Programme: B.C.A. (HONOURS) 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
IV	VII	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
		18	Bio-Informatics (OR) Mathematical and Statistical Foundations	3	3
			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
		Syllabus will be available in due course of time			
	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
		Syllabus will be available in due course of time			

SEMESTER-I

COURSE 1: FUNDAMENTALS OF COMMERCE

Theory	Credits: 4	4 hrs/week

Learning Objectives:
The objective of this paper is to help students to acquire conceptual knowledge of the Commerce, Economy and Role of Commerce in Economic Development. To acquire Knowledge on Accounting and Taxation.

Learning Outcomes:
At the end of the course, the student will able to
Identify the role commerce in Economic Development and Societal Development. Equip with the knowledge of imports and exports and Balance of Payments. Develop the skill of accounting and accounting principles. They acquire knowledge on micro and micro economics and factors determine demand and supply. An idea of Indian Tax system and various taxes levied on in India. They will acquire skills on web design and digital marketing.

Unit 1: Introduction: Definition of Commerce – Role of Commerce in Economic Development - Role Commerce in Societal Development. Imports and Exports, Balance of Payments. World Trade Organization.

Unit 2: Economic Theory: Macro Economics – Meaning, Definition, Measurements of National Income, Concepts of National Income. Micro Economics – Demand and Supply. Elasticity of Demand and Supply. Classification of Markets -Perfect Competition – Characteristics – Equilibrium Price, Marginal Utility.
.
Unit 3: Accounting Principles: Meaning and Objectives Accounting, Accounting Cycle - Branches of Accounting - Financial Accounting, Cost Accounting, Management Accounting. Concepts and Conventions of Accounting – GAAP.

Unit 4: Taxation: Meaning of Tax, Taxation - Types of Tax- Income Tax, Corporate Taxation, GST, Customs & Exercise. Differences between Direct and Indirect Tax – Objectives of Tax- Concerned authorities – Central Board of Direct Taxes (CBDT) and Central Board of Excise and Customs (CBIC).

Unit 5: Computer Essentials: Web Design - Word Press Basics, Developing a Simple Website. Digital Marketing - Social Media Marketing, Content Marketing, Search Engine Optimization (SEO), E-mail Marketing. Data Analytics- Prediction of customer behavior, customized suggestions.

Lab Exercise:

- Build a sample website to display product information.
- Provide wide publicity for your product over social media and e-mail
- Estimate the customer behavior and provide necessary suggestions regarding the products of his interest.

Activities:

- Assignment on GAAP.
- Group Activates on Problem solving.
- Collect date and report the role of Commerce in Economic Development.
- Analyze the demand and supply of a product and make a scheduled based on your analysis, problems on elasticity of demand.
- Identify the Tax and distinguish between Direct Tax and Indirect Tax.
- Assignments and students seminars on Demand function and demand curves
- Quiz Programs
- Assignment on different types of taxes which generate revenue to the Government of India.
- Invited lectures on GST and Taxation system
- Problem Solving Exercises on current economy situation.
- Co-operative learning on Accounting Principles.
- Group Discussions on problems relating to topics covered by syllabus
- Examinations (Scheduled and surprise tests)
- Any similar activities with imaginative thinking beyond the prescribed syllabus

Reference Books:

1. S.P. Jain & K.L Narang, Accountancy - I Kalyani Publishers.
2. R.L. Gupta & V.K. Gupta, Principles and Practice of Accounting, Sultan Chand
3. Business Economics -S.Sankaran, Margham Publications, Chennai.
4. Business Economics - Kalyani Publications.
5. Dr. Vinod K. Singhania: Direct Taxes – Law and Practice, Taxmann Publications.
6. Dr. Mehrotra and Dr. Goyal: Direct Taxes – Law and Practice, SahityaBhavan Publications
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SEMESTER-I

COURSE 2: BUSINESS ORGANIZATION

Theory	Credits: 4	4 hrs/week

Learning Objectives:
The course aims to acquire conceptual knowledge of business, formation various business organizations. To provide the knowledge on deciding plant location, plan layout and business combinations.

Learning outcomes:
After completing this course a student will have:
Ability to understand the concept of Business Organization along with the basic laws and norms of Business Organization. The ability to understand the terminologies associated with the field of Business Organization along with their relevance and to identify the appropriate types and functioning of Business Organization for solving different problems. The application of Business Organization principles to solve business and industry related problems and to understand the concept of Sole Proprietorship, Partnership and Joint Stock Company etc.

Unit 1: Business: Concept, Meaning, Features, Stages of development of business and importance of business. Classification of Business Activities. Meaning, Characteristics, Importance and Objectives of Business Organization.. Difference between Industry & Commerce and Business & Profession, Modern Business and their Characteristics.

Unit 2: Promotion of Business: Considerations in Establishing New Business. Qualities of a Successful Businessman. Forms of Business Organization - Sole Proprietorship, Partnership, Joint Stock Companies & Co-operatives and their Characteristics, relative merits and demerits, Difference between Private and Public Company, Concept of One Person Company.

Unit 3: Plant Location and Layout: Meaning, Importance, Factors affecting Plant Location. Plant Layout - Meaning, Objectives, Importance, Types of Layout. Factors affecting Layout. Size of Business Unit - Criteria for Measuring the Size and Factors affecting the Size. Optimum Size and factors determining the Optimum Size.

Unit 4: Business Combination: Meaning, Characteristics, Objectives, Causes, Forms and Kinds of Business Combination. Rationalization: Meaning, Characteristics, Objectives, Principles, Merits and demerits, Difference between Rationalization and Nationalization.

Unit 5: Computer Essentials: Milestones of Computer Evolution – Computer, Block diagram, generations of computer . Internet Basics - Internet, history, Internet Service Providers,

Types of Networks, IP, Domain Name Services, applications. Ethical and Social Implications - Network and security concepts- Information Assurance Fundamentals, Cryptography - Symmetric and Asymmetric, Malware, Firewalls, Fraud Techniques, privacy and data protection

Activities:

- Assignment on business organizations and modern business.
- Group Discussion on factors that influence plan location
- Seminars on different topics related to Business organization
- Case study could be given to present business plan of students choice.
- Identifying the attributes of network (Topology, service provider, IP address and bandwidth of your college network) and prepare a report covering network architecture.
- Identify the types of malwares and required firewalls to provide security.
- Latest Fraud techniques used by hackers.

Reference Books:

1. Gupta, C.B., "Business Organisation", Mayur Publiction, (2014).

2. Singh, B.P., Chhabra, T.N., "An Introduction to Business Organisation & Management", Kitab Mahal, (2014).

3. Sherlekar, S.A. &Sherlekar, V.S, "Modern Business Organization & Management Systems Approach Mumbai", Himalaya Publishing House, (2000).

4. Bhusan Y. K., "Business Organization", Sultan Chand & Sons.

5. Prakash, Jagdish, "Business Organistaton and Management", Kitab Mahal Publishers (Hindi and English)

6. Fundamentals of Computers by V. Raja Raman

7. Cyber Security Essentials by James Graham, Richard Howard, Ryan Olson

Course – I & II Model Paper (70 Marks)

SECTION A (Multiple Choice Questions)	*30 x 1 = 30 M*

30 Multiple Choice Questions (Each Unit 6 Questions)

SECTION B (Fill in the blanks)	*10 x 1 = 10 M*

10 Fill in the Blanks (Each Unit 2 Questions)

SECTION C (Very short answer questions)	*10 x 1 = 10 M*

10 Very short answer questions (Each Unit 2 Questions)

SECTION D (Matching) (From 5 Units)	*2 x 5 = 10 M*

1 *A*
  B
  C
  D
  E

2 *A*
  B
  C
  D
  E

SECTION E (True or False)	*10 x 1 = 10 M*

10 True or False (Each Unit 2 Questions)

SEMESTER-II
COURSE 3: OFFICE AUTOMATION TOOLS

Theory   Credits: 3   3 hrs/week

Course Objectives:

- ✓ To introduce theenvironment of GUI in Ms-Word and its features..
- ✓ To introduce the fundamental concepts using Ms-Word and its features to make it more useful.
- ✓ To provide hands-on use of Word, Excel and PowerPoint.

Course Outcomes:

The students will be able:

- ✓ To understand concept of Word Processor and use its features.
- ✓ To use the advanced features of Ms-Word to make day to day usage easier.
- ✓ To work comfortably with Ms-Excel Environment.
- ✓ To Create worksheets and use advanced features of Excel.
- ✓ To create presentations and inserting multimedia items in them.

Syllabus

UNIT–I : Introduction to Ms-Office &Ms-Word

MS-Word: Features of MS-Word, MS-Word Window components, working with formatted text, Shortcut keys, Formatting documents: Selecting text, Copying &moving data, Formatting characters, changing cases, Paragraph formatting, Indents, Drop Caps, Using format painter, Page formatting, Header &footer, Bullets & numbering, Tabs, Forming tables. Finding & replacing text, go to(F5) command, proofingtext (Spellcheck, Auto correct),

Case Study:

1. Create a document to write a letter to the DM&HO of the district complaining about Hygienic conditions in your area.
2. Create a document to share your experience of your recent vacation with family.

UNIT–II :Ms-Word Advanced Features

Difference between Wizard and Template - Customize the Quick Access Tool Bar – Macros: Purpose – Creating Macro – Using Macro – Storing Macro - Inserting pictures: From Computer, Online Pictures – Insert 3d Models - Insert Shapes – Insert Text Box – Insert Equation, Hyperlinks- Tables : Insert tables - Mail merge ,Printing documents, Tables : Insert tables, Mathematical calculations on tables data. Insert Text Box etc.

Case Study:
1. Create a document to send a holiday intimation to all the parents at time about Dasara Vacation.
2. Create a document to create Time Table of you class using tables.

UNIT–III: Introduction to Ms-Excel & Its Features

MS-Excel: Excel Features, Spread sheets, workbooks, creating, saving &editing a workbook, Renaming sheet, cell entries(numbers, labels, and formulas),spell check, find and replace, Adding and deleting rows and columns Filling series, fill with drag, data sort, Formatting worksheet, Functions and its types, Some useful Functions in excel(SUM,AVERAGE,COUNT, MAX,MIN, IF),

Case Study:
1. Create a worksheet with you class marks displaying total, average, top marks in the class and least marks in the class.
2. Create a Worksheet with employee no, name, job, salaries of 10 employees, calculate DA, TA,HRA ,Gross Salary and Net Salary.
   i. Find the sum of HRA's of Total employees.
   ii. Find the average DA
   iii. Display the Maximum salary of the employee.

UNIT-IV: Ms-Excel Advanced Features

Cell referencing (Relative, Absolute, Mixed), What-if analysis, Introduction to charts: types of charts, creation of charts, printing a chart, printing worksheet – Sort – Filters – View Menu- Goal Seek –Scenarios.
Case Study:
1. Prepare a chart with height and weights of you class mates in at least 3 types of charts.
2. Demonstrate the use of Filter with the attendance data of your class.

UNIT-V: Ms-PowerPoint and its Applications

MS-PowerPoint: Features of Power Point, Uses, components of slide, templates and wizards, using template, choosing an auto layout, using outlines, adding subheadings, editing text, formatting text, using master slide, adding slides, changing color scheme, changing background and shading, adding header and footer, adding clip arts and auto shapes. Various presentation, Working with slide sorter view (deleting, duplicating, rearranging slides), adding transition and animations to slide show, inserting music or sound on a slide, viewing slideshow, Printing slides.

Case Study:
1. Prepare a presentation with your achievements and experiences in College.
2. Create a Presentation of your organization with pictures, clip arts and animations

Text Books:
1. Computer Fundamentals–Pradeep. K.Sinha: BPB Publications.
2. Fundamentals of Computers –Reema Thareja, Oxford University Press India

SEMESTER-II
COURSE 3: OFFICE AUTOMATION TOOLS

Practical   Credits: 1   2 hrs/week

List of Experiments

1. Design a visiting card for managing director of a company as per the following specification.
   o Sizeofvisitingcardis3½×2
   o Name of the company with big font
   o Phone number, Fax number and E-mail address with appropriate symbols.
   o Office and Residence addresses separated by new line

2. Create a table with following columns and display the result in separate cells for the following
   o Emp Name, Basic pay, DA, HRA, Total salary.
   o Sort all the employees in ascending order with the name as the key
   o Calculate the total salary of the employee
   o Calculate the Grand total salary of the employee
   o Find highest salary and
   o Find lowest salary

3) Prepare an advertisement to company requiring software professional with the following
   o Attractive page border
   o Design the name of the company using WordArt
   o Use at least one clipart.
   o Give details of the company(use bullets etc.)
   o Give details of the Vacancies in each category of employee's(Business manager, Software engineers, System administrators, Programmers, Data entry operators) qualification required.

4) Create a letter head of a company with the following specifications
   o Name of the company on the top of the page 2 with big font and good style
   o Phone no, Faxno and E-mail address with symbols.
   o Main products manufactured by the company
   o Slogans if any should be specified in bold at the bottom

5) Create two pages of curriculum vitae of a graduate with the following specifications
   o Table to show qualifications with proper headings
   o Appropriate left and right margins
   o Format ½pageusingtwo-columnapproachabout yourself
   o Name on each page at the top right side
   o Page no. in the footer on the right side.

6) Write a macro format document as below
   o Line spacing"2"(double)
   • Paragraphindentof0.1
   • Justification formatting style
   • Arial font andBoldof14pt-size

7) Create a letter as the main document and create 10 records for the 10 persons Use mail merge to create letter for selected persons among 10.

8) Create an electronic spread sheet in which you enter the following decimal numbers and convert the number to octal, Hexadecimal and binary numbers and vice-versa.

DecimalNumbers:35,68,95,78,165,225,355,375,465
BinaryNumbers:101,1101,11101,11111,10001,11101111

9) Calculate the net pay of the employees following the conditions below.

	A	B	C	D	E	F	G	H	I
1	Employee Number	Employee Name	Basic pay	DA	HRA	GPF	Gross Pay	Income tax	Net pay
2									

➢ DA:- 16% of the basic pay if Basic pay is greater than 20000 or else 44%.
➢ HRA:- 15 % of the Basic pay subject to maximum of Rs.4000.
➢ GPF: -10% of the basic pay.
➢ INCOMETAX:-10% of basic If Basic pay is greater than20000.
➢ Find who is getting highest salary & who is get lowest salary?

10) The ABC Company shows the sales of different product For5years.CreateBARGraph, 3D and Pie chart for the following.

A	B	C	D	E	F
S.No.	Year	Pro1	Pro2	Pro3	Pro4
1	1989	1000	800	900	1000
2	1990	800	80	500	900
3	1991	1200	190	400	800
4	1992	400	200	300	1000
5	1993	1800	400	400	1200

11) Create a suitable examination database and find the sum of the marks(total) of each student and respective, class secured by the student.
✓ Pass – if marks in each subject >= 35
✓ Distinction- if average >= 75
✓ First class - if average >=60 but <75
✓ Second class – if average >=50 but l<60
✓ Third class – if average >=35 but <50
✓ Fail: if marks in any subject <35

12) Enter the following data in to the sheet.

Name	Department	Salary
Anusha	Accounts	12000
Rani	Engineering	24000
Lakshmi	Accounts	9000
Purnima	Marketing	20000
Bindu	Accounts	4500
Tejaswi	Accounts	11000

Swetha	Engineering	15000
Saroja	Marketing	45000
Sunitha	Accounts	5600
Sandhya	Engineering	24000
Harika	Marketing	8000

➢ Extract records for department in Accounts and Salary>10000
➢ Sort the data by salary with the department using "sort commands".
➢ Calculate total salary for each department using Subtotals

13) Enter the following data into the sheet.

	Raju	Rani	Mark	Rosy	Ismail	Reshma
English	76	89	43	51	76	87
2ndLang	55	85	78	61	47	33
Maths	65	82	34	58	52	65
Computers	45	91	56	72	49	56
Human Values	51	84	54	64	32	64

Apply the conditional formatting for marks

- 35 below   Red
- 35 to 50   Blue
- 51 to 70   Green
- 71 to 100   Yellow

14) Create a presentation using templates.
15) Create a Custom layout or Slide Master for professional presentation.
16) Create a presentation with slide transitions and animation effects.
17) Create a table in PPT and apply graphical representation

SEMESTER-II
COURSE 4: PROGRAMMING IN C

Theory	Credits: 3	3 hrs/week

Course Objectives:

➢ Provides knowledge on Algorithms, Flow chart and basic programming language.
➢ Provides complete knowledge of C language.
➢ Helps to develop logics which will help them to create program and applications in C.
➢ Learning the basic programming constructs, they can easily switch over to any other language in future.

Course Outcomes:

Upon successful completion of this course, students will be able to-
➢ Understand the basic terminology used in computer programming.
➢ Write, compile and debug programs in C language.
➢ Use different data types in a computer program.
➢ Design programs involving decision structures, loops and functions.
➢ Understand the dynamics of memory by the use of pointers and Structures.
➢ Apply different operations in File handling.

Syllabus

UNIT - I:
Introduction to Algorithms and Programming Languages: Algorithm - Key features of Algorithms - examples of Algorithms, Flow Charts– Pseudo code, Programming Languages – Generation of Programming Languages – Structured Programming Language.
Introduction to C: Introduction – Structure of C Program, Writing the first C Program, File used in C Program – Compiling and Executing C Programs, Using Comments – Keywords – Identifiers, Basic Data Types in C, Variables – Constants, I/O Statements in C, Operators in C, Programming Examples, Type Conversion and Type Casting.
Case Study:
Enter any alphabet and display whether it is vowel or a consonant.

UNIT - II:
Control Structures and Functions: Decision Control and Looping Statements: Introduction to Decision Control Statements, Conditional Branching Statements, Iterative Statements, Nested Loops, Break and Continue Statement – Go to Statement. Functions: Introduction, Using functions – Function declaration/ prototype – Function definition, Function call – Return statement – Passing parameters, Scope of variables, Storage Classes, Recursive functions.

Case Study:
Print first 10 natural numbers. (using while, do-wile, for loop, break, continue.)

UNIT - III:
Arrays: Introduction, Declaration of Arrays, accessing elements of the Array – Storing Values in Array, Calculating the length of the Array, Operations that can be performed on Array, Passing one dimensional array to function.
Two dimensional Arrays, accessing two dimensional arrays, Passing two dimensional arrays to functions.
Strings: Introduction, String Operations using String functions.
Case Study:
Searching an element in an array.
Disadvantages of an array.

UNIT - IV:
Pointers, Structures and Unions: Pointers: Understanding Computer Memory – Introduction to Pointers, Declaring Pointer Variable, Pointer Expressions and Pointer Arithmetic – Null Pointers, Passing Arguments to Functions using Pointer, Pointer and Arrays – Passing Array to Function, Memory Allocation in C Programs, Memory Usage – Dynamic Memory Allocation, Drawbacks of Pointers. Structures: Introduction to structures, Nested Structures. Union, and Enumerated Data Types: Introduction to Union – accessing union elements, Enumerated Data Types.

Case Study:
Difference between Arrays, structures & unions

UNIT – V:
File Handling: Files: Introduction to Files, Using Files in C, Reading Data from Files, Writing Data from Files, Detecting the End-of-file, Error Handling during File Operations.

Case Study:
Write a program to read a text file, convert all the lowercase characters into upper case and rewrite the uppercase characters in the file.

PRESCRIBED TEXT BOOKS:
Computer Fundamentals and Programming in C by REEMA THAREJA from OXFORD UNIVERSITY PRESS

REFERENCE BOOKS:
1. E Balagurusamy, COMPUTING FUNDAMENTALS & C PROGRAMMING – Tata McGraw-Hill, Second Reprint 2008, ISBN 978-0-07-066909-3.
2. Ashok N Kamthane: Programming with ANSI and Turbo C, Pearson Edition Publ, 2002.
3. Henry Mullish&HuubertL.Cooper: The Sprit of C, Jaico Pub, House,1996.
4. Teach your C Skills-Kanithker

SEMESTER-II
COURSE 4: PROGRAMMING IN C

Practical   Credits: 1   2 hrs/week

List of Experiments

1. Write a C program to calculate the expression: ((a*b)/c)+(a+b-c) .
2. Write a C program to calculate (a+b+c)3.
3. Write a C program to check whether the given number is Prime or Not.
4. Write a C program to find the sum of individual digits of a given number .
5. Program to convert Hours into seconds.
6. Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.
7. Write a program to check whether the given number is Palindrome or Not.
8. Write a C program to check whether a given 3-digit number is an Armstrong number or not.
9. Write a C program to print the numbers in triangular form.

                    1
                    1 2
                    1 2 3
                    1 2 3 4

10. Program to display the number of daysa in given month using Switch – Case.
11. Write a C program to perform the following:
    I. Addition of two matrices.
    II. Multiplication of two matrices.
12. Write a C program to determine if the given string is a palindrome or not.
13. Write C program to find the factorial of a given integer using a recursive function.
14. Write a C program to concatenate two strings using pointers.
15. Write a C program to find the length of a string using pointers.
16. Program to display Student Details using Structures.
17. Write a C program to
    I. Write data into a File.   II. Read data from a File.

Single Major
Model Question Paper
SEMESTER-II
B.C.A. Computer Applications

Paper: IV OFFICE AUTOMATION TOOLS

Time:3hrs   *MAX MARKS: 70 M*

SECTION – A

Answer any 5 questions. Each question carries 4 marks   (5 X 4 = 20M)

1. Explain Finding & replacing text in MS-Word.

2. Explain how to insert pictures from Computer in MS-Word.

3. Explain how to insert and delete rows in Excel.

4. Explain about sorting and filtering in MS-Excel.

5. Explain various features of Power Point.

6. Explain how to insert header and footer in MS-Word.

7. Explain how to insert tables in MS-Word.

8. Explain various features of MS-Excel.

SECTION – B

Answer all the questions. Each question carries 10 marks.   (5 X 10 = 50M)

9. Explain MS-Word window components with neat diagram.
(OR)
Explain about formatting document in MS-Word.

10. Explain how to insert text box, hyperlinks and shapes in MS-Word.
(OR)
Explain about Mail Merge in MS-Word.

11. Explain various statistical functions used in MS-Excel.
(OR)
Explain how to Create, Save, and Edit a workbook in MS-Excel.

12. What is chart? Explain different types of charts available in Excel.
(OR)
Explain Relative, Absolute and Mixed Cell referencing MS-Excel.

13. Explain Components of slide.
(OR)
Explain adding transition and animations to slide show.

Single Major
Model Question Paper
SEMESTER-II
B.C.A. Computer Applications

Paper: IV PROGRAMMING IN C

Time:3hrs   *MAX MARKS: 70 M*

SECTION – A

Answer any 5 questions. Each question carries 4 marks   **(5 X 4 = 20M)**

1. Define Algorithm and List out various features of algorithm.

2. Demonstrate break and continue statements.

3. Write a program to calculate length of an array.

4. Explain differences between Structure and Union.

5. Explain how to detect end of the file in C programming.

6. What is variable? What are the rules to construct variable?

7. What is Recursion? Demonstrate with an example.

8. Define string. How string is declared and initialized?

SECTION – B

Answer all the questions. Each question carries 10 marks.   **(5 X 10 = 50M)**

9. What is an operator? List and explain various types of operators
   (OR)
   What are basic data types available in 'C'? Write the significance of each data
   Type with example.

10. Explain various Decision making statements supported by 'C' language with example.
    (OR)
    Explain different loops used in 'C' with syntax.

11. Define array. Explain with suitable example how to declare and initialize 1D array**.**
    (OR)
    Define a string. Explain String Operations using String functions.

12. Explain dynamic memory allocation functions with example.
    (OR)
    What is structure? Write a C program to store and print name, USN, subject and
    IA marks of students using structure

13. Explain Error Handling during File Operations.
    (OR)
    Explain reading and writing data into file in C programming.

SEMESTER-III
COURSE 5: DATABASE MANAGEMENT SYSTEM

Theory	Credits: 3	3 hrs/week

Course Objectives:

- Graduates will have the expertise in analyzing real time problems and providing appropriate solutions related to Computer Science & Engineering.
- Graduates will have the knowledge of   fundamental principles and innovative technologies to succeed in higher studies and research.
- Graduates will continue to learn and to adapt technology developments combined with deep awareness of ethical responsibilities in profession.

Course Outcomes:

- An ability to apply Knowledge of computing and mathematics in Computer Science & Engineering.
- An ability to analyze a problem, identify and define the computing requirements appropriate to its solution.
- An ability to design, implement and evaluate a computer-based system to meet desired needs with appropriate societal considerations.
- An ability to conduct investigations, interpret data and provide conclusions in investigating complex problems related to Computer Science & Engineering.
- An ability to engage in continuing professional development and life-long learning.

UNIT- I

Overview of Database Systems: Introduction: Database system, Characteristics (Database Vs File System), Database Users, Advantages of Database systems, Database applications.

Data Models: Introduction; types of data models, Concepts of Schema, Instance and data independence; Three tier schema architecture for data independence; Database system structure, environment, Centralized and Client Server architecture for the database.

Case Study:
1. Describe the differences between Database systems and File based systems
2. Study about database models and their advantages and dis-advantages

UNIT- II

Relational Model: Introduction to relational model, Codd's rules, concepts of domain, attribute, tuple, relation, constraints (Domain, Key constraints, integrity constraints) and their importance , concept of keys (super key, candidate key, primary key, surrogate key, foreign key) , relational Algebra & relational calculus.

Normalization: Purpose of Normalization or schema refinement, concept of functional dependency, normal forms based on functional dependency(1NF, 2NF and 3 NF), Boyce-codd normal form(BCNF)

Case Study:
Describe Relational model and normalization for database design

UNIT - III:

Entity Relationship Model: Introduction, Representation of entities, attributes, entity set, relationship, relationship set, constraints, sub classes, super class, inheritance, specialization, generalization using ER Diagrams,

BASIC SQL: Database schema, data types, DDL operations (create, alter, drop, rename), DML operations (insert, delete, update), basic SQL querying (select and project) using where clause, arithmetic & logical operations, aggregation, grouping, ordering.

Case Study:
1. Examine issues in data storage and query processing using SQL.
2. Create, maintain and manipulate a relational database using SQL

UNIT - IV

SQL: Nested queries/ sub queries, implementation of different types of joins, SQL functions(Date, Numeric, String, Conversion functions), Creating tables with relationship, implementation of key and integrity constraints, views, relational set operations , Transaction Control Language: commit, Rollback, Savepoint , DCL :Grant, Revoke

Case Study:
1. Try to convert some sample data to information and show how it can you be used in decision making.

UNIT –V

PL/SQL: Introduction , Structure , Control Structures , Cursors , Procedure , Function , Packages , Exception Handling ,Triggers.

Transaction processing Concepts : Transaction State, Implementation of Atomicity and Durability, Concurrent Executions, Serializability, Recoverability, Implementation of Isolation, Testing for Serializability, Failure Classification, Storage, Recovery and Atomicity, Recovery algorithm.

Case Study:
Outline the role and issues in Transaction management of data such as efficiency, privacy, security.
Database management systems Text Books

- Database Management Systems, 3rd Edition , Raghurama Krishnan, Johannes Gehrke, TMH
- Database System Concepts,5th Edition , Silberschatz, Korth, TMH

SEMESTER-III
COURSE 5: DATABASE MANAGEMENT SYSTEM

Practical   Credits: 1   2 hrs/week

List of Experiments

SQL :

Cycle-I: Aim: Marketing company wishes to computerize their operations by using following tables.

Table Name: Client- Master
Description: Used to store client information

Column Name	Data Type	Size	Attribute
CLIENT_NO	Varchar2	6	Primarykey
NAME	Varchar2	20	Not null
ADDRESS1	Varchar2	30	
ADDRESSS	Varchar2	30	
CITY	Varchar2	15	
PINCODE	Varchar2	8	
STATE	Varchar2	15	
BAL_DUE	Number	10,2	

Table Name: Product_Master
Description: Used to store product information

ColumnName	Data Type	Size	Attribute
PRODUCT_NO	Varchar2	6	Primarykey
DESCRIPTION	Varchar2	15	Not null
PROFIT _PERCENT	Number	4,2	Not null
UNIT_MEASUE	Varchar2	10	
QTY_ON_ HAND	Number	8	
REORDER_LVL	Number	8	
SELL_PRICE	Number	8,2	Not null, cannot be 0
COST _PRICE	Number	8,2	Not null,cannot be 0

Table Name: Salesman_master
Description: Used to store salesman information working for the company.

ColumnName	Data Type	Size	Attribute
SALESMAN_NO	Varchar2	6	Primary key
SALESMAN_NAME	Varchar2	20	Not null
ADDRESS1	Varchar2	30	
ADDRESS2	Varchar2	30	
CITY	Varchar2	20	
PINCODE	Number	8	
STATE	Vachar2	20	
SAL_AMT	Number	8,2	Not null, cannotbe0
TGT_TO_GET	Number	6,2	Not null, cannotbe0
YTD_SALES	Number	6,2	Not null
REMARKS	Varchar2	20	

Table Name: SALES-
ORDER Description:Used to
store client's orders

ColumnName	Data Type	Size	Attribute
ORDER_NO	Varchar2	6	Primarykey
CLIENT_NO	Varchar2	6	ForeignKey
ORDER _DATE	Date		
DELY_ADDRESS	Varchar2	25	
SALESMAN_NO	Varchar2	6	ForeignKey
DELY_TYPE	Char	1	Delivery:part(p)/full(f)anddefault'F'
BILL_YN	Char	1	
DELY_DATE	Date		Can'tbe lessthanorderdate
ORDER _STATUS	Varchar2	10	Values("InProcess","Fulfilled", "Back Order", "Cancelled.

Table Name: SALES_ORDER_DETAILS
Description:Used to store client's order with details of each product ordered.

ColumnName	Data Type	Size	Attribute
ORDER_NO	Varchar2	6	Primary key references SALES_ORDER table
PRODUCT_NO	Varchar2	6	Foreign Key references SALES_ORDER_table
QTY_ ORDERED	Number	8	
QTY_ DISP	Number	8	
PRODUCT_RATE	Number	10,2	Foreign Key

Solve the following queries by using above tables.
1. Retrieve the list of names, city and the state of all the clients.
2. List all the clients who are located in 'Mumbai' or 'Bangalore'.
3. List the various products available from the product_master table.
4. Find the names of salesman who have a salary equal to Rs.3000.
5. List the names o fall clients having 'a' as the second letter in their names.
6. List all clients whose Baldue is greater than value 1000.
7. List the clients who stay in a city whose first letter is 'M'.
8. List all information from sales-order table for orders placed in the month of July.
9. List the products whose selling price is greater than 1000 and less than or equal to 3000.
10. Find the products whose selling price is greater than 1000 and also find the new selling price as original selling price 0.50.

Cycle-II Supplier

Aim: A manufacturing company deals with various parts and various suppliers supply these parts. It consists of three tables to record its entire information. Those are as follows.

Supplier (Supplier_No, Sname, City, status) Part(Part_no, pname, color, weight, city, cost)
Shipment (supplier_No, Part_no, city) JX(project_no, project_name, city)
SPJX(Supplier_no, part_no, project_no,city)

1. Get supplier numbers and status for suppliers in Chennai with status>20.
2. Get project names for projects supplied by supplier 'S'.
3. Get colors of parts supplied by supplier S,.
4. Get part numbers for parts supplied to any project in Mumbai.
5. Find the id's of suppliers who supply a red or pink parts.

Cycle–III EmployeeDatabase

Aim: An enterprise wishes to maintain a database to automate its operations. Enterprise divided into a certain departments and each department consists of employees. The following two tables describes the automation schemas.

Emp(Empno, Ename, Job, Mgr, Hiredate, Sal, Comm, Deptno)
Dept(Deptno, Dname, Loc)

1. List the details of employees who have joined before the end of September '81.
2. List the name of the employee and designation of the employee, who does not report to anybody.
3. List the name,salary and PF amount of all the employees(PF is calculated as10%of salary)
4. List the names of employees who are more than 2 years old in the organization.
5. Determine the number of employees, who are taking commission.
6. Update the employee salary by 20%,whose experience is greater than 12 years.
7. Determine the department does not contain any employees.
8. Create a view, which contains employee name and their manager names working in sales department.
9. Determine the employees, whose total salary is like the minimum salary of any department.
10. List the department numbers and number of employees in each department.

PL/SQL PROGRAMS

1. Writea PL/SQL program to check the given string is palindrome o rnot.
2. The HRD manager has decide to raise the employee salary by 15% write a PL/SQL block to accept the employee number and update the salary of that employee. Display appropriate message based on the existence of the record in Emp table.
3. Write a PL/SQL program to display top 10rows in Emp table based on their job and salary.
4. Write a PL/SQL program to raise the employee salary by 10% for department number 30 people and also maintain the raised details in the raise table.
5. Create a procedure to update the salaries of Employees by 20%, for those who are not getting commission
6. Write a PL/SQL procedure to prepare an electricity bill by using following table. Table used: Elect

Name	Null?	Type
MNNO	NOT NULL	NUMBER(3)
CNAME		VARCHAR2(20)
CUR_READ		NUMBER(5)
PREV_READ		NUMBER(5)
NO_ UNITS		NUMBER(5)
AMOUNT		NUMBER(8,2)
SER_TAX		NUMBER(8,2)
NET_AMT		NUMBER(9,2)

7. Create a trigger to avoid any transactions(insert, update, delete) on EMP table on Saturday & Sunday.

SEMESTER-III
COURSE 6: DATA STRUCTURES

Theory	Credits: 3	3 hrs/week

Course Objectives:

- The objective of the course is to make a student to implement data structures and organize and manage data, based on data structures for efficient access.

Course Outcomes:

- Identify data structures suitable to solve any specific problem.
- Identifying various data structures and their real-time applications
- Identifying the use of Time and Space Complexity.
- Implementing different sorting & searching techniques.

Syllabus

Unit-I

Introduction and Overview- Elementary Data Organization, Data Structures classification, Data Structure Operations, Algorithms: Complexity, Time-Space Tradeoff.

Preliminaries-Mathematical Notation and Functions, Algorithmic Notation, Control Structures used in algorithms, Complexity of Algorithms. Other Asymptotic Notations, Sub algorithms, Variables, Data Types.

Case Study:
1. Calculate the space complexity of a given code

```
int tot (int a, int b)
{
        int c;
        c = a + b;
        return c;
}
```

Unit-II

Arrays, Records and Pointers – Linear Arrays, Representation and Traversing Linear Arrays, Inserting and Deleting. Passing an array to function, Pointer & Arrays Multidimensional Arrays, Sparse Matrices.

Case Study:
1. Application of arrays in the real world

Unit- III

Linked Lists – Representation, Dynamic Memory Allocation, Traversing, Searching, Insertion, Deletion, Header Linked Lists, Two-Way Lists

Stacks- Stacks, Operations on stacks, Array representation of stacks, Linked List representation of stacks, Arithmetic Expressions, Polish notation, Recursion.

Case Study:
1. Linked list verses Arrays.
2. Towers of Hanoi.

Unit- IV

Queues, Linked representation of Queues, Deques, Priority Queues.

Sorting - Insertion Sort, Bubble Sort, Selection sort, Quick Sort, Merge sort, Heap Sort, Searching – Linear Search, Binary Search.

Case Study:
1. Application of Queues.
2. Comparison of sorting algorithms.

Unit- V

Trees- Binary trees, Representing and traversing binary trees, Traversal algorithms using stacks.
Binary Search Trees, Searching, Insertion and Deletion in Binary Search Trees,

Graphs- Terminology, Sequential representation of Graphs, Linked representation of Graphs, Operations on Graphs, Traversing a Graph.

Case Study:
1. Applications of Binary Tree.
2. Warshall's Algorithm.

Text books:

1. Data Structures by Seymour Lipschutz, McGraw Hill(Schaum's Outlines).
2. Data Structures using C , Second edition , Dr. Reema Thareja, Oxford University Press.

REFERENCE BOOKS:

1. Data Structures & Algorithms Using C, Khanna Publishers
2. Theory and Problems of Data Structures by Seymour Lipschutz, McGraw Hill (Schaum's Outlines)
3. Data Structures & Algorithms in C by M.A.Weiss, Addison Wisley.
4. Data Structures Using C, Reema Thareja, oxford.

SEMESTER-III
COURSE 6: DATA STRUCTURES

Practical	Credits: 1	2 hrs/week

List of Lab Experiments

1. Write a C program to Implement matrix multiplication.

2. Write a C program to Implement stack using arrays.

3. Write a C program to Implement queue using arrays.

4. Write a C program to Implement circular queue using arrays.

5. Write a C program to Implement dequeue using arrays.

6. Write a C program to Implement single linked list using the methods create(), insert(), search(), delete() and display().

7. Write a C program to Implement double linked list.

8. Write a C program to Implement stack using linked list.

9. Write a C program to Implement queue using linked list.

10. Give a solution to towers of Hanoi using C program.

11. Write a C program to Implement bubble sort.

12. Write a C program to Implement selection sort.

13. Write a C program to Implement insertion sort.

14. Write a C program to Implement merge sort.

15. Write a C program to Implement quick sort.

SEMESTER-III
COURSE 7: OBJECT ORIENTED PROGRAMMING THROUGH JAVA

Theory	Credits: 3	3 hrs/week

Course Objectives:

To make the students understand the fundamentals of Java programming.

➢ To expose the students to Window based applications using AWT

➢ To make the students to design appropriate Exception Handling in Java

➢ To make the students to understand the concepts of Threads Files and

➢ I/O Streams, Applets Networking in java.

Course Outcomes:

The student would become competent enough to write, debug, and document well-structured

java applications

➢ Demonstrate good object-oriented programming skills in Java

➢ Able to describe recognize, apply, and implement selected design patterns in Java

➢ Understand the capabilities and limitations of Java

➢ Be familiar with common errors in Java and its associated libraries

➢ Develop excellent debugging skills

UNIT - I
Introduction to OOPS: Paradigms of Programming Languages – Basic concepts of Object Oriented Programming – Differences between Procedure Oriented Programming and Object Oriented programming - Benefits of OOPs – Application of OOPs. Java: History – Java features – Java Environment – JDK – API. Introduction to Java: Creating and Executing a Java program – Java Tokens- Java Virtual Machine (JVM) – Command Line Arguments –Comments in Java program. Elements: Constants – Variables – Data types - Scope of variables – Type casting – Operators: Special operators – Expressions – Evaluation of Expressions.

Case Study:
   1. Study the evolution of JAVA, why it was developed, and how it changed the software industry scenario.

UNIT - II
Control Structures: The if Statement, Nested ifs, The if-else-if Ladder and, Looping Statements: The while Loop, The do-while Loop, for loop and its variations and Nested Loops. Jumping Statements: Break, continue Statement.

Class and objects: Defining a class – Methods – Creating objects – Accessing class members – Constructors – Parameterized Constructors, Adding a Constructor. Arrays: One Dimensional Array – Creating an array – Array
processing – Multidimensional.

Case Study:
1. Study the difference between the looping structured in JAVA And Programming in C.
2. Study the limitation of Constructors in JAVA.

UNIT - III

Inheritance: Defining inheritance –types of inheritance– Method overloading – Static members – Nesting of Methods – this keyword - Overriding methods – Final variables and methods – Final classes – Final methods - Abstract methods and classes – Visibility Control.

Interfaces: Defining interface – Extending interface - Implementing Interface - Accessing interface variables. Strings: Constructing Strings, Operating on Strings, Arrays of Strings

Case Study:
1. Study the inheritance types available in JAVA and try to identify the limitations.

UNIT – IV

Packages: Java API Packages – Defining a Package, System Packages – Naming Conventions – Creating & Package Member Access – Adding Class to a Package.
Multithreading: Creating Threads – Life of a Thread – Defining & Running Thread – Thread Methods – Thread Priority – Synchronization –Implementing Runnable interface – Thread Scheduling.

Case Study:
1. Study the advantages of Package compared to Libraries in Procedural languages.

UNIT – V

Exception Handling: Limitations of Error handling – Advantages of Exception Handling - Types of Errors – Basics of Exception Handling - Syntax of Exception Handling Code, Multiple Catch Statements, Using finally Statement, Throwing Our Own Exceptions

Applets: Introduction, Java applications versus Java Applets, Applet Life-cycle, Working with Applets, The HTML Applet Tag.

Case Study:
1. Study and present the limitation of Applets in Web application development.

TEXT BOOKS:
1. **Object Oriented Programming through Java,** Universities Press, by P. Radha Krishna.
2. E. Balagurusamy, "*Programming with Java*", TataMc-Graw Hill, 5th Edition.

REFERENCES:
1. Herbert Schildt, "The complete reference Java", TataMc-Graw Hill, 7th Edition.

SEMESTER-III
COURSE 7: OBJECT ORIENTED PROGRAMMING THROUGH JAVA

Practical   Credits: 1   2 hrs/week

List of Lab Experiments

1   Write a program to print Biggest of 3 Numbers using Logical Operators.
2   Write a program to Test the Prime number.
3   Write a program to create a Simple class to find out the Area and perimeter of rectangle and box using super and this keyword.
4   Write a program to design a class account using the inheritance and static that show all function of bank(withdrawal, deposit).
5   Write a program to design a class using abstract methods and classes.
6   Write a program to design a string class that perform string method (equal, reverse the string, change case).
7   Write a program to handle the exception using try and multiple catch block.
8   Write a program that import the user define package and access the member variable of classes that contained by package.
9   Write a program that show the implementation of interface.
10 Write a program to create a thread that implement the runable interface.
11 Write a program to draw the line, rectangle, oval, text using the graphics method.
12 Write a program to create menu using the frame.
13 Write a program to create dialog box.
14 Write a program to implement the flow layout and border layout.
15 Write a program to create Frame that display the student information.

SEMESTER-III
COURSE 8: SOFTWARE ENGINEERING

| Theory | Credits: 3 | 3 hrs/week |

Course Objectives: The Objective of the course is to assist the student in understanding the basic theory of software engineering, and to apply these basic theoretical principles to a group software development project.

Course Outcomes
1. Ability to gather and specify requirements of the software projects.
2. Ability to analyze software requirements with existing tools
3. Able to differentiate different testing methodologies
4. Able to understand and apply the basic project management practices in real life projects
5. Ability to work in a team as well as independently on software projects

Syllabus

UNIT I
Introduction to Software Engineering: Definitions - Size Factors - Quality and Productivity Factors – Managerial Issues.
Planning a software project: Defining the problem - Developing a Solution Strategy - Planning the Development Process - Planning an Organization structure - Other Planning Activities.

UNIT – II
Software Cost Estimation: Software cost factors - Software Cost.
Estimation Techniques – Staffing level Estimation- Estimating Software Maintenance Costs - The Software Requirements, Specification - Formal Specification Techniques - Languages and Processors for Requirements Specification.

UNIT – III
Software design: Fundamental Design Concepts - Modules and Modularization Criteria – Design Notations -Design Techniques - Detailed Design Considerations.
Real-Time and Distributed System Design - Test Plans - Milestones, walkthroughs, and Inspections.

UNIT IV
User interface design and real time systems: User interface design - Human factors - Human computer interaction - Human - Computer Interface design - Interface design - Interface standards.

UNIT V
Software quality and testing: Software Quality Assurance - Quality metrics - Software Reliability - Software testing - Path testing – Control Structures testing - Black Box testing - Integration, Validation and system testing - Reverse Engineering and Reengineering.
CASE Tools: Projects management, tools - analysis and design tools – programming tools - integration and testing tool - Case studies.

REFERENCE BOOKS:
1. R.Fairley, Software Engineering Concepts, Tata McGraw-Hill, 1997.
2. R.S. Pressman, Software Engineering, Fourth Ed., McGraw Hill, 1997.
3. Software Engineering, H. Sommervill Ian , Addition Wesley Pub. Co.
4. Software Engineering: An object Oriented Perspective by Braude, E.J., Willey, 2001

Student Activity:
1. Visit any financial organization nearby and prepare requirement analysis report
2. Visit any industrial organization and prepare risk chart

SEMESTER-III
COURSE 8: SOFTWARE ENGINEERING

Practical   Credits: 1   2 hrs/week

(Using Object Oriented Analysis and Design (OOAD))

Case Studies:
1. Student Marks Analysis System
2. E-Commerce Management System
3. Inventory Control System
4. Food Delivery Management system
5. Logistics Management System

Choose any two of above case studies and do the following exercises for that Case Study
1. Write the complete problem statement
2. Write the software requirements specification document
3. Draw the entity relationship diagram
4. Draw the data flow diagrams
5. Draw use case diagrams
6. Draw activity diagrams for all use cases
7. Draw sequence diagrams for all use cases
8. Draw collaboration diagram
9. Assign objects in sequence diagrams to classes and make class diagram.

Note: 1. To draw dataflow diagrams using Microsoft Visio Software, SmartDraw, etc…
    2. To draw UML diagrams using Rational Rose Software, Star UML, etc.

SEMESTER-IV
COURSE 9: PYTHON PROGRAMMING

Theory	Credits: 3	3 hrs/week

Unit-I

Getting Started with Python: Introduction to Python , Python Keywords , Identifiers , Variables , Comments, Data Types , Operators, Input and Output , Type Conversion , Debugging . Flow of Control, Selection , Indentation , Repetition , Break and Continue Statement , Nested Loops .

Strings- String Operations , Traversing a String , String handling Functions.

Case Study:
1. Study the features that make Python different from Procedural Languages.

Unit-II

Functions: Functions, Built-in Functions, User Defined Functions, recursive functions, Scope of a Variable

Python and OOP: Defining Classes, Defining and calling functions passing arguments, Inheritance, polymorphism, Modules – date time, math, Packages.

Exception Handling- Exception in python, Types of Exception, User-defined Exceptions.

Case Study:
1. Present a report of how Exception handling is different from JAVA Exceptional Handling.

Unit-III

List: Introduction to List, List Operations, Traversing a List, List Methods and Built-in Functions.

Tuples and Dictionaries, Introduction to Tuples, Tuple Operations, Tuple Methods and Built-in Functions, Nested Tuples. Introduction to Dictionaries, Dictionaries are Mutable, Dictionary Operations, Traversing a Dictionary, Dictionary Methods and Built-in functions.

Case Study:
1. What are the special features of dictionaries and try to analyze about the same features in any other language.

Unit-IV

Introduction to NumPy, Array , NumPy Array , Indexing and Slicing , Operations on Arrays , Concatenating Arrays , Reshaping Arrays , Splitting Arrays , Statistical Operations on Arrays.

Data Handling using Pandas , Introduction to Python Libraries, Series, DataFrame, Importing and Exporting Data between CSV Files and DataFrames, Pandas Series Vs NumPy ndarray.

Case Study:
1. Present a paper on advanced features of NumPy and Pandas.

Unit-V

Plotting Data using Matplotlib: Introduction, Plotting using Matplotlib –Line chart, Bar chart, Histogram, Scatter Chart, Pie Chart.

GUI Programming and Database Connectivity Using Python. Graphical User Interfaces. Using the Tkinter Module, Creating Label, Text, Buttons, info Dialog Boxes, Radiobutton, Checkbutton, Getting Input, Importing MySQL for Python , Connecting with a database, Forming a query in MySQL, Passing a query to MySQL.

Case Study:
1. Present a paper on the features and advantages of MySQL compared to other commercial Databases.

References:
1. Mark Lutz, Learning Python,5th Ed. O‟REILLY
2. Core Python Programming by Dr. R. Nageswara Rao
3. Problem Solving and Python Programming by E. Balaguru Swamy
4. Python programming: using problem solving approach by Reema Thareja.
5. Albert Lukaszewski ,MySQL for Python,Packet Publishing

SEMESTER-IV
COURSE 9: PYTHON PROGRAMMING

Practical   Credits: 1   2 hrs/week

Lab Programs

1. Write a Program to check whether given number is Armstrong or not.
2. Write a Program to check whether given number is perfect or not.
3. Write a program to find factorial of given number using recursive function
4. Write a program to implement inheritance and polymorphism
5. Demonstrate a python code to print try, except and finally block statements
6. Write a program to demonstrate String handling functions
7. Write a program to input n numbers from the user. Store these numbers in a tuple. Print the maximum and minimum number from this tuple.
8. Write a program to enter names of employees and their salaries as input and store them in a dictionary
9. Write a program to implement statistical operations on arrays using numPy
10. Write a program to import and export CSV file to DataFrame.
11. Create the DataFrame Sales containing year wise sales and perform basic operation on it.
12. Visualize the plots using matplot lib.
13. Create GUI interface with different types button and labels
14. Create GUI interface and connect with MySQL database and perform CRUD(Create, Read, Update and Delete) operations.

SEMESTER-IV
COURSE 10: OPERATING SYSTEMS

Theory	Credits: 3	3 hrs/week

Course Objectives:

1. To know the basic Structure, Components and Organization of Operating System.
2. To learn the notation of a Process- a Program in Execution, Management, Scheduling and Classic Problems of Synchronization.
3. To gain knowledge in various Memory Management Techniques.
4. To understand Unix Operating System and Various File operations.

Course Outcomes:

The students will be able to:
1. Understand the main components and Structure of Operating System & their functions.
2. Analyze various ways of Process Management & CPU Scheduling Algorithms.
3. Evaluate various device and resources like Memory, Time and CPU Management techniques in distributed systems.
4. Apply different methods for Preventing Deadlocks in a Computer System.
5. Create and build an Application/Service over the UNIX operating system.

Syllabus

Unit I

Introduction: What is Operating System? ,History and Evolution of OS, Basic OS Functions, Computer System Architecture, Operating System Structure.

System Structures: Operating System Services, User Operating System Interface, System Calls, Types of System Calls, Overview of UNIX Operating System, Basic Features of Unix Operating System.

Case Study :
1. Understanding and listing the basic differences between UNIX OS and Windows OS in usage, user interface, features etc.

Unit II

Process Management: Process Concept, Operation on Processes, Communication in Client-Server Systems.

Process Scheduling: Basic Concepts, Scheduling Criteria, Scheduling Algorithms, CPU Scheduling in UNIX.

Case Study:

1. Present your understanding on how CPU Scheduling is different in WINDOWS compared to UNIX/LINUX.

Unit III
Synchronization: Process Synchronization, Semaphores: Usage, Implementation, The Critical Section Problem., Classic problems of synchronization.

Deadlocks: Introduction, Deadlock Characterization, Necessary and Sufficient conditions for Deadlock, Deadlock Handling Approaches : Deadlock prevention, Deadlock Avoidance and Deadlock detection and Recovery .

Case Study:
1. Present your understanding of Deadlocks and new methodologies available in new Operating Systems released in the market.

Unit IV

Memory Management: Overview, Swapping, Contiguous Memory Allocation, Paging, Paging Examples, Segmentation, Page Replacement Algorithms, Memory management in UNIX.

Case Study:
1. Present a paper on new methods used in Memory management in the present day Operating Systems .

Unit V
Files and Directories in UNIX: Files, Directory Structure, File Operations, File System Implementation: File Allocation Methods, Comparison of UNIX and Windows.

Case Study:

1. Present a Paper on how UNIX treats regular files and directories differently from other operating systems.

TEXTBOOKS
1. Operating System Concepts: Abraham Silberschatz, Peter B. Galvin, GregGagne, 8th Edition,Wiley.
2. Unix and shell Programming by B.MH Arwani, OXFORD University Press.

REFERENCEBOOKS:
1. Operating System Principles, Abraham Silberchatz, PeterB.Galvin, GregGagne 8thEdition, WileyStudentEdition.
2. Principles of Operating Systems by Naresh Chauhan, OXFORD University Press.
3. Tanenbaum A S, Woodhull A S, Operating System Design and Implementation,3rd edition, PHI 2006.
4. Unix Shell Programming-YashwantKanetkar

SEMESTER-IV
COURSE 10: OPERATING SYSTEMS

Practical   Credits: 1   2 hrs/week

List of Experiments

1. Introducing the LINUX Native editor vi: Working on basics of creating and editing a text file using standard commands of vi.
2. Introduction to UNIX Operating System, Compare with Windows OS. Writing and executing simple Hello World C Program in UNIX Environment.
3. Getting hands-on on basic UNIX Commands.
4. Write a program using the following system calls of UNIX OS fork, exec, getpid, exit, wait, close, opendir, readdir ?
5. Write a Simple shell script for basic arithmetic and logical calculations?
6. Write Shell script to check the given number is even or odd?
7. Write a shell script to swap the two integers?
8. Write Shell script to perform various operations on given strings.
9. Write Shell scripts to explore system variables such as PATH, HOME etc.
10. Write a shell script to display list of users currently logged in.
11. Write a shell script to delete all the temporary files.
12. Write a shell script to find the Factorial of a Number ?
13. Write C programs to implement the following Scheduling Algorithms:
    a) First Come First Serve.
    b) Shortest Job First.
    c) Round Robin.

Reference Text Books:
1. Brian W. Kernighanand Rob Pike,"The UNIX Programming Environment" Prentice Hall India (Edition available in LRCandin the form of E Book on student resource).
2. Yashwant Kanetkar,"UNIXShellProgramming"BPBPublications(FirstEdition).

SEMESTER-IV
COURSE 11: MOBILE APPLICATION DEVELOPMENT USING ANDROID

Theory	Credits: 3	3 hrs/week

COURSE OBJECTIVES:
1. To facilitate students understanding android SDK
2. To help students to gain a basic understanding of Android application development
3. To instill working knowledge of Android Studio development tool

COURSE OUTCOMES:
The theory, practical experiences and relevant soft skills associated with this course are to be taught and implemented, so that the student demonstrates the following industry-oriented COs associated with the above-mentioned competency:

1. Identify various concepts and features of Android operating system.
2. Configure Android environment and development tools.
3. Develop rich user Interfaces by using layouts and controls.
4. Use User Interface components for android application development.
5. Create Android application using database.
6. Publish Android applications.

UNIT-I
Introduction to Android: - Overview, History, Features of Android, The Android Platform, Understanding the Android Software Stack – Android Application Architecture –The Android Application Life Cycle – The Activity Life Cycle, Creating Android Activity -Views- Layout Android SDK, Android Installation, Building you First Android application, Understanding Anatomy of Android Application, Android Manifest file.

Case Study:
i. Give a brief description of Android Architecture and its parts.
ii. List out the challenges we face while using Android?
iii. List the new features of Android in the latest version.

UNIT-II
Android Application Design Essentials: Anatomy of an Android applications, Android terminologies, Creating User Interfaces with basic views- Application Context, Activities, Services, Intents, linking activities with Intents,, Receiving and Broadcasting Intents, Android Manifest File and its common settings, Using Intent Filter, Permissions.

Case Study:
i. Present an idea that you would like to convert it into an application in the future.

UNIT-III
Android User Interface Design Essentials: User Interface Screen elements, Designing User Interfaces with Layouts, Drawing and Working with Animation. Layouts, Recycler View, List View, Grid View and Web view
Input Controls: Buttons, Checkboxes, Radio Buttons, Toggle Buttons, Spinners, Input Events, Menus, Toast, Dialogs, Styles and Themes, Creating lists, and Custom lists

Case Study:
    i.   Present detail report on the features of Check Boxes, Radio Buttons and Toggle Buttons.

UNIT-IV
Testing Android applications: Publishing Android application, Using Android preferences, Managing Application resources in a hierarchy, working with different types of resources.

Case Study:
    1. List out the special features of Android with its counterparts.

UNIT-V
Using Common Android APIs: Internal Storage, External Storage , SQLite Databases , Managing data using Sqlite, Sharing Data between Applications with Content Providers, Using Android Networking APIs, Using Android Web APIs, JSON Parsing, Using Android Telephony APIs, Deploying Android Application to the World. Google maps, Using GPS to find current location, Sensors, bluetooth/Wi-Fi Connectivity.

Case Study:
    i.   List out the points to keep in mind to make you application more attractive.
    ii.   List the controls that make you application attractive.

REFERENCE BOOKS:
1. Reto Meier, "Professional Android 2 Application Development", Wiley India Pvt Ltd
2. Mark L Murphy, "Beginning Android", Wiley India Pvt Ltd
3. "Android Application Development All in one for Dummies" by Barry Burd, Edition: I
4. "Android", Dixit, Prasanna Kumar Vikas Publications, New Delhi 2014,
   ISBN: 9789325977884
5. Maclean David, Komatineni Satya,Allen Grant , "Pro Android 5", Apress Publications2015
   ISBN: 978-1-4302-4680-0
6. " Android Programming for Beginners" by Hortan, John, Packet Publication, 2015
    ISBN: 978-1-78588-326-2
7. Lauren Darcey and Shane Conder, "Android Wireless Application Development", Pearson Education,
   2nd ed. (2011)

ONLINE READING / SUPPORTING MATERIAL:

1. http://www.developer.android.com
2. http://developer.android.com/about/versions/index.html
3. http://developer.android.com/training/basics/firstapp/index.html
4. http://docs.oracle.com/javase/tutorial/index.htm (Available in the form of free downloadable ebooks also).
5. http://developer.android.com/guide/components/activities.html
6. http://developer.android.com/guide/components/fundamentals.html
7. http://developer.android.com/guide/components/intents-filters.html.
8. http://developer.android.com/training/multiscreen/screensizes.html Syllabus of BCA (Honours) under CBCS 33 9. http://developer.android.com/guide/topics/ui/controls.html
10. http://developer.android.com/guide/topics/ui/declaring-layout.html
11. http://developer.android.com/training/basics/data-storage/databases.html

SEMESTER-IV
COURSE 11: MOBILE APPLICATION DEVELOPMENT USING ANDROID

Practical   Credits: 1   2 hrs/week

LIST OF EXPERIMENTS:

1. Develop a program to implement frame layout, table layout and relative layout.
2. Develop a program to implement Text View and Edit Text.
3. Develop a program to implement Auto Complete Text View.
4. Develop a program to implement Button, Image Button and Toggle Button.
5. Develop a program to implement login window using above U1 controls.
6. Develop a program to implement Checkbox.
7. Develop a program to implement Radio Button and Radio Group.
8. Develop a program to implement Progress Bar.
9. Develop a program to implement List View, Grid View, Image View and Scroll View.
10. Develop a program to implement Custom Toast Alert.
11. Develop a program to implement Date and Time Picker.
12. Develop a program to create an activity. Develop a program to implement new activity using explicit intent and implicit intent.
13. Develop a program to implement content provider.
14. Develop a program to implement service.
15. Develop a program to implement broadcast receiver.
16. Develop a program to implement sensors.
17. Develop a program to build Camera.
18. Develop a program for providing Bluetooth connectivity.
19. Perform CRUD operations using SQLite.
20. Develop a program for JSON parsing.

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**

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:

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 In-Built 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.

SEMESTER-V
COURSE 13: WEB DEVELOPMENT USING PHP & MYSQL

Practical   Credits: 1   2 hrs/week

Course Outcomes: On successful completion of this practical course, student 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 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**

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:

1. To learn the basics of machine learning
2. To learn the importance of feature engineering
3. To understand the foundational rules of probability
4. To Study different classification and clustering techniques
5. To understand the basics of neural networks 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

SEMESTER-V
COURSE 14: MACHINE LEARNING

Practical	Credits: 1	2 hrs/week

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

4. Execute basic programs in either R or Pytho.
5. Gain practical knowledge on different python libraries/packages .
6. 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 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

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:

7. Perform automation testing using selenium.
8. Get exposure on Selenium framework.
9. Gain practical knowledge on Selenium web drivers .

Practical (Laboratory) Syllabus: (30 Periods)

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 (ChromeDriver)

3. Write a script to open google.co.in using internet explorer (InternetExplorerDriver)

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:
1. To understand the data science fundamentals and process.
2. To learn to describe the data for the data science process.
3. To learn to describe the relationship between data.
4. To utilize the Python libraries for Data Wrangling.
5. 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*

SEMESTER-V
COURSE 15: FOUNDATIONS OF DATA SCIENCE

Practical	Credits: 1	2 hrs/week

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

10. Execute python basic programs.
11. Work with Python IDEs.
12. 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.