HAVERI UNIVERSITY, HAVERI

B.Sc. in Computer Science

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SYLLABUS

With Effect from 2023-24

DISCIPLINE SPECIFIC CORE COURSE (DSCC) FOR SEM V & VI,

SKILL ENHANCEMENT COURSE (SEC) FOR SEM V &VI

&

INTERNSHIP FOR VI SEM.

AS PER NEP - 2020

Haveri University, Haveri

B.Sc. in **Computer Science**

Effective from 2023-24

Sem.	Type of Course	Theory/ Practical	Course Code	Course Title	Instruction hour/ week	Total hours/sem	Duration of Exam	Marks			Credits
								Formative	Summative	Total	
V	DSCC-9	Theory	035 CSC 011	Programming in Python	04hrs	56	02 hrs	40	60	100	04
	DSCC-10	Practical	035 CSC 012	Practical in Python Programming	04 hrs	56	03 hrs	25	25	50	02
	DSCC-11	Theory	035 CSC 013	Computer Networks	04hrs	56	02 hrs	40	60	100	04
	DSCC-12	Practical	035 CSC 014	Practical in Computer Networks	04 hrs	56	03 hrs	25	25	50	02
	Other subject										
	Other subject										
	Other subject										
	Other subject										
	SEC-3	Practical	035 CSC 061	Cyber Security	04hrs	56	03 hrs	25	25	50	02
	Total										
VI	DSCC-13	Theory	036 CSC 011	Web Technologies	04hrs	56	02 hrs	40	60	100	04
	DSCC-14	Practical	036 CSC 012	Practical in Web Technologies – Java Script, HTMS, CSS	04 hrs	56	03 hrs	25	25	50	02
	DSCC-15	Theory	036 CSC 013	Statistical Computing & R Programming	04hrs	56	02 hrs	40	60	100	04
	DSCC-16	Practical	036 CSC 014	Practical in R Programming	04 hrs	56	03 hrs	25	25	50	02
	Other subject										
	Other subject										
	Other subject										
	Other subject										
	Internship-1	----	036 CSC 091	Mini Project	04 hrs			50	0	50	02
	Total										

Name of Course (Subject): Computer Science

Programme Specific Outcome (PSO)

On completion of the 03/ 04 years Degree in Computer Science students will be able to:

PSO 1: Understand basic concepts involved in computing.

PSO 2: Apply the knowledge in computer techniques to solve real world problems.

PSO 3: Think of new approaches for solving problems in different domains.

PSO 4: Follow ethics in designing software with team members.

PSO 5: Develop research-oriented skills.

PSO 6: Understand good lab practices**.**

B.Sc. Semester – V
Discipline Specific Course (DSCC)-9

Course Title: Programming in Python
Course Code:035 CSC 011

Type of Course	Theory / Practical	Credits	Instruction hour per week	Total No. of Lectures/Hours / Semester	Duration of Exam	Formative Assessment Marks	Summative assessment Marks	Total Marks
DSCC-9	**Theory**	**04**	**04**	**56 hrs.**	**2hrs.**	**40**	**60**	**100**

Course Outcomes (COs): At the end of the course students will be able to:

CO 1: Understand the basic concepts in Python programming.

CO 2: Understand and demonstrate the use of advanced data types such as tuples, dictionaries and lists, Tuples, and Sets.

CO 3: Design solutions for problems using object-oriented concepts in Python.

CO 4: Use and apply the different Python Libraries for GUI Interface, Data Analysis, and Data visualization.

Unit	Contents	56hrs/ sem
Unit I	**Introduction:** Introduction to Features and Applications of Python; Python Versions; Installation of Python; Python Command Line mode and PythonIDEs; 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. **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.	14
Unit II	**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. **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.	14

Unit III	**File Handling:** File Types; Operations on Files– Create, Open, Read, Write, Close Files; File Names and Paths; Format Operator. **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.**Exception Handling:** Types of Errors; Exceptions; Exception Handling using try, except and finally.	14
Unit IV	**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.	14

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

B.Sc. Semester – V
Discipline Specific Course (DSCC)-10

Course Title: Practical in Python Programming
Course Code: 035 CSC 012

Type of Course	Theory / Practical	Credits	Instruction hour per week	Total No. of Lectures/Hours / Semester	Duration of Exam	Formative Assessment Marks	Summative Assessment Marks	Total Marks
DSCC-10	**Practical**	**02**	**04**	**56 hrs.**	**3hrs.**	**25**	**25**	**50**

Course Outcomes (COs): At the end of the course, students will be able to:

CO 1: Set up Python to develop simple applications.

CO 2: Learn how to write, debug and execute Python programs.

CO 3: Extend the knowledge of Python programming to build a successful career in software Development.

Program No	Programs	56 hrs/Sem
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 table.	
5	Write a program to print the Floy'd triangle.	
6	Check if a given number is a Prime Number or not.	
7	To display palindrome of a number	
8	Write a program to enter the numbers till the user press 999 and at the end it should display the count of positive, negative and zeros entered.	
9	Write a program that prompts the user to input a Decimal integer and display its Binary equivalent.	
10	Create a calculator program.	
11	To display permutation of a string.	
12	Write a program that input a string and ask user to delete a given word from a string.	
13	Implement Selection Sort	
14	Implement Stack	
15	Read and write int to a file.	
PART-B		
1	Demonstrate use of basic and advanced regular expressions for data validation.	
2	Demonstrate use of List Find and display the largest number of a list without	

	using built-in function max().	
3	Demonstrate use of Dictionaries	
4	Create SQLite Database and Perform Operations on Tables	
5	Create a GUI using Tkinter module	
6	Demonstrate Exceptions in Python	
7	Drawing Line chart and Bar chart using Matplotlib	
8	Drawing Histogram and Pie chart using Matplotlib	
9	Create Array using NumPy and Perform Operations on Array	
10	Create Data Frame from Excel sheet using Pandas and Perform Operations on Data Frames	

Instruction to the Examiners

Implement all programs using Python.

Formative Assessment for Practical	
Assessment	**Marks**
Writing Program 1 + Execution without error	10
Writing Program 2 + Execution without error	10
Viva	03
Journal	02
Total	**25 Marks**
Formative Assessment as per guidelines.	

Note: The same shall be used for IA (Formative Assessment) and semester end Examination.

B.Sc. Semester – V
Discipline Specific Course (DSCC)-11

Course Title: Computer Networks
Course Code: 035 CSC 013

Type of Course	Theory / Practical	Credits	Instruction hour per week	Total No. of Lectures/Hours / Semester	Duration of Exam	Formative Assessment Marks	Summative Assessment Marks	Total Marks
DSCC-11	**Theory**	**04**	**04**	**56 hrs.**	**2hrs.**	**40**	**60**	**100**

Course Outcomes (COs): At the end of the course, students will be able to:

CO 1: Define various data communication components networking.

CO 2: Describe networking with reference to different types of models and topologies.

CO 3: Understand the need for Network and various layers of OSI and TCP/IP.

CO 4: Explain various Data Communications media.

CO 5: Describe the physical layer functions and components

CO 6: Identify the different types of network topologies and Switching methods.

CO 7: Describe various Data link Layer Protocols.

CO 8: Identify the different types of network devices and their functions within a network.

CO 9: Analyze and Interpret various Data Link Layer and Transport Layer protocols.

CO10: Explain different application layer protocols.

Unit	Contents	56hrs/ sem
Unit I	**Introduction:** Computer Network: Definition, Goals, Structure; Broadcast and Point-To-Point Networks; Network Topology and their various Types; Types of Network, 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.	14
Unit II	**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	14

Unit III	**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), ControlledAccess (Reservation, Polling, Token Passing), Channelization (FDMA, TDMA, CDMA), **Wired LAN:** Ethernet Standards and FDDI, Wireless LAN: IEEE 802.1 Ix and Bluetooth Standards.	14
Unit IV	**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, **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	14

References:

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.
5. http://highered.mheducation.com/sites/0072967757/index.html
6. Larry L. Peterson, Bruce S. Davie, ―Computer Networks: A Systems Approach‖, Morgan Kaufmann Publishers, Fifth Edition, 2011.
7. Brijendrasingh, Data Communication and Computer Networks,PHI.

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

B.Sc. Semester – V

Discipline Specific Course (DSCC)-12

Course Title: Practical in Computer Networks

Course Code:035 CSC 014

Type of Course	Theory / Practical	Credits	Instruction hour per week	Total No. of Lectures/Hours / Semester	Duration of Exam	Formative Assessment Marks	Summative Assessment Marks	Total Marks
DSCC-12	**Practical**	**02**	**04**	**56 hrs.**	**3hrs.**	**25**	**25**	**50**

Course Outcomes (COs): At the end of the course, students will be able to:

CO 1: Understand Networking configuration and commands.

CO 2: Implement topologies, LAN, FTP, TCP.

Expt. No,	Programs	56.hrs/ sem
	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 networksimulator.	
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/

Instruction to the Examiners

Implement all programs using Hands on Simulation.

Formative Assessment for Practical	
Assessment	**Marks**
Writing Program 1 + Execution without error	10
Writing Program 2 + Execution without error	10
Viva	03
Journal	02
Total	**25 Marks**
Formative Assessment as per guidelines.	

Note : The same shall be used for IA(Formative Assessment) and semester end Examination.

B.Sc. Semester – V

Skill Enhancement Course: SEC-3

Course Title: Cyber Security

Course Code: 035 CSC 061

Type of Course	Theory / Practical	Credits	Instruction hour/ week	Total No. of Lectures/Hours / Semester	Duration of Exam	Formative Assessment Marks	Summative Assessment Marks	Total Marks
SEC-3	**Practical**	**02**	**04**	**56 hrs.**	**3hrs.**	**25**	**25**	**50**

Course Outcomes (COs): At the end of the course students will be able to:

CO 1:Understand basic concepts of Cyber security issues and challenges associated with it.
CO 2: Demonstrate Encryption and Decryption using various ciphers.
CO 3: To understand how to secure data on models, tools and techniques for enforcement of security with the some emphasis on the use of cryptography.
CO 4: Gain basic programming knowledge for Cyber Security.

Unit	Contents	
Unit I	**Introduction -** Cybersecurity: Definition, Types of Cyber Attacks, Defense Strategies and Techniques, Guiding Principles, Cryptography; Mathematical Background for Cryptography: Modulo Arithmetic, The Greatest Common Divisor **Computer Security Concepts -** Definition, The Challenges of Computer Security; Security Attacks: Passive Attacks, Active Attacks; Security Services: Authentication, Access Control, Data Confidentiality, Data Integrity, Nonrepudiation, Availability Service; Security Mechanisms; Attack Surfaces and Attack Trees; A Model for Network Security.	
Unit II	**Symmetric Ciphers:** Symmetric Cipher Model: Cryptography, Cryptanalysis and Brute-Force Attack; Substitution Techniques: Caesar Cipher, Hill Cipher, One-Time Pad, Simple XOR, Transposition Techniques, Steganography **Asymmetric Ciphers:** Principles of Public-Key Cryptosystems, Public-Key Cryptosystems, Applications for Public-Key Cryptosystems, Requirements for Public-Key Cryptography, RSA **Cryptographic Hash Functions:** Applications of Cryptographic Hash Functions: Message Authentication, Digital Signatures, Other Applications; Requirements and Security: Security Requirements for Cryptographic Hash Functions, Brute-Force Attacks, Cryptanalysis, Secure Hash Algorithm (SHA) **Key Management:** Digital Certificates 509, Dictionary Attacks.	

Program No	Programs	56hrs/ sem
1	Write a Python program that defines a function and takes a password string as input and returns its SHA-256 hashed representation as a hexadecimal string.	
2	Write a Python program that defines a function to generate random passwords of a specified length. The function takes an optional parameter length, which is set to 8 by default. If no length is specified by the user, the password will have 8 characters.	
3	Write a Python program to check if a password meets the following criteria: a. At least 8 characters long, b. Contains at least one uppercase letter, one lowercase letter, one digit, and one special character (!, @, #, $, %, or &), c. If the password meets the criteria, print a message that says "Valid Password." If it doesn't meet the criteria, print a message that says "Password does not meet requirements."	
4	Write a Python program that reads a file containing a list of passwords, one per line. It checks each password to see if it meets certain requirements (e.g., at least 8 characters, contains both uppercase and lowercase letters, and at least one number and one special character). Passwords that satisfy the requirements should be printed by the program.	
5	Write a Python program that creates a password strength meter. The program should prompt the user to enter a password and check its strength based on criteria such as length, complexity, and randomness. Afterwards, the program should provide suggestions for improving the password's strength.	
6	Write a Python program that reads a file containing a list of usernames and passwords, one pair per line (separated by a comma). It checks each password to see if it has been leaked in a data breach. You can use the "Have I Been Pwned" API (https://haveibeenpwned.com/API/v3) to check if a password has been leaked.	
7	Write a Python program that simulates a brute-force attack on a password by trying out all possible character combinations.	
8	Python program for implementation symmetric encryption using Caesar cipher algorithm	
9	Python program implementation for hacking Caesar cipher algorithm	
10	Python program to implement asymmetric encryption using RSA python library.	
11	Python program for encoding and decoding using Base64	
12	Python program to implement symmetric encryption using python library.	
13	Python program to encrypt and decrypt files.	
14	Python program to identify a digital certificate on a secured website and check what kind of public key algorithm is used for encryption.	

References:

1. W. Stallings. Cryptography and Network Security: Principles and Practices (7th edition). Prentice Hall, 2016, ISBN-13: 978-0134444284.
2. Bruce Schneier, Applied Cryptography, John Wiley & Sons, Second Edition, 2007, ISBN 978-1-119-09672-6.
3. William Stalling & Lawrie Brown, Computer Security: Principles and Practice, Pearson 2008, Indian Edition 2010

Instruction to the Examiners

Implement all programs using Python.

Formative Assessment for Practical	
Assessment	**Marks**
Writing Program 1 + Execution without error	10
Writing Program 2 + Execution without error	10
Viva	03
Journal	02
Total	**25 Marks**
Formative Assessment as per guidelines.	

Note : The same shall be used for IA(Formative Assessment) and semester end Examination.

B.Sc. in Computer Science

VI Semester

W. e. f. from 2023-24

B.Sc. Semester – VI

Discipline Specific Course (DSCC)-13

Course Title: Web Technologies

Course Code: 036 CSC 011

Type of Course	Theory / Practical	Credits	Instruction hour per week	Total No. of Lectures/Hours / Semester	Duration of Exam	Formative Assessment Marks	Summative Assessment Marks	Total Marks
DSCC-13	**Theory**	**04**	**04**	**56 hrs.**	**2hrs.**	**40**	**60**	**100**

Course Outcomes (COs): At the end of the course students will be able to:

CO 1: Understand basics of web technology

CO 2: Recognize the different Client-side Technologies and tools like, HTML, CSS, JavaScript

CO 3: Learn Java Servlets and JDBC

CO 4: Web Technology for Mobiles and Understand web security.

Unit	Contents	56hrs/ sem
Unit I	**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.	14
Unit II	**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.	14
Unit III	**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.	14
Unit IV	**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. **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,	14

	LDAP Injection, XML Injection, HTTP Injection, Mail Service Injection. Types of XSS, XSS in Real World, Finding and Exploiting XSS Vulnerabilities, Preventing XSS Attacks	

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

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

B.Sc. Semester – VI

Discipline Specific Course (DSCC)-14

Course Title: Practical in Web Technologies-Java Script, HTML,CSS

Course Code: 036 CSC 012

Type of Course	Theory / Practical	Credits	Instruction hour per week	Total No. of Lectures/Hours / Semester	Duration of Exam	Formative Assessment Marks	Summative Assessment Marks	Total Marks
DSCC-14	**Practical**	**02**	**04**	**56 hrs.**	**3hrs.**	**25**	**25**	**50**

Course Outcomes (COs): At the end of the course, students will be able to:

CO 1: Design HTML tables, forms, multimedia and frames

CO 2: To write Servlet and Java Script Programs.

Program No	Programs	56 hrs /Sem
	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 Multi-Media 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 server-side SERVLET program for accept number from HTML file and Display.	
8	Write a program to Creating the Life-Cycle Servlet Application	

Instruction to the Examiners

Implement all programs.

Formative Assessment for Practical	
Assessment	**Marks**
Writing Program 1 + Execution without error	10
Writing Program 2 + Execution without error	10
Viva	03
Journal	02
Total	**25 Marks**
Formative Assessment as per guidelines.	

Note: The same shall be used for IA(Formative Assessment) and semester end Examination.

B.Sc. Semester – VI

Discipline Specific Course (DSCC)-15

Course Title: Statistical Computing & R Programming
Course Code: 036 CSC 013

Type of Course	Theory / Practical	Credits	Instruction hour per week	Total No. of Lectures/Hours / Semester	Duration of Exam	Formative Assessment Marks	Summative Assessment Marks	Total Marks
DSCC-15	**Theory**	**04**	**04**	**56 hrs.**	**2hrs.**	**40**	**60**	**100**

Course Outcomes (COs): At the end of the course, students will be able to:

CO 1: Explore fundamentals of statistical analysis in R environment.

CO 2: Describe key terminologies, concepts and techniques employed in Statistical analysis.

CO 3: Define Calculate, Implement Probability and Probability Distributions to solve a wide variety of problems.

CO 4: Conduct and interpret a variety of Hypothesis Tests to aid Decision Making.

CO 5: Understand, Analyse, and Interpret Correlation Probability and Regression to analyze the underlying relationships between different variables.

Unit	Contents	56hrs/ sem
Unit I	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. Reading and writing files, Programming, Calling Functions, Conditions and Loops: standalone statement with illustrations in exercise 10.1,stacking statements, coding loops, Writing Functions, Exceptions, Timings, and Visibility.	14
Unit II	Statistics And Probability, basic data visualisation, probability, common probability distributions: common probability mass functions, bernoulli, binomial, poisson distributions, common probability density functions, uniform, normal, student's t-distribution	14
Unit III	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	14
Unit IV	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 scatte r plots.	14

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

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

B.Sc. Semester – VI
Discipline Specific Course (DSCC)-16
Course Title:Practical in R Programming
Course Code: 036 CSC 014

Type of Course	Theory / Practical	Credits	Instruction hour per week	Total No. of Lectures/Hours / Semester	Duration of Exam	Formative Assessment Marks	Summative Assessment Marks	Total Marks
DSCC-16	**Practical**	**02**	**04**	**56 hrs.**	**3hrs.**	**25**	**25**	**50**

Course Outcomes (COs): At the end of the course, students will be able to:

CO 1: 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.

CO 2: Describe key terminologies, concepts and techniques employed in Statistical Analysis.

CO 3: Define Calculate, Implement Probability and Probability Distributions to solve problems.

CO 4: Conduct and interpret a variety of Hypothesis Tests to aid Decision Making.

CO 5: Understand, Analyse, and Interpret Correlation Probability and Regression to analyse the underlying relationships between different variables.

Program No	Programs	56 hrs/Sem
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(),Line chart(),Pie(),Boxplot(),Scatterplots().	
9	Write a R program for with any dataset containing data frame objects, indexing and sub setting 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.	

Instruction to the Examiners

Implement all programs using Python.

Formative Assessment for Practical	
Assessment	**Marks**
Writing Program 1 + Execution without error	10
Writing Program 2 + Execution without error	10
Viva	03
Journal	02
Total	**25 Marks**
Formative Assessment as per guidelines.	

Note : The same shall be used for IA(Formative Assessment) and semester end Examination.

B.Sc. Semester – VI

INTERNSHIP-1

Course Title: Internship/Mini Project

Course Code:036 CSC 091

Type of Course	Theory / Practical	Credits	Instruction hour per week	Total No. of Lectures/Hours / Semester	Duration of Exam	Formative Assessment Marks	Summative Assessment Marks	Total Marks
Inerenship-1	**Practical**	**02**	**04**			**50**	**0**	**50**

Course Outcomes (COs): At the end of the course, students will be able to:

CO 1: The student will be able toanalyze, specify, design, implement and test application software.
CO 2: Allows a student to demonstrate their capabilities while working independently.
CO 3: Design a project through technical knowledge to meet customer/End user needs.
CO 4: Acquire a deeper understanding of software industry trends, best practices, and current developments.
CO 5: Apply process of Project Development to analyze and design the real-world problem.
CO 6: Document the project report of various phases for future scope of the project development.

Internship:

A course requiring students to participate in a professional activity or work experience, or cooperative education activity with an entity external to the education institution, normally under the supervision of an expert of the given external entity. A key aspect of the internship is induction into actual work situations for 2 credits. Internships involve working with local industry, local governments (such as panchayats, municipalities) or private organizations, business organizations, artists, crafts persons, and similar entities to provide opportunities for students to actively engage in on-site experiential learning.

Execution of the Project:

1. The individual student is required to carry out the project under the guidance of course teacher.
2. Project work problem statement shall be identified by the students with the help of the course teachers and students shall submit the synopsis/project proposal of the same.
3. During project development students are expected to define a project problem, do requirements analysis, systems design, software development, apply testing strategies and do documentation with an overall emphasis on the development of a robust, efficient and reliable software systems.
4. The project development process has to be consistent and should follow standards identified by the guide monitoring the project work.
5. There is no restriction on use of hardware's and software's for carrying out the project work except that

ready application packages are not allowed.

6. The students have to submit the project dissertation of the project work carried out in one hard copy along with soft copy written on compact disc.

Note;

1. One credit internship is equal to 30 hrs.
2. Internship shall be Discipline Specific of 45-60 hours (2 credits) with duration 1-2 weeks.
3. Internship may be full-time/part-time (full-time during last 1-2 weeks before closure of the semester or weekly 4 hrs in the academic session for 13-14 weeks). College shall decide the suitable method for programme wise but not subject wise.
4. Internship mentor/supervisor shall avail work allotment during 6thsemester for a maximum of 20 hours.
5. The student should submit the final internship report (45-60 hours of Internship) to the mentor for completion of the internship.
6. Method of evaluation: Presentations/Report submission/Activity etc.

Whenever Internship is not feasible, the students can to choose the Project Work.

Formative Assessment	
Assessment	**Marks**
Dissertation/Project Report evaluation	20
Presentation/Demo of the application developed: (Navigation of the application, features incorporated, data validation, User Interface, reports, etc.)	20
Viva-voce	10
Total	**50**
Formative Assessment as per guidelines.	

GENERAL PATTERN OF THEORY QUESTION COURSE FOR DSCC

(60 marks for semester end Examination with 2 hrs. duration)

Part-A

1. Question number 1-06 carries 2 marks each. Answer any 05 questions : 10 marks

Part-B

2. Question number 07- 11 carries 05Marks each. Answer any 04 questions : 20 marks

Part-C

3. Question number 12-15 carries 10 Marks each. Answer any 03 questions : 30 marks

(Minimum 1 question from each unit and 10 marks question may have sub questions for 7+3 or 6+4 or 5+5 if necessary)

Note: Proportionate weightage shall be given to each unit based on number of hoursprescribed

HAVERI UNIVERSITY, HAVERI

04 - Year B.Sc. (Hons.) Program

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SYLLABUS

Course: Computer Science

With Effect from 2021-22

DISCIPLINE SPECIFIC CORE COURSE (DSCC) FOR SEM III & IV,

OPEN ELECTIVE COURSE (OEC) FOR SEM III & IV and

SKILL ENHANCEMENT COURSE (SEC) FOR SEM III

AS PER N E P - 2020

Haveri University, Haveri

Four Years under Graduate Program in **Computer Science** for B.Sc. (Hons.)

Effective from 2022-23

Sem.	Type of Course	Theory/ Practical	Course Code	Course Title	Instruction hour per week	Total hours of Syllabus / Sem	Duration of Exam	Formative Assessment Marks	Summative Assessment Marks	Total Marks	Credits
III	DSCC-5	Theory	**033CSC011**	Object Oriented Programming using JAVA	04hrs	52	02 hrs	40	60	100	04
	DSCC-6	Practical	**033CSC012**	Java Lab	04 hrs	52	03 hrs	25	25	50	02
	OEC-3	Theory	**003CSC051**	Python Programming Concepts	03 hrs	42	02 hrs	40	60	100	03
	*SEC-2	Practical	**053CSC061**	Artificial Intelligence (SEC-Model 2)	03 hrs	39	02 hrs	25	25	50	02
IV	DSCC-7	Theory	**034CSC011**	Database Management Systems	04 hrs	52	02 hrs	40	60	100	04
	DSCC-8	Practical	**034CSC012**	Database Management Systems Lab	04 hrs	52	03 hrs	25	25	50	02
	OEC-4	Theory	**004CSC051**	Electronic Commerce	03 hrs	42	02 hrs	40	60	100	03
Details of the other Semesters will be given later											

Name of Course (Subject): Computer Science

Programme Specific Outcome (PSO):

On completion of the 03/ 04 years Degree in Computer Science students will be able to:

PSO 1 : Understand basic concepts involved in computing.

PSO 2 : Apply the knowledge in computer techniques to solve real world problems.

PSO 3 : Think of new approaches for solving problems in different domains.

PSO 4 : Follow ethics in designing software with team members.

PSO 5 : Develop research-oriented skills

PSO 6 : Understand good lab practices

B.Sc. Semester – III

Discipline Specific Course (DSC)

The course Computer Science **in III semester has two papers (Theory Paper –I for 04 credits & Practical Paper -II for 2 credits) for 06 credits: Both the papers are compulsory. Details of the courses are as under.**

Course No.3 (Theory): **Object Oriented Programming using JAVA: 033CSC011**

Course No.	Type of Course	Theory / Practical	Credits	Instruction hour per week	Total No. of Lectures/Hours / Semester	Duration of Exam	Formative Assessment Marks	SummativeAssessment Marks	Total Marks
Course-03	DSCC-5	Theory	04	04	52 hrs.	2hrs.	40	60	100

Course Outcomes (COs):

At the end of the course, (Theory), students will be able to:

- **CO 1:** Explain the object-oriented concepts using JAVA.
- CO 2: Implement Classes, objects and constructors.
- **CO 3:** Write JAVA programs using OOP concepts like Abstraction, Encapsulation, Inheritance and Polymorphism.
- **CO 4:** Implement multithreading using JAVA.
- **CO 5:** Demonstrate the basic principles of creating Java applications with GUI.

Course 3 (Theory): Title-Object Oriented Programming using JAVA
DSC3: Subject Code: 033CSC011

Unit I	**Introduction to Java:** Basics of Java programming, Data types, Variables, Operators, Control structures including selection, Looping, Java methods, Overloading, Math class, Arrays in java. **Objects and Classes:** Basics of objects and classes in java, Constructors, Finalizer, Visibility modifiers, Methods and objects, Inbuilt classes like String, Character, String Buffer, File, this reference.	13 hrs.
Unit II	**Inheritance and Polymorphism:** Inheritance in java, Super and sub class, Overriding, Object class, Polymorphism, Dynamic binding, Generic programming, Casting objects, Instance of operator, Abstract class, Interface in java, Package in java, UTIL package.	13 hrs.
Unit III	**Event and GUI programming:** Event handling in java, Event types, Mouse and key events, GUI Basics, Panels, Frames, Layout Managers: Flow Layout, Border Layout, Grid Layout, GUI components like Buttons, Check Boxes, Radio Buttons, Labels, Text Fields, Text Areas, Combo Boxes, Lists, Scroll Bars, Sliders, Windows, Menus, Dialog Box, Applet and its life cycle, Introduction to swing, Exceptional handling mechanism.	13 hrs.
Unit IV	**I/O programming:** Text and Binary I/O, Binary I/O classes, Object I/O, Random Access Files. Multithreading in java: Thread life cycle and methods, Runnable interface, Thread synchronization, Exception handling with try catch-finally, Collections in java, Introduction to JavaBeans and Network Programming	13 hrs.

References:

1. Programming with Java, By E Balagurusamy – A Primer, 4th Edition, McGraw Hill Publication.
2. Core Java Volume I – Fundamentals, By Cay S. Horstmann, Prentice Hall.
3. Object Oriented Programming with Java: Somashekara M.T., Guru, D.S., Manjunatha K.S, 1st Edition, PHI Learning 2017.
4. Java 2 - The Complete Reference, Herbert Schildt, 5th Edition, McGraw Hill Publication, 2017.
5. Java - The Complete Reference, Herbert Schildt, 7th Edition, McGraw Hill Publication, 2017.

B.Sc. Semester – III

Course: Computer Science
Discipline Specific Course (DSC)

Course No.3 (Practical): 033CSC012 Title of the Course: JAVA Lab

Course No.	Type of Course	Theory / Practical	Credits	Instruction hour per week	Total No. of Lectures/Hours / Semester	Duration of Exam	Formative Assessment Marks	Summative Assessment Marks	Total Marks
Course-03	DSCC-6	Practical	02	04	52 hrs.	3 hrs.	25	25	50

Course Outcomes (COs):

At the end of the course, (Practical), students will be able to:

CO: Student would be able to implement OOP's concepts using JAVA.

List of Experiments for 52 hrs/ Semester.

Operators, Decision making and Loops:

1. Write a Java program to read the radius of a circle and to find the area and circumference.
2. Write a program to demonstrate String Operators
3. Write a Java program to find N prime numbers reading N as command line argument.
4. Write a program to find factorial of N numbers reading N as command line argument.
5. Write a program to read N numbers and sort them using one-dimensional arrays.

Classes and Methods:

6. Write a Java program to illustrate Method Overloading.
7. Write a Java program to illustrate Operator Overloading.
8. Write a program to demonstrate Single Inheritance.
9. Write a program to illustrate Constructor Overloading
10. Write a program to illustrate Method Overriding

Packages, Threads and Exception Handling:

11. Write a Java program demonstrating Multithreading.
12. Write a Java program demonstrating Exception Handling.
13. Write a Java program to demonstrate user defined package program.

Java Applet Programming

14. Write an Applet program to display Geometrical Figures using objects.
15. Write an Applet program which illustrate Scroll bar object.
16. Write an Applet program to change the background color randomly.
17. Write an Applet program to change the color of applet using combo box.
18. Write an Applet program to implement Digital Clock using thread.

Event Handling:

19. Write an Applet program to implement Mouse events.
20. Write an Applet program to implement Keyboard events.

Note: A minimum of 20 assignments should be done by each student.

General Instructions

Implement all programs using JAVA.

Scheme of Practical Examination (distribution of marks): 25 marks for the Semester end examination

1. **7 Marks (Writing Program 1 + Execution without error)**
2. **7 Marks (Writing Program 2 + Execution without error)**
3. **Viva 6 marks**
4. **Journal 5 Marks**

Total 25 Marks

Note: Same scheme may be used for IA (Formative Assessment) examination.

B.Sc. Semester – III

Course: Computer Science
Open Elective Course (OEC-3)
(OEC for other students)

Title of the Course : Python Programming Concepts
OEC-3 : Code: 003CSC051

Course No.	Type of Course	Theory / Practical	Credits	Instruction hour per week	Total No. of Lectures/Hours / Semester	Duration of Exam	Formative Assessment Marks	Summative Assessment Marks	Total Marks
OEC-3	OEC	Theory	03	03	42 hrs	2hrs	40	60	100

Course Outcomes (COs):

At the end of the course, (Practical), students will be able to:

CO 1: Explain the fundamentals of Computers.

CO 2: Explain the basic concepts of Python Programming.

CO 3: Demonstrate proficiency in the handling of loops and the creation of functions.

CO 4: Identify the methods to create and store strings.

Unit I	**Fundamentals of Computers** Introduction to Computers - Computer Definition, Characteristics of Computers, Evolution and History of Computers, Types of Computers, Basic Organization of a Digital Computer; Number Systems – different types, conversion from one number system to another; Computer Codes – BCD, Gray Code, ASCII and Unicode; Boolean Algebra – Boolean Operators with Truth Tables; Types of Software – System Software and Utility Software; Computer Languages - Machine Level, Assembly Level & High Level Languages, Translator Programs – Assembler, Interpreter and Compiler; Planning a Computer Program - Algorithm, Flowchart and Pseudo code with Examples.	**11 hrs.**
Unit II	**Python Basics** Introduction to Features and Applications of Python; Python Versions; Installation of Python; Python Command Line mode and Python IDEs; Simple Python Program. 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; Illustrative programs.	**10 hrs.**

Unit III	**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; Illustrative programs. **Python Functions:** Types of Functions; Function Definition- Syntax, Function Calling, Passing Parameters/arguments, the return statement; Default Parameters; Command line Arguments; Key Word Arguments; Illustrative programs.	**11 hrs.**
Unit IV	**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; Illustrative programs.	**10 hrs.**

References

1. Computer Fundamentals (BPB), P. K. Sinha &Priti Sinha
2. Think Python How to Think Like a Computer Scientist, Allen Downey et al., 2nd Edition, Green Tea Press. Freely available online 2015. @https://www.greenteapress.com/thinkpython/thinkCSpy.pdf
3. Introduction to Python Programming, Gowrishankar S et al., CRC Press, 2019.
4. http://www.ibiblio.org/g2swap/byteofpython/read/
5. http://scipy-lectures.org/intro/language/python_language.html
6. https://docs.python.org/3/tutorial/index.html

B.Sc. Semester – III

Course: Computer Science

Skill Enhancement Course (SEC)-II

Title of the Paper: Artificial Intelligence (Model-2)
Subject Code: 033CSC061

Type of Course	Theory / Practical	Total No. of Lectures/Hours / Semester	Credits	Duration of Exam	Formative Assessment Marks	Summative Assessment Marks	Total Marks
SEC-II	Theory (13 hrs) + Practical (26 hrs)	39	02	2 hrs.	25	25	50

Course Outcomes (COs):

At the end of the course, students will be able to:

CO 1: Appraise the theory of Artificial intelligence and list the significance of AI.

CO 2: Discuss the various components that are involved in solving an AI problem.

CO 3: Illustrate the working of AI Algorithms in the given contrast.

CO 4: Analyze the various knowledge representation schemes, Reasoning and Learning techniques of AI.

CO 5: Apply the AI concepts to build an expert system to solve the real-world problems.

Unit – I	**Overview of AI:** Definition of Artificial Intelligence, Philosophy of AI, Goals of AI, Elements of AI system, Programming a computer without and with AI, AI Techniques, History of AI. **Intelligent Systems:** Definition and understanding of Intelligence, Types of Intelligence, Human Intelligence vs Machine Intelligence.	05 hrs
Unit- II	**AI Applications:** Virtual assistance, Travel and Navigation, Education and Healthcare, Optical character recognition, E-commerce and mobile payment systems, Image based search and photo editing. **AI Examples in daily life:** Installation of AI apps and instructions to use AI apps.	05 hrs
Unit- III	**Robotics:** Introduction to Robotics, Difference in Robot System and Other AI Program, Components of a Robot.	03 hrs

Laboratory Activities: • **Amazon Alexa:** https://play.google.com/store/apps/details?id=com.amazon.dee.app&hl=en&gl=US • **Google Lens:** https://play.google.com/store/search?q=google+lens&c=apps&hl=en&gl=US • **Image to Text to Speech ML OCR:** https://play.google.com/store/apps/details?id=com.mlscanner.image.text.speech&hl=en_IN&gl=US • **Google Pay:** https://play.google.com/store/apps/details?id=com.google.android.apps.nbu.paisa.user&hl=en_IN&gl=US • **Grammarly:** https://play.google.com/store/search?q=grammarly&c=apps&hl=en_IN&gl= • **Google Map:** https://play.google.com/store/search?q=google+maps&c=apps&hl=en&gl=US • **FaceApp:** https://play.google.com/store/apps/details?id=io.faceapp&hl=en_IN&gl=US • **Socratic:** https://play.google.com/store/apps/details?id=com.google.socratic&hl=en_IN&gl=US • **Google Fit: Activity Tracking:** https://play.google.com/store/apps/details?id=com.google.android.apps.fitness&hl=en_IN&gl=US • **SwiftKey Keyboard:** https://swiftkey-keyboard.en.uptodown.com/android • **E-commerce App:** https://play.google.com/store/apps/details?id=com.jpl.jiomart&hl=en_IN&gl=US	**26hrs**

Text Books:

1. Wolfgang Ertel, "Introduction to Artificial Intelligence", 2nd Edition, Springer International Publishing 2017.
2. Michael Negnevitsky, "Artificial Intelligence A Guide to Intelligent Systems", 2nd Edition, Pearson Education Limited 2005.

References:

1. https://www.tutorialspoint.com/artificial_intelligence/artificial_intelligence_tutorial.pdf
2. Kevin Knight, Elaine Rich, Shivashankar B. Nair, "Artificial Intelligence", 3rd Edition, July 2017.

Reference Links:

1. Voice Assistant: https://alan.app/blog/voiceassistant-2/
2. Browse with image: https://www.pocket-lint.com/apps/news/google/141075-what-is-google-lens-and-how-does-it-work-and-which-devices-have-it
3. OCR: https://aws.amazon.com/what-is/ocr/
4. Mobile Payment system: https://gocardless.com/en-us/guides/posts/how-do-mobile-payment-systems-work/
5. Grammarly: https://techjury.net/blog/how-to-use-grammarly/#gref
6. Travel & Navigation: https://blog.google/products/maps/google-maps-101-ai-power-new-features-io-2021/
7. AI in photo editing: https://digital-photography-school.com/artificial-intelligence-changed-photo-editing/
8. AI in education: https://www.makeuseof.com/what-is-google-socratic-how-does-it-work/
9. AI in health and fitness: https://cubettech.com/resources/blog/implementing-machine-learning-and-ai-in-health-and-fitness/
10. E-commerce and online shopping: https://medium.com/@nyxonedigital/importance-of-e-commerce-and-online-shopping-and-why-to-sell-online-5a3fd8e6f416

Implement Laboratory activitiesas specified tools in the SEC-3.

Scheme of Practical Examination (distribution of marks): 25 marks for the Semester end examination

1. **7 Marks (Writing Activity 1 + Execution without error)**
2. **7 Marks (Writing Activity 2 + Execution without error)**
3. **Viva 6 marks**
4. **Journal 5 Marks**

Total 25 Marks

Note: Same scheme may be used for IA (Formative Assessment) examination.

Details of Formative assessment (IA) for DSCC theory/OEC: 40% weight age for total marks

Type of Assessment	Weight age	Duration	Commencement
Written test-1	10%	1 hr	8th Week
Written test-2	10%	1 hr	12th Week
Seminar	10%	10 minutes	--
Case study / Assignment / Field work / Project work/ Activity	10%	------	--
Total	40% of the maximum marks allotted for the paper		

Faculty of Science
04 - Year UG Honors programme:2022-23

GENERAL PATTERN OF THEORY QUESTION PAPER FOR DSCC/ OEC
(60 marks for semester end Examination with 2 hrs duration)

Part-A

1. Question number 1-06 carries 2 marks each. Answer any 05 questions : 10marks

Part-B

2. Question number 07- 11 carries 05Marks each. Answer any 04 questions : 20 marks

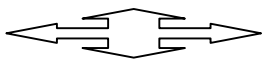
Part-C

3. Question number 12-15 carries 10 Marks each. Answer any 03 questions : 30 marks

(Minimum 1 question from each unit and 10 marks question may have sub questions for 7+3 or 6+4 or 5+5 if necessary)

Total: 60 Marks

Note: Proportionate weight age shall be given to each unit based on number of hours prescribed.



B.Sc. Semester – IV

Course: Computer Science
Discipline Specific Course (DSC)

The course Computer Science **in IV semester has two papers (Theory Paper –I for 04 credits & Practical Paper -II for 2 credits) for 06 credits: Both the papers are compulsory. Details of the courses are as under.**

Title of the Course: Database Management Systems
Course No.4 (Theory): Code: 034CSC011

Course No.	Type of Course	Theory / Practical	Credits	Instruction hour per week	Total No. of Lectures/Hours / Semester	Duration of Exam	Formative Assessment Marks	Summative Assessment Marks	Total Marks
Course-04	DSCC-7	Theory	04	04	52 hrs	2hrs	40	60	100

Course Outcomes (COs):

At the end of the course, students will be able to:

- **CO 1:** Explain the various database concepts and the need for database systems.
- **CO 2:** Identify and define database objects, enforce integrity constraints on a database using DBMS.
- **CO 3:** Demonstrate a Data model and Schemas in RDBMS.
- **CO 4:** Identify entities and relationships and draw ER diagram for a given real-world problem.
- **CO 5:** Convert an ER diagram to a database schema and deduce it to the desired normal form.
- **CO 6:** Formulate queries in Relational Algebra, Structured Query Language (SQL) for database manipulation.
- **CO 7:** Explain the transaction processing and concurrency control techniques.

DSC4: Database Management Systems (DBMS)

Unit I	**Database Architecture:** Introduction to Database system applications. Characteristics and Purpose of database approach. People associated with Database system. Data models. Database schema. Database architecture. Data independence. Database languages, interfaces, and classification of DBMS.	13 hrs.
Unit II	**E-R Model:** Entity-Relationship modeling: E – R Model Concepts: Entity, Entity types, Entity sets, Attributes, Types of attributes, key attribute, and domain of an attribute. Relationships between the entities. Relationship types, roles and structural constraints, degree and cardinality ratio of a relationship. Weak entity types, E -R diagram.	13 hrs.

Unit III	**Relational Data Model:** Relational model concepts. Characteristics of relations. Relational model constraints: Domain constrains, key constraints, primary & foreign key constraints, integrity constraints and null values. Relational Algebra: Basic Relational Algebra operations. Set theoretical operations on relations. JOIN operations Aggregate Functions and Grouping. Nested Sub Queries-Views. Introduction to PL/SQL & programming of above operations in PL/SQL.	13 hrs.
Unit IV	**Data Normalization:** Anomalies in relational database design. Decomposition. Functional dependencies. Normalization. First normal form, Second normal form, Third normal form. Boyce-Codd normal form. **Query Processing Transaction Management:** Introduction Transaction Processing. Single user & multiuser systems. Transactions: read & write operations. Need of concurrency control: The lost update problem, Dirty read problem. Types of failures. Transaction states. Desirable properties (ACID properties) of Transactions. Concurrency Control Techniques: Locks and Time stamp Ordering. Deadlock & Starvation.	13 hrs.

References:

1. Fundamentals of Database Systems, RamezElamassri, Shankant B. Navathe, 7th Edition, Pearson, 2015
2. An Introduction to Database Systems, Bipin Desai, Galgotia Publications, 2010.
3. Introduction to Database System, C J Date, Pearson, 1999.
4. Database Systems Concepts, Abraham Silberschatz, Henry Korth, S.Sudarshan, 6th Edition, McGraw Hill, 2010.
5. Database Management Systems, Raghu Rama Krishnan and Johannes Gehrke, 3rd Edition, McGraw Hill, 2002

B.Sc. Semester – IV

Course: Computer Science

Discipline Specific Course (DSC)

Title of the Course: Database Management Systems Lab
Course No.3 (Practical) Code: 034CSC012

Course No.	Type of Course	Theory / Practical	Credits	Instruction hour per week	Total No. of Lectures/Hours / Semester	Duration of Exam	Formative Assessment Marks	Summative Assessment Marks	Total Marks
Course-04	DSCC-8	Practical	02	04	52 hrs.	3 hrs.	25	25	50

Course Outcomes (COs):

At the end of the course, (Practical), students will be able to:

CO: Student would be able to create a tables, execute queries and PL/SQL programs.

List of Experiments for 52 hrs/ Semester.

Database 1: EMPLOYEE

Consider the following relations for Employee database application.

EMPLOYEE (Empno, Name, Dept_ID, DOJ, City)

DEPARTMENT (Dept_ID, Name, Manager)

Salary (Empno, Basic, HRA, Deductions, Tax, Net_Pay)

a. Create the above tables by properly specifying the primary key.

b. Enter at least five tuples for each relation.

c. Execute the following queries (SQL)

i. Find out the Employees who have the same date of joining.

ii. Get Department ID, the average, maximum, and minimum basic pay of all departments having more than two employees.

d. Write PL/SQL procedure to insert a new row (INSERT INTO command).

Database 2: Company

Consider the following relations for company database application

EMPLOYEE (Adhar_no, Name, Address, Sex, Salary, DNo)

DEPARTMENT (DNo, DName, Mgr_Adharno, MgrStartDate)

DLOCATION (DNo,DLoc)

PROJECT (PNo, PName, PLocation, DNo)

WORKS_ON (Adhar_no,PNo, Hours)

a. Create the above tables by properly specifying the primary key.

b. Enter At least five tuples for each relation.

c. Execute the following queries (SQL)

1. Make a list of all project numbers for projects that involve an employee whose last name is 'Smith', either as a worker or as a manager of the department that controls the project.

1. Retrieve all Employees in department 5 whose salary is between 30000 and 40000.

d. Write PL/SQL program to demonstrate **%ROWCOUNT attribute.**

Database 3: Insurance

Consider the following relations for an accident recording database application

PERSON (Driverid :String, name:String, Address: String)
CAR (Regno: String, Model(Company): String,Year: int)
ACCIDENT (Reportno :Number, Date: Date, Location: String)
OWNS (Driverid: String, Regno: String)
PARTICIPATED (Driverid:String, Regno:String,
Reportno:Number,Damageamount:integer)

a. Create the above tables by properly specifying the primary key.
b. Enter At least five tuples for each relation.
b. Execute the following queries (SQL)

1. Demonstrate how to update the damage amount for the car with a specific regno.
2. List the drivers (name, address & damage amt) who have participated in an accident.

d. Write PL/SQL program demonstrate exception handling for the above query 2.

Database 4: COMPANY (SHIPMENT)

Consider the following relations for an order processing database application in a company

CUSTOMER (Customerno:Integer,Customername:String,City:String)
ORDER (Orderno:integer,orderDate:date,
customerno:int,Orderamount:dec)
ITEM (Itemno:int,unitprice:decimal)
ORDERITEM (Orderno:int,Itemno:int,Quantity: int)
WAREHOUSE (Warehno:int,City:String)
SHIPMENT (Orderno:int,Warehno:int,Shipdate:Date)

a. Create the above tables by properly specifying the primary key

b. Enter At least five tuples for each relation.

c. Execute the following queries (SQL)

1. List the item no, unit price, quantity and total price for a particular order no.

2. List the customer name, city, order number and order amount for a particular customer.

d. Write PL/SQL procedure to illustrate, how to create and call a function.

Database 5: STUDENTS, COURSES & BOOK ISSUED

Consider the following relations for Student, courses & Book issued database.

STUDENT (Regno:String, Name:String; Major:String; Bdate:Date)
COURSE (Courseno:Integer, Cname:String; Dept:String)
ENROLL (Regno:String; Courseno;integer; Semester:Integer: Marks:int)
BOOKADOPTION (Courseno:Integer ;Semester:Integer;BookISBN:Int)
TEXT (BookISBN:Int; BookTitle:String;Publisher:String;Author:string)

a. Create the above tables by properly specifying the primary key.
b. Enter At least five tuples for each relation.
c. Execute the following queries (SQL)

1. Produce a list of textbooks with Book ISBN, Title, publisher, author, course name and course number adopted by some course.
2. List the name, major, course name, semester and the marks obtained by a particular student.

d. Write PL/SQL procedure to demonstrate user defined exception handling.

Database 6: BOOK DEALER

Consider the following relations for a database application for a Book Dealer

AUTHOR (Authorid int, Name:String, City:String,Country:String)
PUBLISHER (Publisherid:int, Name:String, City:String, Country:String)
CATALOG (Bookid:int, Title:String, Authorid int, Publisherid:int,
Categoryid: int,Year:int, Price:int)
CATEGORY (Categoryid: int, Description:String)
ORDERDETAIL (Oredrno:int, Bookid:int, Quantity:int)

a. Create the above tables by properly specifying the primary key.
b. Enter At least five tuples for each relation.
c. Execute the following queries (SQL)

1. Demonstrate how to increase the price of the book published by a specific publisher by 10%.

2. Display the title of the book having maximum sales.

d. Write PL/SQL program to demonstrate Implicit/Explicit **cursor.**

Database 7: BANK

Consider the following relations for a Bank database application

BRANCH (BranchID: integer, Branchname: String, Branchcity:String, Assets:Real)
ACCOUNT (Accno:Int, BranchID:Integer, Balance:Real)
CUSTOMER (AccountNo: Integer,Customername:String, CustomerCity:String)
LOAN (Loano:Integer, BranchID : Integer, Amount:Real)
BRROWER (AccountNo: Integer, Loano:Integer)

a. Create the above tables by properly specifying the primary key.
b. Enter At least five tuples for each relation.
c. Execute the following queries (SQL)

    1. List the names of the customers with their Loan Amount who have taken loan from the main branch(in any city).

    2. Find all the customers who have accounts at the main branch.

d. Write PL/SQL Procedure for an application using package.

Note: Draw ER diagram and Schema diagram for each database application

General Instructions

Implement all programs using

Scheme of Practical Examination (distribution of marks): 25 marks for the Semester end examination

1. **7 Marks (Creating tables, inserting 5 tuples for any one database application)**
2. **7 Marks (Executing SQL and PL/SQL)**
3. **Viva 6 marks**
4. **Journal 5 Marks**

Total 25 Marks

Note: Same scheme may be used for IA (Formative Assessment) examination.

B.Sc. Semester – IV

Course: Computer Science
Open Elective Course (OEC-4)
(OEC for other students)

Title of the Course: Electronic Commerce
OEC-4: Code: 004CSC051

Course No.	Type of Course	Theory / Practical	Credits	Instruction hour per week	Total No. of Lectures/Hours / Semester	Duration of Exam	Formative Assessment Marks	Summative Assessment Marks	Total Marks
OEC-4	OEC	Theory	03	03	42 hrs	2hrs	40	60	100

Course Outcomes (COs):

CO 1:Compare how internet and other information technologies support business processes.
CO2:Demonstrate an overall perspective of the importance of application of internet technologies in business administration
CO 3:Explain the basic business management concepts.
CO 4:Demonstrate the basic technical concepts relating to E-Commerce.
CO 5:Identify the security issues, threats and challenges of E-Commerce.

UNIT I	**Introduction to E-Commerce and Technology Infrastructure** Working of Web - HTML Markup for Structure - Creating simple page - Marking up text - Adding Links - Adding Images - Table Markup - Forms - HTML5.	**10 Hrs**
UNIT II	**Building an E-Commerce Website, Mobile Site and Apps** Systematic approach to build an E-Commerce: Planning, System Analysis, System Design, Building the system, Testing the system, Implementation and Maintenance, Optimize Web Performance – Choosing hardware and software – Other E-Commerce Site tools – Developing a Mobile Website and Mobile App.	**10 Hrs**
UNIT III	**E-Commerce Security and Payment Systems** E-Commerce Security Environment – Security threats in E-Commerce – Technology Solutions: Encryption, Securing Channels of Communication, Protecting Networks, Protecting Servers and Clients – Management Policies, Business Procedure and Public Laws - Payment Systems	**11 Hrs**

UNIT IV	**Business Concepts in E-Commerce** Digital Commerce Marketing and Advertising strategies and tools – Internet Marketing Technologies – Social Marketing – Mobile Marketing – Location based Marketing – Ethical, Social, Political Issues in E-Commerce. **UNIT V Project Case Study** Case Study: Identify Key components, strategy, B2B, B2C Models of E-commerce Business model of any e-commerce website - Mini Project : Develop E-Commerce project in any one of Platforms like Woo-Commerce, Magento or Opencart	**11 Hrs**

Text Book:

1. Kenneth C. Laudon, Carol Guercio Traver - E-Commerce, Pearson, 10th Edition, 2016

References:

1. http://docs.opencart.com/
2. http://devdocs.magento.com/
3. http://doc.prestashop.com/display/PS15/Developer+tutorials
4. RobbertRavensbergen, ―Building E-Commerce Solutions with Woo Commerce, PACKT, 2nd Edition

Details of Formative assessment (IA) for DSCC theory/OEC: 40% weight age for total marks

Type of Assessment	Weight age	Duration	Commencement
Written test-1	10%	1 hr	8th Week
Written test-2	10%	1 hr	12th Week
Seminar	10%	10 minutes	--
Case study / Assignment / Field work / Project work/ Activity	10%	------	--
Total	40% of the maximum marks allotted for the paper		

Faculty of Science
04 - Year UG Honors programme:2022-23

GENERAL PATTERN OF THEORY QUESTION PAPER FOR DSCC/ OEC
(60 marks for semester end Examination with 2 hrs duration)

Part-A

4. Question number 1-06 carries 2 marks each. Answer any 05 questions : 10marks

Part-B

5. Question number 07- 11 carries 05Marks each. Answer any 04 questions : 20 marks

Part-C

6. Question number 12-15 carries 10 Marks each. Answer any 03 questions : 30 marks

(Minimum 1 question from each unit and 10 marks question may have sub questions for 7+3 or 6+4 or 5+5 if necessary)

Total: 60 Marks

Note: Proportionate weight age shall be given to each unit based on number of hours prescribed.