL22CS053	H MANJULA
54.	4AL22CS055	HARSHA C R
55.	4AL22CS056	HARSHITH L S
56.	4AL22CS057	HARSHITHA D BANGERA
57.	4AL22CS058	HARSHITHA H N
58.	4AL22CS059	HARSHITHA M
59.	4AL22CS060	HARSHITHA M
60.	4AL22CS061	HEETHA SHREE S
61.	4AL22CS063	INCHARA ANGADI
62.	4AL22CS064	INDRAJITH S
63.	4AL23CS400	ANNAPURNESHWARI BAKKAYYA HIEMATHI
64.	4AL23CS402	JYOTI BHOKARE
65.	4AL23CS404	RACHANA M
66.	4AL23CS406	SACHIN IRANNA MUNDAS
67.	4AL23CS410	SOUNDARYA SUDHIR SAPARE
68.	4AL23CS412	THRISHA K S


HOD CSE
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Dept. Of Computer Science & Engineering
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Mijar, MOODBIDRI - 574 225

III SEM -CSE-B- Section

SLNo.	USN	NAME
69.	4AL22CS065	JAYALAKSHMI C
70.	4AL22CS066	JEEVAN K
71.	4AL22CS067	K JEEVAN KUMAR
72.	4AL22CS068	K VEERESH
73.	4AL22CS069	KANISHKA SHETTY
74.	4AL22CS070	KARAN
75.	4AL22CS071	KARTHIK N
76.	4AL22CS072	KARTHIKEYA J S
77.	4AL22CS073	KAVYA S
78.	4AL22CS074	KAVYASHREE
79.	4AL22CS075	KEERTHANA M
80.	4AL22CS076	KEERTHANA R S
81.	4AL22CS077	KEERTHIRAJ S B
82.	4AL22CS078	KIRAN KUMAR
83.	4AL22CS079	KUSUMA C D
84.	4AL22CS080	LAKSHMI SHIVABASAPPA BANAKAR
85.	4AL22CS081	LOHITH B R
86.	4AL22CS082	MAHIMA NAYAK
87.	4AL22CS083	MALLIKA K
88.	4AL22CS084	MANOHARI B R
89.	4AL22CS085	MEGHA BASAVARAJ TAMBAKAD
90.	4AL22CS086	MEGHANA N K
91.	4AL22CS087	MEHEK H N
92.	4AL22CS088	MERLYN LUVIS ALMEIDA
93.	4AL22CS089	MOHAMMED AHAZAR
94.	4AL22CS090	MOHIDIN AHMED KABEER
95.	4AL22CS091	NAUSHA TENDULKAR
96.	4AL22CS092	NEHA N RAO
97.	4AL22CS093	NIKSHITHA P RAI
98.	4AL22CS094	NISARGA S
99.	4AL22CS095	NISHITHA SUVARNA
100.	4AL22CS096	NISHMITHA S SHETTY
101.	4AL22CS097	PADMARAJ PRAPHULL KURUNDWADE
102.	4AL22CS098	PALLAVI
103.	4AL22CS099	PAVAN KUMAR H R
104.	4AL22CS100	PAVITRA ISHWARAPPA TALAWAR
105.	4AL22CS101	POOJA K R
106.	4AL22CS102	PRAJWAL
107.	4AL22CS103	PRAMOD K S
108.	4AL22CS104	PRANATHI BHAT
109.	4AL22CS105	PRANAV TIRAKANAGOUDAR

110.	4AL22CS106	PRATHAMESH SHETTY
111.	4AL22CS107	PRATHI U SHETTY
112.	4AL22CS108	PREETHAM DEVADIGA
113.	4AL22CS109	PREETY KAKCHINGTABAM
114.	4AL22CS110	PRIYANKA
115.	4AL22CS111	PUTTARAJU D P
116.	4AL22CS112	RAGHAVENDRA P KARJAGI
117.	4AL22CS113	RAHUL S KOTI
118.	4AL22CS114	RAJESHWARI
119.	4AL22CS115	RAKSHITH V RAO
120.	4AL22CS116	RAKSHITHA
121.	4AL22CS117	RASHMITHA M S
122.	4AL22CS118	RAVITEJ C NEELI
123.	4AL22CS119	RETHIKA P SHETTY
124.	4AL22CS120	ROHINI R BANAGAR
125.	4AL22CS121	ROSHAN S
126.	4AL22CS122	SAHANA G
127.	4AL22CS123	SAHANA U
128.	4AL22CS124	SAKSHI
129.	4AL22CS125	SAKSHI B K
130.	4AL22CS126	SAKSHI SHETTY
131.	4AL22CS127	SAMBRAM


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Alva's Institute of Engineering & Technology
Mijar, Moodbidri - 574225

III SEM -CSE-C- Section

SL.NO	USN	NAME
132.	4AL22CS128	SAMEEKSHA SHETTY
133.	4AL22CS129	SANJANA MADI
134.	4AL22CS130	SANJAY N
135.	4AL22CS131	SHARANYA
136.	4AL22CS132	SHARANYA R
137.	4AL22CS133	SHARATH
138.	4AL22CS134	SHARATH KUMAR B
139.	4AL22CS135	SHASHANK BHANDARY
140.	4AL22CS136	SHASHANK D
141.	4AL22CS137	SHASHANK D P
142.	4AL22CS138	SHASHANK S SHEELAVANTAR
143.	4AL22CS139	SHASHWATI B U
144.	4AL22CS140	SHERIN
145.	4AL22CS141	SHETTY KRISHMA KRISHNA
146.	4AL22CS142	SHETTY PRAKHYAT PRAKASH
147.	4AL22CS143	SHETTY SAMAY DEEPAK
148.	4AL22CS144	SHETTY VINITH VIJAY
149.	4AL22CS145	SHIVAKUMAR V
150.	4AL22CS146	SHIVALEELA KALASAD
151.	4AL22CS147	SHIVANI KAMATH
152.	4AL22CS148	SHIVAPRASAD R K
153.	4AL22CS149	SHLAGHANA
154.	4AL22CS150	SHODHAN KUMAR SHETTY
155.	4AL22CS151	SHRADDHITHA P SHETTIGAR
156.	4AL22CS152	SHRAVAN
157.	4AL22CS153	SHRAVANKUMAR CHANDRASHEKHARA KUDARI
158.	4AL22CS154	SHRAVYA
159.	4AL22CS155	SHRAVYA P SHETTY
160.	4AL22CS156	SHRAVYA S M
161.	4AL22CS157	SHREYA RAJENDRA GAONKAR
162.	4AL22CS158	SHREYAS PUTHRAN
163.	4AL22CS159	SIDDHARTH KANABARGI
164.	4AL22CS160	SOWMYA SHETTY
165.	4AL22CS161	SPOORTHY
166.	4AL22CS162	SRIJAN G ANGADI
167.	4AL22CS163	SRIRAKSHA
168.	4AL22CS164	SRUJAN B N
169.	4AL22CS165	SRUSHITI N B
170.	4AL22CS166	SUDEEKSHA SHETTY
171.	4AL22CS167	SUDEEP VALLAPPA KALAPUR
172.	4AL22CS168	SUMANTH

173.	4AL22CS169	SUMANTHI L
174.	4AL22CS170	SUMANTHI S
175.	4AL22CS171	SURAJ
176.	4AL22CS172	SURAKSHA B R
177.	4AL22CS173	SUSHMITHA
178.	4AL22CS174	SWANJITH A K
179.	4AL22CS175	SWAPNIL SAMBHAJI ALORI
180.	4AL22CS176	SWAROOP SHRINIVAS SALIAN
181.	4AL22CS177	SWEEKRITHI SHETTY
182.	4AL22CS178	TANGEVVA RUDRAPPA GADAD
183.	4AL22CS179	TARUN SHRIVANKUMAR AGARWAL
184.	4AL22CS180	THIRISHA M S
185.	4AL22CS181	V ADITYA
186.	4AL22CS182	VAIBHAVI MALEMATH
187.	4AL22CS183	VAIGAS LOYSTON VINCENT
188.	4AL22CS184	VANDANA H M
189.	4AL22CS185	VARSHITHA R
190.	4AL22CS186	VARUN H M
191.	4AL22CS187	VARUN N R
192.	4AL22CS188	YOGESHWARA B
193.	4AL22CS189	YOGHANA B K
194.	4AL22CS190	YUMLEMBAM HENBA SINGH
195.	4AL23CS401	ANVETHA H M
196.	4AL23CS403	LAKSHMI PRASAD D YADAV
197.	4AL23CS405	RAKESH RAJESH PATTAR
198.	4AL23CS407	SANIYA AMITKUMAR VATURI
199.	4AL23CS408	SHRAVANA GOWRI
200.	4AL23CS409	SNEHA V KHANAGANVI
201.	4AL23CS411	SRUSHITI E B


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ALVA'S INSTITUTE OF ENGINEERING & TECHNOLOGY

(Accredited by NAAC with A+ Grade)

Department of Computer Science and Engineering (Accredited by NBA)

Continuous Internal Evaluation Test 1

AY: 2023-24

Course Title: Operating Systems	Continuous Internal Evaluation Test-II EVEN Semester 2022-23: BCS303
Date: 02/01/2024	Time: 9.30 AM- 11.00 AM
Faculty: Mrs. Vidya and Mr. H Harshavardhan	Semester/Section: III
	Max. Marks: 30

Note: Answer ONE FULL question from each part.

Q. No.	Questions	Marks	COs	POs	BTL
Module 1					
1	a) Explain the dual mode operation of operating system.	7	CO1	1,2,3,4	L2
	b) Analyze the concept of virtual machines with neat diagram.	8	CO1	1,2,3,4	L4
OR					
2	a) Explain the layered approach structure of operating system with diagram.	7	CO1	1,2,3,4	L2
	b) Distinguish between client server computing and peer to peer computing.	8	CO1	1,2,3,4	L4
Module 2					
3	a) What is process? Analyze the different states of a process with state diagram.	7	CO2	1,2,3,4	L4
	b) Develop a program to implement the process system calls.	8	CO2	1,2,3,4	L3
OR					
4	a) Analyze the operating system services with respect to user and system with diagram.	7	CO2	1,2,3,4	L4
	b) Develop a CPU Switching control flow diagram from process to process.	8	CO2	1,2,3,4	L3

Levels of Bloom's Taxonomy

No.	L1	L2	L3	L4	L5	L6
Level	Remember	Understand	Apply	Analyze	Evaluate	Create

Course Outcomes

BCS303.1	Relate the fundamentals of OS, operating system structures, operating system services.
BCS303.2	Apply appropriate process scheduling concepts, algorithms, and multithreaded programming techniques for the given problem.
BCS303.3	Apply the various techniques for process synchronization and deadlock handling.
BCS303.4	Apply the various techniques for memory management.
BCS303.5	Explain and develop a program on file, secondary storage management strategies, and

QUESTION PAPER REVIEW REPORT

Continuous Internal Evaluation (CIE) Test:1

AY 2023-24

Department : Computer Science and Engineering (Accredited by NBA)

Semester/Section: III-A,B & C

Max Marks: 30

Course Title: Operating Systems

Course Code: BCS303

Date: 02-01-2024

Faculty: Mrs.Vidya and Mr. H. Harshavardhan

Qn. No.	Course Outcome (CO)	Bloom's Taxonomy Level	Marks
1a	CO1	L2	7
1b	CO1	L4	8
2a	CO1	L2	7
2b	CO1	L4	8
3a	CO2	L4	7
3b	CO2	L3	8
4a	CO2	L4	7
4b	CO2	L3	8
Total Marks			60

BT Level: L1-Remember, L2-Understand, L3 -Apply, L4 -Analyze, L5- Evaluate, L6- Create

Consolidated Marks for Different BT Levels:

BT Level	Marks for Each Level	% of Marks	Remarks
L2	16	26.6	
L3	14	23.4	
L4	30	50	

Scrutinizer/Reviewer Remark:

Approved	Approved with Correction	Rejected
Reason for Rejection		

VIDYA

Signature
29/12/2023

Signature
H. Harshavardhan

Name & Signature of the Subject Handling Faculty

Date: 29-12-2023

Signature

Vasudevi S.

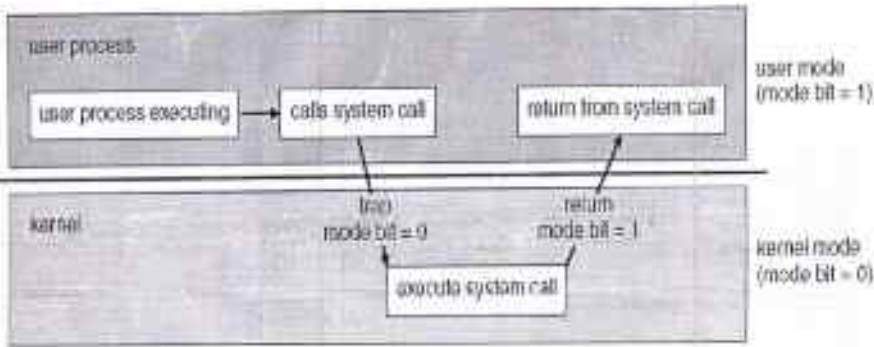
Name & Signature of the IQAC Coordinator

Date: 29-12-2023

Signature
Signature of Head of the Department

Course Title : Operating Systems	Course Code: BCS303
Date: 02/01/2024	Time: 9.00 AM- 09.30 AM
Faculty: Mrs.Vidya and Mr.H Harshavardhan	Semester/Section: III
	Max. Marks: 30

Note: Answer ONE FULL question from each Module.

Q. No.	Questions	Marks	COs	POs	BT L
MODULE 1					
1	a) Explain the dual mode operation of operating system.	7	CO1	1,2,3,4	L3
Ans	Diagram-2 Marks Explanation-5Marks  Figure 1.1 Dual mode operation of OS Dual-mode operation allows OS to protect itself and other system components User mode and kernel mode Mode bit provided by hardware - Provides ability to distinguish when system is running usercode or kernel code - Some instructions designated as privileged, only executable in kernel mode - System call changes mode to kernel, return from call resets it to user bit, called the mode bit is added to the hardware of the computer to indicate the current mode: kernel (0) or user (1). With the mode bit, we are able to distinguish between a task that is executed on behalf of the operating system and one that is executed on behalf of the user. When the computer system is executing on behalf of a user application, the system is in user mode. However, when a user application requests a service from the operating system (via a system call), it must transition from user to kernel mode to fulfill the request				

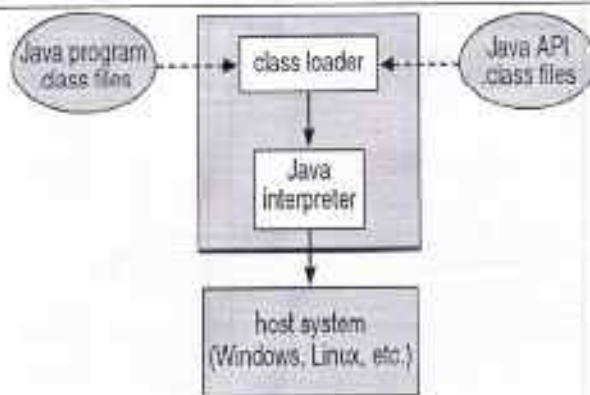


Figure 1.4 The Java Virtual Machine

- **Compiler** produces Bytecode output- architectural neutral
- Java interpreter – executes bytecodes
- JVM- garbage collection- from object no longer in use.
- **Just in time (JIT)** compiler – stores the native machine code for method, when it is invoked for the first time.

OR

2	a)	Explain the layered approach structure of operating system with diagram.	7	CO1	1,2,3 4	L2
---	----	--	---	-----	------------	----

Ans **Layered Approach**
Diagram-2 marks
Explanation-2marks
Advantages and disadvantages-3marks

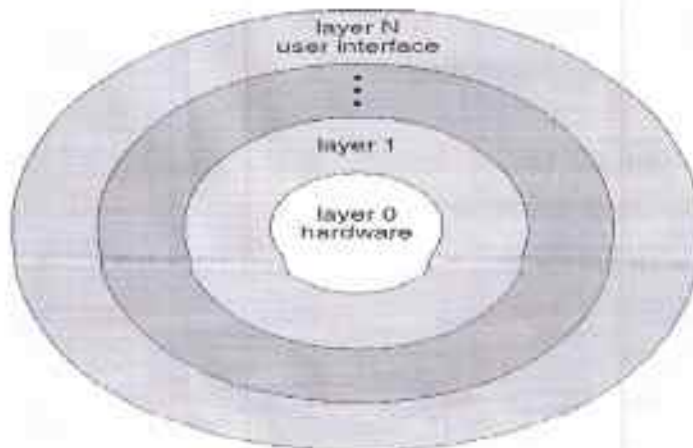


Figure 2.1 Layered Operating System

The operating system is divided into a number of layers (levels),

- each built on top of lower layers.
- The bottom layer (layer 0), is the hardware;
- the highest (layer N) is the user interface.

With **modularity**, layers are selected such that each uses functions (operations) and services **of only lower-level layers**

Layer M– consists of data structures and routines that can be invoked by **higher level layers**.

Advantages:

Program is passive entity and process is active entity.
Process- a program in execution

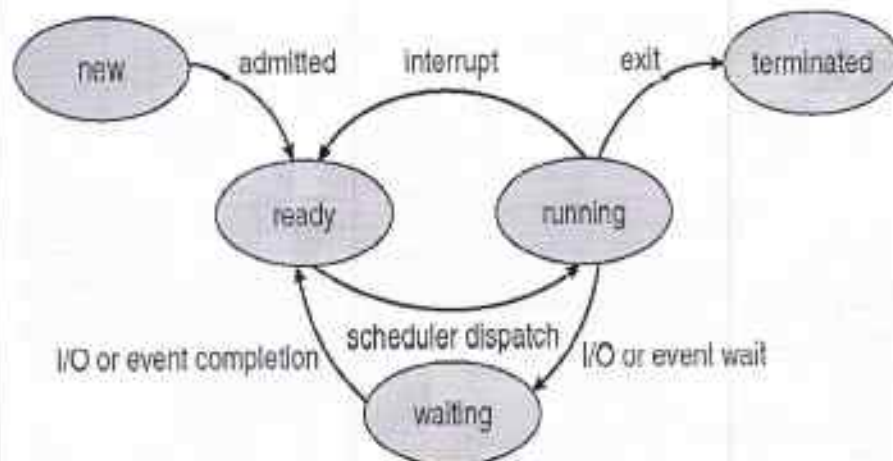


Figure 3.1 Diagram of Process State

Process State

1. **new**: The process is being created.
2. **running**: Instructions are being executed.
3. **waiting**: The process is waiting for some event to occur.
4. **ready**: The process is waiting to be assigned to a processor.
5. **terminated**: The process has finished execution.

b) **Develop a program to implement the process system calls.**

8

CO2

1,2,3
4

L3

Ans

Program-8marks

```

#include<stdio.h>
#include<unistd.h>
#include<stdlib.h>
#include<sys/types.h>
int main()
{
    pid_t pid;
    pid=fork();
    if(pid<0)
    {
        fprintf(stderr,"Fork Failed");
        return 1;
    }
    else if(pid==0)
    {
        execlp("/bin/ls","ls",NULL);
    }
    else
    {

```

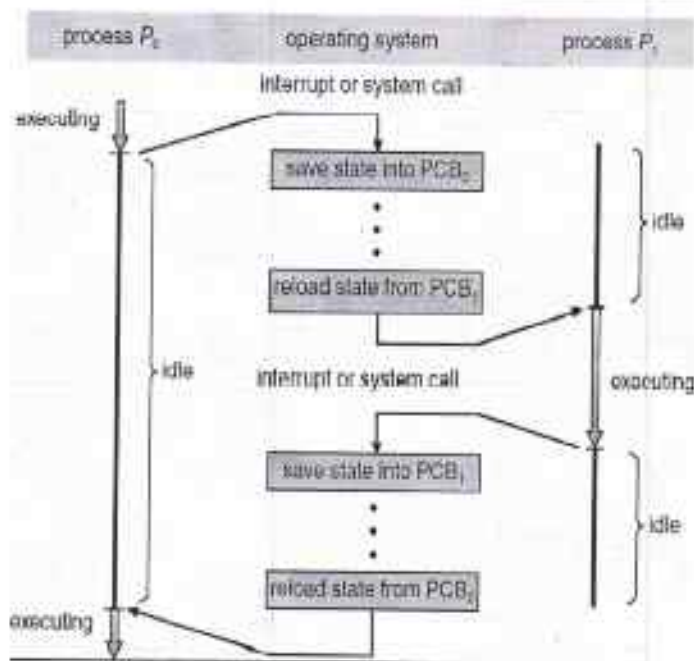



Figure4.2 CPU Switch From Process to Process

[Signature]

Signature of Faculty

[Signature]

Signature of IQAC member

Head of the Department
 Dr. [Signature]
 Signature of IQAC chairman
 Head of the Department
 Dr. [Signature]
 Signature of IQAC chairman



USN

ALVA'S INSTITUTE OF ENGINEERING & TECHNOLOGY

(Accredited by NAAC with A+ Grade)

Department of Computer Science and Engineering (Accredited by NBA)

Continuous Internal Evaluation Test II

AY: 2023-24

Course Title : Operating Systems

Course Code: BCS303

Date: 09/02/2024

Time: 9 30 AM- 11 AM

Semester/Section: III

Faculty: Mrs. Vidya and Mr. H Harshavardhan

Max. Marks: 30

Note: Answer ONE FULL question from each part.

Note: Answer ONE FULL question from each part.

Q. No.		Questions	Marks	COs	POs	BTL																				
Module 2																										
1	a)	Make use of following snapshot of the process, Calculate the average waiting time, Turnaround time and average Response time for the following snapshot of process using: i)Non- Preemptive SJF ii)Non-Preemptive Priority iii)Round Robin(TQ=1ms) <table><tr><th>Process</th><th>Burst time</th><th>Priority</th></tr><tr><td>P1</td><td>10</td><td>3</td></tr><tr><td>P2</td><td>1</td><td>1</td></tr><tr><td>P3</td><td>2</td><td>3</td></tr><tr><td>P4</td><td>1</td><td>4</td></tr><tr><td>P5</td><td>5</td><td>2</td></tr></table>	Process	Burst time	Priority	P1	10	3	P2	1	1	P3	2	3	P4	1	4	P5	5	2	8	CO2	1,2,3,4	L3		
Process	Burst time	Priority																								
P1	10	3																								
P2	1	1																								
P3	2	3																								
P4	1	4																								
P5	5	2																								
	b)	Analyze different types of multithreading models	7	CO2	1,2,3,4	L4																				
OR																										
2	a)	Make use of following snapshot of the process, Calculate the average waiting time, Turn around time and average Response time for the following snapshot of process using: i) Non- Preemptive SJF ii) Non-Preemptive Priority iii) Round Robin(TQ=1ms) <table><tr><th>Jobs</th><th>Arrival Time</th><th>Burst Time</th><th>Priority</th></tr><tr><td>J1</td><td>0</td><td>6</td><td>4</td></tr><tr><td>J2</td><td>3</td><td>5</td><td>2</td></tr><tr><td>J3</td><td>3</td><td>3</td><td>6</td></tr><tr><td>J4</td><td>5</td><td>5</td><td>3</td></tr></table>	Jobs	Arrival Time	Burst Time	Priority	J1	0	6	4	J2	3	5	2	J3	3	3	6	J4	5	5	3	8	CO2	1,2,3,4	L3
Jobs	Arrival Time	Burst Time	Priority																							
J1	0	6	4																							
J2	3	5	2																							
J3	3	3	6																							
J4	5	5	3																							
	b)	Analyze the threading issues in multithreaded programming.	7	CO2	1,2,3,4	L4																				

QUESTION PAPER REVIEW REPORT

Continuous Internal Evaluation (CIE) Test:2

AY 2023-24

Department : Computer Science and Engineering (Accredited by NBA)

Semester/Section: 3-A,B & C

Max Marks: 30

Course Title: Operating Systems

Course Code: BCS303

Date: 09-02-2024

Faculty: Mrs. Vidya and Mr. H. Harshavardhan

Qn. No.	Course Outcome (CO)	Bloom's Taxonomy Level	Marks
1a	CO2	L3	8
1b	CO2	L4	7
2a	CO2	L3	8
2b	CO2	L4	7
3a	CO2	L2	8
3b	CO3	L3	7
4a	CO2	L2	8
4b	CO3	L3	7
Total Marks			60

BT Level: L1-Remember, L2-Understand, L3 -Apply, L4 -Analyze, L5- Evaluate, L6- Create

Consolidated Marks for Different BT Levels:

BT Level	Marks for Each Level	% of Marks	Remarks
L2	16	27	
L3	30	50	
L4	14	23	

Scrutinizer/Reviewer Remark:

Approved	Approved with Correction	Rejected
Reason for Rejection		

Name & Signature of the Subject Teacher

Date: 07-02-2024.

Name & Signature of the IQAC Coordinator

Date:

Signature of Head of the Department



ALVA'S INSTITUTE OF ENGINEERING & TECHNOLOGY

(Accredited by NAAC with A+ Grade)

Department of Computer Science and Engineering (Accredited by NBA)

Continuous Internal Evaluation Test III AY: 2023-24

Course Title : Operating Systems	Course Code: BCS303
Date: 05/03/2024	Time: 9.30 AM- 11.00 AM
Faculty: Mrs.Vidya and Mr.H Harshavardhan	Semester/Section: III
	Max. Marks: 30

Note: Answer ONE FULL question from each part.

Q. No.	Questions		Marks	COs	POs	BTL																												
Module3&4																																		
1	a)	Explain different methods to recover from deadlock.	7	CO3	1,2,34	L2																												
	b)	Analyze the following reference string in which the three frames will be filled in FIFO, Optimal and LRU page replacement .Determine the number of page faults in each case. 4,7,6,1,7,6,1,2,7,2	8	CO4	1,2,34	L4																												
OR																																		
2	a)	Explain Demand paging and Thrashing in detail.	7	CO4	1,2,34	L2																												
	b)	Consider the following snapshot of a system: <table><tr><td></td><td><u>Allocation</u></td><td><u>Max</u></td><td><u>Available</u></td></tr><tr><td></td><td><u>A B C D</u></td><td><u>A B C D</u></td><td><u>A B C D</u></td></tr><tr><td>P_0</td><td>0 0 1 2</td><td>0 0 1 2</td><td>1 5 2 0</td></tr><tr><td>P_1</td><td>1 0 0 0</td><td>1 7 5 0</td><td></td></tr><tr><td>P_2</td><td>1 3 5 4</td><td>2 3 5 6</td><td></td></tr><tr><td>P_3</td><td>0 6 3 2</td><td>0 6 5 2</td><td></td></tr><tr><td>P_4</td><td>0 0 1 4</td><td>0 6 5 6</td><td></td></tr></table> Answer the following questions using the banker's algorithm: a. What is the content of the matrix <i>Need</i>? b. Is the system in a safe state? c. If a request from process P_1 arrives for (0,4,2,0), can the request be granted immediately?		<u>Allocation</u>	<u>Max</u>	<u>Available</u>		<u>A B C D</u>	<u>A B C D</u>	<u>A B C D</u>	P_0	0 0 1 2	0 0 1 2	1 5 2 0	P_1	1 0 0 0	1 7 5 0		P_2	1 3 5 4	2 3 5 6		P_3	0 6 3 2	0 6 5 2		P_4	0 0 1 4	0 6 5 6		8	CO3	1,2,34	L4
	<u>Allocation</u>	<u>Max</u>	<u>Available</u>																															
	<u>A B C D</u>	<u>A B C D</u>	<u>A B C D</u>																															
P_0	0 0 1 2	0 0 1 2	1 5 2 0																															
P_1	1 0 0 0	1 7 5 0																																
P_2	1 3 5 4	2 3 5 6																																
P_3	0 6 3 2	0 6 5 2																																
P_4	0 0 1 4	0 6 5 6																																
Module 4 & 5																																		
3	a)	Summarize access matrix and its implementation.	7	CO5	1,2,34	L2																												
	b)	Consider the page reference string: 1,0,7,1,0,2,1,2,3,0,3,2,4,0,3,6,2,1 for a memory with 4 frames. Determine the number of page faults using FIFO, Optimal and LRU replacement algorithms. Which algorithm is most efficient?	8	CO4	1,2,34	L4																												
4	a)	Explain disk architecture.	7	CO5	1,2,34	L2																												
	b)	Define page fault? With a supporting diagram analyze the steps involved in handling the page fault.	8	CO4	1,2,34	L4																												

QUESTION PAPER REVIEW REPORT

Continuous Internal Evaluation (CIE) Test:3

AY 2023-24

Department : Computer Science and Engineering (Accredited by NBA)
Max Marks: 30

Semester/Section: 3-A,B & C

Course Title: Operating Systems Course Code: BCS303 Date:05-03-2024

Faculty: Mrs.Vidya and Mr. H. Harshavardhan

Qn. No.	Course Outcome (CO)	Bloom's Taxonomy Level	Marks
1a	CO3	L2	7
1b	CO4	L4	8
2a	CO4	L2	7
2b	CO3	L4	8
3a	CO5	L2	7
3b	CO4	L4	8
4a	CO5	L2	7
4b	CO4	L4	8
Total Marks			60

BT Level: L1-Remember, L2-Understand, L3 -Apply, L4 -Analyze, L5- Evaluate, L6- Create

Consolidated Marks for Different BT Levels:

BT Level	Marks for Each Level	% of Marks	Remarks
L2	28	46	
L4	32	54	

Scrutinizer/Reviewer Remark:

Approved	☒	Approved with Correction	☐	Rejected	☐
Reason for Rejection					

Vidya *04/03/2024*
Name & Signature of the Subject Teacher

Date: 04-03-2024

Varadachari *04/03/24*
Name & Signature of the IQAC Coordinator

Date: 04-03-2024

[Signature] *4/3/24*
Signature of Head of the Department



Assignment (Case Study)

Course Name & Course Code: Operating Systems

Course Teachers: Mrs. Vidya and Mr. H Harshavardhan

Sem: 3 -A, B & C Sections

Deadline: 20-01-2024

Rubrics :

Subject Knowledge(6)	Question & Answer(2)	Submission as per Deadline(2)	Total(10)
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Topic/Problem Statement: Case Study on Unix Based Systems and other type of Operating Systems

Name & Signature of Course Teachers:

1. Vidya
2. H. Harshavardhan

CBCS SCHEME

USN

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18CS43

Fourth Semester B.E. Degree Examination, July/August 2022
Operating Systems

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1. a. Distinguish between the following terms:
 i) Multi programming and multitasking. (10 Marks)
 ii) Multi processor systems and clustered systems. (05 Marks)
 b. Define Operating Systems. Explain dual mode of operating systems with a neat diagram. (05 Marks)
 c. Explain about system calls with an example of handling a user application invoking the open() system call. (05 Marks)

OR

2. a. What is a process? Illustrate with a neat diagram the different states of a process and control block. (05 Marks)
 b. Discuss the implementation of IPC using message passing systems in detail. (10 Marks)
 c. List and explain the services provided by OS for the user and efficient operation of system. (05 Marks)

Module-2

3. a. Give a brief description about multithreading and explain the different multi threading models. (05 Marks)
 b. Discuss the issues that come with multithreaded programming. (10 Marks)
 c. Explain CPU scheduling criteria. (05 Marks)

OR

4. a. Calculate the average waiting time and the average turnaround time by drawing the Gantt chart using FCFS, SRTF, RR ($q = 2ms$) and priority algorithms. Lower priority number represents higher priority.

Process	Arrival Time	Burst Time	Priority
P ₁	0	9	3
P ₂	1	4	2
P ₃	2	9	1
P ₄	3	5	4

(12 Marks)

- b. What is critical section problem? What are the requirements for the solution to critical section problem? Explain Peterson's solution. (05 Marks)

18CS43

Module-3

5. a. What is a deadlock? What are the necessary conditions for the deadlock to occur? (05 Marks)
 b. How to prevent the occurrence of deadlock, explain in detail. (05 Marks)
 c. Consider the following snapshot of a system:

Process	Allocation				Max				Available			
	A	B	C	D	A	B	C	D	A	B	C	D
P ₀	2	0	0	1	4	2	1	2	3	3	2	1
P ₁	3	1	2	1	5	2	5	2				
P ₂	2	1	0	3	2	3	1	6				
P ₃	1	3	1	2	1	4	2	4				
P ₄	1	4	3	2	3	6	6	5				

Answer the following using Banker's algorithm.

- i) Is the system in safe state? If so, give the safe sequence.
 ii) If process P₁ requests (0, 1, 1, 3) resources can it be granted immediately? (10 Marks)

OR

6. a. Explain paging hardware with TLB. (05 Marks)
 b. Explain segmentation in detail. (05 Marks)
 c. Discuss structure of page table with suitable diagrams. (10 Marks)

Module-4

7. a. Describe the steps in handling page faults. (06 Marks)
 b. Consider the page reference string: 1, 0, 7, 1, 0, 2, 1, 2, 3, 0, 3, 2, 4, 0, 3, 6, 2, 1 for a memory with 3 frames. Determine the number of page faults using FIFO, optimal and LRU replacement algorithms. Which algorithm is most efficient? (14 Marks)

OR

8. a. Explain the different allocation methods. (10 Marks)
 b. Discuss the various directory structures with required diagrams. (10 Marks)

Module-5

9. a. Explain access matrix method of system protection with domain as objects and its implementation. (10 Marks)
 b. A drive has 5000 cylinders numbered 0 to 4999. The drive is currently serving a request at 143 and previously serviced a request at 125. The queue of pending requests in FIFO order is: 86, 1470, 913, 1774, 940, 1509, 1022, 1750, 130. Starting from current head position, what is the total distance travelled (in cylinders) by disk arm to satisfy the requests using FCFS, SSTF, SCAN, LOOK, and C-LOOK algorithms. (10 Marks)

OR

10. a. With a neat diagram, explain the components of a Linux system. (08 Marks)
 b. Explain the different IPC mechanisms available in Linux. (08 Marks)
 c. Discuss about scheduling in Linux. (06 Marks)

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CBCS SCHEME

USN

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18CS43

Fourth Semester B.E. Degree Examination, Jan./Feb. 2023
Operating Systems

Time: 3 hrs

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1. a. Define Operating System. Explain briefly multiprogramming and time sharing system. (08 Marks)
 b. Explain various OS services. (05 Marks)
 c. What are system calls? Briefly explain types of system call. (07 Marks)

OR

2. a. With a neat diagram, explain the different state of process. (07 Marks)
 b. Explain scheduler in a process execution. (05 Marks)
 c. Explain direct and indirect communication with respect to message passing systems. (08 Marks)

Module-2

3. a. Discuss multithreading models. (05 Marks)
 b. Discuss the benefits of multithreaded programming. (05 Marks)
 c. Consider the following set of four process with length of CPU burst given in MS:

Process	Burst time
P1	2
P2	1
P3	3

Compute the waiting time and avg. turnaround time for the above process using FCFS scheduling algorithm. (10 Marks)

OR

4. a. Explain requirements must satisfy to critical section problem. (04 Marks)
 b. Illustrate with an example Peterson's solution problem. (08 Marks)
 c. Explain syntax and schematic view of monitors. (08 Marks)

Module-3

5. a. What are necessary conditions for deadlock? (04 Marks)
 b. Explain different methods to recovery from deadlocks. (08 Marks)
 c. Consider the following snapshot of system:

Process	Allocation			Maximum			Available		
	A	B	C	A	B	C	A	B	C
P0	0	1	0	7	5	3	3	3	2
P1	2	0	0	3	2	2			
P2	3	0	2	9	0	2			
P3	2	1	1	2	2	2			
P4	0	0	2	4	3	3			

Find the need matrix and calculate safe sequence using bankers algorithm-mention the above is safe or not safe. (08 Marks)

1 of 2

18CS43

OR

6. a. What is paging hardware with TLD?
b. Explain structure of page table with respect to hierarchical paging.
c. Explain the process of segmentation.

(07 Marks)
(08 Marks)
(05 Marks)

Module-4

7. a. Describe the steps in handling a page fault.
b. Explain copy on write process in virtual machine.
c. Explain FIFO and optimal page replacement algorithm.

(06 Marks)
(06 Marks)
(05 Marks)

OR

8. a. Explain with a diagram any two disk allocation method in detail.
b. List the different operations performed on a directory.
c. Explain tree structured directory structure.

(08 Marks)
(06 Marks)
(06 Marks)

Module-5

9. a. Explain SCAN, CSCAN and LOOK scheduling techniques.
b. Explain access matrix model of implementing protection in OS.
c. Explain bad-block recovery in detail.

(08 Marks)
(06 Marks)
(06 Marks)

OR

10. a. With a diagram, explain the component of LINUX system.
b. Explain the IPC mechanisms in LINUX.
c. Discuss passing of data among process in LINUX system.

(08 Marks)
(06 Marks)
(06 Marks)

CBCS SCHEME

USN

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18CS44

Fourth Semester B.E. Degree Examination, June/July 2023

Operating System

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1. a. Define operating system. Explain the services of operating system with neat diagram. (08 Marks)
- b. What do you mean by system call? Explain the types of system call. (07 Marks)
- c. Define system program? Explain multiprogramming and time sharing system. (05 Marks)

OR

2. a. Explain the concept of virtual machine with neat diagram. (06 Marks)
- b. Define process. Explain Quowing diagram representation of the process. (07 Marks)
- c. What is Inter process communication? Explain message passing and shared memory concept of IPC. (07 Marks)

Module-2

3. a. Explain multithreading model with diagram. (04 Marks)
- b. What is dispatcher and dispatch latency? Explain the criteria used to select the scheduling algorithm. (07 Marks)
- c. Calculate the average waiting time by drawing Gantt chart using FCFS (First Come First Serve), SRTF (Shortest Remaining Time First), RR (Round Robin) ($q = 2$ ms) algorithms.

Process	Arrival Time	Hurst Time
P ₁	0	8
P ₂	1	4
P ₃	2	9
P ₄	3	5

(09 Marks)

OR

4. a. What is Critical Section? What are the requirements for critical section to satisfy? (04 Marks)
- b. Illustrate Peterson's solution for critical section problem. (06 Marks)
- c. What is Semaphore? State a dining philosopher problem give a solution using semaphore. (10 Marks)

Module-3

5. a. What is deadlock? Explain the necessary condition for a deadlock to occur. (05 Marks)
- b. Explain in detail how deadlock can be prevented. (05 Marks)
- c. Determine whether the following system is safe state by using Banker's algorithm for On SnapShot given below.

LACS43

Continued

Allocation			
	A	B	C
P ₀	0	1	0
P ₁	2	0	0
P ₂	3	0	2
P ₃	2	1	1
P ₄	0	0	2

Maximum			
	A	B	C
P ₀	7	5	5
P ₁	3	2	2
P ₂	9	0	2
P ₃	2	2	2
P ₄	4	3	3

Available			
	A	B	C
P ₀	2	3	2

If a request from P₄ arrives for (1, 0, 2) can the request be granted immediately? (10 Marks)

OR

6. a. What is paging? Illustrate with example internal and external fragmentation problem encountered in contiguous memory allocation. (07 Marks)
- b. Explain the three methods of memory allocation. With a neat diagram explain the hardware support for relocation and limit register. (07 Marks)
- c. What is segmentation? Explain with a neat diagram. (06 Marks)

Module-4

7. a. What is demand paging? Discuss with a neat diagram steps to handle the page fault. (08 Marks)
- b. What is copy-on-write? Consider the reference string 1, 2, 3, 4, 2, 1, 5, 6, 2, 3, 2, 3, 7, 6, 3, 2, 1, 2, 3, 6. Find the number of page faults using LRU and FIFO S (Frames = 3). (12 Marks)

OR

8. a. What is a file? Distinguish between contiguous and linked allocation methods with the neat diagram. (10 Marks)
- b. Distinguish between single level directory structure and two level directory structures. What are its advantages and disadvantages? (10 Marks)

Module-5

9. a. Explain various disk scheduling algorithms in detail. (05 Marks)
- b. Explain access matrix method of system protection with domain as objects and its implementation. (10 Marks)

OR

10. a. Explain different I/O mechanisms available in Linux. (06 Marks)
- b. With the neat diagram, explain the different components of Linux system. (08 Marks)
- c. What are the design principles of Linux operating system? Explain. (06 Marks)

CBCS SCHEME

USN 4 A L 2 2 T S 0 3 5

BCS303

Third Semester B.E./B.Tech. Degree Examination, Dec.2023/Jan.2024

Operating Systems

Time: 3 hrs.

Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.

2. M : Marks , L: Bloom's level , C: Course outcomes.

Module - 1				M	L	C																			
Q.1	a.	Define Operating System. Explain dual mode of OS with a neat diagram.	5	L1, L2	CO1																				
	b.	Distinguish between the following terms: i) Multiprogramming and Multitasking ii) Multiprocessor system and clustered system.	10	L2	CO1																				
	c.	With a neat diagram, explain the concept the concept of VM-WARE architecture.	5	L1, L2	CO1																				
OR																									
Q.2	a.	Explain the operating system services with respect to programs and users.	5	L2	CO1																				
	b.	List and explain the different computing environments.	5	L1, L2	CO1																				
	c.	What are system calls? List and explain the different types of system calls.	10	L1, L2	CO1																				
Module - 2																									
Q.3	a.	Define process. Explain different states of a process with state diagram.	8	L1, L2	CO1																				
	b.	What is IPC? Explain direct and indirect communication with respect to message passing.	8	L1, L2	CO2																				
	c.	Explain context-switching.	4	L2	CO2																				
OR																									
Q.4	a.	What is multi-threaded process? Explain the four benefits of multithreaded programming.	6	L2	CO2																				
	b.	Calculate the average waiting time and average turn around time by drawing the Gantt-chart using FCFS, SJF-non preemptive, SRTF, RR(q = 2ms) and porosity algorithms. <table><tr><td>Process</td><td>Arrival time</td><td>Burst time</td><td>Porosity</td></tr><tr><td>P1</td><td>0</td><td>9</td><td>3</td></tr><tr><td>P2</td><td>1</td><td>4</td><td>2</td></tr><tr><td>P3</td><td>2</td><td>9</td><td>1</td></tr><tr><td>P4</td><td>3</td><td>5</td><td>4</td></tr></table>	Process	Arrival time	Burst time	Porosity	P1	0	9	3	P2	1	4	2	P3	2	9	1	P4	3	5	4	14	L3	CO2
Process	Arrival time	Burst time	Porosity																						
P1	0	9	3																						
P2	1	4	2																						
P3	2	9	1																						
P4	3	5	4																						
Module - 3																									
Q.5	a.	What is critical section? What are the requirements for the solution to critical section problem? Explain Peaterson's solution.	8	L1, L2	CO3																				
	b.	Explain Reader's-Writer's problem using semaphores.	12	L2	CO3																				

1 of 2

OR

Q.6	a.	What is deadlock? What are the necessary conditions for the deadlock to occur?	6	L1, L2	CO3																																																																																										
	b.	Consider the following snap-shot of a system: <table border="1" data-bbox="410 376 1125 607"> <thead> <tr> <th rowspan="2">Process</th> <th colspan="4">Allocation</th> <th colspan="4">Max</th> <th colspan="4">Available</th> </tr> <tr> <th>A</th> <th>B</th> <th>C</th> <th>D</th> <th>A</th> <th>B</th> <th>C</th> <th>D</th> <th>A</th> <th>B</th> <th>C</th> <th>D</th> </tr> </thead> <tbody> <tr> <td>P0</td> <td>2</td> <td>0</td> <td>0</td> <td>1</td> <td>4</td> <td>2</td> <td>1</td> <td>2</td> <td>3</td> <td>3</td> <td>2</td> <td>1</td> </tr> <tr> <td>P1</td> <td>3</td> <td>1</td> <td>2</td> <td>1</td> <td>5</td> <td>2</td> <td>5</td> <td>2</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>P2</td> <td>2</td> <td>1</td> <td>0</td> <td>3</td> <td>2</td> <td>3</td> <td>1</td> <td>6</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>P3</td> <td>1</td> <td>3</td> <td>1</td> <td>2</td> <td>1</td> <td>4</td> <td>2</td> <td>4</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>P4</td> <td>1</td> <td>4</td> <td>3</td> <td>2</td> <td>3</td> <td>6</td> <td>6</td> <td>5</td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table> Answer the following using Banker's algorithm: i) Is the system in safe state? If so give the safe sequence. ii) If process P2 requests (0, 1, 1, 3) resource can it be granted immediately.	Process	Allocation				Max				Available				A	B	C	D	A	B	C	D	A	B	C	D	P0	2	0	0	1	4	2	1	2	3	3	2	1	P1	3	1	2	1	5	2	5	2					P2	2	1	0	3	2	3	1	6					P3	1	3	1	2	1	4	2	4					P4	1	4	3	2	3	6	6	5					14	L3	CO3
Process	Allocation				Max				Available																																																																																						
	A	B	C	D	A	B	C	D	A	B	C	D																																																																																			
P0	2	0	0	1	4	2	1	2	3	3	2	1																																																																																			
P1	3	1	2	1	5	2	5	2																																																																																							
P2	2	1	0	3	2	3	1	6																																																																																							
P3	1	3	1	2	1	4	2	4																																																																																							
P4	1	4	3	2	3	6	6	5																																																																																							

Module - 4

Q.7	a.	What is paging? Explain with neat diagram paging hardware with TLB?	10	L1, L2	CO4
	b.	What are the commonly used strategies to select a free hole from the available holes?	6	L1	CO4
	c.	Explain fragmentation in detail.	4	L2	CO4

OR

Q.8	a.	With a neat diagram? Describe the steps in handling the page fault.	8	L2	CO4
	b.	Consider the page reference string: 1, 0, 7, 1, 0, 2, 1, 2, 3, 0, 3, 2, 4, 0, 3, 6, 2, 1 for a memory with 3 frames. Determine the number of page faults using F1, F0, optimal and LRU replacement algorithms which algorithm is more efficient.	12	L3	CO4

Module - 5

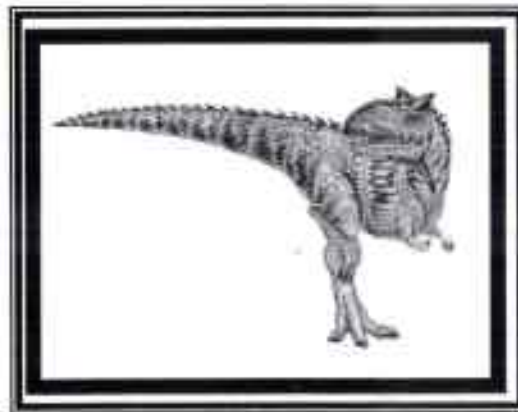
Q.9	a.	Define file. List and explain the different file attributes and operations.	10	L1	CO5
	b.	Explain the different allocation methods.	10	L2	CO5

OR

Q.10	a.	What is Access Matrix? Explain Access Matrix method of system protection with domain as objects and its implementation.	10	L1, L2	CO5
	b.	A drive has 5000 cylinders numbered 0 to 4999. The drive is currently serving a request 143 and previously serviced a request at 125. The queue of pending requests in FIFO order is: 86, 1470, 913, 1774, 948, 1509, 1022, 1750, 130 starting from current head position. What is the total distance travelled (in cylinders) by disk arm to satisfy the requests using FCFS, SSTF, SCAN, LOOK and C-LOOK algorithm.	10	L3	CO5

Module 1

Chapter 1: Introduction





What is an Operating System?

- A program that acts as an intermediary between a user of a computer and the computer hardware
- Operating system goals:
 - Execute user programs and make solving user problems **easier**
 - Make the computer system **convenient** to use
 - Use the computer hardware in an **efficient** manner





What is an Operating System?



Branch : CS

Semester : 3

Sl NO.	USN	BCS303
1	4AL22CS001	18 (TH) , 23 (PR)
2	4AL22CS002	18 (TH) , 17 (PR)
3	4AL22CS003	16 (TH) , 22 (PR)
4	4AL22CS004	22 (TH) , 24 (PR)
5	4AL22CS005	14 (TH) , 20 (PR)
6	4AL22CS006	25 (TH) , 24 (PR)
7	4AL22CS007	20 (TH) , 19 (PR)
8	4AL22CS008	16 (TH) , 19 (PR)
9	4AL22CS009	20 (TH) , 24 (PR)
10	4AL22CS010	21 (TH) , 24 (PR)
11	4AL22CS011	13 (TH) , 19 (PR)
12	4AL22CS012	16 (TH) , 24 (PR)
13	4AL22CS013	18 (TH) , 20 (PR)
14	4AL22CS014	22 (TH) , 22 (PR)
15	4AL22CS015	24 (TH) , 25 (PR)
16	4AL22CS016	22 (TH) , 25 (PR)
17	4AL22CS017	21 (TH) , 22 (PR)
18	4AL22CS018	21 (TH) , 23 (PR)
19	4AL22CS019	25 (TH) , 24 (PR)
20	4AL22CS020	15 (TH) , 19 (PR)
21	4AL22CS021	20 (TH) , 16 (PR)
22	4AL22CS022	18 (TH) , 19 (PR)
23	4AL22CS023	19 (TH) , 23 (PR)
24	4AL22CS024	16 (TH) , 16 (PR)
25	4AL22CS025	21 (TH) , 25 (PR)
26	4AL22CS026	11 (TH) , 16 (PR)
27	4AL22CS027	21 (TH) , 19 (PR)
28	4AL22CS028	24 (TH) , 25 (PR)
29	4AL22CS029	18 (TH) , 20 (PR)
30	4AL22CS030	23 (TH) , 25 (PR)
31	4AL22CS031	19 (TH) , 21 (PR)
32	4AL22CS032	17 (TH) , 21 (PR)
33	4AL22CS033	23 (TH) , 25 (PR)
34	4AL22CS034	21 (TH) , 23 (PR)
35	4AL22CS035	22 (TH) , 21 (PR)
36	4AL22CS036	22 (TH) , 23 (PR)

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38	4AL22CS038	22 (TH) , 21 (PR)
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40	4AL22CS040	24 (TH) , 24 (PR)
41	4AL22CS041	22 (TH) , 23 (PR)
42	4AL22CS042	21 (TH) , 20 (PR)
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74	4AL22CS076	22 (TH) , 24 (PR)
75	4AL22CS077	22 (TH) , 24 (PR)

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78	4AL22CS080	24 (TH) , 22 (PR)
79	4AL22CS081	23 (TH) , 23 (PR)
80	4AL22CS082	20 (TH) , 24 (PR)
81	4AL22CS083	25 (TH) , 25 (PR)
82	4AL22CS084	21 (TH) , 20 (PR)
83	4AL22CS085	24 (TH) , 24 (PR)
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92	4AL22CS094	23 (TH) , 25 (PR)
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94	4AL22CS096	25 (TH) , 25 (PR)
95	4AL22CS097	23 (TH) , 25 (PR)
96	4AL22CS098	23 (TH) , 25 (PR)
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112	4AL22CS114	20 (TH) , 24 (PR)
113	4AL22CS115	20 (TH) , 23 (PR)
114	4AL22CS116	23 (TH) , 25 (PR)

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133	4AL22CS135	21 (TH) , 24 (PR)
134	4AL22CS136	16 (TH) , 20 (PR)
135	4AL22CS137	20 (TH) , 23 (PR)
136	4AL22CS138	17 (TH) , 21 (PR)
137	4AL22CS139	18 (TH) , 21 (PR)
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139	4AL22CS141	24 (TH) , 24 (PR)
140	4AL22CS142	25 (TH) , 25 (PR)
141	4AL22CS143	25 (TH) , 25 (PR)
142	4AL22CS144	25 (TH) , 25 (PR)
143	4AL22CS145	21 (TH) , 21 (PR)
144	4AL22CS146	22 (TH) , 22 (PR)
145	4AL22CS147	25 (TH) , 25 (PR)
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151	4AL22CS153	15 (TH) , 19 (PR)
152	4AL22CS154	25 (TH) , 24 (PR)
153	4AL22CS155	25 (TH) , 24 (PR)

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156	4AL22CS158	19 (TH) , 22 (PR)
157	4AL22CS159	19 (TH) , 24 (PR)
158	4AL22CS160	25 (TH) , 24 (PR)
159	4AL22CS161	25 (TH) , 25 (PR)
160	4AL22CS162	21 (TH) , 24 (PR)
161	4AL22CS163	20 (TH) , 23 (PR)
162	4AL22CS164	17 (TH) , 17 (PR)
163	4AL22CS165	24 (TH) , 25 (PR)
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166	4AL22CS168	22 (TH) , 21 (PR)
167	4AL22CS169	22 (TH) , 25 (PR)
168	4AL22CS170	21 (TH) , 24 (PR)
169	4AL22CS171	22 (TH) , 23 (PR)
170	4AL22CS172	23 (TH) , 23 (PR)
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190	4AL23CS401	16 (TH) , 21 (PR)
191	4AL23CS402	18 (TH) , 19 (PR)
192	4AL23CS403	17 (TH) , 21 (PR)

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194	4AL23CS405	18 (TH) , 22 (PR)
195	4AL23CS406	14 (TH) , 18 (PR)
196	4AL23CS407	20 (TH) , 19 (PR)
197	4AL23CS408	17 (TH) , 21 (PR)
198	4AL23CS409	18 (TH) , 20 (PR)
199	4AL23CS410	14 (TH) , 21 (PR)
200	4AL23CS411	19 (TH) , 21 (PR)
201	4AL23CS412	18 (TH) , 19 (PR)

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Result Analysis 2023-24(Odd)

Faculty Name	Mrs.Vidya
Subject Name and Code	Operating System (BCS303)
Total Number of students	67+67=134
Total Number of students appeared	67+67=134
Number of students pass	62+65=127
% OF PASS	92.54+97.01=95%
No. of Fails	05+02=07
FCD	56+60=116
FC	03+03=06
SC	02
PASS	18


Faculty Name and Signature

Result Analysis 2023-24(Odd)

Faculty Name	Mr. Harshavardhan H
Subject Name and Code	Operating System (BCS303)
Total Number of students	67
Total Number of students appeared	67
Number of students pass	66
% OF PASS	98.48
No. of Fails	01
FCD	55
FC	02
SC	00
PASS	00

H. Harshavardhan
Harsh

Faculty Name and Signature