

Uka Tarsadia University



<<BCA>>

LINUX and Shell Programming (030010502)

5thSemester

EFFECTIVE FROM JUNE-2013

UKA TARSADIA UNIVERSITY			
BCA (5th Semester) Syllabus, 2014-2015			
Course Code: 0300100502		Course Title: LINUX and Shell Programming	
Course Credits: 04		Total Hours: 48	[Lectures: 04, Tutorial: 00, Practical: 03]
Prerequisites:		030010304-Fundamentals of Operating Systems	
Prerequisites By Topics:		Operating system functions	
Objectives:		To provide the student with the skills necessary for working with UNIX/LINUX operating system environment, various utilities for file management, process management, pattern matching and to develop shell script.	
1	Introduction to UNIX /LINUX Operating System		[08 Hours]
	1.1.	Features of UNIX/LINUX Operating System	
	1.2.	UNIX/LINUX Structure: Kernel and Shell	
	1.3.	Basic Commands, Accessing Help in UNIX/LINUX	
	1.4.	Filenames and Using Wild Cards	
	1.5.	Types of Files	
	1.6.	UNIX/LINUX File System: Four Block of File Systems, Directory Hierarchy	
	1.7.	Operations and Utilities for Directory and Files	
2	Security, File Permissions and Job Control		[08 Hours]
	2.1.	Users, group and ownership of files	
	2.2.	Security levels and shell customization: Environment variables	
	2.3.	File permissions: File attribute, permissions and changing file permissions	
	2.4.	User masks, changing ownership and groups	
	2.5.	Job control: process, jobs, foreground and background jobs, ps command, job commands	
	2.6.	job scheduling: at and batch commands, cron jobs	
3	Introduction to Shell		[08 Hours]
	3.1.	UNIX shell and its types	
	3.2.	Features of shell: standard streams, redirection, pipes	
	3.3.	Command execution: sequenced, grouped, chained and conditional command, exit status of command	
	3.4.	Quotes and command substitution: backslash, double quotes and single quotes, Command substitutions and eval command	
	3.5.	Special files: trace file and terminal files	
	3.6.	Environmental variables, startup scripts and command history	
	3.7.	Shell's interpretive cycle	
4	Filters and Communication Utilities		[07 Hours]
	4.1.	Filters: Introduction, using pipe with filters	
	4.2.	Concatenating files	
	4.3.	Display beginning and end of files	
	4.4.	Splitting files, cut, paste, sorting and translating characters	
	4.5.	Files with duplicate lines, counting character, words and lines and comparing files	
	4.6.	Communication utilities	
5	Shell Programming		[07 Hours]
	5.1.	Basic script concept	
	5.2.	Shell variable: predefined variables and user defined variable, storing value in variable and accessing it, unsetting variables, storing filenames, content and command in variable.	
	5.3.	Input: reading word by word, line by line and from file	
	5.4.	Expression	
	5.5.	Decisions and repetition	
	5.6.	Special parameters and variables	
	5.7.	Changing positional parameters and argument validation	

	5.8.	String manipulation	
6	Regular Expression and Utilities		[10 Hours]
	6.1.	Regular expressions: atoms and operators	
	6.2.	grep: working of grep	
	6.3.	grep family	
	6.4.	sed utility	
	6.5.	awk: fields and records, awk script, operation, patterns and actions	
	6.6.	Associative array in awk	
	6.7.	Functions in awk: string functions, mathematical functions and user defined functions	

Course Outcomes:

C01:	Understand the need for study of UNIX/LINUX environment.
C02:	Understand and use of basic utility and wild card to work with UNIX/LINUX environment.
C03:	Understand and use of shell features of redirection, pipe, grouping commands, joining commands and running jobs.
C04:	Develop, debug & execute shell script to carry out routine task.
C05:	Develop and use of regular expression with pattern matching utilities.

Course Objectives and Course Outcomes Mapping:

Working with UNIX/LINUX operating system environment: C01, C02

Use of utilities for file management and process management: C02, C03

Identify pattern matching: C05

To develop shell script: C04

Course Units and Course Outcomes Mapping:

Unit No.	Unit	Course Outcome				
		C01	C02	C03	C04	C05
1	Introduction to UNIX/LINUX Operating System, Architecture, Command Usage and File System	√	√			
2	Security, File permissions and Job control	√	√			
3	Introduction to Shell			√		
4	Filters and communication utilities			√		
5	Shell Programming			√	√	
6	Working with Regular Expression and utilities grep, sed and awk					√

Laboratory:

❖	There shall be at least 30 lists of problems and other extra practice questions in practical list.
❖	The practical list shall not be repeated for next two consecutive years.
❖	After approved by course co-ordinator, the list of problem definitions shall be kept by concern teacher on web site before the commencement of the semester.
❖	Single problem statement may consist of many command exercise to be solved.
❖	Viva shall be conducted when the practical problem solution are checked in the journal by laboratory supervisor and/or subject teacher.
❖	Laboratory supervisor and/or course teacher shall sign in the index/journal only after he/she feels satisfied by student work.
❖	The journal shall be verified at the end of 4 th unit by subject teacher.
❖	Journal shall not be certified if required number of problems are not included and not written clearly or copied.
❖	The practical list contain the problem as follows:

Unit	Minimum	Required No. of	Remarks
------	---------	-----------------	---------

No.	No. of problem	problem to get journal certified	
1	5	5	Covering topics: 1.3, 1.4 & 1.7
2	5	5	Covering all topics from Unit 2
3	10	5	Covering topics: 3.2 to 3.7.
4	10	5	Covering topics: 4.2 to 4.6
5	10	5	Covering all sub- topics from unit 5.
6	10	5	Covering topics: 6.3 to 6.6

Hands-on experience activity:

❖	Students will be practicing with several Laboratory experiments (i.e. problem definition), which will be announced separately for each unit.
❖	Students will execute commands and write shell script in bash solutions to satisfy the requirements for the laboratory experiments.
❖	There will be 2 hours laboratory associated to one week time frame.
❖	For hands-on, following points shall be followed: <ul style="list-style-type: none"> ○ The practical list contains commands for unit 1, 2, 4 & 6 and problem statements to develop shell script for unit 3, 5 & 6 will be provided by the teacher before the commencement of the semester. ○ Each student would individually solve the practical list questions, write output and would demonstrate the same as and when asked by the teacher. ○ All questions provided in the list must be solved by end of the semester. ○ Student would maintain an index of practical list and would get it signed by course teacher as soon as the problem solution is demonstrated.

Computing Environment:

	A student shall have the following computing environment in laboratory as well as on their person laptop.
❖	LINUX operating system or having account on LINUX system and remote login utility

Modes of Transaction (Delivery):

Appropriate methods of teaching shall be decided depending on the objectives of the content taught.

❖	Lecture method is generally used but along with it, as and when required, hands on during lecture would be fruitful. It shall be supplemented with various appropriate audio-visual aids.
❖	Activity assignment may be given to the students. Assignment method would help them to learn by doing.
❖	Seminar may be used to teach in-depth view utilities.
❖	Self Study of following part of the syllabus shall be done by the students: 4.6 - Communication utilities, 6.7 User defined functions in awk

Activities/Practicum:

	The following activities shall be carried out by the students.
❖	Collection of output generated by utilities.
❖	Collect importance and content of configuration files.
❖	Students may prepare chart on various flavor of LINUX, important files and directory etc.
❖	Historical study of the UNIX operating system.
	The following activities shall be carried out by the teacher.
❖	Demonstrate Linux operating system installation.
❖	Demonstrate commands by hands on.
❖	Discuss booting process of LINUX operating system.

Text Book:

1.	Forouzan B. A., Gilberg R. R. - UNIX and Shell Programming - Thomson
----	--

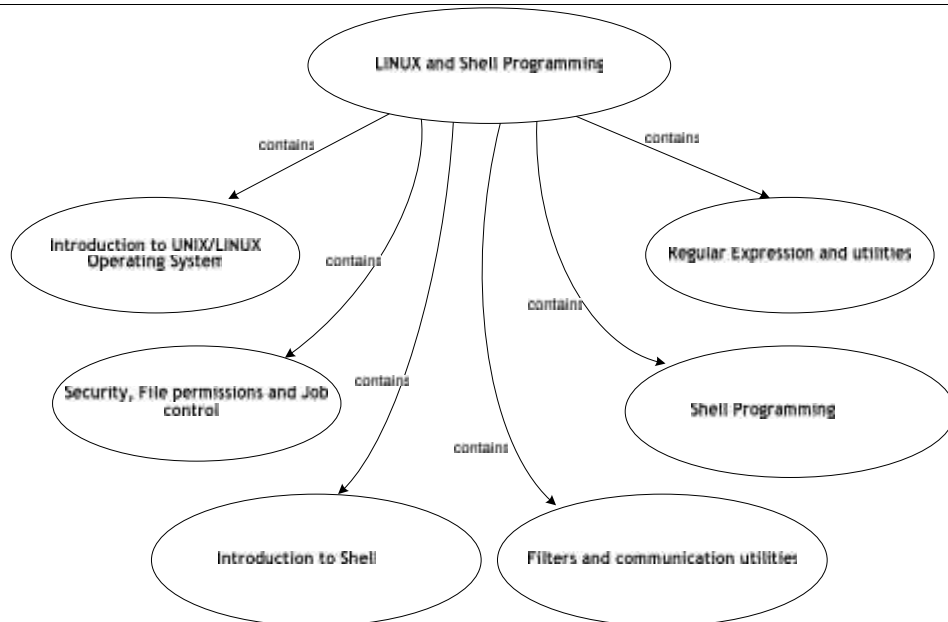
Reference Books:

1.	Das S. - UNIX Concepts and Applications - McGraw-Hill
2.	Saurabh K. - UNIX Programming the first drive - Willey
3.	Venkateshmurthy M. G. - UNIX & Shell Programming - PEARSON
4.	Ramasatish A. - UNIX Programming - SCITECH

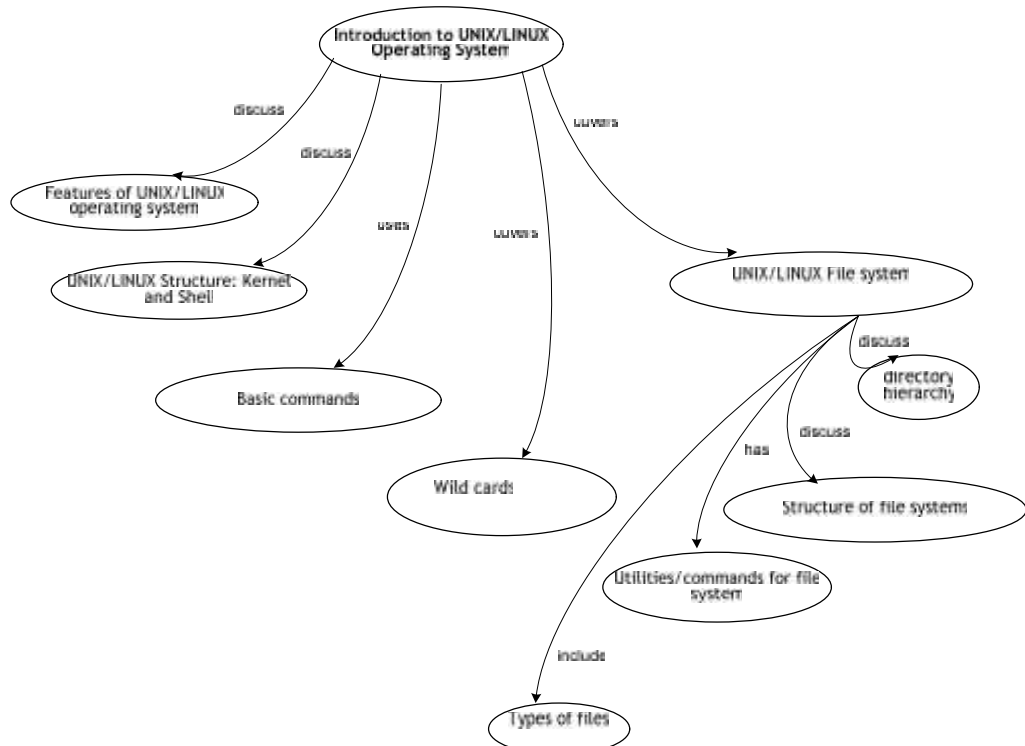
Concept Map:

It is a hierarchical / tree based representation of all topics covered under the course. This gives direct / indirect relationship / association among topics as well as subtopics.

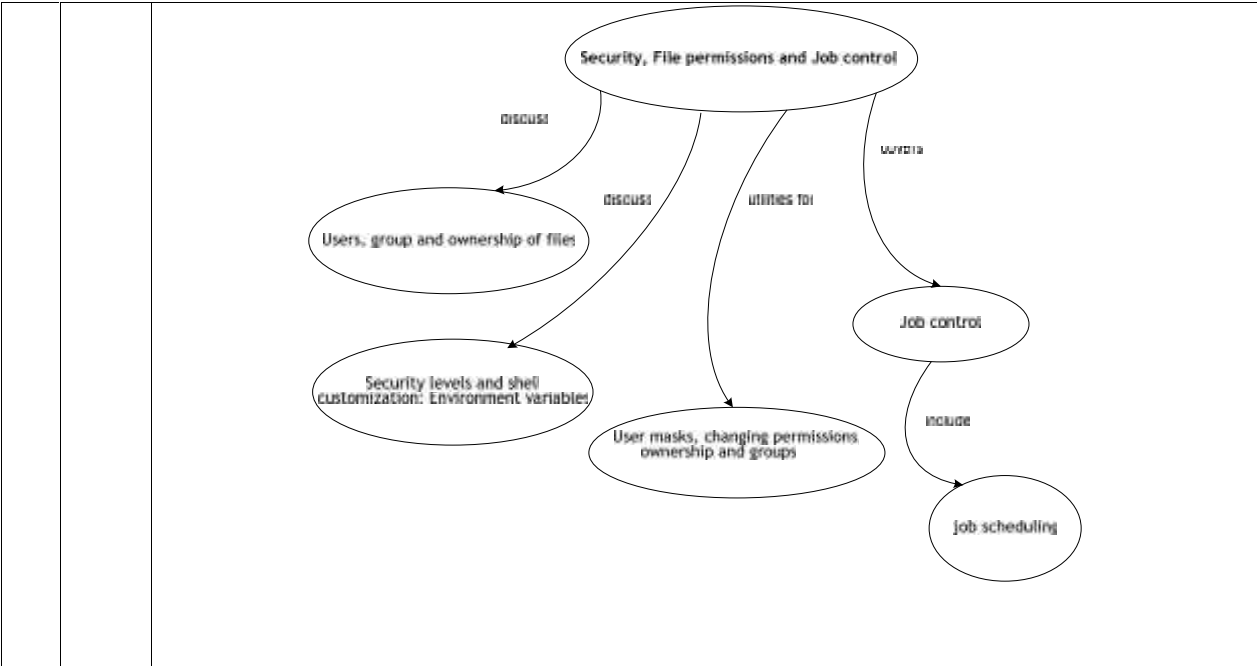
Course : Linux and Shell Programming



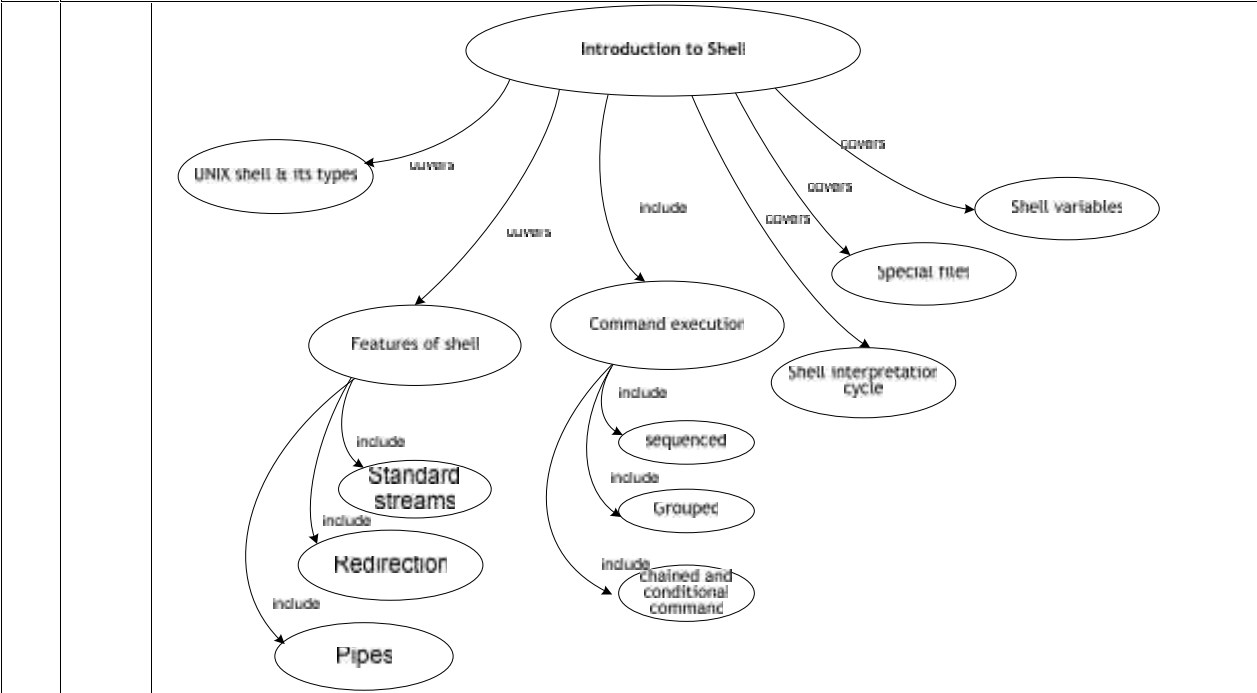
Unit-1: Introduction to UNIX/LINUX Operating System



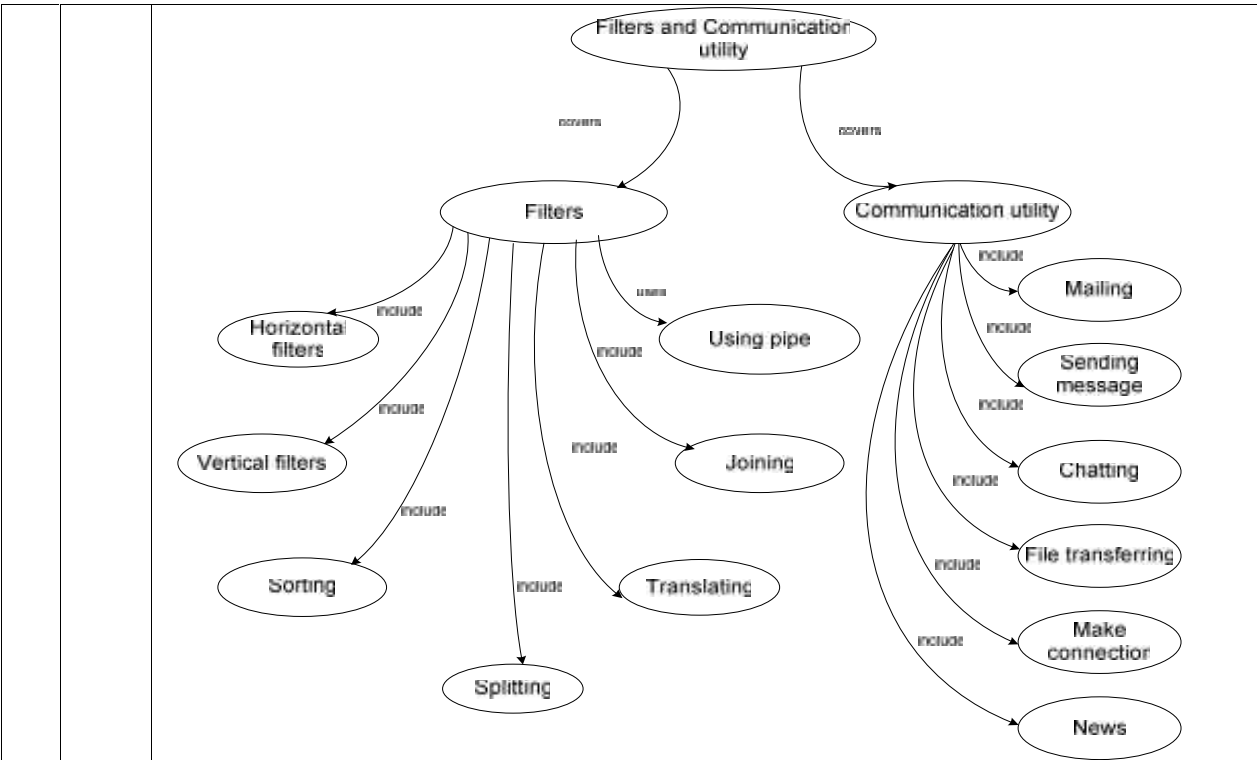
Unit-2: Security, File permissions and Job control



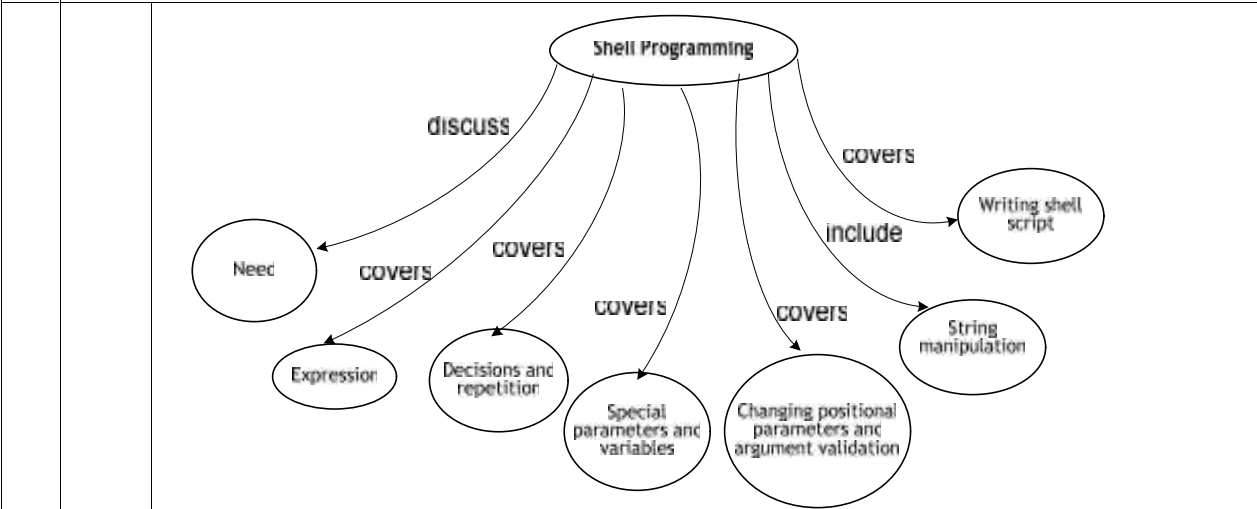
Unit-3: Introduction to Shell



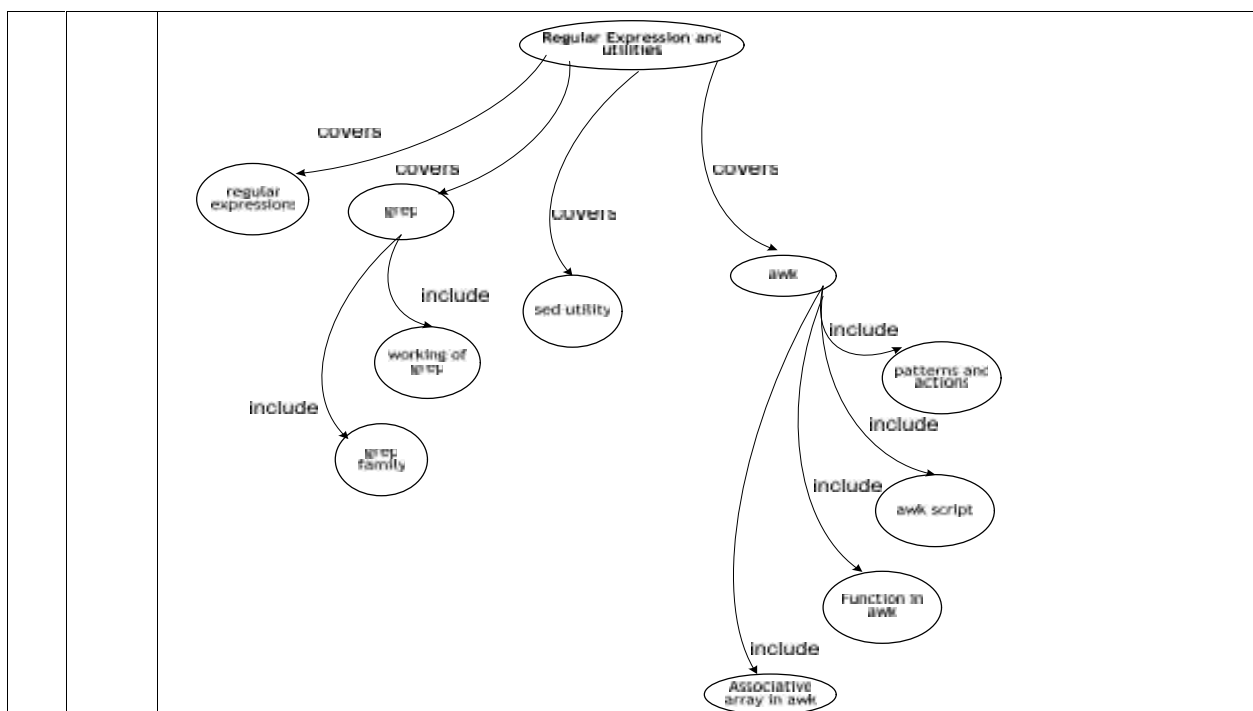
Unit-4: Filters and Communication Utilities



Unit-5: Shell Programming



Unit-6: Regular Expression and Utilities



Assessment:

The weightage of CIE and University examination shall be as per the University regulations.

Composition of CIE shall be

Assessment Code	Assessment Type	Duration of each	Occurrence	Each of marks	Weightage in CIE of 40 marks	Remarks
A1	Quiz	30 Min	4	20	3×4=12	Taken at the end of unit 1, 2 and 4, 6.
A2	Unit Test	45 mins.	2	20	4×2=8	Taken at the end of unit 3, 5
A3	Assignment/ Seminar		2	25	5×1=5	-
A4	Internal Examination	3 hrs.	1	50	15×1=15	-

❖ Syllabus for each CIE parameter shall be covered by the date of the corresponding test.

❖ No make-up work shall be accepted for missed or failed tests.

❖ Late submission shall be penalized as 5% of full marks per day for maximum two days after the cut off date. No submission shall be accepted thereafter with the corresponding mark set to 0.

Course Assessment with Course Outcomes Mapping

Assessment	Course Outcomes				
	C01	C02	C03	C04	C05
A1	√	√			√
A2			√	√	
A3	√	√	√		
A4	√	√	√	√	√

Question Bank:

Question Bank must be prepared which consists of several types of questions namely Multiple Choice Questions, Fill in the blanks, Short type questions, long type questions and command exercises. It shall also consist of practical

	list, app definition and practice questions.
Academic Honesty:	
	Coursework is assumed to be accomplished individually (otherwise stated). Any portion of submission taken directly from anywhere (like statements in assignment/report etc.) without modification must be accompanied with the properly formatted reference giving credit to the author and to the source.
UFM:	
	<ul style="list-style-type: none"> ❖ If two or more submitted papers are too similar for coincidence, a penalty shall be imposed that shall usually be the same for the student who did the original as for the one copying from it. ❖ Any ascertained fact of breaking institute policy shall be associated with one or all of the following: (i) zero marks for the work; (ii) report to the Course coordinator; (iii) report to the Director.
Discussion Group:	
	Students are welcome to post on the Course Discussion Board available on SRIMCA View Course Webpage. It is responsibility of the concern subject teacher to maintain Discussion Board.
Attendance:	
	<ul style="list-style-type: none"> ❖ Attendance means being present for the entire class session. Those arriving significant late or leaving significantly early without prior permission shall be counted as ABSENT for the entire class session. ❖ Concern teacher must clearly state his/her attendance policies at the first class meeting.