INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)
Dundigal, Hyderabad - 500 043

COMPUTER SCIENCE AND ENGINEERING

COURSE DESCRIPTION FORM

Course Title	**Distributed Operating System**			
Course Code	**BCS004**			
Course Structure	Lectures	Tutorials	Practicals	Credits
	3	3	3	3
Course Coordinator	Mr R.M.Noorullah Associate Professor			

I. COURSE OVERVIEW

The course covers the basics of programming and demonstrates fundamentals of R programming customs and terms including the packages and functions. This course helps the students in gaining the knowledge to write simple R language applications in statistical and engineering problems. This course helps to undertake future courses that assume this programming language as a background in Data science. Topics include objects, data types, functions, control structures, pointers, lists, arrays and visualizations. This course in reached to student by power point presentations, lecture notes, and lab involve the problem solving in mathematical and engineering areas.

II. PREREQUISITE(S)

Level	Credits	Periods/ Week	Prerequisites
PG	3	3	Fundamentals of Operating System, Computer Networks Concepts

III. MARKS DISTRIBUTION

Subject	SEE Examination	CIA Examination	Total Marks
DISTRIBUTED OPERATING SYSTEM	70 Marks	30 Marks	100 Marks

Semester End Examination 70 Marks All the Units (1, 2, 3, 4 and 5)	70 Marks (3 Hours)	5 questions to be answered. Each question carries 14 Marks

<table>
<tr><td rowspan="6">Average of two CIA Examinations</td><td colspan="4">Continuous Internal Assessment (CIA) - 1</td></tr>
<tr><td rowspan="3">30 Marks
(2 Hours)</td><td rowspan="3">Units
I, II and
III (half)</td><td rowspan="2">Continuous Internal Examination (CIE)
(2 hours)
[4 questions to be answered out of 5 questions from Part- A & B]</td><td>Part - A
5 questions to be answered out of 5 questions, each carries 1 mark.</td></tr>
<tr><td>Part - B
4 questions each carry 5 marks.</td></tr>
<tr><td>Assignment</td><td>5 marks</td></tr>
<tr><td colspan="4">Continuous Internal Assessment (CIA) - 2</td></tr>
<tr><td rowspan="3">30 Marks
(2 Hours)</td><td rowspan="3">Units
III (half)
IV and V</td><td rowspan="2">Continuous Internal Examination (CIE)
(2 hours)
[4 questions to be answered out of 5 questions from Part- A & B]</td><td>Part – A
5 questions to be answered out of 5 questions, each</td></tr>
<tr><td>Part - B
4 questions each carry 5 marks.</td></tr>
<tr><td>Assignment</td><td>5 marks</td></tr>
</table>

IV. EVALUATION SCHEME

S. No	Component	Duration	Marks
1	CIE - I Examination	2 hour	25
2	Assignment Covers First 2.5 Units		05
TOTAL			30
3	CIE - II Examination	2 hour	25
4	Assignment Covers Last 2.5 Units		05
TOTAL			30
CIA Examination marks to be considered as average of above two CIA's			
5	EXTERNAL Examination	3 hours	70
GRAND TOTAL			100

V. COURSE OBJECTIVES

The course should enable the students to:

1. Understand the concepts of resource sharing, multitasking, multiprocessing in distributed environment.
2. Explore on various internals of operating system.
3. Describe contrast and compare differing structures for operating systems.
4. Understand and analyze theory and implementation of processes, resource control , physical and virtual memory,
5. Analyzing the concept of scheduling of file in the distributed system

VI. COURSE OUTCOMES

At the end of the course the students are able to:

1. Identify and understand the working of distributed system components.
2. Develop ATM Networks In Distributed Systems
3. Design a Remote Procedure Call by using distributed operating systems?
4. Use various real time scheduling algorithms to solve the scheduling problems?.
5. Understand the paging concept for allocation of frames
6. Apply the file allocation methods in distributed operating systems .
7. Develop and provide solutions to the real time problems which include dead locks in DOS.
8. Solve the classical problems of synchronization in DOS .
9. Analyze and evaluate the case study on Mach

VII. HOW PROGRAM OUTCOMES ARE ASSESSED

Program Outcomes		Level	Proficiency assessed by
PO1	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.	H	Seminar
PO2	**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.	H	Seminar
PO3	**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.	S	Projects
PO4	**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.	S	Projects
PO5	**Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.	S	Projects
PO6	**The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.	N	--
PO7	**Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.	N	--
PO8	**Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.	N	--
PO9	**Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.	N	--
PO10	**Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.	N	--

Program Outcomes		Level	Proficiency assessed by
PO11	**Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.	N	--
PO12	**Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.	S	Projects

VIII. HOW PROGRAM SPECIFIC OUTCOMES ARE ASSESSED

Program Specific Outcomes		Level	Proficiency assessed by
PSO1	**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.	H	Lectures, Seminars
PSO2	**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.	S	Projects
PSO3	**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.	S	Guest Lectures

N - None **S - Supportive** **H - Highly related**

IX. SYLLABUS

UNIT – I

Introduction: Introduction to distributed System, goals of distributed system, hardware and software concepts, design issues; Communication in distributed system: Layered protocols, ATM networks, client – server model, remote procedure calls and group communication; Middleware and Distributed Operating Systems

UNIT – II

MUTUAL EXCLUSION AND DEADLOCK IN DISTRIBUTED SYSTEMS

Synchronization in Distributed System: Clock synchronization, mutual exclusion, election algorithm, the bully algorithm, ring algorithm, atomic transactions, deadlock in distributed systems, distributed deadlock prevention, distributed deadlock detection.

UNIT – III

PROCESSES AND PROCESSORS

Processes and Processors in distributed systems: Threads, System models, Processors Allocation, Scheduling in Distributed System; Real Time Distributed Systems. Distributed file system design, distributed file system implementation, trends in distributed file systems

UNIT – IV

DISTRIBUTED SHARED MEMORY

Distributed shared memory: what is shared memory, consistency models, page based distributed shared memory, shared variables and distributed shared memory

UNIT – V **MACH**

Case study MACH: Introduction to MACH, process management in MACH, communication in MACH, UNIX emulation in MACH.

TEXT BOOKS

1. Andrew S. Tanenbaum, "Distributed Operating System", PHI, 1st Edition, 1994.
2. Andrew S. Tanenbaum, , Herbert Bos "Modern Operating Systems", Pearson Higher Ed,4th Edition, 2014

REFERENCE BOOKS

1. Andrew S. Tanenbaum, Maarten van Steen, "Distributed Systems: Principles and Paradigms", Pearson Prentice Hall,2nd Edition Illustrated, 2007.
2. R. Chow and T. Johnson, "Distributed Operating Systems & Algorithms", Addison-Wesley, 1997.

Web References:

1. https://www.youtube.com/watch?v=sK9MC5GREXg
2. http://nptel.ac.in/syllabus/106106107/

E-Text Books:

1. https://www.amazon.com/Distributed-Operating-Systems-Andrew-Tanenbaum/dp/0132199084
2. https://books.google.com/books?id=wa1GAwAAQBAJ&source=gbs_similarbooks

X. COURSE PLAN

At the end of the course, the students are able to achieve the following course learning outcomes.

Lecture No.	Course Outcomes	Topics To Be Covered	Reference
1 – 3	1. Identify and understand the working of distributed system components	Introduction: Introduction to distributed System, goals of distributed system, hardware and software concepts, design issues; Communication in distributed system:	T1:1.1-1.5
4- 7	2. Develop ATM Networks In Distributed Systems	Layered protocols, ATM networks, client–server model, remote procedure calls and group communication; Middleware and Distributed Operating Systems;	T1:2.1- 2.5
8 - 15	3. Design a Remote Procedure Call by using distributed operating systems? 4. Solve the classical problems of synchronization in DOS	**MUTUAL EXCLUSION AND DEADLOCK IN DISTRIBUTED SYSTEMS** Synchronization in Distributed System: Clock synchronization, mutual exclusion, election algorithm, the bully algorithm, ring algorithm, atomic transactions, deadlock in distributed systems, distributed deadlock prevention, distributed deadlock detection.	T1:3.1 – 3.5
16 - 24	5. Use various real time scheduling algorithms to solve the scheduling problems 6. Develop and provide solutions to the real time problems which include	**PROCESSES AND PROCESSORS** Processes and Processors in distributed systems: Threads, System models, Processors Allocation, Scheduling in Distributed System; Real Time Distributed Systems.	T1:4.1-4.7
25- 30	7. Apply the file allocation methods in distributed operating systems	Distributed file system design, distributed file system implementation, trends in distributed file systems	T1:5.1-5.4
31- 38	8. Understand the paging concept for allocation of frames	**DISTRIBUTED SHARED MEMORY** Distributed shared memory: what is shared memory, consistency models, page based distributed shared memory, shared variables and distributed shared memory	T1:6.1– 6.7
39 - 45	9. Analyze and evaluate the case study on Mach	**Case study MACH**: Introduction to MACH, process management in MACH, communication in MACH, UNIX emulation in MACH.	T1:8.1-8.5

XI MAPPING COURSE OBJECTIVES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

Course Objectives	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
I	H	H										S	H	H	
II		H	S		S								S	H	
III	S	H	S										H		S
IV	H	S											H	S	
V	H	S											H	S	S

S - Supportive **H - Highly related**

XII MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES ANDPROGRAM SPECIFIC OUTCOMES

Course Objectives	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	H			S									H	S	
2	S	H	S									S	H		S
3	S	H			S								S		
4	H			S								S	S	S	
5	S	H	S		S							S	H		S
6	H	S		S									S		
7	H				S							S	H	S	
8	H			S									H	S	
9	S	H	S									S	H		S

S - Supportive **H - Highly related**

Prepared by: Mr.R.M.Noorullah, Assoc. Professor

HOD, CSE