KRISHNA UNIVERSITY

MACHILIPATNAM

No.KRU/AAC/UG BOS Meetings/to finalise V to VIII semester syllabus/2024-25 Dt:13-03-2025

PROCEEDINGS OF THE VICE – CHANCELLOR

Present: Prof. K. Ramji

Sub: - UG BOS meetings for finalising syllabus for V to VIII semesters in various UG Programs - orders – Issued.

Ref: - 1. The Vice-Chancellors Note Orders Dt.11.03.2025, Computer. No.:2726469 2726469, File No.:SCHE-KRU/122/2025-KU-EHE73 SCHE-KRU/122/2025-KU-EHE73.

-oOo-

ORDER:

The Vice-Chancellor is pleased to issue orders for conducting BOS meetings with the members of the Board of studies for various UG programs such as BA, B.Sc, B.Com, BCA, BBA etc**.,** so as to finalise the resolutions, syllabus, model question papers and any other related matters for all UG Programmes, from V to VIII semesters, along with the Skill Enhancement Courses (SECs) in the VII & VIII semesters.

The director, Academic Audit Cell, Krishna University is authorized to communicate with the said BOS members to hold the BOS meetings, in the **online mode** to finalise the resolutions, syllabus, model question papers and any other related matters. The chairpersons of the board of studies may facilitate the BOS meetings by communicating and coordinating with the other members of BOS. After the meeting is over, all the relevant documents with signatures are to be submitted to the office of the academic audit cell, in both hard and soft forms for further processing, along with the filled-in claim forms within **30 days** from the date of this order.

The Vice-Chancellor has also permitted to pay sitting allowance, through online/NEFT payment for all the members of the BOS attending online BOS meeting, from the **"Affiliation Account"** for the financial year 2024-25.

(BY ORDER)

S/d

REGISTRAR (I/C)

Copy to:

1. PA to the Vice Chancellor
2. PA to the Registrar
3. To the Dean of Law
4. File

K R I S H N A U N I V E R S I T Y

Prof. K. Sobhan Babu
Registrar
Rudravaram
Machilipatnam-
521004. Mobile : 7382483829
E-mail : registrarku@gmail.com

No.KRU/AAC/Reconstitution of the BOS for BCA (General) /2024 Dt: 30-09-2024

Sub: KU – Academic Audit – Reconstitution of the UG Board of Studies (BOS) in BCA (General) for the approval of the Under Graduation (UG) CBCS syllabus w.e.f 2023-24 – Reg.

Read: Note order's of the Vice-Chancellor, dt: 28-09-2024

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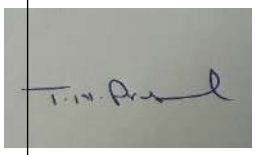
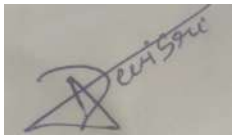
ORDER:

In accordance with the provisions contained by the Krishna University act No:29 of 2008 of A.P. Govt., Hon'ble Vice-Chancellor is pleased to appoint the UG Board of Studies in the Faculty of B.Sc. Bachelor of Computer Applications (BCA) General with the following members.

UG BOARD OF STUDIES FOR B.Sc. BACHELOR OF COMPUTER APPLICATIONS (BCA) GENERAL		
S.No	**Name of the Faculty**	**Designation**
1	Dr.J. Saradha Lakshmi, Lecturer in Computer Science, SRR & CVR Government Degree College, Vijayawada Ph: 9246660822 E-Mail: jsl@srrcvr.ac.in	Chairperson
2	Sri. K. Sridhar, B. Siddhartha College of Arts & Science, Vijayawada, Ph: 9849965036, E-mail: sridharkavuri@yahoo.com	Member
3	Sri. P.L.Ramesh, K.B.N College, Vijayawada, Ph: 9848850252, E-mail: rameshplus@yahoo.com	Member
4	T. Nagaprasadarao HOD in Computer Science .MCA.M.Tech, A.G&S.G. Siddhartha College of Arts & Science, Vuyyuru Ph: 98668 03938 E-Mail: t.nagaprasadarao@gmail.com.	

		 Member
6	Y. Neelima (MCA) Sri Krishnaveni Degree Kalasala-194 Ph. 8341511341, E - Mail id: neelimayaram@gmail.com	 Industry Expert
7	Prof. Y.K. Sundara Krishna, Department of Computer Science, University College of Arts and Science, Krishna University, Machilipatnam Ph: 9440226744, E-Mail: yksk2010@gmail.com	University Nominee
8	One Student from SRR & CVR GOVT DEGREE COLLEGE	 Student Member

The term of office of all the members including the chairperson of Board of studies is until further orders with effect from the date of the order or until the new boards of studies is constituted.

These orders shall come into force with immediate effect.

(BY ORDER)

Sd/-

REGISTRAR

Copy to:

The Chairperson & all members of UG Board of Studies of the

above PA's to Vice-Chancellor/Registrar KRU

Accounts Section/ Establishment Section & File.

Signed by Sobhan Babu K
Date: 30-09-2024 15:22:34
Reason: Approved

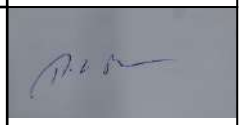
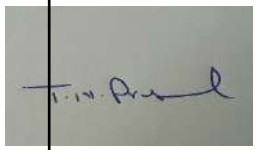
Krishna University::Machilipatnam
Board of Studies Meeting

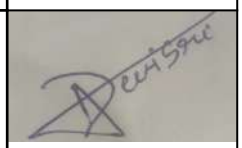
Minutes of the meeting of the UG Board of Studies in the subject of

B.C.A. (HONORS) Computer Applications (Major)

The meeting of the UG Board of Studies in the subject of B.C.A. (HONORS) Computer Applications under single Major/Minor Programme convened at 03.00 P.M, on 11-06-2025 through online mode with the members of the Board of studies for Bachelor of Computer Applications (BCA) as mentioned in the proceedings No.KRU/AAC/Reconstitution of the BOS for BCA (General) /2024 dated 30.09.2024.

THE FOLLOWING MEMBERS ATTENDED THE ONLINE MEETING

UG BOARD OF STUDIES IN BACHELOR OF COMPUTER APPLICATIONS (BCA) GENERAL		
Name of the Faculty	**Designation**	
Dr.J. Saradha Lakshmi, Lecturer in Computer Science, SRR & CVR Government Degree College, Vijayawada Ph: 9246660822, E-Mail: jsl@srrcvr.ac.in	Chairperson	
Sri. K. Sridhar, B. Siddhartha College of Arts & Science, Vijayawada, Ph: 9849965036, E-mail: sridharkavuri@yahoo.com	Member	
Sri. P.L.Ramesh, K.B.N College, Vijayawada, Ph: 9848850252, E-mail: rameshplus@yahoo.com	Member	
T. Naga Prasad Rao HOD in Computer Science .MCA.M.Tech, A.G&S.G. Siddhartha College of Arts & Science, Vuyyuru Ph: 98668 03938, E-Mail: t.nagaprasadarao@gmail.com	Member	
Y. Neelima (MCA)	Member	

Sri Krishnaveni Degree Kalasala-194 Ph. 8341511341, E - Mail id: neelimayaram@gmail.com		
Prof. Y.K. Sundara Krishna, Department of Computer Science, University College of Arts and Science, Krishna University, Machilipatnam Ph: 9440226744, E-Mail: yksk2010@gmail.com	University Nominee	
One Student from SRR & CVR GOVT DEGREE COLLEGE	Student Member A.DEVI SRI	

Agenda:

Item 1: Approval of Syllabus for V, VI, VII, and VIII semesters for the academic year 2024-2025 and 2025-2026 for **BACHELOR OF COMPUTER APPLICATIONS (BCA) GENERAL**

Item 2: Approval of Blueprint and Model Question Papers.

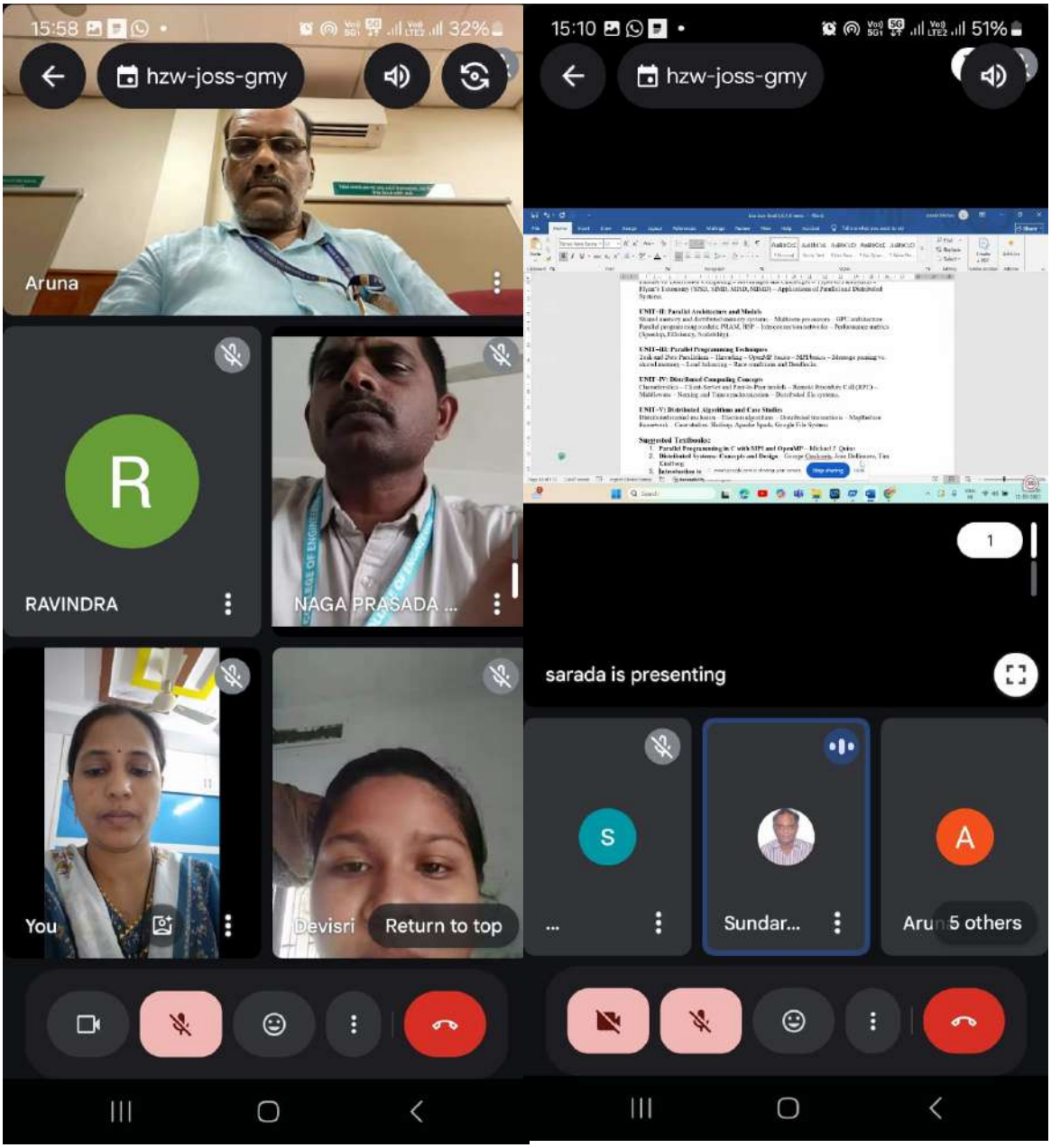
Item 3: Approval of Division of marks for Continuous Internal Assessment and Semester End Examination

Item 4: Any other related matters for BCA general UG program, for V, VI, VII, and VIII semesters with the approval of the Chair.

Resolutions:

The members of the Board of Studies for Bachelor of Computer Applications (BCA) General of Krishna University held an online meeting on 11-06-2025 3 p.m and made the following resolutions unanimously.

1. The Board of Studies resolved to adopt and implement the syllabi for the core subjects as appended hereunder for the V, VI, VII, and VIII semesters only.
2. The Board of Studies unanimously approved to have 30 marks allocated for Continuous Internal Assessment in the colleges and 70 marks allocated for Semester End Examination to be held by Krishna University.
3. The Board of Studies unanimously resolved to adopt the model question paper, along with its scheme of mark distribution, as outlined below.
4. The Board of Studies also came out with a model question paper as envisaged in the blueprint of the Question Paper attached herewith.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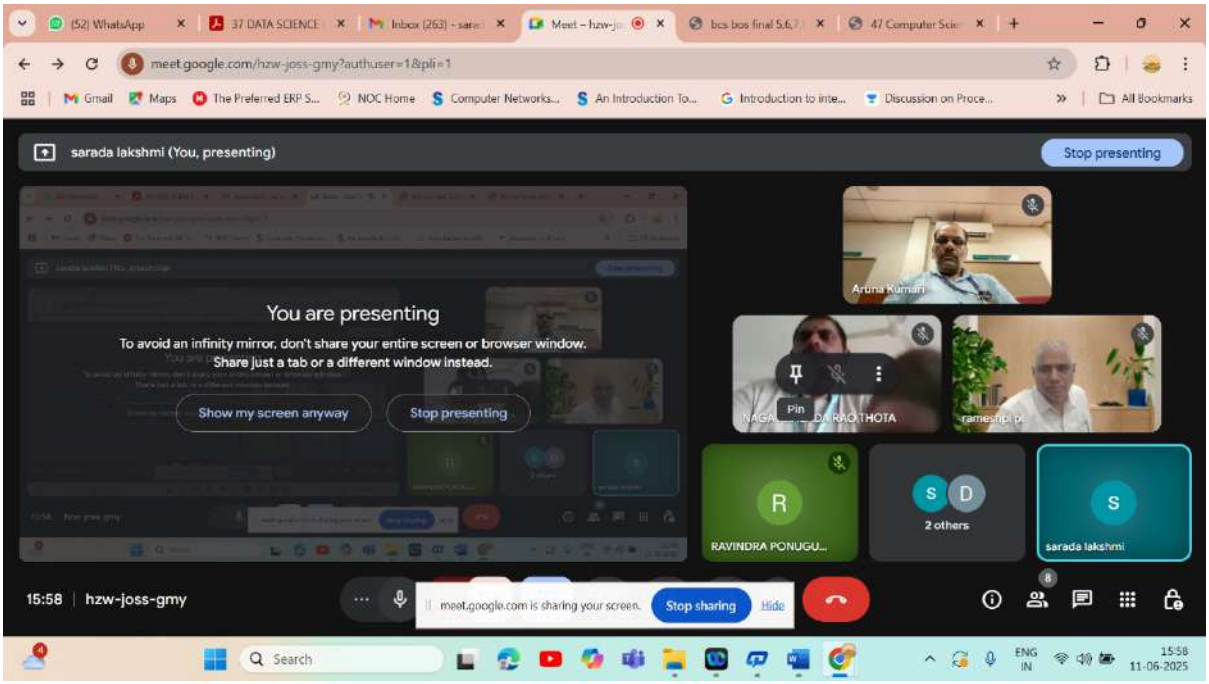

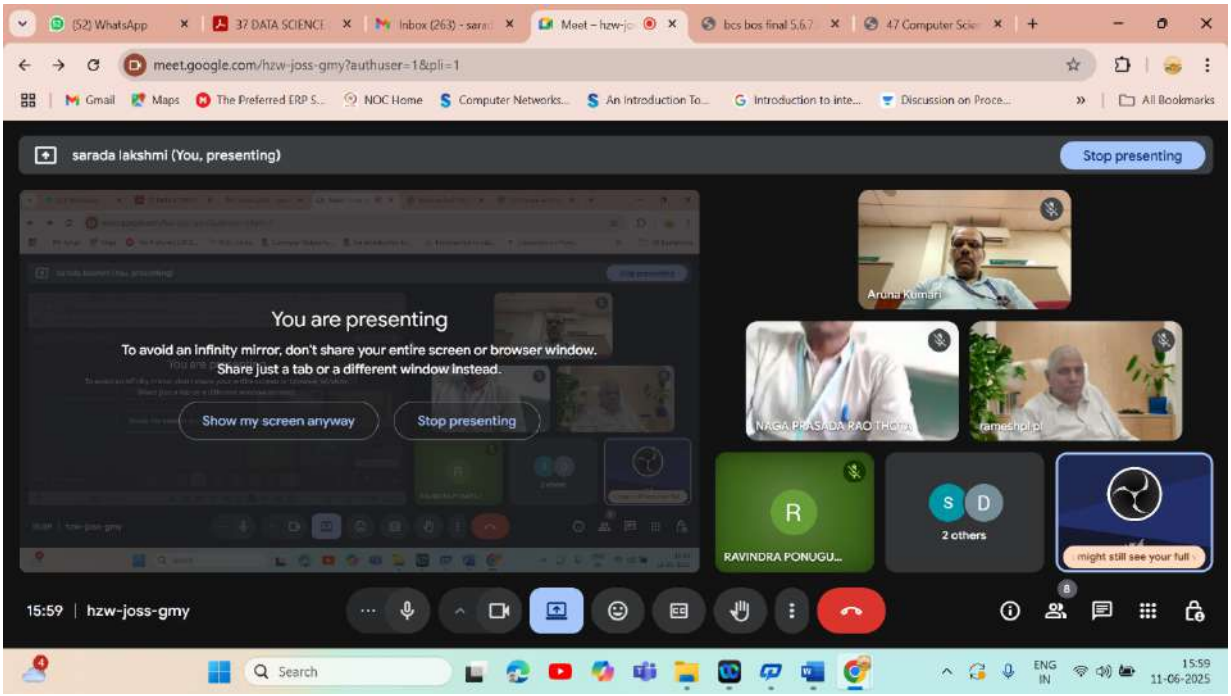

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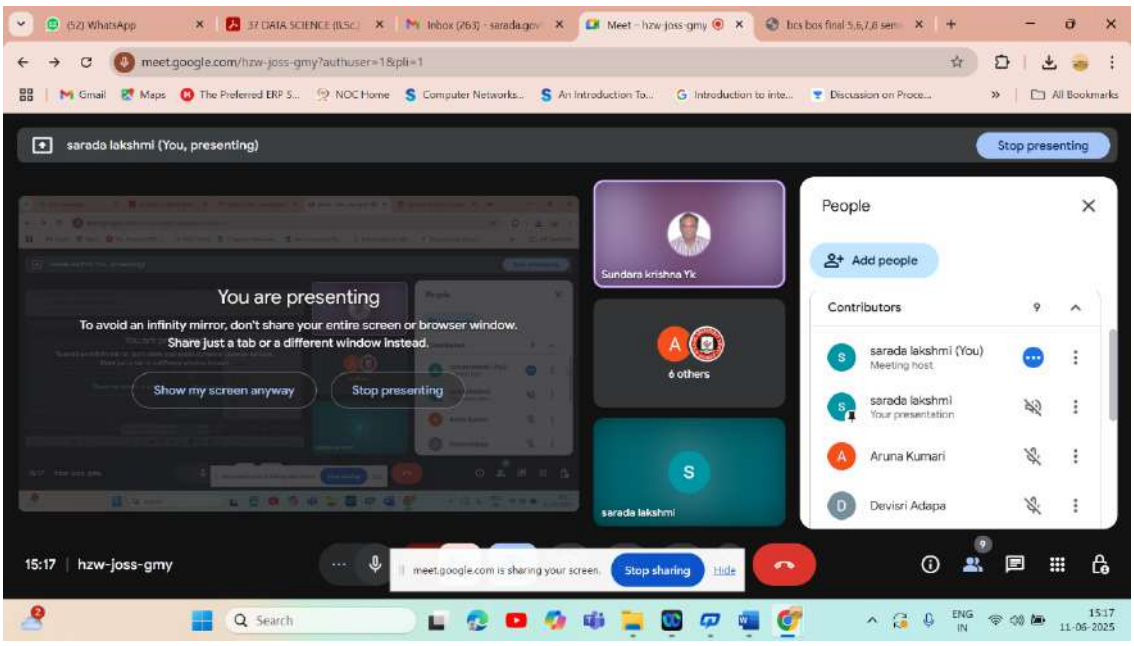

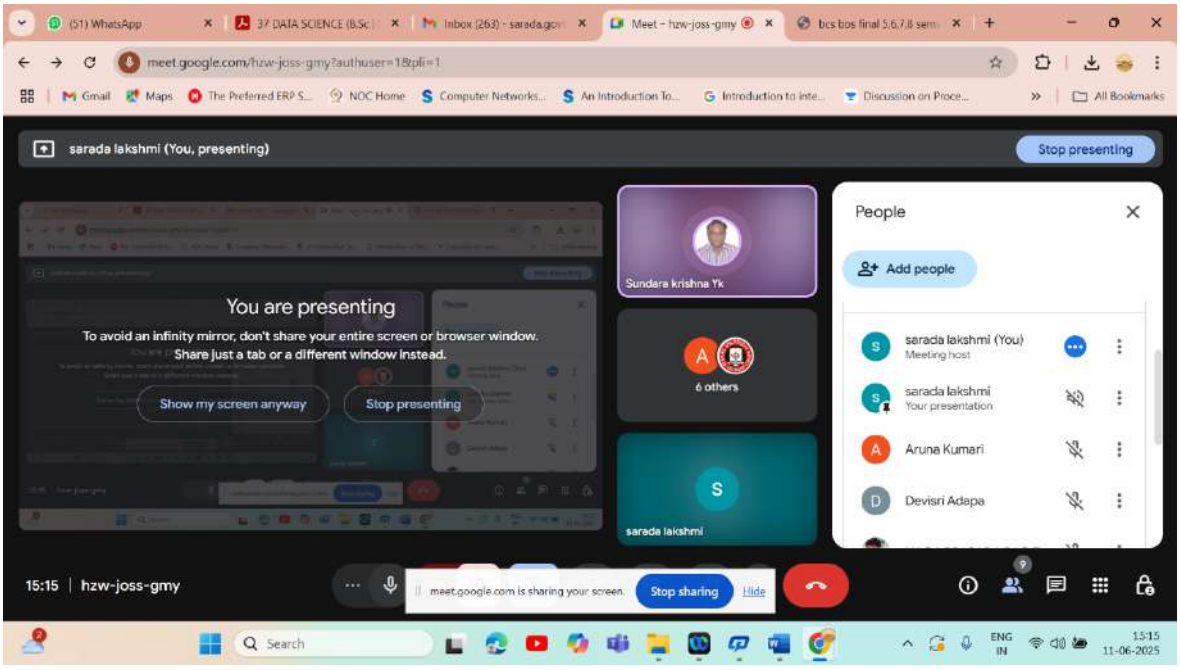

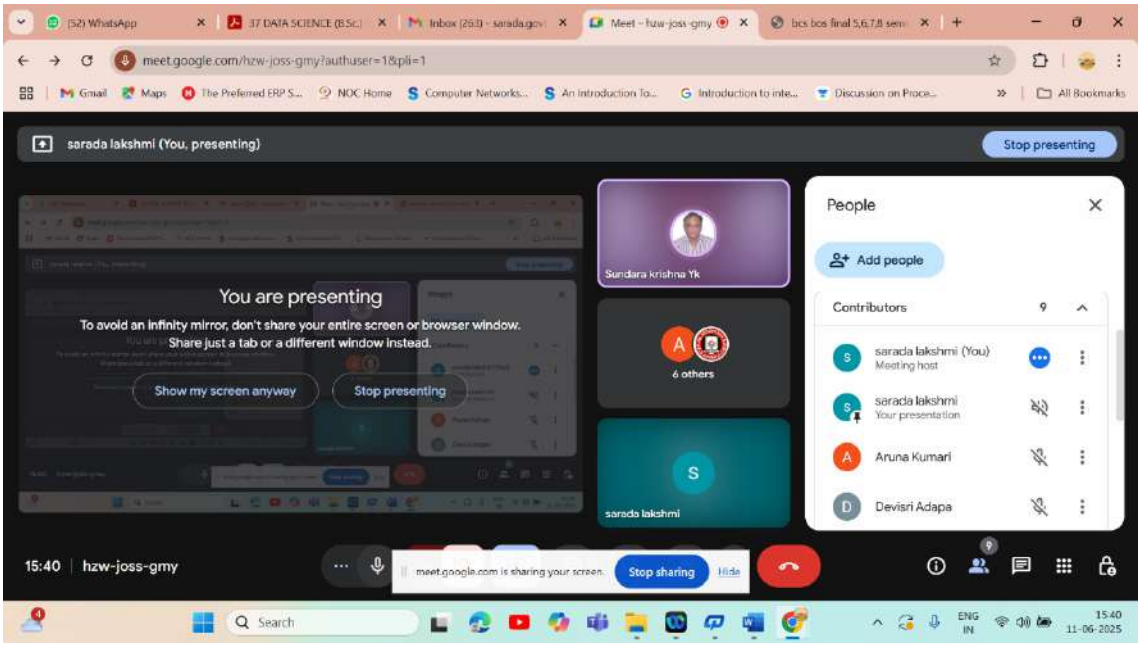

Krishna University :: Machilipatnam

Programme: B.C.A. (HONORS) Computer Applications (Major)

w.e.f. AY 2023-24

COURSE STRUCTURE

Year	Semester	Course	Title of the Course	No. of Hrs /Week	No. of Credits
I	I	1	Fundamentals of Commerce	3+2	4
		2	Business Organization	3+2	4
	II	3	Office Automation Tools	3	3
			Office Automation Tools Lab	2	1
		4	Programming in C	3	3
			Programming in C Lab	2	1
II	III	5	Database Management System	3	3
			Database Management System Lab	2	1
		6	Data Structures	3	3
			Data Structures Lab	2	1
		7	Object Oriented Programming Through JAVA	3	3
			Object Oriented Programming Through JAVA Lab		2 1
		8	Software Engineering	3	3
			Software Engineering Lab	2	1
	IV	9	Python Programming	3	3
			Python Programming Lab	2	1
		10	Operating Systems	3	3
			Operating Systems Lab	2	1
		11	Mobile Application Development using Android	3	3
			Mobile Application Development using Android Lab	2	1
III	V	12	Web Programming	3	3
			Web Programming Lab	2	1
		13	Web Development Using PHP & MySQL	3	3
			Web Development Using PHP & MySQL Lab	2	1
		14	Cloud Computing (OR) Machine Learning	3	3

			Cloud Computing (OR) Machine Learning	2	1
		15	Software Testing (OR) Foundations of Data Science	3	3
			Software Testing (OR) Foundations of Data Science	2	1
	VI	Semester Internship/Apprenticeship with 12 Credits			

Year	Semester	Course	Title of the Course	No. of Hrs /Week	No. of Credits
		16	Parallel and Distributed Computing (OR) Big Data Technologies	3	3
			Parallel and Distributed Computing (OR) Big Data Technologies Lab	2	1
		17	Artificial Intelligence and Neural Networks (OR) Cryptography and Network Security	3	3
			Artificial Intelligence and Neural Networks (OR) Cryptography and Network Security Lab	2	1
			Bio-Informatics (OR) Mathematical and	3	3

IV	VII	18	Statistical Foundations		
			Bio-Informatics (OR) Mathematical and Statistical Foundations Lab	2	1
		SEC			
		19	Content Management (OR) Web Development with ReactJS	3	3
			Content Management (OR) Web Development with ReactJS Lab	2	1
		20	Data Analysis with Power BI (OR) Data Visualization Using Tableau	3	3
			Data Analysis with Power BI (OR) Data Visualization Using Tableau Lab	2	1
	VIII	21	Natural Language Processing & Text Analytics (OR) Social Network Analysis	3	3
			Natural Language Processing & Text Analytics (OR) Social Network Analysis Lab	2	1
		22	Cyber Security (OR) Block Chain Technology	3	3
			Cyber Security (OR) Block Chain Technology Lab	2	1
		23	Advanced Database Systems (OR) Applied Data Analytics	3	3
			Advanced Database Systems (OR) Applied Data Analytics Lab	2	1
		SEC			
		24	Search Engine Optimization (OR) Deep Learning	3	3
			Search Engine Optimization (OR) Deep Learning Lab	2	1
		25	Game Design & Development (OR) Bootstrap & JQuery	3	3
			Game Design & Development (OR) Bootstrap & JQuery Lab	2	1

SEMESTER-V

COURSE 12: WEB PROGRAMMING

Theory Credits: 3 3 hrs/week

Course Objectives:

1. Learn the basics of creating a website.
2. Understand HTML5 coding conventions
3. Understand the philosophy of how HTML and CSS should fit together
4. Learn how JavaScript came to be.

Course Outcomes: Upon Completion of the course, the students will be able to

1. Understand the Web Design Process.
2. Apply the HTML tags, elements and attributes
3. Apply different types of HTML elements
4. Use of organizational elements, tables and images
5. Use of audio, video files
6. Apply JavaScript concepts

Unit-I:

Introduction to Web Programming: Introduction, creating a website, HTML tags, HTML Elements, HTML attributes, CSS Preview, History of HTML, Differences between old HTML and HTML5, how to check your HTML code

Case Study: Create a web page of your department using standard HTML tags, HTML elements and HTML attributes

Unit-II:

Coding Standards, Block Elements:HTML coding conventions, Comments, HTML Elements, Should Describe Web Page Content Accurately, Content Model Categories, Block Elements, blockquote Element, Whitespace Collapsing, pre Element, Phrasing Elements, Editing Elements, q and cite Elements, dfn, abbr, and time Elements, Code-Related Elements, br and wbr Elements.
Text Elements, and Character References: sup, sub, s, mark, and small Elements, strong, em, b, u,

and i Elements, span Element, Character References, Web Page with Character References, and Phrasing Elements.
Case Study: Create a web page related to famous water reservoir/ famous tourist spots near by your location using block elements, text elements and character references

Unit-III:Cascading Style Sheet(CSS) : CSS Overview, CSS Rules, Example with Type Selectors and the Universal Selector, CSS Syntax and Style, Class Selectors, ID Selectors, span and div Elements, Cascading, style Attribute, style Container, External CSS Files, CSS Properties, Color Properties, RGB Values for Color, Opacity Values for Color, HSL and HSLA Values for Color, Font Properties, line-height Property, Text Properties, Border Properties, Element Box, padding Property, margin Property,

Case Study: Description of your City or place with the use of CSS and compare it with previous two case studies

Unit-IV:Organizing a Page's, Content with Lists, Figures, and Various, Organizational Elements: List, Descendant selector, Figure with picture and caption, Organizational elements, Navigation bar, Header and Footer, User agent stylesheet, Child selector, CSS inheritance
Tables and CSS Layout: Data tables vs Layout tables, Table elements, Format table

Links and Images: Implement a link with the a element, different types of href attribute Values, relative URLs, Implement a link that jumps to a particular location within a web page, element's target attribute, Understand the concepts behind GIF, JPEG, and PNG bitmap image formats, implement bitmap image elements within a web page, implement SVG image elements within a web page

Case Study: Create a web page related to your department time table and images of any activity

Unit-V:

Image Manipulations, Audio and Video: Position an image, how to display a shortcut icon in a browser's tab area, iframe, Create an image sprite file, Implement an audio player using the audio element, Handle different audio file formats, Cover a web page's background with an image, web fonts, Implement a video player using the video element, Center a web page's content, Cover a web page's background with a color gradient

Introduction to JavaScript: Button control with an event Handler, Syntax rules for functions, variables, identifiers, and assignments, Document Object Model(DOM), form with a text control and a button, event-handler attributes, rollover using mouse events

Case Study: Create a webpage involving audio and video of your college day activities

Prescribed Text Books:

1. **Web Programming with HTML5,CSS and JavaScript, John Dean, Jones & Bartlett Learning**

Reference Text Books:

1. **HTML & CSS: The Complete Reference, 5th Edition, Thomas. A. Powell**

KRISHNA UNIVERSITY: MACHILIPATNAM - 521004

B.C.A Honors Computer Applications [Major / Minor]

REVISED CBCS FRAMEWORK WITH EFFECT FROM 2023-2024 ADMITTED BATCH

Web Programming

Time: 3 hrs. **Max marks: 70**

SECTION-A

Answer any **FIVE** out of the following 5 x 4 M= 20M

1. What is the structure of HTML document?
2. What are the differences between HTML and HTML5.
3. Explain br and wbr Elements.
4. Explain character references.
5. Explain span an div tags.
6. Explain href attributes.
7. Explain img tag?
8. Explain Rollover buttons.

SECTION-B

Answer ALL Questions 5x10M= 50M

9. Explain the steps to create a web site.

OR

10. What are different types of tags available in HTML? Explain.

11. What are Content Model Categories?

OR

12. How can you format text elements in a web page?

13. What are different types of CSS?

OR

14. Explain CSS properties.

15. What is a list? Explain types of lists with example.

OR

16. How to create and format tables with example?

17. How to implement an audio player in a web page with example.

OR

18. Explain Document Object Model (DOM).

KRISHNA UNIVERSITY :: MACHILIPATNAM - 521004

B.C.A Honours Computer Applications[Major / Minor]

REVISED CBCS FRAMEWORK WITH EFFECT FROM 2023-2024 ADMITTED BATCH

BLUEPRINT
WEB PROGRAMMING

Unit	S.A.Q **Section :A** (including choice) 4 Marks	E.Q **Section: B** (including choice) 10 Marks	Marks Allotted
I	2	2	28
II	2	2	24
III	1	2	28
IV	1	2	28
V	2	2	24
Total	8	10	132

SEMESTER-V

COURSE 12: WEB PROGRAMMING

Practical Credits: 1 2 hrs/week

Course Outcomes: On successful completion of this practical course, student shall be able to:

1. Create web pages using HTML.
2. Apply different styles to HTML page.
3. Work with different scripting elements .

WEEK-1

1. Write an HTML code to display your education details in a tabular format.
2. Write an HTML code to display your CV on a web page.

WEEK-2

1. Create a webpage with HTML describing your department. Use paragraph and list tags.
2. Apply various colors to suitably distinguish key words. Also apply font styling like italics, underline and two other fonts to words you find appropriate. Also use header tags.
3. Create links on the words e.g. “Wi-Fi” and “LAN” to link them to Wikipedia pages.
4. Insert an image and create a link such that clicking on image takes user to other page.
5. Change the background color of the page. At the bottom create a link to take user to the top of the page.

WEEK-3

1. Create a table to show your class time-table.
2. Use tables to provide layout to your HTML page describing your university infrastructure.
3. Use and tags to provide a layout to the above page instead of a table layout.
4. Use frames such that page is divided into 3 frames 20% on left to show contents of pages, 60% in center to show body of page, remaining on right to show remarks.
5. Embed Audio and Video into your HTML web page.

WEEK-4

1. Write an HTML code to illustrate the usage of the following:
   - Ordered List
   - Unordered List
   - Definition List

WEEK-5

1. Write an HTML code to create a frameset having header, footer, navigation and content sections.

WEEK-6

1. Write an HTML code to demonstrate the usage of inline CSS.
2. Write an HTML code to demonstrate the usage of internal CSS.
3. Write an HTML code to demonstrate the usage of external CSS.

WEEK-7

1. Create a form similar to the one in previous experiment. Put validation checks on values entered by the user using JavaScript (such as age should be a value between 1 and 150).
2. Write a JavaScript program to display information box as soon as page loads.
3. Write a JavaScript program to change background color after 5 seconds of page load.
4. Write a JavaScript program to dynamically bold, italic and underline words and phrases based on user actions.
5. Write a JavaScript program to display a hidden div (e.g. showing stats of a player when user clicks on his name
6. Write a Java script to prompt for users name and display it on the screen.
7. Design HTML form for keeping student record and validate it using Java script.
8. Write programs using Java script for Web Page to display browsers information.

SEMESTER-V

COURSE 13: WEB DEVELOPMENT USING PHP & MYSQL

Theory Credits: 3 3 hrs/week

Course Objectives:

To enable students to understand open-source tools to create dynamic web pages, implement user interactivity, and gain proficiency in developing websites.

Course Outcomes: Upon Completion of the course, the students will be able to

1. Write simple programs in PHP.
2. Understand how to use regular expressions, handle exceptions, and validate data.
3. Apply built-in functions and create user-defined functions in PHP programming.
4. Write PHP scripts to handle HTML forms.
5. Write programs to create dynamic and interactive web-based applications using PHP and MYSQL.
6. Know how to use PHP with MySQL DB and can write database-driven web pages.

Unit-I:

Using PHP: PHP Basics: Accessing PHP, Creating Sample Application, Embedding PHP in HTML, Adding Dynamic Content, Identifiers, Variables, Constants, Operators, Data types, Accessing Form Variables, Variable handling Functions, Making Decisions with Conditions, Repeating actions through Iterations, Breaking Out of a Control Structure
Storing and Retrieving Data: Processing Files, opening a File, writing to a File, closing a File, Reading from a File, Other File Functions, Locking Files.

CASE STUDY: Web Based Social Network Application Development

Unit-II:

Arrays: Arrays basics, Types, Operators, Array Manipulations.
String Manipulation and Regular Expressions: Strings Basics, Formatting Strings, Joining and Splitting Strings with String Functions, Comparing Strings, Matching and Replacing Substrings with String Function, Introducing Regular Expressions, Find, Replace, Splitting in regular Expressions

CASE STUDY: Retail E-commerce Application Development for Apparels & Garments

Unit-III:

Reusing Code and Writing Functions: The Advantages of Reusing, Using require () and include (), Using Functions in PHP, Scope, Passing by Reference Versus Passing by Value, keyword, Recursion.
Object-Oriented PHP: OOP Concepts, Creating Classes, Attributes, and Operations in PHP, Implementing Inheritance in PHP, Understanding Advanced Object-Oriented Functionality in PHP.
Error and Exception Handling: Error and Exception Handling, Exception Handling Concepts.

CASE STUDY: e-Commerce Application for Manufacturing Industry

Unit-IV:

Using MySQL: Relational Database Concepts, Web Database Architecture, Introducing MySQL's Privilege System, Creating Database Tables, Understanding MySQL, Identifiers, Database

Operations, querying a Database, Understanding the Privilege System, Making Your MySQL Database Secure, Optimization, Backup, Restore.

CASE STUDY: Custom CMS Website Development

Unit-V:

Introduction of Laravel PHP Framework: Why Lavarel, setting up Lavarel Development Environment, Routing and Controllers: introduction to MVC, the HTTP verbs, and REST, Route Definitions, Route Groups, Signed Routes, Views, Controllers, Route Model Binding, Redirects, Custom Responses

Case Study: E-commerce Business Solution delivered for Groceries Vendor

Prescribed Text Books:

1. Luke Welling, Laura Thomson, “PHP and MySQL Web Development”, 5th Edition
2. Matt Stauffer, “Lavarel: Up & Running”, 2nd Edition
3. Julie C. Meloni, SAMS Teach yourself PHP MySQL and Apache, Pearson Education (2007).
4. Steven Holzner , PHP: The Complete Reference, McGraw-Hill
5. Robin Nixon, Learning PHP, MySQL, JavaScript, CSS & HTML5, Third Edition O'reilly, 2014
6. Xue Bai Michael Ekedahl, The web warrior guide to Web Programming, Thomson (2006).
7. Web resources:

http://www.codecademy.com/tracks/ph
http://www.w3schools.com/PHP
http://www.tutorialpoint.com

8. Other web sources suggested by the teacher concerned and the college librarian including reading material.

KRISHNA UNIVERSITY: MACHILIPATNAM - 521004

B.C.A Honors Computer Applications [Major / Minor]

REVISED CBCS FRAMEWORK WITH EFFECT FROM 2023-2024 ADMITTED BATCH

Web Development Using PHP & MySQL

Time: 3 hrs. **Max marks: 70**

SECTION-A

Answer any **FIVE** out of the following 5 x 4 M= 20M

1. What is a variable? Explain.
2. Explain datatypes in PHP.
3. What are different types of operators available in PHP.
4. Explain regular expressions.
5. What is recursion? Explain.
6. What are the Relational Database Concepts.
7. Explain features of Laravel PHP framework.
8. Explain views in laravel PHP framework.

SECTION-B

Answer ALL Questions 5x10M= 50M

9. Explain decision making and iterative statements.

OR

10. Explain the process of managing files in PHP.

11. What is an array? Explain different types of arrays.

OR

12. What is a string? Explain string handling functions.

13. How to implement functions? Explain passing by reference and passing by value.

OR

14. Explain how to implement OOP functionality in PHP?

15. How to create database tables using MySQL.

OR

16. Explain the process of querying a database in MySQL.?

17. What is MVC in laravel PHP framework.

OR

18. What is a Route in laravel PHP framework? Explain in detail.

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REVISED CBCS FRAMEWORK WITH EFFECT FROM 2023-2024 ADMITTED BATCH

BLUEPRINT

WEB DEVELOPMENT USING PHP & MYSQL

Unit	S.A.Q **Section :A** (including choice) 4 Marks	E.Q **Section: B** (including choice) 10 Marks	Marks Allotted
I	2	2	28
II	2	2	24
III	1	2	28
IV	1	2	28
V	2	2	24
Total	8	10	132

SEMESTER-V

COURSE 13: WEB DEVELOPMENT USING PHP & MYSQL

Practical Credits: 1 2 hrs/week

Course Outcomes: On successful completion of this practical course, students shall be able to:

- Write, debug, and implement the Programs by applying concepts and error handling techniques of PHP.
- Create an interactive and dynamic website.
- Create a website with reports generated from a database.
- Create an interactive website for e-commerce sites like online shopping, etc.

Practical (Laboratory) Syllabus: (30 hrs.)

1. Write a PHP program to display "Hello", and today's date.
2. Write a PHP program to display the Fibonacci series.
3. Write a PHP Program to read the employee details.
4. Write a PHP program to prepare the student marks list.
5. Write a PHP program to generate the multiplication of two matrices.
6. Create student registration form using text box, check box, radio button, select, submit button. And display user inserted value in new PHP page.
7. Create Website Registration Form using text box, check box, radio button, select, submit button. And display user inserted value in new PHP page.
8. Write PHP script to demonstrate passing variables with cookies.
9. Write a program to keep track of how many times a visitor has loaded the page.
10. Write a PHP application to add new Rows in a Table.
11. Write a PHP application to modify the Rows in a Table.
12. Write a PHP application to delete the Rows from a Table
13. Write a PHP application to fetch the Rows in a Table.
14. Develop an PHP application to implement the following Operations.
Registration of Users. Insert the details of the Users. Modify the Details.
Transaction Maintenance. No of times Logged in Time Spent on each login. Restrict the user for three trials only.
Delete the user if he spent more than 100 Hrs of transaction.
15. Write a PHP script to connect MySQL server from your website.
16. Write a program to read customer information like cust-no, cust-name, itempurchased, and mob-no, from customer table and display all these information in table format on output screen.
17. Write a program to edit name of customer to "Kiran" with cust-no =1, and to delete record with cust-no=3.
18. Write a program to read employee information like emp-no, emp-name, designation and salary from EMP table and display all this information using table format.
19. Create a dynamic web site using PHP and MySQL.

SEMESTER-V

COURSE 14: CLOUD COMPUTING

Theory Credits: 3 3 hrs/week

Course Objectives:

1. This course introduces the basic principles of cloud computing, Cloud Computing models and Services, Virtualization Techniques, Resource Sharing, Load Balancing and Security issues in Cloud Computing.
2. It will also equip the students to understand major industry players in the public cloud domain.

Course Outcomes: Upon Completion of the course, the students will be able to

1. Understand the basic principles of cloud computing.
2. Analyze different types of cloud services – Cloud Computing Models and Cloud Computing Services.
3. Understand Virtualization techniques
4. Use different Cloud Platforms
5. Learn different File systems and Security issues in Cloud Computing Platforms

Unit-I: Introduction to Cloud Computing, Evaluation and Enabling technologies, Benefits and Challenges, Cloud Computing Model

CASE STUDY: Identify different types of Public Clouds Private Cloud and Hybrid Cloud

Unit-II: Cloud Computing Services, Elements of Cloud Security model, Cloud Security reference model, Examining Cloud Security against traditional computing, Security Policy

CASE STUDY: Identify various Realtime Examples of Cloud Computing Services and work with them

Unit-III: Virtualization basics, Machine or Server Level Virtualization, Major Server virtualization products and vendors, Types of Virtualization, Advantages and Disadvantages of Virtualization, Virtualization Security Threats

CASE STUDY: Install any Virtualization Software and Perform any task

Unit-IV: Resource Pooling and Sharing, Multi-tenancy, Resource Provisioning, Scaling, Scaling strategies in Cloud, Types of Scaling, Load balancing in Cloud, Categories of Load Balancing, Service Oriented Architecture (SOA), Elements of a service, Benefits of SOA

CASE STUDY: Perform different operations using Google Cloud and Amazon Elastic Compute Cloud(EC2)

Unit-V: Cloud Native File System, Storage types, Relational DBMS in Cloud, Non-Relational DBMS in Cloud, Cloud Security, Treats to cloud security, Infrastructure Security in Cloud, Information Security in Cloud, Identity Management and Access Control

Case Study: Identify and work with Popular cloud storages for developers, Popular General Purpose Cloud Storages

Prescribed Text Books:

1. **Cloud Computing: Sandeep Bhowmik , Cambridge University Press**
2. **CLOUD COMPUTING:Principles and Paradigms by Rajkumar Buyya, James Broberg, Andrzej Goscinski**
3. **The Definite Guide to Cloud Computing by Dan Sullivan**

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REVISED CBCS FRAMEWORK WITH EFFECT FROM 2023-2024 ADMITTED BATCH

Cloud Computing

Time: 3 hrs. **Max marks: 70**

SECTION-A

Answer any **FIVE** out of the following 5 x 4 M= 20M

1. What are the benefits of cloud computing?
2. What is SOA.
3. What are the cloud computing services?
4. Cloud security Vs Traditional computing Security.
5. Explain role of virtualization in cloud computing.
6. Explain resource pooling and sharing.
7. What is the cloud-based RDBMS Services?
8. Explain storage types in cloud.

SECTION-B

Answer ALL Questions 5x10M= 50M

9. What are the enabling technologies of cloud computing?

OR

10. Explain cloud computing model.

11. What are elements of cloud security model?

OR

12. Explain cloud security reference model?

13. What are different types of virtualization?

OR

14. Explain security threats of virtualization.

15. What is a scaling? Explain types of scaling strategies in cloud.

OR

16. What is a Loading? Explain different categories of Load balancing.

17. Explain cloud security.

OR

18. Explain information security in cloud.

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REVISED CBCS FRAMEWORK WITH EFFECT FROM 2023-2024 ADMITTED BATCH

BLUEPRINT
CLOUD COMPUTING

Unit	S.A.Q **Section :A** (including choice) 4 Marks	E.Q **Section: B** (including choice) 10 Marks	Marks Allotted
I	2	2	28
II	2	2	24
III	1	2	28
IV	1	2	28
V	2	2	24
Total	8	10	132

SEMESTER-V

COURSE 14: CLOUD COMPUTING

Practical Credits: 1 2 hrs/week

Course Outcomes: Upon Completion of the course, the students will be able to

1. Working with Virtual machines.
2. Run simple programs on virtual box.
3. Acquire knowledge in Google App Engine
4. Get practical exposure on CloudSim

Experiments:

1. Install Virtualbox / VMware Workstation with different flavours of linux or windows OS on top of windows10 or 11.
2. Install a C compiler in the virtual machine created using virtual box and execute Simple Programs
3. Install Google App Engine. Create hello world app and other simple web applications using python/java.
4. Use GAE launcher to launch the web applications.
5. Simulate a cloud scenario using CloudSim and run a scheduling algorithm that is not present in CloudSim.
6. Find a procedure to transfer the files from one virtual machine to another virtual machine.
7. Find a procedure to launch virtual machine using trystack (Online Openstack Demo Version)

Web Resources:

1. Cloud Computing Fundamentals Labs - Cloud Academy

SEMESTER-V

COURSE 14: MACHINE LEARNING

Theory Credits: 3 3 hrs/week

Course Objectives:

- To learn the basics of machine learning
- To learn the importance of feature engineering
- To understand the foundational rules of probability
- To study different classification and clustering techniques
- To understand the basics of neural network concepts

Course Outcomes: Upon Completion of the course, the students will be able to

1. Develop an appreciation for what is involved in Learning models from data
2. Understand a wide variety of learning algorithms
3. Understand how to evaluate models generated from data
4. Apply the algorithms to a real problem, optimize the models learned and report on the expected accuracy that can be achieved by applying the models
5. Understand different neural network concepts

Unit-I:

Introduction to Machine Learning: Introduction, what is human learning, types of human learning, what is machine learning, types of machine learning, problems not to be solved using machine learning, Applications of machine learning, Tools in machine learning, Issues in machine learning

Preparing to Model: Machine learning activities, Basic types of data in machine learning, Exploring structure of data, Data quality and remediation, Data Preprocessing

Case Study: Machine Learning **Case Study** on Trendyol

Unit-II:

Modelling and Evaluation: Selecting a model, Training a model, Model representation and Interpretability, Evaluating Performance of a model, Improving performance of a model

Basics of Feature Engineering: Introduction, Feature transformation, Feature subset selection

Case Study: Machine Learning **Case Study** On Harley Davidson

Unit-III:

Brief Overview of Probability: Importance of Statistical Tools in Machine Learning, Concept of Probability, Random Variables, Some Common Discrete Distributions, Some Common Continuous Distributions, Multiple Random Variables, Sampling Distributions, Hypothesis Testing

Bayesian Concept Learning: Why Bayesian methods are important, Bayes Theorem, Concept Learning, Bayesian Belief Network

Case Study: Machine Learning **Case Study** on Tesla

Unit-IV:

Supervised Learning : Classification: Example of Supervised Learning, Classification Model, Classification Learning Steps, Common Classification Algorithms

Super vised Learning : Regression: Example of Regression, Common Regression Algorithms

Unsupervised Learning: Unsupervised vs Supervised Learning, Application of Unsupervised Learning, Clustering, Finding Pattern using Association Rule

Case Study: Predicting Heart Failure in Mobile Health

Unit-V:

Basics of Neural Network: Understanding Biological Neuron, Exploring the Artificial Neuron, Types of Activation Functions, Early Implementations of ANN, Architectures of Neural Network, Learning Process in ANN, Back Propagation, Deep Learning

Other Types of Learning: Representation Learning, Active Learning Vs Memory based Learning, Ensemble Learning Algorithm

Case Study: American Cancer Society on Google Cloud ML Engine

Prescribed Text Books:

1. Machine Learning, Pearson by Saikat Dutt, Subramanian Chandramouli, Amit Kumar Das
2. Introduction to Machine Learning with Python:A Guide for Data Scientists by Andreas C.Muller & Sarah Guido
3. Machine Learning for Absolute Beginners, 2nd Edition by Oliver Theobald
4. Machine Learning for Dummies: IBM Limited Edition by Judith Hurwitz and Daniel Kirsch

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Machine Learning

Time: 3 hrs. **Max marks: 70**

SECTION-A

Answer any **FIVE** out of the following 5 x 4 M= 20M

1. Types of Machine Learning.
2. Types of data in Machine Learning.
3. What is a feature? Explain
4. Feature Selection Methods.
5. Hypothesis Testing.
6. Regression.
7. Artificial Neuron.
8. Deep Learning.

SECTION-B

Answer ALL Questions 5x10M= 50M

9. What are the applications of machine learning and issues of machine learning?

OR

10. Explain machine learning activities.

11. Explain model evaluation and selection process?

OR

12. Explain feature transformation?

13. What is concept learning? Explain.

OR

14. Explain Sampling Distributions.

15. How to find pattern using association rule?

OR

16. Explain supervised learning?

17. Explain architectures of Neural Network.

OR

18. Explain Active learning and Memory based learning.

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BLUEPRINT
MACHINE LEARNING

Unit	S.A.Q **Section :A** (including choice) 4 Marks	E.Q **Section: B** (including choice) 10 Marks	Marks Allotted
I	2	2	28
II	2	2	24
III	1	2	28
IV	1	2	28
V	2	2	24
Total	8	10	132

SEMESTER-V

COURSE 14: MACHINE LEARNING

Practical Credits: 1 2 hrs/week

Course Outcomes: On successful completion of this practical course, students shall be able to:

1. Execute basic programs in either R or Python.
2. Gain practical knowledge on different Python libraries/packages.
3. Implement different machine learning algorithms

Implement the following using in either R Language or Python

1. **Introduction to basic commands:**
   a) Get and Set Working Directory
   b) See Directory Content
   c) Install and Load Packages
   d) Compile Source File for Execution
   e) Commands for basic user input/output
   f) Basic Data Types and Data Manipulation Functions
2. **Introduction to basic commands Continued:**
   a) Conditional Statements
   b) Loops
3. Data Manipulation Package installation and different operations using installed package
4. Standard Library function to plot the Graphs
5. Basic Data Exploration on any dataset available publicly
6. Starting to Model to find the accuracy of the model
7. Learning Algorithms-kNN Linear Regression
8. Unsupervised Algorithm- k-means
9. Supervised Algorithm- Naïve Bayes
10. Implement Decision Tree and Support Vector Machine using Library Functions
11. Implement Neural Network using Library Function

SEMESTER-V
COURSE 15: SOFTWARE TESTING

Theory Credits: 3 3 hrs/week

Course Objectives: Student will gain an understanding of Selenium basics. Student will practice writing tests for a variety of quality intent, including code coverage, defect finding, and statistical testing using Selenium.

Course Outcomes: Upon Completion of the course, the students will be able to

1. Understand the Selenium Basics concepts
2. Know about Selenium Web Driver
3. Understand Selenium Framework
4. Learn how TestNG works
5. Learn Advanced concepts in Selenium

Unit-I:

Selenium Basics:
Software Testing, Automation Testing, Introduction to Selenium and its Components, Selenium IDE Features, Selenium Download and Installation, Creating Scripts using Firebug and Its Installation, Locator Types
Case Study: Automation Testing using Cucumber Tool with Selenium

Unit-II:

Selenium WebDriver:
Selenium WebDriver Installation with Eclipse, Handling Dropdowns, Explicit and Implicit Wait, Handling Alerts/Pop-ups, Handling Web Tables, Frames, Dynamic Elements, Robot API, AutoIT

Case Study: Automation Software Testing using Katalon Studio with Winium

Unit-III:

Selenium Framework:
Test Automation Framework: Introduction, Benefits of Automation Framework, Types of Automation framework

Case Study: Cucumber Based Automation Testing to Validate End-user Experience

Unit-IV:

Introduction to TestNG,TestNG Framework, TestNG installation, TestNG Annotations and Listeners, TestNG Example, TestNG Process Execution: Batch, Controlled Batch & Parallel
Case Study: QA Automation Testing for Media & Entertainment

Unit-V:

Advance Selenium:
Selenium Grid: Introduction, Usage of Selenium Grid, Grid1.0 vs Grid2.0, Selenium Grid architecture, How to setup Selenium Grid using command line, designing test scripts that can run on the Grid, Using DesiredCapabilities Object, Using RemoteWebDriver Object, Running a sample Test Case on the Grid
Case Study: Test Automation Using Selenium Java

Prescribed Text Books:

1. Test Automation using Selenium WebDriver with Java: Step by Step Guide by Navneesh Garg
2. Selenium WebDriver_ From Foundations To Framework by Yuzun Liang & Alex Collins
3. Absolute Beginner Java 4 Selenium Webdriver: Come Learn How to Program for Automation Testing by Rex Allen Jones II

Reference Materials on the Web/web-links:

https://www.softwaretestingmaterial.com/types-test-automation-frameworks/
https://www.guru99.com/introduction-to-selenium-grid.html#6

Faculty & Student Resources:

- YouTube: Selenium Video Tutorials
- YouTube: Selenium Full Course – Simplilearn
- YouTube: Selenium Full Course – Edureka!
- Sample Selenium Assignments/Exercises 1
- Sample Selenium Assignments/Exercises 2
- Sample Selenium Assignments/Exercises 3

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Software Testing

Time: 3 hrs. **Max marks: 70**

SECTION-A

Answer any **FIVE** out of the following 5 x 4 M= 20M

1. Automation Testing
2. Features of Selenium
3. Installation of Selenium web driver in brief.
4. Handling frames using selenium.
5. Test Automation framework.
6. Features of testNG.
7. Components of Grid
8. Advantages of Selenium Grid.

SECTION-B

Answer ALL Questions 5x10M= 50M

9. Explain the components of Selenium.

OR

10. What are the tools, advantages and disadvantages of Selenium.

11. Explain handling dropdowns in Selenium.

OR

12. How can you handle web tables in Selenium?

13. What are the benefits of automation framework?

OR

14. Explain different types of automation framework.

15. Explain annotations in TestNG.

OR

16. Explain annotations in TestNG.

17. Explain Selenium Grid architecture.

OR

18. How to create a test script in Selenium Grid.

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BLUEPRINT

SOFTWARE TESTING

Unit	S.A.Q **Section :A** (including choice) 4 Marks	E.Q **Section: B** (including choice) 10 Marks	Marks Allotted
I	2	2	28
II	2	2	24
III	1	2	28
IV	1	2	28
V	2	2	24
Total	8	10	132

SEMESTER-V

COURSE 15: SOFTWARE TESTING

Practical Credits: 1 2 hrs/week

Course Outcomes: On successful completion of this practical course, student shall be able to:

1. Perform automation testing using selenium.
2. Get exposure on Selenium framework.
3. Gain practical knowledge on Selenium web drivers.

Practical (Laboratory) Syllabus:

1. Write a script to open google.com and verify that title is Google and verify that it is redirected to google.co.in
2. Write a script to open google.co.in using chrome browser (Chrome Driver)
3. Write a script to open google.co.in using internet explorer (Internet Explorer Driver)
4. Write a script to create browser instance based on browser name
5. Write a script to search for specified option in the listbox
6. Write a script to print the content of list in sorted order.
7. Write a script to print all the options. For duplicates add entry only once. Use HashSet.
8. Write a script to close all the browsers without using quit() method.
9. Write generic method in selenium to handle all locators and return web element for any locator.
10. Write generic method in selenium to handle all locators containing dynamic wait and return web element for any locator.

III. Lab References:

https://www.guru99.com/selenium-tutorial.html
https://www.javatpoint.com/selenium-tutorial
Web-links: https://youtu.be/Tu61E5mHv18

SEMESTER-V

COURSE 15: FOUNDATIONS OF DATA SCIENCE

Theory Credits: 3 3 hrs/week

Course Objectives:

- To understand the data science fundamentals and process.
- To learn to describe the data for the data science process.
- To learn to describe the relationship between data.
- To utilize the Python libraries for Data Wrangling.
- To present and interpret data using visualization libraries in Python

Course Outcomes: Upon Completion of the course, the students will be able to

1. Define the Data Science
2. Understand the Flow of Data science
3. Identify different steps in Data Science
4. Learn the Ipython basics
5. Learn data loading and manipulation techniques
6. Work with different data visualization techniques

Unit-I:

Benefits and uses of data science and big data, the big data eco system and data science, the data science process: Overview of data science process, Different steps in data science process: Research Goal, Retrieving data, Cleansing, integrating and transforming data, Exploratory data analysis, Build the models, Presenting findings and building applications

CASE STUDY: Predicting malicious URLs

Unit-II:

IPython: Beyond Normal Python, Shell or Notebook?, Launching the IPython Shell, Launching the Jupyter Notebook, Help and Documentation in IPython, Accessing Documentation with ?, Accessing Source Code with ??, Exploring Modules with Tab Completion, Keyboard Shortcuts in the IPython Shell, , IPython Magic Commands, Input and Output History, Underscore Shortcuts and Previous Outputs, Suppressing Output, IPython and Shell Commands, Shell Commands in IPython, Passing Values to and from the Shell, Shell-Related Magic Commands, Errors and Debugging, Profiling and Timing Code,

CASE STUDY: Building a recommender system inside a database

Unit-III:

Introduction to NumPy: Data Types in Python, Python List, Fixed-Type Arrays in Python, Creating Arrays from Python Lists, Creating Arrays from Scratch, NumPy Standard Data Types, The Basics of NumPy Arrays, NumPy Array Attributes, Array Indexing: Accessing Single Elements, Array Slicing: Accessing Subarrays, Reshaping of Arrays, Array Concatenation and Splitting, Exploring NumPy's UFuncs, Aggregation functions

CASE STUDY: Assessing risk when loaning money

Unit-IV:

Data Manipulation with Pandas: Installing and Using Pandas, Introducing Pandas Objects, The Pandas Series Object, The Pandas DataFrame Object, The Pandas Index Object, Data Indexing and Selection, Data Selection in DataFrame, Operating on Data in Pandas, Handling Missing Data, Operating on Null Values, Combining Datasets: Concat and Append, Combining Datasets: Merge and Join, Working with Time Series

CASE STUDY: Classifying Reddit Posts

Unit-V:

Visualization with Matplotlib: Importing matplotlib, Setting Styles, Plotting from a script, Plotting from an IPython shell, Plotting from an IPython notebook, Saving Figures to File, Two Interfaces for the Price of One, Simple Line Plots, Adjusting the Plot: Line Colors and Styles, Adjusting the Plot: Axes Limits, Labeling Plots, Simple Scatter Plots, Density and Contour Plots, Histograms, Binnings, and Density, Customizing Matplotlib: Configurations and Stylesheets, Geographic Data with Basemap, Visualization with Seaborn, Other Python Graphics Libraries

Python Libraries for Machine Learning: Introducing Scikit-Learn, Data Representation in Scikit-Learn, Scikit-Learn's Estimator API

Case Study: Exploring Handwritten Digits

Prescribed Text Books:

1. *Introducing Data Science: BIG DATA, MACHINE LEARNING, AND MORE, USING PYTHON TOOLS by* DAVY CIELEN, ARNO D. B. MEYSMAN, MOHAMED ALI
2. *Python Data Science Handbook Essential Tools for Working with Data by Jake Vander Plas*
3. *R for Data Science Import, Tidy, Transform, Visualize, and Model Data by Hadley Wickham and Garrett Grolemund*
4. *Data Science using Python and R by C.D Larose and D.T.Larose*
5. *Mathematical Foundations of Data Science Using R by Frank Emmert-Streib, Salissou Moutari, and Matthias Dehmer*

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Foundations of Data Science

Time: 3 hrs. **Max marks: 70**

SECTION-A

Answer any **FIVE** out of the following 5 x 4 M= 20M

1. Types of data in Data Science
2. Building a model in Data Science.
3. Features of IPython.
4. history command in IPython.
5. Data types in python.
6. How to slice a series.
7. Define Histogram.
8. Define Seaborn.

SECTION-B

Answer ALL Questions 5x10M= 50M

9. What are the benefits and uses of Data Science and Big data?

OR

10. Explain Data Science process.

11. Explain Shell commands in IPython?

OR

12. Explain Magic commands in IPython?

13. Explain lists in Python.

OR

14. Explain NumPy Arrays.

15. Explain Pandas series object.

OR

16. Explain Pandas dataframe?

17. How to create a simple plot using Matplotlib?

OR

18. Explain Data Representation in ScikitLearn.

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BLUEPRINT

FOUNDATIONS OF DATA SCIENCE

Unit	S.A.Q **Section :A** (including choice) 4 Marks	E.Q **Section: B** (including choice) 10 Marks	Marks Allotted
I	2	2	28
II	2	2	24
III	1	2	28
IV	1	2	28
V	2	2	24
Total	8	10	132

SEMESTER-V

COURSE 15: FOUNDATIONS OF DATA SCIENCE

Practical Credits: 1 2 hrs/week

Course Outcomes: On successful completion of this practical course, students shall be able to:

1. Execute python basic programs.
2. Work with Python IDEs.
3. Gain practical knowledge on different python libraries .

Implement the lab experiments in Python with any real time example

1. Introduction to programming with Python.
2. Python programming basics
3. Conditional statements
4. Loops
5. Functions
6. Integrated Development Environments (IDEs).
7. How to structure Python code in a project.
8. How to manage libraries in Python using virtual environments.
9. Data Loading, Storage, and File Formats.
10. Data Cleaning and Preparation.
11. Data Manipulation with Pandas.
12. Data Wrangling: Join, Combine, and Reshape.
13. Plotting and Visualization.
14. Data Aggregation and Group Operations.
15. Advanced Numpy.
16. Matplotlib
17. Building and optimizing pipelines in scikit-learn.

Semester-VII
Course 16A: Parallel and Distributed Computing

Theory Credits: 3 3 hrs/week

Course Objectives:

- To understand the principles of parallel and distributed computing.
- To introduce architectures, models, and programming techniques for concurrent systems.
- To analyze performance issues and scalability in parallel and distributed systems.

Course Outcomes:

After completing the course, students will be able to:

1. Distinguish between parallel and distributed computing systems.
2. Analyze parallel algorithms and identify performance bottlenecks.
3. Use models and tools for developing distributed applications.
4. Understand synchronization, scheduling, and communication in distributed systems.

UNIT –I

Introduction

Introduction to PDC: Latency vs. Bandwidth, Applications and Challenges, Types of architecture, Flynn's taxonomy, Basic concepts: cores, nodes, threads, processes, speedup, efficiency, overhead, strong and weak scaling (Amdahl's law, Gustafson's law), Cache, Principle of Locality, Programming Models.

UNIT-II:

Distributed Computing: Distributed Memory, Message Passing Interface, Asynchronous/Synchronous computation/communication, concurrency control, fault tolerance, Distributed Programming with OpenMPI.

UNIT-III:

Parallel Computing: shared memory, data and task parallelism, Synchronization, Concurrent Data Structures, Shared Memory Programming with available APIs: PThreads, OpenMP, TBB.

UNIT-IV: GPU Programming: GPU Architecture, Programming Models: CUDA/OpenCL, Basic Concepts: Threads, Blocks, Grids, GPU memory hierarchy, Thread Scheduling, Warps and Control divergence, Memory Coalescing, Programming with CUDA, Using CUDA Libraries: CuBLAS, CuFFT.

UNIT-V:

Load Balancing and Termination Detection: Load Balancing, Dynamic Load Balancing, Distributed Termination Detection Algorithms, Program Example

Reference Books:

1. Parallel Programming Techniques and applications Using Networked Workstations and Parallel Computers (2nd Edition), Barry Wilkinson and Michael Allen, Prentice Hall, 2001.
2. Parallel Programming in C with MPI and OpenMP, Michael J. Quinn, McGraw Hill 2003.
3. Designing and Building Parallel Programs, Ian Foster, Addison Wesley, 1995.

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Course Title: Parallel and Distributed Computing

Time: 3 Hrs. **Max Marks: 70**

SECTION – A

Answer any five out of the following **5 x 4 M = 20 M**

1. Differentiate between latency and bandwidth with suitable examples.
2. Explain Flynn's taxonomy with its classification.
3. What is Amdahl's law? How does it affect speedup?
4. Define message passing interface (MPI). List any two advantages.
5. What is data parallelism? Explain with example.
6. What are warps in CUDA programming?
7. Define dynamic load balancing and give its importance.
8. Write a short note on principle of locality and cache coherence.

SECTION–B

Answer ALL Questions **5 x 10 M = 50 M**

9. a) Explain the types of architectures used in parallel and distributed computing.

   OR

   b) Discuss strong and weak scaling using Amdahl's and Gustafson's laws.
10. a) What are the key features of distributed memory systems? Explain asynchronous and synchronous communication.

    OR

    b) Write a program using OpenMPI to send and receive messages between two processes.
11. a) Explain shared memory programming using PThreads and give a sample program for thread creation.

    OR

    b) Describe task parallelism and synchronization techniques in shared memory programming.
12. a) Explain GPU architecture and memory hierarchy.

    OR

    b) Write a CUDA program to add two vectors and explain thread blocks and grids used in it.
13. a) What are the various distributed termination detection algorithms? Explain with example.

    OR

    b) Explain dynamic load balancing techniques in distributed systems with any two strategies.

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B.C.A Honours Computer Applications[Major / Minor]

REVISED CBCS FRAMEWORK WITH EFFECT FROM 2023-2024 ADMITTED BATCH

BLUEPRINT

Parallel and Distributed Computing

Unit	S.A.Q **Section :A** (including choice) 4 Marks	E.Q **Section: B** (including choice) 10 Marks	Marks Allotted
I	2	2	28
II	2	2	24
III	1	2	28
IV	1	2	28
V	2	2	24
Total	8	10	132

Semester-VII

Course 16A: Parallel and Distributed Computing LAB

Practical Credits: 1 2 hrs/week

List of Experiments

1. Write a program to demonstrate the concept of speedup and efficiency using sequential and parallel execution (OpenMP).
2. Implement a program using PThreads to demonstrate thread creation, joining, and synchronization.
3. Write a program using OpenMP to compute matrix multiplication in parallel.
4. Write an MPI-based program for message passing between multiple processes (using point-to-point communication).
5. Develop an MPI program demonstrating synchronous and asynchronous communication between nodes.
6. Simulate a shared memory producer-consumer problem using TBB or OpenMP with concurrent data structures.
7. Write a CUDA program for parallel vector addition using thread blocks and grids.
8. Demonstrate thread scheduling and memory coalescing using CUDA – vector addition or matrix transpose.
9. Simulate a dynamic load balancing algorithm and demonstrate the redistribution of tasks across threads/processes.
10. Implement a distributed termination detection algorithm (e.g., Dijkstra-Scholten or Credit-based approach) in a simulated environment.

Course 16B: Big Data Technologies

Theory **Credits: 3** **3 hrs./week**

Course Objectives:

- To provide students with a comprehensive understanding of Big Data Technologies, including Apache Hadoop, Hive, HBase, and Zookeeper
- Develop practical skills in data processing, querying, and analytics for large-scale datasets.

Course Outcomes: Upon Successful Completion of the Course, students will be able to:

1. Understand the importance and challenges of Big Data, including its classification and applications.
2. Familiarize yourself with Apache Hadoop and learn the MapReduce algorithms for data movement.
3. Explore Hadoop architecture, including HDFS, MapReduce tasks, and cluster setup.
4. Develop Skills in Hive and HiveQL for querying and analyzing data in Hadoop.
5. Gain proficiency in HBase, including schema design, advanced indexing, and working with Zookeeper for cluster monitoring.

UNIT-I

INTRODUCTION TO BIG DATA: Introduction – Classification of digital data: Structured, Semi-structured and unstructured data, Big Data and its importance, Four Vs in Big data, Drivers for Big data, Challenges of Big data, Big data analytics and Big data applications.

UNIT- II

INTRODUCTION HADOOP: Big Data – Apache Hadoop & Hadoop Ecosystem – Moving Data in and out of Hadoop–Understanding Input and Output of MapReduce-Algorithms Using MapReduce, Matrix-Vector Multiplication by Map Reduce, Data Serialization.

UNIT- III

HADOOP ARCHITECTURE: Hadoop Architecture, Hadoop Storage: HDFS, Common Hadoop Shell commands, Anatomy of File Write and Read, Name Node, Secondary Name Node, and Data Node, Hadoop MapReduce paradigm, Map and Reduce tasks, Job, Task Trackers - Cluster Setup – SSH & Hadoop Configuration – HDFS Administering – Monitoring & Maintenance.

UNIT-IV

HIVE AND HIVEQL: Hive Architecture and Installation, Comparison with Traditional Database, HiveQL - Querying Data - Sorting and Aggregating, Map Reduce Scripts, Joins & Subqueries

UNIT-V

HBase concepts- Advanced Usage, Schema Design, Advance Indexing - Zookeeper - how it helpsin monitoring a cluster, HBase uses Zookeeper and how to Build Applications with Zookeeper.

Text Books:

1. Big Data BlackBook(CoversHadoop2,MapReduce,Hive,Yarn,Pig & Data Visualization) - Dream Tech Publications
2. Big Data and Analytics-Seema Charyaan Subhashini Chellappan-Wiley Publications.

Reference Books:

1. “Understanding Big Data”, Chris Eaton, Dirkderoosetal., McGraw-Hill,2012.
2. “Big Data Analytics”, G.Sudha Sadasivam and R. Thirumagal, Oxford University Press, 2020.
3. “HADOOP: The definitive Guide”, Tom White, O'Reilly, 2012.
4.“Big Data Analytics with R and Hadoop”, Vignesh Prajapati, Packet Publishing, 2013.
5. “Oracle Big Data Handbook”, Tom Plunkett, Brian MacDonald et al., Oracle Press,2014.

Model Question Paper

Course: Big Data Technologies
Semester: BCA – Final Year
Time: 3 Hours
Max. Marks: 70

Section – A

(Answer any FIVE questions) **5 × 4 = 20 Marks**

1. What are the four Vs of Big Data?
2. Define and differentiate structured, semi-structured, and unstructured data.
3. List the challenges of Big Data.
4. What is MapReduce? Explain its role in Hadoop.
5. Write any four commonly used Hadoop shell commands.
6. What is the difference between NameNode and DataNode in Hadoop?
7. What is HiveQL? List any two advantages of Hive.
8. What is the purpose of Zookeeper in HBase?

Section – B

(Answer ALL questions) **5 × 10 = 50 Marks**

9. (a) Explain in detail the classification of digital data and the significance of Big Data in modern computing.

   OR

   (b) Describe the drivers for Big Data and discuss its real-time applications.

10. (a) What is Apache Hadoop? Explain the Hadoop ecosystem and its components.

    OR

    (b) Write and explain the algorithm for matrix-vector multiplication using MapReduce.

11. (a) Explain Hadoop architecture with a neat diagram.

    OR

    (b) Describe the anatomy of file write and read operations in HDFS and list common shell commands.

12. (a) Discuss the architecture of Hive and compare it with a traditional RDBMS.

    OR

    (b) Write HiveQL queries to perform sorting, aggregation, and joins.

13. (a) Explain HBase schema design and advanced indexing.

    OR

    (b) How does Zookeeper support cluster monitoring in HBase? Explain with an example of building a simple app using Zookeeper.

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REVISED CBCS FRAMEWORK WITH EFFECT FROM 2023-2024 ADMITTED BATCH

BLUEPRINT

Big Data Technologies

Unit	S.A.Q **Section :A** (including choice) 4 Marks	E.Q **Section: B** (including choice) 10 Marks	Marks Allotted
I	2	2	28
II	2	2	24
III	1	2	28
IV	1	2	28
V	2	2	24
Total	8	10	132

II Semester

Course 16B: Big Data Technologies

Practical Credits: 1 2 hrs/week

1. HDFS: Set up a HDFS in a single-node to multi-node cluster, perform basic file system operations on it using the commands provided, and monitor cluster performance
2. Write various MapReduce programs to count the number of times a single word has occurred in a given paragraph.
3. Implement The Following File Management Tasks In Hadoop:
   a. Adding files and directories, List the Files And directories
   b. Retrieving Files Deleting Files
   c. Copying Files From One Folder To Another In HDFS
   d. Copying files from Local File System to HDFS
4. Write a MapReduce program to add two matrices.
5. Write a MapReduce program to multiply a matrix with aVector.
6. Run a basic Word Count MapReduce program to understand MapReduce Paradigm
7. Write a MapReduce program that mines weather data(NCDC).Weather sensors collecting data every hour at many locations across the globe gather a large volume log data, which is a good candidate for analysis with MapReduce, sinusitis semi-structured and record-oriented. (Data available at: ftp://ftp.ncdc.noaa.gov/pub/data/noaa/.)
8. Find Average,max and min temperature for each year in NCDC dataset
9. Stopword Elimination problem:

Input:1. A Large Textual file containing one sentence per line

2. A Small File Containing A Set Of stopwords(Onestopwordperline)

Output:

1.Atextual File containing the same sentences of the large input file without the words appearing in the small file.

10. Write a MapReduce Application to implement Combiners
11. Write a MapReduce Application To Implement Reduce-side Join
12. Write a MapReduce Application To Implement Map-side Join
13. Hbase: Setup of Hbase in single node and distributed mode, write a program to write some data into hbase and query i

SEMESTER -VII

Course 17A: Artificial Intelligence and Neural Networks

Theory **Credits: 3** **3 hrs/week**

Course Objectives:

• To introduce students to the core concepts of Artificial Intelligence (AI) and Neural Networks.
• To understand problem-solving, learning, and reasoning techniques in AI.
• To explore the structure, training, and application of Artificial Neural Networks (ANN).

Course Outcomes:

After successful completion of this course, students will be able to:
1. Understand fundamental concepts of AI and its real-world applications.
2. Apply search algorithms and logic-based reasoning techniques.
3. Understand and implement the structure of neural networks.
4. Train and evaluate simple neural networks using datasets.
5. Use libraries like NumPy, TensorFlow, or Keras to build AI models.
6. Analyze AI solutions in problem domains such as classification or prediction.

UNIT–I: Introduction to Artificial Intelligence

Definition and History – AI Applications – AI vs Human Intelligence – Agents and Environments – Types of Agents – Rationality and Performance Measures.

UNIT–II: Problem Solving and Search Techniques

State Space Search – Uninformed Search: BFS, DFS – Informed Search: Best-First Search, A* Algorithm – Game Playing: Minimax and Alpha-Beta Pruning – Constraint Satisfaction Problems.

UNIT–III: Knowledge Representation and Reasoning

Propositional and Predicate Logic – Forward and Backward Chaining – Rule-Based Systems – Semantic Networks – Ontologies – Expert Systems Overview.

UNIT–IV: Introduction to Neural Networks

Biological vs Artificial Neurons – Perceptron Model – Activation Functions – Feedforward Neural Networks – Backpropagation Algorithm – Training and Testing Concepts – Overfitting and Regularization.

UNIT–V: Applications and Tools

Applications in Image Recognition, NLP, Recommendation Systems – Tools and Libraries: TensorFlow, Keras, Scikit-learn – Basic Neural Network Implementation – Introduction to Deep Learning Concepts.

Textbooks:

1. Artificial Intelligence: A Modern Approach – Stuart Russell & Peter Norvig
2. Neural Networks and Deep Learning – Michael Nielsen
3. Python Machine Learning – Sebastian Raschka
4. Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow – Aurélien Géron

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Paper Title: **Artificial Intelligence and Neural Networks**

Time: 3 Hrs Max Marks: 70

SECTION-A

Answer any FIVE of the following $5 \times 4 = 20$ Marks

1. Define Artificial Intelligence and mention its applications.
2. Compare AI with human intelligence.
3. Explain Breadth-First Search with an example.
4. Define Constraint Satisfaction Problems with an example.
5. Write a note on Semantic Networks.
6. What are Activation Functions in Neural Networks?
7. What is Overfitting? How can it be avoided?
8. Mention any four applications of AI in real life.

SECTION-B

Answer ALL questions $5 \times 10 = 50$ Marks

9. Explain the types of agents and describe how they interact with environments.

OR

10. Define rationality in AI and explain the performance measures for AI agents.

11. Explain the A* algorithm with a suitable example.

OR

12. Discuss the Minimax algorithm and Alpha-Beta pruning in game playing.

13. Describe the components of a Rule-Based Expert System with an example.

OR

14. Explain Forward and Backward chaining with examples.

15. Explain the architecture and working of Feedforward Neural Networks.

OR

16. Describe the Backpropagation algorithm and its role in training neural networks.

17. Explain any two real-world AI applications in Image Recognition, NLP, or Recommendation Systems.

OR

18. Write a short note on TensorFlow, Keras, and Scikit-learn. Provide one basic neural network example using any one tool.

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REVISED CBCS FRAMEWORK WITH EFFECT FROM 2023-2024 ADMITTED BATCH

BLUEPRINT

Artificial Intelligence and Neural Networks

Unit	S.A.Q **Section :A** (including choice) 4 Marks	E.Q **Section: B** (including choice) 10 Marks	Marks Allotted
I	2	2	28
II	2	2	24
III	1	2	28
IV	1	2	28
V	2	2	24
Total	8	10	132

VII Semester

Course 17A: Artificial Intelligence and Neural Networks Lab

Practical Credits: 1 2 hrs/week

1. Implement BFS and DFS algorithms for a search problem.

2. Design a simple rule-based expert system using Python.

3. Implement A* search for pathfinding applications.

4. Write Python code to simulate a perceptron.

5. Train a basic neural network using Scikit-learn or Keras.

6. Load and preprocess datasets (e.g., Iris, MNIST) using NumPy/Pandas.

7. Implement forward and backward propagation in a simple network.

8. Visualize neural network performance using plots (Matplotlib/Seaborn).

9. Use Keras to classify data with a multi-layer perceptron.

10. Mini-project: Build a neural network model for binary classification (e.g., spam detection).

SEMESTER -VII

Course 17B: Cryptography and Network Security

Theory **Credits: 3** **3 hrs/week**

Learning Objectives:

To provide students with a comprehensive understanding of cryptography and network security concepts and their practical applications.

Learning Outcomes: Upon successful completion of the course, students will be able to:

1. Demonstrate the knowledge of cryptography, network security concepts and applications.
2. Develop security mechanisms to protect computer systems and networks.
3. Apply security principles in system design.
4. Apply methods for authentication, access control, intrusion detection and prevention.
5. Ability to identify and investigate vulnerabilities and security threats and mechanisms to counter them.

UNIT-I

Information Security: Introduction, History of Information Security, What is Security, CIA Triad, CNSS Security Model, Components of Information System, Balancing Information Security and Access, Approaches to Information Security Implementation, The Security Systems Development Life Cycle.

Security Attacks (Interruption, Interception, Modification, and Fabrication), Vulnerabilities, Security Services (Confidentiality, Authentication, Integrity, Non-repudiation, Access Control, and Availability), and Mechanisms.

UNIT-II

Cryptography: Concepts and Techniques, Conventional substitution and transposition ciphers, One-time Pad, Block cipher and Stream Cipher, Symmetric and Asymmetric key cryptography, Steganography

Symmetric key Ciphers: DES structure, DES Analysis, Security of DES, variants of DES, Block cipher modes of operation, AES structure, Analysis of AES, Key distribution.

UNIT-III

Asymmetric key Ciphers: Principles of public key cryptosystems, RSA algorithm, Analysis of RSA, Diffie-Hellman Key exchange, Elliptic Curve Cryptography.

Message authentication and Hash Functions, Authentication Requirements and Functions, Message Authentication, Hash Functions and MACs, Hash and MAC Algorithms, SHA-512, HMAC. Digital Signatures, Authentication Protocols, and Digital Signature Standard.

UNIT-IV

Program Security: Secure programs, Non-malicious Program errors, Malicious code viruses, Trap doors, Salami attacks, Covert channels, Control against programs.

IP Security: Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations, and Key Management.

Email Security: Pretty Good Privacy (PGP) and S/MIME.

UNIT-V

Web Security: Web Security Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Electronic Transaction (SET).

Intruders, Virus and Firewalls: Intruders, Intrusion detection, password management, Virus and related threats, Countermeasures, Firewall design principles, Types of firewalls

Wireless Security, Honeypots, and Traffic flow security.

Text Book(s)

1. **Principles of Information Security**: *Michael E. Whitman, Herbert J. Mattord*, CENGAGE Learning, 4th Edition.
2. **Cryptography And Network Security Principles And Practice**, Fourth or Fifth Edition, *William Stallings*, Pearson
3. **Security in Computing**, Fourth Edition, by *Charles P. Pfleeger*, Pearson Education

Reference Books

1. **Modern Cryptography**: **Theory and Practice**, by *Wenbo Mao*, Prentice Hall.
2. **Network Security Essentials**: **Applications and Standards**, by *William Stallings*.Prentice Hall.
3. **Principles of Information Security**, *Whitman*, Thomson.
4. **Cryptography and Network Security** : *Forouzan Mukhopadhyay*, Mc Graw Hill, 2nd Edition

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REVISED CBCS FRAMEWORK WITH EFFECT FROM 2024-2025 Admitted Batch
Cryptography and Network Security

Time: 3 hrs. **Max Marks: 70**

SECTION – A

Answer any FIVE of the following **5 x 4 M = 20 M**

1. Explain the CIA Triad in Information Security.
2. Define and explain the types of Security Attacks.
3. Discuss the concept of Steganography.
4. Write short notes on Block Cipher Modes of Operation.
5. Describe the Diffie-Hellman Key Exchange.
6. Write a brief note on Pretty Good Privacy (PGP).
7. Explain the working of Secure Socket Layer (SSL).
8. List and briefly describe types of Firewalls.

SECTION – B

Answer ALL Questions **5 x 10 M = 50 M**

9. Explain the Security Systems Development Life Cycle in detail.

OR

10. Discuss the various Security Services and Mechanisms in Information Security.
11. Describe the DES Algorithm with its structure and security analysis.

OR

12. Explain the structure and working of the AES algorithm.
13. Explain the RSA Algorithm and analyze its security.

OR

14. Discuss Hash Functions, Message Authentication Codes (MACs), and Digital Signature Standards.
15. Discuss Program Security threats and their control mechanisms.

OR

16. Explain IP Security Architecture and its components in detail.
17. Explain Web Security Requirements and the working of Transport Layer Security (TLS).

OR

18. Describe Intrusion Detection Systems and the design principles of Firewalls.

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REVISED CBCS FRAMEWORK WITH EFFECT FROM 2023-2024 ADMITTED BATCH

BLUEPRINT

Cryptography and Information Security

Unit	S.A.Q **Section :A** (including choice) 4 Marks	E.Q **Section: B** (including choice) 10 Marks	Marks Allotted
I	2	2	28
II	2	2	24
III	1	2	28
IV	1	2	28
V	2	2	24
Total	8	10	132

VII Semester

Course 17B: Cryptography and Information Security Lab

Credits -1

List of Experiments:

1. Write a Java Program to implement Ceaser Cipher
2. Write a Java Program to implement Playfair Cipher
3. Write a Java Program to implement Railfence Cipher
4. Write a Java Program to implement Hill Cipher with 2 x 2 Matrix
5. Write a Java Program to implement DES algorithm
6. Write a Java Program to implement RSA algorithm
7. Write a Java Program for Diffie-Hellman Key Exchange
8. Write a Java Program to Generate SHA-512 Hash of a file
9. Write a Java Program to implement Digital Signature with a File
10. Configuring S/MIME for email communication
11. Setup a honeypot and monitor the honeypot on the network
12. Demonstrate how to provide secure data storage, secure data transmission and for creating digital signatures (GnuPG)
13. Perform wireless audit on an access point or a router and decrypt WEP and WPA (Net Stumbler)
14. Demonstrate intrusion detection system (ids) using any tool (snort or any other s/w)

SEMESTER -VII

Course 18A : Bio-Informatics

Theory **Credits: 3** **3 hrs/week**

Learning Objective(s):

1. To help students understand the use of statistics in sorting data
2. To give the students a thorough understanding of the sources and organization of data
3. To make them understand the usage of tools and resources that aid in the analysis of data
4. To introduce them to mapping, alignment, and searching methods in bioinformatics
5. To show them the different fields that bioinformatics is used in

Learning Outcome(s):

1. Students get a thorough understanding of Biostatistics and apply them in research work
2. Understanding available resources in bioinformatics and usage of analysis tools

UNIT I – Biostatistics

Meaning of data and representation in biostatistics, Measures of central tendency and dispersion, Normal distribution curve: characteristics and uses, Standard errors, hypothesis testing (null & alternate), Correlation and regression, Probability, types of events & rules,T-test, Chi-square test, ANOVA

UNIT II – Bioinformatics Tools & Databases

Introduction to Bioinformatics, Online & offline tools, biological database types: Bibliographic (PubMed), Nucleic acid sequence (NCBI, EMBL), Protein sequence (PIR, SWISSPROT), Structural databases (PDB), Metabolic pathways (PubGene), Microbial genomic database (MBGD), Cell line database (ATCC), Virus database (UICTVdb)

UNIT III – Alignment, Mapping & Searching

Sequence alignment: Global and local, scoring matrices, Restriction mapping: NEB Cutter, Similarity searching: FASTA, BLAST, Pairwise and multiple sequence alignment

UNIT IV – Identification & Analysis

Identification of genes in genomes, Identification of ORFs and motifs, Regulatory sequence analysis, Genome maps, markers, variation

UNIT V – Applications

Medical applications of bioinformatics, Homology modelling, Microarray for transcriptional profiling, Metabolic reconstruction, Phylogenetic analysis using MEGA

Textbooks

1. *Bioinformatics Basics* – Hooman Rashidi, Lukas Buehler
2. *Introduction to Bioinformatics* – Stephen Krawetz, David D. Womble
3. *Bioinformatics* – D. Mount
4. *Programming in C* – Balaguru Swamy
5. *Introduction to Bioinformatics* – Arthur M. Lesk
6. *Biostatistics* – Daniel (Wiley)
7. *Statistics* – S.C. Gupta
8. *Statistical Methods* – G.W. Snedecor, W.G. Cochran
9. *Fundamentals of Biostatistics* – Khan & Khanum

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Paper Title: Bioinformatics

Time: 3 Hrs **Max Marks: 70**

SECTION-A

Answer any FIVE of the following (5 × 4 = 20 Marks)

1. Define biostatistics. Mention any two types of data representation.
2. List the characteristics of a normal distribution curve.
3. Differentiate between null and alternate hypothesis.
4. What is the use of PubMed and PDB in bioinformatics?
5. What is pairwise alignment? How is it different from multiple sequence alignment?
6. Explain the use of FASTA or BLAST in similarity searching.
7. Define Open Reading Frames (ORFs) and give their importance.
8. What is homology modelling? Mention one application.

SECTION – B

Answer ALL Questions (5 × 10 = 50 Marks)

9. a) Explain the measures of central tendency and dispersion with suitable examples.
   OR
   b) Describe t-test, chi-square test, and ANOVA with applications.
10. a) Discuss the types of biological databases and give examples for each.
    OR
    b) Explain the purpose and applications of NCBI, EMBL, SWISSPROT, and MBGD.
11. a) Describe global and local sequence alignment and the use of scoring matrices.
    OR
    b) Explain restriction mapping using NEB Cutter and similarity searching using BLAST.
12. a) How are genes, ORFs, and motifs identified in genome sequences?
    OR
    b) Explain regulatory sequence analysis, genome maps, and gene markers.
13. a) Describe applications of bioinformatics in medical science, microarray analysis, and metabolic reconstruction.
    OR
    b) What is phylogenetic analysis? Explain how MEGA software is used in it.

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Bio-Informatics

Unit	S.A.Q **Section :A** (including choice) 4 Marks	E.Q **Section: B** (including choice) 10 Marks	Marks Allotted
I	2	2	28
II	2	2	24
III	1	2	28
IV	1	2	28
V	2	2	24
Total	8	10	132

VII Semester

Course 18A: Bio-Informatics Lab

Credits -1

Practical Questions for Lab

1. Data Analysis Using Biostatistics
Objective: Use statistical tools to calculate mean, median, mode, standard deviation, and variance of a biological dataset.

2. Hypothesis Testing on Biological Data
Objective: Perform T-test and Chi-square test on two biological sample groups and interpret the significance.

3. Explore NCBI and EMBL Databases
Objective: Search and retrieve a nucleic acid sequence from NCBI and EMBL databases.

4. Explore PubMed and Protein Databases
Objective: Conduct a bibliographic search on a specific gene or protein using PubMed and retrieve its sequence from PIR or SWISSPROT.

5. Structural Visualization of Proteins Using PDB
Objective: Retrieve a 3D protein structure from Protein Data Bank (PDB) and visualize it using tools like RasMol or PyMOL.

6. Sequence Alignment Using BLAST and FASTA
Objective: Perform a similarity search for a gene or protein sequence using FASTA and BLAST.

7. Perform Global and Local Sequence Alignment
Objective: Align two given DNA or protein sequences using global (Needleman-Wunsch) and local (Smith-Waterman) algorithms.

8. Multiple Sequence Alignment (MSA)
Objective: Perform MSA for a set of related protein sequences using Clustal Omega or T-Coffee, and interpret the results.

9. Gene Identification and ORF Prediction
Objective: Identify open reading frames (ORFs) and predict possible genes in a given nucleotide sequence.

10. Phylogenetic Tree Construction Using MEGA
Objective: Construct a phylogenetic tree using aligned DNA/protein sequences with the MEGA software.

SEMESTER -VII

Course 18B: Mathematical and Statistical Foundations

Theory **Credits: 3** **3 hrs/week**

Course Objectives (Brief)

- The course aims to provide foundational knowledge of mathematics and statistics essential for computer applications.
- It covers key topics such as logic, functions, probability, and data analysis, enabling students to apply quantitative techniques to solve real-world computing problems.

Course Outcomes (Brief)

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

1. Analyze and summarize data using statistical measures.
2. Understand and apply basic probability principles.
3. Perform hypothesis testing and draw conclusions.
4. Use mathematical and statistical tools in computer-based problem solving.

UNIT I

The Foundations: Logic and Proofs: Propositional Logic, Propositional Equivalences, Predicates and Quantifiers, Nested Quantifiers.

Introduction and Recursion: Mathematical Induction, Strong Induction and Well-Ordering, Recursive Definitions and Structural Induction, Recursive Algorithms, Program Correctness.

UNIT II

Advanced Counting Techniques: Recurrence Relations, Solving Linear Recurrence Relations, Divide and Conquer Algorithms and Recurrence Relations, Generating Functions, Inclusion & Exclusion, Applications of Inclusion & Exclusion.

UNIT III

Relations: Relations and Their Properties, Equivalence Relations, Partial Orderings.

Graphs: Graphs and Graph Models, Graph Terminology and Special Types of Graphs, Representing Graphs and Graph Isomorphism’s, Connectivity, Euler and Hamilton Paths, Shortest Path Problems, Planar Graphs, Graph Coloring.

UNIT IV

Some Probability Laws: Axioms of Probability, Conditional Probability, Independence of the Multiplication Rule,Bayes' Theorem.

Discrete Distributions: Random Variables, Discrete Probability Densities, Expectation and Distribution Parameters, Binomial Distribution, Poisson Distribution, Simulating a Discrete Distribution.

UNIT V

Inferences on the Mean and the Variance of a Distribution: Hypothesis Testing, Significance Testing, Hypothesis and Significance Test on the Mean, Hypothesis Tests on the Variance. Inferences on Proportions: Estimating Proportions, Testing Hypothesis on a Proportion, Comparing two Proportions: Estimation, Comparing two Proportions: Hypothesis Testing.

Reference Textbooks:

1. Susan Milton and Jesse C. Arno ld, Introduction to Probability and Statistics, Fourth Edition, November 2002.

2. William Mendenhall, Robert J Beaver, Barbara M Beaver, Introduction to Probability and Statistics, Twelth Edition, Thomson, January 2012.

3. Kenneth H Rosen, Discrete Mathematics and its Applications, 6th Edition, McGraw-Hill, Chapters [1-10], 2007.

4. Ralph P. Grimaldi, B.V. Ramana, Discrete and Combinational Mathematics, 5th Edition, Pearson Education, 2008.

5. Swapan Kumar Sarkar, A Text Book of Discrete Mathematics, S.Chand, 2008.

6. D.S. Malik and M.K. Sen, Discrete Mathematical Structures, Thomson, 2006.

REVISED CBCS FRAMEWORK WITH EFFECT FROM 2023–2024 admitted batch

Mathematical and Statistical Foundation

Time: 3 Hrs **Max Marks**: 70

SECTION-A

Answer any FIVE of the following **5 × 4 = 20 Marks**

1. Define propositional logic with example.
2. Explain mathematical induction with a suitable example.
3. Solve the recurrence relation: $a_n = 2a_{n-1} + 3$ with $a_0 = 1$
4. What is the principle of inclusion and exclusion?
5. Define equivalence relation and give an example.
6. State and explain Bayes' Theorem.
7. Define binomial distribution and its properties.
8. Write a short note on hypothesis testing.

SECTION-B

Answer ALL questions **5 × 10 = 50 Marks**

9. Define predicates and quantifiers. Explain nested quantifiers with examples.

OR

10. Describe strong induction and structural induction with examples.

11. Solve the recurrence relation using the characteristic root method:

$$a_n - 3a_{n-1} + 2a_{n-2} = 0, \text{ with } a_0 = 2, a_1 = 5.$$

OR

12. Explain divide and conquer algorithms and derive recurrence relations with an example.

13. Define graphs and explain Euler and Hamilton paths with suitable examples.

OR

14. What is graph coloring? Explain chromatic number with an example.

15. State and prove the addition and multiplication rules of probability.

OR

16. Explain discrete random variables and calculate expectation and variance for a binomial distribution.

17. Discuss hypothesis testing for population means and variance.

OR

18. Describe how to estimate and compare two proportions using hypothesis testing.

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REVISED CBCS FRAMEWORK WITH EFFECT FROM 2023-2024 ADMITTED BATCH

BLUEPRINT

Mathematical and Statistical Foundation

Unit	S.A.Q **Section :A** (including choice) 4 Marks	E.Q **Section: B** (including choice) 10 Marks	Marks Allotted
I	2	2	28
II	2	2	24
III	1	2	28
IV	1	2	28
V	2	2	24
Total	8	10	132

VII Semester

Course 18B: Mathematical and Statistical Foundation Lab

Credits -1

1. **Truth Table Generator**
   Write a Python program to generate a truth table for a given logical expression (e.g., ¬(P ∨ Q) ↔ (¬P ∧ ¬Q)).
2. **Recursive Function Implementation**
   Implement a recursive function to calculate factorial or Fibonacci sequence and display the result for a given n.
3. **Solve a Recurrence Relation**
   Solve the recurrence relation T(n) = 2T(n/2) + n programmatically (e.g., merge sort time complexity simulation).
4. **Inclusion-Exclusion Principle Application**
   Solve a counting problem using the inclusion-exclusion principle (e.g., number of students knowing C, Python, and Java) using Excel or Python.
5. **Create and Analyze a Graph**
   Use Python (e.g., NetworkX) to create a graph and find the shortest path between two nodes using Dijkstra's algorithm.
6. **Check Properties of a Relation**
   Write a program to input a relation as a set of ordered pairs and check whether it is reflexive, symmetric, and transitive.
7. **Probability Simulation**
   Simulate 1000 dice rolls and estimate the probability of getting a sum of 7. Compare experimental and theoretical probabilities.
8. **Simulate a Discrete Distribution**
   Generate and plot a binomial distribution (e.g., n = 10, p = 0.5) using Python. Calculate and display mean and variance.
9. **Hypothesis Test on Mean**
   Conduct a one-sample t-test on a dataset (e.g., student marks) to test whether the mean score differs significantly from a given value.
10. **Correlation and Linear Regression**
    Given a dataset (e.g., height vs weight), calculate Pearson's correlation coefficient and plot the regression line using Python (pandas, matplotlib).

SEMESTER -VII

Course 19A : Content Management

Theory **Credits: 3** **3 hrs/week**

Course Objectives

- To introduce students to the fundamentals of Content Management Systems (CMS).
- To provide hands-on experience in creating, managing, and publishing digital content.
- To develop skills in using popular CMS tools like WordPress.
- To understand CMS architecture and its applications in website and blog development.

Course Outcomes

After completing this course, students will be able to:

- Understand the structure and workflow of a Content Management System.
- Create and manage websites using CMS platforms.
- Design content-rich websites with themes, plugins, and widgets.

Syllabus

Unit-I: WordPress Basics, What Is a Website? What Is an App? What Is a Web App? Features of a Web App, WordPress Directory Structure, WordPress Database Structure, Functions Found in /wp-includes/option.php, /wp-includes/, What is WordPress, Use of WordPress, GPL, .com vs .org, how to install WordPress, Connecting to Database, WebMatrix, WP dashboard

Unit-II: Creating Website, Right platform, theme/template, domain name and host, Adding Content, adding editing and deleting pages, Adding and publishing posts, installing plugins, Types of plugins, Menus, Media library, Insert, edit, and delete media files

Unit-III: Plugins, Building Your Own Plugin, File Structure for an App Plugin, Choosing a Plugin, Shopping Cart Plugins, Membership Plugins, Digital Downloads, Payment Gateways, Live chat plugin, Features and advantages of live chat, Different live chat plugins, Pop-up plugins, Search plugin, Sidebar plugin, Calendar plugin

Unit-IV: Joomla, Features, advantages, Architecture, Joomla global configuration, Article manager, Archive manager, Frontpage manager, Section manager, Category manager, Media manager, Menu manager, Component manager, Content manager, Extensions manager, Module manager, Plugin manager, Template manager, How to install a new module, How to install a new template, How to install a new plugin, How to install a new component, Understanding the concept of Joomla positions, Changing the layout structure by changing the module position

Unit-V: Understanding Basic Joomla Template, Customizing Joomla template, Building Custom Joomla Template, Understanding Templatedetails.xml File, Creating Templatedetails.xml File using tmpl_builder, Linking CSS, Linking JavaScript, Understanding include, Displaying Content in XHTML, Creating Template installation Package, Creating Custom Forms, Changing the Form Appearance using CSS

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Content Management

Time: 3 Hrs **Max Marks**: 70

SECTION-A

Answer any FIVE of the following **5 × 4 = 20 Marks**

1. Explain about web application
2. Explain about WebMatrix
3. Explain about DNS
4. Explain about membership plugin
5. Explain about sidebar plugin
6. Explain about extension manager of Joomla
7. How to create Templatedetails.xml
8. Write the procedure to install new template in Joomla

SECTION–B

Answer the following questions (5×10 = 50M)

9. A) Explain the features of WordPress

OR

B) Draw and explain WordPress database structure

10. A) Explain about adding and publishing posts in a website using WordPress

OR

B) Explain in detail about how to add, edit, and delete pages in WordPress

11. A) Explain about features and advantages of live chat plugin

OR

B) Explain the following:
   I. Calendar plugin
   II. Search plugin
   III. Pop-up plugin

12. A) Explain about Component menu

OR

B) Explain about Joomla architecture

13. A) How to create custom forms using Joomla

OR

B) Write the procedure to change the form appearance using CSS in Joomla

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Content Management

Unit	S.A.Q **Section :A** (including choice) 4 Marks	E.Q **Section: B** (including choice) 10 Marks	Marks Allotted
I	2	2	28
II	2	2	24
III	1	2	28
IV	1	2	28
V	2	2	24
Total	8	10	132

VII Semester

Course 19A: Content Management Lab

Credits -1

Practical / Lab Work

1. Install and configure WordPress on local and web servers.
2. Create posts, pages, and organize them using categories/tags.
3. Customize a WordPress theme and set up site navigation.
4. Install and configure essential plugins (e.g., SEO, security, contact forms).
5. Manage user roles and permissions.
6. Embed multimedia content in posts/pages.
7. Implement a basic SEO strategy and track site metrics.
8. Create a simple blog or business website.
9. Backup and restore the WordPress site.
10. **Mini-Project**: Build and publish a CMS-powered website.

Course 19B : Web Development with ReactJS

Theory **Credits: 3** **3 hrs/week**

Course Objectives

- To introduce the fundamentals of modern front-end web development using ReactJS.
- To understand component-based architecture and virtual DOM.
- To develop single-page applications (SPAs) using JSX, state, and props.
- To manage complex application states using hooks.
- To integrate APIs and perform routing in React apps.

Course Outcomes

After successful completion of this course, students will be able to:

- Understand the ReactJS architecture and component-based development.
- Develop interactive web interfaces using JSX, props, and state.
- Implement navigation with React Router.
- Use hooks for state and side-effect management.
- Fetch and display data from RESTful APIs.
- Build responsive, modular, and reusable UI components.

Syllabus

UNIT–I: Introduction to ReactJS

Overview of ReactJS, Key Features of React, Setting up React Environment, JSX Syntax and Expressions, Components: Functional and Class, State and Props Basics, Conditional Rendering

UNIT–II: Working with Components

Component Lifecycle, Event Handling, Forms: Controlled vs Uncontrolled, Lifting State Up, Styling Components (CSS, styled-components), Reusable Components and Props Drilling

UNIT–III: State Management with Hooks

Introduction to Hooks, useState, useEffect, useContext, Custom Hooks, Rules of Hooks, State Management Patterns

UNIT–IV: Routing and Navigation

React Router Basics, BrowserRouter, Route, Link, Switch, Navigation and Redirects

Nested Routes, URL Parameters and 404 Handling

UNIT–V: API Integration and Project Deployment

Fetching Data with Fetch/Axios, Displaying Data in Components, Error Handling and Loading States, Responsive UI with Tailwind/Bootstrap, Build and Deploy React App (Netlify/Vercel), Folder Structure and Best Practices

Suggested Co-Curricular Activities

- Participate in open-source ReactJS projects on GitHub.
- Follow tutorials on platforms like freeCodeCamp or Codecademy.
- Build and present a React-based portfolio site.
- Attend webinars and workshops on front-end frameworks.
- Join React development communities (Discord/Reddit).

References

Textbooks & Guides:

- *Learning React* – Alex Banks and Eve Porcello
- *React Up and Running* – Stoyan Stefanov
- *Fullstack React* – Accomazzo et al.

Online Resources:

- https://reactjs.org
- https://www.freecodecamp.org/learn/front-end-development-libraries/#react
- https://beta.reactjs.org

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Web Development with ReactJS

Time: 3 Hrs **Max Marks**: 70

SECTION – A

Answer any FIVE of the following **5 × 4 = 20 Marks**

1. What are the key features of ReactJS?
2. Explain the difference between functional and class components.
3. What is JSX? Give an example.
4. Describe the component lifecycle in React.
5. Compare controlled and uncontrolled components in forms.
6. What are React hooks? Name any three.
7. Explain React Router and its purpose.
8. What are the benefits of using Axios for API calls?

SECTION – B

Answer ALL questions **5 × 10 = 50 Marks**

9. Explain how to set up the React environment and demonstrate conditional rendering with an example.

OR

10. Describe state and props in detail. How are they used in React?

11. Explain event handling in React with examples. How does "lifting state up" help in component interaction?

OR

12. Discuss reusable components and props drilling. Provide suitable examples.

13. Explain the useState and useEffect hooks with examples.

OR

14. Describe custom hooks and the rules for using hooks in React.

15. What is React Router? Explain nested routes and URL parameters with examples.

OR

16. How are navigation and redirects handled in React Router? Also explain 404 handling.

17. Explain how to fetch and display data in React using Axios.

OR

18. Describe the process of building and deploying a React app using Netlify or Vercel.

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Web Development with ReactJS

Unit	S.A.Q **Section :A** (including choice) 4 Marks	E.Q **Section: B** (including choice) 10 Marks	Marks Allotted
I	2	2	28
II	2	2	24
III	1	2	28
IV	1	2	28
V	2	2	24
Total	8	10	132

Course 19B: Web Development with ReactJS Lab
Credits -1

Practical / Lab Work (30 Hours)

1. Set up a React project using Create React App.
2. Build basic functional components using JSX.
3. Pass data between components using props and manage state.
4. Handle events and forms in React.
5. Use React Hooks (useState, useEffect) to create dynamic behavior.
6. Create navigation using React Router with nested routes.
7. Fetch data from a public API (e.g., JSONPlaceholder) and display it in the UI.
8. Implement conditional rendering and reusable component structures.
9. Build a responsive UI with Tailwind CSS or Bootstrap.
10. **Mini Project**: Develop and deploy a small-scale SPA (e.g., To-Do App, Blog UI, Weather App).

Course 20A : Data Analysis with Power BI

Theory **Credits: 3** **3 hrs/week**

Course Objectives:

- To understand the process of analyzing data using Microsoft's self-service BI tools.
- To apply Power BI tools like Power Pivot and DAX for data modeling and visualization.
- To gain knowledge on data preparation, cleaning, shaping, and visual storytelling using Power BI.

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

- Understand Power Pivot and Excel analytic integration.
- Combine data from various sources into models.
- Prepare, clean, merge, and filter data from multiple sources.
- Model data relationships for user-friendly visual reports.
- Apply DAX and data shaping techniques in a BI environment.

Syllabus:

Unit I: Introduction to Power Pivot, Use Power Pivot, xVelocity in-memory analytics engine, Exploring the Data Model Management interface, analyzing data using a pivot table

Unit II: Power BI Data Import and Cleaning, import data from relational databases, text files, and feeds, Discover and import from various sources, Working with imported data

Unit III: Data Cleaning Techniques, Data Munging and shaping, Cleanse, merge, and filter data, Group and aggregate data, Insert calculated columns

Unit IV: Power BI Data Modeling, creating a data model, Table relationships, Star schema, Denormalization, Linked tables

Unit V: Power BI Visuals and DAX, Adding calculations and measures, Time-based analysis Creating and analyzing visuals

Prescribed Text Books:

1 Powell Brett Power BI 2021 - Volume 3 F Silva Roger (Paperback) 9798711316824
2 F Silva Roger Mastering Microsoft Power BI Packt Publishing 9781788297233
3 Hutchinson Jeff Microsoft Power BI Desktop - Creating Visual Reports Independently Published 9781081588908

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Paper Title: *Data Analysis with Power BI*

Time: 3 Hrs **Max Marks**: 70

SECTION – A

Answer any FIVE of the following **5 × 4 M = 20**

1. What is Power Pivot? Mention any two of its uses.
2. Define xVelocity in-memory analytics engine.
3. List various data sources supported by Power BI for importing data.
4. What is data munging?
5. What is the purpose of calculated columns in Power BI?
6. Explain the concept of a star schema.
7. What are the key features of the Data Model Management interface?
8. Write a short note on DAX.

SECTION – B

Answer ALL Questions **5 × 10 M = 50**

9. What is Power Pivot? Explain how to use Power Pivot for analyzing data using a Pivot Table.

OR

10. Describe the architecture and role of the xVelocity engine in Power Pivot.

11. How can data be imported into Power BI? Explain with examples for relational databases and text files.

OR

12. Discuss the process of discovering and importing data from various sources in Power BI.

13. Explain various data cleaning techniques available in Power BI. How do you merge and filter data?

OR

14. What do you mean by data shaping and transformation? Explain with steps to group and aggregate data.

15. What is a data model in Power BI? Explain how to create relationships between tables using a star schema.

OR

16. Define denormalization. How are linked tables handled in Power BI?

17. Explain how to perform time-based analysis using DAX.

OR

18. Describe how to create and analyze visuals in Power BI. Mention at least three types of visuals and their use cases.

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Data Analysis with Power BI

Unit	S.A.Q **Section :A** (including choice) 4 Marks	E.Q **Section: B** (including choice) 10 Marks	Marks Allotted
I	2	2	28
II	2	2	24
III	1	2	28
IV	1	2	28
V	2	2	24
Total	8	10	132

VII Semester

Course 20A: Data Analysis with Power BI Lab

Credits -1

List of Experiments

1. Write the Procedure for preparing a Pivot in Excel and prepare a Dashboard using sample marketing data.

a. Offline Data and online data b. Online to Online using Google Forms

2. Installation of Power BI and its procedure

3. Explain the procedure in importing various format files in Power BI, write its observations

4. Power BI Data Models (Schemas in Power BI)

5. How to edit data in power BI when data is Exported use few data cleaning techniques Munging)

6. Advance Data Cleaning techniques, Data Munging and Data collection and collaboration techniques.

7. Write the procedure in building an association (Power Query) identify various schemas in Power BI

8. Data Visualization (charts for a sample data) constructions and analysis

9. Step in preparing a dashboard for the organization

10. Constructing Quick Measures and Dax formulas

VII Semester

COURSE 20B: DATA VISUALIZATION USING TABLEAU

Theory **Credits: 3** **3 hrs/week**

Course Objectives:

- To know the importance of data Visualization in the world of Data Analytics and Prediction
- To know the important libraries in Tableau
- To get equipped with Tableau Tool

Course Outcomes:

1. Students should be able to visualize data through seven stages of data analysis process
2. Should be able to do explanatory and hybrid types of data visualization
3. Should be able to understand various stages of visualizing data

UNIT I:

Creating Visual Analytics with tableau desktop, connecting to your data-How to Connect to your data, What are generated Values? Knowing when to use a direct connection, Joining tables with tableau, blending different data sources in a single worksheet.

UNIT II:

Building your first Visualization- How Me works- Chart types, Text Tables, Maps, bar chart, Line charts, Area Fill charts and Pie charts, scatter plot, Bullet graph, Gantt charts, Sorting data in tableau, Enhancing Views with filters, sets groups and hierarchies.

UNIT III:

Creating calculations to enhance your data- What is aggregation, what are calculated values and table calculations, Using the calculation dialog box to create, Building formulas Using table calculations, using table calculation functions

UNIT IV:

Using maps to improve insights- Create a Standard Map View, Plotting your own locations on a map, Replace Tableau's standard maps, Shape data to enable Point-to-Point mapping.

UNIT V:

Developing an Adhoc analysis environment- generating new data with forecasts, providing Self-evident adhoc analysis with parameters, editing views in Tableau Server.

TEXT BOOKS:

1. Tableau your data-Daniel G. Murray and the Inter works BI team, Wiley Publications
2. Tableau Data Visualizaton Cookbook, Ashutosh Nandeshwar, PACKT publishing.
3. Storytelling with Data: A Data Visualization Guide for Business Professionals by Cole Nussbaumer Knaflic (2014)
4. ggplot2: Elegant Graphics for Data Analysis by Hadley Wickham (2009)

REFERENCE BOOKS:

1. Designing Data Visualizations: Representing Informational Relationships by Noah Iliinsky, Julie Steele (2011)
2. Alexandru C. Telea – "Data Visualization principles and practice" SecondEdition, CRC Publications
3. Joshua N. Millign–" Learning Tableau -2019" – Third Edition- Packt publications

Student Activity

Create a sample super store data set and visualize the following requirements

General Requirements

1. Dashboard size is 1250px wide by 750px tall.
2. Prefer using containers
3. The dashboard has a total of 5 containers (no more, no less)
4. The Filter Pane
5. Each filter has some padding

1. Charts Pane Requirement

1. All 3 charts must be in one vertical container
2. Do proper formatting
3. Each chart has some padding between them and other objects
4. Each chart has a grey border, slightly darker than the Pane background color.
5. The Pane under the Title has a border

2. The second graph should have the title as "Sales" and should showmonthly sales per year. Make sure it is an area chart with proper formatting.

3. The third graph should the title as "Profit" and should show monthlyprofit per year. Make sure it is an area chart with proper formatting.

Continuous assessment:

Let the students be tested in the following questions from each unit

1. What are generated values? Join tables using Tableau
2. Create any visualization charts using Chart types, Text Tables, Maps, barchart, Line charts, Area Fill charts and Pie charts, scatter plot etc.,
3. What is aggregation, what are calculated values and table calculations?
4. Using Standard Map View, Plot your own locations on a map
5. Develop an Adhoc analysis environment.

Time: 3 Hrs **Max Marks**: 70

SECTION-A

Answer any FIVE of the following **5 × 4 = 20 Marks**

1. What are generated values in Tableau?
2. Explain the process of blending data sources in a worksheet.
3. Define and differentiate between Text Tables and Pie Charts.
4. How do filters and groups enhance Tableau visualizations?
5. What is aggregation in Tableau?
6. Explain how to create a Standard Map View.
7. Write short notes on: Parameters in Tableau.
8. How is forecasting used in Adhoc analysis?

SECTION-B

Answer ALL questions **5 × 10 = 50 Marks**

9. Explain the process of connecting data in Tableau and describe the difference between joining tables and blending data sources.

OR

10. What are the different methods of connecting to data in Tableau? Explain with examples.

11. Explain various types of charts available in Tableau and describe how to build a basic bar chart and map.

OR

12. What are hierarchies and sets in Tableau? How do they help in enhancing views?

13. Describe calculated values and table calculations in Tableau. How do you create formulas using the calculation dialog box?

OR

14. What is the role of aggregation in Tableau? Explain with examples.

15. How can custom locations be plotted on a map in Tableau? Describe the process to replace Tableau's standard maps.

OR

16. What is point-to-point mapping? Explain how data shaping is done for such mapping.

17. What is Adhoc Analysis? How can parameters be used to enable user-driven analysis in Tableau?

OR

18. Describe the process of creating forecasts in Tableau and their significance in analysis.

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DATA VISUALIZATION USING TABLEAU

Unit	S.A.Q **Section :A** (including choice) 4 Marks	E.Q **Section: B** (including choice) 10 Marks	Marks Allotted
I	2	2	28
II	2	2	24
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IV	1	2	28
V	2	2	24
Total	8	10	132

SEMESTER-VII

COURSE 20B: DATA VISUALIZATION USING TABLEAU LAB

Practical **Credits: 1** **3 hrs/week**

1. Connect to data Sources
2. Create Univariate Charts
3. Create Bivariate and Multivariate charts
4. Create Maps
5. Calculate user-defined fields
6. Create a workbook data extract
7. Save a workbook on a Tableau server and web
8. Export images, data.

VIII Semester

COURSE 21A: Natural Language Processing & Text Analytics

Theory **Credits: 3** **3 hrs/week**

Course Objectives

- To introduce the concepts and techniques of Natural Language Processing (NLP).
- To apply machine learning algorithms to text analytics problems.
- To use popular NLP libraries such as NLTK, spaCy, and transformers.
- To build real-world applications such as sentiment analyzers, chatbots, and document summarizers.

Course Outcomes By the end of this course, students will be able to:

1. Understand the core concepts of NLP and text analytics.
2. Apply text preprocessing techniques on raw text data.
3. Build models for text classification, sentiment analysis, and language modeling.
4. Use Python NLP libraries for syntactic and semantic analysis.
5. Analyze and extract insights from unstructured text data.

Syllabus

UNIT –I

Introduction

Different levels of NLP; Text Normalization: Basic pre-processing, Word and sentence segmentation, Lemmatization, Stemming, Morphology. Why is it hard to process a natural language, Levels of Language Processing, Linguistic Fundamentals for NLP

UNIT-II: Models

Language Models: n-gram models, smoothing techniques, **Sequence Learning Tasks and Models**: Examples of NLP tasks, **Statistical Models** - HMM, MEMM, CRF;

UNIT-III: Parsing

Syntactic Parsing: Regular and Context-Free Languages, Context-Free Parsing, CKY Algorithm**. Dependency Parsing:** Dependency Grammar, Graph-based dependency parsing, Transition-based dependency parsing

UNIT-IV: Part-of-speech tagging and Named Entities

Sequence Models: Hidden-Markov Models, MEMM and CRF; Classification Models: Naïve Bayes, Logistic Regression, Clustering.

UNIT-V: Text Processing and Preprocessing:

Tokenization, Normalization, Stop word removal, Stemming, lemmatization, Morphological Analysis & Finite State Transducers (Code demo: Tokenization, Stop-Word-Removel, Stemming, Lemmatization)

Reference Books:

1. Speech and Language Processing, Daniel Jurafsky, James H.Martin
2. Foundations of Statistical Natural Language Processing, CH Manning, H Schuetze
3. Introduction to Natural Language Processing, Jacob Eisenstein
4. Natural Language Understanding, James Allen
5. Deep Dive into Deep Learning, Aston Zhang, Zack C. Lipton, Mu Li, Alexander J. Smola
6. Neural Network Methods for Natural Language Processing, Yaov Goldeberg
7. D. Jurafsky, J.H. Martin, Speech and Language Processing, 3rd Online Edition
8. J. Eisenstein, Introduction to Natural Language Processing, MIT Press, 2019.

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Natural Language Processing and Text Analytics

Time: 3 Hrs **Max Marks**: 70

SECTION–A

Answer any FIVE of the following **5 x 4 = 20 Marks**

1. Define text normalization.
2. What are the levels of natural language processing?
3. Explain stemming and lemmatization with examples.
4. Describe the use of Hidden Markov Models in NLP.
5. What is the difference between constituency parsing and dependency parsing?
6. What are n-gram language models?
7. Explain POS tagging with an example.
8. What is tokenization? Give an example.

SECTION – B

Answer ALL Questions **5 x 10 = 50 Marks**

9. Explain the different levels of language processing in NLP.

OR

10. Why is natural language difficult to process? Explain with linguistic fundamentals.

11. Describe the construction of n-gram language models and explain smoothing techniques used.

OR

12. Explain the working of statistical sequence models: HMM, MEMM, and CRF.

13. What is syntactic parsing? Explain the CKY parsing algorithm.

OR

14. Compare graph-based and transition-based dependency parsing approaches.

15. What are sequence labeling tasks in NLP? Explain POS tagging and NER with models.

OR

16. Explain the classification models used in NLP – Naïve Bayes, Logistic Regression, and Clustering.

17. Write short notes on:

a) Tokenization
b) Stop-word removal
c) Morphological analysis

OR

18. Demonstrate with code: stemming, lemmatization, and finite state transducers.

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Natural Language Processing & Text Analytics

Unit	S.A.Q **Section :A** (including choice) 4 Marks	E.Q **Section: B** (including choice) 10 Marks	Marks Allotted
I	2	2	28
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V	2	2	24
Total	8	10	132

SEMESTER-VIII

COURSE 21A: Natural Language Processing & Text Analytics Lab

Practical **Credits: 1** **3 hrs/week**

Practical / Lab Work (30 Hrs)

1. Text preprocessing with NLTK or spaCy.
2. POS tagging and Named Entity Recognition using spaCy.
3. Build a TF-IDF model for text similarity.
4. Train a sentiment classifier using logistic regression.
5. Create a topic model using Gensim.
6. Summarize documents using extractive techniques.
7. Translate sentences using HuggingFace Transformers.
8. Develop a rule-based chatbot.
9. Fine-tune a pre-trained model for classification.
10. Mini-project: Real-time sentiment analyzer or resume parser.

VIII Semester

COURSE 21B: Social Network Analysis

Theory **Credits: 3** **3 hrs/week**

Course Objectives:

- Understand the benefits and limitations of social media data compared to traditional marketing research.
- Learn the foundational skills of social media listening.
- Understand how social media data provides insights into market structure and consumer perception.

Course Outcomes:

- Evaluate social media messaging and data
- Understand tools and techniques used in social media analytics
- Apply tools to real-world business scenarios
- Build a solid foundation in social media analytics for career readiness

UNIT I – Introduction

What is Social Media Mining, New Challenges for Mining, Graph Essentials: Graph Basics, Graph Representation, Types of Graphs, Connectivity in Graphs, Special Graphs, Graph Algorithms, Web Scraping: What is Web Scraping? Uses of Web Scraping in Data Science, Setting Up a Quick Python Primer

UNIT II – Network Measures and Models

Network Measures: Centrality, Transitivity, Reciprocity, Balance and Status Similarity
Network Models: Properties of Real-World Networks, Random Graphs, Small World Models, Preferential Attachment Model

UNIT III – Data Mining and Community Analysis

Data Mining Essentials: Data, Data Preprocessing, Supervised and Unsupervised Learning Algorithms
Communities and Interactions: Community Analysis, Community Detection, Community Evolution, Community Evaluation

UNIT IV – Information Diffusion & Influence

Information Diffusion in Social Media: Herd Behavior, Information Cascades, Diffusion of Innovations, Epidemics
Influence and Homophily: Measuring Assortativity, Influence and Homophily, Distinguishing Influence from Homophily

UNIT V – Recommendation & Behavior Analysis

Recommendation Systems in social media: Challenges, Classical Recommendation Algorithms, Recommendations using Social Context, Evaluating Recommendations
Behavior Analysis: Individual and Collective Behavior, Events Analytics in Social Media

Prescribed Textbooks

1. Reza Zafarani, Mohammad Ali Abbasi, and Huan Liu.
   Social Media Mining: An Introduction, Cambridge University Press, 2014
2. Seppe Vanden Broucke, Bart Baesens.
   Practical Web Scraping for Data Science, Apress, 2018

Reference Books

1. Matthew A. Russell, *Mining the Social Web*, 2nd Ed., O'Reilly Media, 2013
2. Jennifer Golbeck, *Analyzing the Social Web*, Morgan Kaufmann, 2013
3. Ricardo Baeza-Yates & Berthier Ribeiro-Neto,
   Modern Information Retrieval, ACM Press, 2nd Ed., 2011
4. Charu C. Aggarwal, *Social Network Data Analytics*, Springer, 2011

B.C.A Honours Computer Applications[Major / Minor]

REVISED CBCS FRAMEWORK WITH EFFECT FROM 2023-2024 ADMITTED BATCH

BLUEPRINT

Social Network Analysis

Unit	S.A.Q **Section :A** (including choice) 4 Marks	E.Q **Section: B** (including choice) 10 Marks	Marks Allotted
I	2	2	28
II	2	2	24
III	1	2	28
IV	1	2	28
V	2	2	24
Total	8	10	132

KRISHNA UNIVERSITY :: MACHILIPATNAM – 521004

B.C.A Honours Computer Applications [Major / Minor]

REVISED CBCS FRAMEWORK WITH EFFECT FROM 2023–2024 admitted batch

Course Title: Social Network Analysis

Time: 3 Hrs. **Max Marks: 70**

SECTION – A

Answer any FIVE of the following (5 × 4 = 20 Marks)

1. Define social media mining. Mention any two challenges.
2. List the types of graphs and their representations.
3. What are the uses of web scraping in data science?
4. Define centrality and transitivity in networks.
5. What is preferential attachment model?
6. Differentiate between supervised and unsupervised learning.
7. What is meant by information cascade?
8. Define recommender systems. Mention any two challenges in social media recommendation.

SECTION – B

Answer ALL Questions (5 × 10 = 50 Marks)

9. a) What is social media mining? Explain graph essentials and special graphs with examples.

   OR

   b) What is web scraping? Describe its setup in Python and its uses in social media mining.

10. a) Explain centrality, reciprocity, and balance in networks with illustrations.

    OR

    b) Discuss small world models and preferential attachment with real-world applications.

11. a) Describe the essential steps in data preprocessing. Explain supervised vs unsupervised learning.

    OR

    b) Explain community detection and evaluation in social networks with suitable examples.

12. a) What is information diffusion? Discuss diffusion of innovations and information cascades.

    OR

    b) Explain influence and homophily. How can we distinguish between the two?

13. a) Explain recommendation systems using social context. How are they evaluated?

    OR

    b) Discuss individual and collective behavior and event analytics in social media.

VIII Semester

COURSE 21B: Social Network Analysis Lab

Theory **Credits: 3** **3 hrs/week**

1. **Write a Python program to extract social media posts using web scraping techniques.**
   Use BeautifulSoup or Scrapy to scrape Twitter handles, YouTube comments, or blog posts for later analysis.
2. **Write a program to create and visualize a social network graph using NetworkX.**
   Create nodes and edges from sample data to visualize connections and relationships between users.
3. **Write a Python program to calculate centrality measures (degree, closeness, betweenness) for a given graph.**
   Analyze node importance and influence in a network using NetworkX or igraph.
4. **Write a program to preprocess textual data from social media (remove stop words, punctuation, etc.).**
   Use NLTK or spaCy to clean and tokenize posts for sentiment or topic analysis.
5. **Write a Python script to perform sentiment analysis on tweets using TextBlob or VADER.**
   Classify tweets as positive, negative, or neutral and calculate sentiment scores.
6. **Write a program to apply supervised learning (e.g., Naive Bayes or SVM) to classify social media posts.**
   Train a model using labeled tweet data to predict categories like spam, news, review, etc.
7. **Write a program to perform community detection using the Louvain or Girvan–Newman algorithm.**
   Use graph clustering techniques to identify communities in a network graph.
8. **Write a Python script to simulate information diffusion using a simple SIR or independent cascade model.**
   Model how content (like a meme or news) spreads in a network.
9. **Write a program to build a basic recommendation system using user interaction data.**
   Use collaborative filtering or cosine similarity to recommend friends, pages, or products.
10. **Write a program to visualize individual vs. collective behavior using event logs or activity timelines.**
    Analyze the behavior patterns of users before, during, and after a major social media event (e.g., a product launch).

VIII Semester

COURSE 22A: CYBER SECURITY

Theory **Credits: 3** **3 hrs/week**

Course Objectives:

- Learn threats and risks with in context of the cyber security architecture.
- Student should learn and Identify security tools and hardening techniques.

- To learn types of incidents including categories, responses and timelines for response.

Course Outcomes: At the end of the course, student will be able to

- Apply cyber security architecture principles.
- Demonstrate the risk management processes and practices.
- Appraise cyber security incidents to apply appropriate response
- Distinguish system and application security threats and vulnerabilities.
- Identify security tools and hardening techniques

UNIT–I:

Introduction to Cyber Security-Cyber security objectives, roles, differences between information security and cyber security, Cyber security principles-confidentiality, integrity, availability, authentication and non repudiation

UNIT–II:

Information Security within Lifecycle Management-Lifecycle management landscape, Security architecture processes, Security architecture tools, Intermediate lifecycle management concepts, **Risks & Vulnerabilities-**Basics of risk management, Operational threat environments, Classes of attacks

UNIT–III:

Incident Response-Incident categories, Incident response, Incident recovery, **Operational security protection**-Digital and data assets, ports and protocols, Protection technologies, Identity and access Management, configuration management

UNIT–IV:

Threat Detection and Evaluation Monitoring-Vulnerability management, Security logs and alerts, Monitoring tools and appliances, **Analysis-**Network traffic analysis, packet capture and analysis

UNIT–V:

Introduction to backdoor System and security-Introduction to metas ploit, backdoor, demilitarized zone (DMZ), Digital signature, Brief study on Harding of operating system.

Text Books**:**

1. NASSCOM:SecurityAnalystStudentHandBook,Dec2015
2. Information Security Management Principles, Updated Edition, DavidAlexander,AmandaFinch, David Sutton, BCS publishers, June 2013

Reference Books**:**

1. Cyber Security Fundamentals-Cyber Security, Network Security and Data Governance Security,2nd Edition, ISACA Publishers,2019

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B.C.A Honours Computer Applications[Major / Minor]

REVISED CBCS FRAMEWORK WITH EFFECT FROM 2023-2024 ADMITTED BATCH

BLUEPRINT

Cyber security

Unit	S.A.Q **Section :A** (including choice) 4 Marks	E.Q **Section: B** (including choice) 10 Marks	Marks Allotted
I	2	2	28
II	2	2	24
III	1	2	28
IV	1	2	28
V	2	2	24
Total	8	10	132

SEMESTER-VIII

COURSE 22A: CYBER SECURITY LAB

Practical **Credits: 1** **2 hrs/week**

1. Explore cyber security principles using case scenarios. Write a report on confidentiality, integrity, availability (CIA).
2. Install and configure a basic firewall. Block specific ports and test accessibility.
3. Simulate a brute force attack using **Hydra** and demonstrate mitigation strategies.
4. Perform **port scanning** using **Nmap** and interpret the result to identify vulnerabilities.
5. Demonstrate **user authentication and access control** using a Linux-based system.
6. Conduct a **packet sniffing** and **network traffic analysis** using **Wireshark**.
7. Setup a simulated **incident response** scenario (e.g., malware detection) and perform logging, alerting, and response.
8. Introduction to **Metasploit**: Demonstrate scanning and launching a test exploit on a virtual environment.
9. Demonstrate **digital signature generation and verification** using GPG tools.
10. **Hardening of an operating system**: Disable unnecessary services, apply patches, and set up basic security policies.

SEMESTER-VIII

COURSE 22B: BLOCK CHAIN TECHNOLOGY

Theory **Credits: 3** **3 hrs/week**

Course Objectives:

- The course aims to help learners to acquire conceptual knowledge of Block Chain Technology.
- To Understand Security systems in Block Chain Technology. To acquire knowledge to
- applications of Block Chain Technology.

Course Outcomes: The students will be able to

1. Identify various types of Software Architecture and understand types of Cryptography.
2. Improve knowledge in understanding underlying technologies in Block Chain Technologies.
3. Understand the storage methods and advantages and have knowledge on the applications of Block Chain.

Unit 1: Layers of a Software System, Integrity, A Payment System, Types of Software Architecture, Purpose of the Blockchain, Peer-to-Peer system: Definition, Architecture, Link between Peer-to-Peer and Blockchain, Integrity Threats in Peer-to-Peer Systems, Four ways of Defining Blockchain, The purpose of the Blockchain, Blockchain Properties

Case Study: Identify Different Crypto Payments and Differentiate Them

Unit 2: Foundations of Ownership, Security Related concepts in Block chain, Purpose and Properties of a Ledger, Double Spending Problem, Designing and Developing a Software System, Documenting Ownership, Integrity of the Transaction History

Case Study: Study about Harbor, Ubitquity, Propy that are used in Real Estate

Unit 3: Hash Function in Block chain, Patterns of Hashing Data, Uses of Hash Values, Cryptography: Activities, Types of Cryptography, Digital Signatures

Case Study: Differentiate between various Blockchain Techniques used in Medical Field such as Ambrosus, Connecting Care, Farma Trust, MedRec

Unit 4: Transforming Book into Blockchain Data structure, Chaining Blocks of Data, Protecting the Data Store, Distributing the Data Store among Peers, Verifying and Adding Transactions

Case Study: How we Apply Blockchain Technology in Elections and Voting

Unit 5: Choosing a transaction History, Paying for Integrity, Technical Limitations of Blockchain, Conflicting Goals of the Blockchain, Characteristics of the Blockchain, Blockchain Applications, Blockchain Platforms

Case Study: Identify various Blockchain Technologies used in Entertainment

Text Books:

1. Blockchain Basics by: A Non-Technical Introduction in 25 Steps by Daniel Drescher, APress
2. Blockchain: Cybrosys Limited Edition

Web References:

1. 10 Blockchain Use Cases in Real Practical World | GoLinuxCloud
2. 33 Top Blockchain Applications to Know for 2023 | Built In
3. 15+ Practical Blockchain Use Cases in 2022 - 101 Blockchains
4. 30+ Real Examples Of Blockchain Technology In Practice (forbes.com)

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BLOCKCHAIN TECHNOLOGY

Time: 3 Hrs **Max Marks:** 70

SECTION – A

Answer any FIVE of the following **5 × 4 M = 20 Marks**

1. What are the different layers of a software system?
2. Define peer-to-peer system and explain its architecture.
3. What is the purpose of a ledger in blockchain?
4. Explain the double spending problem.
5. What is the use of a hash function in blockchain?
6. Differentiate between symmetric and asymmetric cryptography.
7. Explain the concept of chaining blocks in blockchain.
8. List any two blockchain applications in the entertainment industry.

SECTION – B

Answer ALL Questions **5 × 10 M = 50 Marks**

9. Explain different types of software architecture. How do integrity threats affect peer-to-peer systems?

OR

10. Describe the purpose and key properties of blockchain. Discuss four different ways to define blockchain.

11. What is ownership in blockchain? How is transaction history integrity maintained in real estate systems like Harbor, Ubitquity, and Propy?

OR

12. Explain the security-related concepts in blockchain and describe how a ledger solves the double spending problem.

13. What is a digital signature? Explain the various types of cryptography and the role of hash values in blockchain.

OR

14. Compare and contrast Ambrosus, Connecting Care, FarmaTrust, and MedRec blockchain techniques used in the medical field.

15. Explain how blockchain data structures are formed from books. Describe how data is distributed and protected across peers.

OR

16. How are transactions verified and added in a blockchain network? Describe the use of blockchain in elections and voting with a case study.

17. Discuss the technical limitations and conflicting goals of blockchain systems.

OR

18. Identify and explain different blockchain technologies used in the entertainment industry. Also, describe the characteristics of a blockchain platform.

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BLUEPRINT

BLOCK CHAIN TECHNOLOGY

Unit	S.A.Q **Section :A** (including choice) 4 Marks	E.Q **Section: B** (including choice) 10 Marks	Marks Allotted
I	2	2	28
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IV	1	2	28
V	2	2	24
Total	8	10	132

SEMESTER-VIII

COURSE 22B: BLOCK CHAIN TECHNOLOGY

Practical **Credits: 1** **2 hrs/week**

LIST OF EXPERIMENTS

1. Simulate a Peer-to-Peer Payment System and identify transaction integrity issues.

2. Explore types of software architecture using online architecture modeling tools.
3. Case Study: Identify and compare different **crypto payment systems** (e.g., Bitcoin, Ethereum, Ripple).
4. Demonstrate **double spending** and prevention in a simplified digital ledger.
5. Simulate ownership documentation using a JSON-based transaction history.
6. Explore and apply **hash functions** (SHA256, SHA512) in Python or online tools.
7. Generate **digital signatures** and verify them using cryptographic tools (e.g., GPG or Python libraries).
8. Convert a document/book into chained data blocks to simulate a blockchain.
9. Case Study: Study Blockchain applications in **e-voting** and simulate vote recording on a ledger.
10. Final Mini Project: Choose a domain (Healthcare, Real Estate, Entertainment), research and document use of blockchain platforms in it.

VIII Semester

Course 23 A: Advanced Database Management Systems

Credits -3

Learning Objectives:

To provide students with a thorough theoretical knowledge and practical application of advanced topics in database management systems.,

Learning Outcomes: Upon successful completion of the course, students will be able to:

1. Gain understanding of relational database concepts, functional dependencies, and correctness of FDs.
2. Analyze and apply normalization techniques (3NF, BCNF, 4NF, 5NF)
3. Develop skills in processing joins, grasp materialized vs. pipelined processing
4. Learn principles of correct interleaved execution, locking mechanisms (2PL), handle deadlocks.
5. Acquire knowledge of T/O-based techniques, multi-version approaches

UNIT-I

Formal review of relational database concepts, Functional dependencies, Closure, Correctness of FDs

UNIT-II

3NF and BCNF, 4NF and 5NF, Decomposition and synthesis approaches, Review of SQL99, Basics of query processing, external sorting, file scans

UNIT-III

Processing of joins, materialized vs. pipelined processing, query transformation rules, DB transactions, ACID properties, interleaved executions, schedules, serializability

UNIT-IV

Correctness of interleaved execution, Locking and management of locks, 2PL, deadlocks, multiple level granularity, Concurrency Control on B+ trees, Optimistic Concurrency Control and the concepts related to Global and Local transactions in Distributed transactions.

UNIT-V

T/O based techniques, Multiversion approaches, Comparison of Concurrency Control methods, dynamic databases, Failure classification, recovery algorithm, XML and relational databases

Text Book(s)

1. R. Ramakrishnan, J. Gehrke, Database Management Systems, McGraw Hill, 2004
2. A. Silberschatz, H. Korth, S. Sudarshan, Database system concepts, 5/e, McGraw Hill, 2008.

Reference Books

3. Hector Garcia-Molina, Jeff Ullman, and Jennifer Widom, “Database Systems: TheComplete Book”, Pearson, 2011.

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REVISED CBCS FRAMEWORK WITH EFFECT FROM 2023-2024 admitted batch

Advanced Database Management Systems

Time: 3 Hrs. **Max Marks:** 70

SECTION – A

Answer any FIVE of the following **5 × 4 M = 20 M**

1. Define functional dependency with an example.
2. What is the closure of a set of attributes?
3. Explain the difference between 3NF and BCNF.
4. What is external sorting?
5. Define ACID properties of a database transaction.
6. What is Two-Phase Locking (2PL)?
7. List any four concurrency control techniques.
8. Write a short note on XML and relational databases.

SECTION – B

Answer ALL Questions **5 × 10 M = 50 M**

9. Explain functional dependencies. How do you determine the correctness of FDs?

OR

10. What is attribute closure? Explain how it is useful in database design with an example.

11. Discuss 3NF, BCNF, 4NF, and 5NF with suitable examples.

OR

12. What is decomposition in normalization? Explain decomposition and synthesis approaches.

13. Explain the difference between materialized and pipelined processing.

OR

14. Describe query transformation rules. Explain with examples.

15. Define interleaved execution and explain its correctness. How is deadlock handled in concurrency control?

OR

16. Explain multiple granularities locking. How is concurrency control applied on B+ trees?

17. Explain time-stamp ordering based concurrency control techniques.

OR

18. What are dynamic databases? Explain failure classification and recovery algorithms.

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BLUEPRINT

Advanced Database Management Systems

Unit	S.A.Q **Section :A** (including choice) 4 Marks	E.Q **Section: B** (including choice) 10 Marks	Marks Allotted
I	2	2	28
II	2	2	24
III	1	2	28
IV	1	2	28
V	2	2	24
Total	8	10	132

VIII Semester

Course 23A: Advanced Database Management Systems Lab

Credits -1

List of Experiments:

1. Running Basic SQL commands

2. Understanding the use of Intermediate SQL

3. Running Advanced SQL related to data mining (Slicing and Dicing)

4. Creation of ER and EER diagrams for an organization

5. Database Design and Normalization for a given organization

6. Accessing Databases from Programs using JDBC

7. Analyzing query performance using explain plans

8. Creation of indexes for better query performance.

9. Running different query evaluation plans

10. Experimenting on DBMS locks and session management

VIII Semester

Course 23 B: Applied Data Analytics

Theory **Credits -3** **3hrs/Week**

Course Objectives

- To introduce the principles and applications of data analytics.
- To provide hands-on experience in data wrangling, visualization, and modeling.
- To apply statistical and machine learning methods to solve real-world problems.
- To familiarize students with tools like Python, Pandas, Matplotlib, and Tableau.
- To enable students to make data-driven decisions using analytical techniques

Course Outcomes After completing this course, students will be able to:

1. Understand the core concepts of applied data analytics.
2. Perform data cleaning, transformation, and exploratory analysis.
3. Apply statistical and machine learning models to structured data.
4. Use tools like Pandas, Matplotlib, and Scikit-learn for analysis.
5. Visualize data insights using dashboards and plots.
6. Complete mini-projects solving real-world data problems

Syllabus

UNIT - I

Introduction to R:
Why use R?, R Environment, Working with R Packages, Understanding Datasets, Data Types, Data Structures (Operations on Data Structures), Missing Values, Sorting Data, Merging Datasets, Subsetting Datasets, Control Flow Statements, Aggregation and Restructurings.

UNIT - II

Descriptive Statistics:
Introduction to Descriptive Statistics (Measures of Central Tendency, Measures of Dispersion of Variability, Measures of Shapes (Skewness and Kurtosis)), Introduction to Sampling (Sampling Types), Hypothesis Testing with R (One Sample Test, One Sample Sign Test, Two Samples Test), Parametric Test (Correlations, Z-Test, T-Test), Non Parametric Tests (Wilcoxon Signed-Rank Test, Chi Square Test).

UNIT - III

Basic Graphs:
Bar Plots, Pie Charts, Histograms, Line, Dot Plots, Kernel Density Plots and Dot Plots.
The Advanced Graphics: The `ggplot2` Package.

Analysis of Variance:
Fitting ANOVA Models, One-way ANOVA, One-way ANCOVA, Two-way factorial ANOVA, Repeated measures ANOVA, Multivariate Analysis of Variance (MANOVA).

UNIT - IV

Basic Multivariate Analysis:
Regression (Simple Linear Regression, Multiple Linear Regression, Logistic Regression), Time Series Analysis (Creating Time Series, Components of Time Series Analysis, Seasonal Decomposition, Exponential Models), Forecasting (Simple Moving Averages, Weighted Moving Averages, Single Exponential Smoothing.)

UNIT - V

Connecting R to External Interfaces:
CSV Files (Reading From a CSV File, Writing to a CSV File),Microsoft Excel (Reading from XLSX File, Writing to XLSX File),Databases (Connecting R to MYSQL, Creating Tables, Inserting Rows, Updating Rows, Deleting Rows, Querying Rows, Querying Tables, Dropping Tables),XML Files (Reading From XML Files),JSON Files (Reading From JSON Files), Binary Files (Writing to Binary Files, Reading From Binary Files).

Text Books

1. Dr. Rob Kabacoff – *R in Action: Data Analysis and Graphics with R*, Manning Publications Co., Edition 2011.
2. Dr. Jeeva Jose – *A Beginner's Guide For Data Analysis Using R Programming*, Khanna Book Publishing Co. (P) Ltd., Edition 2019. (UNIT IV and UNIT V)

Reference Text Books

1. Dr. Dhaval Maheta – *Data Analysis using R*, Notion Press.
2. Michael J. Crawley – *The R Book*, Wiley, Edition: 2007.
3. Ken Black John – *Business Statistics for Contemporary Decision Making*, John Wiley & Sons, Inc., Edition 2013.

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Applied Data Analytics

Time: 3 Hrs **Max Marks:** 70

SECTION – A

Answer any FIVE of the following **5 × 4 M = 20 Marks**

1. What are the different data types in R?
2. How do you handle missing values in R?
3. Define measures of central tendency with examples.
4. What is the difference between a parametric and a non-parametric test?
5. Write a short note on bar plots and histograms.
6. What are the components of a time series?
7. How can R connect to a CSV file?
8. Explain how to read and write JSON files in R.

SECTION – B

Answer ALL Questions **5 × 10 M = 50 Marks**

9. Explain data structures in R. Describe any three operations that can be performed on them with examples.

OR

10. What are control flow statements in R? Explain the usage of `if`, `if-else`, `for`, and `while` loops with examples.

11. Define skewness and kurtosis. Explain how they help in understanding data shape.

OR

12. What is hypothesis testing? Explain Z-test, T-test, and Chi-square test with suitable examples in R.

13. Discuss the creation and customization of basic plots in R (bar, pie, line, and histogram).

OR

14. What is ANOVA? Explain one-way and two-way factorial ANOVA with examples in R.

15. Explain logistic regression with an example in R. Also, compare it with linear regression.

OR

16. What is exponential smoothing? How does it help in forecasting time series data?

17. Describe how R can interact with MySQL database. Explain the operations of creating a table and inserting, updating, and deleting rows.

OR

18. Explain how R can read from and write to Excel and XML files with examples.

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Applied Data Analytics

Unit	S.A.Q **Section :A** (including choice) 4 Marks	E.Q **Section: B** (including choice) 10 Marks	Marks Allotted
I	2	2	28
II	2	2	24
III	1	2	28
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V	2	2	24
Total	8	10	132

VIII Semester
Course 23B: Applied Data Analytics
Credits -1

Practical / Lab Work

1. Install R and RStudio. Load and explore datasets using built-in and external packages.
2. Perform data cleaning: handle missing values, sort, merge, and subset datasets.
3. Manipulate data structures: vectors, lists, matrices, data frames, and factors.
4. Use control flow statements (if, for, while) to automate data processing tasks.
5. Calculate descriptive statistics: mean, median, mode, variance, skewness, and kurtosis.
6. Perform parametric and non-parametric tests: t-test, z-test, chi-square, Wilcoxon.
7. Visualize data using bar plots, histograms, pie charts, and line graphs.
8. Create advanced visualizations using ggplot2 for layered graphics and density plots.
9. Conduct ANOVA: One-way, Two-way, and Repeated Measures ANOVA using aov().
10. Build regression models: simple, multiple, and logistic regression using lm() and glm().
11. Perform time series analysis: decomposition, smoothing, and forecasting.
12. Read/write external files: CSV, Excel, XML, JSON, and Binary files.
13. Connect R with MySQL: create tables, insert, update, delete, and query data.
14. Analyze a real-world dataset (e.g., weather, finance, education, health) and summarize findings.
15. Mini-project: End-to-end statistical analysis and visualization using R.

VIII Semester

Course 24 A: Search Engine Optimization

Theory **Credits -3** **3hrs/Week**

Course Objectives:

- To introduce the concepts and importance of SEO in digital marketing.
- To enable students to apply on-page and content optimization techniques.
- To learn SEO tools for analysis, auditing, and improvement of web content.
- To gain insights on search engine algorithms and ranking factors.
- To build SEO strategies for real-time business and websites.

Course Outcomes:

- Optimize websites for search engine rankings using on-page, off-page, and technical SEO techniques.
- Conduct keyword research and competitor analysis using industry-standard tools.
- Apply SEO strategies to live WordPress projects and e-commerce platforms.
- Analyse performance with Google Analytics 4 and Google Search Console.
- Understand AI's impact on SEO and prepare for job interviews.

Unit 1: Foundations of SEO and Keyword Research

Introduction to SEO: Importance, SERPs, and search engine algorithms (Google, Bing). White Hat vs. Black Hat SEO practices. Keyword Research: Types (short-tail, long-tail, LSI), search intent, and competition analysis. Tools: Google Keyword Planner, SEMrush, Ahrefs, Uber suggest. Competitor keyword analysis and reverse engineering top-ranking pages.

Unit 2: On-Page SEO and Content Optimization

On-Page SEO: Meta titles, meta descriptions, header tags (H1-H3), and keyword density. SEO-friendly URL structures and internal linking strategies.

Content Optimization: Writing SEO-friendly content, avoiding keyword stuffing, and content cluster strategies. Image SEO: Alt tags, file naming, and compression (e.g., WebP format, referencing your interest in website optimization).

Schema Markup: Basics and implementation for rich snippets. Tools: Yoast SEO, Rank Math.

Unit 3: Technical SEO and Website Performance

Technical SEO: XML/HTML sitemaps, robots.txt, canonical tags, and HTTPS.

Website Speed: Page speed testing (Google PageSpeed Insights), CDN setup, and image optimization (WebP, aligning with your prior query on WebP images).

Core Web Vitals: LCP, FID, CLS, and mobile-friendliness. Fixing errors: Broken links, 404 pages, and redirects.

Tools: Google Search Console, Screaming Frog, GTmetrix.

Unit 4: Off-Page SEO and Local SEO

Off-Page SEO: Backlinks, link-building strategies, guest posting, and social media submissions. Anchor text optimization and do-follow/no-follow links.

Local SEO: Google My Business (GMB) setup, NAP consistency, and local citations.

Tools: Moz Link Explorer, BuzzStream.

Practical: Create a backlink strategy and simulate outreach for guest posting.

Unit 5: Analytics, AI in SEO, and Career Preparation

Google Analytics 4: Setting up, tracking users, engagement, and bounce rate.
Google Search Console: Performance tracking, sitemap submission, and Core Web Vitals.
AI in SEO: Using AI tools for content ideas, schema markup, and outreach emails.

Books (Physical or eBooks):

1. **"SEO 2024: Learn Search Engine Optimization with Smart Internet Marketing Strategies"**
   Author: Adam Clarke
   Level: Beginner to Intermediate
   Why: Easy to follow, practical examples, up-to-date.
2. **"The Art of SEO: Mastering Search Engine Optimization"**
   Authors: Eric Enge, Stephan Spencer, Jessie Stricchiola
   Level: Intermediate to Advanced
   Why: Comprehensive and authoritative.
3. **"SEO for Dummies" (latest edition)**
   Author: Peter Kent
   Level: Beginner
   Why: Great for students who are new to the field.
4. **"Product-Led SEO"**
   Author: Eli Schwartz
   Level: Intermediate
   Why: Focuses on strategic thinking, product-driven SEO – good for WordPress and e-commerce learners.

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REVISED CBCS FRAMEWORK WITH EFFECT FROM 2023-2024 ADMITTED BATCH

BLUEPRINT

Search Engine Optimization

Unit	S.A.Q **Section :A** (including choice) 4 Marks	E.Q **Section: B** (including choice) 10 Marks	Marks Allotted
I	2	2	28
II	2	2	24
III	1	2	28
IV	1	2	28
V	2	2	24
Total	8	10	132

Semester-VIII

Model Question Paper

Course: Search Engine Optimization

Time: 3 Hours | Max. Marks: 70

Section – A

Answer any FIVE questions **5 × 4 = 20 Marks**

1. What is the difference between white hat and black hat SEO?
2. Define short-tail and long-tail keywords with examples.
3. What are meta tags and why are they important?
4. Write a short note on Core Web Vitals.
5. What is the role of alt text in image SEO?
6. Mention the advantages of using Google Search Console.
7. What is NAP consistency in Local SEO?
8. Write a short note on schema markup.

Section – B

(Answer ALL questions – 5 × 10 = 50 Marks)

9. Explain the importance of keyword research. How do tools like Ahrefs or SEMrush help in it?

   OR

   Describe various types of search intents and their role in SEO.
10. What are the key elements of on-page SEO? Explain with examples.

    OR

    Explain the steps for writing SEO-friendly content.
11. What is technical SEO? Explain the importance of `robots.txt`, sitemap, and canonical tags.

    OR

    Discuss Core Web Vitals and how they influence SEO performance.
12. What are backlinks? Describe the techniques for link building and their importance in off-page SEO.

    OR

    Explain the role of Local SEO and how GMB enhances local visibility.
13. What is the role of AI in modern SEO? Describe how AI tools assist in schema markup and content generation.

    OR

    Explain the steps to set up and interpret performance data using Google Analytics and Search Console.

VIII Semester
Course 24A: Search Engine Optimization
Credits -1
Practical / Lab Work

1. **Keyword Research**
   - Use Google Keyword Planner or Ubersuggest to identify high-volume keywords.

- Classify them into short-tail, long-tail, and LSI.

2. **On-Page SEO**
   - Optimize a sample HTML page with meta title, meta description, H1-H3 tags, keyword density.
   - Create SEO-friendly URL structures and internal links.
3. **Content Optimization**
   - Write and optimize an article/blog post using keyword best practices.
   - Demonstrate content clustering and internal linking strategies.
4. **Image SEO**
   - Insert and optimize images using appropriate alt text, filenames, and convert to WebP format.
5. **Technical SEO Audit**
   - Create and validate robots.txt, XML sitemap, and use canonical tags.
   - Perform a technical audit using Screaming Frog or Google Search Console.
6. **Website Performance**
   - Test website speed using GTMetrix and Google PageSpeed Insights.
   - Implement improvements (e.g., image compression, CDN).
7. **Schema Markup**
   - Add basic schema (e.g., FAQ, article) to an HTML page.
   - Test with Google's Rich Results Test.
8. **Backlink Strategy Simulation**
   - Identify backlink opportunities from competitors using Ahrefs or SEMrush.
   - Simulate outreach email for guest posting.
9. **Local SEO Setup**
   - Create a mock Google My Business (GMB) listing.
   - Add NAP information and simulate local citation submissions.
10. **SEO Analytics**
    - Set up Google Search Console and Analytics for a sample website.
    - Interpret performance reports including Core Web Vitals.

SEMESTER-VIII

COURSE 24B: DEEP LEARNING

Theory **Credits: 3** **3 hrs/week**

Course Objectives:

- To understand the basic ideas and principles of Neural Networks

- To understand the basic concepts of Big Data and Statistical Data Analysis
- To familiarize the student with The Image Processing facilities like Tensorflow and Keras
- To appreciate the use of Deep Learning Applications
- To understand and implement Deep Learning Architectures

Course Outcomes : Upon successful completion of this course, students should have the knowledge and skills to

1. Understand the role of Deep learning in Machine Learning Applications.
2. To get familiar with the use of TensorFlow/Keras in Deep Learning Applications.
3. To design and implement Deep Learning Applications.
4. Critically Analyse Different Deep Learning Models in Image Related Projects.
5. To design and implement Convolutional Neural Networks.

UNIT I BASICS OF TENSOR FLOW

Tensors – Computational Graph and Session – Creating Tensors – Working on Matrices- Activation Functions – Tangent Hyperbolic and Sigmoid – RELU and ELU – RELU6- Loss Functions – Common Loss Functions – Optimizers – Metrics – Common Metrics – Understanding and working with Keras.

UNIT II BASICS OF ARTIFICIAL NEURAL NETWORKS (ANN)

From Biological to Artificial Neurons – Single Layer Perceptron– Multi Layer Perceptron - Logistic Regression Model - Linear Regression, Multilayer Perceptron in Tensorflow – Log-Linear Model – Keras NN for Linear Regression. MLP on IRIS — Randomly Generated Data.

UNIT III CONVOLUTIONAL NEURAL NETWORKS (CNN)

Introduction to CNN - CNN Architectures – TensofFlow for CNN Models – Image Classifienr for MNIST Data – Using a High-Level API for Building CNN Models – Define Network Structure – Define Model Architecture – MNIST (Digit Classification) - Building an Image Classifier with CIFAR-10 Data – Pretrained Models.

UNIT IV RNN AND LSTM

Concept of RNN – LSTM – Models of LSTM – Sequence Prediction – Time Series forecasting with the LSTM Model. Speech to Text – Speech as Data – Speech Features – Spectrograms - Classifier for Speech Recognition Through MFCC Features – Spectrogram – Open Source Approaches – Text to speech Conversion – Cognitive Service Providers – Speech Analytics.

UNIT V APPLICATIONS OF DEEP LEARNING

Developing Chatbots – Face Detection – Face Recognition and Face Analysis – OpenCV – Eigenfaces – LBPH – Fisherfacers – Detecting a face – Tracking the face – Face Recognition – Deep Learning Based Face Recognition – Transfer Learning.

TEXT BOOK:

1. Navin Kumar Manaswi, “Deep Learning with Applications Using Python”, Apress, 2018.
2. Francois Chollet, “Deep Learning with Python”, Manning Publications, 2018.

REFERENCES:

1. Ian Good Fellow, Yoshua Bengio, Aaron Courville, “Deep Learning”, MIT Press, 2017.
2. Phil Kim, “Matlab Deep Learning: With Machine Learning, Neural Networks and Artificial Intelligence”, Apress , 2017.
3. Ragav Venkatesan, Baoxin Li, “Convolutional Neural Networks in Visual Computing”, CRC Press, 2018.
4. Joshua F. Wiley, “R Deep Learning Essentials”, Packt Publications, 2016.

BLUEPRINT

Deep Learning

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I	2	2	28
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Total	8	10	132

Semester VIII
Model Question Paper
Course: Deep Learning

Time: 3 Hours **Max. Marks: 70**

Section – A

Answer any **FIVE** of the following questions **5x4=20M**

1. State the salient features of Tensors
2. Differentiate between the RELU and ELU.
3. Describes Multilayer perception
4. What is the importance of keras NN For linear Regression
5. Write a short note on Tensor Flow of CNN Models?
6. How to Creating Pretrained Models?
7. Write a short note on Spectrograms?
8. Explain the concept of Face Detection?

Section –B

Answer **ALL** of the following questions **5x10=50M**

9. a. Explain about Working on Matrices

(or)

b. Explain about Loss functions in detail.?

10. a. Explain about Logistic and Linear Regression Models?

(or)

b Explain about Multilayer perception in Tensor flow?

11. a. Explain about CNN Architecture?

(or)

b. Explain about MNIST?

12. a. How will you explain Models of LSTM?

(or)

b. Demonstrate Text to speech Conversion and Speech Analytics. Social Signals.

13. a. Explain about Face Reorganization and Faced Analysis

(or)

b. Explain about Deep Learning Based Face Recognition and Transfer Learning. Metrics

VIII Semester
Course 24B: Deep Learning
Credits -1

1. Installing Tensorflow 2

2. Working on placeholders, constants and variables with tensorflow.
3. Creating Tensors – from image to tensor Fixed Tensors , sequence Tensors, Random Tensors
4. Activation function and Loss Functions Working on Optimizers
5. Working on eight steps to the deep learning process in Keras:Linear Regression in Tensorflow
6. - IRIS
7. Logistic Regression in Tensorflow – IRIS Log- Linear Model
8. Keras Neural Network in Linear Regression MLP on IRIS Data
9. MLP on MNIST Data (Digit Classification) MLP on Randomly Generated Data
10. Building an Image Classifier for MNIST Data in Kears Time Series Forecasting with LSTM
11. Develop a Chatbot Spectrogram of Speech
12. Text to Speech and Vice Versa OpenCV Face Detection and Face Recognition

SEMESTER-VIII

COURSE 25A: Game Design & Development

Theory **Credits: 3** **3 hrs/week**

Course Objectives:

- To introduce the fundamentals of game design principles and mechanics.
- To explore game development tools, engines, and frameworks.
- To enable students to design, prototype, and develop 2D/3D games.
- To promote creativity, logic, and storytelling in game creation.
- To equip students with the knowledge of publishing and marketing games.

Course Outcomes:

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

1. Understand core concepts of game design including mechanics and dynamics.
2. Apply game development tools like Unity, Unreal Engine, or Godot.
3. Develop interactive 2D/3D games with scripting and logic.
4. Incorporate graphics, sound, and UI elements in games.
5. Plan and manage small-scale game development projects.
6. Demonstrate and deploy a playable game prototype.

Syllabus

UNIT–I: Introduction to Game Design

History and Evolution of Video Games – Game Genres – Game Design Process – Game Elements (Mechanics, Dynamics, Aesthetics) – Role of Game Designers – Storytelling and Narratives in Games.

UNIT–II: Game Design Documentation

Game Concept and Idea Generation – Game Design Document (GDD) – Character and Environment Design – Level Design Principles – Game Balancing – Wireframing and Prototyping.

UNIT–III: Introduction to Game Development Tools

Overview of Game Engines: Unity, Unreal, Godot – Installation and Setup – Interface and Project Structure – Basic 2D/3D Game Scene Creation – Assets: Sprites, Models, Audio, Textures.

UNIT–IV: Game Programming and Scripting

Game Loop – Input Handling – Collision Detection – Physics and Animation – UI Elements (Menus, HUDs) – Scripting using C# (for Unity) or GDScript (Godot) – Debugging and Optimization.

UNIT–V: Game Testing and Publishing

Playtesting – Bug Tracking – Iteration and Feedback – Final Builds – Game Packaging – Publishing Platforms: Web, PC, Android – Basics of Game Monetization and Marketing.

Suggested Co-Curricular Activities

- Conduct game jams (24–48 hr game creation challenges).
- Guest lectures from indie game developers or studios.
- Group project presentations and portfolio building.
- Participation in online game design competitions (e.g., Ludum Dare).
- Blogs or vlogs explaining design decisions or development experiences.

References

Textbooks:
1. The Art of Game Design: A Book of Lenses – Jesse Schell
2. Game Programming Patterns – Robert Nystrom
3. Level Up! The Guide to Great Video Game Design – Scott Rogers

Online Resources:
- https://learn.unity.com
- https://godotengine.org/learn
- https://gamedesignconcepts.wordpress.com

Semester-VIII

Model Question Paper

Course: Game Design And Development

Time: 3 Hours **Max. Marks: 70**

Section – A

Answer any **FIVE** of the following questions **5x4=20M**

1. Explain the procedure of Game Design Process
2. What ate the different roles of Game designers
3. Write a short note on Game Design Document?
4. Describes Game Balancing?
5. Explain about Godet?
6. Explain the Asset tool in Game Desing?
7. Explain about UI Elements
8. Explain about Bug Tracking?

Answer any **FIVE** of the following questions **5x10=50M**

9. a). Explain about different Game Elements in details

OR

b) . Explain the procedure of Story Telling and narratives in Games

10. a). Explain about Character and Environmental Design

OR

b). Explain about Levels of Game Design Principles

11. a). Write a Procedure How to Install and Setup a Game Design

OR

b). Hoe to Create 2D & 3D Game Scene.

12. a). Explain about Collision Detection in game Design

OR

b). Explain about GD Scripts

13. a). Explain about Game Packaging?

OR

b). Explain the Concept of Game Monetization and Marketing.

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B.C.A Honours Computer Applications[Major / Minor]

REVISED CBCS FRAMEWORK WITH EFFECT FROM 2023-2024 ADMITTED BATCH

BLUEPRINT

Game design and development

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VIII Semester
Course 24B: Game design and development Lab
Credits -1

Practical / Lab Work

1.Create a GDD for a simple 2D platformer or puzzle game.

2. Develop a 2D game prototype with at least one level using Unity or Godot.

3. Implement player controls, scoring system, and basic AI.

4. Design and animate a main character or enemy.

5. Add UI elements like health bar, timer, and start screen.

6. Create and apply sound effects and background music.

7. Optimize and test the game for performance issues.

8. Build and export the game to a playable format.

9. Upload the game to itch.io or similar platform.

10. Showcase the game and present a project demo.

SEMESTER-VIII

` **COURSE 25A: Bootstrap & JQuery**

Theory **Credits: 3** **3 hrs/week**

Learning Outcomes:

- Build responsive, mobile-first websites using Bootstrap 5's grid system and components.
- Enhance user interactivity with jQuery for DOM manipulation, event handling, and animations.
- Integrate Bootstrap and jQuery with SEO practices (e.g., semantic HTML, fast-loading pages).
- Develop a portfolio-ready project (e.g., a responsive website for KBN College).
- Prepare for front-end development roles through practical projects and interview preparation.

Unit 1: Introduction to Bootstrap 5 and Responsive Design

Introduction to Bootstrap 5: Features, mobile-first approach, and differences from Bootstrap 3/4 (no jQuery dependency for core components).
Setting up Bootstrap: Using CDN (jsDelivr) or npm for CSS and JavaScript.
Responsive Design: HTML5 doctype, viewport meta tag, and cross-browser compatibility
Bootstrap Grid System: Containers, rows, columns, and breakpoints.
Utility Classes: Spacing, typography, colors, and text alignment.

Unit 2: Bootstrap Components and Customization

Bootstrap Components: Buttons, forms, navbars, cards, modals, carousels, and alerts.
Typography: Headings, paragraphs, and blockquote styling.
Customizing Bootstrap: Using Sass variables and overriding default styles.
Bootstrap Icons: Integrating SVG icons for UI enhancement.
Accessibility: Semantic HTML and ARIA attributes for screen readers.

Unit 3: jQuery Fundamentals and DOM Manipulation

Introduction to jQuery: Features, CDN integration, and noConflict mode.
jQuery Syntax and Selectors: CSS3 selectors, DOM traversal, and filtering.
DOM Manipulation: Get/set content, add/remove elements, and CSS property changes.
Event Handling: Click, change, hover, and custom events.
jQuery with Bootstrap: Enhancing Bootstrap components (like, modals, tooltips) with jQuery.

Unit 4: jQuery Effects, Animations, and AJAX

jQuery Effects: Hide/show, fade, slide, and custom animations.
Method Chaining and Callbacks: Streamlining multiple actions.
AJAX with jQuery: Fetching data via $.get, $.post, and getJSON for REST APIs.
Animating Bootstrap Components: Adding animations to carousels and modals.

Performance Optimization: Minimizing DOM queries and using minified jQuery.

Unit 5: Integration, Optimization

Integrating Bootstrap and jQuery with SEO: Semantic HTML, fast-loading pages (WebP images), and schema markup (linking to SEO syllabus).
Performance Optimization: Minifying CSS/JS, using CDNs, and lazy-loading images.
Debugging: Using Chrome DevTools for Bootstrap and jQuery issues.
Portfolio Building: Creating a cohesive project combining Bootstrap, jQuery, and SEO.

References

Text Books:
1. Bootstrap 5 By Example – Snig Bhaumik
2. Learning Bootstrap 5 – Matt Lambert
3. jQuery: Novice to Ninja – Earle Castledine & Craig Sharkie
4. JavaScript and jQuery: The Missing Manual – David Sawyer McFarland

Web Resources:
- https://getbootstrap.com
- https://jquery.com

Time: 3 Hrs **Max Marks**: 70

SECTION - A

(Answer any FIVE of the following) (5 × 4 = 20 Marks)

1. What is a mobile-first approach in Bootstrap 5?
2. List any four Bootstrap utility classes for spacing and text alignment.
3. Explain the use of `fadeIn()` and `fadeOut()` in jQuery.
4. What is the difference between `.on()` and `.click()` in jQuery event handling?
5. Define semantic HTML with an example.
6. Mention any four components of Bootstrap 5 and their use.
7. How do you integrate Bootstrap using CDN?
8. Write a jQuery code to change the background color of a div on button click.

SECTION - B

(Answer ALL questions) (5 × 10 = 50 Marks)

9. Explain Bootstrap Grid System with an example showing all breakpoints.
   OR
10. Describe how to use Bootstrap containers, rows, and columns to create a responsive layout.
11. Discuss various Bootstrap components like Navbar, Cards, and Modals with examples.
    OR
12. Explain how Sass can be used to customize Bootstrap and override styles.
13. What are jQuery selectors? Explain with examples how to select DOM elements.
    OR
14. Explain different jQuery event handlers with syntax and examples.
15. Describe how jQuery effects and animations work. Provide examples of hide/show and slide.
    OR
16. Explain the use of AJAX in jQuery. Demonstrate the use of `$.get()` and `$.post()` with example.
17. Explain the integration of Bootstrap and jQuery with SEO optimization techniques.
    OR
18. Design a responsive portfolio page layout using Bootstrap and jQuery. Discuss its features.

B.C.A Honours Computer Applications[Major / Minor]

REVISED CBCS FRAMEWORK WITH EFFECT FROM 2023-2024 ADMITTED BATCH

BLUEPRINT

Bootstrap & JQuery

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VIII Semester
Course 25B: Bootstrap & JQuery Lab
Credits -1

Practical (Laboratory) Syllabus

Week 1: Bootstrap Basics

Create a responsive page using the Bootstrap 5 Grid System.

Use container, rows, and columns to layout sections.

Week 2: Bootstrap Components

Create a form using Bootstrap form controls and buttons.

Design a responsive navigation bar with links and dropdowns.

Week 3: Bootstrap UI Elements

Use Bootstrap Cards, Alerts, and Modals.

Integrate Bootstrap Carousel with at least three slides.

Week 4: Bootstrap Customization

Customize Bootstrap using Sass variables.

Override default styles in a Bootstrap-based page.

Week 5: jQuery Introduction

Include jQuery via CDN and demonstrate basic selectors.

Manipulate DOM elements using jQuery (add, remove, toggle).

Week 6: jQuery Events and Effects

Handle click, hover, and change events.

Add animations like slideToggle, fadeIn, and fadeOut.

Week 7: jQuery & Bootstrap Integration

Enhance a Bootstrap modal using jQuery.

Create a tooltip using jQuery and Bootstrap combined.

Week 8: AJAX with jQuery

Use $.get and $.post to fetch/display data in a Bootstrap card layout.

Load content into a div using AJAX.

Week 9: SEO and Optimization

Add semantic HTML and viewport tags.

Optimize images using WebP and apply lazy-loading.

Week 10: Mini Project

Build a portfolio webpage or product landing page using Bootstrap, jQuery, and SEO best practices.