INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)
Dundigal, Hyderabad -500 043

COMPUTER SCIENCE AND ENGINEERING

COURSE DESCRIPTOR

Course Title	**OPERATING SYSTEMS LABORATORY**					
Course Code	ACS106					
Programme	B.Tech					
Semester	IV	IT	CSE			
Course Type	Core					
Regulation	IARE - R16					
Course Structure	**Theory**			**Practical**		
	Lectures	**Tutorials**	**Credits**	**Laboratory**	**Credits**	
	3	1	4	3	2	
Chief Coordinator	Dr. Chukka Santhaiah, Professor					
Course Faculty	Dr. D Kishore Babu, Professor Mr. N V Krishna Rao, Assistant Professor Mr. M Rakesh, Assistant Professor					

I. COURSE OVERVIEW:

This course provides a comprehensive introduction to operating system design concepts, data structures and algorithms. The course is designed to provide in-depth critique on the problems of resource management and scheduling, concurrency and synchronization, memory management, file management, peripheral management, protection and security. This course is intended to discuss the topics in a general setting not tied to any one particular operating system. Throughout the course, the study of practical aspects that pertain to the most popular operating systems such as Unix/Linux and Windows are considered as case studies.

II. COURSE PRE-REQUISITES:

Level	Course Code	Semester	Prerequisites
UG	ACS002	II	Data Structures
UG	ACS004	III	Computer Organization and Architecture

III. MARKS DISTRIBUTION:

Subject	SEE Examination	CIA Examination	Total Marks
Operating System Laboratory	70 Marks	30 Marks	100

IV. DELIVERY / INSTRUCTIONAL METHODOLOGIES:

✘	Chalk & Talk	✘	Quiz	✘	Assignments	✘	MOOCs
✔	LCD / PPT	✘	Seminars	✘	Mini Project	✔	Videos
✔	Open Ended Experiments						

V. EVALUATION METHODOLOGY:

Each laboratory will be evaluated for a total of 100 marks consisting of 30 marks for internal assessment and 70 marks for semester end lab examination. Out of 30 marks of internal assessment, continuous lab assessment will be done for 20 marks for the day to day performance and 10 marks for the final internal lab assessment.

Semester End Examination (SEE): The semester end lab examination for 70 marks shall be conducted by two examiners, one of them being Internal Examiner and the other being External Examiner, both nominated by the Principal from the panel of experts recommended by Chairman, BOS.

The emphasis on the experiments is broadly based on the following criteria:

20 %	To test the preparedness for the experiment.
20 %	To test the performance in the laboratory.
20 %	To test the calculations and graphs related to the concern experiment.
20 %	To test the results and the error analysis of the experiment.
20 %	To test the subject knowledge through viva – voce.

Continuous Internal Assessment (CIA):
CIA is conducted for a total of 30 marks (Table 1), with 20 marks for continuous lab assessment during day to day performance, 10 marks for final internal lab assessment.

Table 1: Assessment pattern for CIA

Component	**Laboratory**		**Total Marks**
Type of Assessment	Day to day performance	Final internal lab assessment	
CIA Marks	20	10	30

Continuous Internal Examination (CIE):
One CIE exams shall be conducted at the end of the 16th week of the semester. The CIE exam is conducted for 10 marks of 3 hours duration.

Preparation	**Performance**	**Calculations and Graph**	**Results and Error Analysis**	**Viva**	**Total**
4	4	-	-	2	10

VI. HOW PROGRAM OUTCOMES ARE ASSESSED:

Program Outcomes (POs)		Strength	Proficiency assessed by
PO 1	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.	3	Videos
PO 2	**Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.	3	Case Studies
PO 3	**Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.	2	Videos
PO 4	**Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.	2	Case Studies

3 = High; 2 = Medium; 1 = Low

VII. HOW PROGRAM SPECIFIC OUTCOMES ARE ASSESSED:

Program Specific Outcomes (PSOs)		Strength	Proficiency assessed by
PSO 1	**Professional Skills:** The ability to research, understand and implement computer programs in the areas related to algorithms, system software, multimedia, web design, big data analytics, and networking for efficient analysis and design of computer-based systems of varying complexity.	2	Videos
PSO 2	**Problem-Solving Skills:** The ability to apply standard practices and strategies in software project development using open-ended programming environments to deliver a quality product for business success.	2	Case Studies
PSO 3	**Successful Career and Entrepreneurship:** The ability to employ modern computer languages, environments, and platforms in creating innovative career paths, to be an entrepreneur, and a zest for higher studies.	1	Case Studies

3 = High; 2 = Medium; 1 = Low

VIII. COURSE OBJECTIVES (COs):

The course should enable the students to:	
I	Understand the basic principles of Scheduling algorithms.
II	Apply the page replacement algorithms.
III	Understand the file allocation strategies.
IV	Evaluate the bankers algorithm.
V	Understand the memory management techniques.

IX. COURSE LEARNING OUTCOMES (CLOs):

CLO Code	CLO's	At the end of the course, the student will have the ability to:	PO's Mapped	Strength of Mapping
ACS106.01	CLO 1	Understand the concepts of different scheduling algorithms	PO 1	2
ACS106.02	CLO 2	Demonstrate the concept of scheduling the process with the shortest burst time to be process first.	PO 1, PO 3	2
ACS106.03	CLO 3	Understand the Priority Scheduling algorithm used for both pre-emptive and non-pre-emptive scheduling of tasks in operating systems.	PO 1, PO 3	2
ACS106.04	CLO 4	Demonstrate the replacing the page with page replacement algorithms in memory management in operating systems	PO 1, PO 2, PO 4	2
ACS106.05	CLO 5	Determine the importance of different file allocation strategies.	PO 1, PO 3	2
ACS106.06	CLO 6	Understand the concepts of Bankers algorithm for the purpose of deadlock avoidance.	PO 1, PO 2, PO 4	2
ACS106.07	CLO 7	Determine the procedure for deadlock prevention using Bankers algorithm.	PO 1, PO 2, PO 3	1
ACS106.08	CLO 8	Understand the basic concepts of MVT memory management techniques.	PO 1, PO 2, PO 3	1
ACS106.09	CLO 9	Understand the basic concepts of MFT memory management techniques.	PO 1, PO 2	3
ACS106.10	CLO 10	Determine the concepts of file organization techniques.	PO 1, PO 3	2
ACS106.11	CLO 11	Understand the importance of two level directories.	PO 1, PO 3	2
ACS106.12	CLO 12	Determine the concepts of paging techniques of memory management.	PO 1, PO 2	3

3 = High; 2 = Medium; 1 = Low

X. MAPPING COURSE LEARNING OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Learning Outcomes (CLOs)	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CLO 1	3												1	2	
CLO 2	3		3										1		
CLO 3	3		3										1	2	
CLO 4	2	2		2									1	2	
CLO 5	2		2										1	2	
CLO 6	2	2		2										2	
CLO 7	1	1	1										1		
CLO 8	1	1	1											2	

Course Learning Outcomes (CLOs)	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CLO 9	2	2												2	
CLO 10	2		2										1		
CLO 11	3		3											2	
CLO 12	3	3											1		

3 = High; 2 = Medium; 1 = Low

XI. ASSESSMENT METHODOLOGIES – DIRECT

CIE Exams	PO 1, PO 2 PO 3, PO 4	SEE Exams	PO 1, PO 2 PO 3, PO 4	Assignments	-	Seminars	PO 1, PO 2 PO 3, PO 4
Laboratory Practices	PO 1, PO 2 PO 3, PO 4	Student Viva	PO 1, PO 2 PO 3, PO4	Mini Project	-	Certification	-

XII. ASSESSMENT METHODOLOGIES - INDIRECT

✔	Early Semester Feedback	✔	End Semester OBE Feedback
✘	Assessment of Mini Projects by Experts		

XIII. SYLLABUS

WEEK-l	**CPU SCHEDULING ALGORITHMS**
Write a program to simulate the FCFS and SJF non-preemptive CPU Scheduling algorithms to find turnaround time and waiting time.	
WEEK-2	**CPU SCHEDULING ALGORITHMS**
Write a program to simulate the Round Robin and Proiorty CPU Scheduling algorithms to find turnaround timeand waiting time.	
WEEK-3	**PAGE REPLACEMENT ALGORITHMS**
Write a program to simulate FIFO page replacement algorithm.	
WEEK-4	**PAGE REPLACEMENT ALGORITHMS**
Write a program to simulate LRU and LFU page replacement algorithms.	
WEEK-5	**FILE ALLOCATION STRATEGIES**
Write a program to simulate the Sequential file allocation strategies.	
WEEK-6	**BANKER ALGORITHMS**
Write a program to simulate Bankers algorithm for the purpose of deadlock avoidance.	
WEEK-7	**BANKER ALGORITHMS**
Write a program to simulate Bankers algorithm for the purpose of deadlock Prevention.	
WEEK-8	**MEMORY MANAGEMENT TECHNIQUES**
Write a program to simulate the MVT memory management techniques.	
WEEK-9	**MEMORY MANAGEMENT TECHNIQUES**
Write a program to simulate the MFT memory management techniques.	
WEEK-10	**FILE ORGANIZATION TECHNIQUES**
Write a program to simulate the Single level directory file organization techniques.	

WEEK-11	FILE ORGANIZATION TECHNIQUES
Write a program to simulate the Two level directory file organization techniques.	
WEEK-12	**PAGING TECHNIQUES**
Write a program to Simulate paging technique of memory management.	
TEXT BOOK:	
1. Abraham Silberschatz, Peter B. Galvin, Greg Gagne, "Operating System Principles", Wiley StudentEdition, 8th Edition, 2010.	
REFERENCE BOOK:	
1. Andrew S Tanenbaum, "Modern Operating Systems", PHI, 3rd Edition, 2007.	

XIV. COURSE PLAN:

The course plan is meant as a guideline. Probably there may be changes.

Week No.	Topics to be covered	Course Learning Outcomes (CLOs)	Reference
1	simulate the FCFS and SJF	CLO 1, CLO 2	T1:1.2
2	simulate the Round Robin and Proiorty	CLO 1,CLO 3	R1:2.4
3	simulate page replacement algorithms FIFO.	CLO 4	R1:2.5
4	simulate page replacement algorithms LRU and LFU	CLO 4	T1:2.6
5	simulate the Sequential file allocation strategies.	CLO 5	R1:22.7
6	simulate Bankers algorithm for the purpose of deadlock avoidance	CLO 6	R1:5.3
7	simulate Bankers algorithm for the purpose of deadlock Prevention	CLO 7	T1:6.3
8	simulate the MVT memory management techniques.	CLO 8	R1:6.8
9	simulate the MFT memory management techniques.	CLO 9	R1:13.1
10	simulate the Single level directory file organization techniques.	CLO 10	T1:13.2
11	simulate the Two level directory file organization techniques.	CLO 11	R1:13.7
12	Simulate paging technique of memory management	CLO 12	T1:10.2

XV. GAPS IN THE SYLLABUS - TO MEET INDUSTRY / PROFESSION REQUIREMENTS:

S No	Description	Proposed Actions	Relevance With POs	Relevance With PSOs
1	Interrupts, Exceptions, and System Calls.	Assignments	PO 2, PO 3	PSO 1
2	Multicore Programming, Multithreading Models	Seminars / NPTEL	PO 2, PO 3	PSO 1
3	Free Space Management, I/O Systems	Seminars / NPTEL	PO 1, PO 3	PSO 1

Prepared by:

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