INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad -500 043

INEEINFORMATION TECHNOLOGY

COURSE DESCRIPTOR

Course Title	**LINUX INTERNALS LABORATORY**				
Course Code	AIT105				
Programme	B. Tech				
Semester	VI				
Course Type	Core				
Regulation	IARE - R16				
Course Structure	**Theory**			**Practical**	
	Lectures	**Tutorials**	**Credits**	**Laboratory**	**Credits**
	3	1	4	3	2
Chief Coordinator	Mr.D. Rahul,Assistant Professor, Dept. of IT				
Course Faculty	Mr.A Krishna Chaitanya,Assistant Professor, Dept. of IT				

I.   COURSE OVERVIEW:

This course provides a deep understanding of the operating system architecture and low-level interfaces (principally, system calls and library functions) that are required to build system-level, multithreaded, and network applications on Linux and UNIX systems. The course consists of a mixture of detailed presentations coupled with a large number of carefully designed practical exercises that allow participants to apply the knowledge learned in the presentations. By the completion of the course, participants will have the mastery needed to write complex system, network, and multithreaded applications on a Linux or UNIX system.

II.   COURSE PRE-REQUISITES:

Level	Course Code	Semester	Prerequisites	Credits
UG	ACS001	I	Computer Programming	4
UG	AIT003	IV	Computer Networks	4

III.   MARKS DISTRIBUTION:

Subject	SEE Examination	CIA Examination	Total Marks
Linux Internals	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
2	2	2	2	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	Calculations of the observations
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.	2	Characteristic curves
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	Video
PO 5	**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.	3	Term observations

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 understand, analyze and develop computer programs in the areas related to algorithms, system software, multimedia, web design, big data analytics, and networking for efficient design of computer-based systems of varying complexity.	3	Characteristic curves
PSO 2	**Software Engineering Practices:** The ability to apply standard practices and strategies in software service management using open-ended programming environments with agility to deliver a quality service for business success.	2	Seminars

3 = High; 2 = Medium; 1 = Low

VIII. COURSE OBJECTIVES (COs):

The course should enable the students to:	
I	Familiar with the Linux command-line environment.
II	Understand system administration processes by providing a hands-on experience.
III	Understand Process management and inter-process communications 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
AIT105.01	CLO 1	Understand the Basic commands of Linux.	PO 1	3
AIT105.02	CLO 2	Understand the Basic commands	PO 1, PO 4	2

CLO Code	CLO's	At the end of the course, the student will have the ability to:	PO's Mapped	Strength of Mapping
		like cat, tail.		
AIT105.03	CLO 3	Understand basic shell scripting.	PO 1, PO 2	2
AIT105.04	CLO 4	Understand shell script execution.	PO 1, PO 2	2
AIT105.05	CLO 5	Perform the simulated cat command.	PO 2, PO 3	2
AIT105.06	CLO 6	Perform the simulated head, tail command.	PO 1, PO 5	2
AIT105.07	CLO 7	Perform the simulated mv, nll command	PO 2, PO 5	1
AIT0102.08	CLO 8	Understand the signal handling	PO 2	2
AIT105.09	CLO 9	Test the interprocess communication	PO 1, PO 3	2
AIT105.10	CLO 10	Test the message queues	PO 1	3
AIT105.11	CLO 11	Understand the shared memory from of IPC	PO 1, PO 2	2
AIT105.12	CLO 12	Understand the socket programming	PO 3, PO 5	1

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 Specific Outcomes (PSOs)														
	PO1	PO2	PO3	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CLO 1	3		3											
CLO 2		2		3								3		
CLO 3			2											
CLO 4	3		2											
CLO 5		2		3								3		
CLO 6			2										2	
CLO 7	3											3		
CLO 8			2									3		
CLO 9	3			3										
CLO 10	3		3											
CLO 11				3								3		
CLO 12		2												
CLO 13			3									3		

3 = High; 2 = Medium; 1 = Low

XI. ASSESSMENT METHODOLOGIES – DIRECT

CIE Exams	PO 1, PO 2 PO 3, PO 5	SEE Exams	PO 1, PO 2 PO 3, PO 5	Assignments	-	Seminars	-
Laboratory Practices	PO 1, PO 2 PO 3, PO 5	Student Viva	PO 1, PO 2 PO 3, PO 5	Mini Project	-	Certification	-

XII. ASSESSMENT METHODOLOGIES - INDIRECT

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

XIII. SYLLABUS

LIST OF EXPERIMENTS
Week-1 **BASIC COMMANDS I**
Study and Practice on various commands like man, passwd, tty, script, clear, date, cal, cp, mv, ln, rm, unlink, mkdir, rmdir, du, df, mount, umount, find, unmask, ulimit, ps, who, w.
Week -2 **BASIC COMMANDS II**
Study and Practice on various commands like cat, tail, head , sort, nl, uniq, grep, egrep,fgrep, cut, paste, join, tee, pg, comm, cmp, diff, tr, awk, tar, cpio.
Week-3 **SHELL PROGRAMMING I**
a) Write a Shell Program to print all .txt files and .c files.   b) Write a Shell program to move a set of files to a specified directory.   c) Write a Shell program to display all the users who are currently logged in after a specified time.   d) Write a Shell Program to wish the user based on the login time.
Week - 4 **SHELL PROGRAMMING II**
a) Write a Shell program to pass a message to a group of members, individual member and all.   b) Write a Shell program to count the number of words in a file.   c) Write a Shell program to calculate the factorial of a given number.   d) Write a Shell program to generate Fibonacci series.
Week -5 **SIMULATING COMMANDS I**
a) Simulate cat command b) Simulate cp command
Week-6 **SIMULATING COMMANDS II**
a) Simulate tail command b) Simulate head command.
Week-7 **SIMULATING COMMANDS III**
a) Simulate mv command b) Simulate nl command
Week-8 **SIGNAL HANDLING**
Write a program to handle the signals like SIGINT, SIGDFL, SIGIGN
Week-9 **INTERPROCESS COMMUNICATIONS I**
Implement the following IPC forms   a) FIFO b) PIPE.
Week-10 **MESSAGE QUEUES**
a) Write a C program (sender.c) to create a message queue with read and write permissions to write 3 messages to it with different priority numbers.   b) Write a C program (receiver.c) that receives the messages (from the above message queue as specified and displays them.

Week -11	SHARED MEMORY
Implement shared memory form of IPC.	

Week -12	SOCKET PROGRAMMING
a)	Write client and server programs (using c) for interaction between server and client processes using TCP Elementary functions.
b)	Write client and server programs (using c) for interaction between server and client processes using UDP Elementary functions.

Reference Books:

1. Jiawei Han, Michelin Kamber, "Data Mining-Concepts and techniques", Morgan Kaufmann Publishers, Elsevier, 2nd Edition, 2006.
2. Alex Berson, Stephen J.Smith, "Data warehousing Data mining and OLAP", Tata McGraw-Hill, 2nd Edition, 2007.

Web References:

1. Arum K Pujari, "Data Mining Techniques", 3rd Edition, Universities Press, 2005
2. PualrajPonnaiah, Wiley, "Data Warehousing Fundamentals", Student Edition, 2004.
3. Ralph Kimball, Wiley, "The Data warehouse Life Cycle Toolkit", Student Edition, 2006

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	Understand the Basic commands of Linux.	CLO 1, CLO 2	T1:1.4 R1:1.2
2	Understand the Basic commands like cat, tail.	CLO 1, CLO 2	T1:1.5 R1:2.4
3	Understand basic shell scripting.	CLO 1, CLO 2, CLO 3, CLO 4	T1:2.5 R1:2.5
4	Understand shell script execution.	CLO 1, CLO 2, CLO 3, CLO 4	T1:2.5 R1:2.6
5	Perform the simulated cat command.	CLO 3, CLO 4, CLO 5	T1:22.7
6	Perform the simulated head, tail command.	CLO 3, CLO 4, CLO 5, CLO 6	T1:6.3 R1:5.3
7	Perform the simulated mv, nll command	CLO 3, CLO 4, CLO 5, CLO 6,CLO 7	T1:7.5 R1:6.3
8	Understand the signal handling	CLO 1, CLO 2, CLO 8	T1:8.5 R1:6.8
9	Test the interprocess communication	CLO 1, CLO 3, CLO 6, CLO 9	T1:12.2 R1:13.1
10	Test the message queues	CLO 8, CLO 9, CLO 10	T1:12.3 R1:13.2
11	Understand the shared memory from of IPC	CLO 8, CLO 9, CLO 11	T1:12.10 R1:13.7
12	Understand the socket programming	CLO 8, CLO 9, CLO 12	T1:11.2 R1:10.2

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

S NO	Description	Proposed actions	Relevance with POs	Relevance with PSOs
1	To improve standards and analyze the concepts.	GuestLecture	PO 1, PO 4	PSO 1
2	Conditional probability, Sampling distribution, correlation,	GuestLecture / NPTEL	PO 4, PO3	PSO 1

	regression analysis and testing of hypothesis			
3	Encourage students to solve real time applications.	NPTEL	PO 2	PSO 1

Prepared by:
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