

RAMDEOBABA UNIVERSITY

[RBU]

NAGPUR - 440013



RBU

RAMDEOBABA UNIVERSITY, NAGPUR
Formerly Shri Ramdeobaba College of Engineering & Management (RCOEM) Est. 1984

TEACHING & EVALUATION SCHEME

BACHELOR OF COMPUTER APPLICATION

School of Computer Science & Engineering

2025-2029

Semester-I

S. No.	Course Type	Course Code	Course Name	L	P	C	Continuous Assessment	End Sem / Internal Eval	Total	Duration of End Semester
1	ESC	25CS18TP0101	Fundamentals of Programming	3	2	4	50 + 25	50 + 25	150	03 Hrs
2	ESC	25CS18TP0102	Digital Circuits	3	2	4	50 + 25	50 + 25	150	03 Hrs
3	VSEC	25CS18PR0103	Programming Workshop - I	0	2	1	25	25	50	-
4	BSC	25HS01TP0102	ChemInformatics	3	2	4	50 + 25	50 + 25	150	03 Hrs
5	BSC	25HS03TP0108	Matrices and Calculus	3	2	4	50 + 25	50 + 25	150	03 Hrs
6	AEC	25HS02TP0106	English for Professional Communication	2	2	3	50 + 25	50 + 25	150	02 Hrs
7	VEC	25HS02TH0103-2	Foundational course in Universal Human Values	1	0	1	25	25	50	-
8	CCA	25HS02PR0102	Liberal/Performing Art	0	2	1	25	25	50	-
			TOTAL	15	14	22	450	450	900	

Liberal/ Performing Art Bucket

Sr. No.	Course Code	Course Title	L	P	Credits	Continuous Evaluation	End Sem Exam/ Internal Evaluation	Total	ESE Duration
1	25HS02PR0102-2	Fundamentals of Indian Classical Dance: Bharatnatayam	0	2	1	25	25	50	NA
2	25HS02PR0102-3	Fundamentals of Indian Classical Dance: Kathak	0	2	1	25	25	50	NA
3	25HS02PR0102-4	Introduction to Digital Photography	0	2	1	25	25	50	NA
4	25HS02PR0102-5	Introduction to Basic Japanese Language	0	2	1	25	25	50	NA
5	25HS02PR0102-6	Art of Theatre	0	2	1	25	25	50	NA

6	25HS02PR0102-7	Introduction to French Language	0	2	1	25	25	50	NA
7	25HS02PR0102-8	Introduction to Spanish Language	0	2	1	25	25	50	NA
8	25HS02PR0102-9	Art of Painting	0	2	1	25	25	50	NA
9	25HS02PR0102-10	Art of Drawing	0	2	1	25	25	50	NA
10	25HS02PR0102-11	Nature Camp	0	2	1	25	25	50	NA
11	25HS02PR0102-12	Developing Self-awareness	0	2	1	25	25	50	NA
12	25HS02PR0102-13	Art of Poetry	0	2	1	25	25	50	NA
13	25HS02PR0102-14	Creative and content writing	0	2	1	25	25	50	NA
14	25HS02PR0102-15	Science of life through Bhagwad Gita	0	2	1	25	25	50	NA
15	25HS02PR0102-16	Sanskrit Sambhashan-Spoken Sanskrit	0	2	1	25	25	50	NA
16	25HS02PR0102-17	Kirtan Kala	0	2	1	25	25	50	NA
17	25HS02PR0102-18	Introduction to German Language and culture	0	2	1	25	25	50	NA
18	25HS02PR0102-19	Adventure Sports	0	2	1	25	25	50	NA
19	25HS02PR0102-20	Introduction to Defense Forces & Obstacle Training	0	2	1	25	25	50	NA
20	25HS02PR0102-21	First Aid & Disaster Management	0	2	1	25	25	50	NA
21	25HS02PR0102-22	Basic Nutritional Course	0	2	1	25	25	50	NA
22	25HS02PR0102-23	Stress Management Through Yoga & Meditation	0	2	1	25	25	50	NA

Semester-II

S. No.	Course Type	Course Code	Course Name	L	P	C	Continuous Assessment	End Sem / Internal Eval	Total	Duration of End Semester
1	ESC	25CS18TP0201	Object Oriented Programming	3	2	4	50+25	50+25	150	03 Hrs
2	PCC	25CS18TH0202	Computer Architecture and Organization	3	0	3	50	50	100	03 Hrs
3	VSEC	25CS18PR0203	Programming Workshop - II	0	2	1	25	25	50	-
4	VEC	25CS18TH0204	Cyber Laws & Ethics in IT	2	0	2	50	50	100	02 Hrs
5	BSC	25HS05TP0202	Basics of Quantum Computing	3	2	4	50+25	50+25	150	03 Hrs
6	BSC	25HS03TH0218	Foundation of Probability and Statistics	3	0	3	50	50	100	03 Hrs
7	IKS	25HS02TH0207	Foundational Literature of Indian Civilization	2	0	2	50	50	100	02 Hrs
8	CCA	25HS04PR0204	Health-Fitness-Wellbeing	0	2	1	25	25	50	-
			TOTAL	16	8	20	400	400	800	

Exit Option: Award of Undergraduate Certificate after securing 42 credits and an additional 8 Credits

Exit Courses

1.	Computer Hardware and Networking	Online/offline Certification Course	8
2.	Advanced JAVA programming		8
3.	Python Programming		8
4.	Web Designing		8

Semester-III

S. No.	Course Type	Course Code	Course Name	L	P	C	Continuous Assessment	End Sem / Internal Eval	Total	Duration of End Semester
1	PCC	25CS18TP0301	Introduction to Data Structures	4	2	5	50+25	50+25	150	03 Hrs
2	VSEC	25CS18PR0302	IT Infrastructure Services Lab	0	2	1	25	25	50	-
3	VEC	25CS18PR0303	Software Lab	0	2	1	25	25	50	-
4	VEC	25CS18PR0304	Project based Learning	0	4	2	25	25	50	-
5	EEM	25CS18TH0305	Principles of Management	2	0	2	50	50	100	02 Hrs
6	MDM	25CS18TH0306	MDM-I	3	0	3	50	50	100	03 Hrs
7	BSC	25HS03TH0305	Discrete Mathematics & Graph Theory	3	0	3	50	50	100	03 Hrs
8	OEC	25ID118TH0301	Open Elective -I	2	0	2	50	50	100	02 Hrs
9	BSC	25HS01TH0303	Environmental Science	2	0	2	50	50	100	02 Hrs
10	AUD	25HS04PR0301	Self-Defence & Indian Martial Arts	0	2	0	-	-	-	-
			TOTAL	16	12	21	400	400	800	

Semester-IV

S. No.	Course Type	Course Code	Course Name	L	P	C	Continuous Assessment	End Sem / Internal Eval	Total	Duration of End Semester
1	PCC	25CS18TP0401	Introduction to Database Management Systems	4	2	5	50+25	50+25	150	3 hrs
2	PCC	25CS18TP0402	Introduction to Operating Systems	3	2	4	50+25	50+25	150	3 hrs
3	PCC	25CS18TP0403	Introduction to Computer Networks	3	2	4	50+25	50+25	150	3 hrs
4	PCC	25CS18TH0404	Theory of Computation	3	0	3	50	50	100	3 hrs
5	VEC	25CS18TH0405	Creativity, Innovation & Design Thinking	2	0	2	50	50	100	02 Hrs
6	MDM	25CS18TH0406	MDM-II	3	0	3	50	50	100	03 Hrs
7	OE	25ID118TH0401	Open Elective - II	2	0	2	50	50	100	02 Hrs
			TOTAL	20	06	23	425	425	850	

Exit Option: Award of Undergraduate Diploma after securing 86 credits and an additional 8 Credits

Exit Courses			
1.	Web Development	Online/offline Certification Course	8
2.	Mobile Development		8
3.	Data Analyst		8
4.	Ethical Hacking		8
5.	IT certified data engineer		8
6.	Blockchain and its application		8

Semester-V

S. No.	Cour se Type	Course Code	Course Name	L	P	C	Continu ous Assess ment	End Sem / Internal Eval	Total	Duration of End Semester
1	PCC	25CS18TP0501	Introduction to Data Science	3	2	4	50+25	50+25	150	03 hrs
2	PCC	25CS18TP0502	Analysis of Algorithms	4	2	5	50+25	50+25	150	03 Hrs
3	PCC	25CS18TP0503	Software Engineering	3	2	4	50+25	50+25	150	03 hrs
4	AEC	25CS18PR0504	Basic Competitive Coding	0	2	1	50	-	50	-
5	VSEC	25CS18PR0505	Mini Project – I	0	4	2	75	75	150	-
6	MDM	25CS18TH0506	MDM-III	3	0	3	50	50	100	03 Hrs
7	OE	25ID118TH0501	Open Elective -III	2	0	2	50	50	100	02 Hrs
			TOTAL	15	12	21	450	400	850	

Semester-VI

S. No.	Course Type	Course Code	Course Name	L	P	C	Continuous Assessment	End Sem / Internal Eval	Total	Duration of End Semester
1	PCC	25CS18PR0601	Mobile Applications and Development Lab	0	4	2	25	25	50	-
2	PCC	25CS18TP0602	Internet and Web Technologies	4	2	5	50+25	50+25	150	03 hrs
3	PCC	25CS18TP0603	Artificial Intelligence	3	2	4	50+25	50+25	150	03 hrs
4	PCC	25CS18TH0604	Basics of Ethical Hacking	3	0	3	50	50	100	03 hrs
5	PEC	25CS18TP0605	Program Elective - I	3	2	4	50+25	50+25	150	03 hrs
6	VSE C	25CS18PR0606	Mini Project – II	0	4	2	75	75	150	-
7	AEC	25CS18PR0607	Advanced Competitive Coding	0	2	1	50	-	50	-
8	AEC	25CS18PR0608	Participative Learning	0	2	1	50	-	50	-
9	MDM	25CS18TH0609	MDM-IV	3	0	3	50	50	100	03 Hrs
			TOTAL	16	18	25	525	425	950	

Exit Option: Award of Undergraduate Degree after securing 132 credits and an additional 8 Credits

Exit Courses			
1.	Project	-	8

Semester-VII/VIII

Sr. No.	Course type	Course Code	Course Name	L	P	C	Continuous Assessment	End Sem Exam	Total	Exam Duration
1	PCC	25CS18TP0701	Machine Learning	3	2	4	50+25	50+25	150	03 Hrs
2	PCC	25CS18TH0702	Data Mining	3	0	3	50	50	100	03 Hrs
3	PEC	25CS18TH0703	Program Elective -II	3	0	3	50	50	100	03 Hrs
4	PEC	25CS18TP0704	Program Elective - III	3	2	4	50+25	50+25	150	03 Hrs
5	PRJ	25CS18PR0705	Project -III	0	8	4	75	75	150	-
TOTAL				12	12	18	325	325	650	

Semester-VIII/ VII

S. No.	Course Type	Course Code	Course Name	L	P	C	Continuous Assessment	End Sem / Internal Eval	Total	Duration of End Semester
1	PCC	25CS18TH0801	Introduction to Deep Learning	4	0	4	50	50	100	03 Hrs
2	PEC	25CS18TP0802	Program Elective -IV	3	2	4	50+25	50+25	150	03 Hrs
3	PEC	25CS18TP0803	Program Elective -V	3	2	4	50+25	50+25	150	03 Hrs
TOTAL				10	4	12	200	200	400	

OR

S. No.	Course Type	Course Code	Course Name	L	P	C	Continuous Assessment	End Sem / Internal Eval	Total	Duration of End Semester
1	INT R	25CS18PR0804	Full Semester Internship/ Research Internship/ TBI	0	24	12	200	200	400	-

● Research

Methodology course of 3 credits should be taken by those students who are going for a Research Internship. These credits are inclusive of 12.

Award of Undergraduate Degree with Honors after securing 162 credits

ELECTIVE BASKET

Micro Specialization	Course Code	Elective-1 [SEM-6]
Cloud	25CS18TP0605-1	Distributed and Parallel Databases
Security	25CS18TP0605-2	Intrusion Detection and Prevention System
Image processing and NLP	25CS18TP0605-3	Computer Graphics

Micro Specialization	Course Code	Elective-2 [SEM-7]
Cloud	25CS18TH0703-1	Administration Cloud
Security	25CS18TH0703-2	Ethical Hacking
Image processing and NLP	25CS18TH0703-3	Digital Image Processing

Micro Specialization	Course Code	Elective-3 [SEM-7]
Cloud	25CS18TP0704-1	Development on Cloud
Security	25CS18TP0704-2	Vulnerability Assessment and Penetration Testing
Image processing and NLP	25CS18TP0704-3	Natural Language Processing

Micro Specialization	Course Code	Elective-4 [SEM-8]
Cloud	25CS18TP0802-1	AI & ML on Public Cloud Platform
Security	25CS18TP0802-2	Cyber Risk Assessment & Management
Image processing and NLP	25CS18TP0802-3	Computer Vision

Micro Specialization	Course Code	Elective-5 [SEM-8]
Cloud	25CS18TP0803-1	Cloud Security
Security	25CS18TP0803-2	Auditing IT Infrastructure for Compliance
Image processing and NLP	25CS18TP0803-3	Deep Learning for Computer Vision and NLP

OPEN ELECTIVE

Semester	Course Code	Course Name
Semester-III [Open Elective-I]	25ID118TH0301-1	Cyber Laws & Ethics
	25ID118TH0301-2	Statistical Computing with R
	25ID118TH0301-3	Introduction to Data Science
	25ID118TH0301-4	MOOC-Coursera
	25ID118TH0301-5	Course offered by CDPC
Semester-IV [Open Elective-II]	25ID118TH0401-1	Tools for Data Science
	25ID118TH0401-2	Web Development
	25ID118TH0401-3	Mobile App Development

	25ID118TH0401-4	MOOC-Coursera
	25ID118TH0401-5	Course offered by CDPC
Semester-V [Open Elective-III]	25ID118TH0501-1	Data Analytics Visualization
	25ID118TH0501-2	Open-Source Technologies
	25ID118TH0501-3	Basics of Ethical Hacking
	25ID118TH0501-4	MOOC-Coursera
	25ID118TH0501-5	Course offered by CDPC

Multidisciplinary Minor [MDM] Track

[For Students other than School of Computer Science & Engineering]

Semester	MDM	Track
Semester-III	MDM-I	Introduction to Web Development
Semester-IV	MDM-II	Front End Development
Semester-V	MDM-III	Backend Technologies
Semester-VI	MDM-IV	Cloud Technologies

Course Code: 25CS18TP0101

Course: Fundamentals of Programming

L: 3 Hrs P: 2 Hr, Per Week

Total Credits: 4

Course Objectives

1. Understand logic for simple problem statements.
2. Learning coding problems involving statements like decision-making and loops, functions, etc.
3. Explore modular programming.
4. Understand the concepts based on arrays, structures, file operations, etc.

Course Outcomes

On successful completion of the course, student shall be able to

1. Design logic for simple problem statements.
2. Code problem statements involving decision-making and loops.
3. Use functions for modular programming.
4. Apply the concept of arrays in coding.
5. Apply the concept of structures in coding.
6. Perform file operations.

SYLLABUS

Unit I: Introduction to components of a computer system, Algorithm and Flowchart for problem-solving.

Introduction to C language: Keywords, Constant, Variable, Data types, Operators, Types of Statements, Decision Control Statement- if and Conditional operators.

Unit II: Switch case statement, Loops, Pre-processor Directives.

Unit III: Concept of functions, User defined and Library Functions, parameter passing, Recursion, Storage class, Pointers.

Unit IV: Arrays: 1-D, 2-D, Searching, Basic Sorting Algorithms (Bubble, Insertion and Selection), Pointers to the array, Command line arguments.

Unit V: Structures, Simple structures, Array of Structures

Unit VI: File handling Streams in C, Types of Files, File Input/ Output Operations: Modes of file opening, Reading and writing the file, Closing the files, using fflush ().

Text Books :

1. The C Programming Language: B. W. Kernighan and D. M. Ritchie, Second Edition, Pearson, June 2015
2. Programming in ANSI C: E. Balguruswami McGraw Hill
3. Programming in C: B. Gottfried, Second Edition, Schaum Outline Series, Tata Mc-Graw Hill Publishers, 1996

Reference Books

1. Mastering C: K. R. Venugopal and S. R. Prasad, Tata McGraw Hill
2. Let Us C: Yashwant Kanetkar, BPB Publication

Lab Syllabus:

Minimum 8 practicals based on the syllabus.

Syllabus for Semester I, Bachelor of Computer Application

Course Code: 25CS18TP0102

Course: Digital Circuits

L: 3 Hrs P: 2 Hrs, Per Week

Total Credits: 4

Course Objective

1. Understand the basics of digital systems, including number systems and arithmetic operations.
2. Learn the minimization techniques and Boolean algebra.
3. Explore the combinational as well as sequential circuits.
4. Comprehend microprocessor fundamentals and programming concepts.

Course Outcomes

After successful completion of this course, the student will be able to,

1. Apply the knowledge of number systems and arithmetic operations to solve problems.
2. Apply minimization techniques and Boolean algebra to simplify logic functions and its realization.
3. Design and analyse combinational as well as sequential circuits.
4. Use microprocessor programming concepts to write simple Assembly language programs.

SYLLABUS

UNIT-I

Basics of number Systems and operations

Introduction to digital systems and their applications, number systems (binary, decimal, octal, hexadecimal), Binary Codes: BCD, Excess-3, Gray, Arithmetic Operations, Signed Number Representation.

UNIT-II

Minimization Techniques and Switching Circuits

Boolean Algebra, Boolean Algebraic Theorems, Representation of Boolean functions, Logic simplification techniques: Karnaugh maps up to five variables, Quine-McCluskey method, Map manipulation-essential prime implicants, non-essential prime implicants. Basic, Universal and Special Purpose Gates, Realization of logic using universal gates.

UNIT-III

Combinational Logic Circuits

Design Procedure of Combinational Circuit, Arithmetic Circuits: Adder (Half, Full, Parallel, Carry look-ahead, Serial, BCD, Excess-3), Subtractor, Non-Arithmetic Circuits: Code Converter, Magnitude Comparator, Multiplexer, Decoder, De-Multiplexer, Encoder, Parity Generators/Checkers, Hazards.

UNIT-IV

Sequential Circuit-I

Latches and flip-flops: Triggering, SR-latch, JK, D and T Flip Flop, Race Around Condition: Master Slave Flip-flop, Conversion of FFs, Analysis –Setup Time, Hold Time, Characteristics equations, State table, Excitation table, Introduction to memory: Random access memory, Read only memory, Programmable Logic Devices.

UNIT-V

Sequential Circuit-II

Asynchronous/ripple counter, synchronous counter, Synchronous counter Design, State diagram and State table, Shift registers and applications, Mealey & Moore Finite State Machines.

UNIT-VI

Fundamentals of 8085 Microprocessor

Microprocessor Architecture, Addressing Modes, Instruction set, Assembly language programming.

Text Books

1. A. Anand Kumar; Fundamental of Digital Electronics; Second Edition, PHI, 2016
2. Morris Mano; Digital Logic Design; Fourth edition, McGraw Hill, 2018
3. Ramesh Gaonkar; 8-bit Microprocessor; CBS Publishers; 2011

Reference Books

1. Roger L. Tokheim; Digital Electronics: Principles and Applications; Eighth edition, McGraw Hill, 2013
2. R P. Jain, Kishor Sarawadekar, Modern Digital Electronics, 5th Edition, 2022

Lab:

DIGITAL ELECTRONICS:

Practicals based on-

1. Verification of Truth Table for gates
2. Karnaugh map Reduction and Logic Circuit Implementation.
3. Verification of DeMorgan's Laws.
4. Implementation of Adder and Subtractor.

MICROPROCESSORS (8086 Assembly Language Programming)

Practicals based on-

1. 8 Bit/ 16 bit Addition and Subtraction.
2. BCD Addition and Subtraction.
3. 8 Bit Multiplication and Division.
4. Searching and Sorting

Syllabus for Semester I, Bachelor of Computer Application

Course Code : 25CS18PR0103

Course : Programming Workshop -I

L: 0 Hrs P: 2Hr, Per Week

Total Credits: 1

Course Outcomes

On successful completion of the course, students will be able to:

1. Perform Data Analysis using MS Excel.
2. Design static web pages using HTML.
3. Demonstrate proficiency in web page styling.
4. Develop websites using MS Excel, HTML and CSS

MS Excel

Complex formulas: INDEX-MATCH and array formulas, Pivot tables for comprehensive data analysis, Advanced charting for dynamic data visualization, Conditional formatting for data insights, Automating tasks with macros, Data validation for error-free data entry

HTML

Creation of headers, paragraphs, links, importing of images, tables, designing of forms, and document structure of HTML.

HTML-5

Navigation in Webpage, Multimedia based tags- audio, video, iframe, Creating Animations.

CSS & Bootstrap

Introduction to Cascading Style Sheets, Features, Core syntax, Style Sheets and HTML StyleRule, Text Properties

Text Books

1. Microsoft Excel 2019: Data analysis and Business Modelling, Wayne Winston, PHI
2. HTML & CSS: The Complete Reference, Thomas Powell, MGH
3. Web Design: A Beginner's Guide, Wendy Willard, MGH

PRACTICAL LIST

Course: COMPUTER WORKSHOP-I LAB

1. **MS Excel: INDEX-MATCH and Array Formula**

Suppose you manage a sales department and have a dataset containing sales data, including salespersons, products, sales amount, and the date of sales.

- a. Find the sales amount for a specific salesperson and product with INDEX-MATCH.
- b. Calculate the total sales for each salesperson using an array formula.

2. **MS Excel: PivotTable**

Assume we have sales data for a company that sells products in different regions through various salespersons. Our dataset includes columns for Date, Region, Salesperson, Product, Quantity Sold, and Sales Amount. Create and customize a PivotTable report in Excel to analyze and summarize sales data efficiently.

3. **MS Excel: Dynamic Vata visualization**

Assume we have sales data for different products across several months. Demonstrate on how to create advanced dynamic charts in Excel that update based on user input using various features in Excel, such as named ranges, data validation, and advanced chart types.

4. **MS Excel: Conditional Formatting**

Suppose you manage a sales team and have a dataset containing monthly sales data for each team member. Use conditional formatting in Excel to highlight top performers, identify underperformers, and visualize sales trends over time.

5. **MS Excel: Macros**

Demonstrate on how to automate the task of creating a weekly sales report using macros in Excel.

6. **HTML**

Design a static web page using HTML to display information about department of CSE and ET, which includes the following:

- a. Headings and paragraphs
- b. Line breaks and horizontal rules
- c. Format the text by using formatting tags
- d. Create a navigation bar and provide links to various web pages like About Department, Achievements, Placements, etc.

e. Insert ordered and unordered lists

7. HTML

Create HTML web page for T&P Registration by taking the controls for First

Name, Last Name, Date of Birth, Department (User has to select from dropdown list), Gender (take radio buttons), Semester-wise Marks, Uploading the Resume and any other information along with Accept terms and conditions etc. T&P Registration details must be displayed in a table.

8. HTML & CSS

Develop an online shopping website showing Home page first using HTML and CSS. Home page shows different items along with details. Once Item is purchased then click on the Item Image, open a new web page containing a feedback form.

9. HTML5 and CSS Animations

Design a webpage using advanced HTML5 tags for MP tourism.

- a. Details of any four tourist attractions in MP
- b. Each tourist location should have image, audio, and video related to its significance.
- c. Include iframes in the webpage.
- d. Include css animations.

10. HTML5 and Bootstrap

Design a responsive web page for Alumni Feedback using HTML5 and Bootstrap.

Syllabus for Semester I, Bachelor of Computer Application

Course Code: 25HS01TP0102

Course: ChemInformatics

L: 3 Hrs, P: 2 Hrs, Per Week

Total Credits: 4

Course Outcomes:

After the successful completion of the course, students shall be able to

CO1: Analyze the fundamental concepts of Cheminformatics and apply chemical data representation techniques

CO2: Classify and explain the properties, synthesis, and applications of conducting, semiconducting, and insulating materials used in computer hardware.

CO3: Identify and explain the chemical and thermal interactions affecting material compatibility and degradation

CO4: Analyze the physicochemical and biological factors influencing drug properties.

CO5: Apply molecular docking techniques and virtual screening methods for computer-aided drug design.

CO6: Utilize cheminformatics tools for chemical structure visualization and data management.

Unit- I: Introduction to Cheminformatics

Introduction to Cheminformatics, overview of the field and its applications, Introduction to databases, Types of database, Chemical data representation , Introduction of line notations, SMILES, SMARTS

Unit-II: Materials in computer hardware

Conducting materials – conducting polymers, synthesis and applications.

Semiconduction materials - semiconductors, doping, Silicon wafer production

Insulating materials- Plastics, ceramics and fibre glass.

Unit-III: Chemical Interactions

Material compatibility (Interfacial reactions, material degradation), Thermal Interactions (Thermal degradation, Inter-metallic compound formation)

Factors influencing degradation- moisture, humidity, stress, temperature, chemical and biological agents.

Unit -IV: Drug and Data Bases

Drug and Data bases: Introduction, classification of drugs, Drug Solubility and factors affecting it, permeability and factors affecting it, Drug Likeness Introduction to Pharmacokinetics and Pharmacodynamics, ADMET

Unit-V: Computer Aided Drug Design

Introduction to molecular docking, rigid docking, flexible docking- shape complementarity, 3D data base searching and virtual searching, brief introduction about various online tools for drug designing and molecular docking.

Unit-VI: Tools for Cheminformatics

Visualization tools like ChemDraw, Data management tools like PubChem, ChEMBL, ChemSpider etc.

Text Books

1. Upadhayay, K. Upadhayay, N. Nath, Biophysical Chemistry (Principles and Techniques), Himalaya Publishing House, 2009.
2. David L. Nelson and Michael M. Cox, Lehninger Principles of Biochemistry, Fifth Edition, W. H. Freeman and Company, New York, 2008.
3. Young David. Computational drug design: A Guide for Computational and Medicinal Chemists. Publisher: Wiley. 2009. ISBN: 9780470126851
4. Elementary Organic Spectroscopy by Y. R. Sharma

Reference books

1. Chem-informatics: Basic Concepts and Methods" edited by Thomas Engel and Johann Gasteiger
2. Introduction to Bioinformatics by Arthur M. Lesk University of Cambridge, Published in the United States by Oxford University Press Inc., New York
4. Abraham, Donald (Ed). Burger's medicinal chemistry and drug discovery. Publisher: John Wiley & Sons, Inc. 2003. ISBN: 0471270903
5. Schlick, T. Molecular modelling and simulation: an interdisciplinary guide. Publisher: Springer. 2002. ISBN: 0-387-95404-X
6. Leach, Andrew. Molecular Modelling: Principles and Applications. Publisher: Prentice Hall. 2001. ISBN: 0582239338.
7. Jensen, Jan H. Molecular Modeling Basics. Publisher: CRC Press. 2010. ISBN: 978-1420075267
8. Hinchliffe Alan. Molecular modelling for beginners. Publisher: John Wiley and Sons Ltd. 2008. ISBN: 978 0470513149

E- Text book

1. Computer Aided Drug Design by Prof. Mukesh Doble, Biotechnology, IIT, Madras (Swayam NPTEL)
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Lab:

Course Outcomes

1. CO1: Apply the fundamental principles of measurement, preparation of solution, handling of hazardous chemicals and also estimate the amount of different elements present in the given samples.
2. CO1: Use open online tools and various search tools for understanding the properties and functioning of various biomolecules/Chemicals and analyse the spectral properties for qualitative and quantitative analysis

. List of Experiments:

1. To understand the functions of various biologically important biomolecules and to search Material Safety Data Sheets of different biomolecules / hazardous bio-chemical
2. Preparation of different Solutions: Molar solution, Normal solution and percent solution and Determination of concentration.
3. Basic statistical analysis of results of neutralization of acid against the base and preparing acceptable graphs using software.
4. To compute and analyze the structures and molecular bondings in the bio-molecules / drugs using open online software such as Chem-Sketch, etc..
5. To compute and analyze the bio-activity of drugs molecule / new molecular structure using open online software such as Molinspiration, etc
6. To study chemical kinetics of per-oxydisulphate and iodide ions reactions and to find out order of the reaction and analysis of experimental data using Computational Software
7. Determination of rate of the reaction at room temperature and analysis of experimental data using Computational Software
8. Prediction of infrared/NMR spectral and analytical data of organic molecules using Computational Software.
9. Spectroscopic/Colorimetric determination of wavelength of maximum absorption of chemical/biological compound in solution and determination of concentration using Lambert's- Beer's Law.
10. Estimation of Fe^{2+} ions spectro-photometrically.

Suggested Books/Reference Books:

1. S. S. Dara, A Textbook on Experiments and Calculations in Engineering Chemistry, S. Chand Publications.
2. J. B. Yadav, Advanced Practical Physical Chemistry, Krishna's Prakashan Media (P) Limited.
3. A. J. Elias, Collection of Interesting General Chemistry Experiments, Universities Press Publications.
4. V. K. Ahluwalia, S. Dhingra and A. Gulati, College Practical Chemistry, Universities Press Publications. **a g e**

Syllabus for Semester I, Bachelor of Computer Application

Course Code: 25HS03TP0108

Course: Matrices and Calculus

L: 3 Hrs P: 2 Hr, Per Week

Total Credits: 4

Course Objective

The objective of this course is to develop students' foundational understanding of matrix theory, differential and integral calculus, and their applications. It aims to enhance analytical and problem-solving skills through the study of linear algebra, eigenvalue analysis, partial derivatives, and optimization. The course also incorporates computational tools and mathematical software to visualize, simulate, and apply mathematical concepts in areas such as data analysis, computer graphics, and scientific computing, thereby preparing students for practical and interdisciplinary applications in computer science and allied fields.

Course Outcomes

On successful completion of the course, student shall be able to

1. **Perform** matrix operations and determine properties such as symmetry and orthogonality using both analytical methods and mathematical software.
2. **Solve** systems of linear equations and **compute** eigenvalues and eigenvectors; **use** computational tools to diagonalize matrices and interpret applications in graphics and data representation
3. **Compute** derivatives and integrals of algebraic, trigonometric, logarithmic, and exponential functions; **implement** symbolic and numerical differentiation/integration using software.
4. **Calculate** first and higher-order partial derivatives of multivariable functions and **visualize** their behavior using 2D and 3D plots in computational environments.
5. **Determine** maxima and minima of functions of one and several variables using analytical techniques and **apply** numerical methods such as gradient descent in optimization problems.

Theory Syllabus

Module 1 : (8 Lectures)

Algebra of matrices, types of matrices, and matrices of order two and three, Properties of determinants, evaluation of determinants, Adjoint and evaluation of inverse of a square matrix using determinants, orthogonal matrices, symmetric matrices.

Module 2:(8 Lectures)

Rank of matrix, Consistency of system of linear equations and its solution, solution of linear system of equations by using inverse and rank concept, linearly dependent and independent vectors, Eigen values and eigenvectors, Diagonalization of matrices

Module 3: (8 Lectures)

Differentiation: Limits of a function, Differentiability, Differentiation of the sum, difference, product, and quotient of two functions, Differentiation of trigonometric, inverse trigonometric,

logarithmic, exponential, composite and implicit functions, definite Integration and Indefinite integration.

Module 4: (8 Lectures)

Partial Differentiation: Partial derivatives, higher order partial derivatives, Euler's Theorem, Deduction of Euler's theorem, Chain rule

Module 5: (8 Lectures)

Application of Derivative: Monotonic increasing and decreasing functions, Maxima, and minima of functions of one variable, Maxima, and minima of functions of several variables, Lagrange's method for finding Maxima and Minima.

Lab Syllabus:

Exp. No.	Name of Experiments	Mapped COs
1	To use mathematical software as an advance calculator .	CO1, CO3
2	2D Plotting and data visualization	CO2,CO4, CO5
3	3D-plotting and data visualization	CO2, CO4
4	Matrix Computations and Eigenvalue Analysis	CO1,CO2
5	Linear Algebra with Various applications (computer Graphix , image processing)	CO1, CO2
6	Differential Calculus Techniques for Modelling Engineering behavior.	CO3 , CO4
7	Applied optimization (Maxima, minima and Gradient descent method)	CO5
8	Curve Fitting to identify trends and patterns within dataset .	CO5

Textbooks/References

1. Thomas Finney, Calculus, Pearson Low price edition, 2018
2. Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008.
3. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.
4. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 35th Edition, 2000.
5. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010.
6. Paul Zimmermann, Computational Mathematics with Sagemath , siam publisher.

Syllabus for Semester I, Bachelor of Computer Application

Course Code: 25HS02TP0106

Course: English for Professional Communication

L: 2 Hrs, P: 2 Hr, Per Week

Total Credits: 3

Course Objectives

The main objective of this course is to enhance the employability skills of students as well as prepare them for effective work place communication.

Course Outcomes:

On successful completion of the course the students will be able to achieve the following:

1. Demonstrate effective use of word power in written as well as oral communication.
2. Understand the techniques of listening and apply the techniques of reading comprehension used in professional communication.
3. Apply the principles of functional grammar in everyday as well as professional communication.
4. Effectively implement the comprehensive principles of written communication by applying various writing styles.
5. Create precise and accurate written communication products.

Unit I: Vocabulary Building hours

6

- 1.1 Importance of using appropriate vocabulary
- 1.2 Techniques of vocabulary development
- 1.3 Commonly used power verbs, power adjectives and power adverbs.
- 1.4 Synonyms, antonyms, phrases & idioms, one-word substitutions and standard abbreviations

Unit II: Listening and Reading Comprehension

6 hours

- 2.1 Listening Comprehension: active listening, reasons for poor listening, traits of a good listener, and barriers to effective listening
- 2.2 Reading Comprehension: types and strategies.

Unit III: Functional Grammar and Usage hours

6

- 3.1 Identifying Common Errors in use of: articles, prepositions, modifiers, modal auxiliaries, redundancies, and clichés
- 3.2 Tenses
- 3.3 Subject-verb agreement, noun-pronoun agreement
- 3.4 Voice

Unit IV: Writing Skills hours

6

- 4.1 Sentence Structures
- 4.2 Sentence Types
- 4.3 Paragraph Writing: Principles, Techniques, and Styles

Unit V: Writing Practices

6 hours

- 5.1 Art of Condensation: Précis, Summary, and Note Making
- 5.2 Correspondence writing techniques and etiquettes – academic writing
- 5.3 Essay Writing

Books

1. *Communication Skills*. Sanjay Kumar and PushpLata. Oxford University Press. 2011.
2. *Practical English Usage*. Michael Swan. OUP. 1995.
3. *Remedial English Grammar*. F.T. Wood. Macmillan. 2007

4. *On Writing Well*. William Zinsser. Harper Resource Book. 2001
5. *Study Writing*. Liz Hamp-Lyons and Ben Heasley. Cambridge University Press. 2006.
6. *Exercises in Spoken English*. Parts. I-III. CIEFL, Hyderabad. Oxford University Press

List of practicals

Computer Assisted + Activity Based Language Learning

Practical 1: Everyday Situations: Conversations and Dialogues – Speaking Skills

Practical 2: Pronunciation, Intonation, Stress, and Rhythm

Practical 3: Everyday Situations: Conversations and Dialogues – Listening Skills

Activity Based Language Learning

Practical 4: Presentation Skills: Orientation & Mock Session

Practical 5: Presentation Skills: Practice

Practical 6: Group Discussions: Orientation & Mock Session

Practical 7: Group Discussions: Practice

Practical 8: Personal Interviews: Orientation & Mock Session

Practical 9: Personal Interviews: Practice

Syllabus for Semester I, Bachelor of Computer Application

Course Code:25HS02TH0103-2 **Course:** Foundational course in Universal Human Values
L: 1 Hrs **P:** 0 Hr, Per Week **Total Credits:** 1

Course Objectives:

- To help the student see the need for developing a holistic perspective of life.
- To sensitize the student about the scope of life – individual, family (inter-personal relationship), society and nature/existence.
- To strengthen self-reflection.
- To develop more confidence and commitment to understand, learn and act accordingly.

Course Outcome:

On completion of course, students will be able to achieve the following:

- 1: Develop a holistic perspective of life
- 2: Better understanding of inter-personal relationships and relationship with society and nature.
- 3: An ability to strengthen self-reflection

SYLLABUS

Unit I:- Aspirations and concerns

5 hours

Need for Value Education: Guidelines and content of value education.

Exploring our aspirations and concerns: Knowing yourself, Basic human aspirations Need for a holistic perspective, Role of UHV; Self-Management: harmony in human being

Unit II:- Health

4

hours

Harmony of the Self and Body, Mental and physical health; Health for family, friends and society.

Unit III:- Relationships and Society

5

hours

Harmony in relationships, Foundational values: Trust, Respect, Reverence for excellence, Gratitude and love; harmony in society; harmony with nature.

Reference Material

The primary resource material for teaching this course consists of

Text book:

1. R.R Gaur, R Sangal, G P Bagaria, A foundation course in Human Values and professional Ethics, Excel books, New Delhi, 2010, ISBN 978-8-174-46781-2

Reference books:

1. B L Bajpai, 2004, Indian Ethos and Modern Management, New Royal Book Co., Lucknow. Reprinted 2008.
2. PL Dhar, RR Gaur, 1990, Science and Humanism, Commonwealth Purblishers.
3. Sussan George, 1976, How the Other Half Dies, Penguin Press. Reprinted 1986, 1991
4. Ivan Illich, 1974, Energy & Equity, The Trinity Press, Worcester, and HarperCollins, USA
5. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, limits to Growth, Club of Rome's Report, Universe Books.
6. Subhas Palekar, 2000, How to practice Natural Farming, Pracheen(Vaidik) Krishi Tantra Shodh, Amravati.
7. A Nagraj, 1998, Jeevan Vidya ek Parichay, Divya Path Sansthan, Amarkantak.
8. E.F. Schumacher, 1973, Small is Beautiful: a study of economics as if people mattered, Blond & Briggs, Britain.
9. A.N. Tripathy, 2003, Human Values, New Age International Publishers.

Syllabus for Semester I, Bachelor of Computer Application

Course Code: 25HS02PR0102-2 Course: Fundamentals of Indian Classical Dance: Bharatnatayam

L: 00 Hrs, T: 0 Hr, P: 2 Hrs, Per Week

Total Credits: 01

Course objective

The course aims to introduce the students to Bharatnatyam, an important element of Indian traditional knowledge system. The course will not only provide the learning and skill to perform this art but would also enhance many mental and physical aspects of the students such as strength, flexibility, discipline, self-confidence, creativity, focus, coordination, etc.

Course Outcomes

On completion of the course, students will be able to achieve the following:

CO1: Understand the importance of dance and Bharatnataym as an Indian dance form

CO2: Develop skills to perform the dance form at its basic level.

CO3: Evaluate their strengths and interest to take bridge course to give *Pratham* (1st level formal exam of Bharatnatayam).

Syllabus

Practical -1: Orientation in Bharatnatayam

Practical-2: Tattu Adavu till 8, Naatta Adavu 4 Steps, Pakka Adavu 1 step, Metta Adavu 1 Step, Kuditta Metta Adavu 4 Steps,

Practical -3: Practice sessions

Practical-4: Tatta Kuditta Adavu (Metta), Tatta Kuditta Adavu (Metta) 2 Steps, Tirmanam Adavu 3 Steps, Kattu Adav - 3 Steps, Kattu Adav - 3 Steps

Practical-5: Practice sessions

Practical-6: Tiramanam (front) 3 Steps, Repeat of Tiramanam (Overhead) 3 Steps,

Practical-7: practice sessions

Practical – 8: final practice sessions and performances.

Recommended reading

1. *Introduction to Bharata's Natyasastra*, Adya Rangacharya, 2011
2. *The Natyasastra and the Body in Performance: Essays on the Ancient Text*, edited by Sreenath Nair, 2015
3. *Bharatanatyam How to ... : A Step-by-step Approach to Learn the Classical Form*, Eshwar Jayalakshmi, 2011

Syllabus for Semester I, Bachelor of Computer Application

Course Code: 25HS02PR0102-3 Course: Fundamentals of Indian Classical Dance: Kathak

L: 00 Hrs, T: 0 Hr, P: 2 Hrs, Per Week Total Credits: 01

Course objective

The course aims to introduce the students to Kathak, an important element of Indian traditional knowledge system. The course will not only provide the learning and skill to perform this art but would also enhance many mental and physical aspects of the students such as strength, flexibility, discipline, self-confidence, creativity, focus, coordination, etc.

Course Outcomes

On completion of the course, students will be able to achieve the following:

CO1: Understand the importance of dance and Kathak as an Indian dance form

CO2: Develop skills to perform the dance form at its basic level.

CO3: Evaluate their strengths and interest to take bridge course to give *Prarambhik* (1st level formal exam of Kathak).

Syllabus

Practical -1: Orientation in Kathak. Correct posture of kathak, Basic Movements and exercise Stepping, Chakkar of 5 count (Bhramari),

Practical -2: practice sessions of practical 1

Practical -3: Hastaks, Hastaks and Steppings, Reciting asamyukta Mudra shloka, Hastak and steppings

Practical -4: practice sessions of practical 3

Practical -5: Todas and Asamyukta hasta mudra shlok, Vandana of Shlok, 2 Todas and Vandana, Ghante Ki Tihai,

Practical -6: practice sessions of practical 5

Practical -7: 2 1 Chakkardar Toda and Ginnti Ki Tihai, 2 Todas and 1 Chakkardar Toda, practice sessions

Practical -8: Final performances.

Recommended reading

1. Kathak Volume1 A "Theoretical & Practical Guide" (Kathak Dance Book), Marami Medhi & Debasish Talukdar, 2022, Anshika Publication (13 September 2022)

Syllabus for Semester I, Bachelor of Computer Application

Course Code: 25HS02PR0102-4

L: 00 Hrs, T: 0 Hr, P: 2 Hrs, Per Week

Course: Introduction to Digital Photography

Total Credits: 01

Course objective

The course aims to develop basic skills of students in digital photography to lay a foundation for them as a hobby and/or a profession.

Course outcome:

At the end of the course the students will be able to achieve the following:

CO1: Develop an understanding of the technical aspects and aesthetics of Photography.

CO2: Apply the rules of digital photography for creating photographs.

CO3: Develop skills to enhance photographs through post processing.

CO4: Create a portfolio of their photographs in selected genre.

Syllabus

Practical 1: **Orientation in digital photography:** Genres, camera handling and settings

Practical 2: **Rules of Composition**

Practical 3: **Rules of Composition:** practice sessions

Practical 4: **Understanding Exposure and Art of Pre-Visualization**

Practical 5: **Rules of Composition and Art of Pre-Visualization:** practice sessions

Practical 6: **Post Processing Photographs and Portfolio creation**

Practical 7: **Post Processing Photographs:** practice sessions

Practical 8: **Portfolio finalization and presentation in selected genre.**

Reference material

1. Scott Kelby (2020) *The Digital Photography Book: The Step-by-Step Secrets for how to Make Your Photos Look Like the Pros*, Rocky Nook, USA
2. Larry Hall (2014) *Digital Photography Guide: From Beginner to Intermediate: A Compilation of Important Information in Digital Photography*, Speedy Publishing LLC, Newark
3. J Miotke (2010) *Better Photo Basics: The Absolute Beginner's Guide to Taking Photos Like a Pro*, AMPHOTO Books, Crown Publishing Group, USA

Syllabus for Semester I, Bachelor of Computer Application

Course Code: 25HS02PR0102-5

L: 00 Hrs, T: 0 Hr, P: 2 Hrs, Per Week

Course: Introduction to Basic Japanese Language

Total Credits: 01

Course objective

The course aims to develop basic communication skills in Japanese Language and help develop a basic understanding of Japanese culture for effective cross-cultural communication.

Course outcome

After the completion of the course the students will be able to achieve the following:

CO1: Basic understanding about Japan as a country and Japanese culture.

CO2: Ability to use vocabulary required for basic level communication in Japanese language.

CO3: Able to frame simple sentences in Japanese for everyday conversations

Syllabus

Practical-1: Orientation about Japan, its language, and its culture

Practical-2: Communication Skills 1: Vocabulary for basic Japanese language

Practical -3: Practice sessions

Practical-4: Basic day to day greetings in Japanese language and their usage through role-play

Practical-5: Practice sessions

Practical- 6: Communication Skills 2: framing sentences

Practical- 7: Practice sessions

Practical- 8: Introduction of Japanese Culture, Arts, Traditions, Etiquettes and Manners etc.

Recommended reading

1. Marugoto Starter (A1) Rikai - Course Book for Communicative Language Competences, by The Japan

Foundation, Goyal Publishers & Distributors Pvt. Ltd (ISBN: 9788183078047)

2. Japanese Kana Script Practice Book – Vol. 1 Hiragana, by Ameya Patki, Daiichi Japanese Language

Solutions (ISBN: 9788194562900)

Syllabus for Semester I, Bachelor of Computer Application

Course Code: 25HS02PR0102-6

L: 00 Hrs, T: 0 Hr, P: 2 Hrs, Per Week

Course: Art of Theatre

Total Credits: 01

Course objectives:

The course aims to develop in the students, an actor's craft through physical and mental training.

Course Outcomes:

On completion of the course, students will be able to achieve the following:

CO1: Understand and synthesize the working of the prominent genres of theatre across the world.

CO2: Apply the skill of voice and speech in theatre and public speaking

CO3: Apply the art of acting and also develop generic skills such as confidence, communication skills, self-responsibility, motivation, commitment, interpersonal skills, problem solving, and self-discipline.

CO4: Apply skills acquired related to technical/production aspects of theatre and also develop problem solving and interpersonal skills.

Syllabus:

Syllabus

Practical 1: **Orientation in theatre**

Practical 2: **Voice and Speech training**

Practical 3: **Voice and Speech training:** practice sessions

Practical 4: **Art of acting**

Practical 5: **Art of acting:** practice sessions

Practical 6: **Art of script writing**

Practical 7: **Art of script writing:** practice sessions

Practical 8: **Final performances**

Reference books:

1. Boleslavsky, R. (2022). *Acting: The First Six Lessons* (1st ed., pp. 1-92). Delhi Open Books.

2. Shakthi, C. (2017). *No Drama Just Theatre* (1st ed., pp. 1-171). Partridge.

3. Bruder, M., Cohn, L. M., Olnek, M., Pollack, N., Previto, R., & Zigler, S. (1986). *A Practical Handbook for the Actor* (1st ed.). Vinatge Books New York.

Syllabus for Semester I, Bachelor of Computer Application

Course Code: 25HS02PR0102-7

L: 00 Hrs, T: 0 Hr, P: 2 Hrs, Per Week

Course: Introduction to French Language

Total Credits: 01

Course objective:

To help build a foundation and interest in French language so that the students can pursue the proficiency levels of the language in higher semesters.

Course outcomes:

On successful completion of the course the students will be able to achieve the following:

CO1. Demonstrate basic knowledge about France, the culture and similarities/differences between India and France

CO2. Learn to use simple language structures in everyday communication.

CO3. Develop ability to write in basic French about themselves and others.

CO4. Develop ability to understand beginner level texts in French

Syllabus

List of Practicals

Practical-1: Orientation about France, the language, and culture

Practical-2: Communication Skills 1: Vocabulary building for everyday conversations

Practical -3: Practice sessions

Practical-4: Reading and writing Skills : Reading and writing simple text in French

Practical-5: Practice sessions

Practical-6: Communication Skills 2: listening comprehension

Practical-7: Practice sessions

Practical-8: Writing Skills: Write basic French and practice

Recommended reading

1. 15-minute French by Caroline Lemoine
2. Cours de Langue et de Civilisation Françaises by G. Mauger Vol. 1.1
3. Cosmopolite I by Natalie Hirschsprung, Tony Tricot

Syllabus for Semester I, Bachelor of Computer Application

Course Code: 25HS02PR0102-8

L: 00 Hrs, T: 0 Hr, P: 2 Hrs, Per Week

Course: Introduction to Spanish Language

Total Credits: 01

Course objective:

To help build a foundation and interest in Spanish language so that the students can pursue the proficiency levels of the language in higher semesters.

Course outcomes:

On successful completion of the course the students will be able to achieve the following:

CO1. Demonstrate basic knowledge about Spain, the culture and similarities/differences between India and France

CO2. Learn to use simple language structures in everyday communication.

CO3. Develop ability to write in basic Spanish about themselves and others.

CO4. Develop ability to read and understand beginner level texts in Spanish

Syllabus

List of Practicals

Practical-1: Orientation about Spain, the language, and culture

Practical-2: Communication Skills 1: Vocabulary building for everyday conversations

Practical -3: Practice sessions

Practical-4: Reading and writing Skills : Reading and writing simple text in Spanish

Practical-5: Practice sessions

Practical-6: Communication Skills 2: listening comprehension

Practical-7: Practice sessions

Practical-8: Writing Skills: Write basic Spanish and practice

Recommended reading

1. 15-Minute Spanish by Ana Bremon
2. Aula Internacional 1 by Jaime Corpas ,Eva Garcia, Agustin Garmendia.
3. Chicos Chicas Libro del Alumno by María Ángeles Palomino

Syllabus for Semester I, Bachelor of Computer Application

Course Code: 25HS02PR0102-9
L: 00 Hrs, T: 0 Hr, P: 2 Hrs, Per Week

Course: Art of Painting
Total Credits: 01

Course objective

Painting is fundamentally about learning to see, and to transport that vision onto paper through a variety of mark making techniques. This course aims to develop basic skills of students in painting to lay a foundation for them as a hobby and/or a profession.

Course outcome:

At the end of the course the students will be able to achieve the following:

CO1: Become familiar with the basic methods, techniques & tools of painting.

CO2: Train the eye and hand to develop sense of balance, proportion and rhythm.

CO3: Develop the ability to observe and render simple natural forms.

CO4: Enjoy the challenging and nuanced process of painting.

Syllabus

Practical 1: **Orientation in Painting tools & basics of lines, shapes, light, shadows and textures**

Practical 2: **The art of observation** how to see shapes in drawing

Practical 3: **Introduction Water color** how to handle water paints

Practical 4: **Introduction to acrylic colors** how to handle acrylic paints

Practical 5: **Explore layering paint and capturing the quality of light with paint.**

Practical 6: **Create landscape painting**

Practical 7: **Create Abstract painting**

Practical 8: **Paint on Canvas** (try to recreate any famous painting)

Reference material

1. Drawing made easy by Navneet Gala; 2015th edition
2. Alla Prima II Everything I Know about Painting--And More by Richard Schmid with Katie Swatland
3. Daily Painting: Paint Small and Often To Become a More Creative, Productive, and Successful Artist by Carol Marine

Syllabus for Semester I, Bachelor of Computer Application

Course Code: 25HS02PR0102-10

L: 00 Hrs, T: 0 Hr, P: 2 Hrs, Per Week

Course: Art of Drawing

Total Credits: 01

Course objective

Drawing is fundamentally about learning to see, and to transport that vision onto paper through a variety of mark making techniques. This course aims to develop basic skills of students in drawing to lay a foundation for them as a hobby and/or a profession.

Course outcome:

At the end of the course the students will be able to achieve the following:

CO1: Become familiar with the basic methods, techniques & tools of drawing.

CO2: Train the eye and hand to develop sense of balance, proportion and rhythm.

CO3: Develop the ability to observe and render simple natural forms.

CO4: Enjoy the challenging and nuanced process of drawing.

Syllabus

Practical 1: **Orientation in Drawing tools & basics of lines, shapes, light, shadows and textures**

Practical 2: **The art of observation** how to see shapes in drawing

Practical 3: **One/two-point basic linear perspective**

Practical 4: **Nature drawing and landscapes**

Practical 5: **Gestalt principles of visual composition**

Practical 6: **Figure drawing:** structure and proportions of human body

Practical 7: **Gesture drawing:** expression and compositions of human figures

Practical 8: **Memory drawing:** an exercise to combine the techniques learnt

Reference material

1. Drawing made easy by Navneet Gala; 2015th edition
2. Perspective Made Easy (Dover Art Instruction) by Ernest R. Norling

Syllabus for Semester I, Bachelor of Computer Application

Course Code: 25HS02PR0102-11

L: 00 Hrs, T: 0 Hr, P: 2 Hrs, Per Week

Course: Nature Camp

Total Credits: 01

Course Objective: To create an opportunity for the students to develop affinity with nature and thus subsequently impact their ability to contribute towards sustainability of nature.

Course outcome:

After the completion of the course the students will be able to do the following:

CO1: Develop an affinity with nature by observing and understanding its marvels with guidance from experts

CO2: Develop an understanding of the challenges and solutions associated with nature and its conservation.

Course content

In collaboration with the Forest Department and/or a local NGO working in the field of environment conservation, this course would be conducted in 24 hours. Students will be taken to a tiger reserve in Central Indian region or Forest fringe villages or work with an NGO from Central Indian region working on natural resource management. The camps (for 2 days) will cover any one of the following topics as decided by the course coordinator:

1. Awareness about each element of biodiversity (camps on moths, butterflies, birds, other wildlife etc)
2. Environment management (water, forest, wildlife) – practices of Forest Department in managing a tiger reserve, and other aspects of water and forest conservation.
3. Sustainable natural resource management - initiatives by rural communities and local NGOs
4. Man-animal conflict and solutions (socio-economic and technical) – role of local communities and Forest Department
5. Traditional practices in environment conservation – role of local communities and local NGOs

Syllabus for Semester I, Bachelor of Computer Application

Course Code: 25HS02PR0102-12
L: 00 Hrs, T: 0 Hr, P: 2 Hrs, Per Week

Course: Developing Self-awareness
Total Credits: 01

Course objectives:

The course aims to develop students in their personal as well as professional life by means of graphotherapy, NLP, and Neurobics

Course Outcomes:

On completion of the course, students will be able to achieve the following:

CO1: Gain foundational understanding of graphology and through self-analysis will achieve greater awareness about their strengths and weaknesses & areas for personal growth

CO2: students will be equipped with tools and techniques for continuous self-improvement, using signature analysis and graphotherapy as part of their personal development journey

CO3: understand how to use Neuro Linguistic Programming (NLP) strategies to set and achieve goals effectively, overcoming mental blocks and limiting beliefs.

CO4: Enhance ability to absorb, retain, and recall information, which can benefit academic and professional performance.

Syllabus:

Practical 1: **The Power of Handwriting (Handwriting is Brainwriting)**

Practical 2: **Know yourself through handwriting**

Practical 3: **The Role of Signature in your life**

Practical 4: **Graphotherapy to enhance yourself in all ways**

Practical 5: **Neurolinguistic Programming , S.M.A.R.T Goal**

Practical 6: **Effective Communication Model, Rapport Building and Anchor**

Practical 7: **Brain Directives & Linguistic Presuppositions**

Practical 8: **Neurobics**

Syllabus for Semester I, Bachelor of Computer Application

Course Code: 25HS02PR0102-13

L: 00 Hrs, T: 0 Hr, P: 2 Hrs, Per Week

Course: Art of Poetry

Total Credits: 01

Course Outcomes:

To familiarize the students with the art of poetry and develop a sense of appreciation for the art

At the end of the course the student will be able to achieve the following:

CO1: Understand the origin and development of poetry

CO2: Appreciate the art of poetry in life

CO3: Develop aesthetic sense

CO4: Develop holistic perspective to their personality

Syllabus

Practical 1: **Art of poetry – orientation**

Practical 2: **Forms of poetry – orientation**

Practical 3: **Forms of poetry – recitation**

Practical 4: **Application of poetry – orientation**

Practical 5: **Application of poetry – practical session**

Practical 6: **Poetry and aesthetics**

Practical 7: **Writing poetry – orientation**

Practical 8: **Writing poetry – writing sessions**

Reading material

I. The Art of Poetry

1. Fry, S. (2005). The ode less travelled: Unlocking the poetic mind. HarperCollins.
2. Addonizio, K., & Laux, D. (1997). The poet's companion: A guide to the pleasures of writing poetry. W.W. Norton & Company.
3. Lucy, J. (Ed.). (2001). The art of poetry. Penguin Books.

II. Understanding and Interpretation of Poetry

1. Hirsch, E. (1999). How to read a poem: And fall in love with poetry. Harcourt Brace & Company.
2. Pinsky, R. (1998). The sounds of poetry: A brief history. Farrar, Straus and Giroux.
3. Meyer, M. (2005). Poetry: An introduction. Bedford/St. Martin's.

III. Writing Poetry

1. Hugo, R. (1979). The triggering town: Lectures and essays on poetry and writing. W.W. Norton & Company.
2. Bradbury, R. (1990). Zen in the art of writing: Releasing the creative genius within you. Bantam Books.
3. Behn, R., & Twichell, C. (Eds.). (1992). The practice of poetry: Writing exercises from poets who teach. HarperCollins.

Syllabus for Semester I, Bachelor of Computer Application

Course Code: 25HS02PR0102-14

L: 00 Hrs, T: 0 Hr, P: 2 Hrs, Per Week

Course: Creative and content writing

Total Credits: 01

Course objective:

The objective of the course is to equip students with comprehensive skills in creative and content writing through experiential learning and real-world applications.

Course outcomes:

On completion of the course, student will be able to achieve the following:

CO1: Understand and apply fundamental concepts and techniques of creative writing.

CO2: Apply storytelling techniques to create engaging narratives.

CO3: Develop and implement effective SEO and digital content strategies

CO4: Create and refine content using various tools and applying diverse writing styles and formats.

CO5: Utilize digital tools to craft multimedia narratives and create a professional portfolio.

Syllabus

Creative Writing

Practical 1: **Introduction to Creative and Content Writing**

Practical 2: **Character and Story Development**

Practical 3: **Crafting Compelling Narratives**

Content Writing

Practical 4: **SEO and Digital Content Strategies**

Practical 5: **Writing for Media**

Practical 6: **Tools**

Content Creation

Practical 7: **Digital Storytelling**

Practical 8: **Creative Portfolio Launch**

Syllabus for Semester I, Bachelor of Computer Application

Course Code: 25HS02PR0102-15
Gita

Course: Science of life through Bhagwad

L: 00 Hrs, T: 0 Hr, P: 2 Hrs, Per Week

Total Credits: 01

Course Objective

The objective of the course is to seek directions from the Bhagwad Gita to garner life skills for a successful and happy life

Course Outcome

CO1: To understand the methodology to correctly interpret and analysis the scripture

CO2: To understand the application of various teaching of the Bhagwad Gita

CO3: Use meditation and breathing techniques for healthy mind and body.

Syllabus

Practical 1: **Introduction to Bhagwad Gita - methodology**

Practical 2: **Real life application of chapter 1-3**

Practical 3: **Real life application of chapter 4-6**

Practical 4: **Real life application of chapter 7-9**

Practical 5: **Real life application of chapter 10-12**

Practical 6: **Real life application of chapter 13-15**

Practical 7: **Real life application of chapter 16-18**

Practical 8: **Meditation and breathing techniques**

Syllabus for Semester I, Bachelor of Computer Application

Course Code: 25HS02PR0102-16

Course: *Sanskrit Sambhashan- Spoken Sanskrit*

L: 00 Hrs, T: 0 Hr, P: 2 Hrs, Per Week

Total Credits: 01

Course objectives:

The objective of the course is to enhance the communication skills of the students in Sanskrit

Course outcome

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

CO1: Enhanced writing skills in Sanskrit

CO2: Enhanced speaking skills in Sanskrit

CO3: Enhanced listening skills in Sanskrit

CO4: Enhanced writing skills in Sanskrit

Syllabus:

संस्कृतसम्भाषणशिबिरस्य पाठ्यक्रमः

प्रथमं दिनम्

- ❖ गीतम् - पठत संस्कृतम्..... ।
- ❖ मम नाम -भवतः नाम किम्? भवत्याः नाम किम्?
द्वयोः मध्ये परिचयः । परस्परं 5 जनान् ।
- ❖ सः कः? सा का? तत् किम्?
- ❖ एषः, एषा, एतत् ।
- ❖ अहम्, भवान्, भवती..... अभिनयः ।
- ❖ आम्, न, वा/किम्..... अभिनयः ।
- ❖ अस्ति × नास्ति..... अभिनयः ।
- ❖ अत्र, तत्र, कुत्र, सर्वत्र, अन्यत्र, एकत्र - अभिनयः ।
- ❖ षष्ठी - तस्य, एतस्य, कस्य, तस्याः, एतस्याः, कस्याः, मम, भवतः, भवत्याः..... अभिनयः ।
मम नासिका, भवतः नासिका, भवत्याः नासिका ।
एतत् कस्य? अङ्गानि प्रदर्श्य प्रश्नः ।
- ❖ दशरथस्य...., सीतायाः...., लेखन्याः...., पुस्तकस्य...., ।
स्फोरकपत्रस्य (Flash Card) उपयोगः करणीयः ।
'पुत्रः' 'पतिः' इत्यादीनां वाक्यपत्राणाम् (Charts)
उपयोगः करणीयः ।
- ❖ गीतम् - मनसा सततं स्मरणीयम् ।
- ❖ आवश्यकम्, मास्तु, पर्याप्तम्, धन्यवादः, स्वागतम् ।
- ❖ पूर्वनिश्चितसम्भाषणप्रदर्शनम् ।
- ❖ क्रियापदानां पाठनम् -
गच्छति । आगच्छति । पठति । लिखति । खादति । पिबति ।
क्रीडति । वदति । उत्तिष्ठति । उपविशति ।
- ❖ गच्छामि । आगच्छामि..... ।
- ❖ गच्छतु । आगच्छतु..... ।
- ❖ सङ्ख्याः - (अ) 1, 2, 3, 4,.....10 ।
(आ) 10, 20, 30,.....100 ।
- ❖ समयः - 5.00, 5.15, 5.30, 4.45 ।
- ❖ कथा - गतानुगतिको लोकः । (काचित् कथा सरलया
भाषया वक्तव्या) ।
- ❖ रटनाभ्यासः (पूर्वमेव लिखितानि पठितानि च कानिचित्
वाक्यानि वाचनीयानि) ।
- ❖ एकं वाक्यम् (प्रत्येकं छात्रः एकं वाक्यं वदेत् ।)
- ❖ सूचना ।
- ❖ ऐक्यमन्त्रः ।

द्वितीयं दिनम्

- ❖ गीतम् ।
- ❖ पुनस्स्मारणम् ।
- ❖ शब्देषु लिङ्गभेदज्ञापनम् - यथा -सः सुधाखण्डः, सा
कुष्ठिका, तत् पुष्पम् ।
- ❖ बहुवचनपाठनम् -
बालकाः...., बालिकाः...., लेखन्यः...., पुस्तकानि... ।
- ❖ ते, के, ताः, काः, तानि, कानि, एते, एताः, एतानि,
भवन्तः, भवत्यः, वयम् । (चित्राणि उपयोक्तव्यानि ।)
- ❖ वचनपरिवर्तनाभ्यासः । यथा - सः बालकः - ते बालकाः ।
- ❖ अस्ति - सन्ति ।
- ❖ कति?
- ❖ सप्तमी - हस्ते । उत्पीठिकायाम् । लेखन्याम् । पुस्तके ।
(स्फोरकपत्रस्य प्रयोगः करणीयः ।)
वाक्यपत्रस्य उपयोगेन वाक्यानि वाचनीयानि ।
- ❖ कदा?
- ❖ उत्तराणां प्रश्नाः । (शिक्षकः आरम्भे उत्तरं वदेत्, अनन्तरं
छात्राः तस्य प्रश्नं पुच्छेयुः ।)
यथा - रामः प्रातःकाले शालां गच्छति ।
रामः कदा शालां गच्छति?
- ❖ अद्य, ध्वः, परध्वः, प्रपरध्वः, ह्यः, परह्यः, प्रपरह्यः, इदानीम् ।
- ❖ गीतम् ।
- ❖ गच्छन्ति । गच्छामः । गच्छन्तु ।
- ❖ शिष्टाचारः - सुप्रभातम्/नमस्कारः/शुभरात्रिः/हरिः
ओम्/क्षम्यताम्/चिन्ता मास्तु ।
- ❖ प्रातर्विधिः - दन्तधावनम् इत्यादयः शब्दाः पाठनीयाः ।
- ❖ सङ्ख्या - 1-50 ।
- ❖ समयः - 6.05, 6.10, 5.55, 5.50
- ❖ स्वागतसम्भाषणम् । (शिक्षकः सहशिक्षकेण सह कृत्वा
प्रदर्शयेत्)
- ❖ कथा ।
- ❖ रटनाभ्यासः ।
- ❖ वाक्यद्वयम् (प्रत्येकम् अपि छात्रः वाक्यद्वयं वदेत् ।)
- ❖ सूचनाः ।
- ❖ ऐक्यमन्त्रः ।

तृतीयं दिनम्

- ❖ गीतम् ।
- ❖ पुनस्स्मारणम् ।
- ❖ क्रियापदानां बहुवचनरूपाणि ।
गच्छन्ति - गच्छामः - गच्छन्तु (Chart दर्शनीयम्)
पिबन्ति - पिबामः - पिबन्तु ।
लिखन्ति - लिखामः - लिखन्तु ।
इत्यादिपरिवर्तनाभ्यासः करणीयः ।
- ❖ द्वितीयाविभक्तिः - स्फोरकपत्राणाम् उपयोगः ।
(वाक्यपत्राणि उपयुज्य वाक्यानि वाचनीयानि ।)
- ❖ कृपया ददातु - वस्तूनि प्रदर्श्य ।
शिक्षकः एकैकं वस्तु प्रदर्शयति ।
उदा. - ग्रन्थः, घटी,.....
छात्राः - कृपया ग्रन्थं ददातु, कृपया घटी ददातु इत्यादि
वदेयुः । (स्फोरकपत्रस्य उपयोगः)
- ❖ पुरतः, पृष्ठतः, वामतः, दक्षिणतः, उपरि, अधः ।
(चित्रं दर्शनीयम्)
- ❖ इतः, ततः,तः, गृहतः, कुतः?
(स्फोरकपत्राणाम् उपयोगः)
वाक्यपत्राणि उपयुज्य वाक्यानि वाचनीयानि ।
- ❖ गीतम् ।
- ❖ कथम्? सम्यक् ।
- ❖ शीघ्रम् × मन्दम् । उच्चैः × शनैः ।
- ❖ पठनार्थम्, किमर्थम्?
- ❖ सप्तककाराः - किम्, कुत्र, कति, कदा, कुतः, कथम्,
किमर्थम् (Chart प्रदर्शनीयम्) ।
एकैकम् उपयुज्य परस्परं प्रश्नाः ।
- ❖ अपि ।
- ❖ अस्तु ।
- ❖ अहं न जानामि । - कानिचन वाक्यानि ।
- ❖ भूतकालीनक्रियापदानां पाठनम् ।
गतवान् - पठितवान् - लिखितवान् ।
गतवती - पठितवती - लिखितवती ।
- ❖ क्रियापदकोष्ठकस्य प्रथमपृष्ठस्य अभ्यासः ।
- ❖ द्वितीयपृष्ठस्य सर्वाणि क्रियापदानि उपयुज्य छात्राः
वर्तमानकाले वाक्यानि वदन्ति । (ए.व - व.व.)
- ❖ विशिष्टक्रियापदानाम् अभ्यासः -
करोमि - कुर्मः । करोति - कुर्वन्ति ।
ददामि - दद्यः । ददाति - ददति ।

शृणोमि - शृणुमः । शृणोति - शृण्वन्ति ।

जानामि - जानीमः । जानाति - जानन्ति ।

- ❖ सम्बोधनम् - भोः !, श्रीमन् !, मान्ये !, भगिनि!, मित्र !,
.....महोदय!, राम !, सीते ! इत्यादि ।
- ❖ सङ्ख्या- 1-100 ।
- ❖ समयः - 1.00, 2.00, 3.00, 4.00 ।
- ❖ सम्भाषणप्रदर्शनम् (मित्रसंलापः) ।
- ❖ कथा ।
- ❖ वाक्यत्रयम् एकैकोऽपि छात्रः वदेत् ।
- ❖ सूचना ।
- ❖ ऐक्यमन्त्रः ।

चतुर्थं दिनम्

- ❖ गीतम् ।
- ❖ पुनःस्मारणम् ।
- ❖ च
- ❖ अतः
- ❖ एव
- ❖ इति
- ❖ अस्मि
- ❖ यदि -तर्हि
- ❖ यथा - तथा
- ❖ तः - पर्यन्तम् (वाक्यपत्रस्य उपयोगेन वाक्यानि
वाचनीयानि ।)
- ❖ अद्य आरभ्य
- ❖ कृते (वाक्यपत्रस्य उपयोगः करणीयः)
- ❖ क्तवतुप्रत्ययान्तानाम् अभ्यासः
गतवान् - पठितवान् - लिखितवान् (ए.व. पुलिङ्गे) ।
गतवती - पठितवती - लिखितवती (ए.व. स्त्रीलिङ्गे) ।
गतवन्तः - पठितवन्तः - लिखितवन्तः (व.व. पुलिङ्गे) ।
गतवत्यः - पठितवत्यः - लिखितवत्यः (व.व. स्त्रीलिङ्गे) ।
- ❖ सः गतवान् - सा गतवती - लिङ्गपरिवर्तनाभ्यासः ।
- ❖ अहं गतवान् - अहं गतवती - लिङ्गपरिवर्तनाभ्यासः ।
- ❖ क्रियापदानां कालपरिवर्तनाभ्यासः ।
यथा - गच्छति - गतवान्, गतवती ।
- ❖ गीतम् ।
- ❖ विशेषपाठनम् - आसीत्, आसन्, आसम् ।
- ❖ एकः, एका, एकम् - लिङ्गभेदः ज्ञापनीयः ।
(स्फोरकपत्रस्य उपयोगः)

- ❖ भोजनसम्बन्धिशब्दाः यथा - सूपः, शाकम्, इत्यदयः ।
- ❖ सङ्ख्या ।
- ❖ समयः ।
- ❖ ॐ - सङ्ख्याक्रीडा ।
- ❖ कथा ।
- ❖ सम्भाषणप्रदर्शनम् ।
- ❖ चत्वारि वाक्यानि ।
- ❖ सूचना ।
- ❖ ऐक्यमयः ।

पञ्चमं दिनम्

- ❖ गीतम् ।
- ❖ पुनःस्मरणम् ।
- ❖ वाहनानां नामानि ।
- ❖ तृतीयाविभक्तिः - दण्डेन, मापिकया, लेखन्या, पुष्पेण ।
(वाक्यपत्रस्य आचारेण वाक्यानि वाचनीयानि ।)
- ❖ सह, विना ।
- ❖ अद्यतन, ह्यस्तन, क्षस्तन, पूर्वतन, इदानीन्तन ।
- ❖ भविष्यत्कालीनक्रियापदानां पाठनम् ।
गमिष्यति, पठिष्यति, लेखिष्यति । (कोष्ठकस्य साहाय्येन)
- ❖ गत, आगामि ।
- ❖ गीतम् ।
- ❖ स्म ।
- ❖ अभवत् ।
- ❖ क्वाप्रयोगः (कोष्ठकस्य साहाय्येन) ।
- ❖ यदा - तदा ।
- ❖ बन्धुवाचकशब्दाः ।
- ❖ वेशभूषणानां नामानि ।
- ❖ वर्णाः ।
- ❖ रुचयः ।
- ❖ क्रीडा - एकधासेन सङ्ख्याकथनम् ।
- ❖ कथा ।
- ❖ पञ्च वाक्यानि ।
- ❖ सूचना ।
- ❖ ऐक्यमयः ।

षष्ठं दिनम्

- ❖ गीतम् ।
- ❖ पुनःस्मरणम् ।
- ❖ नूतनम् x पुरातनम्,

- ❖ बहु x किञ्चित्,
- ❖ दीर्घः x ह्रस्वः ।
- ❖ उन्नतः x वामनः ।
- ❖ स्थूलः x कृशः ।
- ❖ एतादृश, तादृश, कीदृश?
- ❖ तुमुन् (कोष्ठकस्य साहाय्येन) ।
- ❖ किन्तु ।
- ❖ निश्चयेन ।
- ❖ बहुशः / प्रायशः ।
- ❖ किल / खलु ।
- ❖ शक्नोति ।
- ❖ गीतम् ।
- ❖ विशेषणविशेष्यभावस्य अभ्यासः । (प्रथमाविभक्तौ)
- सः उत्तमः बालकः ।
- सा उत्तमा बालिका ।
- तत् उत्तमं पुस्तकम् ।
- ❖ इव । विनोदकणिका । (गतवान् 'इव' अभिनये कृतवान्!)
- ❖ अपेक्षया ।
- ❖ पशूनां नामानि ।
- ❖ अवयवानां नामानि ।
- ❖ वाक्यविलोमनाम्न्यासः ।
(सः मम पुस्तकं प्रातःकाले पञ्चवादने पठितवान् ।)
- ❖ इतः पूर्वम् - इतः परम् ।
- ❖ 'रामकृष्ण' सङ्ख्याक्रीडा ।
- ❖ कथा ।
- ❖ षट् वाक्यानि ।
- ❖ सूचना ।
- ❖ ऐक्यमयः ।

सप्तमं दिनम्

- ❖ गीतम् ।
- ❖ पुनःस्मरणम् ।
- ❖ क्वा - तुमुन् - परिवर्तनाभ्यासः ।
- ❖ बहिः x अन्तः ।
- ❖ रिक्तम् x पूर्णम् ।
- ❖ इतोऽपि ।
- ❖ इत्युक्ते ।
- ❖ अन्ते ।
- ❖ चेत् - नो चेत् ।

- ❖ गीतम् ।
- ❖ आरोग्यसम्बन्धिशब्दाः – वैद्यरोगिसम्भाषणम् ।
- ❖ प्रश्नोत्तरस्पर्धा ।
- ❖ ऋषीणां नामानि ।
- ❖ कथा - शिक्षकः एकां कथां वदति । अनन्तरं छात्रेषु एकैकः तस्याः कथायाः एकैकं वाक्यम् उक्त्वा कथां सम्पूर्णां करोति ।
- ❖ सङ्ख्या - दीर्घसङ्ख्यापाठनम् ।
- ❖ प्रश्नोत्तरम् ।
- ❖ क्रीडा - (गणद्वये नामस्मरणक्रीडा)
- ❖ कथा ।
- ❖ पुस्तकानां परिचयः ।
- ❖ सप्त वाक्यानि ।
- ❖ सूचना ।
- ❖ ऐक्यमञ्चः ।

अष्टमं दिनम्

- ❖ गीतम् ।
- ❖ पुनःस्मरणम् ।
- ❖ वारम् ।
- ❖ अतः - यतः परिवर्तनाभ्यासः ।
- ❖ यद्यपि - तथापि ।
- ❖ यत्र - तत्र ।
- ❖ कति - कियत् - एतयोः भेदज्ञापनम् ।
- ❖ यावत् - तावत् ।
- ❖ यत् - तत् ।
- ❖ यः - सः ।
- ❖ या - सा ।
- ❖ गीतम् ।
- ❖ अस्माकम् ।
- ❖ चर्चा ।
- ❖ सङ्ख्या - 'शतायुः - गतायुः' क्रीडा ।
- ❖ विनोदकणिकाकथनम् ।
- ❖ कथा ।
- ❖ अष्ट वाक्यानि ।
- ❖ समाजनिधिविषये सूचना ।
- ❖ ऐक्यमञ्चः ।

नवमं दिनम्

- ❖ गीतम् ।
- ❖ पुनःस्मरणम् ।
- ❖ चित् ।
- ❖द्वयम् ।
- ❖ सङ्ख्यासु लिङ्गभेदः ।
एकः - एका - एकम्
द्वयम् - द्वयम् - द्वयम्
त्रयः - तिस्रः - त्रीणि
चत्वारः - चतस्रः - चत्वारि
- ❖ शिक्षकः - अहं वैद्यः - मम नाम सुरेशः
(छात्राः तमुद्दिश्य प्रश्नान् पृच्छेयुः ।)
- ❖ अर्थम् (समाजार्थम्, संस्कृतकार्यार्थम्...) ।
- ❖ गीतम् ।
- ❖ तव्यत् - अनीयर् ।
- ❖ अनन्त्यकथारचना ।
- ❖ सङ्ख्यान्वेषणम् (क्रीडा) ।
- ❖ छात्रैः सह प्रश्नोत्तरम् ।
- ❖ समाजनिधिविषये पुनःस्मरणम् ।
- ❖ ऐक्यमञ्चः ।

दशमं दिनम्

- ❖ गीतम् ।
- ❖ पुनःस्मरणम् ।
- ❖ पत्रलेखनम् ।
- ❖ दूरवाणीसम्भाषणम् ।
- ❖ मार्गनिर्देशः - कुत्र गन्तव्यम् इत्यादि ।
- ❖ तव्यत् अभ्यासार्थम् - अद्य किं किं करणीयम् ?
- ❖ सान्दर्भिकभाषणम् -
1. प्रवासात् प्रतिनिवर्तनस्य ।
2. आपणिकस्य इत्यादि ।
- ❖ क्रीडा - सङ्ख्यायोजनम् (गणद्वये) ।
- ❖ शुभाशयाः ।
- ❖ असत्यकथनम् / कल्पनाकथनम् ।
- ❖ समारोपः (सर्वैः शिक्षार्थिभिः भारतमातुः पूजां कृत्वा निधिसमर्पणं करणीयम् ।)
- ❖ पत्राचारप्रगतशिक्षणादिविषये सूचना ।
- ❖ ऐक्यमञ्चः ।

Syllabus for Semester I, Bachelor of Computer Application

Course Code: 25HS02PR0102-17

Course: *Kirtan Kala*

L: 00 Hrs, T: 0 Hr, P: 2 Hrs, Per Week

Total Credits: 01

Course objectives:

The objective of the course is to provide the students with a spiritual experience as well as its benefits to them in the form of better abilities to concentrate and develop the ability to create a peaceful mind.

Course outcome

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

CO1: Learn from the inspiring spiritual journey of the saints and the history of Kirtan tradition

CO2: Learn about the musical instruments used in the art of Kirtan

CO3: Develop communication skills

- कीर्तन परंपरेचा इतिहास आणि अखिल भारतातील कीर्तन परंपरांचा परिचय
- चार महिन्यात वीस संतचरित्रांचा परिचय अधिक त्याविषयी प्रवचन
- वीस संतांचा वाङ्मयीन परिचय
- प्रमुख पाच कीर्तन पद्धतींचे मांडणी तंत्र.
- पूर्वरंग - उत्तररंग सहित कीर्तनप्रक्रियेतील सर्व महत्वाचे टप्पे.
- कीर्तनासाठी आवश्यक असणारी कंठ संगीतात्मक माहिती
- ठळ, मृदंग, वीणा, तबला, पेटी या वाद्यांची ओळख.
- प्रवचनांसाठी अभ्यासग्रंथांचे मार्गदर्शन.
- वक्तृत्व कला, संभाषण कला, संवाद कौशल्य, कथाकथन यांची रहस्ये
- कीर्तनाचे अनुषंगाने संस्कृत मराठी श्लोक, सुभाषिते व प्रमाणाधार अशी ओव्या अभंगांची शिंदोरी.

Syllabus for Semester I, Bachelor of Computer Application

Course Code: 25HS02PR0102-18 Course: Introduction to German Language and culture
L: 00 Hrs, T: 0 Hr, P: 2 Hrs, Per Week Total Credits: 01

Course objective:

To help build a foundation and interest in German language so that the students can pursue the proficiency levels of the language in higher semesters.

Course outcomes:

On successful completion of the course the students will be able to achieve the following:

CO1. Demonstrate basic knowledge about Germany, the culture and similarities/differences between India and Germany

CO2. Learn to use simple language structures in everyday communication.

CO3. Develop ability to write in basic German about themselves and others.

CO4. Develop ability to read and understand beginner level texts in German.

Syllabus

List of Practicals

Practical-1: Orientation about Germany, the language, and culture

Practical-2: Vocabulary building for everyday conversations

Practical -3: Numbers, days and time

Practical-4: Introducing Oneself & Others

Practical-5: Reading Skills: Reading simple text in German language

Practical-6: Basic Verbs & Sentence Construction

Practical-7: Food & Dining, Giving Directions & Transportation

Practical-8: Writing Skills: Write basic German and practice

Recommended reading

1. German Made Easy by Diego A. Agundez
2. Teach Yourself Complete German: Learn to Read, write, Speak and Understand A new Language by Paul Coggle, Heiner Schenke
3. Netzwerk A1 by Helen Smitz, Stefanie Dengler and Paul Rusch
4. Deutsche Welle (DW) – www.dw.com/learngerman
5. BBC Languages – German – www.bbc.co.uk/languages/german
6. Goethe-Institut – www.goethe.de

Syllabus for Semester I, Bachelor of Computer Application

Course Code: 25HS04PR0102-1

Course Name: Adventure Sports

L: 0 Hrs. T: 0 Hrs. P: 2 Hrs. Per Week

Total Credits: 01

Course Objective:

This course introduces adventure sports, emphasizing experiential learning through participation in various activities. The course will cover the fundamentals, safety procedures, and physical and mental benefits of adventure sports. Students will engage in outdoor activities such as wall climbing, rappelling, and more, fostering a connection with nature and understanding the principles of risk management.

Course Outcome: By the end of this course, students will:

- Understand the principles and benefits of adventure sports.
- Develop basic skills in selected adventure sports.
- Learn and apply safety measures and risk management techniques.
- Foster teamwork, leadership, and problem-solving skills.

Syllabus:

- Tent pitching, knot practice session and Tent allotment
- Activities like Jumaring and Climbing
- Individual challenge like Burma bridge, ladder bridge, multi vine
- Group Task like improvise raft making and Kayaking
- Activities like Archery rifle shooting, cycle ride

Pattern of Classes: 30 Hrs. Camp (2 Days and 1 Night Camp)

Assessment Pattern:

Assessment Type	Weightage in Marks	Total Marks
Practical 25HS04PR0102-1 / 25HS04PR0202-1	Internal Marks – 25 Marks External Marks – 25 Marks	50
Total – 50 Marks		

Syllabus for Semester I, Bachelor of Computer Application

Course Code: 25HS04PR0102-2
Obstacle Training

Course Name: Introduction to Defense Forces &

L: 0 Hrs. T: 0 Hrs. P: 2 Hrs. Per Week /30 Hrs.

Total Credits: 01

Course Objective:

- Understand the Structure and Function of Defense Forces
- Familiarize with Defense Force Training and Discipline
- Learn Basic Obstacle Course Techniques
- Apply Problem-Solving and Teamwork in Obstacle Training
- Explore the Role of Obstacle Training in Defense Preparedness

Course Outcome:

Upon successful completion of the course, students should be able to:

- Describe the Structure and Functions of Defense Forces
- Demonstrate Knowledge of Defense Training Protocols
- Navigate Basic Obstacle Courses & Connect Obstacle Training to Defense Preparedness
- Collaborate and Problem-Solve in Team-Based Exercises

Syllabus:

- Knot and Hitch practice session
- Activities like Rappelling & Wall Climbing
- Burma bridge & ladder bridge
- First Aid
- Rifle Shooting
- Horse riding
- Group Task and Team building activities

Pattern of Classes: 30 Hrs Camp (2 Days and 1 Night Camp)

Assessment Pattern:

Assessment Type	Weightage in Marks	Total Marks
Practical 25HS04PR0102-2 / 25HS04PR0202-2	Internal Marks – 25 Marks External Marks – 25 Marks	50
Total – 50 Marks		

Syllabus for Semester I, Bachelor of Computer Application

Course Code: 25HS04PR0102-3 Course Name: First Aid & Disaster Management

L: 0 Hrs. T: 0 Hrs. P: 2 Hrs. Per Week

Total Credits: 01

Course Objective:

- Understand Disaster Types and Characteristics
- Learn Risk Assessment and Management
- Master Emergency Preparedness and Response
- Explore Recovery and Reconstruction
- Develop Skills in Communication and Coordination
- Understand Legal and Ethical Considerations

Course Outcome:

Upon successful completion of the disaster management course, students should be able to:

- Identify and Categorize Disasters
- Conduct Risk Assessments
- Develop Emergency Plans
- Implement Response Strategies

Syllabus:

- Basic First Aid
- Transportation of Casualty
- Injury Prevention & Cure
- Various Types of Knots & Hitches
- Various team building activities
- Fire emergencies & use of extinguishers (Optional)
- Snake Bite & Environmental emergencies.

Assessment Pattern:

Assessment Type	Weightage in Marks	Total Marks
Practical 25HS04PR0102-3 / 25HS04PR0202-3	Internal Marks – 25 Marks External Marks – 25 Marks	50
Total – 50 Marks		

Syllabus for Semester I, Bachelor of Computer Application

Course Code: 25HS04PR0102-4

Course Name: Basic Nutritional Course

L: 0 Hrs. T: 0 Hrs. P: 2 Hrs. Per Week

Total Credits: 01

Course Objective:

In the "Basics of Nutrition" course, students will develop a comprehensive understanding of essential nutrients and their roles in supporting overall health. They will learn to apply dietary guidelines effectively, tailoring recommendations to various age groups and health conditions. Additionally, students will cultivate the skills needed to assess and improve their own and others' eating habits for better health outcomes.

Course Outcome:

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

- Accurately describe the functions of key nutrients and their impact on health,
- create balanced meal plans based on established dietary guidelines,
- critically evaluate nutrition information to distinguish between credible and misleading sources.

Syllabus:

Unit I

- Introduction to Nutrition – Define Balanced Diet, Nutrition, Optimum Nutrition, Nutrients, Concept of Health, Recommended Dietary Allowances (RDA)
- Carbohydrates (sources, functions and digestion)
- Proteins (sources, functions and digestion)
- Fats (sources, functions and digestion)
- Micronutrients (vitamins and minerals-sources, functions and digestion)

Practical I

- Display of all the foods with the help of students and while demonstrating teacher will again explain role and importance of nutrition in daily life. Deficiency will lead to chronic diseases and its prevention is very necessary for the quality of life.

Unit II

- What is Body Mass Index?
- What is Basal Metabolic Rate?
- What is Ideal Body Weight? (Male/Female)
- How to read labels on Food Packets?
- How to choose smart food and Concept of Rainbow diet, My Food Pyramid or My plate given by ICMR-NIN.

Practical II

- Calculation of Body Mass Index, Basal Metabolic Rate, Ideal Body Weight (Male/Female) with the use of self-body measurements.
- Demonstration of Rainbow diet, My Food Pyramid or My plate in a class.

Assessment Pattern:

Assessment Type	Weightage in Marks	Total Marks
Practical 25HS04PR0102-4 / 25HS04PR0202-4	Internal Marks – 25 Marks External Marks – 25 Marks	50
Total – 50 Marks		

Syllabus for Semester I, Bachelor of Computer Application

Course Code: 25HS04PR0102-5
Through Yoga & Meditation

Course Name: Stress Management

L: 0 Hrs. T: 0 Hrs. P: 2 Hrs. Per Week

Total Credits: 01

Course Objective: Mental health is one of the most important facets of human life. Academic learning has emerged as a major source of stress among young students worldwide. Promoting mental well-being among students in India is a crucial step toward achieving Sustainable Development Goal 3 (Good Health and Well-being). Stress management involves using various techniques and strategies to control stress levels, improve how you react to stressful situations. Yoga combines physical movement with deep breathing and meditation, providing a holistic approach to stress relief.

Course Outcome:

Upon successful completion of the course, students should be able to:

- Understand the basics of stress management.
- Analyze stress triggers and to manage them.
- Evaluate the responses to stressful situations.
- Apply the techniques of Yog & Meditation for stress management in day-to-day life.

Syllabus:

Unit-1

Introduction to Stress: The Meaning of Stress, types of stress: distress, eustress

Stress Management Techniques I:

Treatment 1- (Asanas): Tadasana, Trikonasana, Vrikshasana, Garudasana,, Ardha-Padamasana, Padamasana, Vajarasana, Ushtrasana, Gomukhasna,, Paschimottanasan, ,Ardha Halasana, ,Setu-Bandhanasa,Naukasana, Bhujangasana, and Dhanurasana; along with relaxing asanas

Unit-2

Spiritual approach to stress management.

Stress Management Techniques II

Treatment 2 – (Prananyam) Deep breathing, Yoga, Mindfulness meditation

Rechak, Purak, Kumbhak, Nadi Suddhi and Bhramari Pranayama.

Measuring Academic stress- It can be measure using questionnaire: Academic stress Scale (Sun .et al 2011).

Assessment Pattern:

Assessment Type	Weightage in Marks	Total Marks
Practical	Continuous Assessment – 25 Marks	50

25HS04PR0102-5 / 25HS04PR0202-5	Internal Test Evaluation – 25 Marks	
Total – 50 Marks		

Syllabus for Semester I, Bachelor of Computer Application

Course Code: 25EE07PR0105

Course Name: Day-to-Day Electrical Systems

L: 0 Hrs. T: 0 Hrs. P: 2 Hrs. Per Week

Total Credits: 01

Course Outcomes:

After completion of the course, students will be able to

1. Understand how to measure and interpret electrical parameters of home appliances & calculate residential bills.
2. Comprehend the concept of energy star ratings and their significance.
3. Gain practical knowledge of residential wiring techniques.
4. Identify and understand the components of a residential solar PV system.
5. Understand the importance of ELCB, MCB, and fuses in electrical safety
6. Conduct market surveys to evaluate different electric two-wheelers.

Syllabus

- Identification of parameters of home appliances using the Power guard meter.
- Calculation and verification of the residential energy bill.
- Energy efficiencies of home appliances- Introduction to Star ratings: Case Study.
- Implementation of simple wiring used in residential installations.
- Identification of components of Solar Photovoltaic systems for residential consumers.
- Understanding the necessity and application of Earth Leakage Circuit Breaker (ELCB) and Miniature Circuit Breaker (MCB) and Fuse.
- Comparative study of Electric Two-Wheelers (Market Survey)
- Hands-on training in Digital meters.

Text/ Reference books:

1. Electrical Measurement, Signal Processing, and Displays" by John G. Webster.
2. Electrical Installation Design Guide: Calculations for Electricians and Designers" by The Institution of Engineering and Technology.
3. Solar Photovoltaic Technology and Systems: Chetan Singh Solanki, PHI learning Pvt. Ltd.,2014
4. Modern Wiring Practice: Design and Installation" by W. E. Steward and R. A. Beck.
5. Electrical Safety Handbook" by John Cadick, Mary Capelli-Schellpfeffer, Dennis Neitzel, and Al Winfield.

Syllabus for Semester II, Bachelor of Computer Application

Course Code: 25CS18TP0201

Course: Object Oriented Programming

L: 3 Hrs, P: 2 Hr, Per Week

Total Credits: 4

Course Objectives

1. To make students understand the fundamental features of an object-oriented language like Java: object classes and interfaces, exceptions, and libraries of object collections
2. Introduce students to fundamental concepts like exception handling, generics, collection classes, and streams.

Course Outcomes:

On successful completion of the course, students will be able to:

1. Understand the object-oriented programming features, classes, objects, and methods.
2. Develop efficient programs by implementing the concept of Inheritance, polymorphism exception handling.
3. Use the concept of generics, collections, and streams to develop solution to the given problem.
4. Analyze characteristics and need of design pattern in software design process.

Syllabus

Unit I:

Features of Object-Oriented Programming languages, Abstraction, Encapsulation, Inheritance, polymorphism, and late binding. Programming paradigms, Bytecode, JDK, JRE, JVM.

Concept of a class and object, ways of representing objects, access specifiers, constructors and functions.

Unit II:

Concept of overloading: Constructor Overloading, Function Overloading.

Arrays and Array of objects, Wrapper classes (Integer, Double etc.), String Class, creating packages, importing packages.

Lambda Expressions Introduction, Block, Passing Lambda expression as Argument

Unit III:

Concept of inheritance, methods of derivation, use of super keyword and final keyword in inheritance, overriding, run time polymorphism, abstract classes and methods, Interface, implementation of interface, static and non-static members.

Unit IV:

Exceptions: Types of exception, use of try-catch block, handling multiple exceptions, using finally, throw and throws clause, user-defined exceptions.

Introduction to streams, byte streams, character streams, file handling in Java, Serialization.

Unit V:

Generics: type-safety, generic class with two type parameters, bounded generics, wildcard, and generic method.

Collection classes: ArrayList, TreeSet, HashMap, Iterator, ListIterator, Collections class, Comparator, Comparable

Unit VI:

Introduction to Design Patterns, Need of Design Pattern, Classification of Design Patterns, Role of Design Pattern in Software design, Creational Patterns, Structural Design Patterns and Behavioral Patterns.

Text Books

1. Herbert Schildt; JAVA The Complete Reference; Ninth Edition, Tata McGraw- Hill Publishing Company Limited.
2. Design Patterns By Erich Gamma, Pearson Education

Reference Books

1. Herbert Schildt and Dale Skrien; Java Fundamentals A Comprehensive Introduction; Tata McGraw- Hill Education Private Ltd 2013.
2. Core Java Volume I – Fundamentals” by Cay S. Horstmann and Gary Cornell

LAB SYLLABUS

Minimum 8 practicals based on but not limited to the following topics:

Classes and Objects, Inheritance, Overloading, Polymorphism, Collections, Generics, File Handling

Syllabus for Semester II, Bachelor of Computer Application

Course Code: 25CS18TH0202

Course: Computer Architecture and Organization

L: 3 Hrs, P: 0Hr, Per Week

Total Credits: 3

Course Outcomes:

On Successful completion of course, students will be able to:

1. Understand basic components of a computer, including CPU, memories, and input/output, and their organization.
2. Apply pipelining and parallel computing concepts.
3. Perform mathematical operations on arithmetic and floating-point numbers.
4. Analyze cost performance trade off in designing memory hierarchy and instruction sets.
5. Design control unit and execute instructions.

SYLLABUS

UNIT I: Basic Structure of Computers: Functional units of computer. Instructions set architecture of a CPU- Instruction sequencing, addressing modes, and instruction set classification, subroutine & parameter passing, expanding opcode, RISC and CISC.

UNIT II: Data Representation: Signed number representations and their operations, design of Fast Adders, Multiplication- shift and add booth's Algorithm, bit-pair recoding, Integer Division- restoring and non-restoring division. Floating point numbers: representation, guard bits and rounding, arithmetic.

UNIT III: Basic Processing Unit: Bus architecture, Execution of a Complete Instruction, sequencing of control signals, Hard wired control, Micro-programmed Control.

UNIT IV: Memory System Design: Semiconductor RAM memories, Static and Dynamic Memories, ROM, Higher order memory design and Memory hierarchy, multi-module memories, Memory interleaving, Cache memory, Mapping functions.

UNIT V: Input/output Organization: I/O mapped I/O and memories mapped I/O, interrupt and interrupt handling mechanisms, vectored interrupts, synchronous and asynchronous data transfer, Bus Arbitration, Direct Memory Access.

UNIT VI: Pipelining and Parallel Computing: Basic concepts of pipelining, throughput and speedup, Introduction of Parallel Computing: SISD, MISD, SIMD, MIMD. Introduction to Higher-order Processor.

Text Books

1. V.C. Hamacher, Z.G. Vranesic and S.G. Zaky; Computer Organisation; 5th edition; McGrawHill, 2002.
2. W. Stallings; Computer Organization & Architecture; PHI publication; 2001.
3. J. P. Hayes; Computer Architecture & Organization; 3rd edition; McGraw-Hill; 1998.

Reference Books

1. M Mano; Computer System and Architecture; PHI publication; 1993.
2. A.S. Tanenbaum; Structured Computer Organization; Prentice Hall of India Ltd.

Syllabus for Semester II, Bachelor of Computer Application

Course Code: 25CS18PR0203

Course : Programming Workshop-II

L: 0 Hrs P: 2Hr, Per Week

Total Credits: 1

Course Outcomes

On successful completion of the course, students will be able to:

1. Design and develop dynamic web pages using JavaScript
2. Apply ES6 features to create interactive and dynamic web designs.
3. Gain proficiency in writing modern JavaScript code for web design projects

JavaScript: Introduction to JavaScript, Syntax, Variables and Data Types, Statements, Operators, Literals, Functions, Objects-Arrays-Built-in Objects, Handling Events in JavaScript, Form creation & validation, PHP database connectivity.

Introduction to ES6: Let and Const Declarations, Arrow Functions and Template Literals, Destructuring and Spread/Rest Operators, Classes and Modules, Exploring array methods.

Text Books:

1. JavaScript: The Complete Reference, Thomas Powell, Fritz Schneider, MGH
2. Textbook: "Exploring ES6", Axel Rauschmayer, Leanpub
3. User story mapping, Jeff Patton, O'Reilly Publication

PRACTICAL LIST

Course: COMPUTER WORKSHOP-II LAB

1. JavaScript

a. Conditional Statements

Write the code to output Grade “C” if entered marks are between 50-65, “B” for 66-80 and “A” for 80-90 and “A+” for above 90.

b. Arrays and loops

Write the code to create an array (read elements entered by user) which should allow only unique values, if there are duplicates, then keep the first occurrence and remove the duplicates.

c. String

Write the code to count the number of vowels in a paragraph.

d. Functions

Write a function to reverse a given number. Use this function to check whether a number is a palindrome or not.

e. Class and Object

Write a class Employee, constructor to initialize name, empid, salary, years of experience. Create operation addIncrement() to increment the salary of employees based on the years of experience.(If exp>3, increment = 10%; else 5%)

Create and initialize an array of employee objects and add Increment to each.

Use alerts, prompts and confirm boxes wherever required.

2. Event Handling using JavaScript

Design a calculator to calculate the Profit and Loss in percentage using JavaScript.

3. Form Validation using JavaScript

Design a form for registration of online exam implementing the following validation constraints:

Divide the form in three sections:

A. Personal Information:

- Name (must not have the digits or special characters)
- Email id should be valid
- Mobile number (length == 10 and must start with 7/8/9 only)
- Date of birth (should be such that $18 < \text{age} < 25$)

B. Educational information:

- X and XII marks must be mandatory
- Rest of the fields of academic details are optional

C. Payment Details:

- Card no should be valid in case of card payment and upi id should be valid in case of upi payment

4. PHP and MYSQL

Demonstrate on how to connect to a MySQL database using PHP and perform basic CRUD operations for registration of online NPTEL courses using PHP and MYSQL.

5. Destructuring and Spread/Rest Operators

- a. Write the code to display data of different vendor purchasing and selling common products using spread operator.
- b. Write the code to create an array of five different subjects and apply destructuring using rest operator to display first subject and then remaining subjects.

6. Arrow Functions and Template Literals

- a. Write the code to find Fibonacci series of n numbers using Arrow functions in ES6.

- b. Write the code for generating HTML templates for a grocery item using template literals in ES6.

7. Classes and Modules

Write the code for different gadgets available in electronic showroom using classes and modules in ES6.

Syllabus for Semester II, Bachelor of Computer Application

Course Code: 25CS18TH0204

Course: Cyber Laws & Ethics in IT

L: 2 Hrs, T: 0 Hr, P: 0 Hr, Per Week

Total Credits: 2

Course Outcomes

On successful completion, of course student will able to learn:

1. To analyze the role of ethics in IT organization.
2. To identify various cyber laws with respect to legal dilemmas in the Information Technology field.
3. To interpret various intellectual property rights, Privacy, Protection issues in Information Technology field.
4. To describe the ways of precaution and prevention of Cyber Crime as well as Human Rights.

Syllabus:

UNIT I

Ethics in business world & IT professional malpractices, Introduction to firewalls, IDS System, Distortion and fabrication of information

UNIT II

Ethics of IT Organization: Contingent Workers H- IB Workers, Whistle- blowing, Protection for Whistle- Blowers, Handling Whistle- blowing situation, Digital divide.

UNIT III

Intellectual Property: Copyrights, Patents, Trade Secret Laws, Key Intellectual property issues, Plagiarism, Privacy: The right of Privacy, Protection, Key Privacy and K- Anonymity issues, Identity Theft, Consumer Profiling,

UNIT IV

Cyber laws and rights in today's digital age, Emergence of Cyberspace, Cyber Jurisprudence, Cyber Crimes against Individuals, Institution and State, Hacking, Digital Forgery, Cyber Stalking/Harassment, Cyber terrorism, cyber tort, Cyber Defamation & hate speech, Competitive Intelligence, Cybersquatting, The indian information technology act 2000 IT Act.

Text Books:

1. George Reynolds, "Ethics in information Technology", 5th edition, Cengage Learning
2. Hon C Graff, Cryptography and E-Commerce - A Wiley Tech Brief, Wiley Computer Publisher, 2001.

Reference Books:

1. Michael Cross, Norris L Johnson, Tony Piltzecker, Security, Shroff Publishers and Distributors Ltd.
2. Debora Johnson, "Computer Ethic s", 3/e Pearson Education.
3. Sara Baase, "A Gift of Fire: Social, Legal and Ethical Issues, for Computing and the Internet," PHI Public at ions.
4. Chris Reed & John Angel, Computer Law, OUP, New York, (2007).
5. Dr Pramod Kr.Singh, "Laws on Cyber Crimes [Along with IT Act and Relevant Rules]" Book Enclave Jaipur India.

Syllabus for Semester II, Bachelor of Computer Application

Course Code: 25HS05TP0202

Course: Basics of Quantum Computing

L: 3 Hrs, P: 2 Hr, Per Week

Total Credits: 4

Course Objectives

1. To introduce the fundamentals of quantum computing to students
2. To make students capable of quantum programming.

Course Outcomes

After successful completion of the course, the students will be able to -

CO-1 Use the basic quantum theory relating to the probabilistic behaviour of an electron in an atom.

CO-2 Apply complex vector space to eigenvalues and eigenfunctions, inner products, tensor products in the domain of quantum theory

CO-3 Classify deterministic and probabilistic systems and analyse quantum observations and quantum measurements.

CO-4 Build the foundational concepts of quantum states, quantum measurements as applicable to the qubit spin systems using mathematical and conceptual frameworks.

CO-5 Use quantum gates in building architecture and quantum algorithms.

CO-6 Utilize Mathematica software for graph plotting and for least squares fitting of the experimental data.

Module 1: Basic Quantum Theory

Brief introduction about Quantum Computers and Quantum mechanics, Wave nature of Particles, Bohr's quantization condition, Heisenberg's Uncertainty principle, Wave function, probability, Schrodinger's wave equation, Operators, Electron in an infinite potential well, Eigen value and Eigen functions.

Module 2: Complex Vector Spaces

Algebra and Geometry of Complex numbers, Real and Complex Vector Spaces, definitions, properties, Abelian group, Euler's formula, Dr Moivre's formula, Matrix properties.

Module 3: Linear Algebra in Quantum Computing

Basis and Dimensions, Inner products, Hilbert Spaces, Eigenvalues and Eigenvectors, Hermitian and Unitary Matrices, Tensor Product, Applications of linear algebra in computer graphics.

Module 4: Classical and Quantum Systems

Deterministic and Probabilistic Systems, Quantum Systems, Stochastic billiard ball, Probabilistic double slit experiment with bullet and photon, Superposition of states, assembling systems, Entangled states.

Module 5: Quantum representation of systems

Dirac notations, Stern-Gerlach experiment, transition amplitude, norm of the ket, Bloch Sphere, Observables, Spin matrices, commutator operator, expectation values, variance, standard deviation, Heisenberg's uncertainty principle in matrix mechanics, measuring, dynamics, observations.

Module 6: Architecture and Algorithms

Bits and Qubits, Classical Gates and their equivalent quantum representation, Reversible Gates: CNOT, Toffoli, Fredkin, gates, outline of Pauli X,Y,Z gates, Hadamard gates, Deutsch Gate.

Quantum Algorithms: Deutsch's algorithm, Grover's search algorithm.

Applications of quantum computing in Cryptography, Quantum teleportation, Cybersecurity, banking, finance, advance manufacturing and artificial intelligence.

Text Book

1. Quantum computing for computer scientists, Noson S. Yanofsky, Mirco A. Mannucci, Cambridge University Press 2008
2. Introduction to Quantum Mechanics, 2nd Edition, David J. Griffiths, Prentice Hall New Jersey 1995

Reference Books

1. Quantum computing explained, David McMahon, Wiley-interscience, John Wiley & Sons, Inc. Publication 2008
2. Quantum computation and quantum information, Michael A. Nielsen and Isaac L. Chuang, Cambridge University Press 2010

The laboratory will consist of general physics experiments and computational physics practical.

1. Linear and Nonlinear data fitting by least squares fit method
2. Working with Vectors.
3. Working with Matrices: Real and Complex numbers.
4. Eigen values, Eigen functions, Properties of Inner Product and Unitary Matrices, Tensor Product.
5. Simulation of classical gates by quantum representation of the gates and inputs.
6. Introduction to IBM quantum computer.
7. Simulation of quantum gates: CNOT gate, Toffoli gate, Fredkin gate, Hadamard gate on IBM quantum computer.
8. Arithmetic operations using IBM Quantum computer.
9. Measuring scales and error estimation.
10. Verification of Ohm's law and linear least square fitting method.
11. Analyzing Wavepackets with Mathematica.
12. Measurement, analysis and fitting of non-linear IV characteristics of PN junction diode

Reference Books: (i) Lab manual prepared by Physics Department, RBU, Nagpur.

(ii) Quantum Computing: A Gentle Introduction by Textbook by Eleanor Rieffel and Wolfgang H. Polak, The MIT Press Cambridge, Massachusetts London, England, 2011.

Syllabus for Semester II, Bachelor of Computer Application

Course Code: 25HS03TH0218

Course: Foundation of Probability and Statistics

L: 3 Hrs, P: 0 Hr Per Week

Total Credits: 3

Course Pre-requisite :Set Theory.

Course Objective:

The objective of this course is to expose student to understand the basic importance fundamental principles of probability, including probability distributions, random variables, basic statistical methods used for data analysis, inferential statistics, hypothesis testing, confidence intervals, and regression analysis in computer science.

Course Outcomes

On successful completion of the course, student shall be able to

1. Identify and differentiate between discrete and continuous random variables, and interpret probabilities obtained from standard probability distributions.
 2. Solve the problems related with binomial, Poisson and normal distributions.
 3. Find mean, mode, median, quartiles for analysis of data.
 4. Grasp the fundamental concepts of curve fitting like regression techniques, model selection, and the use of different types of curves or functions to approximate data.
 5. Understand the fundamental concept of hypothesis testing, significance levels, p-values, and the basic logic behind hypothesis testing.
-

Module 1 (8 hours)

Probability of an event, addition and multiplication theorems of probability, conditional probability, independent events, Baye's theorem, random variable, types of random variable and probability distribution of a random variable.

Module 2 (8 hours)

Expectation, Variance, standard deviation, Bernoulli trials, binomial distribution, Poisson distribution and Normal (Gaussian) distribution.

Module 3: (8 Lectures)

Calculation of mean, median, mode of grouped and ungrouped data calculation of standard deviation, variance and mean deviation for grouped and ungrouped data, quartile, interquartile range and methods for finding outliers.

Module 4: (8 hours)

Curve fitting by the method of least squares- fitting of straight lines, second degree parabolas and more general curves, correlation and regression – Rank correlation.

Module 5: (8 Lectures)

Sampling Distributions, Point and Interval Estimations, Testing of Hypothesis for single mean and proportion.

Text / Reference Books:

1. M R. Spiegel , Theory and Problems of probability and statistics :,2nded :,Schaum series
2. S. Ross, A First Course in Probability, 6th Ed., Pearson Education India, 2002.
3. Maurtis Kaptein, Statistics for data science, An introduction to probability, statistics and Data Analysis, Springer 2022.
4. Jay L Devore, Probability and Statistics for Engineering and sciences, 8th edition, Cenage learning.

Syllabus for Semester II, Bachelor of Computer Application

Course Code: 25HS02TH0207
Civilization

Course: Foundational Literature of Indian

L: 2 Hrs P: 0 Hr, Per Week

Total Credits: 2

Course Outcome:

At the end of the course the students will be able to achieve the following:

- 1: Understand the Indian knowledge system and its scientific approach
- 2: Get introduced to the Vedic corpus and recognize the multi-faceted nature of the knowledge contained in the Vedic corpus
- 3: Understand the salient features of the philosophical systems of the Vedic and non-Vedic schools
- 4: Develop a basic understanding of the ancient wisdom recorded in various Indian literary work

SYLLABUS

Unit I: Overview of Indian Knowledge System:

6 hours

Importance of ancient knowledge, defining IKS, IKS classification framework, Historicity of IKS, Some unique aspects of IKS.

Unit II: The Vedic corpus:

6 hours

Introduction of Vedas, four Vedas, divisions of four Vedas, six Vedangas, Distinct features of Vedic life.

Unit III: Indian Philosophical systems:

6 hours

Development and unique features, Vedic schools of philosophy, *Samkhya* and *Yoga* School of philosophy, *Nayay* and *Vaisesika* school of philosophy, *Purva-mimamsa* and *Vedanta* schools of Philosophy, Non-vedic philosophies: Jainism, Buddhism, and other approaches

Unit IV: Indian wisdom through ages:

8 hours

Panchatantras, **Purans**: contents and issues of interests, **Itihasa**: uniqueness of the two epics (Ramayan and Mahabharata), Key issues and messages from Ramayana, Mahabharata – a source of worldly wisdom; **Indian ancient Sanskrit literature**: *Kalidas*, *Vishakadutta*, *Bhavbhuti*, *Shudraka**

***any one text as decided by the course teacher**

Reference material

1. B. Mahadevan, Vinayak Rajat Bhar, Nagendra Pavana R. N., “*Introduction to Indian Knowledge System: Concepts and Applications*” PHI, 2022
2. S.C. Chatterjee and D.M. Datta, *An introduction to Indian Philosophy*, University of Calcutta, 1984

Syllabus for Semester II, Bachelor of Computer Application

Course Code: 25HS04PR0204

Course: Health-Fitness-Wellbeing

L: 0 Hrs P: 2 Hr, Per Week

Total Credits: 1

Aim of the Course: The course aims to foster Health and wellness through Healthy and Active Lifestyle and creating awareness about the fundamentals of Physical Education, Sports, Yoga, Recreation and its effectiveness through practical experiences and hands on activities.

Objectives of the Course:

1. To impart the students with basic concepts of Sports, Yoga and Recreational activities for health and wellness.
2. To familiarize the students with health-related Exercise and evaluate their Health-related Fitness.
3. To make Overall growth & development with team spirit, social values and leadership qualities among students through various sports, games and Yogic activities.
4. To create Environment for better interaction and recreation among students as neutralizer for stress through various minor and recreational games.

Course Outcomes: On completion of the course, students will be able to:

1. Understand fundamental skills, basic principle and practices of Health, Fitness, Sports and Yoga.
2. Practically learn the principles of implementing general and specific conditioning of Fitness exercises.
3. Develop Health-related fitness and Body-mind co-ordination through various fitness activities, sports, recreational games and yoga.
4. Practice Healthy & active living with reducing Sedentary Life style.

Course Content:

Unit 1:

- Warm up and Cool Down and Stretching Exercises.
- General and Specific Exercises.
- Calculation of BMI & Resting Pulse Rate.
- General and Specific exercises for strength, Speed, Agility, Cardiovascular Endurance, Flexibility and Coordination.
- Practice of Fundamental Skills of Volleyball, Table Tennis and Chess, etc.
- Knowledge and practice of the Equipment used in Health Center, Gymnasium and its application.

Unit 2:

- Yog: Standing, Sitting, Prone & Supine positions.
- Suryanamaskar.
- Pranayama, Meditation and Relaxation Techniques.
- Dietary Habits, Daily Energy Requirements
- Recreational Games.
- Practice of Fundamental Skills of Basketball, Football, Carrom, etc.
- Health related Physical Fitness Test.

Assessment Pattern: Assessment Type	Weightage in Marks	Total Marks
Practical	Internal Marks – 25 Marks	50

25HS04PR0101 (SEM I)	External Marks – 25 Marks	
25HS04PR0201 (SEM II)		
Total – 50 Marks		

References:

1. Russell, R.P. (1994). Health and Fitness Through Physical Education. USA: Human Kinetics.
2. Uppal, A.K. (1992). Physical Fitness. New Delhi: Friends Publication.
3. AAPHERD “Health related Physical Fitness Test Manual.”1980 Published by Association drive Reston Virginia
4. Kumar, Ajith. (1984) Yoga Pravesha. Bengaluru: Rashtrothanna Prakashana.
5. Dr. Devinder K. Kansal, A Textbook of Test Evaluation, Accreditation, Measurements and Standards (TEAMS ‘Science)

Syllabus for Semester III, Bachelor of Computer Application

Course Code: 25CS18TP0301

Course: Introduction to Data Structures

L: 4 Hrs P: 2 Hr, Per Week

Total Credits: 5

Course Objective

Given knowledge about various data structures, students should develop skills to create error free and efficient logic's; by applying data-structures algorithms for real world problems.

Course Outcomes

On successful completion of the course, student shall be able to

1. Solve real world problems based on the concepts of arrays, sorting, searching and various linked list algorithms.
2. Apply stacks mechanism, queues and select appropriate algorithm as per the properties of the given problem.
3. Identify tree data structure and hashing techniques to formulate the problem, devise an algorithm and transform into code.

SYLLABUS

UNIT-I

Introduction to Data Structures: Definition, Concept of data types, Abstract Data Type. Arrays implementation in memory, Types of arrays, Applications of Arrays.

Sorting & Searching: General Background, Different Sorting & Searching Techniques and their complexities.

UNIT-II

Linked List - Concept of Linked Lists, Types, Operations on Linked lists, concept of Doubly Linked List, Header Linked List. Applications of Linked List: Reversing and Concatenation of Two Linked Lists.

UNIT-III

Stacks: Definition and example, primitive operations on Stacks, Arithmetic expressions - (Infix, Post-fix and Prefix), Evaluating post-fix expression, converting an expression from infix to post-fix, Applications of Stacks.

UNIT-IV

Queues - Definition and examples of queues, primitive operations, Types of Queues.

Trees: Definition and Basic Terminology of trees, Binary Tree, Binary Search Tree, Tree Traversal.

UNIT-V

Graphs and digraphs: Representations and traversals like Depth First Search Technique and Breadth First Search Technique.

Hashing: Introduction to Hashing, Different Hashing Techniques and Collision Handling Mechanisms.

Text Books

1. Schaum's Outlines Data structure: Seymour Lipschutz, Tata McGraw Hill 2nd Edition.
2. Classical Data Structure: Samanta, PHI.
3. Data Structures and Program Design: Robert Kruse, PHI.

Reference Books

1. How to solve it by Computers: R G Dromey, PHI.
2. Science of Programming: David Greece: Springer Verlag New York Pub.
3. Fundamentals of Data Structures: Elis Horowitz, SartajSahani, Galgotia Publications.
4. Data Structures using C/C++: Tanenbaum, PHI.

Lab Syllabus

Minimum 10 practicals and assignments based on but not limited to the following topics:

1. Abstract Datatypes and Arrays
2. Sorting and Searching Techniques
3. Linked list
4. Stacks
5. Queues
6. Trees
7. Hashing Techniques

Syllabus for Semester -III, Bachelor of Computer Application

Course Code: 25CS18PR0302

Course:IT Infrastructure Services Lab

L: 0 Hrs, P: 2 Hr, Per Week

Total Credits: 1

Course Objectives

This course aims to provide foundational knowledge of IT infrastructure components and their configurations. Students will gain hands-on experience with various IT service tools while developing troubleshooting skills for both hardware and software issues.

Course Outcomes

On successful completion of the course, student shall be able to

- Identify and configure IT infrastructure components.
- Install and troubleshoot operating systems and software.
- Monitor and maintain IT infrastructure, network configurations and security measures using various tools.

SYLLABUS

Minimum 4-5 practicals and assignments based on but not limited to the following topics:

- Identifying hardware components and assembling a computer.
- Installing and configuring operating systems.
- Setting up and troubleshooting network connections.
- Configuring user access and permissions in a server environment.
- Implementing firewalls and security configurations.
- Monitoring system performance and troubleshooting common issues.
- Understanding and configuring backup and recovery solutions.

Syllabus for Semester III, Bachelor of Computer Application

Course Code: 25CS18PR0303

Course: Software Lab

L: 0 Hrs, P: 2 Hr, Per Week

Total Credits: 1

Course Objectives

Students should be able to integrate the software libraries for basic web development for creating rich interfaces and dynamic features.

Course Outcomes

On successful completion of the course, student shall be able to

1. Integrate different scripting libraries for webpage development.
2. Understanding and developing rich and responsive websites quickly by using different frameworks.

SYLLABUS

- Installing Bootstrap framework and understanding Grid system by creating webpages.
- Understanding media queries and implementing it for all sized devices.
- Knowing different features of Bootstrap and implementing them.
- Integrating jQuery and understanding its usage of Events.
- Effective implementation of jQuery for different needs of webpage development
- Integration of React.js for its use on front end programming.
- Understanding the advantages provided by React.js for the current web practices.

Text Books

1. Bootstrap-Programming-Cookbook.pdf by Fabio Cimo
2. jQuery in Action by Bear Bibeault, Yehuda Katz

Reference Books

1. Introducing Bootstrap 4 by Jörg Krause – Apress
2. Head First jQuery by Ryan Benedetti, Ronan Cranley – O'Reilly

Syllabus for Semester III, Bachelor of Computer Application

Course Code: 25CS18PR0304

Course: Project based Learning

L: 0 Hrs, P: 4 Hr, Per Week

Total Credits: 2

Course Objectives

Students should be able to develop software application in a defined technology and showcase the programming skills along with understanding and participating in team based approach in project development.

Course Outcomes

On successful completion of the course, student shall be able to

1. Develop a project using any technology for a given problem-statement by using standard practices.
2. Understanding and practicing the team based efforts in developing the project like it works in software companies.

SYLLABUS

- Developing a software in a given technology and achieving the expected results by using the Object oriented principles and other standard practices.
- Writing test cases and validating the programming of the project for its correctness.
- Understanding version control systems and their usages.
- Knowing the techniques that normally practiced in the software industry.

Text Books

1. Java: The Complete Reference, Herbert Schildt
2. Software Project Survival Guide by Steve McConnell, Microsoft

Reference Books

1. Programming with Java – A Primer by E. Balaguruswamy – McGraw Hill

Syllabus for Semester III, Bachelor of Computer Application

Course Code: 25CS18TH0305

Course: Principles of Management

L: 02 Hrs P: 00 Hr, Per Week

Total Credits: 02

Course Objective

This course provides a comprehensive overview of the key principles of management, tailored to BCA students, and emphasizes the integration of these principles in the tech and business landscape.

Course Outcomes

On successful completion of the course, student shall be able to

1. Analyze the significance of management in organizational success and evaluate various management theories and their practical applications.
2. Apply decision-making tools and management strategies for problem-solving in organizations, particularly in the context of technology and business management.
3. Critically assess leadership and motivational theories and their impact on workforce management in technology-driven environments.
4. Develop a managerial mindset to handle challenges, uncertainties, and organizational changes in a global and digital business environment.
5. Enhance communication and interpersonal skills for managing teams and projects effectively in an organizational setup.

SYLLABUS

Unit 1: Introduction to Management

Definition, Meaning, and Nature of Management, Management as a Process, Management Functions (Planning, Organizing, Leading, Controlling), Levels of Management, Role of a Manager, Management vs. Administration, Evolution of Management Thought (Classical, Behavioral, Quantitative, etc.)

Unit 2: Planning and Decision Making

Meaning, Importance, and Types of Planning, Planning Process and Steps, Decision-Making Process, Decision-Making Models and Techniques, Strategic, Tactical, and Operational Planning, Setting Objectives and Goals (SMART Goals)

Unit 3: Leading and Motivation

Leadership: Definition, Styles, and Qualities of a Leader, Motivation Theories (Maslow's Hierarchy of Needs, Herzberg's Two-Factor Theory, McGregor's Theory X and Theory Y), Communication in Management, Conflict Management and Negotiation, Team Building and Group Dynamics, Managerial Leadership in Technology-driven Organizations

Unit 4: Controlling and Coordination

Controlling: Meaning, Importance, and Process, Control Mechanisms and Tools, Budgetary Control, Quality Control, and Performance Evaluation, Coordination as a Key to Organizational Effectiveness, Modern Tools for Control (ERP, AI in Management)

Text Books

1. Principles of Management by P. C. Tripathi & P. N. Reddy, McGraw Hills
2. Management: A Global Perspective by Stephen P. Robbins & Mary Coulter, Global Edition, Pearson
3. Essentials of Management by Harold Koontz and Heinz Weihrich, Tata McGraw

Reference Books:

1. Management Principles and Practices by L. M. Prasad, Sultan Chand & Sons
2. Modern Management: Concepts and Skills by Samuel C. Certo, Pearson
3. Management and Organisational Behaviour by Laurie J. Mullins, Pearson

Syllabus for Semester III, Bachelor of Computer Application

Course Code: 25HS03TH0305

Course: Discrete Mathematics & Graph Theory

L:03Hrs. T:0Hrs. P:00 Hr,Per Week

Total Credits: 03

Course Objective:

The objective of this course is to expose student to understand the basic importance of Logic, Set Theory, Algebraic structures like groups, and graph theory in computer science and Information technology.

Course Outcomes

On successful completion of the course, student shall be able to

6. Use Venn diagrams to visualize and solve problems involving set operations.
7. Identify and classify different types of relations (e.g., reflexive, symmetric, transitive, and equivalence relations) and functions (e.g., one-one, onto, and bijective functions).
8. Analyze logical statements and connectives, construct truth tables, and apply tautological implications to establish logical equivalence and validity in reasoning.
9. Develop a strong foundation in the basic concepts of graph theory, including graphs, subgraphs, degree of vertices, and graph isomorphism.
10. Understand the basic definitions, properties, and examples of groups, subgroups, and related algebraic structures.

Syllabus

Module 1: (6 Lectures)

Sets : Sets and their representation, types of sets, operation on sets, Product Sets and Partitions

Module 2(9 Lectures)

Relation and functions: Cartesian product, Relations, Graph of relations, type of Relations, (equivalence, compatible), functions , bijective , injective, surjective, composition of functions, inverse functions.

Module 3(9 Lectures)

Logic: Statements, proposition , negation, conjunction, disjunction, conditional(converse, inverse, contrapositive), bi-conditional , tautology, contingency and contradiction.

Module 4: (8 Lectures)

Graph Theory: Definition of Graphs, directed and undirected graph, simple and multi graph, degree of vertex(indegree, outdegree), types of graphs, matrix representation of graphs, isomorphism of graphs

Module 5: (7 Lectures)

Algebraic structures: Binary operations, algebraic structure , semigroups, monoids ,groups, abelian groups, cyclic groups, subgroups.

Text Books:

5. Discrete Mathematical Structures with Applications to Computer Science: *J. P. Tremblay and R. Manohar , Tata McGraw-hill.*
6. Discrete Mathematics: *Babu Ram, Pearson Publication.*

Reference Books:

1. Foundations of Discrete Mathematics: *K. D. Joshi, New age international Publication.*
2. Discrete Mathematics: *Kolman, Busby & Ross, Pearson Publication.*

Syllabus for Semester III, Bachelor of Computer Application

Course Code: 25HS01TH0303

Course: Environmental Science

L: 02 Hrs P: 00 Hr, Per Week

Total Credits: 02

After completion of this unit, students would be able to:

- Develop an understanding of pollution and its types.
- Learn about different kinds of sources of pollution.
- Explain sustainable development, its goals, targets, challenges and global strategies for sustainable development
- Understand different methods of assessing environmental quality and associated risks.

Unit 1: Environmental Pollution I

Air pollution: Sources of air pollution; Primary and secondary pollutants; carbon monoxide, lead, nitrogen oxides, ground-level ozone, particulate matter and sulphur dioxide; Other important air pollutants. Indoor air pollution; Adverse health impacts of air pollutants; National Ambient Air Quality

Water pollution: Sources of water pollution; marine pollution and groundwater pollution; Water quality parameters and standards; adverse health impacts of water pollution on human and aquatic life, treatment scheme for waste water from different industry.

Unit 2: Environmental Pollution II

Soil pollution and solid waste: Soil pollutants, hazardous wastes and their sources; Impact on human health.

Introduction, types of e-wastes, environmental impact, e-waste recycling, e-waste management rules.

Noise pollution: Definition of noise; Unit of measurement of noise pollution; Sources of noise pollution; Noise standards; adverse impacts of noise on human health, recent advances in noise pollution control and benefits.

Thermal and Radioactive pollution: Sources and impact on human health and ecosystems.

Unit 3: Environmental Sustainability

Introduction to sustainable development: Sustainable Development Goals (SDGs)-targets and indicators, challenges and strategies for SDGs

Green Technology: goals and significance, sustainability
Green chemistry, challenges to green technology, advantage and disadvantages of green processes, Eco mark certification- its importance and implementation

Unit 4: Environmental laws and regulation

Introduction to environmental laws and regulation: Constitutional provisions- Article 48A, Article 51A (g) and other derived environmental rights; Introduction to environmental legislations on the forest, wildlife and pollution control.

Environmental management system: ISO 14001

Environmental audit and impact assessment; Environmental risk assessment
Pollution control and management.

Text Books:

1. Environmental Pollution and its control Techniques by Dr. S.S. Dara. S. Chand Publications.
2. M Afshar Alam, Sapna Jain, Hena Parveen, Green Computing Approach Towards Sustainable Development, Wiley Interscience Publications.
3. Dr. Rajshree Khare, A Textbook of Engineering Chemistry (AICTE), S.K. Kataria & amp; Sons.

Reference Books:

1. E-waste recycling and management: present scenarios and environmental issues, Khan, Anish, and Abdullah M. Asiri. 2019, Springer, Vol. 33. ISBN: 978-3-030-14186-8.
2. Hans-Eckhardt Schaefer, Nanoscience: The Science of the Small in Physics, Engineering,
3. Chemistry, Biology and Medicine, Springer-Verlag Berlin Heidelberg.
4. Ahluwalia, V. K. (2015). Environmental Pollution, and Health. The Energy and Resources Institute (TERI).
5. P.T. Anastas & J.C. Warner, Green Chemistry: Theory & practice, Oxford University Press.

Syllabus for Semester III, Bachelor of Computer Application

Course Code: 25HS04PR0301

Course: Self Defence & Indian Martial Arts

L: 00 Hrs P: 02 Hr, Per Week

Total Credits: Audit Course

Course Objective:

This course provides students with practical knowledge and skills in self-defense, focusing on personal safety and awareness. Students will learn basic techniques for self-defense, including striking, blocking, and evasion, while also discussing the legal and ethical considerations of self-defense. The course will emphasize both physical techniques and mental preparedness.

Course Outcome: By the end of this course, students will:

- Understand the principles of personal safety and awareness.
- Learn and practice basic self-defense techniques.
- Develop strategies to avoid dangerous situations.
- Understand the legal and ethical implications of using self-defense.
- Build confidence and physical fitness through regular practice.

Syllabus:

1. Mental Awareness

- Importance of Self Defense
- Types of Self Defense
- Rules of Self Defense

2. Physical Session

- Various Self Defense Techniques
- Different Situational Defense Techniques

3. Improvise Weapon

- Knowledge and practice of different equipment's which can be used for self defense

4. Martial Arts

- Introduction of Indian Martial Arts
- Demonstration of Indian Martial Arts
- Training of Indian Martial Arts (Lathi Kathi)

Pattern of Classes: Training/Classes at Campus

Syllabus for Semester IV, Bachelor of Computer Application

Course Code: 25CS18TP0401
Systems

Course: Introduction to Database Management

L: 4 Hrs P: 2 Hr, Per Week

Total Credits: 5

Course Objectives

To design, manipulate and manage databases. Students can learn to develop preliminary understandings, skills for designing a database information system, the concepts of SQL and PL/SQL and to implement database systems in real world.

Course Outcomes

On successful completion of the course, students will be able to:

1. Recognize the context, phases and techniques for designing and building database information systems in business.
2. Design and implement a database schema, database objects for a given problem-domain, organize database entities, understand the principles of storage structures and apply various Normalization techniques.
3. Apply concurrency control and recovery techniques to build application for real world problem and understand query processing techniques involved in query optimization.

Syllabus

Unit - I

Introduction to Database Management Systems:

Introduction, Conventional File Processing System, Components of DBMS, Advantages and Disadvantages, Three-level Architecture proposal for DBMS, Abstraction and Data Integration, Data Independence. Data Models, Entity-Relationship Model, The Relational Model.

Unit - II

SQL, Intermediate SQL and Relational Database Design:

SQL: Overview of SQL, DDL, integrity constraints, DML, set operations, null values, aggregate functions, sub-queries.

Intermediate SQL: Joins, Views.

Unit - III

Relational Database Design: Functional Dependency, Normalization.

File Organization, Indexing and Hashing

Introduction, Ordered indices, B-Tree and B+-Tree file organization, Static & Dynamic hashing.

Unit - IV

Query Processing and Optimization:

Query Processing: Overview, Selection Operation, Join Operation.

Query Optimization: Overview, Transformation of Relational Expressions, Cost-Based Optimization, Heuristic Optimization.

Unit - V**Concurrency Control and Database Recovery:**

Concept of Transaction, Serializability, locking protocols.

Deadlock Detection and Recovery, Log based Recovery, Recovery with concurrent transactions.

.

Text Books:

1. Database Systems Concepts: *Silberschatz, Korth, Sudarshan, McGraw-Hill.*
2. An Introduction to Database Systems: *Bipin C. Desai, Galgotia.*

Reference Books:

1. Fundamental of Database Systems: *Elmasri, Navathe, Somayajulu, Gupta Pearson Publications*
2. Database Management System: *Raghu Ramkrishnan, Johannes, McGraw Hill*
3. An Introduction to Database Systems: *C.J.Date, Narosa*

Lab Syllabus

Minimum 8 practicals and assignments based on the theory syllabus.

SYLLABUS OF SEMESTER - IV, BCA (BACHELOR OF COMPUTER APPLICATION)

Course Code: 25CS18TP0402
Systems

Course: Introduction to Operating

L: 3 Hrs, P: 2 Hr, Per Week

Total Credits: 4

Course Objectives

To study various elements of operating systems and compare core functionalities of Windows and Linux operating systems. Students can learn concurrent processes problems, understand various memory management techniques, analyze deadlock handling methodologies and different protection and security concerns of operating system.

Course Outcomes

On successful completion of the course, students will be able to:

1. Identify various elements of operating system and compare core functionalities of Windows and Linux.
2. Identify and synchronize concurrent processes problems, analyze various memory management techniques and deadlock handling methodologies.
3. Understand file systems and disk scheduling

Syllabus

Unit - I

Introduction – Concepts of operating systems, Generations of OS, Types of OS, Operating system services, system calls. Case study on Windows and Unix OS.

Unit - II

Process: Introduction, Threads, CPU Scheduling algorithms, Inter-process communication, Critical section problem, Semaphores, Classical process coordination problem.

Unit - III

Deadlock: Definition, Necessary and sufficient conditions for Deadlock, Deadlock Prevention, Deadlock Avoidance, Banker's algorithm, Deadlock detection and Recovery.

Unit - IV

Memory Management: Concept of Fragmentation, Swapping, Paging, Segmentation.

Virtual memory: Demand Paging, Page replacement algorithm, Thrashing.

Unit - V

File system introduction, Access methods, Allocation methods, Directory system, Disk and drum scheduling.

Text Books:

1. Operating System Concepts: *Silberschatz Galvin: John Wiley & Sons.*
2. Modern Operating Systems: *Andrew Tanenbaum, PHI.*
3. Operating System, internals and Design Principles: *Williams Stallings.*

Reference Books :

1. An Introduction to Operating System: *H.M.Dietel, Pearson Education.*
2. Operating System: *Charles Crowley, IRWIN Publications.*

Lab Syllabus

Minimum 8 practicals and assignments based on the above syllabus.

SYLLABUS OF SEMESTER - IV, BCA (BACHELOR OF COMPUTER APPLICATION)

Course Code: 25CS18TP0403

Course: Introduction to Computer Networks

L: 3 Hrs, P: 2 Hr, Per Week

Total Credits : 4

Course Objectives

This course introduces the fundamental concepts of data communication and computer networks. It covers various types of networks, transmission media, network devices, and layered architecture models such as OSI and TCP/IP. Students will gain an understanding of the roles of different network layers, addressing, routing, and essential application protocols

Course Outcomes

On successful completion of the course, students will be able to:

1. Describe the basic components, types, and topologies of data communication systems and networks.
2. Differentiate between various transmission media, networking devices, and switching techniques.
3. Explain the functions of OSI and TCP/IP layers and understand basic error handling and data framing techniques.
4. Identify the roles of IP addressing, routing, transport layer protocols, and common application layer services along with basic network security principles.

Syllabus

UNIT-I

Introduction: Components of data communication, Types of data: analog and digital, Data flow: simplex, half-duplex, full-duplex, Network criteria and performance, Types of networks: LAN, MAN, WAN, Network topologies, Protocols and standards

UNIT-II

Transmission Media and Networking Devices: Guided media: twisted pair, coaxial cable, fiber-optic cable, Unguided media: radio waves, microwaves, infrared, Transmission impairments: attenuation, distortion, noise, Network devices and Switching techniques.

UNIT-III

Network Models and Data Link Layer: OSI model: layers and their functions, TCP/IP model: layers and comparison with OSI, Framing and flow control, stop-and-wait, sliding window, Error detection methods: parity check, CRC.

UNIT-IV

Network Layer and Routing: Functions of network layer, IP addressing (IPv4) , Subnetting , Routing basics: static vs dynamic, Routing algorithms: distance vector and link state

UNIT-V

Transport, Application Layer: Duties of transport layer, TCP vs UDP: features and differences, Ports and sockets (basic idea), Application layer protocols: DNS, FTP, HTTP, SMTP.

Text Books

1. Data Communications and Networking” by Behrouz A. Forouzan, 5th Edition, McGraw Hill.

Reference Books

1. Computer Networks”, by Tanenbaum A. S., Pearson Education, 2008, ISBN-978-81-7758-165-2, 4th Edition
2. Computer Networks- A Systems Approach”, by Larry L. Peterson and Bruce S. Davie, Morgan Kaufmann, ISBN-978-81-312-1045-1, 4th Edition.

Lab Syllabus

Minimum 8 Practicals based on theory syllabus.

Syllabus for Semester IV, Bachelor of Computer Application

Course Code: 25CS18TH0404

Course: Theory of Computation

L: 3 Hrs P: 0 Hr, Per Week

Total Credits: 03

Course Objectives

To develop foundational skills in formal language theory by designing finite automata, context-free grammars, and pushdown automata, and to understand Turing machines and the concepts of decidability and computational intractability.

Course Outcomes

On successful completion of the course, students will be able to:

1. Design and optimize finite automata and apply regular expressions for language recognition and processing.
2. Analyze and construct context-free grammars (CFGs) and design pushdown automata (PDA) for context-free languages.
3. Implement Turing Machines and evaluate the decidability and unsolvability of computational problems.

Syllabus

Unit -I

Finite Automata

Informal picture of Finite automation model (FA), Deterministic Finite Automata, Definition and Notations of DFA, How a DFA processes Strings and Languages, Non-deterministic finite Automata, Definition, Equivalence of NFA & DFA, Conversion of NFA into DFA, Finite Automata with Epsilon transitions, Finite Automata with output: Moore & Mealy machines.

Unit – II

Regular Expressions

Regular expressions (RE), Operators and rules, Building regular expressions, Converting DFA's to RE and RE to Automata, Pumping lemma for regular languages, Closure properties of regular languages, Regular grammars (RG), Right linear and Left linear grammars, Interconversion between RE and RG, Minimization of FSM.

Unit -III

Context Free Grammar and Languages

Context-free grammars, Parse trees, Ambiguity in grammar and languages, Normal forms for Context- Free Grammars Chomsky normal form, Greibach normal form, Reduction of CFG's,

Elimination of ϵ - Productions, Unit Productions and Left Recursion, Useless Symbols, closure and decision properties of CFLs.

Unit – IV

Push Down Automata

Definition of Pushdown Automata (PDA), Formal definition of PDA, Languages of PDA- Acceptance by final state and Empty Stack, , From PDA to CFG and CFG to PDA, Deterministic vs. Nondeterministic PDA .

Unit - V

Turing Machines & Undecidability

The Turing Machine, Transition diagrams for Turing machines, Languages, Turing machines and Halting, Extensions to basic Turing Machine, Universal Turing Machine, Recursive and Recursively enumerable languages, Undecidable Problem, Decidability, Rice's theorem, Post's Correspondence problem, Church's Hypothesis, Recursive function theory.

Text Books:

1. Hopcroft Ulman, Introduction to Automata Theory, Languages and Computations, Pearson Education Asia, 2nd Edition, ISBN: 9788131720479.
2. Michael Sipser, Introduction to the Theory of Computation, CENGAGE Learning, 3 rd Edition ISBN: 978-81-315-2529-6
3. Dr. O. G. Kakde, "Theory of Computation", University Science Press

Reference Books:

1. John C. Martin, Introduction to Language and Theory of Computation, TMH, 3 rd Edition, ISBN: 978-0-07-066048-9.
2. K.L.P. Mishra and Chandrasekaran, "Theory of Computer Science (Automata, Languages and Computation)", PHI, 3rd Edition
3. Daniell. A. Cohen, Introduction to Computer Theory, Wiley-India, ISBN: 978-81-265-1334-5.

Syllabus for Semester IV, Bachelor of Computer Application

Course Code: 24CS18TH0405

Course: Creativity, Innovation & Design Thinking

L:2 Hrs P: 0 Hr, Per Week

Total Credits: 2

Course Outcome:

On completion of course, students will be able to achieve the following:

1. Be familiar with processes and methods of creative problem solving
2. Enhance their creative and innovative thinking skills
3. Practice thinking creatively and innovative design and development

SYLLABUS

UNIT - 1 : Introduction

Making a case for creativity, Creative thinking as a skill, Valuing diversity in thinking: Thinking

preferences, Creativity styles, Creativity in problem solving

UNIT - 2 : Pattern Breaking

Thinking differently, Lateral thinking, Mind stimulation: games, brain- twisters and puzzles, Idea collection

processes, Brainstorming/Brain writing, The SCAMPER methods, Metaphoric thinking,

Outrageous thinking, Mapping thoughts, other (new approaches)

UNIT – 3:

Using Math and Science, Systematic logical thinking, Using math concepts, Eight-Dimensional (8D)

Approach to Ideation: Uniqueness, Dimensionality, Directionality, Consolidation, Segmentation,

Modification, Similarity, Experimentation

UNIT - 4 : Systematic Inventive Thinking

Systematic inventive thinking: The TRIZ methodology, Decision and Evaluation: Focused thinking

framework, six thinking hats, Ethical considerations

UNIT - 5 : Design for Innovation

Introduction to design for interaction, nine lessons for innovation, difference in creativity and

innovation, Building blocks for innovation

UNIT - 6 : Intellectual Property

Introduction to intellectual property: Patents, Copyrights©, Trademarks®, Trade Secret, Unfair

Competition.

Reference Books and Text Book

1. Creative Problem Solving for Managers - Tony Proctor - Routledge Taylor & Francis Group
2. 101 Activities for Teaching creativity and Problem Solving - By Arthur B Vangundy - Pfeiffer
3. H. S. Fogler and S.E. LeBlanc, Strategies for Creative Problem Solving, Prentice Hall
4. E. Lumsdaine and M. Lumsdaine, Creative Problem Solving, McGraw Hill,
5. J. Goldenberg and D. Mazursky, Creativity in product innovation. Cambridge University Press, 2002.

Syllabus for Semester V, Bachelor of Computer Application

Course Code: 25CS18TP0501

L: 3 Hrs P: 2 Hr, Per Week

Course: Introduction to Data Science

Total Credits: 4

Course Objective

This course introduces fundamental concepts, lifecycle, and applications of Data Science. In addition, the course will develop skills in data acquisition, cleaning, transformation, and exploratory analysis. Build foundational statistical analysis capabilities and teach data visualization, communication, and ethical handling of data. Lastly to provide practical, hands-on exposure to Python-based data science tools.

Course Outcomes

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

CO1: Identify data science concepts, lifecycle, and application domains.

CO2: Explore, collect, clean, and preprocess datasets, including handling different data types and features.

CO3: Apply descriptive and inferential statistical techniques to analyze data.

CO4: Create clear, accurate visualizations and communicate insights effectively.

CO5: Implement end-to-end data science concepts, analyse and interpret the results.

SYLLABUS

Unit 1: Introduction to Data Science

Data Science vs. Data Analytics vs. AI, Data Science lifecycle: Collection → Cleaning → Analysis → Communication, Roles in a Data Science team: Data Engineer, Data Analyst, ML Engineer, Data Scientist, Real-world applications (healthcare, finance, retail, social media) Overview of data formats (CSV, JSON, database tables).

Unit 2: Data Handling & Exploration

Data sources: files, APIs, and public datasets, Handling missing data, outliers, and duplicates Exploratory Data Analysis (EDA): summary statistics, correlations, Merging, concatenating, and reshaping data tables, Introduction to data indexing and slicing, Data quality assessment (checking consistency, detecting anomalies).

Unit 3: Statistics for Data Science

Measures of central tendency: mean, median, mode, Variability: range, variance, standard deviation, Probability basics and common distributions (normal, binomial), Covariance vs. correlation, scatter plots, Sampling techniques and sample size basics, Confidence intervals and basic hypothesis testing.

Unit 4: Data Transformation & Feature Handling

Feature extraction: numerical, categorical, and datetime data, encoding techniques: label encoding, one-hot encoding, Scaling: normalization and standardization methods, combining

features (feature engineering basics), Handling categorical vs. continuous features, Introduction to automated pipelines for preprocessing.

Unit 5: Data Visualization, Communication & Ethics

Visualization principles: clarity, accuracy, simplicity, Plot types: bar, histogram, scatter, boxplots, heatmaps, Building simple analytical reports, Storytelling with data: designing a data narrative, Introduction to dashboards (basic concept, e.g., Streamlit), Data privacy, security, and bias considerations in projects.

Text Books

1. Doing Data Science: Straight Talk from the Frontline – Cathy O’Neil & Rachel Schutt, O’Reilly Media publication
2. Introduction to Data Science – Laura Igual & Santi Seguí, Springer
3. Foundations of Data Science – Avrim Blum, John Hopcroft, and Ravindran Kannan, Cambridge University Press

Reference Books

1. Data Science and Analytics – V.K. Jain, Khanna Publishing
2. Fundamentals of Data Science – Seema Acharya & Subhashini Chellappan, Wiley India
3. Fundamentals of Data Science – Dr. Anil Maheshwari, Wiley India

LAB SYLLABUS

Minimum 12 practicals and assignments based on but not limited to the following topics:

1. Python basics: lists, dictionaries, loops, file operations.
2. NumPy arrays: creation, indexing, reshaping, broadcasting.
3. Pandas: reading CSV/Excel, selecting, and filtering data.
4. Handling missing values, duplicates, and outliers.
5. Exploratory Data Analysis: summary stats, correlations.
6. Basic visualizations: line, bar, histogram, scatter plots.
7. Advanced visualizations: boxplots, heatmaps, pairplots (Seaborn).
8. Feature engineering: encoding categorical data, scaling numeric data.
9. Basic descriptive statistics: mean, variance, correlation matrix.
10. Hypothesis testing: t-test or chi-square using Python.
11. Preparing a reproducible report in Jupyter Notebook.
12. **Mini Project:** Acquire → Clean → Visualize → Summarize findings from a real dataset.

Syllabus for Semester V, Bachelor of Computer Application

Course Code: 25CS18TP0502
L: 4 Hrs P: 2 Hr, Per Week

Course: Analysis of Algorithms
Total Credits: 5

Course Objective

To enable the students to design good efficient solutions to real world problems and understand the complexity of their solution in terms of memory space and computer time.

Course Outcomes

On successful completion of the course, the student shall be able to

1. Appreciate the need for analysis of algorithms.
2. How to analyze algorithms best-case, average-case, and worst-case running times using asymptotic analysis.
3. Design efficient algorithms using the Divide and conquer paradigm, specifically for problems encountered in real-life situations.
4. Design efficient algorithms using the Greedy paradigm and, Dynamic Programming paradigm.
5. Know the limitations on the time complexity of algorithms and the theory of NP Complete problems

SYLLABUS

Unit I:

Introduction to Algorithms, and the need for analysing algorithms. Mathematical foundations, summation of arithmetic and geometric series, recurrence relations, and solutions of recurrence relations using the substitution method.

Unit II:

Asymptotic notations of analysis of algorithms, analyzing control structures, worst case and average case analysis, sorting algorithms such as insertion sort, bubble sort, lower bound proof, elementary data structures with operations on them, and their time complexity.

Unit III:

Divide and conquer basic strategy, Linear search, binary search. Comparison and Analysis of both searches. Design and analysis of sorting problems like quick sort, merge sort, Max-Min problems, etc.

Unit IV:

Greedy Algorithms basic strategy, Solving the greedy coin changing problem, the fractional knapsack problem.

Dynamic Programming basic strategy, solving the coin changing problem, and the 0/1 knapsack problem. Comparing these problems with greedy method.

Unit V:

P Class problems, NP class problems, NP-hard and NP-complete problems, basic concepts, Examples of Deterministic Versus non-deterministic algorithms, decision and optimization problems.

Text Books

- Introduction to Algorithms: Cormen T.H.: Prentice Hall of India
- Foundations of Algorithms: Shailesh R. Sathe : Penram International Publishing (India) Pvt.Ltd

Reference Books

- Fundamentals of Algorithms: Brassard, Bratley, Prentice Hall
- Computer Algorithms: Horowitz, Sahani, Rajshekharan, Galgotia Publications Pvt. Ltd

LAB SYLLABUS

Minimum 8 practicals and assignments based on but not limited to the following topics:

8. Divide and conquer Technique
9. Sorting Techniques
10. Searching Techniques
11. Greedy Algorithms
12. Dynamic programming
13. Backtracking
14. Graphs
15. Case studies

SYLLABUS OF SEMESTER - V, BCA (BACHELOR OF COMPUTER APPLICATIONS)

Course Code: 25CS18TP0503
L: 3 Hrs, P: 2 Hr, Per Week

Course: Software Engineering
Total Credits: 4

Course Objectives

This course's objective is to provide students with an overall idea of software development processes, methodologies, and best practices, including software testing techniques. It equips students with the knowledge required to design, develop, test, and maintain high-quality software systems in a systematic and professional manner.

Course Outcomes

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

1. Familiarization with the concept of software engineering, methodologies and its relevance.
 2. Understanding of various methods or models for developing a software product.
 3. Understanding requirement analysis and its implementation strategies.
 4. Understanding testing fundamentals and various techniques for testing.
 5. Able to understand Integration Testing.
-

Syllabus

Unit 1: Introduction to Software Engineering

Introduction to Software Engineering: Software Processes & Characteristics, Software. Software Myths. **Software Process:** Software Engineering, Process Framework, Process Models-Waterfall Model, Incremental Process Models, Evolutionary Process Models, Specialized process Models, Agile Process.

Unit 2: Requirements Analysis and Specifications

Requirement engineering, requirement, requirements analysis using DFD.

Design Engineering: Design Concept, Design Model, Architectural Design, Component Level Design, Interface Design.

Unit 3: Software Project Management & Estimation

Management Spectrum-The People, The Product, The Process, The Project.

Project Estimation: Resources, Estimation Models, Project Scheduling, Risk Management, and Quality Management Software Quality Management and QA, V & V Planning

Unit 4: Software Testing Fundamentals

Static testing by Humans, Static Analysis Tools, Structural Testing, Code Functional Testing, Code Coverage Testing, Code Complexity Testing, Challenges in White Box Testing and Black Box Testing

Unit 5: Integration Testing

Introduction, Top-Down Integration, Bi-Directional integration, System Integration; System and Acceptance Testing. Performance Testing, Introduction.

Test Planning: Management, Execution and Reporting: - Test Planning, preparing a Test Plan, setting up Criteria for Testing, Test Case Specification, Developing and Executing Test Cases, Test Summary Report.

Textbooks

1. **Roger S. Pressman**, "Software Engineering: A Practitioner's Approach," 8th Edition, McGraw Hill, 2014.
2. **Ian Sommerville**, "Software Engineering," 10th Edition, Pearson Education, 2015.

Reference Books

1. **Naresh Chauhan**, "Software Testing: Principles and Practices," Oxford University Press, 2010.
2. **Capers Jones**, "Software Quality: Analysis and Guidelines for Success," International Thomson Computer Press, 1997.

Software Engineering Lab

LAB SYLLABUS

A minimum 8-10 practicals based on the syllabus.

Syllabus for Semester V, Bachelor of Computer Application

Course Code: 25CS18PR0504

Course: Basic Competitive Coding

L: 0 Hrs P: 2 Hr, Per Week

Total Credits: 1

Course Objective

This course is designed to enhance students' logical reasoning and problem-solving abilities through structured programming practices. It aims to provide a strong foundation in basic algorithms and their implementation techniques. Furthermore, the course introduces students to competitive programming environments and platforms, fostering skill development through regular hands-on problem-solving and coding challenges.

Course Outcomes

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

1. Solve basic programming problems using standard input/output and conditional logic.
2. Implement fundamental algorithms such as loops, arrays, and string manipulation.
3. Apply logical reasoning and problem-solving techniques to solve real-time competitive problems.

SYLLABUS

Minimum 7-8 practical's and assignments based on but not limited to the following topics:

1. Input/Output Basics
2. Conditional Statements and Loops
3. Arrays and Matrices
4. String Manipulation
5. Hash Map, Hash Set, Tree Map, Tree Set
6. Stack and Queue Problems
7. Linked Lists – Traversal-Based Problems
8. Tree Basics – Types and Traversals
9. Basic Sorting Algorithms
10. Time and Space Complexity (Introductory Level)

Note :

Platforms Used: HackerRank, CodeChef (Beginner Track), LeetCode (Easy)

Syllabus for Semester V, Bachelor of Computer Application

Course Code: 25CS18PR0505
L: 0 Hrs P: 4 Hr, Per Week

Course: Mini Project – I
Total Credits: 2

Course Objective

Understand and learn various software project development concepts for solving real world problems. Apply various project management concepts for developing solutions to real world problems.

Course Outcomes

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

CO1: Formulate minor project (phase-I) with clearly identified scope and requirements.

CO2: Implement minor project (phase-I) by applying Software Development Life Cycle.

CO3: Implement programming theories, concepts and principles learnt for Software Development.

CO4: Develop team building capacity for successful project development.

SYLLABUS

Develop a demonstrable minor project based on the subjects learned till this semester.

SYLLABUS OF SEMESTER - VI, BCA (BACHELOR OF COMPUTER APPLICATION)

Course Code: 25CS18PR0601

Course: Mobile Applications and Development Lab

L: 0 Hrs P: 4 Hr, Per Week

Total Credits: 02

Course Objectives:

This course aims to equip students with foundational knowledge of Flutter and Dart, enabling them to design responsive UIs, build and deploy cross-platform mobile apps, and develop real-time applications using Firebase.

Course Outcomes

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

1. Develop user interfaces using Flutter widgets
2. Implement navigation and state management in Flutter apps
3. Integrate Firebase for authentication and real-time database features
4. Design and deploy complete cross-platform mobile applications

SYLLABUS

Minimum 8 practical's and assignments based on but not limited to the following topics:

- Getting Started with Flutter: Hello World App
- Designing Interactive Forms with Input Validation
- Screen Navigation and Route Management in Flutter
- Developing a To-Do List App using Stateful Widgets
- Fetching and Displaying Data from REST APIs
- User Authentication with Firebase in Flutter Apps
- Using Shared Preferences for Local Data Storage
- Mini Project: Building a Feature-Rich Mobile Application with Flutter

SYLLABUS OF SEMESTER VI, BCA (BACHELOR OF COMPUTER APPLICATIONS)

Course Code: 25CS18TP0602

Course: Internet and Web Technologies

L: 4 Hrs, P: 2 Hr, Per Week

Total Credits: 5

Course Objectives

To understand the history of Web and internet technologies current industrial data modeling and representation concepts. Learning and implementing the Server side technologies like PHP, Asp.Net and MEAN.

Course Outcomes

On successful completion of the course, students will be able to:

1. Understand the fundamentals of internet and web development.
 2. Usage of different data models and schemas.
 3. Grasp essential knowledge for creation of web applications using PHP.
 4. Implementing the website development by using Asp.Net.
 5. Learning and developing the web pages by using MEAN stack.
-

SYLLABUS

UNIT-I

Introduction to Internet and Web :

History and Evolution of Internet and Web, Internet Architecture & Protocols (TCP/IP, HTTP, FTP, SMTP), Domain Name System (DNS), IP Addressing, Web Browsers, Web Servers (Apache, Nginx), URLs, URIs, and Search Engines, Introduction to Web 1.0, 2.0, 3.0.

UNIT – II

Data modeling and representation – Introduction of XML, XML DTD validation, Introduction to JSON, JSON Schema, JSON Format, API Handling etc.

UNIT – III

PHP : Introduction to PHP, History of PHP, Installation and Configuration of PHP, Basic Web page designing, processing a web form, capturing form data, passing information between pages, PHP \$_GET, PHP \$_POST, with multi value fields, validating a web form, input validation, exception and error handling, introduction to cookies and session handling. Working with database: PHP supported databases, using PHP & MySQL.

UNIT – IV

ASP.NET : DotNet Framework Introduction, ASP .NET file Types, Page Class, Auto Postback, WebControls, Validation Controls, Master Pages, web.config, persisting data by using Sessions and Cookies.

UNIT –V

MEAN : Introduction to MEAN, Getting started, with Node.js, Node modules, Introduction to Express, Implementing the MVC pattern in MEAN.

Text Books:

1. Beginning HTML, XHTML, CSS, and JavaScript - *Jon Duckett , Wrox*
2. Programming PHP - Kevin Tatroe, Peter MacIntyre and RasmusLerdorf, O'REILLY media , 3rd edition.
3. Asp.Net Complete Reference – *Mathew McDonald.*
4. Mean Web Development - *Amos Q. Haviv, PACKT Publishing.*

LAB SYLLABUS:

Minimum 8-10 practicals based on the syllabus from the technologies of PHP, ASP.NET & MEAN.

SYLLABUS OF SEMESTER - VI, BCA (BACHELOR OF COMPUTER APPLICATION)

Course Code: 25CS18TP0603

Course: Artificial Intelligence

L: 3 Hrs P: 2 Hr, Per Week

Total Credits: 4

Course Objective:

The primary objective of this course is to introduce the fundamental concepts of Artificial Intelligence, including intelligent agents, problem-solving techniques, knowledge representation, reasoning, and learning. It also aims to develop a foundational understanding of AI applications and ethics.

Course Outcomes:

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

1. Understand the foundations and history of Artificial Intelligence.
2. Apply various problem-solving and searching techniques in AI.
3. Represent knowledge using appropriate techniques and perform logical reasoning.
4. Explain different AI learning techniques including supervised and unsupervised learning.
5. Understand real-world AI applications and ethical concerns related to AI.

SYLLABUS

Unit I: Introduction to Artificial Intelligence

Definition, History, and Applications of AI, Intelligent Agents: Structure, Environment, Types, AI vs. Human Intelligence

Unit II: Problem Solving and Search Techniques

Problem Solving Process, Uninformed Search Strategies: BFS, DFS, Uniform Cost Search, Informed Search Strategies: Greedy, A*, Heuristic Functions and Game Playing (Minimax, Alpha-Beta Pruning)

Unit III: Knowledge Representation and Reasoning

Knowledge Representation: Propositional and Predicate Logic, Forward and Backward Chaining, Semantic Networks, Frames, Rule-Based Systems

Unit IV: Learning in AI

Introduction to Machine Learning, Supervised and Unsupervised Learning, Decision Trees, K-means Clustering, Neural Networks (Basic Concepts)

Unit V: AI Applications and Ethics

Introduction of Natural Language Processing, Expert Systems, Robotics, Ethical and Social Issues in AI.

LAB SYLLABUS:

Minimum 8-10 practicals based on the syllabus .

Text Books

- Stuart Russell, Peter Norvig – Artificial Intelligence: A Modern Approach, Pearson Education.
- Elaine Rich, Kevin Knight – Artificial Intelligence, Tata McGraw-Hill.

Reference Books

- Dan W. Patterson – Introduction to Artificial Intelligence and Expert Systems, Pearson Education.
- Nils J. Nilsson – Artificial Intelligence: A New Synthesis, Morgan Kaufmann.
- Ethem Alpaydin – Introduction to Machine Learning, MIT Press.

SYLLABUS OF SEMESTER - VI, BCA (BACHELOR OF COMPUTER APPLICATION)

Course Code: 25CS18TH0604

Course: Basics of Ethical Hacking

L: 3 Hrs P: 0 Hr, Per Week

Total Credits: 3

Course Objective:

To introduce students to the fundamental techniques of ethical hacking, including footprinting, scanning, enumeration, and system exploitation. The course emphasizes on identifying and assessing vulnerabilities in Windows and UNIX environments ethically and legally.

Course Outcomes:

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

1. Apply footprinting techniques to gather publicly available information.
2. Identify proficiency in scanning to understand live systems, open ports, services and operating systems using industry-standard tools.
3. Perform enumeration tasks to assess network and service configurations.
4. Analyze Windows-based attacks and Windows security features.
5. Evaluate vulnerabilities in UNIX systems aimed at privilege escalation and root access.

SYLLABUS

UNIT-1

Footprinting: Introduction, Internet Footprinting Determine the Scope of Your Activities, Get Proper Authorization, Publicly Available Information, WHOIS & DNS Enumeration, DNS Interrogation, Network Reconnaissance.

UNIT-2

Scanning: Determining If the System Is Alive, Determining Which Services Are Running or Listening, Detecting the Operating System, Processing and Storing Scan Data.

UNIT-3

Enumeration: Service Fingerprinting, Vulnerability Scanners, Basic Banner Grabbing, Enumerating Common Network Services.

UNIT-4

Hacking Windows: Overview, Unauthenticated Attacks, Authenticated Attacks, Windows Security Features.

UNIT-5

Hacking UNIX: The Quest for Root, Remote Access, Local Access, After Hacking Root.

Text Books

1. Stuart McClure, Joel Scambray and Goerge Kurtz, Hacking Exposed 7: Network Security Secrets & Solutions, Tata Mc Graw Hill Publishers, 2010.
2. Bensmith, and Brian Komer, Microsoft Windows Security Resource Kit, Prentice Hall of India, 2010.

Reference Books

1. Stuart McClure, Joel Scambray and Goerge Kurtz, "Hacking Exposed Network Security Secrets & Solutions", 5th Edition, Tata Mc Graw Hill Publishers, 2010.
2. Rafay Baloch, "A Beginners Guide to Ethical Hacking".
3. Allen Harper, Shon Harris, Jonathan Ness, Chris Eagle, "Gray Hat Hacking The Ethical Hackers Handbook", 3rd Edition, McGraw-Hill Osborne Media paperback(January 27, 2011)

SYLLABUS OF SEMESTER - VI, BCA (BACHELOR OF COMPUTER APPLICATION)

Course Code: 25CS18TP0605-1

Course: Distributed and Parallel Databases

L: 3 Hrs P: 2 Hr, Per Week

Total Credits: 4

Course Objective

Understand the architecture and challenges of distributed and parallel database systems. Learn data fragmentation, replication, and distributed query processing. Implement concurrency control, recovery, and transaction management in distributed environments. Understand parallel query optimization and execution.

Course Outcomes

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

1. Explain the concepts, architecture, and motivations behind distributed databases.
2. Analyze fragmentation, replication, and data allocation strategies.
3. Apply distributed query processing and optimization techniques.
4. Compare and implement distributed transaction management and concurrency control.
5. Understand and simulate recovery mechanisms in distributed environments.

SYLLABUS

Unit - I :

Introduction to Distributed Databases- Features and needs- Distributed DBMS architecture- Data independence, system architecture

Unit - II:

Data Fragmentation and Replication- Horizontal and vertical fragmentation- Data allocation and replication strategies- Transparency issues

Unit - III :

Distributed Query Processing and Optimization- Query decomposition- Query optimization strategies- Cost-based optimization

Unit - IV :

Distributed Transactions and Concurrency Control- Transaction management- Two-phase commit- Locking protocols and deadlocks

Unit - V :

Distributed Database Recovery- Distributed recovery techniques- Log management- Checkpoints and recovery protocols Parallel Database Systems- Architecture and models (shared-nothing, shared-disk)- Intra-query and inter-query parallelism- Parallel join, partitioning, load balancing

LAB SYLLABUS

Minimum 8 practicals and assignments based on but not limited to the following topics:

- Basic SQL Refresher ,Review of SQL DDL, DML, and simple queries.
- Horizontal and Vertical Fragmentation.
- Data Replication.
- Data Replication.
- Distributed Query Processing.
- Query Optimization
- Parallel Query Execution (Simulation).
- Use of MongoDB for Partitioning

Text Books

1. M. Tamer Özsu & Patrick Valduriez Springer, 4th Ed **Principles of Distributed Database Systems**
2. Stefano Ceri & Giuseppe Pelagatti McGraw Hill **Distributed Databases: Principles and Systems**

Reference Books

1. Parallel Database Systems: The Future of High Performance Database Systems David J. DeWitt and Jim Gray
2. Database System Concepts Abraham Silberschatz, Henry F. Korth, and S. Sudarshan

SYLLABUS OF SEMESTER - VI, BCA (BACHELOR OF COMPUTER APPLICATION)

Course Code: 25CS18TP0605-2 Course: Intrusion Detection and Prevention System

L: 3 Hrs P: 2 Hr, Per Week

Total Credits: 4

Course Objectives

To provide foundational knowledge of intrusion detection systems with a focus on Snort, covering network protocols, packet analysis, rule-based attack detection, hands-on Snort deployment, and basic alert management and prevention strategies.

Course Outcomes

On successful completion of the course, student shall be able to

- Explain the role and need for intrusion detection systems in securing networks.
- Understand and apply packet analysis concepts using Snort.
- Create and customize Snort rules for detecting various types of network intrusions.
- Use Snort for real-time traffic monitoring and alert generation.
- Deploy Snort in different environments with logging, output modules, and rule management

SYLLABUS

Unit I:

Introduction to Intrusion Detection and Snort: Basics of Network Security and Threats, Introduction to IDS and Snort, IDS Components: Sensor, Console, Engine, Role of Open Source Tools in IDS

Unit II:

Understanding TCP/IP and Packet Capture: Packet Structure: Ethernet, IP, TCP, UDP, ICMP, Packet Analysis Tools (tcpdump, Wireshark), Promiscuous Mode and Libpcap, Introduction to Packet Filtering

Unit III:

Installing and Running Snort: Installing Snort on Linux and Windows, Running Snort in Sniffer, Packet Logger, and IDS Modes, Snort Configuration File (snort.conf), Output Plugins and Logging Options

Unit IV:

Writing and Managing Snort Rules: Rule Structure: Headers and Options, Content Matching and Rule Actions, Using Variables, Preprocessors, and Rule Optimization, Custom Rule Creation for Specific Attacks (Port Scan, DoS, Malware)

Unit V:

Snort Deployment and Integration: Real-time Alerting and Logging with BASE or Kibana, Rule Management Tools (PulledPork, Snorby), Integrating Snort with Firewalls and SIEM, Performance Tuning and Troubleshooting.

Text Books

1. Rafeeq Ur Rehman, *Intrusion Detection Systems with Snort*, Prentice Hall, 2003.

Reference Books

1. Carl Endorf, Eugene Schultz, Jim Mellander, *Intrusion Detection & Prevention*, McGraw-Hill.
2. Chris Sanders, *Applied Network Security Monitoring*, Syngress.
3. Snort User Manual and Documentation from snort.org

LAB SYLLABUS:

Minimum 8 practicals and assignments based on but not limited to the following topics:

- Install Snort and run it in sniffer and packet logger modes
- Analyze basic TCP/IP packets using Wireshark
- Configure snort.conf for live traffic monitoring
- Write simple Snort rules for detecting ICMP, TCP, and UDP traffic
- Simulate and detect a ping sweep or port scan using Snort
- Configure output logging in fast, full, and unified modes
- Use BASE or other front-ends to view Snort alerts graphically
- Develop a mini project to monitor and alert on a suspicious login attempt

SYLLABUS OF SEMESTER - VI, BCA (BACHELOR OF COMPUTER APPLICATION)

Course Code: 25CS18TP0605-3

Course: Computer Graphics

L: 3 Hrs P: 2 Hr, Per Week

Total Credits: 4

Course Objective

To introduce the fundamental concepts, techniques, and applications of computer graphics and helps students understand and implement basic 2D and 3D graphics, transformations, and animation principles.

Course Outcomes

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

1. Explain the basic concepts, types, and applications of computer graphics.
2. Apply line, circle, and character drawing algorithms with pixel-level control.
3. Perform 2D transformations and implement viewing techniques.
4. Understand and apply basic 3D transformations and viewing pipelines.
5. Demonstrate knowledge of Bezier curves, color models, and animation fundamentals.

SYLLABUS

Unit 1: Introduction to Computer Graphics, Types and Applications, Overview of Graphic Systems: Raster vs Random Scan, Basic Input/Output Devices used in Graphics, Introduction to Graphics Software and Standards

Unit 2: Points, Lines, Circles – Concept and Drawing Logic, Basic Line Drawing Algorithm, Circle Drawing, Simple Character Drawing and Pixel Coloring, Line and Fill Attributes

Unit 3: 2D Transformations and Viewing: Translation, Scaling, Rotation Matrix Representation and Homogeneous Coordinates, Composite Transformations, Window-to-Viewport Mapping, Simple Clipping Concepts

Unit 4: Introduction to 3D Graphics: Why 3D? Real-world Examples, Introduction to 3D Objects, 3D Transformations: Translation, Scaling, Rotation, Orthographic vs Perspective Projection, 3D Object Representation: Polygons, Meshes, Depth and Z-buffer Concept, Simple 3D Viewing Pipeline Overview

Unit 5: Introduction to Bezier Curves, Color Models: RGB and CMY, Introduction to Animation in Graphics: Keyframes, Tweening, Introduction to Frame Rate and Timing in Animation, Overview of Morphing and Motion Paths

Text Books

1. Donald Hearn & M. Pauline Baker, “Computer Graphics with OpenGL”, Third Edition, 2004, Pearson Education, Inc. New Delhi.
2. Ze-NianLi and Mark S. Drew, “Fundamentals of Multimedia”, First Edition, 2004, PHI Learning Pvt. Ltd., New Delhi.

Reference Books

1. Plastock : Theory & Problem of Computer Gaphics, Schaum Series.
2. Foley & Van Dam : Fundamentals of Interactive Computer Graphics, Addison Wesley.
3. Newman : Principles of Interactive Computer Graphics, McGraw Hill.

LAB SYLLABUS

Minimum 8 practicals and assignments based on but not limited to the following topics:

1. Drawing Points, Lines, and Circles
2. Line Drawing Algorithms
3. 2D Transformations
4. Composite Transformations
5. Window-to-Viewport Mapping and Clipping
6. 3D Transformations
7. Bezier Curves
8. Animation Basics

SYLLABUS OF SEMESTER - VI, BCA (BACHELOR OF COMPUTER APPLICATION)

Course Code: 25CS18PR0606

Course: Mini Project – II

L: 0 Hrs P: 4 Hr, Per Week

Total Credits: 2

Course Objective

Understand and learn various software project development concepts for solving real world problems. Apply various project management concepts for developing solutions to real world problems.

Course Outcomes

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

1. Formulate minor project (phase-II) with clearly identified scope and requirements.
2. Implement minor project (phase-II) by applying Software Development Life Cycle.
3. Implement and use latest computing tools for Software project development.
4. Work in team and use work ethics for successful project development and management.

SYLLABUS

Develop a demonstrable minor project based on the subjects learned till this semester.

SYLLABUS OF SEMESTER - VI, BCA (BACHELOR OF COMPUTER APPLICATION)

Course Code: 25CS18PR0607

Course: Advanced Competitive Coding

L:0;P: 2 Hr, Per Week

Total Credits: 1

Course Objective

To train students in advanced algorithmic problem-solving, including time-space complexity, dynamic programming, and graph algorithms. The course enables participation in national and global competitive coding contests.

Course Outcomes

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

1. Implement efficient solutions using recursion, sorting, and divide-and-conquer techniques.
2. Apply advanced algorithms such as dynamic programming, greedy strategies, and graph traversal.
3. Analyse and optimize code based on time and space complexity for coding competitions.

SYLLABUS

Minimum 7-8 practical's and assignments based on but not limited to the following topics:

1. Time & Space Complexity Analysis (Advanced)
2. Sorting Techniques and Binary Search
3. Recursion and Backtracking
4. Greedy Algorithms and Divide & Conquer
5. Tree Problems – BST Insertion, Views (Top, Left, Right, Bottom), Path-Based Problems
6. Sliding Window, Subarrays, Two Pointer Technique
7. Dynamic Programming – Memoization vs Tabulation
8. One-Dimensional and Two-Dimensional DP
9. Graph Traversal Algorithms – BFS, DFS
10. MST, Dijkstra's Algorithm, Bellman-Ford Algorithm
11. Stack/Queue-Based Problem Solving

Note :

Platforms Used: Codeforces, AtCoder, Code Chef (Intermediate), LeetCode (Medium Level)

SYLLABUS OF SEMESTER - VI, BCA (BACHELOR OF COMPUTER APPLICATION)

Course Code: 25CS18PR0608

Course: Participative Learning

L:0;P: 2 Hr, Per Week

Total Credits: 1

Course Objective

Practice and demonstrate participative teaching techniques. Design and implement learner-centered activities. Foster collaboration, creativity, and critical thinking in peers. Use technology and peer-feedback for engagement. Build a practical toolkit for participative classroom strategies.

Course Outcomes

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

1. **Develop confidence and competence** in becoming a facilitator rather than a traditional lecturer, focusing on active student participation.
2. **Prepare engagement toolkits** or activity portfolios for future classroom use, including templates and strategies for participative methods.
3. **Use student- centered teaching approaches** that promote critical thinking, creativity, and peer learning in real-time classroom situations.
4. **Design and implement** a variety of participative learning techniques such as group discussions, role plays, brainstorming, debates, and simulations to foster learner engagement.
5. **Plan and deliver participative lesson plans** aligned with curriculum objectives, learning styles, and classroom needs.

SYLLABUS

Building a Participative Environment : Icebreakers & Energizers. Group bonding games. Classroom simulations. Sharing circle: 'Best learning moments in life'.

Cooperative and Collaborative Learning Techniques

Think-Pair-Share. Jigsaw Method (Split-Research-Teach). Learning Stations. Round-Robin & Rotating Roles.

Roleplay, Debate, and Experiential Learning

Role Play (choose educational/social themes). Structured Debate (affirmative vs negative). Simulation Games. Peer Review: What made it engaging?.

Tech Tools for Engagement

Create and conduct quizzes (Kahoot /Mentimeter). Use Google Jamboard, Padlet for brainstorming. Flipgrid or video-based peer feedback. Collaborative Padlet Board on 'Effective Teacher Traits'.

Peer Teaching & Participative Lesson Planning (

Design a complete participative lesson (any subject/topic). Teach in pairs or groups (peer teaching). Use one or more methods learned. Peer & Mentor feedback on delivery

Syllabus for Semester VII/VIII, Bachelor of Computer Application

Course Code: 25CS18TP0701

Course: Machine Learning

L: 3 Hrs P: 2 Hr, Per Week

Total Credits: 4

Course Objective

The course aims to introduce students to the fundamental concepts, tools, and applications of machine learning. It is designed to help students understand and effectively apply commonly used machine learning algorithms to address and solve real-life problems.

Course Outcomes

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

1. Understand core concepts and evaluation strategies in machine learning.
2. Pre-process data and manage model complexity effectively.
3. Understand and apply key supervised learning algorithms.
4. Use probabilistic and classification models for prediction tasks.
5. Implement unsupervised techniques for clustering and pattern discovery.

SYLLABUS

Unit I:

Introduction to Machine Learning, Types of Learning: Supervised, Unsupervised, Reinforcement, Applications of Machine Learning, Hypothesis Space and Inductive Bias, Evaluation Strategies: Holdout, Cross-validation, k-Fold, Performance Metrics: Accuracy, Precision, Recall, F1-Score, Confusion Matrix

Unit II:

Machine Learning Workflow, Underfitting, Overfitting, Bias-Variance Trade-off, Dataset Splitting: Training, Validation, Test Sets, Data Pre-processing: Missing values, Scaling, Normalization, Encoding, Feature Engineering and Selection

Unit III:

Linear Regression and Polynomial Regression, Decision Trees and Random Forests, k-Nearest Neighbours, Introduction to Neural Networks

Unit IV:

Basics of Probability in ML, Bayes Theorem and Naive Bayes Classifier, Logistic Regression, Support Vector Machines (SVM), Kernel Functions and the Kernel Trick

Unit V:

Clustering Techniques: k-Means, Hierarchical Clustering, Dimensionality Reduction: Principal Component Analysis (PCA), Association Rule Mining: Apriori Algorithm, Anomaly Detection

Text Books

1. Tom Mitchell; Machine Learning- an Artificial Intelligence Approach, Volume-II; Morgan Kaufmann, 1986.
2. Christopher Bishop, Pattern Recognition and machine learning; Springer Verlag, 2006.

Reference Books :

1. Soumen Chakrabarti; Mining the Web: Discovering Knowledge from Hypertext Data, MorganKaufmann, 2003.
2. A. K. Jain and R. C. Dubes; Algorithms for Clustering Data; Prentice Hall PTR, 1988.
3. Ethem Alpaydin, Introduction to Machine Learning, PHI.

LAB SYLLABUS

Minimum 8 practicals and assignments based on but not limited to the following topics:

1. Data Preprocessing and Dataset Splitting
2. Evaluation Strategies and Performance Metrics
3. Linear and/or Polynomial Regression
4. Decision Trees and/or Random Forests
5. k-Nearest Neighbors (k-NN)
6. Logistic Regression and/or Naive Bayes
7. Support Vector Machines
8. k-Means Clustering and/or PCA

Syllabus for Semester VII/VIII, Bachelor of Computer Application

Course Code: 25CS18TH0702

Course: Data Mining

L: 3 Hrs P: 0 Hr, Per Week

Total Credits: 3

Course Objective

This course is designed to provide a comprehensive understanding of the fundamental concepts and techniques in data mining. Students will explore essential data preprocessing methods required for effective mining and gain hands-on experience in applying various data mining approaches, including classification, clustering, and association. The course also emphasizes the ability to analyze and interpret patterns and rules from large datasets, while introducing advanced techniques such as outlier detection and trend analysis.

Course Outcomes

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

1. Explain the foundational concepts and importance of Data Mining in various domains.
2. Apply appropriate data preprocessing techniques for quality data preparation.
3. Implement and evaluate association rule mining techniques like Apriori and FP-Growth.
4. Use classification algorithms such as Decision Trees and Naïve Bayes for prediction tasks.
5. Apply clustering techniques to discover inherent groupings in data.

SYLLABUS

UNIT 1:

Introduction to Data Mining-Definition and importance of Data Mining, Knowledge, Discovery in Databases (KDD) process, Applications of Data Mining in business, marketing, health care, etc., Challenges in Data Mining, Types of Data: Structured, Semi-structured, Unstructured

UNIT 2:

Data Preprocessing-Data Cleaning, Data Integration, Data Reduction: Dimensionality Reduction, Numerosity Reduction, Data Transformation and Discretization, Handling Missing Values and Noise, Feature Selection and Feature Engineering basics

UNIT 3:

Association Rule Mining-Market Basket Analysis, Frequent Itemset Generation, Apriori Algorithm, FP-Growth Algorithm, Evaluation of Association Rules (Support, Confidence, Lift)

UNIT 4:

Classification Techniques-Concept of Supervised Learning, Decision Trees (ID3, C4.5), Naïve Bayes Classifier, k-Nearest Neighbors (k-NN), Model Evaluation: Confusion Matrix, Accuracy, Precision, Recall

UNIT 5:

Clustering Techniques-Concept of Unsupervised Learning, Partitioning Methods: k-Means, k-Medoids, Hierarchical Clustering: Agglomerative and Divisive, Density-Based Methods: DBSCAN, Cluster Evaluation Metrics

Text Books:

1. Data Mining- Concepts and Techniques: Jiawei Han, Micheline Kamber Morgan Kaufmann

Publishers, Third Edition.

2. Mining of Massive Datasets: Anand Rajaraman, Jeff Ullman, Jure Leskovec.

Reference Books:

1. Advances In Knowledge Discovery And Data Mining,: Usama M.Fayyad, Gregory Piatetsky Shapiro, Padhrai Smyth And Ramasamy Uthurusamy, The M.I.T Press, 1996.

2. The Data Warehouse Life Cycle Toolkit: Ralph Kimball, John Wiley & Sons Inc., 1998.

Syllabus for Semester VII/VIII, Bachelor of Computer Application

Course Code: 25CS18TH0703-1

Course: Administration Cloud

L: 3 Hrs P: 0 Hr, Per Week

Total Credits: 3

Course Objective

Understand the fundamentals and architecture of cloud computing. Learn the administration and management aspects of cloud platforms to gain hands-on experience with leading cloud service providers such as AWS, Azure or Google Cloud.

Course Outcomes

After completing this course, students will be able to:

1. Describe key concepts, service models and deployment models of cloud computing.
2. Configure and manage virtual machines, storage and networking in a cloud environment.
3. Administer user roles, permissions, and security policies on cloud platforms.
4. Monitor cloud resources and optimize cost using billing dashboards.
5. Automate cloud tasks using scripting and tools like CLI or SDKs.
6. Apply their knowledge in real-world cloud administration scenarios and prepare for cloud certifications.

SYLLABUS

UNIT I: Introduction to Cloud Computing

Cloud computing overview, Evolution of cloud computing, Service models: IaaS, PaaS, SaaS, Deployment models: Public, Private, Hybrid, Community, Virtualization concepts and hypervisors, Cloud architecture and components.

UNIT II: Cloud Service Providers and Interfaces

Overview of AWS, Microsoft Azure, and Google Cloud Platform, Creating and configuring cloud accounts, Introduction to Cloud Consoles and Command-Line Interfaces, Cloud billing and pricing models, Identity and Access Management (IAM).

UNIT III: Resource Management

Launching and managing virtual machines (EC2, Azure VM), Configuring cloud storage: S3, Blob Storage, Google Cloud Storage, Virtual networking and load balancing, Security groups, firewalls, and basic network policies, Backups and snapshots.

UNIT IV: Monitoring and Security

Monitoring tools: AWS CloudWatch, Azure Monitor, Alerts and notifications, Encryption, authentication, and data protection, Role-based access control (RBAC), Managing logs and auditing

UNIT V: Automation and Cloud Tools

Automation with scripts (Bash, PowerShell), Introduction to Infrastructure as Code (IaC) – basic Terraform or **AWS** CloudFormation, Overview of DevOps in the cloud, Real-world case studies of cloud administration.

Text Books

1. **Cloud Computing: Principles and Paradigms** – Rajkumar Buyya
2. **Amazon Web Services for Beginners** – Web Services Institute

Reference Books

1. **Microsoft Azure Fundamentals** – Microsoft Press
2. **Enterprise Cloud Computing: Technology, Architecture, Applications** – Gautam Shroff
3. **Cloud Native Infrastructure** – Justin Garrison, Kris Nova

Syllabus for Semester VII/VIII, Bachelor of Computer Application

Course Code: 25CS18TH0703-2

Course: Ethical Hacking

L: 3 Hrs P: 0 Hr, Per Week

Total Credits: 3

Course Objective

To equip students with conceptual knowledge of ethical hacking techniques used to identify, exploit and mitigate vulnerabilities in modern computing environments. Student will learn system and network-based attacks, wireless and VoIP exploitation, social engineering and web application threats, fostering a comprehensive understanding of cybersecurity threats and defences.

Course Outcomes

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

1. Identify and apply footprinting, scanning, and enumeration techniques for information gathering.
2. Analyze security flaws in Windows and UNIX systems.
3. Assess vulnerabilities in remote access, VoIP and network devices.
4. Analyze wireless, firewall and DoS attack strategies.
5. Evaluate techniques in social engineering, web hacking and malware-based exploitation.

SYLLABUS

UNIT-1

Casing the Establishment: What is foot printing, Internet Foot printing, Scanning, Enumeration, Basic Banner Grabbing, Enumerating Common Network services.

UNIT-2

Hacking Windows: Unauthenticated Attacks, Authenticated Attacks, Windows Security Features.

Hacking Unix: The Quest for Root, Remote access, Local access, After hacking root.

UNIT-3

Remote Connectivity and VoIP Hacking: Preparing to dial up, War-Dialing, Brute-Force Scripting PBX hacking, Voice mail hacking, VPN hacking, Network Devices: Discovery Autonomous System Lookup, Public Newsgroups, Service Detection, Network Vulnerability, Detecting Layer 2 Media.

UNIT-4

Wireless Hacking: Wireless Foot printing, Wireless Scanning and Enumeration, Gaining Access, Tools that exploiting WEP Weakness, Denial of Services Attacks, Firewalls: Firewalls landscape, Firewall Identification-Scanning Through firewalls, packet Filtering, Application Proxy Vulnerabilities, Denial of Service Attacks, Motivation of Dos Attackers, Types of DoS attacks, Generic Dos Attacks, UNIX and Windows DoS.

UNIT-5

Remote Control Insecurities, Discovering Remote Control Software, Connection, Weakness.VNC, Microsoft Terminal Server and Citrix ICA, Advanced Techniques Session Hijacking, Back Doors, Trojans, Cryptography, Subverting the systems Environment, Social Engineering, Web Hacking, Web server hacking web application hacking, Hacking the internet Use, Malicious Mobile code, SSL fraud, E-mail Hacking, IRC hacking, Global countermeasures to Internet User Hacking.

Text Books

1. Stuart McClure, Joel Scambray and Goerge Kurtz, Hacking Exposed 7: Network Security Secrets & Solutions, Tata Mc Graw Hill Publishers, 2010.
2. Bensmith, and Brian Komer, Microsoft Windows Security Resource Kit, Prentice Hall of India, 2010.

Reference Books

1. Stuart McClure, Joel Scambray and Goerge Kurtz, "Hacking Exposed Network Security Secrets & Solutions", 5th Edition, Tata Mc Graw Hill Publishers, 2010.
2. Rafay Baloch, "A Beginners Guide to Ethical Hacking".
3. Allen Harper, Shon Harris, Jonathan Ness, Chris Eagle, "Gray Hat Hacking The Ethical Hackers Handbook", 3rd Edition, McGraw-Hill Osborne Media paperback(January 27, 2011)

Syllabus for Semester VII/VIII, Bachelor of Computer Application

Course Code: 25CS18TH0703-3

Course: Digital Image Processing

L: 3 Hrs P: 0 Hr, Per Week

Total Credits: 3

Course Objectives:

To learn the fundamental concepts and applications of digital image processing, learn the concepts of and how to perform Intensity transformations, spatial filtering, image segmentation, restoration and reconstruction, color image processing, image compression and watermarking.

Course Outcomes:

On successful completion of the course, students will be able to:

1. Illustrate the fundamental concepts of a digital image processing system.
2. Apply different image Filtering Models, Image restoration and reconstruction
3. Apply the different segmentation algorithms and image compression standards for Computer vision & image analysis.

SYLLABUS

UNIT I:

Introduction to image processing: Fundamentals Applications Image processing system components , Image sensing and acquisition, Sampling and quantization, Neighbors of pixel, adjacency connectivity , Regions and boundaries Distance measure .

UNIT II:

Image Enhancement: Frequency and Spatial Domain , Contrast Stretching , Histogram Equalization, Low pass and High pass filtering.

UNIT III:

Image Restoration and Reconstruction - Degradation model, Restoration in the Presence of Noise Only—Spatial domain, Periodic Noise Reduction by Frequency Domain, Geometric Mean Filter.

UNIT IV:

Image Compression: Fundamentals Models Error free and lossy compression Standards, Coding Redundancy, Spatial and Temporal Redundancy, Image Compression Models, Huffman Coding, LZW Coding.

UNIT V:

Image Segmentation : Point, Line, Edge detection-detection of isolated points, thresholding : Basic global thresholding; Region based segmentation, region growing, region splitting and merging.

Representation and Description - Representation Schemes like Chain Coding

Text Books

1. **Digital Image Processing: R.C.Gonzalez & R.E. Woods, Addison Wesley Pub.**
2. **Fundamentals of Digital Image Processing: A.K.Jain, PHI Pub.**

Reference Books

1. Digital Image Processing: S.Sridhar, Oxford Uni. Press.
2. Digital Image Processing and Analysis, B. Chanda and D. Dutta Majumder, PHI Learning Pvt. Ltd.

Syllabus for Semester VII/VIII, Bachelor of Computer Application

Course Code: 25CS18TP0704-1

Course: Development on Cloud

L: 3 Hrs P: 2 Hr, Per Week

Total Credits: 4

Course Objective

The course aims to introduce cloud-based application development using modern cloud platforms. Equip students with skills to design, develop and deploy scalable applications on cloud environments. Prepare students for real-world cloud application deployment and testing.

Course Outcomes

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

1. Explain the principles of cloud application development.
2. Develop and deploy applications using PaaS platforms (e.g., AWS Elastic Beanstalk, Google App Engine, Azure App Services).
3. Use cloud-managed services like databases, authentication and serverless functions.
4. Integrate APIs, storage and messaging services in cloud-based applications.
5. Apply DevOps principles for continuous integration and deployment in cloud.
6. Design cloud-native applications using containers and microservices.

SYLLABUS

UNIT I: Introduction to Cloud Development

Cloud service models: IaaS, PaaS, SaaS, Comparison: Traditional vs Cloud-based application development, Introduction to cloud-native development, Overview of popular cloud platforms (AWS, Azure, GCP)

UNIT II: PaaS and Application Hosting

Introduction to PaaS platforms, Deploying web applications on: AWS Elastic Beanstalk, Google App Engine, Azure App Services, Environment variables, build & deploy

UNIT III: Cloud Databases & Storage

Using managed databases: Amazon RDS, Firebase, Azure SQL, NoSQL in the cloud: DynamoDB, Firestore, Integrating blob/file storage in apps: S3, Azure Blob Storage, Backup and recovery considerations

UNIT IV: Cloud APIs & Authentication

REST APIs & API Gateways, OAuth 2.0 and cloud-based authentication (Firebase Auth, AWS Cognito), Role-based access control and permissions, Serverless Architecture:

Introduction to serverless computing, AWS Lambda, Azure Functions, Google Cloud Functions, Triggers, events, and integrations with backend services, Use cases and limitations

UNIT V: Containers and Microservices

Introduction to containers: Docker basics, Containerizing cloud applications, Basics of Kubernetes and cloud container orchestration, Microservices architecture, CI/CD and DevOps on Cloud: DevOps lifecycle overview, Continuous Integration with GitHub Actions / AWS CodePipeline / Azure DevOps, Deployment automation and version control, Monitoring and logging cloud apps.

Text Books

1. Cloud Application Architectures – George Reese, O'Reilly
2. Developing Cloud Applications – David Gonzalez, Packt

Reference Books

1. Google Cloud Platform for Developers – Ted Hunter
2. Microsoft Azure Developer's Guide – Jack Lee

LAB SYLLABUS

Minimum 7-8 practicals and assignments based on but not limited to the following topics:

1. Cloud Setup and Deployment
2. Cloud Database Integration
3. Storage and API Integration
4. Authentication & Security
5. Serverless Functions and Event Triggers
6. Containerizing an Application Using Docker
7. Deploying Dockerized App on Cloud
8. CI/CD Pipeline for Cloud Deployment

Syllabus for Semester VII/VIII, Bachelor of Computer Application

Course Code: 25CS18TP0704-2 Course: Vulnerability Assessment and Penetration Testing

L: 3 Hrs P: 2Hr, Per Week

Total Credits: 4

Course Objective

The course aims to introduce students to the fundamental concepts of cybersecurity, including common threats, vulnerabilities, and exploits. It is designed to develop a clear understanding of vulnerability assessment and penetration testing (VAPT) methodologies and the tools used in the process. The course also enables students to perform ethical hacking and penetration testing within a controlled and legally compliant environment. Additionally, it provides hands-on experience in identifying and exploiting security weaknesses across networks, systems, and web applications.

Course Outcomes

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

1. Understand key concepts of cybersecurity, vulnerabilities, threats, and attacks.
2. Perform reconnaissance, scanning, and enumeration using professional tools.
3. Identify and exploit vulnerabilities in network and application environments.
4. Execute penetration testing in controlled environments and prepare professional reports.
5. Apply ethical and legal principles in real-world VAPT scenarios.

SYLLABUS

Unit I: Introduction to VAPT and Cybersecurity Fundamentals

Introduction to core concepts of information security including the CIA triad, types of threats and attacks, and the distinction between vulnerability, exploit, risk, and threat. Fundamentals of Vulnerability Assessment and Penetration Testing (VAPT), including its phases: planning, discovery, exploitation, and reporting. Industry methodologies such as OWASP, PTES, and NIST.

Unit II: Information Gathering and Scanning Techniques

Methods of reconnaissance, including both passive and active information gathering. Foot printing tools such as WHOIS, NSLOOKUP, and Google Dorks Network scanning techniques using tools like Nmap and Netcat, as well as OS fingerprinting and service enumeration. Vulnerability scanning tools like Nessus, Nikto, and OpenVAS.

Unit III: Exploitation and Penetration Testing

Introduction to exploitation frameworks, particularly Metasploit, and demonstrates exploitation of vulnerabilities in Windows and Linux systems, escalation

techniques, client-side exploits, and the generation of payloads. Antivirus evasion techniques and maintaining persistence in compromised systems.

Unit IV: Web Application and Wireless Penetration Testing

Common web application of vulnerabilities based on the OWASP Top 10 list. Students study attacks such as SQL Injection, Cross-Site Scripting (XSS), Cross-Site Request Forgery (CSRF), and Local and Remote File Inclusions. Tools such as Burp Suite, SQLMap, and Wapiti are used in practical testing. Introduction to wireless penetration testing techniques including WEP/WPA cracking and rogue access point simulation.

Unit V: Reporting, Risk Management, and Legal Compliance

Structure and components of a professional VAPT report, including the executive summary, risk ratings, and technical findings. Risk assessment using CVSS and suggests remediation strategies. Legal and ethical considerations are addressed through discussion of the IT Act 2000, GDPR, ISO 27001 compliance, and responsible disclosure practices.

Text Books

1. Georgia Weidman, *Penetration Testing: A Hands-On Introduction to Hacking*, No Starch Press
2. Peter Kim, *The Hacker Playbook 2*, Secure Planet

Reference Books

1. Dafydd Stuttard & Marcus Pinto, *The Web Application Hacker's Handbook*, Wiley
2. Stuart McClure et al., *Hacking Exposed*, McGraw Hill
3. Jon Erickson, *Hacking: The Art of Exploitation*, No Starch Press

LAB SYLLABUS

Minimum **10 practicals and assignments** based on but not limited to the following topics:

1. Setting up a VAPT Lab Environment using VirtualBox/VMware and installing Kali Linux.
2. Performing Network Scanning and Service Enumeration using Nmap and Netcat.
3. Using OpenVAS or Nessus for Automated Vulnerability Scanning.
4. Exploiting Vulnerabilities with the Metasploit Framework.
5. Performing Web Application Testing using Burp Suite and OWASP ZAP.
6. Detecting SQL Injection and Cross-Site Scripting (XSS) Vulnerabilities using SQLMap and manual techniques.

7. Capturing WPA/WPA2 Handshakes and Cracking Wireless Passwords using Aircrack-ng Suite.
8. Generating Payloads using msfvenom and executing client-side attacks in a controlled setup.
9. Implementing Countermeasures and Security Hardening Techniques.
10. Preparing Professional VAPT Reports including vulnerability summary, risk ratings, and mitigation strategies.

Syllabus for Semester VII/VIII, Bachelor of Computer Application

Course Code: 25CS18TP0704-3

Course: Natural Language Processing

L:3 Hrs P: 2 Hr, Per Week

Total Credits: 4

Course Objective

1. To introduce students to the foundational concepts of natural language processing.
2. To develop understanding of syntactic, semantic, and pragmatic analysis of language.
3. To expose students to text preprocessing, vectorization, and information retrieval techniques.
4. To provide practical experience with Python NLP libraries like NLTK, spaCy, and transformers

Course Outcomes

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

1. Understand the fundamentals of NLP and language processing components.
2. Apply text preprocessing and feature extraction techniques.
3. Perform syntactic and semantic analysis using parsing techniques and POS tagging.
4. Implement basic NLP tasks using Python libraries (e.g., NLTK, spaCy).
5. Develop and evaluate NLP models for applications like sentiment analysis, text classification, and summarization.

SYLLABUS

Unit 1:

Introduction to Natural Language Processing: Definition and scope of NLP, NLP pipeline and its components, Challenges in natural language understanding, Applications of NLP: Chatbots, Translation, Sentiment Analysis

Unit 2:

Text Processing and Normalization: Text pre-processing: Tokenization, stop-word removal, stemming, lemmatization, Regular expressions for text, Word normalization and noise removal, Bag of Words (BoW), TF-IDF, Word2Vec

Unit 3:

Syntax and Parsing: Part-of-Speech (POS) tagging, Parsing techniques: constituency and dependency parsing, Grammar types and ambiguity, Named Entity Recognition (NER),

Semantic Analysis: Word sense disambiguation, Word embeddings and semantic similarity, Topic Modeling (LDA), Text classification and clustering

Unit 4:

Advanced NLP Techniques: Introduction to deep learning in NLP, Overview of RNN, LSTM, Transformer models, Introduction to BERT and GPT, NLP with Hugging Face Transformers

Unit 5:

NLP Applications and Ethics: Sentiment analysis, Text summarization and machine translation, Speech recognition basics, Ethics in NLP: Bias, misinformation, and responsible AI

Text Books

1. Speech and Language Processing: Jurafsky, D., & Martin, J. H., 3rd Edition, Pearson Education, 2023.
2. Natural Language Processing with Python – Analyzing Text with the Natural Language Toolkit: Bird, Steven, Klein, Ewan, & Loper, Edward O'Reilly Media, 2009.

Reference Books

1. Jump-Starting NLP Projects with ChatGPT & Hugging Face Transformers: Springer, Cambria, Erik, White, Bebo, 2024.
2. Natural Language Processing: Chowdhury, Goutam, Oxford University Press, 2003.
3. Neural Network Methods in Natural Language Processing: Goldberg, Yoav Morgan & Claypool Publishers, 2017.

LAB SYLLABUS

Minimum 8 practical's and assignments based on but not limited to the following topics:

1. Text pre-processing using NLTK/spaCy
2. POS tagging and NER demonstration
3. Build a sentiment analysis model
4. Train a simple chatbot
5. Use pre-trained BERT for classification

Syllabus for Semester VII/VIII, Bachelor of Computer Application

Course Code: 25CS18PR0705

Course: Project – III

L: 0 Hrs P: 8 Hr, Per Week

Total Credits: 4

Course Objective

The students can explore a wide range of project ideas mapping within the domain of computer science and its applications. The students should be able to learn detailed design, development, and testing during their project

Course Outcomes

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

1. Formulate major software project with clearly identified scope and requirements.
2. Implement comprehensive project planning, designing, development and testing phases.
3. Demonstrate conception of modern software engineering principles.
4. Develop work ethics for successful project development and management as per industry needs.

SYLLABUS

Develop a demonstrable project based on the industry needs. Use latest software development tools and open-source tools to develop the project.

Syllabus for Semester VIII/VII, Bachelor of Computer Application

Course Code: 25CS18TH0801

Course: Introduction to Deep Learning

L: 4 Hrs P: 0 Hr, Per Week

Total Credits: 4

Course Objective: To understand the fundamentals of Deep Neural Networks and know about various deep learning algorithms and techniques.

Course Outcomes:

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

1. Apply fundamentals of Deep Learning to Deep Neural Networks.
2. Implement feedforward and backpropagation techniques in Deep Neural Networks.
3. Apply various optimization techniques during deep neural networks training.
4. Solve various problems related to Convolutional Neural Networks, Recurrent Neural Networks and Autoencoders.
5. Work with transformers and attention-based models to solve problems

SYLLABUS

Unit-1:

Fundamentals of Deep Learning: Basic Concepts and Terminology for Neural Networks, Activation Functions (ReLU, Sigmoid, Tanh), Loss Functions, Performance: Capacity, Underfitting, Overfitting, Hyperparameters, Estimators, Bias, Variance.

Unit-2:

Deep Neural Network training: Perceptron, Multilayer Perceptron (MLP), Gradient descent, Deep Feedforward Neural Networks, Back Propagation Learning.

Unit-3:

Optimizations for training deep models: The Idea of Regularization, L1 and L2 Regularization, Dataset Augmentation, Early stopping, Dropout, Batch normalization, Learning Rate, Stochastic gradient descent, Momentum optimizer, Batch optimization. RMSProp and Adam optimizers.

Unit-4:

Introduction to transformers and attention-based models: Attention Mechanism, Transformer Architecture (Encoder-Decoder), Pretrained Models: BERT, GPT. Vision Transformers (ViT). Multimodal **Transformers**.

Unit-5:

Applications, Ethics, and Current Trends in Deep Learning:

Multimodal Learning, Self-Supervised Learning, Explainable AI, Bias and Fairness in Deep Learning, Diffusion Models, and Large Language Models (LLMs)

Test book:

1. Deep Learning, Ian Goodfellow, Yoshua Bengio and Aaron Courville, MIT Press
2. Neural Networks and Deep Learning, Charu C. Aggarwal, ISBN 978-3-319-94462-3 ISBN 978-3-319-94463-0 (eBook), Springer.

Reference Books:

1. Fundamentals of Deep Learning - Designing Next-Generation Machine Intelligence Algorithms, Nikhil Buduma, O'Reilly Media, Inc.

Syllabus for Semester VIII/VII, Bachelor of Computer Application

Course Code: 25CS18TP0802-1

Course: AI & ML on Public Cloud Platform

L: 3 Hrs P: 2 Hr, Per Week

Total Credits: 4

Course Objective

This course aims to Introduce the foundations of AI & ML and their cloud-based implementation by Familiarizing students with public cloud AI/ML services from AWS, Azure and Google Cloud and Enable students to build, train, deploy, and monitor AI/ML models using cloud tools.

Course Outcomes

After completing this course, students will be able to:

1. Understand the core concepts of AI & ML and their lifecycle in the cloud.
2. Use cloud platforms like AWS SageMaker, Azure ML Studio, and GCP Vertex AI for ML model development.
3. Utilize pre-trained models and APIs (vision, speech, NLP) on public cloud platforms.
4. Deploy and test ML models in cloud environments using GUI or notebooks.
5. Integrate AI services in cloud-native applications.

SYLLABUS

UNIT I: Introduction to AI & ML

Basics of Artificial Intelligence and Machine Learning, Types of ML: Supervised, Unsupervised, Reinforcement, ML workflow: Data collection → training → evaluation → deployment, Introduction to Public Cloud: AWS, Azure, Google Cloud

UNIT II: Cloud Platforms for AI/ML

Overview of: AWS SageMaker, Azure Machine Learning Studio and Google Cloud Vertex AI, AI/ML model lifecycle in cloud environments, Jupyter Notebooks in the cloud

UNIT III: Model Development Using Cloud Services

Loading and cleaning datasets (CSV, JSON, BigQuery, etc.), Splitting data and feature engineering, Training regression/classification models using GUI and notebook, Model evaluation and tuning in the cloud

UNIT IV: Using Pre-Trained AI APIs

Vision APIs: Image labeling, object detection (AWS Rekognition, Azure Computer Vision, Google Vision AI), NLP APIs: Sentiment analysis, language detection, translation (Google

NLP API, AWS Comprehend), Speech-to-text and text-to-speech APIs

UNIT V: Model Deployment & Monitoring

Deploying trained models on cloud endpoints, REST API generation and integration, Monitoring predictions and evaluating performance metrics, AutoML services and low-code ML workflows, Ethical AI and Case Studies: Ethics in AI: Bias, fairness and transparency, Data privacy, security and responsible AI, Case studies: AI/ML in healthcare, e-commerce, agriculture, education

Text Books

1. Hands-On Machine Learning on Google Cloud Platform – Giuseppe Ciaburro
2. Practical Machine Learning on AWS – Mike Chambers
3. Azure Machine Learning Studio: A Practical Guide – Haishi Bai

Reference Books

1. Machine Learning with SageMaker Cookbook – Joshua Arvin Lat
2. Artificial Intelligence: A Guide for Thinking Humans – Melanie Mitchell

LAB SYLLABUS

Minimum 7-8 practicals and assignments based on but not limited to the following topics:

1. Performing on AWS/Azure/GCP for ML model training
2. Use of cloud notebooks
3. Train a model (classification/regression) using GUI (AutoML)
4. Study Google Vision API for object detection in images.
5. Sentiment analysis using Azure Text Analytics
6. Use of REST API for model training
7. Chatbot using Dialogflow or AWS Lex
8. Build a mini AI-based application using any cloud service

Syllabus for Semester VIII/VII, Bachelor of Computer Applications

Course Code: 24CS18TP0802-2

Course: Cyber Risk Assessment & Management

L: 3 Hrs , P: 2 Hr,Per Week

Total Credits: 4

Course Objectives:

This course focuses on critical design and implementation issues essential for developing software that is resilient to security threats. A key objective is to integrate the core security principles of confidentiality, integrity, and availability throughout the software development lifecycle. The course covers secure software practices from requirements gathering to design, development, configuration, deployment, and ongoing maintenance.

Course Outcomes:

1. Understand various aspects and principles of software security.
2. Devise security models for implementing at the design level.
3. Identify and analyze the risks associated with s/w engineering and use relevant models to mitigate the risks.
4. Understand the various security algorithms to implement for secured computing and computer networks
5. Explain different security frameworks for different types of systems including electronic systems.

UNIT-1:

Defining computer security, the principles of secure software, trusted computing base, etc, threat modeling, advanced techniques for mapping security requirements into design specifications. Secure software implementation, deployment and ongoing management.

UNIT-2:

Software design and an introduction to hierarchical design representations. Difference between high-level and detailed design. Handling security with high-level design. General Design Notions. Security concerns designs at multiple levels of abstraction, Design patterns, quality assurance activities and strategies that support early vulnerability detection, Trust models, security Architecture & design reviews .

UNIT-3:

Software Assurance Model: Identify project security risks & selecting risk management strategies, Risk Management Framework, Security Best practices/ Known Security Flaws, Architectural risk analysis, Security Testing & Reliability (Penn testing, RiskBased Security Testing.

UNIT-4:

Software Security in Enterprise Business: Identification and authentication, Enterprise Information Security, Symmetric and asymmetric cryptography, including public key cryptography, data encryption standard (DES), advanced encryption standard (AES), algorithms for hashes and message digests. Authentication, authentication schemes , access

control models, Kerberos protocol, public key infrastructure (PKI), protocols specially designed for e-commerce and web applications, firewalls and VPNs.

UNIT-5:

Security development frameworks. Security issues associated with the development and deployment of information systems, including Internet-based e-commerce, e-business, and e-service systems

Text Books :

1. W. Stallings, Cryptography and network security: Principles and practice, 5 th Edition, Upper Saddle River, NJ: Prentice Hall., 2011
2. C. Kaufman, r. Perlman, & M. Speciner, Network security: Private communication in a public world, 2nd Edition, Upper Saddle River, NJ:Prentice Hall, 2002
3. C. P. Pfleeger, S. L. Pfleeger, Security in Computing, 4 th Edition, Upper Saddle River, NJ:Prentice Hall, 2007
4. T4. M. Merkow, & J. Breithaupt, Information security: Principles and practices. Upper Saddle River, NJ: Prentice Hall, 2005

Reference Books:

1. Gary McGraw, Software Security: Building Security In, Addison-Wesley, 2006

LAB SYLLABUS

Minimum 8 practical's and assignments based on but not limited to the following topics:

1. Demonstrate symmetric (e.g., AES) and
2. Demonstrate asymmetric encryption (e.g., RSA) with encryption and decryption implementation .
3. Implement and analyze hashing algorithms (e.g., SHA-256, MD5) and demonstrate message digest verification.
4. Simulate authentication mechanisms using password-based, OTP, and token-based login systems.
5. 13. Setup a simple PKI (Public Key Infrastructure) using OpenSSL to issue and verify digital certificates.
6. Implement firewall and VPN rules simulation using any network simulation software like Packet Tracer or GNS3.
7. Analyze security frameworks (e.g., NIST, OWASP, ISO 27001) and map them to a case study of an e-commerce system.

Syllabus for Semester VIII/VII, Bachelor of Computer Application

Course Code: 25CS18TP0802-3

Course: Computer Vision

L: 3 Hrs P: 0 Hr, Per Week

Total Credits: 3

Course Objective

To introduce students to the fundamental concepts and techniques in Computer Vision. The course focuses on understanding how machines interpret and process visual data, and includes topics such as image processing, object detection, feature extraction, and machine learning applications in vision.

Course Outcomes

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

1. Understand the fundamentals of digital image processing and computer vision.
2. Apply filtering and transformation techniques on images.
3. Implement feature detection and extraction methods.
4. Analyze and perform object detection and recognition tasks.
5. Understand real-world applications of computer vision using machine learning models.

SYLLABUS

Unit I: Introduction to Computer Vision, Definition and applications of computer vision

- Image formation and acquisition, Basic concepts of digital image processing

Unit II: Image Processing Techniques

- Image filtering and enhancement, Image smoothing and sharpening, Edge detection: Sobel, Canny operators

Unit III: Feature Detection and Matching

- Corners and blobs: Harris, SIFT, SURF, Feature matching techniques, Geometric transformations.

Unit IV: Object Detection and Recognition

Template matching, Viola-Jones algorithm for face detection, Deep learning-based object detection (YOLO, SSD)

Unit V: Applications and Tools

Applications in autonomous vehicles, surveillance, and healthcare, Overview of OpenCV and Python for vision tasks, Introduction to neural networks in computer vision

Text Books

1. Richard Szeliski – Computer Vision: Algorithms and Applications, Springer.
2. Rafael C. Gonzalez, Richard E. Woods – Digital Image Processing, Pearson.

Reference Books

1. David A. Forsyth, Jean Ponce – Computer Vision: A Modern Approach, Pearson.
2. Simon J. D. Prince – Computer Vision: Models, Learning, and Inference, Cambridge University Press.
3. Adrian Rosebrock – Practical Python and OpenCV, PyImageSearch.

Syllabus for Semester VIII/VII, Bachelor of Computer Applications

Course Code: 24CS18TP0803-1

Course: Cloud Security

L: 3 Hrs , P: 2 Hr,Per Week

Total Credits: 4

Course Objectives:

The course aims to equip learners with knowledge about cloud security and privacy issues, helping them recognize the challenges and requirements related to securing data and maintaining user privacy in the cloud environment. The course also focuses on understanding various threat models and cloud-based attacks, enabling students to identify vulnerabilities and assess potential risks. Additionally, it covers essential aspects of data security and storage techniques, including encryption and access control mechanisms.

Course Outcome:

1. Ability to acquire the knowledge on fundamentals concepts of cloud computing.
2. Able to distinguish the various cloud security and privacy issues.
3. Able to analyze the various threats and Attack tools
4. Able to understand the Data Security and Storage
5. Able to analyze the Security Management in the Cloud.

UNIT - I

Overview of Cloud Computing: Introduction, Definitions and Characteristics, Cloud Service Models, Cloud Deployment Models, Cloud Service Platforms, Challenges Ahead.

Introduction to Cloud Security: Introduction, Cloud Security Concepts, CSA Cloud ReferenceModel, NIST Cloud Reference Model, NIST Cloud Reference Model.

UNIT - II

Cloud Security and Privacy Issues: Introduction, Cloud Security Goals/Concepts, Cloud Security Issues, Security Requirements for Privacy, Privacy Issues in Cloud.

Infrastructure Security: The Network Level, the Host Level, the Application Level, SaaS Application Security, PaaS Application Security, IaaS Application Security.

UNIT - III

Threat Model and Cloud Attacks: Introduction, Threat Model- Type of attack entities, Attack surfaces with attack scenarios, A Taxonomy of Attacks, Attack Tools-Network-level attack tools, VM- level attack tools, VMM attack tools, Security Tools, VMM security tools.

UNIT - IV

Information Security Basic Concepts, an Example of a Security Attack, Cloud Software Security

Requirements, Rising Security Threats.

Data Security and Storage: Aspects of Data Security, Data Security Mitigation, Provider Data and Its Security.

UNIT – V

Evolution of Security Considerations, Security Concerns of Cloud Operating Models, Identity Authentication, Secure Transmissions, Secure Storage and Computation, Security Using Encryption Keys, Challenges of Using Standard Security Algorithms, Variations and Special Cases for Security Issues with Cloud Computing, Side Channel Security Attacks in the Cloud Security Management in the Cloud- Security Management Standards, Availability Management, Access Control, Security Vulnerability, Patch, and Configuration Management .

Text Books:

1. Cloud Security Attacks, Techniques, Tools, and Challenges by Preeti Mishra, Emmanuel S Pilli, Jaipur R C Joshi Graphic Era, 1st Edition published 2022 by CRC press.
2. Cloud Computing with Security Concepts and Practices Second Edition by Naresh Kumar Sehgal Pramod Chandra, P. Bhatt John M. Acken, 2nd Edition Springer nature Switzerland AG2020.
3. Cloud Security and Privacy by Tim Mather, Subra Kumaraswamy, and Shahed Lati First Edition, September 2019.

Reference Books:

1. Essentials of Cloud Computing by K. Chandrasekaran Special Indian Edition CRC press.
2. Cloud Computing Principles and Paradigms by Rajkumar Buyya, John Wiley

LAB SYLLABUS

Minimum 8 practical's and assignments based on but not limited to the following topics:

1. Setup a cloud environment and explore different cloud service models (IaaS, PaaS, SaaS).
2. Analyze cloud security issues in SaaS, PaaS, and IaaS models using real-world case studies.
3. Implement basic access control and network security rules in a cloud platform.
4. Simulate network-level attacks (e.g., DoS/DDoS) in a virtual environment.
5. Implement encryption for data-at-rest and data-in-transit in cloud storage (e.g., AWS S3 or Azure Blob).
6. Demonstrate data leakage prevention and mitigation techniques using access logging and permission control.
7. Configure secure data transmission using HTTPS and SSL certificates in a cloud-hosted web application.
8. Use encryption key management services (e.g., AWS KMS or Azure Key Vault) to manage and secure encryption keys.

Syllabus for Semester VIII/VII, Bachelor of Computer Application

Course Code: 25CS18TP0803-2
Course: Auditing IT Infrastructure for Compliance

Course: Auditing IT Infrastructure for Compliance

L: 3 Hrs P: 2 Hr, Per Week

Total Credits: 4

Course Objective

To provide students with foundational and practical knowledge to audit IT infrastructures, focusing on compliance with industry standards, regulations, and internal policies. This course equips learners to assess and secure IT systems through professional auditing methodologies.

Course Outcomes

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

1. Understand core concepts of IT auditing and infrastructure compliance.
2. Evaluate the role of regulatory frameworks in IT system audits.
3. Perform audits of operating systems, applications, and networks.
4. Utilize tools and techniques for identifying compliance risks and gaps.
5. Prepare professional audit documentation and communicate findings.

SYLLABUS

Unit I

Introduction to IT Infrastructure Auditing:

Overview of IT audits, Need for compliance and governance, Roles of auditors and security professionals, Risk management and audit planning, **Introduction to frameworks** - ISO 27001, COBIT, NIST

Unit II

Legal, Ethical and Regulatory Compliance:

Understanding compliance - HIPAA, SOX, PCI-DSS, GDPR, Legal and ethical responsibilities, Audit lifecycle and methodologies, Compliance-driven policies and controls

Unit III

Operating System & Application Audits:

System audit techniques (Windows, Linux), Security settings and audit logs, Software compliance and license management, Patch and update management audits

Unit IV

Network & Cloud Infrastructure Audits:

Auditing network devices, firewalls, routers, Intrusion Detection/Prevention Systems (IDS/IPS), Vulnerability assessment tools (Nessus, OpenVAS), Auditing cloud environments and shared responsibility

Unit V

Audit Reporting and Case Studies:

Gathering audit evidence, preparing audit documentation, creating audit reports and communicating results, Real-world case studies in IT auditing and compliance

Text Books

1. **Martin Weiss, Michael G. Solomon**
"Auditing IT Infrastructures for Compliance" (Information Systems Security & Assurance), 3rd Edition, Jones & Bartlett Learning, 2015.
ISBN: 9781284031633
2. **Nina Godbole, Sunit Belapure,**
"Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives", Wiley India
ISBN: 9788126521791

Reference Books

1. **Michael E. Whitman, Herbert J. Mattord**
"Management of Information Security", 6th Edition, Cengage Learning
2. **Chris Davis, Mike Schiller, Kevin Wheeler**
"IT Auditing: Using Controls to Protect Information Assets", McGraw-Hill Education

LAB SYLLABUS

Minimum 7-8 practical's and assignments based on but not limited to the following topics:

1. Risk assessment of IT infrastructure.
2. Creating an audit checklist for a system.
3. Auditing a Windows environment for policy compliance.
4. Linux system audit using command-line tools.
5. Analysing firewall and IDS logs.
6. Vulnerability scanning using Nessus/OpenVAS.
7. Simulating a compliance audit and preparing a report.
8. Evaluating cloud-based infrastructure against ISO 27001 or CSA standards.

Syllabus for Semester VIII/VII, Bachelor of Computer Application

Course Code: 25CS18TP0803-3 Course: Deep Learning for Computer Vision and NLP

L: 3 Hrs P: 2 Hr, Per Week

Total Credits: 4

Course Objective: To understand the fundamentals of Deep Neural Networks and know about various deep learning algorithms and techniques related to Computer Vision and Natural Language Processing.

Course Outcomes:

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

1. Apply fundamentals of Deep Learning to Deep Neural Networks.
2. Implement Deep Learning for computer vision applications.
3. Implement Deep Learning for NLP applications.
4. Apply transformers and attention-based models for CV and NLP tasks.

SYLLABUS

Unit-1:

Deep Neural Network training and optimization: Introduction to Deep Neural Networks, Forward and Backward propagation, Optimization techniques: Regularization, Dataset Augmentation, Early stopping, Dropout, Batch optimization, Learning Rate, Momentum optimizer.

Unit-2:

Deep Learning for Computer Vision:

Convolutional Neural Networks, Image Classification, Transfer Learning & Fine-tuning, Object Detection: YOLO, SSD, Semantic Segmentation.

Unit-3:

Deep Learning for NLP – Foundations:

Basic Text Preprocessing: Tokenization, Padding, Encoding, Word Embeddings: Word2Vec, GloVe, RNNs, LSTMs, GRUs for Sequence Modeling, Language Modeling: predicting the next word in a sequence, autocomplete, machine translation, and text generation.

Unit-4:

Transformers and attention-based models for CV and NLP tasks: Attention Mechanism, Transformer Architecture (Encoder-Decoder), Pretrained Models: BERT, GPT. Vision Transformers (ViT).

Unit-5:

Introduction to transformers and attention-based models: Attention Mechanism, Transformer Architecture (Encoder-Decoder), Pretrained Models: BERT, GPT. Vision Transformers (ViT).

Test book:

1. Deep Learning, Ian Goodfellow, Yoshua Bengio and Aaron Courville, MIT Press
2. **Speech and Language Processing** by Daniel Jurafsky and James H. Martin.
3. Deep Learning for Computer Vision, by Rajalingappaa Shanmugamani packt

Reference Book:

1. Transformers for Natural Language Processing and Computer Vision: Explore Generative AI and Large Language Models with Hugging Face, ChatGPT, GPT-4V, and DALL-E 3 by Denis Rothman, Packt Publishing.

LAB SYLLABUS

Minimum 8 practicals and assignments based on but not limited to the following topics:

1. Deep Neural Network training and optimization
2. Convolutional Neural Networks
3. Text Preprocessing
4. Sequence Modelling
5. Transformers and attention-based models