GAYATRI VIDYA PARISHAD COLLEGE FOR DEGREE AND PG COURSES (A)
M.V.P, Rushikonda, Visakhapatnam-530 045 | website: www.gvpcdpgc.edu.in
(Approved by AICTE | Permanently Affiliated to Andhra University | Accredited by NAAC)
UG, PG-MBA and UG Engineering B. Tech (CE, CSE, ECE, ME) programs are Accredited by NBA

Department of Computer Applications

BACHELOR OF COMPUTER APPLICATIONS Under CBCS

Course Structure and Scheme of Examination w.e.f. 2023-24

I Semester

Paper Code	Course	Teaching Hours	Sem End Exam	Mid Sem Exam*	Total Marks	Credits
BCA1.1.1	First Language-English-I	4	60	40	100	3
BCA1.1.2	Second Language-Hindi/Sanskrit-I	4	60	40	100	3
BCA1.1.3	Skill Enhancement Course – I (communication skills)	3	50	0	50	2
BCA1.1.4	Skill Enhancement Course – II (Analytical Skills)	3	50	0	50	2
BCA1.1.5	Multi-Disciplinary Course (Social Work)	2	50	0	50	2
BCA1.1.6	Fundamentals of Commerce	5	60	40	100	4
BCA1.1.8	Business Organization	5	60	40	100	4
Total		**26**	**390**	**160**	**550**	**20**

II Semester

Paper Code	Course	Teaching Hours	Sem End Exam	Mid Sem Exam*	Total Marks	Credits
BCA 1.2.1	First Language-English-II	4	60	40	100	3
BCA 1.2.2	Second Language-Hindi/Sanskrit-II	4	60	40	100	3
BCA 1.2.3	Skill Enhancement Course – III	3	50	0	50	2
BCA 1.2.4	Skill Enhancement Course – IV	3	50	0	50	2
BCA 1.2.5	Minor-1 Artificial Intelligence Theory	3	60	40	100	3
BCA 1.2.6	Minor-1 Artificial Intelligence Lab	2	25	25	50	1
BCA 1.2.7	Office Automation Tools	3	60	40	100	3
BCA 1.2.8	Office Automation Tools Lab	2	25	25	50	1
BCA 1.2.9	Programming in C	3	60	40	100	3
BCA 1.2.10	Programming in C Lab	2	25	25	50	1
Total		**29**	**475**	**275**	**750**	**22**

III Semester

Paper Code	Course	Teaching Hours	Sem End Exam	Mid Sem Exam*	Total Marks	Credits
BCA2.1.1	Database Management System	3	60	40	100	3
BCA2.1.2	Database Management System Lab	2	25	25	50	1
BCA2.1.3	Data Structures	3	60	40	100	3
BCA2.1.4	Data Structures Lab	2	25	25	50	1
BCA2.1.5	Object Oriented Programming Through JAVA	3	60	40	100	3
BCA2.1.6	Object Oriented Programming Through JAVA Lab	2	25	25	50	1
BCA2.1.7	Software Engineering	3	60	40	100	3
BCA2.1.8	Software Engineering Lab	2	25	25	50	1
BCA2.1.9	Minor-2 Machine Learning Theory	3	60	40	100	3
BCA2.1.10	Minor-2 Machine Learning Lab	2	25	25	50	1
BCA2.1.11	Multidisciplinary Course Health Hygiene	2	50	0	50	2
BCA2.1.12	Skill Enhancement Course Data Analytics	2	50	0	50	2
Total		**29**	**525**	**325**	**850**	**24**

IV Semester

Paper Code	Course	Teaching Hours	Sem End Exam	Mid Sem Exam*	Total Marks	Credits
BCA2.2.1	Python Programming	3	60	40	100	3
BCA2.2.2	Python Programming Lab	2	25	25	50	1
BCA2.2.3	Operating Systems	3	60	40	100	3
BCA2.2.4	Operating Systems Lab	2	25	25	50	1
BCA2.2.5	Mobile Application Development using Android	3	60	40	100	3
BCA2.2.6	Mobile Application Development using Android Lab	2	25	25	50	1
BCA2.2.7	Minor-3 Theory	3	60	40	100	3
BCA2.2.8	Minor-3 Lab	2	25	25	50	1
BCA2.2.9	Minor-4 Theory	3	60	40	100	3
BCA2.2.10	Minor-4 Lab	2	25	25	50	1
BCA2.2.11	Multidisciplinary Course	2	50	0	50	2
BCA2.2.12	Skill Enhancement Course	2	50	0	50	2
Total		**29**	**525**	**325**	**850**	**24**

V Semester

Paper Code	Course	Teaching Hours	Sem End Exam	Mid Sem Exam*	Total Marks	Credits
BCA3.1.1	Web Programming	3	60	40	100	3
BCA3.1.2	Web Programming Lab	2	25	25	50	1
BCA3.1.3	Web Development Using PHP & MySQL	3	60	40	100	3
BCA3.1.4	Web Development Using PHP & MySQL Lab	2	25	25	50	1
BCA3.1.5	Cloud Computing (OR) Machine Learning	3	60	40	100	3
BCA3.1.6	Cloud Computing (OR) Machine Learning Lab	2	25	25	50	1
BCA3.1.7	Software Testing (OR) Foundations of Data Science	3	60	40	100	3
BCA3.1.8	Software Testing (OR) Foundations of Data Science Lab	2	25	25	50	1
BCA3.1.9	Minor-5 Theory	3	60	40	100	3
BCA3.1.10	Minor-5 Lab	2	25	25	50	1
BCA3.1.11	Minor-6 Theory	3	60	40	100	3
BCA3.1.12	Minor-6 Lab	2	25	25	50	1
BCA3.1.13	Env.Edu	2	50	0	50	2
Total		**32**	**560**	**390**	**950**	**26**

VI Semester

Paper Code	Course	Teaching Hours	Sem End Exam	Mid Sem Exam*	Total Marks	Credits
BCA3.2.1	FIRST and SECOND PHASES (2 spells) of APPRENTICESHIP between 1st and 2nd year and between 2nd and 3rd year (two summer vacations).		**50**	**50**	APPRENTICE SHIP between 1st and 2nd year (1Spell) **100**	4
BCA3.2.2	THIRD PHASE of APPRENTICESHIP Entire 5th / 6th Semester		**100**	**100**	APPRENTICE SHIP between 2nd and 3rd year (2Spell) **200** _	4
BCA3.2.3	**Main Project**		**50**	**50**	**100**	12
Total		**--**	**200**	**200**	**400**	**20**
Grand Total		**145**	**3150**	**1200**	**4350**	**136**

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BACHELOR OF COMPUTER APPLICATIONS

Syllabus

With effect from 2023-24 admitted batch

Chairman

Board of Studies

(2023-24)

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Department of Computer Applications (U.G)

BACHELOR OF COMPUTER APPLICATIONS

Syllabi

With effect from 2023-24 admitted batch

I YEAR I SEMESTER

Paper Code	Course	Teaching Hours	Sem End Exam	Mid Sem Exam*	Total Marks	Credits
BCA1.1.1	First Language-English-I	4	60	40	100	3
BCA1.1.2	Second Language-Hindi/Sanskrit-I	4	60	40	100	3
BCA1.1.3	Skill Enhancement Course – I (communication skills)	3	50	0	50	2
BCA1.1.4	Skill Enhancement Course – II (Analytical Skills)	3	50	0	50	2
BCA1.1.5	Multi-Disciplinary Course (Social Work)	2	50	0	50	2
BCA1.1.6	Fundamentals of Commerce	5	60	40	100	4
BCA1.1.8	Business Organization	5	60	40	100	4
Total		**26**	**390**	**180**	**550**	**20**

Department of Computer Applications

B.C.A-Semester I

FUNDAMENTALS OF COMMERCE

Credits: 3	Theory: 5 Hours	Tutorials: -
Max Marks: 100	External: 60 Marks	Internal: 40 Marks

Course Objectives:

1. The objective of this Course is to help students to acquire conceptual knowledge of the Commerce,
2. Economy and Role of Commerce in Economic Development.
3. To acquire Knowledge on Accounting and Taxation.

SYLLABUS

UNIT I:

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 II:

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 III:

Accounting Principles: Meaning and Objectives Accounting, Accounting Cycle - Branches of Accounting - Financial Accounting, Cost Accounting, Management Accounting. Concepts and Conventions of Accounting – GAAP.

UNIT IV:

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

UNIT V:

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.

Outcomes:		

At the end of the course, the student will able to

1. Identify the role commerce in Economic Development and Societal Development.
2. Equip with the knowledge of imports and exports and Balance of Payments.
3. Develop the skill of accounting and accounting principles.
4. They acquire knowledge on micro and micro economics and factors determine demand and supply.
5. An idea of Indian Tax system and various taxes levied on in India.
6. They will acquire skills on web design and digital marketing

References:		

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

Text Books:

1. S.P. Jain & K.L Narang, Accountancy - I Kalyani Publishers.

Department of Computer Applications
B.C.A-Semester I
BUSINESS ORGANIZATION

Credits: 4	**Theory: 5 Hours**	**Tutorials: -**
Max Marks: 100	**External: 60 Marks**	**Internal: 40 Marks**

Course Objectives:

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

	SYLLABUS	
UNIT I:		

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 II:		

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 III:		

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 IV:		

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 V:		

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

Outcomes:		

After completing this course a student will have:

1. Ability to understand the concept of Business Organization along with the basic laws and norms of Business Organization.
2. 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.
3. 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.

References:

1. Singh, B.P., Chhabra, T.N., "An Introduction to Business Organisation & Management", Kitab Mahal, (2014).
2. Sherlekar, S.A. &Sherlekar, V.S, "Modern Business Organization & Management Systems Approach Mumbai", Himalaya Publishing House, (2000).
3. Bhusan Y. K., "Business Organization", Sultan Chand & Sons.
4. Prakash, Jagdish, "Business Organistaton and Management", Kitab Mahal Publishers (Hindi and English)
5. Fundamentals of Computers by V. Raja Raman
6. Cyber Security Essentials by James Graham, Richard Howard, Ryan Olson

Text Books:

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

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B.C.A-Semester I

COMMUNICATION SKILLS

Credits: 2	**Theory: 2 Hours**	**Tutorials: -**
Max Marks: 50	**External: 50 Marks**	**Internal:**

SYLLABUS

UNIT I:	**BASICS OF COMMUNICATION**	7Hours

1. Nature and importance of communication
2. Process of Communication
3. Principles of communication
4. Barriers to effective communication
5. Strategies for effective communication

UNIT II:	**PRESENTATION SKILLS**	9Hours

1. Preparation of a good presentation
2. Verbal communication in presentation
3. Non-verbal communication in presentation
4. Visual aids/Materials in presentation
5. Analyzing audience and managing questions

UNIT III:	**INTERVIEWS AND GROUP DISCUSSIONS**	9Hours

1. Interview and its types
2. Before, during and after an interview
3. Do's and Don'ts in an interview
4. Basic Interview questions
5. Structure and process of Group Discussions
6. Role functions, Do's and Don'ts

Outcomes:

Course Objectives & Outcomes: Upon the completion of the course the students will be able to:

- Understand the nature importance of communication.
- Learn the process involved in communication.
- Develop interview skills.
- Acquire presentation skills.
- Effectively play their roles in group discussions.
- Enhance the skills of public speaking.

References:

1. Working in English, Jones, Cambridge
2. Business Communication, Raman –Prakash, Oxford
3. Speaking Personally, Porter-Ladousse, Cambridge
4. Speaking Effectively, Jermy Comfort, et.al, Cambridge

5. Anjanee Sethi & Bhavana Adhikari, Business Communication, Tata McGraw Hill
6. Jermy Comfort, Speaking Effectively, et.al, Cambridge

Department of Computer Applications
B.C.A-Semester I

ANALYTICAL SKILLS

Credits: 2	**Theory: 2 Hours**	**Tutorials: -**
Max Marks: 50	**External: 50 Marks**	**Internal:**

Course Objectives:

Intended to inculcate quantitative analytical skills and reasoning as an inherent ability in students.

	SYLLABUS	
UNIT I:		7Hours

Arithmetic ability: Algebraic operations BODMAS, Fractions, Divisibility rules, LCM & GCD (HCF).
Verbal Reasoning: Number Series, Coding & Decoding, Blood relationship, Clocks, Calendars.

UNIT II:		9Hours

Quantitative aptitude: Averages, Ratio and proportion, Problems on ages, Time-distance – speed.
Business computations: Percentages, Profit & loss, Partnership, simple compound interest.

UNIT III:		9Hours

Data Interpretation: Tabulation, Bar Graphs, Pie Charts, line Graphs. Venn diagrams.
Recommended Co-Curricular Activities Surprise tests / Viva-Voice / Problem solving/Group discussion.

Outcomes:

After successful completion of this course, the student will be able to;
1. Understand the basic concepts of arithmetic ability, quantitative ability, logical reasoning, business computations and data interpretation and obtain the associated skills.
2. Acquire competency in the use of verbal reasoning.
3. Apply the skills and competencies acquired in the related areas
4. Solve problems pertaining to quantitative ability, logical reasoning and verbal ability inside and outside the campus.

References:

1. Analytical skills by Showick Thorpe, published by S Chand And Company Limited, Ramnagar,New Delhi-110055
2. Quantitative Aptitude and Reasoning by R V Praveen, PHI publishers.
3. Quantitative Aptitude for Competitive Examination by Abhijit Guha, Tata Mc Graw HillPublications

Text Books:
Quantitative Aptitude for Competitive Examination by R.S. Agrawal, S.Chand Publications

Department of Computer Applications
B.C.A-Semester I
Introduction to Social Work

Credits: 2	**Theory: 2 Hours**	**Tutorials: -**
Max Marks: 50	**External: 50 Marks**	**Internal:**

Course Objectives:

Acquaint the process of primary methods of social work
Get to know the skills of working with individuals, groups and communities.

	SYLLABUS	
UNIT I:	Introduction to social work and concepts related to social work	7Hours

Introduction to Social Work- Definition- Scope- objectives - Functions- social service, social welfare services, social reform, major social problems in India; Social work philosophy, values, objectives, principles, methods and fields of social work.

UNIT II:	Methods of Working with Individuals and Groups	9Hours

Social case work –Definition-scope and importance of social case work, principles and process of social case work -Tools and techniques in social case work- Counselling skills. Social Group Work-Definition-scope- the need for social group work –Group work process - Principles of Group Work -Stages of Group Work-Facilitation skills and techniques.

UNIT III:	Workingwith Communitiesand Field Work in social work	9Hours

Community – definition - characteristics- types- community organisation as a method of social work-definition-objectives-principles- phases of community organization - concepts of community development, community participation and community empowerment. Field work in social work – Nature, objectives and types of field work - Importance of field work supervision.

Outcomes:

By successful completion of the course, students will be able to:
1. Understand the basic concepts relating to social work practice, values, principles of social work and social problems in India
2. List out different approaches of providing help to the people in need.
3. Acquaint the process of primary methods of social work
4. Get to know the skills of working with individuals, groups and communities.

References:

1. Government of India, (1987). Encyclopedia of Social Work in India (Set of 4 Volumes). New Delhi, Publications Division, Ministry of Information and Broadcasting.
2. Lal Das, D.K. (2017). Practice of Social Research – Social Work Perspective, Jaipur,

3. Rawat Publications.
4. Madan, G.R. (2009). Indian Social Problems (Volume 1 & 2). New Delhi: Allied publishers Private Limited.
5. Siddiqui, H.Y.(2007). Social Group Work. Jaipur: Rawat Publications
6. Pasty McCarthy &Carolin Hatcher, (2002). Presentation skills. The Essential Guide for Students. New Delhi, Sage Publications.
7. Websites on Social work methods.

Text Books:

1. Chowdhary, Paul. D. (1992). Introduction to Social Work. New Delhi: Atma Ram and Sons.
2. Friedlander W.A. (1955). Introduction to social welfare, New York, Prentice Hall

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BACHELOR OF COMPUTER APPLICATIONS

Syllabi

With effect from 2023-24 admitted batch

I YEAR II SEMESTER

Paper Code	Course	Teaching Hours	Sem End Exam	Mid Sem Exam*	Total Marks	Credits
BCA 1.2.1	First Language-English-II	4	60	40	100	3
BCA 1.2.2	Second Language-Hindi- II	4	60	40	100	3
BCA 1.2.3	Skill Enhancement Course – III Investment Planning	3	50	0	50	2
BCA 1.2.4	Skill Enhancement Course – IV Digital Literacy	3	50	0	50	2
BCA 1.2.5	Minor-1 Artificial Intelligence Theory	3	60	40	100	3
BCA 1.2.6	Minor-1 Artificial Intelligence Lab	2	25	25	50	1
BCA 1.2.7	Office Automation Tools	3	60	40	100	3
BCA 1.2.8	Office Automation Tools Lab	2	25	25	50	1
BCA 1.2.9	Programming in C	3	60	40	100	3
BCA 1.2.10	Programming in C Lab	2	25	25	50	1
Total		**29**	**475**	**275**	**750**	**22**

Department of Computer Applications
B.C.A-Semester II
OFFICE AUTOMATION TOOLS

Credits: 3	Theory: 3 Hours	Tutorials: -
Max Marks: 100	External: 60 Marks	Internal: 40Marks

Course Objectives:

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

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),

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

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),

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.

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.

Outcomes:

The students will be able:

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

References:

1. Rajaraman, Introduction to Information Technology, PHI
2. Introduction to Computers – Peter Norton Mcgraw Hill.
3. Microsoft Excel 2007, Custom Guide Inc, 2007

Text Books:

1. Computer Fundamentals – Pradeep. K.Sinha: BPB Publications.
2. Fundamentals of Computers by Reema Thareja from Oxford University Press
3. Microsoft Office 2007 Fundamentals, 1st Edition By Laura Story, Dawna Walls

Department of Computer Applications

B.C.A-Semester II

OFFICE AUTOMATION TOOLS LAB

Credits: 1	Lab: 2 Hours	Tutorials: -
Max Marks: 50	External: 25 Marks	Internal: 25 Marks

Course Objectives: The course is designed to develop skills to design and analyze and implement simple linear and non - linear data structures in java. It strengthens the ability to the students to identify and apply the suitable data structure for the given real-world problem. It enables them to gain knowledge in practical applications of data structures.

SYLLABUS

List of Experiments

1. Design a visiting card for managing director of a company as per the following specification.
   1. Size of visiting cardis3½×2
   2. Name of the company with big font
   3. Phone number, Fax number and E-mail address with appropriate symbols.
   4. 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
   1. Emp Name, Basic pay, DA, HRA, Total salary.
   2. Sort all the employees in ascending order with the name as the key
   3. Calculate the total salary of the employee
   4. Calculate the Grand total salary of the employee
   5. Find highest salary and o Find lowest salary
3. Prepare an advertisement to company requiring software professional with the following
   1. Attractive page border
   2. Design the name of the company using WordArt
   3. Use at least one clipart.
   4. Give details of the company(use bullets etc.)
   5. 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
   1. Name of the company on the top of the page with big font and good style
   2. Phone no, Faxno and E-mail address with symbols.
   3. Main products manufactured by the company
   4. 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
   1. Table to show qualifications with proper headings
   2.Appropriate left and right margins
   3. Format ½pageusingtwo-columnapproachabout yourself

4. Name on each page at the top right side
5. Page no. in the footer on the right side.

6. Write a macro format document as below
   1. Line spacing"2"(double)
   2. Paragraphindentof0.1
   3. Justification formatting style
   4. 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	Employe 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.

11) Create a suitable examination database and find the sum of the marks (total) of each student and respective, class secured by the student.
1.Pass – if marks in each subject >= 35
2. Distinction- if average >= 75
3. First class - if average >=60
12) Create a presentation using templates.
13) Create a Custom layout or Slide Master for professional presentation.
14) Create a presentation with slide transitions and animation effects.
15) Create a table in PPT and apply graphical representation

Outcomes:		_

1 Describe the usage of computers and why computers are essential components in business and society.
2. Identify categories of programs, system software and applications. Organize and work with files and folders.
3. Compose, format and edit a word document and working with macros.
4. Create work sheets and using various functions.

5. Make presentations and inserting multimedia in them.

Department of Computer Applications

B.C.A-Semester II
PROGRAMMING IN C

Credits: 3	**Theory: 3 Hours**	**Tutorials: -**
Max Marks: 100	**External: 60 Marks**	**Internal: 40Marks**

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.

	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.

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.

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.

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.

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.

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.

References:

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

Text Books:

1. Computer Fundamentals and Programming in C by REEMA THAREJA from OXFORD UNIVERSITY PRESS

Department of Computer Applications

B.C.A-Semester II

PROGRAMMING IN C Lab

Credits: 1	Lab: 2 Hours	Tutorials: -
Max Marks: 50	External: 25 Marks	Internal: 25 Marks

Course Objectives:

1. To implement decision making and arrays.
2. To develop programs for pointers and structures.
3. To write C programs using Files.

SYLLABUS

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.

Outcomes:

After Completion of the course student should able to
1. Student will be able to Know concepts in problem solving.
2. Ability to do programming in C language.
3. To write diversified solutions using C language.
4. Ability to write programming with pointers and structures.
5. Ability to write c programming with files.

Department of Computer Applications
B.C.A-Semester II
Minor –1 Artificial Intelligence Theory

Credits: 3	**Theory: 3 Hours**	**Tutorials: -**
Max Marks: 100	**External: 60 Marks**	**Internal: 40 Marks**

Course Objectives:

The objective of this course is to educate students in basic Artificial Intelligence concepts and provide insights of solving problems using AI.
This course also aims to educate students in basics of practical Expert systems.

	SYLLABUS	
UNIT I:		

Introduction to AI: What is AI? AI problems, foundation of AI and history of AI intelligent agents: Agents and Environments, the concept of rationality, the nature of environments, structure of agents, problem solving agents, problem formulation.

UNIT II:		

Searching: Searching for solutions, uninformed search strategies – Breadth first search, depth first Search. Search with partial information (Heuristic search) Hill climbing, Best First search algorithm and Means End Analysis algorithm.

UNIT III:		

Knowledge representation approaches and key issues, types of knowledge, types of Knowledge Representations weak slot and strong slot fillers -semantic nets- frames –Scripts- conceptual Dependency

UNIT IV:		

First order logic: Inference in first order logic, propositional vs. first order inference, forward chaining, Backward chaining, Resolution. Reasoning under uncertainty, review of probability, Baye's probabilistic interferences and dempster shafer theory.

UNIT V:		

Expert systems:- Introduction, basic concepts, structure of expert systems, the human element in expert systems how expert systems works, types of expert systems, knowledge engineering, scope of knowledge, difficulties in knowledge acquisition methods of machine learning. Learning from observation Inductive learning, Decision trees, Explanation based learning, Statistical Learning methods, Reinforcement Learning.

Outcomes:		
Upon successful completion of this course, students should have the knowledge and skills to: **1.** Understand the need of AI and Intelligent Agents. **2.** Understand knowledge based agents and prepositional logic. 3. Gain knowledge about learning agents and decision trees.		
Text Books:		
Artificial Intelligence, 2nd Edition, E.Rich and K.Knight (TMH).		
References:		
Artificial Intelligence and Expert Systems – Patterson PHI. Expert Systems: Principles and Programming- Fourth Edn, Giarrantana/ Riley, Thomson.		

Department of Computer Applications

B.C.A-Semester II

Minor Artificial Intelligence LAB

Credits: 1	Lab: 2 Hours	Tutorials: -
Max Marks: 50	External: 50 Marks	Internal:

Course Objectives:

The objective of this course is to enable students to analyse various AI related problems and develop a solution using Python programming language.

SYLLABUS

1. A) Basic programs in python.
   B) Programs demonstrating list, Vector, Matrix and Array
2. Solving water – jug problem using Python.
3. Implementing DFS and BFS using Python.
4. Solve 8 – puzzle problem using A* algorithm.
5. Solve 8 – puzzle problem using hill climbing Algorithm.
6. Implement Tic – Tac – Toe game using Python.
7. Develop Python code for mini – max algorithm.
8. Develop Python code for Hangman game.
9. A) Develop Python code for removing punctuation marks from the given string.
   B) Develop Python code for sorting the sentence in alphabetical order.
10. A) Using Pylog programming, display first order logic.
    B) Using Pylog programming, display unification process.
11. A) Find mean and mode for given data set.
    B) Calculate variance and standard deviation for given data set.
12. A) Determining probability of a prime number appearing when a 20 sided die is rolled.
    B) Time series analysis to predict rain fall information base on record.
13. Predict the class of testing sample using Bayes Classification.

Outcomes:

Upon successful completion of this course, students should have the knowledge and skills to:
Develop various basic python programs.
Analyze and develop solutions for various problems like water jug
Develop programs using DFS, BFS,.
Develop python programs for analyzing given data set.
Develop python programs for implementing Bayes Classification.

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Department of Computer Applications
B.C.A-Semester II-Data Science
Minor –1 INTRODUCTION TO DATA SCIENCE AND R PROGRAMMING **Theory**

Credits: 3	**Theory: 3 Hours**	**Tutorials: -**
Max Marks: 100	**External: 60 Marks**	**Internal: 40 Marks**

Course Objectives:		
Data Science is a fast-growing interdisciplinary field, focusing on the analysis of data to extract knowledge and insight This course will introduce students to the collection. Preparation, analysis, modelling and visualization of data, covering both conceptual and practical issues.		
	SYLLABUS	
UNIT I:		
Defining Data Science and Big data, Benefits and Uses, facets of Data, Data Science Process. Historyand Overview of R, Getting Started with R, R Nuts and Bolts		
UNIT II:		
The Data Science Process: Overview of the Data Science Process-Setting the research goal, Retrieving Data, Data Preparation, Exploration, Modeling, data Presentation and Automation. GettingData in and out of R, Using reader package, Interfaces to the outside world.		
UNIT III:		
Machine Learning: Understanding why data scientists use machine learning-What is machine learning and why we should care about, Applications of machine learning in data science, Where itis used in data science, The modeling process, Types of Machine Learning-Supervised and Unsupervised.		
UNIT IV:		
Handling large Data on a Single Computer: The problems we face when handling large data, General Techniques for handling large volumes of data, Generating programming tips fordealing with large datasets.		
UNIT V:		
Sub setting R objects, Vectorised Operations, Managing Data Frames with the dplyr, Control structures, functions, Scoping rules of R, Coding Standards in R, Loop Functions, Debugging, Simulation. Case studies on preliminary data analysis.		
Outcomes:		
Recognize the various disciplines that contribute to a successful data science effort. • Understand the processes of data science identifying the problem to be solved, data collection, preparation, modeling, evaluation and visualization. • Be aware of the challenges that arise in Data Sciences.		

- Be able to identify the application of the type of algorithm based on the type of the problem.
- Be comfortable using commercial and open source tools such as the R/Python languageandits associated libraries for data analytics and Visualization

Text Books:

1. DavyCielen, Arno.D.B.Maysman, Mohamed Ali, "Introducing Data Science"ManningPublications, 2016.
2. Roger D. Peng, "R Programming for DataScience" Lean Publishing, 2015.

References:

1. Nina Zumel, John Mount, "Practical Data Science with R", Manning Publications, 2014.

2. Tony Ojeda, Sean Patrick Murphy, Benjamin Bengfort, AbhijitDasgupta, "PracticalData Science Cookbook", Packt Publishing Ltd., 2014.

WebReferences for case studies: 1. https://www.kaggle.com/datasets

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Department of Computer Applications

B.C.A-Semester II

Minor INTRODUCTION TO DATA SCIENCE AND R PROGRAMMING **LAB**

Credits: 1	**Lab: 2 Hours**	**Tutorials: -**
Max Marks: 50	**External: 50 Marks**	**Internal:**

Course Objectives:

Data Science is a fast-growing interdisciplinary field, focusing on the analysis of data to extract knowledge and insight
This course will introduce students to the collection. Preparation, analysis, modelling and visualization of data, covering both conceptual and practical issues.

SYLLABUS

1. Installing R and R studio, with proper notes on version management, cosmetic settings and different libraries.
2. Basic operations in r with arithmetic and statistics.
3. Getting data into R, Basic data manipulation, Loading Data into R
4. Basic plotting
5. Loops and functions
6. Create Vectors, Lists, Arrays, Matrices, Data frames and operations on them.
7. Demonstrate the visualization and graphics using visualization packages like ggplot2.
8. Implement Loop functions with lapply(), sapply(), tapply(), apply(), mapply().
9. Explore data using Single Variables: Unimodal, Bimodal, Histograms, Density Plots,Barcharts 10. Explore data using two Variables: Line plots, Scatter Plots, smoothing cures, Bar charts
11. Explore and implement commands using dplyr package
12. Download a dataset and work on basic data manipulation followed by inferential statistics.

Outcomes:

Recognize the various disciplines that contribute to a successful data science effort.

- Understand the processes of data science identifying the problem to be solved, data collection, preparation, modeling, evaluation and visualization.

- Be aware of the challenges that arise in Data Sciences.

- Be able to identify the application of the type of algorithm based on the type of the problem.
- Be comfortable using commercial and open source tools such as the R/Python language and its associated libraries for data analytics and Visualization

Department of Computer Applications
B.C.A-Semester II (Cyber Forensics)
Minor –1 Fundamentals of Computer Theory

Credits: 3	Theory: 3 Hours	Tutorials: -
Max Marks: 100	External: 60 Marks	Internal: 40 Marks

Course Objectives:

The students will be able to understand the fundamentals of computers & networks.

	SYLLABUS	
UNIT I:	**Computer**	

Basics, History, Characteristics, Applications, Types, Components; Input/ Output Devices, Storage Devices, Peripheral Devices; Central Processing Unit- Input/Output Unit, Arithmetic Logical Unit, Control Unit, Memory Unit. Operating System & Types; Desktop icons and Control panel objects; Files and Folders.

UNIT II:	**Networks**	

Computer Networks- Introduction, Characteristics, Types and Topologies; Types of Network Devices; Internet, Internet Service Providers and their connection types.

UNIT III:	**Components of Computer & Printers**	

Computer Hardware-Power Supplies, Motherboards, Internal PC Components, External Ports and Cables; Selection of Computer Components; Lab safety Procedures; Procedures to Protect Equipment and Data; Proper use of tools- Software Tools, Antistatic Wrist Strap. PrintersInstalling and configuring printers, Configuring Options and Default Settings, Maintenance and Troubleshooting of Printers, Troubleshooting Printer Issues, Common Problems and Solution.

UNIT IV:	**Assembling and Dissembling of Computer**	

Computer Assembling- Installation of Motherboard, Drives, Cables and Adapter Cards; Dissembling the Computer- Cables, RAM, Motherboard, Heatsink, Hard drives; BIOS Beep Codes and Setup, BIOS and UEFI Configuration, Upgradation and Configuration of a computer.

UNIT V:	**Preventive Maintenance and Troubleshooting**	

Preventive Maintenance and the Troubleshooting Process, Benefits, Tasks; Inspection of Internal Components; Problem in the Computer: Identification, Root Cause; Plan of Action, Resolution of the problem and implementation.

Outcomes:

On successful completion of the course the student will be able to:
1. Demonstrate computer and its components
2. Identify basic input and output devices
3. Learn types of printers and their configuration
4. Assembling and dissembling of computer
5. Identify preventive maintenance and troubleshooting process

Text Books:		
1.Introduction to IT essentials Version 6 byCISCO		
References:		
1. Fundamentals of Computers by Balagurusamy. 2. Fundamentals of computers byRajaraman 3. Computer Fundamentals Course by Anita Goel 4. Computer Fundamentals 6 th Ed byP.K. Sinha 5. Fundamentals of Computers by Rajaraman V		

Department of Computer Applications

B.C.A-Semester II

Minor Fundamentals of Computer LAB

Credits: 1	Lab: 2 Hours	Tutorials: -
Max Marks: 50	External: 50 Marks	Internal:

Course Objectives:

The students will be able to understand the fundamentals of computers & networks.

SYLLABUS

1. Identification of Input Devices
2. Identification of Output Devices
3. Creation of Folders.
4. Components of Computer and Printers
5. Dissemble of computer.
6. Computer Assembly
7. Creation of a word file and name as Network Devices.
8. Creation of a table and data entry.
9. Power Point presentation with 10 slides.
10. Power Point with various smart arts in it.

Outcomes:

On successful completion of the course the student will be able to:
1. Demonstrate computer and its components
2. Identify basic input and output devices
3. Learn types of printers and their configuration
4. Assembling and dissembling of computer
5. Identify preventive maintenance and troubleshooting process

Gayatri Vidya Parishad College for Degree and PG Courses (AUTONOMOUS)
Department of Computer Applications
B.C.A-Semester II (Cloud Computing)
Minor –1 Computer Networks Theory

Credits: 3	Theory: 3 Hours	Tutorials: -
Max Marks: 100	External: 60 Marks	Internal: 40 Marks

Course Objectives:

The students will be able to understand the fundamentals of computers & networks.

SYLLABUS

UNIT I:

Introduction to Network:- Definition, Applications, line configuration, Network topologies, Transmission mode, Types of Networks (LAN, WAN, MAN), Protocols, Network models: The OSI model, TCP/IP Protocol Suite. Physical Layer: Signals –Analog signals, Digital signals, Transmission media - Guided & Un- Guided.

UNIT II:

Network LAN Technologies: Ethernet, Fast Ethernet, Gigabit Ethernet, and Wireless LAN's. Data Link Layer: Error Detection and correction - Types of Errors, Error Detection, Error correction. Data link Protocols – Stop-and-wait ARQ, Go-back-n ARQ, Automatic Repeat Request (ARQ).

UNIT III:

Network Devices: Modem, Hub, Switch, Router, Repeaters, bridges, Gateway. Network Layer: Internetwork Protocol (IP), Addressing (Classes, Dotted-decimal notation, Sample Internet), Subnet mask, Network layer Protocols – ARP, IPv4, and IPv6.

UNIT IV:

Transport Layer: TCP protocol, UDP protocol, Process-to-Process delivery, Congestion: Congestion control, congestion avoidance, congestion discarding, Quality of Service (QOS).

UNIT V:

Application Layer: Domain Name System (DNS) - domain name space, distribution of name space, DNS in the Internet, SMTP, SNMP, FTP, POP3, HTTP, WWW.

Outcomes:

After this course, the student will be able to
1. Identify the different components in a Communication System and their respective roles.
2. Describe the fundamental concepts on data communication and the design of computer networks.
3. To get familiarized with the basic protocols of computer networks.
4. Describe the technical issues related to the local Area Networks
5. Identify the common technologies available in establishing LAN infrastructure.

Text Books:

Data Communication and Computer Networks by Behrouz A. Forozoun, Published by Thomas MC GRAW HILL 2nd edition

References:

1. Andrew S. Tanenbaum, "Computer Networks", Fourth Edition, 2003
2. An introduction to computer network by PETER L DORODAL.

Department of Computer Applications

B.C.A-Semester II

Minor Computer Networks LAB

Credits: 1	Lab: 2 Hours	Tutorials: -
Max Marks: 50	External: 50 Marks	Internal:

Course Objectives:

The students will be able to understand the fundamentals of computers & networks.

SYLLABUS

1. Write a program for print the IP Address of a WWW.YAHOO.COM
2. Write a program for to print the IP Address of the local machine and hostname.
3. Write HTML program to implement get( ) and post( ) methods
4. Write a program for to identify the well known ports on a Remote system.
5. Write a program for to print the parts of URL.
6. Write a program for to send & receive data from datagram packet.
7. Write a program for a chat application.
8. Write a program for the simple file transfer between two systems by opening socket connection to out server on one system and sending a file from one system to another.
9. Write a program for the HTTP server.

Outcomes:

After this course, the student will be able to

1. Write HTML program to implement get( ) and post( ) methods
2. Describe the simple file transfer between two systems by opening socket connection to out server on one system and sending a file from one system to another.
3. To get familiarized with the basic protocols of computer networks.
4. Describe the technical issues related to the local Area Networks IV.

Department of Computer Applications
B.C.A-Semester II

INVESTMENT PLANNING

Credits: 2	**Theory: 3 Hours**	**Tutorials: -**
Max Marks: 50	**External: 50 Marks**	**Internal:**

Course Objectives:

The objective of the course is to make the students familiarize with the concepts of investment, associated risks along with the regulatory authorities that monitor the capital market.

	SYLLABUS	
UNIT I:		7Hours

Investment: Attributes of Investment, Investment and speculation, Features of a good Investment, Investment Process. Investment Avenues – Types. Tax saving options.

UNIT II:		9Hours

Return and Risk: Meaning and Measurement of Security Returns. Meaning and Types of Security Risks- Systematic Vs Non-systematic Risk. Measurement of Total Risk - Intrinsic Value Approach to Valuation of Bonds and Shares.

UNIT III:		9Hours

Portfolio: Choosing the right Investment options, Construction of Investment portfolio, and Portfolio management. Investor Protection Guidelines of SEBI– SEBI Investment Advisors Regulations.

Hands on Activities:

1. Group/Individual presentations on Investment Alternatives (Advantages, Suitability and Limitations).
2. Calculation of Stock Return and Risk from historical data of NSE and BSE.
3. To make comparative analysis between various stocks using excel

Outcomes:

The students familiarize with the concepts of investment, associated risks along with the regulatory authorities that monitor the capital market.

References:

1. Bhalla VK, Investment Management, S.Chand.
2. Donald E.Fischer, Ronald J.Jordan, Security Analysis and Portfolio Management; Prentice Hall of Inida.
3. Preeti Singh, Investment Management, Himalaya Publishers.
4. Pitabas Mohanty Spreadsheet Skills for Finance Professionals Taxmann Publications

Text Books:

1. Prasanna Chandra, Investment Analysis and Portfolio Management, Tata McGraw Hill.

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Department of Computer Applications
B.C.A-Semester II

DIGITAL LITERACY

Credits: 2	**Theory: 2 Hours**	**Tutorials: -**
Max Marks: 50	**External: 50 Marks**	**Internal:**

Course Objectives:

1: Perform operations on the computer
2: Access the Internet and finding information of interest
3: Register for an E-mail account and operating it

	SYLLABUS	
UNIT I:	**operate the elements of a computer and performing operations on the computer**	7Hours

Operate the elements of a computer including power cord, power switch, network connecting cable, USB ports, Mouse operations, Keyboard operations, interface icons, GUI elements, Editing options, perform operations including switching on the computer, logging in, locating a file, opening a file, printing a document, storing a file with proper extension, creating a folder/ sub folder in a volume on hard disk and desktop, shifting files from one folder to another, shutting off the computer

UNIT II:	Access the Internet to browse information and E-mail operation	9Hours

Access the Internet, use a search engine, find information on the topic of interest, register for a web-based E-mail account, access E-mail with attachments, reply to an E-mail, forward an E-mail and delete an E-mail message

UNIT III:	Make bill payments, other applications using Internet and word processing	9Hours

Make utility bill payments, booking bus/train tickets, bank transactions, personal transactions, job search through employment portals, mobile/DTH recharge, word processing basics, creating, editing and formatting of text, saving and printing of word document

Outcomes:

By undergoing the Digital Literacy course, one should acquire basic knowledge on Computer and he/she is able to
1: Perform operations on the computer
2: Access the Internet and finding information of interest
3: Register for an E-mail account and operating it
4: Make bill payments and use other applications of Internet
5: Create, edit and format documents using a word processor

References:

Prescribed readings:
1. Appreciation of Digital Literacy Handbook published by Department of Electronics & Information Technology, Ministry of Communications & Information Technology, Government of India

Text Books:

Web Resources: -
1. https://youtu.be/b2X_j5Bz-VM
2. https://youtu.be/jln3-P6L2ro
3. https://youtu.be/cfDisqUMIvw
4. https://youtu.be/3h_PyURcdrc
5. https://youtu.be/EqN0LBcydBg

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BACHELOR OF COMPUTER APPLICATIONS

Syllabi

With effect from 2023-24 admitted batch

II YEAR I SEMESTER

III Semester

Paper Code	Course	Teaching Hours	Sem End Exam	Mid Sem Exam*	Total Marks	Credits
BCA2.1.1	Database Management System	3	60	40	100	3
BCA2.1.2	Database Management System Lab	2	25	25	50	1
BCA2.1.3	Data Structures	3	60	40	100	3
BCA2.1.4	Data Structures Lab	2	25	25	50	1
BCA2.1.5	Object Oriented Programming Through JAVA	3	60	40	100	3
BCA2.1.6	Object Oriented Programming Through JAVA Lab	2	25	25	50	1
BCA2.1.7	Software Engineering	3	60	40	100	3
BCA2.1.8	Software Engineering Lab	2	25	25	50	1
BCA2.1.9	Minor-2 Machine Learning Theory	3	60	40	100	3
BCA2.1.10	Minor-2 Machine Learning Lab	2	25	25	50	1
BCA2.1.11	Multidisciplinary Course – HEALTH AND HYGIENE	2	50	0	50	2
BCA2.1.12	Skill Enhancement Course – DATA ANALYTICS	2	50	0	50	2
Total		**29**	**525**	**325**	**850**	**24**

Department of Computer Applications
B.C.A-Semester III
Database Management System

Credits: 4	Theory: 4 Hours	Tutorials: -
Max Marks: 100	External: 60Marks	Internal: 40 Marks

Course Objectives:

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

SYLLABUS

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.

Outcomes:		

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

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

Text Books:		

1. Database Management Systems, 3rd Edition , Raghurama Krishnan, Johannes Gehrke, TMH

References: Database System Concepts,5th Edition , Silberschatz, Korth, TMH

Department of Computer Applications

B.C.A-Semester III

Database Management System LAB

Credits: 1	**Theory: 2 Hours**	**Tutorials: -**
Max Marks: 50	**External: 25 Marks**	**Internal: 25Marks**

Course Objectives:

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

SYLLABUS

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

Column Name	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.

Column Name	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: SALESORDER
Description:Used to store client's orders

Column Name	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.

Column Name	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 of all 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 describe 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 or not.
2. The HRD manager has decided 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.

Outcomes:		

1. An ability to apply Knowledge of computing and mathematics in Computer Science & Engineering.
2. An ability to analyze a problem, identify and define the computing requirements appropriate to its solution.
3. An ability to design, implement and evaluate a computer-based system to meet desired needs with appropriate societal considerations.
4. 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

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Department of Computer Applications

B.C.A-Semester III
DATA STRUCTURES

Credits: 4	Theory: 4 Hours	Tutorials: -
Max Marks: 100	External: 60 Marks	Internal: 40 Marks

Course Objectives:

1 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.

	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.

Outcomes:		

The students will be able to:

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

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

References:

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

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B.C.A-Semester III

DATA STRUCTURES LAB

Credits: 1	Theory: 2 Hours	Tutorials: -
Max Marks: 50	External: 25 Marks	Internal: 25Marks

Course Objectives:

1. 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.

SYLLABUS

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

Outcomes:

The students will be able to:

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

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Department of Computer Sciences
B.C.A-Semester III
COURSE 7: OBJECT ORIENTED PROGRAMMING THROUGH JAVA

Credits: 4	Theory: 6 Hours	Tutorials: -
Max Marks: 100	External: 60 Marks	Internal: 40 marks

Course Objectives:

1. To make the students understand the fundamentals of Java programming.
2. To expose the students to Window based applications using AWT
3. To make the students to design appropriate Exception Handling in Java
4. To make the students to understand the concepts of Threads Files and
5. I/O Streams, Applets Networking in java.

	SYLLABUS	
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.

Outcomes:

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

1. Demonstrate good object-oriented programming skills in Java
2. Able to describe recognize, apply, and implement selected design patterns in Java
3. Understand the capabilities and limitations of Java
4. Be familiar with common errors in Java and its associated libraries
5. Develop excellent debugging skills

Text Books:

1. Object Oriented Programming through Java, Universities Press, by P. Radha Krishna.
2. E. Balagurusamy, “Programming with Java”, TataMc-Graw Hill, 5 th Edition..

References :

1. Herbert Schildt, “The complete reference Java”, TataMc-Graw Hill, 7th Edition.

Department of Computer Applications

B.C.A-Semester III

COURSE 7: OBJECT ORIENTED PROGRAMMING THROUGH JAVALAB

Credits: 1	Theory: 2 Hours	Tutorials: -
Max Marks: 50	External: 25 Marks	Internal: 25Marks

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.

SYLLABUS

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.

Outcomes:

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

1. Demonstrate good object-oriented programming skills in Java
2. Able to describe recognize, apply, and implement selected design patterns in Java
3. Understand the capabilities and limitations of Java
4. Be familiar with common errors in Java and its associated libraries
5. Develop excellent debugging skills

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B.C.A-Semester III

SOFTWARE ENGINEERING

Credits: 4	Theory: 6 Hours	Tutorials: -
Max Marks: 100	External: 60 Marks	Internal: 40Marks

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.

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.

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 –

Text 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		

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B.C.A-Semester III

SOFTWARE ENGINEERING LAB

Credits: 1	Theory: 2 Hours	Tutorials: -
Max Marks: 50	External: 25 Marks	Internal: 25Marks

Course Objectives:

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

(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

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.

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

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Department of Computer Applications

B.C.A-Semester III

Machine Learning Using R (Minor)

Credits: 4	Theory: 6 Hours	Tutorials: -
Max Marks: 100	External: 60Marks	Internal: 40

Course Objectives:

The main objective of this course is to enabling the student with basic knowledge on the techniques to build an intellectual machine for making decisions behalf of humans. This course covers the techniques on how to make learning by a model, how it can be evaluated, what are all different algorithms to construct a learning model.

	SYLLABUS	
Unit I:		

INTRODUCTION: Overview of Machine learning, machine learning types, well posed learning algorithms and issues in machine learning.
CLASSICAL DATA ANALYSIS: Mean, variance, Regression- linear.
CONCEPT LEARNING: Introduction, a concept learning task and learning as search, version space and candidate elimination algorithm, inductive bias.

Unit II:		

DECISION TREE LEARNING: - Introduction, Representation, basic decision tree learningalgorithm, space search in decision tree learning algorithm ,cross validation and over fitting.
NEURAL NETWORK LEARNING: Introduction, Perceptrons - Representational power of Perceptrons, Back propagation algorithm.

Unit III:		

INTRODUCTION TO R: Basic features of R, Benefits of R, data types in R, Installing R, Getting started with the RStudio IDE, Running R, Packages in R, variable names and assignment ,operators, Input/output functions.

Unit IV:		

Preview of Some Important R Data Structures: Vectors, Character Strings, Matrices, Lists, Data Frames, and Classes.
Control Structure: Conditional statements, Loops, dates and times, functions, String manipulations.

Unit V:		

Vectors: Scalars, Vectors, Arrays and Matrices: Adding and Deleting Vector Elements, Obtaining the Length of a Vector, Vector Indexing, Common vector operations, Generating vector sequences
, Repeating vector constants, using all() and any(), Vectorized operations.

Outcomes:		

1. Understand the basic concepts such as decision trees and neural networks.
2. Ability to formulate machine learning techniques to respective problems.
3. Apply machine learning algorithms to solve problems of moderate complexity.
4. Use and program in the programming language R
5. Ability to implement software quality and testing methods.

Text Books:		

1. Tom Michel, Machine Learning, McGraw Hill, 1997.
2. The Art of R Programming by Norman Matlof, No starch press, SAN FRANSISCO,2011.

Reference Books:		

3. Machine Learning Methods in the Environmental Sciences, Neural Networks, William W Hsieh, Cambridge University Press.
4. An Introduction to R for Beginners by SASHA HAFNER, on AUG-2019.

Department of Computer Applications

B.C.A-Semester III

Machine Learning using R (Minor) LAB

Credits: 1	Theory: 2 Hours	Tutorials: -
Max Marks: 50	External: 25Marks	Internal: 25Marks

Course Objectives:

The main objective of this course is to enabling the student with basic knowledge on the techniques to build an intellectual machine for making decisions behalf of humans. This course covers the techniques on how to make learning by a model, how it can be evaluated, what are all different algorithms to construct a learning model.

SYLLABUS

1. Write an R-Program to take input from the user.
2. Write an R-Program to compute a product of two integer values.
3. Write an R-Program to demonstrate working with operators (Arithmetic, Relational,Logical, Assignment operators).
4. Write an R Program to check if a Number is Odd or Even 5. Write an R program to checkwhether the biggest of two values.
6. Write an R Program to check if the given Number is a Prime Number
7. Write an R Program to Find the Factorial of a Number
8. Write an R Program to Find the Fibonacci sequence Using Recursive Function.
9. Write an R Program to create a Vector and to access elements in a Vector.
10. Write an R Program to create a Matrix from a Vector using dim() function.

1. Understand the basic concepts such as decision trees and neural networks.
2. Ability to formulate machine learning techniques to respective problems.
3. Apply machine learning algorithms to solve problems of moderate complexity.
4. Use and program in the programming language R

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Department of Computer Applications
B.C.A-Semester III
DATA ANALYTICS (Skill Course)

Credits: 2	Theory: 2 Hours	Tutorials: -
Max Marks: 50	**External: 50 Marks**	**Internal:**

Course Objectives:

The students are understand and implement to analyze the data through this course

	SYLLABUS	
UNIT I:		7Hours

Introduction: Overview, Data Science, Big Data Characteristics, Architecture – Core Layers, service layers; roles in data science team, life cycle of data-centric projects, big data life cycle.

UNIT II:		9Hours

Pre-processing: Introduction, Measures of Central tendency-Mean, Median, Mode, sampling distributions, inferential statistics, ANOVA, feature selection-PCA

UNIT III:		9Hours

Methods: Association rules, Apriori algorithm, overview of clustering, k-means algorithm, Regression- Linear, Logistic, Support Vector Machines, Classification-Decision Tree classification, Attribute selection, Naïve Bayes Classification.

Outcomes:

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

- Understand the framework of big data environment.
- Apply pre-processing techniques that aid in feature selection.
- Classify the data for better understanding.

References:

Paul Zikopoulos, Chris Eaton, “Understanding Big Data Analytics for Enterprise Class Hadoop and Streaming Data”, 1st edition, TMH

Text Books:

1. G. Sudha Sadasivam, R. Thirumahal, “Big Data Analytics”, Oxford University Press.

Activities Planned:

1. Identify the roles played by different persons in the team.
2. Understand the phases of big data life cycle.
3. Calculate the central tendency for a given data.
4. Apply Apriori algorithm for generating association rules on a given data.
5. Construct decision tree on a given data for classification

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Department of Computer Applications
B.C.A-Semester III

HEALTH AND HYGIENE (Multi-Disciplinary Course)

Credits: 2	Theory: 2 Hours	Tutorials: -
Max Marks: 50	External: 50 Marks	Internal:

Course Objectives:

The course is designed to provide a complete guidance on health and hygiene systems, guidelines for implementing and role of government and public in maintaining a healthy life.

	SYLLABUS	
UNIT I:	**Basics of Nutrition**	7Hours

Nutrition – definition, importance, Good nutrition and mal nutrition; Balanced Diet: Basics of Meal Planning 2. Carbohydrates –functions, dietary sources, effects of deficiency. 3. Lipids –functions, dietary sources, effects of deficiency. 4. Proteins –functions, dietary sources, effects of deficiency. 5. Brief account of Vitamins- functions, food sources, effects of deficiency, 6. Macro and micro minerals –functions, effects of deficiency; food sources of Calcium, Potassium and Sodium; food sources of Iron, Iodine and Zinc 7. Importance of water– functions, sources, requirement and effects of deficiency.

UNIT II:	**Health**	9Hours

Health - Determinants of health, Key Health Indicators, Environment health & Public health; Health-Education: Principles and Strategies 9. Health Policy & Health Organizations: Health Indicators and National Health Policy of Govt. of India-2017; Functioning of various nutrition and health organizations in India viz., NIN (National Institution of Nutrition), FNB (Food and Nutrition Board), ICMR (Indian Council of Medical Research), IDA (Indian Dietetics Association),WHO-India, UNICEF-India 10. National Health Mission: National Rural Health Mission (NRHM) Framework, National Urban Health Mission (NUHM) Framework 11. Women & Child Health Care Schemes: Reproductive, Maternal, Newborn, Child and Adolescent Health (RMNCH+); Janani Shishu Suraksha Karyakaram (JSSK); Rashtriya Bal Swasthya Karyakram(RBSK); India Newborn Action Plan (INAP); Adolecent Heatlh- Rashtriya Kishor Swasthya Karyakram (RKSK) 12. Disaster Management – Containment, Control and Prevention of Epidemics and Pandemics – Acts, Guidelines and Role of Government and Public

UNIT III:	**Hygiene**	9Hours

Hygiene – Definition; Personal, Community, Medical and Culinary hygiene; WASH (WAter, Sanitation and Hygiene) programme 14. Rural Community Health: Village health sanitation & Nutritional committee (Roles & Responsibilities); About Accredited Social Health Activist (ASHA); Village Health Nutrition Day, Rogi Kalyan Samitis 15. Community & Personal Hygiene: Environmental Sanitation and Sanitation in Public places 16. Public Awareness through Digital Media - An Introduction to Mobile Apps of Government of India: NHP, Swasth Bharat, No More Tension, Pradhan Mantri Surakshit Mantritva Abhiyan (PM Suman Yojana), My Hospital (Mera aspataal), India fights Dengue, JSK Helpline, Ayushman Bhava, Arogya Setu, Covid 19AP

Outcomes:

At the end of the course the student shall be able to understand –
1.The importance of health and hygiene in life
2. The importance of nutrition for a healthy life

3. Different health care programmes of India
4. Basic concept of health impact assessment as a means of assessing the policies, plans and projects using quantitiative and qualitative techniques
5. Importance of community and personal health & hygiene measures
6. Importance of food, social tenets, mental condition, physical activity on health

References:

Bamji, M.S., K. Krishnaswamy & G.N.V. Brahmam (2009) Textbook of Human Nutrition(3rd edition) Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi
Swaminathan (1995)Food & Nutrition(Vol I, Second Edition) The Bangalore Printing &Publishing Co Ltd., , Bangalore
Vijaya Khader (2000)Food, nutrition & health, Kalyan Publishers, New Delhi
Srilakshmi, B., (2010)Food Science, (5th Edition) New Age International Ltd., New Delhi

Text Books:

Weblinks: https://nhm.gov.in/
♣ National Rural Health Scheme:
https://nhm.gov.in/index1.php?lang=1&level=1&sublinkid=969&lid=49
♣ National Urban Health Scheme:
https://nhm.gov.in/index1.php?lang=1&level=1&sublinkid=970&lid=137
♣ Village health sanitation & Nutritional committee
https://nhm.gov.in/index1.php?lang=1&level=1&sublinkid=149&lid=225
♣ About Accredited Social Health Activist (ASHA)
https://nhm.gov.in/index1.php?lang=1&level=1&sublinkid=150&lid=226
♣ Village Health Nutrition Day
https://nhm.gov.in/index1.php?lang=1&level=1&sublinkid=152&lid=228
♣ Rogi Kalyan Samitis https://nhm.gov.in/index1.php?lang=1&level=1&sublinkid=153&lid=229
♣ Health Impact Assessment - https://www.who.int/hia/about/faq/en/
(suggested information only)
http://www.euro.who.int/ data/assets/pdf_file/0011/261929 /Health-in Impact-Assessments-final-version.pdf?ua=1
♣ WASH https://www.unicef.org/wash/ and
https://www.unicef.org/wash/files/UNICEF_Strategy_for_WASH_2016_203 0.PDF
♣ Healthy Living https://www.nhp.gov.in/healthyliving
Viewall Note: The above web links are from MoHFW, GoI.
Teachers can prepare their notes from other resources also

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BACHELOR OF COMPUTER APPLICATIONS

Syllabi

With effect from 2023-24 admitted batch

II YEAR II SEMESTER

IV Semester

Paper Code	Course	Teaching Hours	Sem End Exam	Mid Sem Exam*	Total Marks	Credits
BCA2.2.1	Python Programming	3	60	40	100	3
BCA2.2.2	Python Programming Lab	2	25	25	50	1
BCA2.2.3	Operating Systems	3	60	40	100	3
BCA2.2.4	Operating Systems Lab	2	25	25	50	1
BCA2.2.5	Mobile Application Development using Android	3	60	40	100	3
BCA2.2.6	Mobile Application Development using Android Lab	2	25	25	50	1
BCA2.2.7	Artificial Intelligence for Games Theory Minor-3	3	60	40	100	3
BCA2.2.8	Artificial Intelligence for Games Lab Minor-3	2	25	25	50	1
BCA2.2.9	Algorithms for Intelligent Systems Theory Minor-4	3	60	40	100	3
BCA2.2.10	Algorithms for Intelligent Systems Lab Minor-4	2	25	25	50	1
BCA2.2.11	Multidisciplinary Course - **Basic Statistics**	2	50	0	50	2
BCA2.2.12	Skill Enhancement Course – Cyber Security	2	50	0	50	2
Total		**29**	**525**	**325**	**850**	**24**

Department of Computer Applications.
B.C.A-Semester IV
PYTHON PROGRAMMING

Credits: 4	**Theory: 4 Hours**	**Tutorials: -**
Max Marks: 100	**External: 60 Marks**	**Internal: 40Marks**
Course Objectives:		
	SYLLABUS	
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.		
Outcomes:		
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		

Department of Computer Applications

B.C.A-Semester IV

PYTHON PROGRAMMING LAB

Credits: 1	Theory: 2 Hours	Tutorials: -
Max Marks: 50	External: 25 Marks	Internal: 25Marks

Course Objectives:

SYLLABUS

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.

Outcomes:

1. .

Department of Computer Applications.
B.C.A-Semester IV
OPERATING SYSTEMS

Credits: 4	**Theory: 4 Hours**	**Tutorials: -**
Max Marks: 100	**External: 60 Marks**	**Internal: 40Marks**

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.

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 ClientServer 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.

Outcomes:

The students will be able to:

1Understand 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.

References:

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

Department of Computer Applications

B.C.A-Semester IV

OPERATING SYSTEMS **LAB**

Credits: 1	**Theory: 2 Hours**	**Tutorials: -**
Max Marks: 50	**External: 25 Marks**	**Internal: 25Marks**

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.

SYLLABUS

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.

Outcomes:

The students will be able to:

1Understand 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.

Department of Computer Applications.
B.C.A-Semester IV
MOBILE APPLICATION DEVELOPMENT USING ANDROID

Credits: 4	**Theory: 4 Hours**	**Tutorials: -**
Max Marks: 100	**External: 60 Marks**	**Internal: 40Marks**

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

SYLLABUS

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:

List out the points to keep in mind to make you application more attractive.
List the controls that make you application attractive.

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.

References:

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)

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B.C.A-Semester IV

MOBILE APPLICATION DEVELOPMENT USING ANDROIDLAB

Credits: 1	Theory: 2 Hours	Tutorials: -
Max Marks: 50	External: 25 Marks	Internal: 25Marks

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

SYLLABUS

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.

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.

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B.C.A-Semester IV

Artificial Intelligence for Games

Credits: 4	**Theory: 4 Hours**	**Tutorials: -**
Max Marks: 100	**External: 60 Marks**	**Internal: 40Marks**

Course Objectives:

.

	SYLLABUS	
UNIT I:		

Introduction to Game AI

Course Overview, Roles of AI in Game design, Game AI Interfaces (Movement, Path finding, Decision Making, Strategy), Complexity (Artificial Stupidity, Intelligent Mistakes),

Game AI Inputs, Outputs, and Behaviors: The 2D Rigid body Agent, Steering Output, Variable Matching

UNIT II:

Position Matching: Kinematic and Dynamic

Orientation Matching: Kinematic and Dynamic: Align, Wander **Advanced Movement: Delegation and Combination** :Interfaces, Blending, Arbitration

UNIT III:

Advanced Position and Orientation Matching: Pursue, Evade, Face, Look Where You Are Going

Group Movement: Separation, Flocking

UNIT IV:

Structure of Path finding Algorithms: Directed Weighted Graphs, The Family of Search Algorithms

Abstraction Schemes: Lifting and Grounding (Tile Graph, Navmesh),

Path FollowMovement

UNIT V:		

. **From Path finding to Movement**: The Steering Pipeline, Obstacle and Collision Avoidance

Structure of Decision Making Algorithms: Actions, Action Manager

Decision Trees: Nodes(Decisions, Actions), Design, Performance

Outcomes:		

Develop software code for a range of artificial intelligence techniques used in traditional and modern computer games.

1. Describe the performance of artificial intelligence techniques used in traditional and moderncomputer games.
2. Choose, develop, explain, and defend the use of particular artificial intelligence techniquesfor solving particular game design problems.
3. Evaluate the relative benefits and drawbacks of different artificial intelligence techniques thatcan be used to solve computer game design problems.
4. Identify and examine state-of-the-art artificial intelligence techniques from the industry andacademia to solve computer game design problems.

Text Books:		

1. Millington, Ian. Artificial Intelligence for Games (3rd Ed.). CRC Press, 2019.
2. Unity Artificial Intelligence Programming Add powerful, believable, and fun AIentities in your game with the power of Unity, 5th Edition

References:

1. Game AI Pro 360Guide to Movement and Path finding: Guide to Movement and Pathfinding
2. Unity Artificial Intelligence Programming Add powerful, believable, and fun AIentities in your game with the power of Unity, 5th Edition

Department of Computer Applications

B.C.A-Semester IV

Artificial Intelligence for Games LAB

Credits: 1	Theory: 2 Hours	Tutorials: -
Max Marks: 50	External: 25 Marks	Internal: 25Marks

Course Objectives:

SYLLABUS

1. Complexity
2. Orientation Matching
3. Separation
4. Directed Weighted Graphs
5. Decision Trees

Outcomes:

Develop software code for a range of artificial intelligence techniques used in traditional andmodern computer games.

1. Describe the performance of artificial intelligence techniques used in traditional and moderncomputer games.
2. Choose, develop, explain, and defend the use of particular artificial intelligence techniquesfor solving particular game design problems.
3. Evaluate the relative benefits and drawbacks of different artificial intelligence techniques thatcan be used to solve computer game design problems.
4. Identify and examine state-of-the-art artificial intelligence techniques from the industry andacademia to solve computer game design problems.

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B.C.A-Semester IV

ALGORITHMS FOR INTELLIGENT SYSTEMS

Credits: 4	Theory: 4 Hours	Tutorials: -
Max Marks: 100	External: 60 Marks	Internal: 40Marks

Course Objectives:

The course should enable the students to focus on developing machine that can think which leads to gain fundamental knowledge for understanding AI.

	SYLLABUS	
UNIT I:		
Introduction and History of AI: What is AI ? A brief history ? The state of the art		
UNIT II:		
Intelligent Agents: Agents and environments, Rationality, PEAS (Performance measure, Environment, Actuators, Sensors), Environment types, Agent types		
UNIT III:		
Solving Problem by Searching: Problem-solving agents, Problem types, Problem formulation, Example problems, Basic search algorithms		
UNIT IV:		
Informed search algorithms: Best-first search, A*_ search, Heuristics		
UNIT V:		
Adversial Search: Games, Perfect play, minimax decisions, pruning, Resource limits and approximate evaluation, Games of chance, Games of imperfect information		
Outcomes:		
Upon successful completion of this course, students should have the knowledge and skills to 1. Understanding the foundations of Artificial Intelligence 2. Representing a problem as a search solving problem. 3. Searching a space of answers for a solution to a problem in practical time. 4. Representing problems in terms of logic and deduction. 5. Representing intelligent behavior in terms of agent.		
Text Books:		
Title: Artificial Intelligence: A Modern Approach, Author(s):Stuart Russell and Peter Norvig, Edition:3rd Edition, Publisher:Prentice-Hall.		
References:		

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Department of Computer Applications

B.C.A-Semester IV

ALGORITHMS FOR INTELLIGENT SYSTEMS LAB

Credits: 1	Theory: 2 Hours	Tutorials: -
Max Marks: 50	External: 25 Marks	Internal: 25 Marks

Course Objectives:

The objective of this course is to enable students to develop and implement algorithms for problem solving using AI.

SYLLABUS

- Study of PROLOG
- Write the following programs using PROLOG:
- Write a program to solve 8-queens problem.
- Solve any problem using depth first search.
- Solve any problem using best first search.
- Solve 8-puzzle problem using best first search
- Solve Robot (traversal) problem using means End Analysis.
- Solve the Traveling Salesman problem.

Outcomes:

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

1. Understanding the foundations of Artificial Intelligence
2. Representing a problem as a search solving problem.
3. Searching a space of answers for a solution to a problem in practical time.
4. Representing problems in terms of logic and deduction.
5. Representing intelligent behavior in terms of agent.

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B.C.A -Semester IV

Basic Statistics (Multi-Disciplinary Course)

Credits: 2	Theory: 2 Hours	Tutorials: -
Max Marks: 50	External: 50 Marks	Internal:

Course Objectives:

To provide basic understating of general statistical tools and their elementary applications and to create awareness on Indian Statistical System.

	SYLLABUS	
UNIT I:	**Meaning, scope and limitations of Statistics**	7Hours

Collection of data: Primary and Secondary, Classification and Tabulation, Construction of frequency distribution. Graphical Representation: Histogram, Bar, Pie and Frequency polygon.

UNIT II:	**Measures of Central Tendency:**	9Hours

Features of good average, Arithmetic Mean, Median, Mode. Empirical relationship between Mean Median and Mode and skewness based on central values.

UNIT III:	**Measures of Dispersion:**	9Hours

Range, Quartile Deviation(QD), Mean Deviation(MD), Variance, Standard Deviation(SD), relationship between QD, MD and SD.Familiarizationof the concepts relating to Correlation and Linear Regression line.

Outcomes:

1. To understand the concept of Statistics and its merits and demerits. Distinguishing primary and secondary data. Classification, Tabulation and Pictorial representation of data.
2. To understand the basic nature of data and how a single value describes the entire data set.Measuring the degree of departure of a distribution from symmetry and reveals the direction of scatterdness of the items.
3. To understand the spread of the data and to draw conclusions from the comparison of averages.
4. To understand the concept of correlation and regression and to learn the degree of association between two variables and establishing relationship between the variables.

References:

Web sites for free download books for Statistics
https://www.pdfdrive.com/introduction-to-statistics-books.html
http://www.freebookcentre.net/SpecialCat/Free-Statistics-BooksDownload.html
https://bookboon.com/en/statistics-ebooks http://onlinestatbook.com/Online_Statistics_Education.pdf

Text Books:

1. Statistics (Theory, Methods, Application) D C Sancheti, V K Kapoor, Sultan Chand and Sons, New Delhi 2. Statistical Methods, S.P. Gupta, Sultan Chand and Sons, New Delhi 3. Statistics (Theory and Practice) B.N Gupta, Sahitya Bhavan, Agra

Department of Computer Applications
B.C.A -Semester IV
CYBER SECURITY (Skill Course)

Credits: 2	**Theory: 2 Hours**	**Tutorials: -**
Max Marks: 50	**External: 50 Marks**	**Internal:**

Course Objectives:

	SYLLABUS	
UNIT I:	**Introduction to Cybercrime:**	7Hours

Introduction, Cybercrime: Definition and origins of the word, Cybercrime and Information Security, who are cyber criminals? Classifications of cybercrimes, cybercrime: the legal perspectives, an Indian perspective, cybercrime and the Indian IT Act 2000, a Global perspective on Cybercrimes.

UNIT II:	**Cybercrime-Mobile and Wireless Devices:**	9Hours

Introduction, Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit Card Frauds in Mobile and Wireless Computing Era, Authentication Service Security, Attacks on Mobile/Cell Phones.
Mobile Devices: Security Implications for Organizations, Organizational Measures for Handling Mobile Devices-Related Security Issues, Organizational Security Policies and Measures in Mobile Computing Era, Laptops.

UNIT III:	**Tools and Methods Used in Cybercrime:**	9Hours

Tools and Methods Used in Cybercrime: Password Cracking, key loggers and Spywares, virus and worms, Trojan Horses and Backdoors, Steganography, attacks on wireless networks, Phishing and Identity Theft: Introduction, Phishing, Identity Theft (ID Theft)

Outcomes:

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

1. Develop an understanding of cybercrimes and various legal perspectives involved.
2. Develop a security model to handle mobile, wireless devices and related security issues of an organization.
3. Use the cybercrime tools and methods in solving real world problems

References:

Text Books:

Mark Rhodes, Ousley, Information Security, 1st Edition ,MGH, 2013. 2. Nina Godbole and SunitBelpure ¯ Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives , 1st Edition Publication Wiley, 2011.

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BACHELOR OF COMPUTER APPLICATIONS

Syllabi

With effect from 2023-24 admitted batch

III YEAR I SEMESTER

V Semester

Paper Code	Course	Teaching Hours	Sem End Exam	Mid Sem Exam*	Total Marks	Credits
BCA3.1.1	Web Programming	3	60	40	100	3
BCA3.1.2	Web Programming Lab	2	25	25	50	1
BCA3.1.3	Web Development Using PHP & MySQL	3	60	40	100	3
BCA3.1.4	Web Development Using PHP & MySQL Lab	2	25	25	50	1
BCA3.1.5	Cloud Computing (OR) Machine Learning	3	60	40	100	3
BCA3.1.6	Cloud Computing (OR) Machine Learning Lab	2	25	25	50	1
BCA3.1.7	Software Testing (OR) Foundations of Data Science	3	60	40	100	3
BCA3.1.8	Software Testing (OR) Foundations of Data Science Lab	2	25	25	50	1
BCA3.1.9	Deep Learning Theory Minor-5	3	60	40	100	3
BCA3.1.10	Deep Learning Lab Minor-5	2	25	25	50	1
BCA3.1.11	Neural Networks Theory Minor-6	3	60	40	100	3
BCA3.1.12	Neural Networks Lab Minor-6	2	25	25	50	1
BCA3.1.13	Environmental Education Value Added course	2	50	0	50	2
Total		**32**	**560**	**390**	**950**	**26**

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WEB PROGRAMMING

Credits: 4	Theory: 4 Hours	Tutorials: -
Max Marks: 100	**External: 75 Marks**	**Internal: 25 Marks**

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.

SYLLABUS

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, block quote 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 nearby 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		
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		
References:		
1. HTML & CSS: The Complete Reference, 5th Edition, Thomas. A. Powell		

Department of Computer Applications

B.C.A-Semester IV
WEB PROGRAMMING LAB

Credits: 1	**Theory: 2 Hours**	**Tutorials: -**
Max Marks: 50	**External: 25 Marks**	**Internal: 25 Marks**

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.		
	SYLLABUS	
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.

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.

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B.C.A-Semester IV
WEB DEVELOPMENT USING PHP & MYSQL

Credits: 4	Theory: 4 Hours	Tutorials: -
Max Marks: 100	External: 75 Marks	Internal: 25 Marks

Course Objectives:

	SYLLABUS	
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 Industr

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

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.

References:		

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.

Department of Computer Applications

B.C.A-Semester IV

WEB DEVELOPMENT USING PHP & MYSQL LAB

Credits: 1	**Theory: 2 Hours**	**Tutorials: -**
Max Marks: 50	**External: 25 Marks**	**Internal: 25 Marks**

Course Objectives:		
	SYLLABUS	
		-

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 mobno, 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.
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.

Department of Computer Applications

B.C.A-Semester IV

CLOUD COMPUTING

Credits: 4	**Theory: 4 Hours**	**Tutorials: -**
Max Marks: 100	**External: 75 Marks**	**Internal: 25 Marks**
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.		
	SYLLABUS	
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
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
References:
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

Department of Computer Applications

B.C.A-Semester IV
CLOUD COMPUTINGLAB

Credits: 1	**Theory: 2 Hours**	**Tutorials: -**
Max Marks: 50	**External: 25 Marks**	**Internal: 25 Marks**

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.

SYLLABUS

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)

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

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B.C.A-Semester IV
MACHINE LEARNING

Credits: 4	Theory: 4 Hours	Tutorials: -
Max Marks: 100	**External: 60 Marks**	**Internal: 40 Marks**

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

SYLLABUS

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

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

References:		

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

Department of Computer Applications

B.C.A-Semester IV
MACHINE LEARNING LAB

Credits: 1	**Theory: 2 Hours**	**Tutorials: -**
Max Marks: 50	**External: 25 Marks**	**Internal: 25 Marks**

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

	SYLLABUS	

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

Outcomes:		
:On successful completion of this practical course, student shall be able to: Execute basic programs in either R or Pytho. Gain practical knowledge on different python libraries/packages . Implement different machine learning algorithms		

Department of Computer Applications

B.C.A-Semester IV
SOFTWARE TESTING

Credits: 4	**Theory: 4 Hours**	**Tutorials: -**
Max Marks: 100	**External: 60 Marks**	**Internal: 40 Marks**
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.		
	SYLLABUS	
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
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
References:
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

Department of Computer Applications

B.C.A-Semester IV
SOFTWARE TESTING LAB

Credits: 1	**Theory: 2 Hours**	**Tutorials: -**
Max Marks: 50	**External: 25 Marks**	**Internal: 25 Marks**

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.		
	SYLLABUS	-
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.

Outcomes:		
On successful completion of this practical course, student shall be able to: . Perform automation testing using selenium. . Get exposure on Selenium framework. . Gain practical knowledge on Selenium web drivers.		

Department of Computer Applications

B.C.A-Semester IV

FOUNDATIONS OF DATA SCIENCE

Credits: 4	**Theory: 4 Hours**	**Tutorials: -**
Max Marks: 100	**External: 60 Marks**	**Internal: 40 Marks**
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		
	SYLLABUS	
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 T̄ab 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 ScikitLearn, Scikit-Learn's Estimator API Case Study: Exploring Handwritten Digits		
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		
References:		
1. Introducing Data Science: BIG DATA, MACHINE LEARNING, AND MORE, USING PYTHON TOOLS by DAVY CIELEN, ARNO D. B. MEYSMAN, MOHAMED ALI 2. Python Data Science Handbook Essential Tools for Working with Data by Jake Vander Plas 3. R for Data Science Import, Tidy, Transform, Visualize, and Model Data by Hadley Wickham and Garrett Grolemund 4. Data Science using Python and R by C.D Larose and D.T.Larose 5. Mathematical Foundations of Data Science Using R by Frank Emmert-Streib, Salissou Moutari, and Matthias Dehmer		

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B.C.A-Semester IV
FOUNDATIONS OF DATA SCIENCE LAB

Credits: 1	Theory: 2 Hours	Tutorials: -
Max Marks: 50	External: 25 Marks	Internal: 25 Marks

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

SYLLABUS

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.

Outcomes:

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

Execute python basic programs.

Work with Python IDEs.

Gain practical knowledge on different python libraries .

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B.C.A-Semester IV
DEEP LEARNING

Credits: 4	Theory: 4 Hours	Tutorials: -
Max Marks: 100	**External: 60 Marks**	**Internal: 40 Marks**

Course Objectives:

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

SYLLABUS

Unit I:

BASICS OF NEURAL NETWORKS:

Basic concept of Neurons – Perceptron Algorithm – Feed Forward and Back Propagation Networks.

Unit II:

INTRODUCTION TO DEEP LEARNING

Feed Forward Neural Networks – Gradient Descent – Back Propagation Algorithm – Vanishing Gradient problem – Mitigation – RelU Heuristics for Avoiding Bad Local Minima – Heuristics for Faster Training – Nestors Accelerated Gradient Descent – Regularization – Dropout.

Unit III:

CONVOLUTIONAL NEURAL NETWORKS

CNN Architectures – Convolution – Pooling Layers – Transfer Learning – image Classification using Transfer Learning

Unit IV:

MORE DEEP LEARNING ARCHITECTURES

LSTM, GRU, Encoder/Decoder Architectures – Autoencoders – Standard- Sparse – Denoising – Contractive- Variational Auto encoders – Adversarial Generative Networks – Autoencoder and DBM

Unit V:

APPLICATIONS OF DEEP LEARNING

Image Segmentation – Object Detection – Automatic Image Captioning – Image generation with Generative Adversarial Networks – Video to Text with LSTM Models – Attention Models for

Computer Vision – Case Study: Named Entity Recognition – Opinion Mining using Recurrent Neural Networks – Parsing and Sentiment Analysis using Recursive Neural Networks – Sentence Classification using Convolutional Neural Networks – Dialogue Generation with LSTMs.

Outcomes:

Understand the role of Deep learning in Machine Learning Applications.

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

TextBooks

Francois Chollet, "Deep Learning with Python", Manning Publications, 2018.

References:

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

Department of Computer Applications

B.C.A-Semester IV

DeepLearning LAB

Credits: 1	Theory: 2 Hours	Tutorials: -
Max Marks: 50	External: 25 Marks	Internal: 25 Marks

Course Objectives:

- To understand the basic ideas and principles of Neural Networks
- To understand the basic concepts of Big Data and Statistical Data Analysis
- To familiarize the student with The Image

Processing facilities like Tensorflow and Keras

- To appreciate the use of Deep Learning Applications
- To understand and implement Deep Learning Architectures

	SYLLABUS	

Experiments List

Week-1 : Perceptron Learning Implementation
Week-2 : Multilayer
Perceptron and its
Hyperparameter Tuning
Week-3 : Hyperparameter
Tuning
Week-4 : Implementation of Multilayer Neural Network
using Keras and Data Augmentation on MNIST dataset.
Week-5 : CNN Implementation on MNIST Dataset.
Week-6 : Transfer Learning of pretrained models on MNIST dataset
Week-7 : Transfer Learning on Plant
Village dataset for Plant Disease Detection
Week-8 : Sentiment Analysis using
Recurrent Neural Networks(RNN)
Week-9 : Text Generation using LSTM
Week-10 : Denoising and Dimensionality Reduction for Medical
MNIST dataset using Autoencoders

Outcomes:		

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

Department of Computer Applications

B.C.A-Semester IV

NEURAL NETWORKS

Credits: 4	Theory: 4 Hours	Tutorials: -
Max Marks: 100	External: 75 Marks	Internal: 25 Marks

Course Objectives:

The main objective of this course is to provide the student with the basic understanding of neural networks fundamentals, Program the related algorithms and Design the required and related systems

	SYLLABUS	
Unit I:		

Introduction: A Neural Network, Human Brain, Models of a Neuron, Neural Networks viewed as Directed Graphs, Network Architectures, Knowledge Representation, Artificial Intelligence and Neural Networks

Learning Process: Error Correction Learning, Memory Based Learning, Hebbian Learning, Competitive, Boltzmann Learning, Credit Assignment Problem, Memory, Adaption, Statistical Nature of the Learning Process

Unit II:		

Single Layer Perceptron's: Adaptive Filtering Problem, Unconstrained Organization Techniques, Linear Least Square Filters, Least Mean Square Algorithm, Learning Curves, Learning Rate Annealing Techniques, Perceptron –Convergence Theorem, Relation Between Perceptron and Bayes Classifier for a Gaussian Environment

Multilayer Perceptron: Back Propagation Algorithm XOR Problem, Heuristics, Output Representation and Decision Rule, Computer Experiment, Feature Detection

Unit III:		

Back Propagation: Back Propagation and Differentiation, Hessian Matrix, Generalization, Cross Validation, Network Pruning Techniques, Virtues and Limitations of Back Propagation Learning, Accelerated Convergence, Supervised Learning

Unit IV:		

Self-Organization Maps (SOM): Two Basic Feature Mapping Models, Self-Organization Map, SOM Algorithm, Properties of Feature Map, Computer Simulations, Learning Vector Quantization, Adaptive Patter Classification.

Unit V:		
Neuro Dynamics: Dynamical Systems, Stability of Equilibrium States, Attractors, Neuro Dynamical Models, Manipulation of Attractors as a Recurrent Network Paradigm Hopfield Models – Hopfield Models, restricted boltzmen machine.		
Outcomes:		
Demonstrate ANN structure and activation Functions Define foundations and learning mechanisms and state-space concepts Identify structure and learning of perceptions. Explain Feed forward, multi-layer feed forward networks and Back propagation algorithms Analyze Radial Basis Function Networks, Theory Regularization and RBF networks fuzzy systems.		
Text Books		
1. Simon Haykin, "Neural Networks: A comprehensive foundation", Second Edition, Pearson Education Asia. 2. Satish Kumar, "Neural Networks: A classroom approach", Tata McGraw Hill, 2004.		
References:		
3. Robert J. Schalkoff, "Artificial Neural Networks", McGraw-Hill International Editions, 1997.		

B.C.A-Semester IV

Neural NetworksLAB

Credits: 1	**Theory: 2 Hours**	**Tutorials: -**
Max Marks: 50	**External: 25 Marks**	**Internal: 25 Marks**

Course Objectives:		
To gain knowledge in various fundamental concepts of Artificial Neural Networks which will help students to get sufficient knowledge to Analyze and design the various intelligent control systems.		
	SYLLABUS	

Lab Experiments:

Week 1:Write a program to implement Perceptron

Week 2:Write a program to implement AND gates.

Week 3:Write a program to implement OR gates.

Week 4:Implement Crab Classification using pattern net.

Week 5: Write a program to implement Wine Classification using Back propagation.

Week 6: Write a Script Addition function.

Week 7: Write a Script Subtraction function.

Week 8: Write a Script Multiply function.

Week 9: Write a Script Divide function.

Week 10: Write a program to implement classification of linearly separable Data with a perceptron.

Week 11: Implement single layer neural network classification.

Week 12: Implement multi-layer neural network classification

Week 13: Implement Regression.

Week 14: To study Convolutional Neural Network and Recurrent Neural Network.

Week 15: To study ImageNet, GoogleNet, ResNet convolutional Neural Networks.

Outcomes:

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

1. Understand the characteristics and types of artificial neural network and remember working of biological Neuron and Artificial Neural Network
2. Apply learning algorithms on perceptron and apply back propagation learning on Neural Network. Apply Back propagation algorithms application.
3. Design Convolutional Neural Network and classification using Convolutional Neural Network.
4. Solve sequence learning problem and implement long short-term memory and gated recurrent.

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B.C.A-Semester III
Environmental Education

Credits: 2	Theory: 2 Hours	Tutorials: -
Max Marks: 50	External: 50 Marks	Internal:

Course Objectives:

A Generic Course intended to create awareness that the life of human beings is an integral part of environment and to inculcate the skills required to protect environment from all sides.

	SYLLABUS	
UNIT I:	**Environment and Natural Resources**	7Hours

Multidisciplinary nature of environmental education;
1. Scope and importance.
2. Man as an integral product and part of the Nature.
3. A brief account of land, forest and water resources in India and their importance.
4. Biodiversity: Definition; importance of Biodiversity - ecological,consumptive, productive, social, ethical and moral, aesthetic, and option value.
5. Levels of Biodiversity: genetic, species and ecosystem diversity

UNIT II:	**Environmental degradation and impacts**	9Hours

1. Human population growth and its impacts on environment; land use change, land degradation, soil erosion and desertification.
2. Use and over-exploitation of surface and ground water, construction of dams, floods, conflicts over water (within India).
3. Deforestation: Causes and effects due to expansion of agriculture, firewood, mining, forest fires and building of new habitats.
4. Non-renewable energy resources, their utilization and influences.
5. A brief account of air, water, soil and noise pollutions; Biological, industrial and solid wastes in urban areas. Human health and economic risks.
6. Greenhouse effect - global warming; ocean acidification, ozone layer depletion, acid rains and impacts on human communities and agriculture.
7. Threats to biodiversity: Natural calamities, habitat destruction and fragmentation, over exploitation, hunting and poaching, introduction of exotic species, pollution, predator and pest control.

UNIT III:	**Conservation of Environment**	9Hours

1. Concept of sustainability and sustainable development with judicious use of land, water and forest resources; afforestation.
2. Control measures for various types of pollution; use of renewable and alternate sources of energy.
3. Solid waste management: Control measures of urban and industrial waste.
4. Conservation of biodiversity: In-situ and ex-situ conservation of biodiversity.
5. Environment Laws: Environment Protection Act; Act; Wildlife Protection Act; Forest Conservation Act.
6. International agreements: Montreal and Kyoto protocols; Environmental movēments: Bishnois of Rajasthan, Chipko, Silent valley.

Outcomes:

On completion of this course the students will be able to …..
1. Understand the nature, components of an ecosystem and that humans are an integral part of nature.
2. Realize the importance of environment, the goods and services of a healthy biodiversity,

dependence of humans on environment.
3. Evaluate the ways and ill effects of destruction of environment, population explosion on ecosystems and global problems consequent to anthropogenic activities.
4. Discuss the laws/ acts made by government to prevent pollution, to protect biodiversity and environment as a whole.
5. Acquaint with international agreements and national movements, and realize citizen's role in protecting environment and nature.

References:

Odum, E.P., Odum, H.T. & Andrews, J. (1971) Fundamentals of Ecology. Philadelphia:Saunders.
Pepper, I.L., Gerba, C.P. &Brusseau, M.L. (2011). Environmental and Pollution Science.Academic Press.
Raven, P.H., Hassenzahl, D.M. & Berg, L.R. (2012) Environment. 8th edition. JohnWiley & Sons.
Singh, J.S., Singh, S.P. and Gupta, S.R. (2014) Ecology, Environmental Science and Conservation. S. Chand Publishing, New Delhi.
Sengupta, R. (2003) Ecology and economics: An approach to sustainable development.OUP.
Wilson, E. O. (2006) The Creation: An appeal to save life on earth. New York: Norton.
Groom, Martha J., Gary K. Meffe, and Carl Ronald Carroll (2006) Principles ofConservation Biology. Sunderland: Sinauer Associates

Text Books:

ErachBarucha (2004) Text book of Environmental Studies for Undergraduate courses (Prepared for University Grants Commmission) Universities Press.
PurnimaSmarath (2018) Environmental studies Kalyani Publishers, Ludhiana

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ALL SEMESTERS
MODEL QUESTION PAPER

Time: 3 Hours **Max. Marks: 60**

SECTION - A

Answer the following Questions **(5 × 2 = 10 Marks)**

1. **UNIT-1**
2. **UNIT-2**
3. **UNIT-3**
4. **UNIT-4**
5. **UNIT-5**

SECTION-B

Answer the following Questions: **(5 x 10= 50 Marks)**

6. A. B. **UNIT-1**
7. A. B. **UNIT-2**
8. A. B. **UNIT-3**
9. A. B. **UNIT-4**
10. A B. **UNIT-5**