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UNIVERSITY OF MYSORE

Estd. 1916

VishwavidyanilayaKaryasoudha
Crawford Hall, Mysuru- 570 005

No.AC2(S)/151/2020-21

Dated: 01.09.2023

Notification

Sub:- Syllabus and Scheme of Examinations of Computer Science (CB) (V & VI Semester) with effect from the Academic year 2023-24.

Ref:- 1. This office letter No: AC6/303/2022-23 dated: 28-07-2023.

2. Decision of BOS in Computer Science (CB) meeting held on 07-08-2023.

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The Board of Studies in Computer Science (CB) which met on 07-08-2023 has resolved to recommended and approved the syllabus and scheme of Examinations of Computer Science programme (V & VI Semester) with effect from the Academic year 2023-24.

Pending approval of the Faculty of Science & Technology and Academic Council meetings the above said syllabus and scheme of examinations are hereby notified.

The syllabus and scheme of Examinations contents may be downloaded from the University website i.e., www.uni-mysore.ac.in.

Registrar

Registrar
University of Mysore
Mysore

To:-

1. All the Principal of affiliated Colleges of University of Mysore, Mysore.
2. The Registrar (Evaluation), University of Mysore, Mysuru.
3. The Chairman, BOS/DOS, in Computer Science (CB), Manasagangothri, Mysore.
4. The Director, Distance Education Programme, Moulya Bhavan, Manasagangotri, Mysuru.
5. The Director, PMEB, Manasagangothri, Mysore.
6. Director, College Development Council , Manasagangothri, Mysore.
7. The Deputy Registrar/Assistant Registrar/Superintendent, Administrative Branch and Examination Branch, University of Mysore, Mysuru.
8. The PA to Vice-Chancellor/ Registrar/ Registrar (Evaluation), University of Mysore, Mysuru.
9. Office Copy.

Syllabus for Bachelor of Science in Computer Science(V & VI Sem)

Model Curriculum Structure

Program: B.Sc **Subject: Computer Science**

Syllabus for BSc Programme with two core subjects as majors (both with practicals).

Semester	Course No.	Theory/Practical	Credits	Paper Title	Marks	
					S.A.	I.A.
V	DSC5	Theory	4	Programming in Python	60	40
	DSC5-Lab	Practical	2	Python Programming Lab	25	25
	DSC6	Theory	4	Computer Networks	60	40
	DSC6-Lab	Practical	2	Computer Networks Lab	25	25
	SEC-4	Theory/Practical	3	Cyber Security	25	25
VI	DSC8	Theory	4	Web Technologies	60	40
	DSC8-Lab	Practical	2	Web Technologies Lab – Java Script, HTMS, CSS Lab	25	25
	DSC9	Theory	4	Statistical Computing & R Programming	60	40
	DSC9-Lab	Practical	2	R Programming Lab	25	25
	SEC-5	Theory/Practical	2	Internship	25	25

Program Name	**B.Sc.**	Semester	**V**
Course Title	**Programming in Python (Theory)**		
Course Code:	**DSC5**	No. of Credits	**04**
Contact hours	**52 Hours**	Duration of SEA/Exam	**2 hours**
Formative Assessment Marks	**40**	Summative Assessment Marks	**60**

Course Outcomes (COs): After the successful completion of the course, the student will be able to:

CO1	Setup python to develop simple applications
CO2	Understand the basic concepts in Python Programming
CO3	Learn how to write, debug and execute Python programs
CO4	Understand and demonstrate the use of advanced data types such as tuples, dictionaries and lists, Tuples and Sets
CO5	Design solutions for problems using object-oriented concepts in Python
CO6	Use and apply the different Python Libraries for GUI Interface, Data Analysis and Data Visualization.
C07	Extend the knowledge of python programming to build successful career in software development.

Contents	**52 Hrs**
Introduction to Features and Applications of Python; Python Versions; Installation of Python; Python Command Line mode and Python IDEs; Simple Python Program. **Python Basics:** Identifiers; Keywords; Statements and Expressions; Variables; Operators; Precedence and Association; Data Types; Indentation; Comments; Built-in Functions- Console Input and Console Output, Type Conversions; Python Libraries; Importing Libraries with Examples. **Python Control Flow:** Types of Control Flow; Control Flow Statements- if, else, elif, while loop, break, continue statements, for loop Statement; range () and exit () functions.	10
Exception Handling: Types of Errors; Exceptions; Exception Handling using try, except and finally. **Python Functions:** Types of Functions; Function Definition- Syntax, Function Calling, Passing Parameters/arguments, the return statement; Default Parameters; Command line Arguments; Key Word Arguments; Recursive Functions; Scope and Lifetime of Variables in Functions. **Strings:** Creating and Storing Strings; Accessing Sting Characters; the str() function; Operations on Strings- Concatenation, Comparison, Slicing and Joining, Traversing; Format Specifiers; Escape Sequences; Raw and Unicode Strings; Python String Methods.	10
Lists: Creating Lists; Operations on Lists; Built-in Functions on Lists; Implementation of Stacks and Queues using Lists; Nested Lists. **Dictionaries:** Creating Dictionaries; Operations on Dictionaries; Built-in Functions on Dictionaries; Dictionary Methods; Populating and Traversing Dictionaries. **Tuples and Sets:** Creating Tuples; Operations on Tuples; Built-in Functions on Tuples; Tuple Methods; Creating Sets; Operations on Sets; Built-in Functions on Sets; Set Methods.	10
File Handling: File Types; Operations on Files– Create, Open, Read, Write, Close Files; File Names and Paths; Format Operator.	10

Object Oriented Programming: Classes and Objects; Creating Classes and Objects; Constructor Method; Classes with Multiple Objects; Objects as Arguments; Objects as Return Values; Inheritance- Single and Multiple Inheritance, Multilevel and Multipath Inheritance; Encapsulation- Definition, Private Instance Variables; Polymorphism- Definition, Operator Overloading.	
GU Interface: The Tkinter Module; Window and Widgets; Layout Management- pack, grid and place. **Python SQLite:** The SQLite3 module; SQLite Methods- connect, cursor, execute, close; Connect to Database; Create Table; Operations on Tables- Insert, Select, Update. Delete and Drop Records. **Data Analysis:** NumPy- Introduction to NumPy, Array Creation using NumPy, Operations on Arrays; Pandas- Introduction to Pandas, Series and DataFrames, Creating DataFrames from Excel Sheet and .csv file, Dictionary and Tuples. Operations on DataFrames. **Data Visualisation:** Introduction to Data Visualisation; Matplotlib Library; Different Types of Charts using Pyplot- Line chart, Bar chart and Histogram and Pie chart.	12

Pedagogy: Lecture/ PPT/ Videos/ Animations/ Role Plays/ Think-Pair-Share/ Predict-Observe-Explain/ Demonstration/ Concept mapping/ Case Studies examples/ Tutorial/ Activity/ Flipped Classroom/ Jigsaw/ Field based Learning/ Project Based Learning/ Mini Projects/ Hobby Projects/ Forum Theatre/ Dance/ Problem Based Learning/ Game Based Learning/ Group Discussion/ Collaborative Learning/ Experiential Learning / Self Directed Learning etc.

References	
1	**Think Python How to Think Like a Computer Scientist,** Allen Downey et al., 2nd Edition, 2015, Green Tea Press. Freely available online @ https://www.greenteapress.com/thinkpython/thinkCSpy.pdf
2	**Introduction to Python Programming**, Gowrishankar S et al.,2019, CRC Press
3	**Python Data Analytics**: Data Analysis and Science Using Pandas, matplotlib, and the Python Programming Language, Fabio Nelli, 2015, Apress®
4	**Advance Core Python Programming**, Meenu Kohli, 2021, BPB Publications
5	**Core PYTHON Applications Programming**, Wesley J. Chun, 3rd Edition, 2012, Prentice Hall
6	**Automate the Boring Stuff**, Al Sweigart, 2015, No Starch Press, Inc.
7	**Data Structures and Program Design Using Python**, D Malhotra et al., 2021, Mercury Learning and Information LLC
8	http://www.ibiblio.org/g2swap/byteofpython/read/
9	https://docs.python.org/3/tutorial/index.html

Formative Assessment for Theory	
Assessment Occasion/ type	**Marks**
Internal Assessment Test 1	10%
Internal Assessment Test 2	10%
Quiz/ Assignment/ Small Project	10%
Seminar	10%
Total	**40 Marks**
Formative Assessment as per guidelines.	

Program Name	**B.Sc.**	Semester	**V**
Course Title	**Python Programming Lab (Practical)**	Practical Credits	**02**
Course Code	**DSC5-Lab**	Contact Hours	**04 Hours**
Formative Assessment	**25 Marks**	Summative Assessment	**25 Marks**

Practical Content

Part-A

1. Check if a number belongs to the Fibonacci Sequence
2. Solve Quadratic Equations
3. Find the sum of n natural numbers
4. Display Multiplication Tables
5. Check if a given number is a Prime Number or not
6. Implement a sequential search
7. Create a calculator program
8. Explore string functions
9. Implement Selection Sort
10. Implement Stack
11. Read and write into a file

Part-B

1. Demonstrate usage of basic regular expression
2. Demonstrate use of advanced regular expressions for data validation.
3. Demonstrate use of List
4. Demonstrate use of Dictionaries
5. Create SQLite Database and Perform Operations on Tables
6. Create a GUI using Tkinter module
7. Demonstrate Exceptions in Python
8. Drawing Line chart and Bar chart using Matplotlib
9. Drawing Histogram and Pie chart using Matplotlib
10. Create Array using NumPy and Perform Operations on Array
11. Create Data Frame from Excel sheet using Pandas and Perform Operations on DataFrames

Note: A minimum of 10 Programs should be done in each Part.

Program Name	**B.Sc.**	Semester	**V**
Course Title	**Computer Networks (Theory)**		
Course Code:	**DSC6**	No. of Credits	**04**
Contact hours	**52 Hours**	Duration of SEA/Exam	**2 hours**
Formative Assessment Marks	**40**	Summative Assessment Marks	**60**

Course Outcomes (COs): After the successful completion of the course, the student will be able to:

CO1	Define various data communication components in networking.
CO2	Describe networking with reference to different types of models and topologies.
CO3	Understand the need for Network and various layers of OSI and TCP/IP reference model.
CO4	Explain various Data Communications media.
CO5	Describe the physical layer functions and components
CO6	Identify the different types of network topologies and Switching methods.
CO7	Describe various Data link Layer Protocols.
CO8	Identify the different types of network devices and their functions within a network.
CO9	Analyze and Interpret various Data Kink Layer and Transport Layer protocols.
CO10	Explain different application layer protocols.

Contents	**52 Hrs**
Introduction: Computer Network: Definition, Goals, Structure; Broadcast and Point-To-Point Networks; Network Topology and their various Types; Types of Networks, Network software, Design issues for the layers, Connection-oriented vs. Connectionless service, Applications of Computer network, Protocols and Standards, The OSI Reference Model, The TCP/IP Protocol suite, Comparison between OSI and TCP/IP Reference model.	10
Physical Layer: Functions of Physical Layer**,** Analog signals, Digital signals, Transmission Impairment, Data Rate Limits, and Performance. Data Transmission Media: Guided Transmission Media, Magnetic Media, Twisted Pairs, Coaxial Cable, Power Lines, Fiber Optics, Wireless Transmission, Electromagnetic Spectrum, Radio Transmission, Microwave Transmission, Infrared Transmission, Light Transmission, Digital Modulation and Multiplexing, Public Switched Telephone Networks. Switching: Circuit switching, Message switching & Packet switching	12
Data Link Layer: Functions of Data Link Layer, Data Link Control: Framing, Flow and Error Control, Error Detection and Correction, High-Level Data Link Control (HDLC) & point to Point protocol (PPP), Channel Allocation Problem, Multiple Access: Radom Access (ALOHA, CSMA, CSMA/CD, CSMA/CA), Controlled Access (Reservation, Polling, Token Passing), Channelization (FDMA, TDMA, CDMA),	10
Wired LAN: Ethernet Standards and FDDI, Wireless LAN: IEEE 802.1 Ix and Bluetooth Standards. **Transport Layer:** Functions of Transport Layer, Elements of Transport Protocols: Addressing, Establishing and Releasing Connection, Flow Control & Buffering, Error Control, Multiplexing & De-multiplexing, Crash Recovery,	10
User Datagram Protocol (UDP): User Datagram, UDP Operations, Uses of UDP, RPC, Principles of Reliable Data Transfer: Building a Reliable Data Transfer Protocol, Pipelined Reliable Data Transfer Protocol, Go Back-N(GBN), Selective Repeat (SR). **Application layer:** Functions of Application layer, Application Layer Protocols: DNS, DHCP, WWW, HTTP, HTTPs, TELNET, FTP, SMTP, POP, IIMAP	10

Pedagogy: Lecture/ PPT/ Videos/ Animations/ Role Plays/ Think-Pair-Share/ Predict-Observe-Explain/ Demonstration/ Concept mapping/ Case Studies examples/ Tutorial/ Activity/ Flipped Classroom/ Jigsaw/ Field based Learning/ Project Based Learning/ Mini Projects/ Hobby Projects/ Forum Theatre/ Dance/ Problem Based Learning/ Game Based Learning/ Group Discussion/ Collaborative Learning/ Experiential Learning / Self Directed Learning etc.

References	
Reference Books:	
1	Andrew S Tanenbaum, David. J. Wetherall, ―Computer Networks‖, Pearson Education, 5th Edition,
2	Behrouz A. Forouzan, "Data Communications and Networking", Tata McGraw-Hill, Fourth Edition
3	Kurose and Ross, Computer Networking- A Top-Down approach, Pearson, 5th edition
4	William Stallings, Data and Computer Communications, 7th Edition,PHI.
4	http://highered.mheducation.com/sites/0072967757/index.html
7	Larry L. Peterson, Bruce S. Davie, -Computer Networks: A Systems Approach‖, Morgan Kaufmann Publishers, Fifth Edition, 2011.
8	Brijendrasingh, Data Communication and Computer Networks,PHI.

Formative Assessment for Theory	
Assessment Occasion/ type	**Marks**
Internal Assessment Test 1	10%
Internal Assessment Test 2	10%
Quiz/ Assignment/ Small Project	10%
Seminar	10%
Total	**40 Marks**
Formative Assessment as per guidelines.	

ProgramName	**B.Sc.**	Semester	**V**
Course Title	**Computer Networks Laboratory (Practical)**	Practical Credits	**02**
Course Code	**DSC6 Lab**	Contact Hours	**04 Hours**
Formative Assessment	**25 Marks**	Summative Assessment	**25 Marks**

Practical Content

Part A:

1. Prepare hardware and software specification for basic computer system and Networking.
2. Study of different types of Network cables and practically implement the cross-wired cable and straight through cable using clamping tool.
3. Identifying the networking devices on a network.
4. Configure the IP address of the computer.
5. Create a basic network and share file and folders.
6. Study of basic network command and Network configuration commands.
7. Installation process of any open-source network simulation software.

Part B:

1. Implement connecting two nodes using network simulator.
2. Implement connecting three nodes considering one node as a central node using network simulator. Implement a network to connect three nodes considering one node as a central node using network simulator
3. Implement bus topology using network simulator.
4. Implement star topology using network simulator.
5. Implement ring topology using network simulator.
6. Demonstrate the use of wireless LAN using network simulator.
7. Implement FTP using TCP bulk transfer using network simulator.
8. Implement connecting multiple routers and nodes and building a

Hybrid topology network simulator.

Links for open-source simulation software:

- NS3 software: https://www.nsnam.org/releases/ns-3-30/download/
- Packet Tracer Software: https://www.netacad.com/courses/packet-tracer
- GNS3 software: https://www.gns3.com/

Pedagogy: Demonstration, Hands on Simulation.

Program Name	**B.Sc./B.C.A**	Semester	**V**
Course Title	**Cyber Security(Theory)**		
Course Code:	**SEC-4**	No. of Credits	**02**
Contact hours	**30Hrs**	Duration of SEA/Exam	**01hrs**
Formative Assessment Marks	**25**	Summative Assessment Marks	**25**

Course Outcomes(COs): After the successful completion of the course, the student will be able to:

CO1	After completion of this course, students would be able to understand the concept of Cyber security and issues and challenges associated with it.
CO2	Students, at the end of this course, should be able to understand the cybercrimes, their nature, legal remedies and as to how report the crimes through available platforms and procedures.
CO3	On completion of this course, students should be able to appreciate various privacy and security concerns on online social media and understand the reporting procedure of inappropriate content, underlying legal aspects and best practices for the use of Social media platforms.

Contents	**30Hrs**
Module-I. Introduction to Cyber security: Defining Cyberspace and Overview of Computer and Web-technology, Architecture of cyberspace, Communication and web technology, Internet, World wide web, Advent of internet, Internet infrastructure for data transfer and governance, Internet society, Regulation of cyberspace, Concept of cyber security, Issues and challenges of cyber security.	10
Module-II . Cyber crime and Cyber law: Classification of cyber crimes, Common cyber crimes- cyber crime targeting computers and mobiles, cyber crime against women and children, financial frauds, social engineering attacks, malware and ransomware attacks, zero day and zero click attacks, Cybercriminals modus-operandi, Reporting of cyber crimes, Remedial and mitigation measures, Legal perspective of cyber crime, IT Act 2000 and its amendments, Cyber crime and offences, Organizations dealing with Cybercrime and Cyber security in India, Case studies.	10
Module III. Social Media Overview and Security: Introduction to Social networks. Types of Social media, Social media platforms, Social media monitoring, Hashtag, Viral content, Social media marketing, Social media privacy, Challenges, opportunities and pitfalls in online social network, Security issues related to social media, Flagging and reporting of inappropriate content, Laws regarding posting of inappropriate content, Best practices for the use of Social media, Case studies.	10

Pedagogy: Problem Solving

Formative Assessment for Theory	
Assessment Occasion/type	**Marks**
Internal Test1	30%
Assignment/Surprise Test	20%
Total	**25Marks**
Formative Assessment as per guidelines.	

Text/References	
1	Cyber Crime Impact in the New Millennium, by R. C Mishra , Auther Press. Edition 2010
2	Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives by Sumit Belapure and Nina Godbole, Wiley India Pvt. Ltd. (First Edition, 2011)
3	Security in the Digital Age: Social Media Security Threats and Vulnerabilities by Henry A. Oliver, Create Space Independent Publishing Platform. (Pearson , 13th November, 2001)
4	Cyber Laws: Intellectual Property & E-Commerce Security by Kumar K, Dominant Publishers.
5	Fundamentals of Network Security by E. Maiwald, McGraw Hill.
6	Network Security Bible, Eric Cole, Ronald Krutz, James W. Conley, 2nd Edition, Wiley India Pvt. Ltd.

Program Name	**B.Sc.**	Semester	**VI**
Course Title	**Web Technologies (Theory)**		
Course Code:	**DSC8**	No. of Credits	**04**
Contact hours	**52 Hours**	Duration of SEA/Exam	**2 hours**
Formative Assessment Marks	**40**	Summative Assessment Marks	**60**

Course Outcomes (COs): After the successful completion of the course, the student will be able to:

CO1	Understand basics of web technology
CO2	Recognize the different Client-side Technologies and tools like, HTML, CSS, JavaScript
CO3	Learn Java Servlets and JDBC
CO4	Web Technology for Mobiles and Understand web security

Contents	**52 Hrs**
Introduction and Web Design: Introduction to Internet, WWW and Web 2.0, Web browsers, Web protocols and Web servers, Web Design Principles and Web site structure, client-server technologies, Client-side tools and technologies, Server-side Scripting, URL, MIME, search engine, web server- Apache, IIS, proxy server, HTTP protocol. Introductions to HTML. HTML5 Basics tags, Formatting tags in HTML, HTML5 Page layout and Navigation concepts, Semantic Elements in HTML, List, type of list tags, tables and form tags in HTML,multimedia basics, images, iframe, map tag, embedding audio and video clips on webpage.	11
Introduction to XML: XML Syntax, XML Tree, Elements, Attributes, Namespace, Parser, XSLT DOM, DTD, Schema. Introduction to CSS, CSS syntax, CSS selectors, CSS Background Cursor, CSS text fonts, CSS-List Tables, CSS Box Modeling, Display Positioning, Floats, CSS Gradients, Shadows, 2D and 3 Transform, Transitions, CSS Animations.	10
Introduction to JavaScript: JavaScript Data type and Variables, JavaScript Operators, Conditional Statements, Looping Statements, JavaScript Functions, Number, Strings, Arrays, Objects in JavaScript, Window and Frame objects, Event Handling in JavaScript, Exception Handling, Form Object and DOM, JSON, Browser Object Model.	11
Introduction to Servlets: Common Gateway Interface (CGI), Lifecycle of a Servlets, deploying a Servlets, The Servlets API, Reading Servlets parameters, reading initialization parameters, Handling HTTP Request & Responses, Using Cookies and sessions, connecting to a database using JDBC.	10
Web Security: Authentication Techniques, Design Flaws in Authentication, Implementation Flaws in Authentication, Securing Authentication, Path Traversal Attacks. Injecting into Interpreted Contexts, SQL Injection, NoSQL Injection, XPath Injection, LDAP Injection, XML Injection, HTTP Injection, Mail Service Injection. Types of XSS, XSS in Real World, Finding and Exploiting XSS Vulnerabilities, Preventing XSS Attacks.	10

Pedagogy: Lecture/ PPT/ Videos/ Animations/ Role Plays/ Think-Pair-Share/ Predict-Observe-Explain/ Demonstration/ Concept mapping/ Case Studies examples/ Tutorial/ Activity/ Flipped Classroom/ Jigsaw/ Field based Learning/ Project Based Learning/ Mini Projects/ Hobby Projects/ Forum Theatre/ Dance/ Problem Based Learning/ Game Based Learning/ Group Discussion/ Collaborative Learning/ Experiential Learning / Self Directed Learning etc.

Formative Assessment for Theory	
Assessment Occasion/ type	**Marks**
Internal Assessment Test 1	10%
Internal Assessment Test 2	10%
Quiz/ Assignment/ Small Project	10%
Seminar	10%
Total	**40 Marks**
Formative Assessment as per guidelines.	

References	
1	Web Programming, building internet applications, Chris Bates 2nd edition, Wiley Dremtech
2	Java Server Pages – Hans Bergsten, SPD O'Reilly
3	Java Script, D.Flanagan, O'Reilly, SPD
4	Beginning Web Programming-Jon Duckett WROX.
5	Web Applications : Concepts and Real World Design, Knuckles, Wiley-India
6	Internet and World Wide Web – How to program, Dietel and Nieto, Pearson.

Program Name	**B.Sc.**	Semester	**VI**
Course Title	**Web Technologies Lab**		
Course Code:	**DSC8-Lab**	No. of Credits	**02**
Contact hours	**04 Hours per week**	Duration of SEA/Exam	**2 hours**
Formative Assessment Marks	**25**	Summative Assessment Marks	**25**

Part A

1. Design web pages for your college containing college name and Logo, departments list using href, list tags.
2. Create a class timetable using table tag.
3. Write a HTML code to design Student registrations form for your college Admission
4. Design Web Pages with includes Multimedia data (Image, Audio, Video, GIFs etc)
5. Create a web page using frame.
6. Write code in HTML to develop a webpage having two frames that divide the webpage into two equal rows and then divide the row into equal columns fill each frame with a different background color.
7. Write CSS code to Use Inline CSS to format your ID Card.
8. Using HTML, CSS create display a text called -Hello India! ‖ On top of an image of India- Map using an overlay.

Part B

1. Write a JavaScript Program to perform Basic Arithmetic operations
2. JavaScript Program to Check Prime Number
3. JavaScript Program to implement JavaScript Object Concept
4. JavaScript Program to Create Array and inserting Data into Array
5. JavaScript Program to Validate an Email Address
6. Write a Program for printing System Date & Time using SERVLET
7. Write a serverside SERVLET program for accept number from HTML file and Display.
8. Write a program to Creating the Life-Cycle Servlet Application

Program Name	**B.Sc.**	Semester	**VI**
Course Title	**Statistical Computing & R Programming (Theory)**		
Course Code:	**DSC9**	No. of Credits	**04**
Contact hours	**52 Hours**	Duration of SEA/Exam	**2 hours**
Formative Assessment Marks	**40**	Summative Assessment Marks	**60**

Course Outcomes (COs): After the successful completion of the course, the student will be able to:

CO1	Explore fundamentals of statistical analysis in R environment.
CO2	Describe key terminologies, concepts and techniques employed in Statistical Analysis.
CO3	Define Calculate, Implement Probability and Probability Distributions to solve a wide variety of problems.
CO4	Conduct and interpret a variety of Hypothesis Tests to aid Decision Making.
CO5	Understand, Analyse, and Interpret Correlation Probability and Regression to analyse the underlying relationships between different variables.

Contents	**52 Hrs**
Introduction of the language, numeric, arithmetic, assignment, and vectors, Matrices and Arrays, Non-numeric Values, Lists and Data Frames, Special Values, Classes, and Coercion, Basic Plotting.	10
Reading and writing files, Programming, Calling Functions, Conditions and Loops: stand-alone statement with illustrations in exercise 10.1, stacking statements, coding loops, Writing Functions, Exceptions, Timings, and Visibility.	10
Statistics And Probability, basic data visualization, probability, common probability distributions: common probability mass functions, Bernoulli, binomial, Poisson distributions, common probability density functions, uniform, normal, student's t-distribution.	11
Statistical testing and modelling, sampling distributions, hypothesis testing, components of hypothesis test, testing means, testing proportions, testing categorical variables, errors and power, Analysis of variance.	10
Simple linear regression, multiple linear regression, linear model selection and diagnostics. Advanced graphics: plot customization, plotting regions and margins, point and click coordinate interaction, customizing traditional R plots, specialized text and label notation. Defining colors and plotting in higher dimensions, representing and using color, 3D scatterr plots.	11

Pedagogy: Lecture/ PPT/ Videos/ Animations/ Role Plays/ Think-Pair-Share/ Predict-Observe-Explain/ Demonstration/ Concept mapping/ Case Studies examples/ Tutorial/ Activity/ Flipped Classroom/ Jigsaw/ Field based Learning/ Project Based Learning/ Mini Projects/ Hobby Projects/ Forum Theatre/ Dance/ Problem Based Learning/ Game Based Learning/ Group Discussion/ Collaborative Learning/ Experiential Learning / Self Directed Learning etc.

Formative Assessment for Theory	
Assessment Occasion/ type	**Marks**
Internal Assessment Test 1	10%
Internal Assessment Test 2	10%
Quiz/ Assignment/ Small Project	10%
Seminar	10%
Total	**40 Marks**
Formative Assessment as per guidelines.	

References	
1	Tilman M. Davies, -The book of R: A first course in programming and ststistics‖, San Francisco, 2016.
2	Vishwas R. Pawgi, -Statistical computing using R software‖, Nirali prakashan publisher, e1 edition, 2022.
3	https://www.youtube.com/watch?v=KlsYCECWEWE https://www.geeksforgeeks.org/r-tutorial/ https://www.tutorialspoint.com/r/index.htm

Program Name	**B.Sc.**		Semester	**VI**
Course Title	**R Programming Lab**			
Course Code:	**DSC9 Lab**		No. of Credits	**02**
Contact hours	**04 Hours per week**		Duration of SEA/Exam	**2 hours**
Formative Assessment Marks		**25**	Summative Assessment Marks	**25**

Overview

The following program problematic comprises of R programming basics and application of several Statistical Techniques using it. The module aims to provide exposure in terms of Statistical Analysis, Hypothesis Testing, Regression and Correlation using R programming language.

Learning Objectives

The objective of this Laboratory to make students exercise the fundamentals of statistical analysis in R environment. They would be able to analysis data for the purpose of exploration using Descriptive and Inferential Statistics. Students will understand Probability and Sampling Distributions and learn the creative application of Linear Regression in multivariate context for predictive purpose.

Course Outcomes:

- Install, Code and Use R Programming Language in R Studio IDE to perform basic tasks on Vectors, Matrices and Data frames. Explore fundamentals of statistical analysis in R environment.
- Describe key terminologies, concepts and techniques employed in Statistical Analysis.
- Define Calculate, Implement Probability and Probability Distributions to solve a wide variety of problems.
- Conduct and interpret a variety of Hypothesis Tests to aid Decision Making.
- Understand, Analyze, and Interpret Correlation Probability and Regression to analyse the underlying relationships between different variables.

1. Write a R program for different types of data structures in R.
2. Write a R program that include variables, constants, data types.
3. Write a R program that include different operators, control structures, default values for arguments, returning complex objects.
4. Write a R program for quick sort implementation, binary search tree.
5. Write a R program for calculating cumulative sums, and products minima maxima and calculus.
6. Write a R program for finding stationary distribution of markanov chains.
7. Write a R program that include linear algebra operations on vectors and matrices.
8. Write a R program for any visual representation of an object with creating graphs using graphic functions: Plot (), Hist(),Linechart(),Pie(),Boxplot(),Scatterplots().
9. Write a R program for with any dataset containing data frame objects, indexing and subsetting data frames, and employ manipulating and analyzing data.
10. Write a program to create an any application of Linear Regression in multivariate context for predictive purpose.

Guidelines for Internship and Question Paper Pattern for BSc

1. **Guidelines for Internship is as per the Model Curriculum Structure of the University of Mysore provided in the circular vide reference AC2(S)/151/2020-21 Dated 08/08/2023.**

2. **Question Paper Pattern for Theory C3 (60 Marks) for V and VI Sem BCA:**

   Answer Part A and Part B

   Part A: Answer all the questions. Each Question carries 10 marks:

   1. a1) a2) … OR b1) b2) …
   2. a1) a2) … OR b1) b2) …
   3. a1) a2) … OR b1) b2) …
   4. a1) a2) … OR b1) b2) …
   5. a1) a2) … OR b1) b2) …

   Part B: Answer any five questions. Each Question carries 2 marks:

   6. 7. 8. 9. 10. 11. 12. 13.