JYOTI NIVAS COLLEGE AUTONOMOUS
SYLLABUS FOR 2018 BATCH AND THEREAFTER

Programme: B.Sc.   **Semester: V**

COMPUTER SCIENCE – VI(A)

UNIX & SOFTWARE ENGINEERING

Course Code: 18VCS6A   **No. of Hours: 45**

COURSE OBJECTIVES:

- To study the need for operating system with the advent of existing technologies.
- To learn about the Unix general purpose commands, file management and permission commands etc.
- Knowledge of basic Software Engineering methods and practices, and their appropriate application.
- An understanding of some ethical and professional issues those are important for software engineers.

LEARNING OUTCOMES:

- An understanding of some ethical and professional issues those are important for software engineers.
- The ability to work in one or more significant application domains
- Student will have clear understanding about the file management and permission commands.

UNIT I   **(09 HRS)**
Introduction: History - Salient features of Unix - Unix system architecture**.**
Unix File System: Unix file system - listing files and directories - file and directory permissions - Boot Block, Super Block, Inode Table, Data Blocks - How does Unix access files.
File and directory related Unix commands: ls, cat, mkdir, rmdir, cd, cp, mv, ln- File and Directory permissions – chmod command and usage.

UNIT II   **(09 HRS)**
Essential Unix commands: passwd, cal, bc, tty, touch, file, wc, sort, cut, grep, dd, viewing files: head, tail, more, pg, Taking printouts: lp, lpstat, cancel, **File Compression**: compress, pack, uncompress, unpack, online Unix manual: man.
I/O Redirection and Piping: I/O redirection - Piping –Filter commands

UNIT III   **(09 HRS)**
Processes in Unix: Process creation - Process killing - Background process - Changing process priorities
Shell Programming - Basics: Types of Shells - Shell variables - Shell parameters.
Shell Programming: Control Structures: If, while, until, for, continue.

UNIT IV   **(09 HRS)**

Introduction to Software Engineering: Software characteristics, components, software process model: Classic Life cycle model, Spiral model, Prototyping model.
Software Cost Estimation: Cost factors, cost estimation technique: COCOMO Model.
Software Requirements: Software requirement specification, SRS document.

UNIT V   **(09 HRS)**
Software Design: Fundamental design concepts, design notations, design techniques.
Coding: Qualities of good code, Coding style, Verification and validation.
Testing: Different types of Testing- Debugging.
Software maintenance: Types of maintenance.

REFERENCES

1. Yashwant P.Kanethkar. *Unix Shell programming*. BPB Publications.2005. 6th Edition.

2. Sumitabha Das. *UNIX Concepts and Applications*. Tata McGraw-Hill Education, 2006. 4th Edition.

3. Brian W. Kernighan and Rob Pike. *The Unix programming environment*. Prentice-Hall.1984. 2nd Edition.

4. Roger S Pressman. *Software Engineering*. Tata Mc Graw Hill Publishers. 2001.5th Edition.

Ian Somenville. *Software Engineering*. Pearson Education Publishers. 2001. 6th Edition.

COMPUTER SCIENCE VI(A)

UNIX PROGRAMMING-LAB

No. of Hours: 45

COURSE OBJECTIVES:

- Use the standard Unix editor 'vi'
- The various types of commands such as basic commands, directory and file related, pipe and filter related commands are executed on the shell.

LEARNING OUTCOMES:

- How to write shell script and debug it
- Implement shell scripts using this editor involving decision control, looping and control flow statements.

PART – A

1. Write a Shell program to implement ten UNIX commands.
2. Write a Shell program to perform arithmetical calculator.
3. Write a Shell program using menu 1) To print given numbers sum of all digit 2) print it in words.
4. Write a shell script that computes the gross salary of an employee according to the following

1) if basic salary is <15000 then HRA 10% of the basic and DA =90% of the basic
2) if basic salary is >=15000 then HRA 5000 and DA =98% of the basic
The basic salary is entered interactively through the key board

5. Write a program to convert the given decimal number to binary and vice versa.
6. Write a program to accept a string find length, print the reverse demonstrating string library
   functions.
7. Write a menu driven program 1) To check if user has logged in or not 2) Send a mail.
8. Write a program to create a file containing patterns 1) Replace and 2) Delete the pattern.

PART B

1. Write a Shell Script 1) Search a pattern in a file 2) File compression commands.
2. Write a shell program 1) convert the lower case to uppercase 2) to read 10 names from a file and sort in ascending order, descending order.
3. Write a Shell script 1) to wish according to day time. 2) To check the given file is a directory or not.
4. Shell script to generate the Electricity Bill of a customer.
5. Write a Shell program 1) to find out factorial of the given number 2) Multiplication table for a number.
6. Write a menu driven shell script program to demonstrate the tail, cmp, uniq and rm command.
7. Write Shell script to generate a Mark Sheet for a student.
8. Write a shell script to determine the period for which a specified user is working on the system.

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Programme: B.Sc.   **Semester: V**

COMPUTER SCIENCE – VI(B)

DATA ANALYTICS USING R PROGRAMMING

Course Code: 18VCS6B   **No. of Hours: 45**

COURSE OBJECTIVES:

- Learn Fundamentals of R.
- Covers how to use different functions in R, how to read data into R, accessing R packages, writing R functions, debugging, and organizing data using R functions.
- Cover the Basics of statistical data analysis with examples.
- The whole syllabus will give an idea to collect, compile and visualize data using statistical functions.

LEARNING OUTCOMES:

- Understand the basics of Fundamentals of R.
- Understands the loading, retrieval techniques of data.
- Understand how data is analysed and visualized using statistic functions.

UNIT I   **(08 HRS)**

Introduction to R: What is R? – Why R? – Advantages of R over Other Programming Languages - R Studio: R command Prompt, R script file, comments – Handling Packages in R: Installing a R Package, Few commands to get started: installed.packages(), packageDescription(), help(), find.package(), library() - Input and Output – Entering Data from keyboard – Printing fewer digits or more digits – Special Values functions : NA, Inf and –inf.

UNIT II   **(08 HRS)**

R Data Types: Vectors, Lists, Matrices, Arrays, Factors, Data Frame – **R - Variables:** Variable assignment, Data types of Variable, Finding Variable ls(), Deleting Variables - **R Operators**: Arithmetic Operators, Relational Operators, Logical Operator, Assignment Operators, Miscellaneous Operators - **R Decision Making:** if statement, if – else statement, if – else if statement, switch statement – **R Loops:** repeat loop, while loop, for loop - Loop control statement: break statement, next statement.

UNIT III   **(10 HRS)**

R-Function : function definition, Built in functions: mean(), paste(), sum(), min(), max(), seq(), user-defined function, calling a function, calling a function without an argument, calling a function with argument values - **R-Strings** – Manipulating Text in Data: substr(), strsplit(), paste(), grep(), toupper(), tolower() - **R Vectors –** Sequence vector, rep function, vector access, vector names, vector math, vector recycling**,** vector element sorting **- R List -**

Creating a List, List Tags and Values, Add/Delete Element to or from a List, Size of List, Merging Lists, Converting List to Vector - **R Matrices –** Accessing Elements of a Matrix, Matrix Computations: Addition, subtraction, Multiplication and Division- **R Arrays:** Naming Columns and Rows, Accessing Array Elements, Manipulating Array Elements, Calculation Across Array Elements - **R Factors** –creating factors, generating factor levels gl().

UNIT IV (10 HRS)

Data Frames –Create Data Frame, Data Frame Access, Understanding Data in Data Frames: dim(), nrow(), ncol(), str(), Summary(), names(), head(), tail(), edit() functions - Extract Data from Data Frame, **Expand Data Frame**: Add Column, Add Row - Joining columns and rows in a Data frame rbind() and cbind() – Merging Data frames merge() – Melting and Casting data melt(), cast().

Loading and handling Data in R: Getting and Setting the Working Directory – getwd(), setwd(), dir() - **R-CSV Files** - Input as a CSV file, Reading a CSV File, Analyzing the CSV File: summary(), min(), max(), range(), mean(), median(), apply() - Writing into a CSV File – **R -Excel File** – Reading the Excel file.

UNIT V (09HRS)
Descriptive Statistics: Data Range, Frequencies, Mode, Mean and Median: Mean Applying Trim Option, Applying NA Option, Median - Mode **- Standard Deviation – Correlation - Spotting Problems in Data with Visualization:** visually Checking Distributions for a single Variable **- R –Pie Charts**: Pie Chart title and Colors – Slice Percentages and Chart Legend, 3D Pie Chart – **R Histograms** – Density Plot - **R – Bar Charts**: Bar Chart Labels, Title and Colors.

REFERENCES

1. Sandip Rakshit, R Programming for Beginners, McGraw Hill Education (India), 2017, ISBN : 978-93-5260-455-5.

2. Seema Acharya, Data Analytics using R, McGrawHill Education (India), 2018, ISBN: 978-93-5260-524-8.

3. Tutorials Point (I) simply easy learning, Online Tutorial Library (2018), *R Programming*, Retrieved from https://www.tutorialspoint.com/r/r_tutorial.pdf.

4. Andrie de Vries, Joris Meys, R for Dummies A Wiley Brand, 2nd Edition, John Wiley and Sons, Inc, 2015, ISBN: 978-1-119-05580-8

COMPUTER SCIENCE VI(B)
DATA ANALYTICS USING R PROGRAMMING LAB

No. of Hours: 45

COURSE OBJECTIVES:

- Demonstrate use of basic functions
- Create their own customized functions
- Construct tables and figures for descriptive statistics
- Learn to understand new data sets and functions by yourself
- Work on built in real time cases for analysis and visualization

LEARNING OUTCOMES:

- Enable to build programming logic and thereby developing skills in Programming
- Clear understanding on how to organize data and analyze data using real time examples

PART A

1. Write a program to check whether a year (integer) entered by the user is a leap year or not?
2. Write an R program to find the sum of natural numbers without formula using the if–else statement and the while loop.
3. Write a program that prints the grades of the students according to the marks obtained. The grading of the marks should be as follows.

Marks	Grades
800-1000	A+
700 – 800	A
500 – 700	B+
400-500	B
150 – 400	C
Less than 150	D

4. Write an R program to make a simple calculator that can add, subtract, multiply and divide using switch cases and functions.
5. Write a set of instructions to create the following matrix using vectors and rbind() function. Rename the rows to Lang1,Lang2 & Lang3 respectively and use the function to access any one elements using row names.

Rows	Columns			
	1	2	3	4
1	C#	Java	Cobol	.Net
MatrixOfTechnology 2	JavaScript	NodeJs	R	Azure
3	Power BI	ASP.Net	Unity	Block Chain

6. Write a program to perform searching within a list (1 to 50). If the number is found in the list, print that the search is successful otherwise print that the number is not in the list.

7. Create a list and data frame that stores the marks of any three subjects for 10 students. Find out the total marks, average, maximum marks and minimum marks of every subject.
8. Write the steps to import data from Excel to CSV files and apply data viewer functions like rm(),dim(), head(), tail(), sorting, filtering, searching to view few set of rows.

PART B

1. Write a program to create two 3 X 3 matrices A and B and perform the following operations
   a) Transpose of the matrix b) addition c) subtraction.
2. Write an R program to create a list containing strings, numbers, vectors and logical values and do the following manipulations over the list.
   a. Access the first element in the list
   b. Give the names to the elements in the list
   c. Add element at some position in the list
   d. Remove the element
   e. Print the fourth element
   f. Update the third element
3. Write an R program to create a Data Frame with following details and do the following operations.'

itemCode	itemCategory	ItemPrice
1001	Electronics	700
1002	Desktop Supplies	300
1003	Office Supplies	350
1004	USB	400
1005	CD Drive	800

   a.   Subset the Data frame and display the details of only those items whose price is greater than or equal to 350.
   b. Subset the Data frame and display only the items where the category is either "Office Supplies" or "Desktop Supplies"
   c. Create another Data Frame called "item-details" with three different fields itemCode, ItemQtyonHand and ItemReorderLvl and merge the two frames.
4. Let us use the built-in dataset air quality which has Daily air quality measurements in New York, May to September 1973. Create a histogram by using appropriate arguments for the following statements.
   a. Assigning names, using the air quality data set.
   b. Change colors of the Histogram
   c. Remove Axis and Add labels to Histogram
   d. Change Axis limits of a Histogram
   e. Create a Histogram with density and Add Density curve to the histogram
5. Design a data frame in R for storing about 20 employee details. Create a CSV file named "input.csv" that defines all the required information about the employee such as id, name, salary, start_date, dept. Import into R and do the following analysis.
   a. Find the total number rows & columns
   b. Find the maximum salary
   c. Retrieve the details of the employee with maximum salary
   d. Retrieve all the employees working in the IT Department

e. Retrieve the employees in the IT Department whose salary is greater than 20000 and write these details into another file "output.csv".

6. Create a dataset or table ['Smart Phone"] in an excel sheet that stores the mobile information [price, company name, model, SalePercent] of five different companies. Store at least 20 rows. Write the scripts and find out the output for the following information.
   a. Maximum price of the mobile of each company
   b. Minimum price of mobile of each company
   c. Average price of mobile of each company
   d. Total Price of mobile of each company

7. The ToothGrowth data are from a study which examined the growth of teeth in guinea pigs (n=10) in response to three dose levels of Vitamin C (0.5, 1, and 2 mg), which was administered using two delivery methods (orange juice or ascorbic acid). Data from the Tooth Growth Study is available as an R dataset and information about this study can be found by using R help.
   a. How many rows are there is ToothGrowth?
   b. What is the mean and standard deviation of Tooth length
   c. Which treatment is the best in terms of toothgrowth? Derive the findings based on correlation between Dosage and Length for both supplements.

8. Using the built in dataset mtcars which is a popular dataset consisting of the design and fuel consumption patterns of 32 different automobiles. The data was extracted from the 1974 Motor Trend US magazine, and comprises fuel consumption and 10 aspects of automobile design and performance for 32 automobiles (1973-74 models).
   Format
   A data frame with 32 observations on 11 variables
   [1] mpg Miles/(US) gallon, [2] cyl Number of cylinders
   [3] disp Displacement (cu.in.), [4] hp Gross horsepower
   [5] drat Rear axle ratio,[6] wt Weight (lb/1000)
   [7] qsec 1/4 mile time, [8] vs V/S, [9] am Transmission (0 = automatic, 1 = manual), [10] gear Number of forward gears, [11] carb Number of carburetors
   Answer the following using the functions from stats package.
   a. What is the total number of observations and variables in the dataset?
   b. Plot three distributions for each variable and determine whether continuous variables are normally distributed or not. If not, what is their skewness?
   c. What is the average difference of gross horse power(hp) between automobiles with 3 and 4 number of cylinders(cyl)? Also determine the difference in their standard deviations.
   d. Which pair of variables has the highest Pearson correlation?