

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

2024-2028

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	24CS18TH0101	Fundamentals of Programming	3	0	3	50	50	100	03 Hrs
2	ESC	24CS18PR0101	Fundamentals of Programming Lab	0	2	1	25	25	50	-
3	ESC	24CS18TH0102	Digital Circuits	3	0	3	50	50	100	03 Hrs
4	ESC	24CS18PR0102	Digital Circuits Lab	0	2	1	25	25	50	-
5	VSEC	24CS18PR0103	Programming Workshop - I	0	2	1	25	25	50	-
6	BSC	24HS01TH0102	ChemInformatics	3	0	3	50	50	100	03 Hrs
7	BSC	24HS01PR0102	ChemInformatics Lab	0	2	1	25	25	50	-
8	BSC	24HS03TH0105	Matrices and Calculus	3	0	3	50	50	100	03 Hrs
9	AEC	24HS02TH0106	English for Professional Communication	2	0	2	50	50	100	02 Hrs
10	AEC	24HS02PR0106	English for Professional Communication Lab	0	2	1	25	25	50	-
11	VEC	24HS02TH0104	Foundational course in Universal Human Values	1	0	1	25	25	50	-
12	CCA	24HS02PR0105	Liberal/ Performing Art	0	2	1	25	25	50	-
			TOTAL	15	12	21	425	425	850	

Sr . N o.	Course Code	Course Title	L	P	Credits	Contin uous Evaluat ion	End Sem Exam/ Internal Evaluation	Total	ESE Duration
1	24HS02PR0105-01	Fundamentals of Indian Classical Dance: Bharatnatayam	0	2	1	25	25	50	NA
2	24HS02PR0105-02	Fundamentals of Indian Classical Dance: Kathak	0	2	1	25	25	50	NA
3	24HS02PR0105-03	Introduction to Digital Photography	0	2	1	25	25	50	NA
4	24HS02PR0105-04	Introduction to Basic Japanese Language	0	2	1	25	25	50	NA
5	24HS02PR0105-05	Art of Theatre	0	2	1	25	25	50	NA
6	24HS02PR0105-06	Introduction to French Language	0	2	1	25	25	50	NA
7	24HS02PR0105-07	Introduction to Spanish Language	0	2	1	25	25	50	NA
8	24HS02PR0105-08	Art of Painting	0	2	1	25	25	50	NA
9	24HS02PR0105-09	Art of Drawing	0	2	1	25	25	50	NA
10	24HS02PR0105-10	Nature Camp	0	2	1	25	25	50	NA
11	24HS02PR0105-11	Developing Self- awareness	0	2	1	25	25	50	NA
12	24HS02PR0105-12	Art of Poetry	0	2	1	25	25	50	NA
13	24HS02PR0105-13	Creative and content writing	0	2	1	25	25	50	NA
14	24HS02PR0105-14	Science of life through Bhagwad Gita	0	2	1	25	25	50	NA
15	24HS02PR0105-15	Sanskrit Sambhas han- Spoken Sanskrit	0	2	1	25	25	50	NA
16	24HS02PR0105-16	Kirtan Kala	0	2	1	25	25	50	NA
17	24HS04PR0102-1	Adventure Sports	0	2	1	25	25	50	NA
18	24HS04PR0102-2	Introduction to Defense Forces & Obstacle Training	0	2	1	25	25	50	NA
19	24HS04PR0102-3	Self Defense and Indian Martial Arts	0	2	1	25	25	50	NA

20	24HS04PR0102-4	Basic Nutritional Course	0	2	1	25	25	50	NA
21	24EE07PR0105	Day-to-Day Electrical Systems	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	24CS18TH0201	Object Oriented Programming	3	0	3	50	50	100	03 Hrs

2	ESC	24CS18PR0201	Object Oriented Programming Lab	0	2	1	25	25	50	-
3	PCC	24CS18TH0202	Computer Architecture and Organization	3	0	3	50	50	100	03 Hrs
4	VSE C	24CS18PR0203	Programming Workshop - II	0	2	1	25	25	50	-
5	VEC	24CS18TH0204	Cyber Laws & Ethics in IT	2	0	2	50	50	100	02 Hrs
6	BSC	24HS05TH0202	Basics of Quantum Computing	3	0	3	50	50	100	03 Hrs
7	BSC	24HS05PR0202	Basics of Quantum Computing Lab	0	2	1	25	25	50	-
8	BSC	24HS03TH0215	Foundation of Probability and Statistics	3	0	3	50	50	100	03 Hrs
9	BSC	24HS03PR0212	Advanced Computational Mathematics Lab	0	2	1	25	25	50	-
10	IKS	24HS02TH0207	Foundational Literature of Indian Civilization	2	0	2	50	50	100	02 Hrs
11	CCA	24HS04PR0201	Sports-Yoga-Recreation	0	2	1	25	25	50	-
			TOTAL	16	10	21	425	425	850	

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	24CS18TH0301	Introduction to Data Structures	4	0	4	50	50	100	03 Hrs

2	PCC	24CS18PR0301	Introduction to Data Structures Lab	0	2	1	25	25	50	-
3	VSE C	24CS18PR0302	IT Infrastructure Services Lab	0	2	1	25	25	50	-
4	VEC	24CS18PR0303	Software Lab	0	2	1	25	25	50	-
5	VEC	24CS18PR0304	Project based Learning	0	4	2	25	25	50	-
6	EEM	24CS18TH0305	Principles of Management	2	0	2	50	50	100	02 Hrs
7	MD M	24CS18TH0306	MDM-I	3	0	3	50	50	100	03 Hrs
8	BSC	24HS03TH0305	Discrete Mathematics & Graph Theory	3	0	3	50	50	100	03 Hrs
9	OEC	24ID118TH0301	Open Elective -I	2	0	2	50	50	100	02 Hrs
10	BSC	24HS01TH0303	Environmental Science	2	0	2	50	50	100	02 Hrs
			TOTAL	16	10	21	400	400	800	

Semester-III

Semester-IV

S. No.	Course Type	Course Code	Course Name	L	P	C	Continuous Assessment	End Sem / Internal Eval	Total	Duration of End Semester
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1	PCC	24CS18TH0401	Introduction to Database Management Systems	4	0	4	50	50	100	3 hrs
2	PCC	24CS18PR0401	Introduction to Database Management Systems Lab	0	2	1	25	25	50	-
3	PCC	24CS18TH0402	Introduction to Operating Systems	3	0	3	50	50	100	3 hrs
4	PCC	24CS18PR0402	Introduction to Operating Systems Lab	0	2	1	25	25	50	-
5	PCC	24CS18TH0403	Introduction to Computer Networks	3	0	3	50	50	100	3 hrs
6	PCC	24CS18PR0403	Introduction to Computer Networks Lab	0	2	1	25	25	50	-
7	PCC	24CS18TH0404	Theory of Computation	3	0	3	50	50	100	3 hrs
8	VEC	24CS18TH0405	Creativity, Innovation & Design Thinking	2	0	2	50	50	100	02 Hrs
9	MD M	24CS18TH0406	MDM-II	3	0	3	50	50	100	03 Hrs
10	OE	24ID118TH0401	Open Elective -II	2	0	2	50	50	100	02 Hrs
			TOTAL	20	06	23	400	400	800	

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.	Course Type	Course Code	Course Name	L	P	C	Continuous Assessment	End Sem / Internal Eval	Total	Duration of End Semester
1	PCC	24CS18TH0501	Introduction to Data Science	3	0	3	50	50	100	03 hrs
2	PCC	24CS18PR0501	Introduction to Data Science Lab	0	2	1	25	25	50	-
3	PCC	24CS18TH0502	Analysis of Algorithms	4	0	4	50	50	100	03 Hrs
4	PCC	24CS18PR0502	Analysis of Algorithms Lab	0	2	1	25	25	50	-
5	PCC	24CS18TH0503	Software Engineering	3	0	3	50	50	100	03 hrs
6	PCC	24CS18PR0503	Software Engineering Lab	0	2	1	25	25	50	-
7	AEC	24CS18PR0504	Basic Competitive Coding	0	2	1	50	-	50	-
8	VSEC	24CS18PR0505	Mini Project – I	0	4	2	75	75	150	-
9	MDM	24CS18TH0506	MDM-III	3	0	3	50	50	100	03 Hrs
10	OE	24ID118TH0501	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	24CS18PR0601	Mobile Applications and Development Lab	0	4	2	25	25	50	-
2	PCC	24CS18TH0602	Internet and Web Technologies	4	0	4	50	50	100	03 hrs
3	PCC	24CS18PR0602	Internet and Web Technologies Lab	0	2	1	25	25	50	-
4	PCC	24CS18TH0603	Artificial Intelligence	3	0	3	50	50	100	03 hrs
5	PCC	24CS18PR0603	Artificial Intelligence Lab	0	2	1	25	25	50	-
6	PCC	24CS18TH0604	Basics of Ethical Hacking	3	0	3	50	50	100	03 hrs
7	PEC	24CS18TH0605	Program Elective -I	3	0	3	50	50	100	03 hrs
8	PEC	24CS18PR0605	Program Elective -I Lab	0	2	1	25	25	50	-
9	VSE C	24CS18PR0606	Mini Project – II	0	4	2	75	75	150	-
10	AE C	24CS18PR0607	Advanced Competitive Coding	0	2	1	50	-	50	-
11	AE C	24CS18PR0608	Participative Learning	0	2	1	50	-	50	-
12	MD M	24CS18TH0609	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
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Semester-VII/VIII

Sr. No.	Course type	Course Code	Course Name	L	P	C	Continuous Assessment	End Sem Exam	Total	Exam Duration
1	PCC	24CS18TH0701	Machine Learning	3	0	3	50	50	100	03 Hrs
2	PCC	24CS18PR0701	Machine Learning Lab	0	2	1	25	25	50	-
3	PCC	24CS18TH0702	Data Mining	3	0	3	50	50	100	03 Hrs
4	PEC	24CS18TH0703	Program Elective -II	3	0	3	50	50	100	03 Hrs
5	PEC	24CS18TH0704	Program Elective -III	3	0	3	50	50	100	03 Hrs
6	PEC	24CS18PR0704	Program Elective -III Lab	0	2	1	25	25	50	-
7	PRJ	24CS18PR0705	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	24CS18TH0801	Introduction to Deep Learning	4	0	4	50	50	100	03 Hrs
2	PEC	24CS18TH0802	Program Elective -IV	3	0	3	50	50	100	03 Hrs
3	PEC	24CS18PR0802	Program Elective -IV Lab	0	2	1	25	25	50	-
4	PEC	24CS18TH0803	Program Elective -V	3	0	3	50	50	100	03 Hrs
5	PEC	24CS18PR0803	Program Elective -V Lab	0	2	1	25	25	50	-
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	24CS18PR0804	Full Semester Internship/ Research Internship/ TBI	0	24	12	200	100	300	-

- 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	24CS18TH0605-1	Distributed and Parallel Databases
	24CS18PR0605-1	Distributed and Parallel Databases Lab
Security	24CS18TH0605-2	Intrusion Detection and Prevention System
	24CS18PR0605-2	Intrusion Detection and Prevention System Lab
Image processing and NLP	24CS18TH0605-3	Computer Graphics
	24CS18PR0605-3	Computer Graphics Lab

Micro Specialization	Course Code	Elective-2 [SEM-7]
Cloud	24CS18TH0703-1	Administration Cloud
Security	24CS18TH0703-2	Ethical Hacking
Image processing and NLP	24CS18TH0703-3	Digital Image Processing

Micro Specialization	Course Code	Elective-3 [SEM-7]
Cloud	24CS18TH0704-1	Development on Cloud
	24CS18PR0704-1	Development on Cloud Lab
Security	24CS18TH0704-2	Vulnerability Assessment and Penetration Testing

	24CS18PR0704-2	Vulnerability Assessment and Penetration Testing Lab
Image processing and NLP	24CS18TH0704-3	Natural Language Processing
	24CS18PR0704-3	Natural Language Processing Lab

Micro Specialization	Course Code	Elective-4 [SEM-8]
Cloud	24CS18TH0802-1	AI & ML on Public Cloud Platform
	24CS18PR0802-1	AI & ML on Public Cloud Platform Lab
Security	24CS18TH0802-2	Cyber Risk Assessment & Management
	24CS18PR0802-2	Cyber Risk Assessment & Management Lab
Image processing and NLP	24CS18TH0802-3	Computer Vision
	24CS18PR0802-3	Computer Vision Lab

Micro Specialization	Course Code	Elective-5 [SEM-8]
Cloud	24CS18TH0803-1	Cloud Security
	24CS18PR0803-1	Cloud Security Lab
Security	24CS18TH0803-2	Auditing IT Infrastructure for Compliance
	24CS18PR0803-2	Auditing IT Infrastructure for Compliance Lab
Image processing and NLP	24CS18TH0803-3	Deep Learning for Computer Vision and NLP
	24CS18PR0803-3	Deep Learning for Computer Vision and NLP Lab

OPEN ELECTIVE

Semester	Course Code	Course Name
Semester-	24ID118TH0301-1	Cyber Laws & Ethics

III [Open Elective-I]		
	24ID118TH0301-2	Statistical Computing with R
	24ID118TH0301-3	Introduction to Data Science
	24ID118TH0301-4	MOOC-Coursera
	24ID118TH0301-5	Course offered by CDPC
Semester-IV [Open Elective-II]	24ID118TH0401-1	Tools for Data Science
	24ID118TH0401-2	Web Development
	24ID118TH0401-3	Mobile App Development
	24ID118TH0401-4	MOOC-Coursera
	24ID118TH0401-5	Course offered by CDPC
Semester-V [Open Elective-III]	24ID118TH0501-1	Data Analytics Visualization
	24ID118TH0501-2	Open-Source Technologies
	24ID118TH0501-3	Basics of Ethical Hacking
	24ID118TH0501-4	MOOC-Coursera
	24ID118TH0501-5	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

Syllabus for Semester I, Bachelor of Computer Application

Course Code: 24CS18TH0101

Course: Fundamentals of Programming

L: 3 Hrs P: 0 Hr, Per Week

Total Credits: 3

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

Syllabus for Semester I, Bachelor of Computer Application

Course Code: 24CS18PR0101

Course: Fundamentals of Programming Lab

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

Total Credits: 1

Course Outcomes

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

1. Write programs involving decision-making and loops
2. Write programs using arrays
3. Apply the concept of pointers in real-life programming
4. Use structures to code complex problems
5. Perform operations on files.

SYLLABUS

Practical

1. Program to demonstrate the use of different data types
2. Program to demonstrate the use of decision control statement
3. Program to demonstrate the use of Loops
4. Program to demonstrate the use of functions and Recursion
5. Program to demonstrate the use of Arrays
6. Program to demonstrate the use of pointers
7. Program to demonstrate the use of Structures
8. Program to demonstrate the use of File Handling

Syllabus for Semester I, Bachelor of Computer Application

Course Code: 24CS18TH0102

Course: Digital Circuits

L: 3 Hrs P: 0 Hrs, Per Week

Total Credits: 3

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: Radom 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

Syllabus for Semester I, Bachelor of Computer Application

Course Code: 24CS18PR0102

Course: Digital Circuits Lab

L: 0 Hrs, P: 2 Hr Per Week

Total Credits: 1

Course Outcomes

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

1. Perform simple operations based on number systems and arithmetic operations.
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 and execute simple Assembly language programs.

SYLLABUS

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: 24CS18PR0103

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: 24HS01TH0102

Course: ChemInformatics

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

Total Credits: 3

Course Outcomes:

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

1. Use all the features of Chemical databases for drawing 2D and 3D structures
2. Explain the role of stereochemistry in drug development
3. Implement the various approaches in Molecular Modelling
4. Provide a detail strategy on drug activity and drug discovery.
5. Analyse the principles of various spectroscopic techniques and utilize them for qualitative and quantitative analysis
6. Understand the principles of Chemical Kinetics and predict kinetic parameters by computational tools.

Unit 1: Chemical structure and databases

Introduction to cheminformatics- scope and applications in various fields, Chemical Databases: types of chemical database, reaction databases, Spectral database.

Unit 2: Stereochemistry- Definition, isomerism- geometrical and optical, chirality, optical activity, Element of symmetry, role of stereochemistry in drug designing.

Unit 3: Molecular Docking and molecular simulations

Molecular docking: Introduction to docking approaches: Rigid docking, Flexible docking - Shape complementarily- Simulation Mechanics of docking, Scoring Function- Applications

Unit 4: Computer added drug Design: Introduction to drugs, Structure-based drug design, Ligand-Based Design and Virtual screening/docking of ligands, ADMET prediction.

Unit 5: Characterization Techniques and Computational Tools

Fundamentals of spectroscopy, Electronic Spectroscopy, Lambert-Beer's Law, Nuclear Magnetic Resonance Spectroscopy, Interpretation of spectra of simple molecules using computational tools

Unit 6: Chemical Reactions

Molecular interactions, Order and Molecularity of the reactions, Rate expressions for Zero, first and Second order reaction, activation energy, use of computational tools for graphical plotting and analysis.

Text Books

1. Rajashree Khare, A textbook of Engineering Chemistry, S. K. Kataria and Sons, India 2019
2. Upadhayay, K. Upadhayay, N. Nath, Biophysical Chemistry (Principles and Techniques), Himalaya Publishing House, 2009.
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. Introduction to Computational Biology: Maps, Sequences and Genomes, Waterman, M., Chapman and Hall, 1995.
2. Abraham, Donald (Ed). Burger's medicinal chemistry and drug discovery. Publisher: John Wiley & Sons, Inc. 2003. ISBN: 0471270903
3. Schlick, T. Molecular modelling and simulation: an interdisciplinary guide. Publisher: Springer. 2002. ISBN: 0-387-95404-X

Syllabus for Semester I, Bachelor of Computer Application

Course Code: 24HS01PR0102

Course: ChemInformatics Lab

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

Total Credits: 1

1. Use open online tools and various search tools for understanding the properties and functioning of various biomolecules.
2. Estimate the rate constants of reactions and order of the reaction using computational tools
3. 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 biomolecules / drugs using open online software such as ChemSketch, etc..
5. To compute and analyze the bioactivity of drugs molecule / new molecular structure using open online software such as MolInspiration, etc
6. To study chemical kinetics of peroxydisulphate 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 determine of wavelength of maximum absorption of chemical/biological compound in solution and determination of concentration using Lambert- Beer's Law.
10. Estimation of Fe^{2+} ions spectrophotometrically

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.

Suggested Reference Books:

- 1 David Young, Computational Chemistry: A Practical Guide for Applying Techniques to RealWorld Problems, Wiley Inter science Publications

Syllabus for Semester I, Bachelor of Computer Application

Course Code: 24HS03TH0105

Course: Matrices and Calculus

L: 3 Hrs P: 0 Hr, Per Week

Total Credits: 3

Course Outcomes

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

1. Identify the type and order of Matrix and perform various binary operation on Matrices.
2. Interpret the solutions of system of linear equations and use the concepts of Eigen values, Eigen vectors to find diagonalization of matrices.
3. Differentiate and Integrate trigonometric, algebraic, exponential and logarithmic functions.
4. Differentiate multivariable functions .
5. Find Maxima and Minima of function of one and several variables

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.

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.

Syllabus for Semester I, Bachelor of Computer Application

Course Code: 24HS02TH0106
Communication

Course: English for Professional

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

Total Credits: 2

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

6 hours

- 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

6 hours

- 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

6 hours

- 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

Syllabus for Semester I, Bachelor of Computer Application

Course Code: 24HS02PR0106 Course: English for Professional Communication Lab

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

Total Credits: 1

Course Outcomes

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

1. Apply effective listening and speaking skills in professional and everyday conversations.
2. Demonstrate the techniques of effective Presentation Skills
3. Evaluate and apply the effective strategies for Group Discussions
4. Analyse and apply the effective strategies for Personal Interviews
5. Implement essential language skills- listening, speaking, reading, and writing

SYLLABUS

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:24HS02TH0104
Values

Course: Foundational course in Universal Human

L: 1 Hrs P: 0 Hr, Per Week

Total Credits: 1

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: 24HS02PR0105-01 Course: Fundamentals of Indian Classical Dance:
Bharatnatayam**

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

Total Credits: 01

Course Outcomes

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

- 1: Understand the importance of dance and Bharatnataym as an Indian dance form
- 2: Develop skills to perform the dance form at its basic level.
- 3: 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: 24HS02PR0105-02 Course: Fundamentals of Indian Classical Dance: Kathak

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

Course Outcomes

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

- 1: Understand the importance of dance and Kathak as an Indian dance form
- 2: Develop skills to perform the dance form at its basic level.
- 3: 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: 24HS02PR0105-03

Course: Introduction to Digital Photography

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

Total Credits: 01

Course outcome:

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

- 1: Develop an understanding of the technical aspects and aesthetics of Photography.
- 2: Apply the rules of digital photography for creating photographs.
- 3: Develop skills to enhance photographs through post processing.
- 4: 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: 24HS02PR0105-04

Course: Introduction to Basic Japanese Language

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

Total Credits: 01

Course outcome

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

- 1: Basic understanding about Japan as a country and Japanese culture.
- 2: Ability to use vocabulary required for basic level communication in Japanese language.
- 3: 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: 24HS02PR0105-05

Course: Art of Theatre

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

Total Credits: 01

Course Outcomes:

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

- 1: Understand and synthesize the working of the prominent genres of theatre across the world.
- 2: Apply the skill of voice and speech in theatre and public speaking
- 3: 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.
- 4: Apply skills acquired related to technical/production aspects of theatre and also develop problem solving and interpersonal skills.

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: 24HS02PR0105-06

Course: Introduction to French Language

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

Total Credits: 01

Course outcomes:

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

1. Demonstrate basic knowledge about France, the culture and similarities/differences between India and France
2. Learn to use simple language structures in everyday communication.
3. Develop ability to write in basic French about themselves and others.
4. 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: 24HS02PR0105-07

Course: Introduction to Spanish Language

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

Total Credits: 01

Course outcomes:

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

1. Demonstrate basic knowledge about Spain, the culture and similarities/differences between India and France
2. Learn to use simple language structures in everyday communication.
3. Develop ability to write in basic Spanish about themselves and others.
4. 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: 24HS02PR0105-08

Course: Art of Painting

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

Total Credits: 01

Course outcome:

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

- 1: Become familiar with the basic methods, techniques & tools of painting.
- 2: Train the eye and hand to develop sense of balance, proportion and rhythm.
- 3: Develop the ability to observe and render simple natural forms.
- 4: 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: 24HS02PR0105-09

Course: Art of Drawing

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

Total Credits: 01

Course outcome:

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

- 1: Become familiar with the basic methods, techniques & tools of drawing.
- 2: Train the eye and hand to develop sense of balance, proportion and rhythm.
- 3: Develop the ability to observe and render simple natural forms.
- 4: 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: 24HS02PR0105-10

Course: Nature Camp

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

Total Credits: 01

Course outcome:

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

- 1: Develop an affinity with nature by observing and understanding its marvels with guidance from experts
- 2: 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: 24HS02PR0105-11

Course: Developing Self-awareness

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

Total Credits: 01

Course Outcomes:

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

- 1: Gain foundational understanding of graphology and through self-analysis will achieve greater awareness about their strengths and weaknesses & areas for personal growth
- 2: students will be equipped with tools and techniques for continuous self-improvement, using signature analysis and graphotherapy as part of their personal development journey
- 3: understand how to use Neuro Linguistic Programming (NLP) strategies to set and achieve goals effectively, overcoming mental blocks and limiting beliefs.
- 4: 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: 24HS02PR0105-12

Course: Art of Poetry

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

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:

- 1: Understand the origin and development of poetry
- 2: Appreciate the art of poetry in life
- 3: Develop aesthetic sense
- 4: 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: 24HS02PR0105-13

Course: Creative and content writing

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

Total Credits: 01

Course outcomes:

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

- 1:** Understand and apply fundamental concepts and techniques of creative writing.
- 2:** Apply storytelling techniques to create engaging narratives.
- 3:** Develop and implement effective SEO and digital content strategies
- 4:** Create and refine content using various tools and applying diverse writing styles and formats.
- 5:** 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: 24HS02PR0105-14

Course: Science of life through Bhagwad Gita

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

Total Credits: 01

Course Outcome

- 1: To understand the methodology to correctly interpret and analysis the scripture
- 2: To understand the application of various teaching of the Bhagwad Gita
- 3: 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: 24HS02PR0105-15

Course: Sanskrit Sambhashan- Spoken Sanskrit

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

Total Credits: 01

Course outcome

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

- 1: Enhanced writing skills in Sanskrit
- 2: Enhanced speaking skills in Sanskrit
- 3: Enhanced listening skills in Sanskrit
- 4: Enhanced writing skills in Sanskrit

Syllabus:

संस्कृतसम्भाषणशिविरस्य पाठ्यक्रमः

प्रथम 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 - गतानुगतिकी लोकः । (काचित् कथा सरलया
भाषया वक्तव्या) ।
- ❖ रटनाभ्यासः (पूर्वमेव लिखितानि पठितानि च कानिचित्
वाक्यानि वाचनीयानि) ।
- ❖ एकं वाक्यम् (प्रत्येकं छात्रः एकं वाक्यं वदेत् ।)
- ❖ सूचना ।
- ❖ ऐक्यमन्त्रः ।

द्वितीय दिनम्

- ❖ गीतम् ।
- ❖ पुनस्स्मरणम् ।
- ❖ शब्देषु लिङ्गभेदज्ञापनम् - यथा -सः सुधाखण्डः, सा
कुक्षिका, 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 पृच्छेयुः ।)
यथा - रामः प्रातःकाले शालां गच्छति ।
रामः कदा शालां गच्छति?
- ❖ अद्य, श्वः, परश्वः, प्रपरश्वः, 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 ।

तृतीय दिनम्

- ❖ गीतम् ।
- ❖ पुनस्स्मारणम् ।
- ❖ क्रियापदानां बहुवचनरूपाणि ।
गच्छन्ति - गच्छामः - गच्छन्तु (Chart दर्शनीयम्)
पिबन्ति - पिबामः - पिबन्तु ।
लिखन्ति - लिखामः - लिखन्तु ।
इत्यादिपरिवर्तनाभ्यासः कारणीयः ।
- ❖ द्वितीयाविभक्तिः - स्फोरकपत्राणाम् उपयोगः ।
(वाक्यपत्राणि उपयुज्य वाक्यानि वाचनीयानि ।)
- ❖ कृपया ददातु - वस्तूनि प्रदर्श्य ।
शिक्षकः एकैकं वस्तु प्रदर्शयति ।
उदा. - ग्रन्थः, घटी,.....
छात्राः - कृपया ग्रन्थं ददातु, कृपया घटीं 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 - ब.व.)
- ❖ विशिष्टक्रियापदानाम् अभ्यासः -
करोमि - कुर्मः । करोति - कुर्वन्ति ।
ददामि - ददः । 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 कारणीयः)
- ❖ क्तवतुप्रत्ययान्तानाम् अभ्यासः
गतवान् - पठितवान् - लिखितवान् (ए.व. पुलिङ्गे) ।
गतवती - पठितवती - लिखितवती (ए.व. स्त्रीलिङ्गे) ।
गतवन्तः - पठितवन्तः - लिखितवन्तः (ब.व. पुलिङ्गे) ।
गतवत्यः - पठितवत्यः - लिखितवत्यः (ब.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 ।
- ❖ ऐक्यमन्त्रः ।

पञ्चमं दिनम्

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

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 । (प्रथमाविभक्ती)
- सः उत्तमः बालकः ।
- सा उत्तमा बालिका ।
- तत् उत्तमं पुस्तकम् ।
- ❖ इव । विनोदकणिका । (गतवान् 'इव' अभिनये कृतवान्!)
- ❖ अपेक्षया ।
- ❖ पशूनां नामानि ।
- ❖ अवयवानां नामानि ।
- ❖ वाक्यविस्तारणाभ्यासः ।
(सः मम पुस्तकं प्रातःकाले पञ्चवादने पठितवान् ।)
- ❖ इतः पूर्वम् - इतः परम् ।
- ❖ 'रामकृष्ण' सङ्ख्याक्रीडा ।
- ❖ कथा ।
- ❖ षट् वाक्यानि ।
- ❖ सूचना ।
- ❖ ऐक्यमन्त्रः ।

सप्तमं दिनम्

- ❖ गीतम् ।
- ❖ पुनःस्मरणम् ।
- ❖ क्त्वा - 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 ।
- ❖ ऐक्यमन्त्रः ।

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 ।
- ❖ ऐक्यमन्त्रः ।

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 – अनीयत् ।
- ❖ अनन्त्यकथारचना ।
- ❖ सङ्ख्यान्वेषणम् (क्रीडा) ।
- ❖ छात्रैः सह प्रश्नोत्तरम् ।
- ❖ समाजनिधिविषये पुनःस्मरणम् ।
- ❖ ऐक्यमन्त्रः ।

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 ।
- ❖ ऐक्यमन्त्रः ।

Syllabus for Semester I, Bachelor of Computer Application

Course Code: 24HS02PR0105-16

Course: Kirtan Kala

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

Total Credits: 01

Course outcome

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

- 1: Learn from the inspiring spiritual journey of the saints and the history of Kirtan tradition
- 2: Learn about the musical instruments used in the art of Kirtan
- 3: 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
- टाळ, 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 शिदोरी.

Syllabus for Semester I, Bachelor of Computer Application

Course Code: 24HS04PR0102-1

Course Name: Adventure Sports

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

Total Credits: 01

Course Outcome:

By the end of this course, students will:

1. Understand the principles and benefits of adventure sports.
2. Develop basic skills in selected adventure sports.
3. Learn and apply safety measures and risk management techniques.
4. Foster teamwork, leadership, and problem-solving skills.
5. Cultivate a greater appreciation for nature and outdoor activities.

Syllabus:

1. Tent pitching, knot practice session and Tent allotment
2. Activities like Jumaring and Climbing
3. Individual challenge like Burma bridge, ladder bridge, multi vine
4. Group Task like improvise raft making and Kayaking
5. activities like Archery rifle shooting, cycle ride

Pattern of Classes: 2 Days and 1 Night Camp

Syllabus for Semester I, Bachelor of Computer Application

Course Code: 24HS04PR0102-2
Forces & Obstacle Training

Course Name: Introduction to Defense

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

Total Credits: 01

Course Outcome:

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

1. Describe the Structure and Functions of Defense Forces
2. Demonstrate Knowledge of Defense Training Protocols
3. Navigate Basic Obstacle Courses
4. Collaborate and Problem-Solve in Team-Based Exercises
5. Connect Obstacle Training to Defense Preparedness
6. Evaluate and Reflect on Training Experiences

Syllabus:

1. Knot and Hitch practice session
2. Activities like Rappelling & Wall Climbing
3. Burma bridge & ladder bridge
4. First Aid
5. Rifle Shooting
6. Horse riding
7. Group Task and Team building activities

Pattern of Classes: 2 Days and 1 Night Camp

Syllabus for Semester I, Bachelor of Computer Application

Course Code: 24HS04PR0102-3

Course Name: Self Defense & Indian Martial Arts

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

Total Credits: 01

Course Outcome:

By the end of this course, students will:

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

Syllabus:

1. Mental Awareness

1. Importance of Self Defense
2. Types of Self Defense
3. Rules of Self Defense

2. Physical Session

1. Various Self Defense Techniques
2. Different Situational Defense Techniques

3. Improvise Weapon

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

4. Martial Arts

1. Introduction of Indian Martial Arts
2. Demonstration of Indian Martial Arts
3. Training of Indian Martial Arts (Lathi Kathi)

Pattern of Classes: Training/Classes at Campus

Syllabus for Semester I, Bachelor of Computer Application

Course Code: 24HS04PR0102-4

Course Name: Basic Nutritional Course

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

Total Credits: 01

Course Outcome:

By the end of this course, students will:

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

Syllabus:

Unit I

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

Practical I

1. 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

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

Practical II

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

Pattern of Classes:

Theory Classes – 10

Practical Classes – 2

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, and critically evaluate nutrition information to distinguish between credible and misleading sources.

Syllabus for Semester I, Bachelor of Computer Application

Course Code: 24EE07PR0105

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: 24CS18TH0201
Programming

Course: Object Oriented

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

Total Credits: 3

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

Syllabus for Semester II, Bachelor of Computer Application

Course Code: 24CS18PR0201

Course: Object Oriented Programming Lab

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

Total Credits: 1

Course Outcomes

On completion of the course, the student will be able to

1. Design solution to problems using concepts of object-oriented programming like classes, objects, inheritance with proper exception handling.
2. Use collection classes, generic classes to design programs and perform database connectivity.
3. Implement programs based on streams and multithreading.

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: 24CS18TH0202
Organization

Course: Computer Architecture and

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: 24CS18PR0203

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
4. Develop high-fidelity designs and prototypes in Figma

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.

UX Programming: Figma Basics, Wireframe and Prototype, Digital Storytelling

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:

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

B. Educational information:

- a) X and XII marks must be mandatory

- b) Rest of the fields of academic details are optional

C. Payment Details:

- a) 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.

8. Wireframing using Figma

Demonstrate the working of Wireframing using Figma. The wireframe design should contain the following elements: layout, page structure and information architecture. (Consider the case study Online Food Delivery Mobile Apps).

9. Prototyping using Figma

Demonstrate the working of animated prototypes using Figma (consider the case study Online Food Delivery Mobile Apps).

10. Digital Storytelling using Figma

Create a Digital Story to present a narrative for the given scenario: “Evolution of Smart Gadgets” using Figma as the digital story-telling tool.

Syllabus for Semester II, Bachelor of Computer Application

Course Code: 24CS18TH0204

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: 24HS05TH0202

Course: Basics of Quantum Computing

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

Total Credits: 3

Course Outcomes

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

1. Use the basic quantum theory relating to the probabilistic behaviour of an electron in an atom.
2. Utilize the knowledge of complex vector space in the domain of quantum theory.
3. Analyse classical and quantum approach towards the quantum computation.
4. Classify deterministic and probabilistic systems and analyse quantum observations and quantum measurements.
5. Use quantum gates in building architecture and quantum algorithms.

Unit I: 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.

Unit II: 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.

Unit III: 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.

Unit IV: 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.

Unit V: 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.
3. Introduction to Classical and Quantum Computing by Thomas G. Wong, (2022).
4. Principles Of Quantum Computation And Information - Volume I: Basic Concepts, Giuliano Strini (Author), Giulio Casati (Author), (2004)

Syllabus for Semester II, Bachelor of Computer Application

Course Code: 24HS05PR0202

Course: Basics of Quantum Computing Lab

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

Total Credits: 1

Course Outcomes:

The physics laboratory will consist of experiments and programming exercises illustrating the principles of quantum physics and quantum computing relevant to the study of computer science and engineering.

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

1. Develop skills required for experimentation and verification of physics laws.
2. Utilize Mathematica software for graph plotting and for least squares fitting of the experimental data.
3. Compare the properties of real and complex matrices with reference to their use in quantum system.
4. Apply the computational methods to solve eigenvalues and eigenfunctions, tensor products.
5. Simulate classical and quantum gates.

List of Experiments:

1. Introduction to IBM quantum computer.
2. Simulation of classical gates by quantum representation of the gates and inputs.
3. Arithmetic operations using IBM Quantum computer.
4. Simulation of quantum gates: CNOT gate, Toffoli gate, Fredkin gate, Hadamard gate on IBM quantum computer.
5. Linear and Nonlinear data fitting by least squares fit method
6. Working with Vectors.
7. Working with Matrices: Real and Complex numbers.
8. Eigen values, Eigen functions, Properties of Inner Product and Unitary Matrices, Tensor Product.
9. Verification of Ohm's law and error analysis of the data using Linear Least Square Fit (LLSF) method.
10. Analysis of energy values and wavefunction using Mathematica software

Reference Books

1. Lab manual prepared by Physics Department, RBU, Nagpur

Syllabus for Semester II, Bachelor of Computer Application

Course Code: 24HS03TH0215

Course: Foundation of Probability and Statistics

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

Total Credits: 3

Course Outcomes

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

1. Grasp the meaning of discrete and continuous random variables, probability distribution. Interpret the meaning of probabilities derived from distributions. This involves understanding what the calculated probabilities represent in practical terms and drawing conclusions from the results.
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, including the null hypothesis (H_0) and alternative hypothesis (H_1), 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: 24HS03PR0212

Course: Advanced Computational Mathematics Lab

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

Total Credits: 1

Proposed Course Outcomes:

By using open source software Students will be able to

- 1: To use mathematical software as an advance calculator.
- 2: Create and manipulate 2D Graphs and use these skills to effectively visualize and interpret data
- 3: Plots 3D graphs in SageMath, and use these skills to effectively visualize and interpret data.
- 4 Find higher order derivatives and its interpretation with the help of Sagemath.
- 5: Use partial derivatives and gradients for optimizing multivariable functions.
- 6: Understand different curve fitting techniques, such as linear, polynomial, and exponential fitting and learn how to choose the appropriate curve fitting method based on the data characteristics.
- 7: Understand how matrices are used to solve system of equations and in cryptographic algorithms.
- 8 : Understand and articulate the fundamental concepts and purposes of hypothesis testing in data analysis.

Mapping of Course outcomes (COs) with Experiments

Exp. No.	Name of Experiments	Mapped COs
1	To use mathematical software as an advance calculator and for visualization of data	CO1
2	2D Plotting	CO2
3	3D- Plotting and data visualization	CO3
4	Calculus	CO4
5	Applied optimization (Maxima, minima and Gradient descent method)	CO5
6	Curve Fitting to identify trends and patterns within dataset .	CO6
7	Application of Matrices	CO7
8	Validating Hypotheses in Data Analysis	CO8

References:

1. Paul Zimmermann, Computational Mathematics with Sagemath , siam publisher.

Syllabus for Semester II, Bachelor of Computer Application

Course Code: 24HS02TH0207

Course: Foundational Literature of Indian Civilization

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

Panchtantras, **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: 24HS04PR0201

Course: Sports-Yoga-Recreation

L: 0 Hrs P: 2 Hr, Per Week

Total Credits: 1

Course Outcomes:

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

1. Understand fundamental skills, basic principle and practices of sports and Yoga.
2. Practically learn the principles of implementing general and specific conditioning of physical exercises and yoga.
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, Coordinative abilities.
- Practice of Fundamental Skills of Volleyball, Table Tennis and Chess, etc.
- Knowledge and practice of the Equipment used in a Gymnasium and its application.

Unit 2:

- Yoga: Standing, Sitting, Prone & Supine positions.
- Suryanamaskar.
- Pranayama, Meditation and Relaxation Techniques.
- 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	Physical Efficiency Test – 30 Marks Sports/Games skill Activity/Project – 10 Marks Yoga Activities – 10 Marks	50
		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: 24CS18TH0301

Course: Introduction to Data Structures

L: 4 Hrs P: 0 Hr, Per Week

Total Credits: 4

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.

Syllabus for Semester III, Bachelor of Computer Application

Course Code: 24CS18PR0301

Course: Introduction to Data Structures Lab

L: 0 Hrs P: 2 Hr, Per Week

Total Credits: 1

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: 24CS18PR0302

Course:IT Infrastructure Services Lab

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

Total Credits: 1

Course Outcomes

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

1. Identify and configure IT infrastructure components.
2. Install and troubleshoot operating systems and software.
3. 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:

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

Syllabus for Semester III, Bachelor of Computer Application

Course Code: 24CS18PR0303

Course: Software Lab

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

Total Credits: 1

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

1. Installing Bootstrap framework and understanding Grid system by creating webpages.
2. Understanding media queries and implementing it for all sized devices.
3. Knowing different features of Bootstrap and implementing them.
4. Integrating jQuery and understanding its usage of Events.
5. Effective implementation of jQuery for different needs of webpage development
6. Integration of React.js for its use on front end programming.
7. 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: 24CS18PR0304

Course: Project based Learning

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

Total Credits: 2

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: 24CS18TH0305

Course: Principles of Management

L: 02 Hrs P: 00 Hr, Per Week

Total Credits: 02

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: 24HS03TH0305

Course: Discrete Mathematics & Graph Theory

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

Total Credits: 03

Course Outcomes

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

1. Use Venn diagrams to visualize and solve problems involving set operations.
2. 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).
3. Analyze logical statements and connectives, construct truth tables, and apply tautological implications to establish logical equivalence and validity in reasoning.
4. Develop a strong foundation in the basic concepts of graph theory, including graphs, subgraphs, degree of vertices, and graph isomorphism.
5. 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:

1. Discrete Mathematical Structures with Applications to Computer Science: J. P. Tremblay and R. Manohar, Tata McGraw-hill.
2. 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: 24HS01TH0303

Course: Environmental Science

L: 02 Hrs P: 00 Hr, Per Week

Total Credits: 02

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

1. Develop an understanding of pollution and its types.
2. Learn about different kinds of sources of pollution.
3. Explain sustainable development, its goals, targets, challenges and global strategies for sustainable development
4. 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 IV, Bachelor of Computer Application

Course Code: 24CS18TH0401 **Course: Introduction to Database Management Systems**

L: 4 Hrs P: 0 Hr, Per Week

Total Credits: 4

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.

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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 Ramkrishan, Johannes, McGraw Hill*
3. An Introduction to Database Systems: *C.J.Date, Narosa*

Syllabus for Semester IV, Bachelor of Computer Application

Course Code: 24CS18PR0401
Systems Lab

Course: Introduction to Database Management

L:0 Hrs P: 2 Hr, Per Week

Total Credits: 1

Course Outcomes

1. Design and implement a database schema, database objects for a given problem-domain.
2. Declare and enforce business rules on a database using RDBMS.
3. Normalize a database, populate and query a database using SQL DML/DDDL commands.

Syllabus

Minimum 8 practicals and assignments based on the theory syllabus.

Syllabus for Semester IV, Bachelor of Computer Application

Course Code: 24CS18TH0402

Course: Introduction to Operating Systems

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

Total Credits: 3

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.*

Syllabus for Semester IV, Bachelor of Computer Application

Course Code: 24CS18PR0402

Course: Introduction to Operating Systems Lab

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

Total Credits: 1

Course Outcomes

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

1. Install and work with various operating systems.
2. Use and run the commands of Linux.
3. Implement OS concepts in LINUX.

Syllabus

Minimum 8 practicals and assignments based on the above syllabus.

Syllabus for Semester IV, Bachelor of Computer Application

Course Code: 24CS18TH0403

Course: Introduction to Computer Networks

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

Total Credits: 3

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.

Syllabus for Semester IV, Bachelor of Computer Application

Course Code: 24CS18PR0403

Course: Introduction to Computer Networks Lab

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

Total Credits: 1

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, 3rd 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, 3rd 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: 24CS18TH0501

Course: Introduction to Data Science

L: 3 Hrs P: 0 Hr, Per Week

Total Credits: 3

Course Outcomes

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

1. Identify data science concepts, lifecycle, and application domains.
2. Explore, collect, clean, and preprocess datasets, including handling different data types and features.
3. Apply descriptive and inferential statistical techniques to analyze data.
4. Create clear, accurate visualizations and communicate insights effectively.
5. 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

Syllabus for Semester V, Bachelor of Computer Application

Course Code: 24CS18PR0501

Course: Introduction to Data Science Lab

L: 0 Hrs P: 2 Hr, Per Week

Total Credits: 1

Course Outcomes

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

1. Identify data science concepts, lifecycle, and application domains.
2. Explore, collect, clean, and preprocess datasets, including handling different data types and features.
3. Apply descriptive and inferential statistical techniques to analyze data.
4. Create clear, accurate visualizations and communicate insights effectively.
5. Implement end-to-end data science concepts, analyse and interpret the results.

LAB SYLLABUS

Minimum 8 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.

Syllabus for Semester V, Bachelor of Computer Application

Course Code: 24CS18TH0502

Course: Analysis of Algorithms

L: 4 Hrs P: 0 Hr, Per Week

Total Credits: 4

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

Syllabus for Semester V, Bachelor of Computer Application

Course Code: 24CS18PR0502

Course: Analysis of Algorithms Lab

L: 0 Hrs P: 2 Hr, Per Week

Total Credits: 1

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

LAB SYLLABUS

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

1. Divide and conquer Technique
2. Sorting Techniques
3. Searching Techniques
4. Greedy Algorithms
5. Dynamic programming
6. Backtracking
7. Graphs
8. Case studies

Syllabus for Semester V, Bachelor of Computer Application

Course Code: 24CS18TH0503

Course: Software Engineering

L: 3 Hrs P: 0 Hr, Per Week

Total Credits: 3

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.

Syllabus for Semester V, Bachelor of Computer Application

Course Code: 24CS18PR0503

Course: Software Engineering Lab

L: 0 Hrs P: 2 Hr, Per Week

Total Credits: 1

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.

LAB SYLLABUS

A minimum 8-10 practicals based on the syllabus.

Syllabus for Semester V, Bachelor of Computer Application

Course Code: 24CS18PR0504

Course: Basic Competitive Coding

L: 0 Hrs P: 2 Hr, Per Week

Total Credits: 1

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: 24CS18PR0505

Course: Mini Project – I

L: 0 Hrs P: 4 Hr, Per Week

Total Credits: 2

Course Outcomes

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

1. Formulate minor project (phase-I) with clearly identified scope and requirements.
2. Implement minor project (phase-I) by applying Software Development Life Cycle.
3. Implement programming theories, concepts and principles learnt for Software Development.
4. Develop team building capacity for successful project development.

SYLLABUS

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

Course Code: 24CS18PR0601

Course: Mobile Applications and Development Lab

L: 0 Hrs P: 4 Hr, Per Week

Total Credits: 02

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

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

Syllabus for Semester VI, Bachelor of Computer Application

Course Code: 24CS18TH0602

Course: Internet and Web Technologies

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

Total Credits: 4

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.

Syllabus for Semester VI, Bachelor of Computer Application

Course Code: 24CS18PR0602

Course: Internet and Web Technologies Lab

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

Total Credits: 1

LAB SYLLABUS:

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

Syllabus for Semester VI, Bachelor of Computer Application

Course Code: 24CS18TH0603

Course: Artificial Intelligence

L: 3 Hrs P: 0 Hr, Per Week

Total Credits: 3

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.

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 for Semester VI, Bachelor of Computer Application

Course Code: 24CS18PR0603

Course: Artificial Intelligence Lab

L: 0 Hrs P: 2 Hr, Per Week

Total Credits: 1

LAB SYLLABUS:

Minimum 8-10 practicals based on the syllabus.

Syllabus for Semester VI, Bachelor of Computer Application

Course Code: 24CS18TH0604

Course: Basics of Ethical Hacking

L: 3 Hrs P: 0 Hr, Per Week

Total Credits: 3

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 for Semester VI, Bachelor of Computer Application

Course Code: 24CS18TH0605-1

Course: Distributed and Parallel Databases

L: 3 Hrs P: 0 Hr, Per Week

Total Credits: 3

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

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 for Semester VI, Bachelor of Computer Application

Course Code: 24CS18PR0605-1

Course: Distributed and Parallel Databases lab

L: 0 Hrs P: 2 Hr, Per Week

Total Credits: 1

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.

LAB SYLLABUS

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

1. Basic SQL Refresher ,Review of SQL DDL, DML, and simple queries.
2. Horizontal and Vertical Fragmentation.
3. Data Replication.
4. Data Replication.
5. Distributed Query Processing.
6. Query Optimization
7. Parallel Query Execution (Simulation).
8. Use of MongoDB for Partitioning

Syllabus for Semester VI, Bachelor of Computer Application

Course Code: 24CS18TH0605-2 Course: Intrusion Detection and Prevention System

L: 3 Hrs P: 0 Hr, Per Week

Total Credits: 3

Course Outcomes

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

1. Explain the role and need for intrusion detection systems in securing networks.
2. Understand and apply packet analysis concepts using Snort.
3. Create and customize Snort rules for detecting various types of network intrusions.
4. Use Snort for real-time traffic monitoring and alert generation.
5. 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

Syllabus for Semester VI, Bachelor of Computer Application

Course Code: 24CS18PR0605-2 Course: Intrusion Detection and Prevention System Lab

L: 0 Hrs P: 2 Hr, Per Week

Total Credits: 1

Course Outcomes

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

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

LAB SYLLABUS:

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

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

Syllabus for Semester VI, Bachelor of Computer Application

Course Code: 24CS18TH0605-3

Course: Computer Graphics

L: 3 Hrs P: 0 Hr, Per Week

Total Credits: 3

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.

Course Code: 24CS18PR0605-3

Course: Computer Graphics Lab

L: 0 Hrs P: 2 Hr, Per Week

Total Credits: 1

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.

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 for Semester VI, Bachelor of Computer Application

Course Code: 24CS18PR0606

Course: Mini Project – II

L: 0 Hrs P: 4 Hr, Per Week

Total Credits: 2

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 for Semester VI, Bachelor of Computer Application

Course Code: 24CS18PR0607

Course: Advanced Competitive Coding

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

Total Credits: 1

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 for Semester VI, Bachelor of Computer Application

Course Code: 24CS18PR0608

Course: Participative Learning

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

Total Credits: 1

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

